



**PRODUCT  
INFORMATION  
DISCONNECTOR  
TYPE NSA362-420/3150D**

WITH MOTOR OPERATING  
MECHANISM BCM-F OR HAND  
OPERATING MECHANISM BCH-F

**5309870E-29**

**(ABB DESIGN)**



Certificate CH03/0811

2021 March – rev A



## Pars Switch Co.

### PRODUCT INFORMATION

#### 5309 870E-29

#### **DISCONNECTOR TYPE NSA 362-420131 500 WITH MOTOR OPERATING MECHANISM BCM-F OR HAND OPERATING MECHANISM BCH-F**

The disconnecter can be equipped with earthing switch type NVA

Disconnecter	NSA 362-420131 50D	5309872E-2
Earthing switch	NVA 362-420	5309868E-5
Mechanical interlocking		5309892E-3
Motor operating mechanism BCM-F		5275 826E-23
Hand operating mechanism BCH-F		5275 826E-24
Lubricants		5409 506E

Manufacturer of high voltage circuit breakers & disconnectors under license of ABB in IRAN



## **DIRECTIONS FOR USE**

### **DISCONNECTOR TYPE NSA 362-420/3150 D**

#### **DESIGNATIONS AND REPEREXCES**

When ordering spare parts and in inquiries end other correspondence the complete type designation and manufacturing number according to the rating plate of the disconnector shall be given and reference made to this instruction as in the following example: Contact bar 5309 872E-C-2.

#### **LIST OF CONTENTS**

General.....	2
Delivery units.....	3
Check on delivery.....	3
Storage prior to mounting.....	3
Current paths.....	4
Knife holder.....	6
Bearing.....	7
Operating arm with bearing.....	8
Mounting and adjustment.....	9
Interconnection of operating device and disconnector.....	11
Line connections.....	15
Permissible terminal load.....	16
Lubrication.....	16

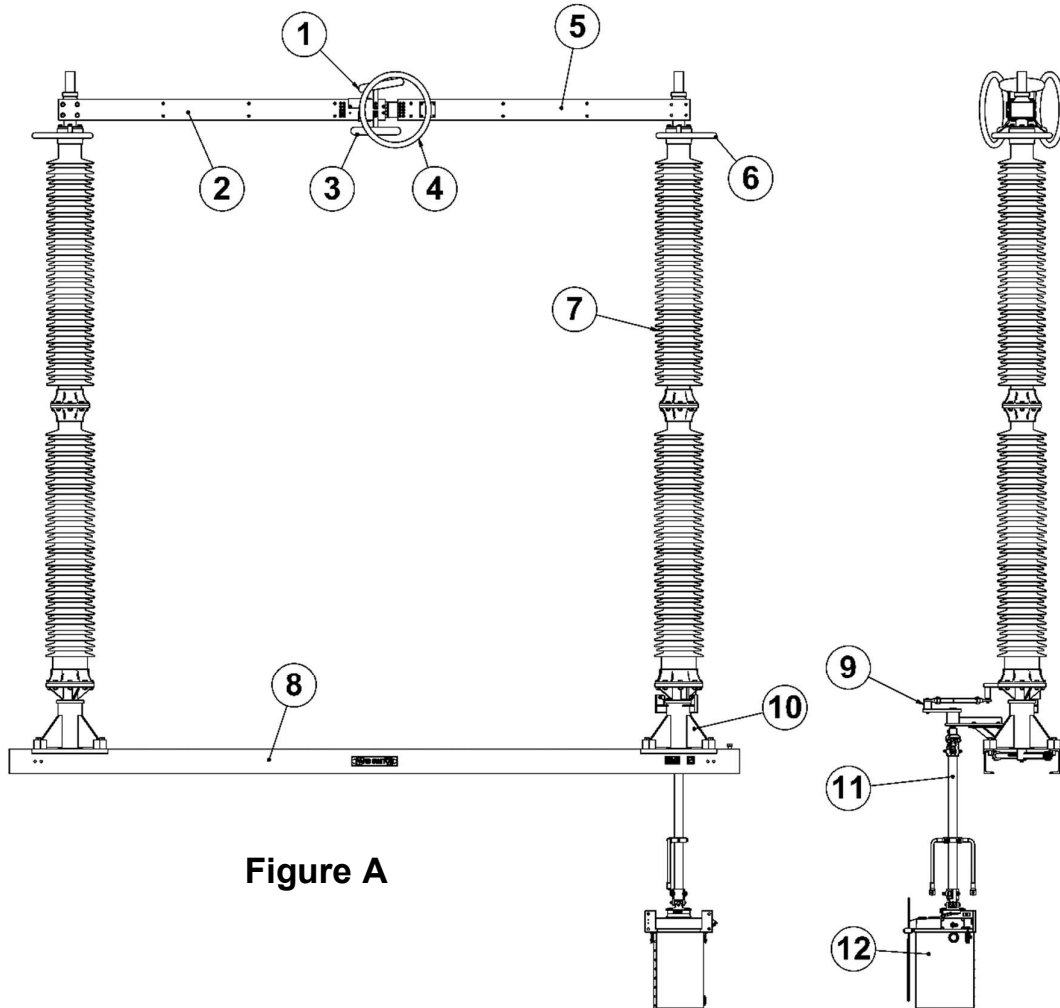


## General

This instruction is intended for rated voltages 362-420 kV and rated normal current 3150 A.

The disconnectors are single-pole operated and can be complemented with earthing switches.

For operation either a hand- or a motor-operated device can be used, to both of which interlocking and locking devices can be added.



**Figure A**

Figure A			
A-1	Ice Protection	A-7	Insulator Column
A-2	Current Path For Bearing Female Contact	A-8	Body
A-3	Corona Ring	A-9	Operating Arm With Bearing
A-4	Corona Ring	A-10	Bearing
A-5	Current Path For Male Contact	A-11	Operating Shaft
A-6	Field Equalizer	A-12	Operating Device





The steel parts in the disconnecter pole, e.g. the Beam A-8, the Bearing A-10, the operating arm 8-9 etc. are anti-rust treated by means of hot-dip galvanization.

### **Delivery units**

The disconnecter pole is delivered in the following units packed in the same crate:

- The Current Paths 8-2 and A-5 with Corona Rings mounted on them
- Field Equalizer A-6
- Insulators A-7
- Completely mounted and adjusted body
- Operating Shaft, A-11
- Universal Joint for interlocking device/operating device
- Hand-Operated Device, if any
- Screw material

The Motor-Operated Device including auxiliary apparatus is delivered in a special crate.

If the Operating Shaft A-11 is not included in the order, the relevant dimension print shall be consulted regarding dimensions and quality.

### **Check on delivery**

During unpacking a check shall be made with the accompanying packing specification that all the parts have accompanied the delivery. A check shall be made for possible transport damages, and if any are found they shall be reported.

### **Storage prior to mounting**

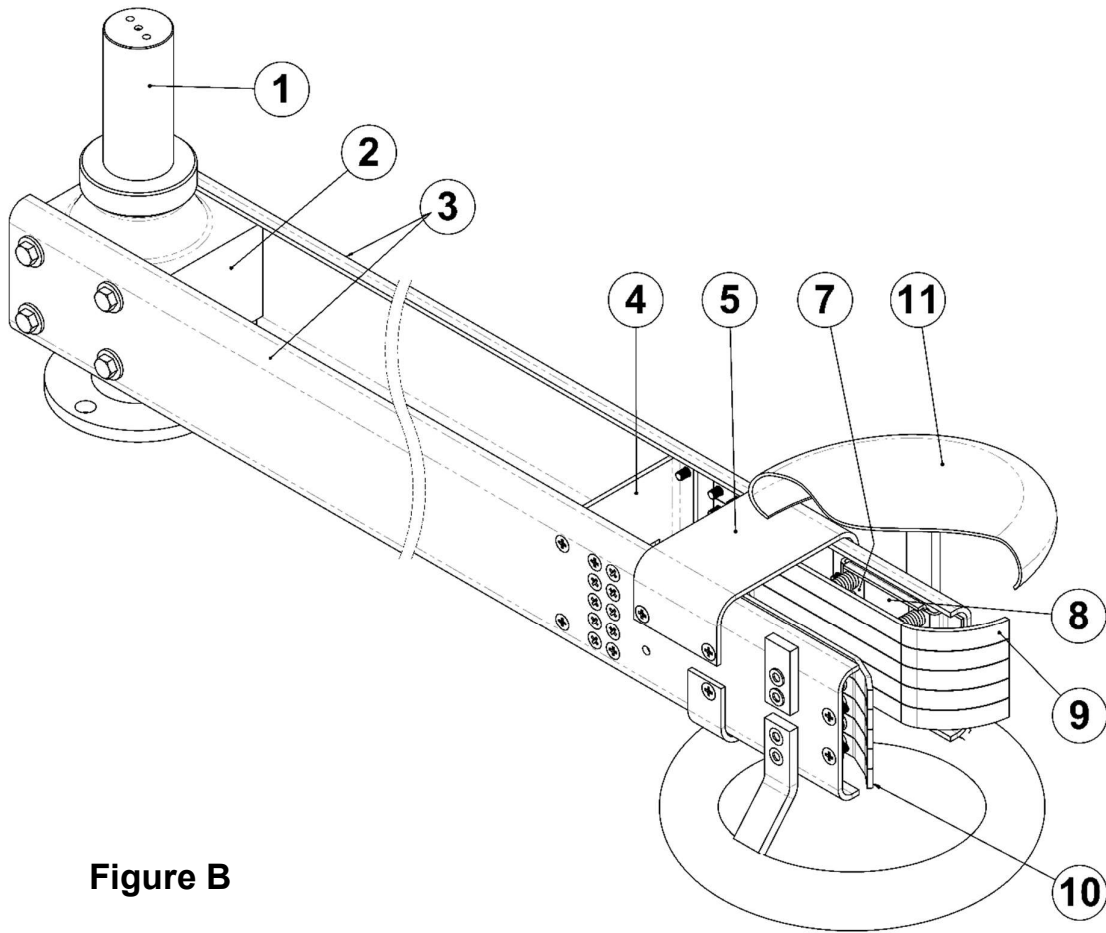
The disconnecter parts can be stored out-of-doors, blocked up and covered with tarpaulin.

Care shall be taken that the goods are not left standing in any accumulation of water during rainy weather.

The operating device with any auxiliary apparatus shall be stored in accordance with the direction8 in the relevant instruction.

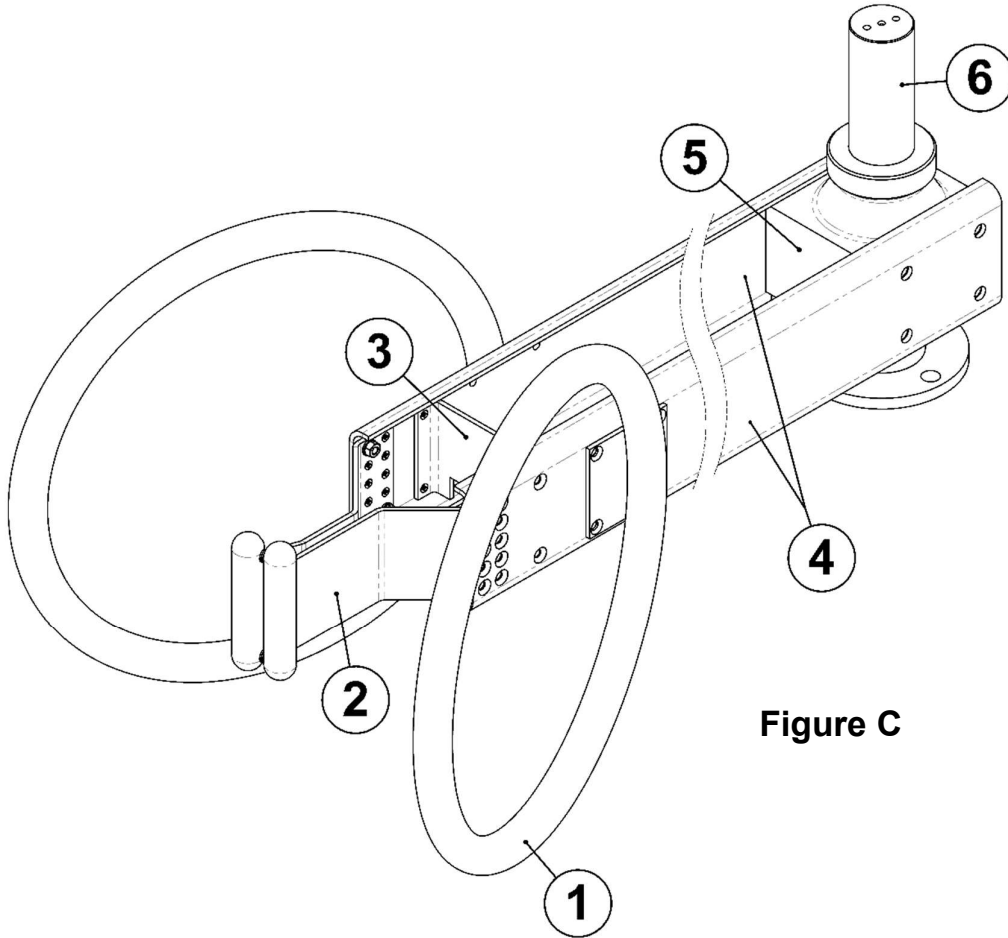


## Current paths



**Figure B**

Figure B Current path for female contact			
B-1	Terminal Bolt	B-7	insulation
B-2	Knife Bolder	B-8	Spring Aggregate
B-3	Knife Bars	B-9	Contact Bars (five)
B-4	Stay	B-10	Contact Bars (five)
B-5	Loop	B-11	Ice Protection
B-6	Spacer Disc (insulated)		



**Figure C**

Figure C Current Path For Male Contact	
C-1	Corona Ring
C-2	Corona Ring
C-3	Stay
C-4	Knife Bar
C-5	Knife Holder. See figure D
C-6	Terminal Bolt

The knife Bar B-3 and C-4 are made of U-shaped aluminum plate. Each of the Contact Bars 3-9 and B-10 on the female contact is individually actuated by two springs which provide the correct contact pressure. The springs are mounted on the Spring Aggregate B-8.

The fixed current passages in the respective current paths have, prior to being mounted, been treated with electrical joint compound to prevent oxidation. If replacement of the Contact Bar B-9, B-10 and C-2 respectively is necessary, both the knife bars and the new contact bars shall be treated in the following way:



- 1- The surfaces shall be cleaned from grease and impurities.
- 2- The surfaces shall be brushed with a steel brush or an emery cloth.
- 3- The surfaces shall be carefully lubricated with ASEA electrical joint compound 1 6901-202 article number 1269 001 2-202 immediately after being brushed.
- 4- The joint shall be mounted together with the electrical joint compound still on it.

## Knife holder

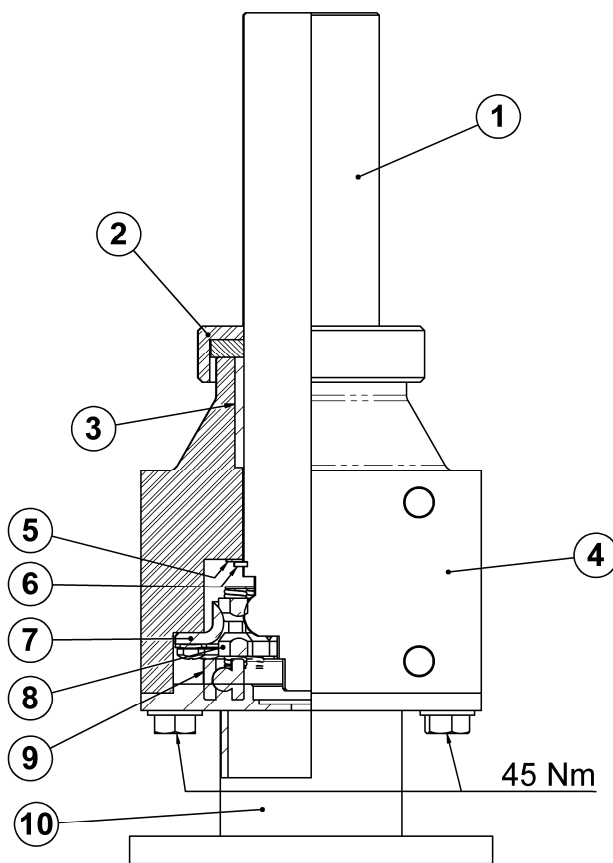


Figure D	
D-1	Terminal Bolt
D-2	Felt Gasket
D-3	Sleeve
D-4	Contact Housing
D-5	Washer
D-6	Lock Ring
D-7	Contact Ring
D-8	Roller Contact
D-9	Ball Bearing
D-10	Foot

**Figure D**

The upper part of the Terminal Bolt D-1 is of aluminum, while its contact part below against the Roller Contact D-8 is of silver-plated copper.

Twelve pairs of Roller Contacts D-8 with built-in springs produce the required contact pressure between the Terminal Bolt D-1 and the Contact Ring D-7.



The bearings of the knife holder shall be lubricated with grease E and the roller contacts with oil B.

If it is necessary to replace the silver-plated contact ring D-7, the contact surface on the Housing D-4 shall be brushed with Grease E on a steel brush. After the grease has been wiped away, the contact surface shall be coated with compound 1269 0012-201. The compound shall first be stirred so that the metal grains are evenly distributed. Finally, the joint shall be mounted with the compound still there.

The compound shall not penetrate the roller contacts or the ball bearing.

## Bearing

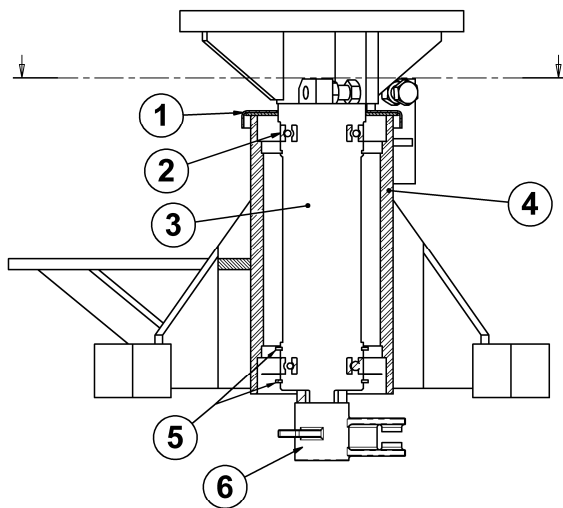
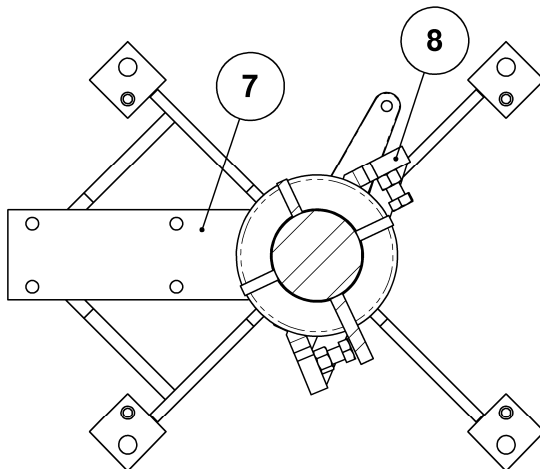


Figure E	
E-1	Felt Washer
E-2	Ball Bearing
E-3	Shaft With Flange
E-4	Bearing Housing
E-5	Lock Rings
E-6	Arm
E-7	Bar
E-8	End Position Stop

The Shaft with Flange, which supports the insulator column, is via the Ball Bearing E-2 carried in the Bearing Housing E-4.

The two End Stope E-8 and the Bar E-7 exist only on that bearing which is situated above the operating device.



**Figure E**



## Operating arm with bearing

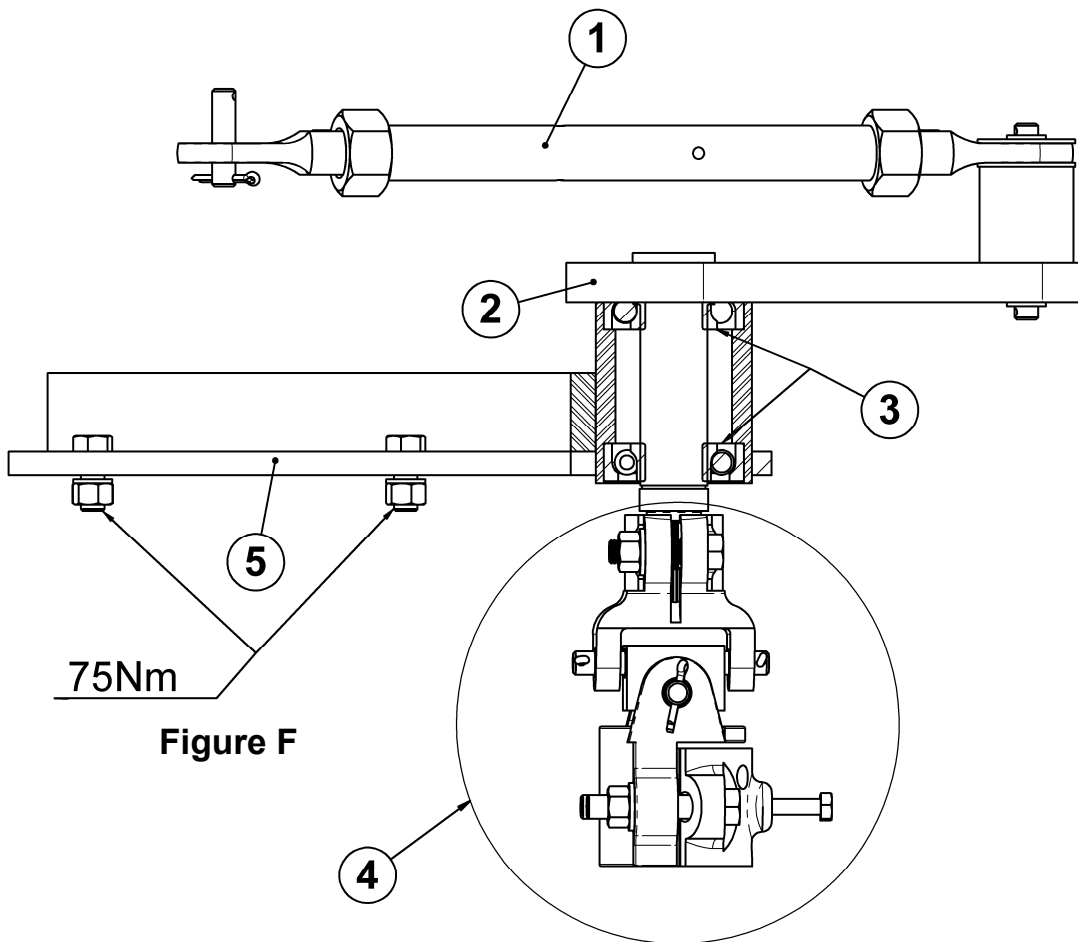


Figure F	
F-1	Opera Tine Rod (right - and left-hand threaded respectively)
F-2	Operating Arm
F-3	Ball Bearing
F-4	Universal Joint
F-5	Holder

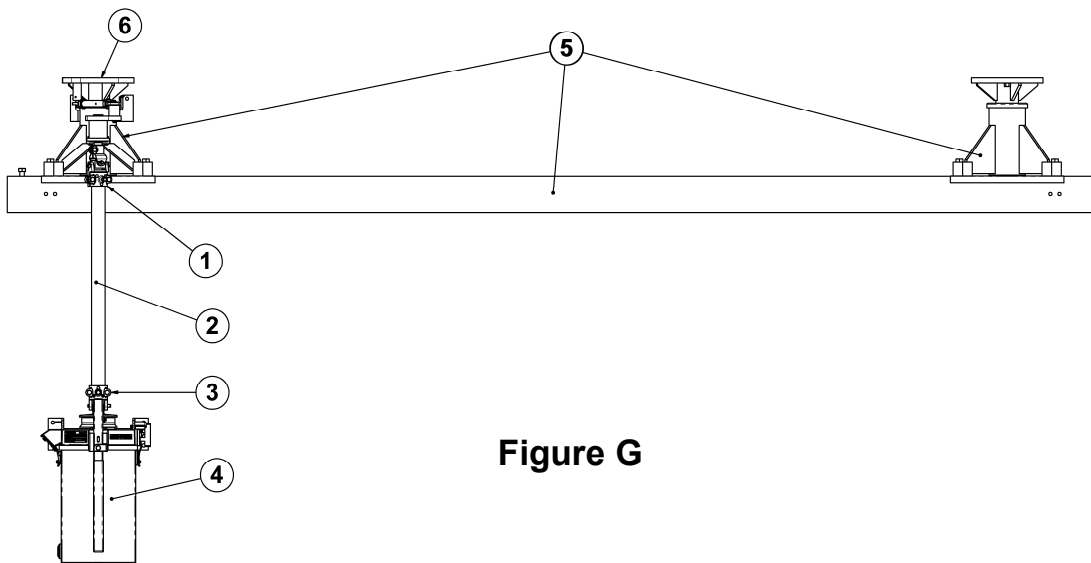
The Operating Rod F-1 has right- and left-handed threads respectively.

## Mounting and adjustment

It is appropriate to carry out mounting of the disconnecter in the following order:

1- The Body G-5 of the disconnecter pole shall be placed on the framework as shown in the relevant dimension print. A check shall be made that the disconnecter beam is resting evenly on the substructure so that no distortion will occur when the fastening bolts are tightened. Compensation shall be made with washers.

The body of the disconnecter is at delivery set for the correct angular motion for the current paths.



**Figure G**

Figure G			
G-1	Universal Joint	G-4	Operating Device
G-2	Operating Tub	G-5	Body
G-3	Universal Joint	G-6	Flange For The Insulator Column

2- The Operating Device shall be mounted on the framework and the Universal Joint G-3 shall be mounted on the outward-going shaft of the operating device, so that the plates of the Universal Joint, and in applicable cases, those of the ice protection, correspond with the plates of the Operating Device.

It shall be noted that the operating device can be mounted turned in any direction around the center line for the Operating Tube G-2.

The Operating Tube G-2 is permitted to incline a maximum of 10° (175 mm/m)



3-The Operating Tube G-2 shall be mounted and care shall be taken that all the serrated Lock Washers (L-2) in the clamps of the universal joints have a grip against the operating tube. The nuts on the Universal Joint G-1 shall be tightened, while the nuts for the Universal Joint G-3 shall, for the time being, be only hand-tightened.

4-Check with the help of a level that the Flanges, H-1 on both ends of Beam H-2 are horizontal. If not, they shall be adjusted according to Figure J.

Figure H

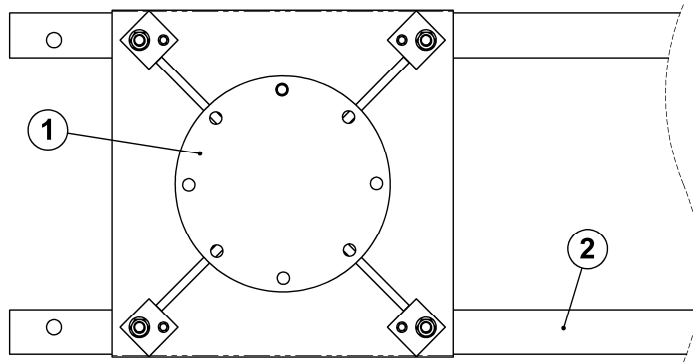


Figure J

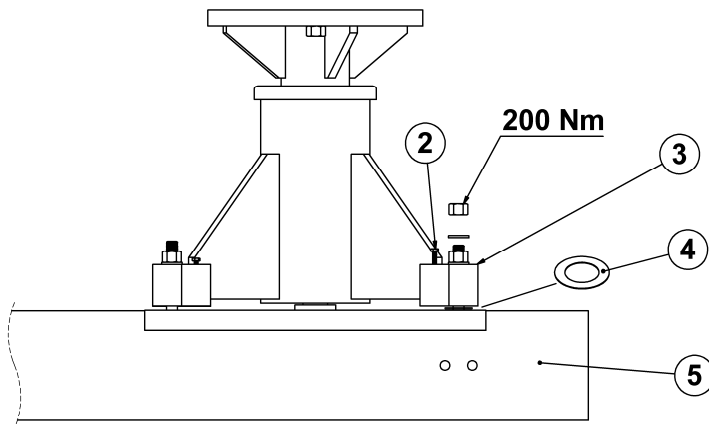
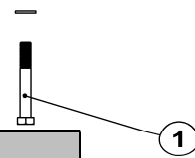


Figure J	
J-1	Mounting Screw (200 Nm)
J-2	Set Screw
J-3	Bearing Holder
J-4	Washer 40*25*0.5 mm Washer 36*22.2*0,5 mm
J-5	Disconnecter Beam

Figure H	
H-1	Flange For Insulator Column
H-2	Beam







The Mounting Screws J-1 on those Bearing Holders J-3 in the direction of which the flange inclines shall be loosened and lifted out. Those Bearing Holders J-3 shall be lifted by means of threading in the Set Screw J-2 until the flange is horizontal.

Then a washer or a washer packet, made up of Washers J-4 accompanying the delivery, shall be placed so that the gap is filled. The Screw J-1 shall be put down through the washer packet, the Set Screw J-2 shall be loosened by a few turns, and the nut for the Screw J-1 shall be tightened.

A check shall again be made of the horizontal position of the flange and any necessary corrections shall be made.

### Interconnection of operating device and disconnecter

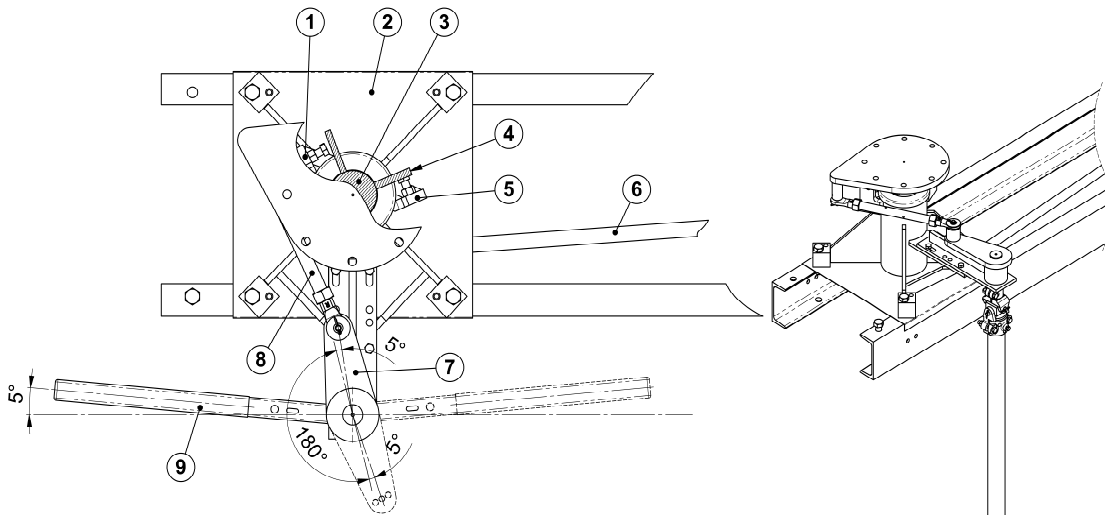
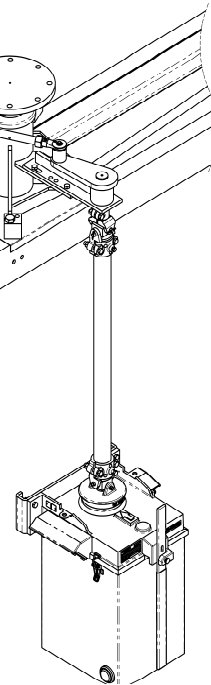


Figure K

Figure K			
K-1	End position stop , open disconnecter	K-6	Pull - rod
K-2	Protective plate	K-7	Operating arm
K-3	Operating shaft with flange	K-8	Operating rod, right- and left-hand threads respectively
K-4	Stop lug	K-9	Lever of the operating device
K-5	End position stop, closed disconnecter		





5- The Lever K-9 of the operating device shall be placed in the closed position and the Operating Arm K-7 shall be turned so that it is  $5 \pm 1^\circ$  over the center as shown. In the figure. Then the Operating Tube G-2 shall be locked by means of tightening the screws in the Universal Joint (G-3).

The lever Shall be moved over to the open position and a check shall be made that the Operating Arm K-7 goes  $5 \pm 1^\circ$  over the Centre as shown by the dotted position.

6- fine adjustment of the angular motion shall be made as shown below:

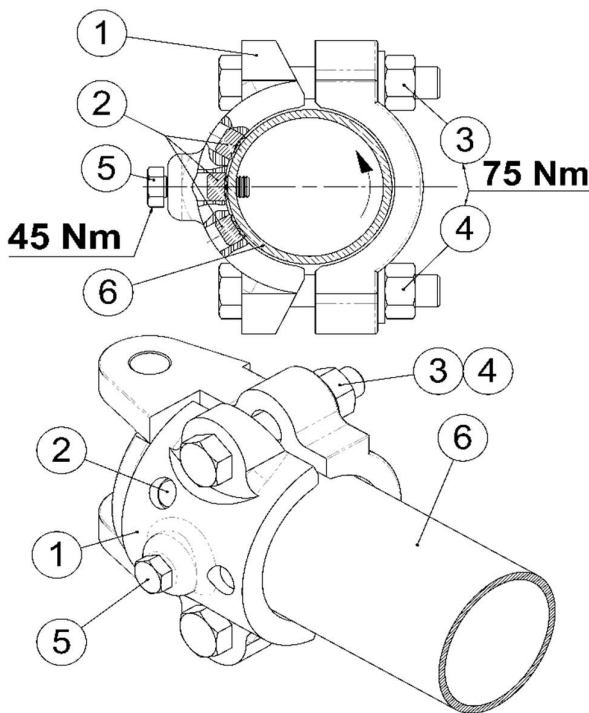


Figure L Universal. Joint G-3	
L-1	Clamp
L-2	Serrated steel washers (three)
L-3	Nut M12 (75 Nm)
L-4	Nut M12 (75 Nm)
L-5	Screw M10*30 (45 Nm)
L-6	Operating shaft

The nut L-3 shall be loosened by approximately one turn and the nut L-4 shall be correspondingly tightened. The operating shaft L-6 will then be turned in relation to the universal joint in the direction of the arrow, whereupon the angle

**Figure L**  $5^\circ$  on Figure K will decrease in the “closed “position and increase in the “open “position.

If adjustment in the opposite direction is required, the opposite procedure to the one described above shall be followed.

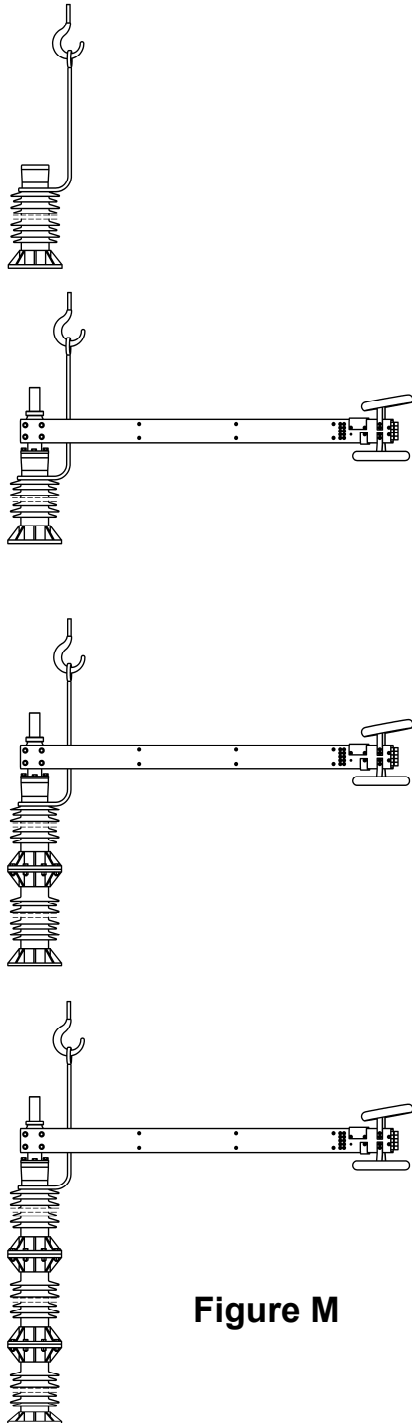
When necessary, the other universal Joint can also be used for a similar adjustment.

After a completed adjustment a check shall be made that all the nuts are well tightened. If a final fixing of the operating shaft is desired, there is a possibility of boring and threading for a screw L-5 through the joint. The, screw M10x30 accompanies the delivery.



It is of the greatest importance that the operating arm K-7 goes  $5\pm 1^\circ$  over center in both the end positions, as this constitutes the actual locking of the current paths of the disconnecter in the end positions.

7- Mount the insulator column with current path as shown in Figure M “a” up to end including “d”.



**Figure M**

- a. Hang up the upper insulator in a strap.
- b. Mount the current path with the male contact and the corona ring on the upper insulator. Check that the corona ring is correctly turned according to Figure MA. At the same time mount the contact for the earthing switch (when applicable) see instructions for earthing switch.
- c. Lift the upper insulator with current path and mount insulator unit No. 2 from above.
- d. Lift the upper insulators with current path and mount the insulator unit No. 3 from above.

Insulator and current path with female contact shall be mounted later in the same way.

The screws shall be lightly tightened at first, as it can be necessary to loosen them when adjusting the disconnecter.

When the disconnecter has been adjusted, the M16 screws in the top flange of the upper insulator shall be tightened with 120 Nm. The other screws in the insulator flanges shall be tightened with 170 Nm.



## 8- Mounting of the current paths and insulator column

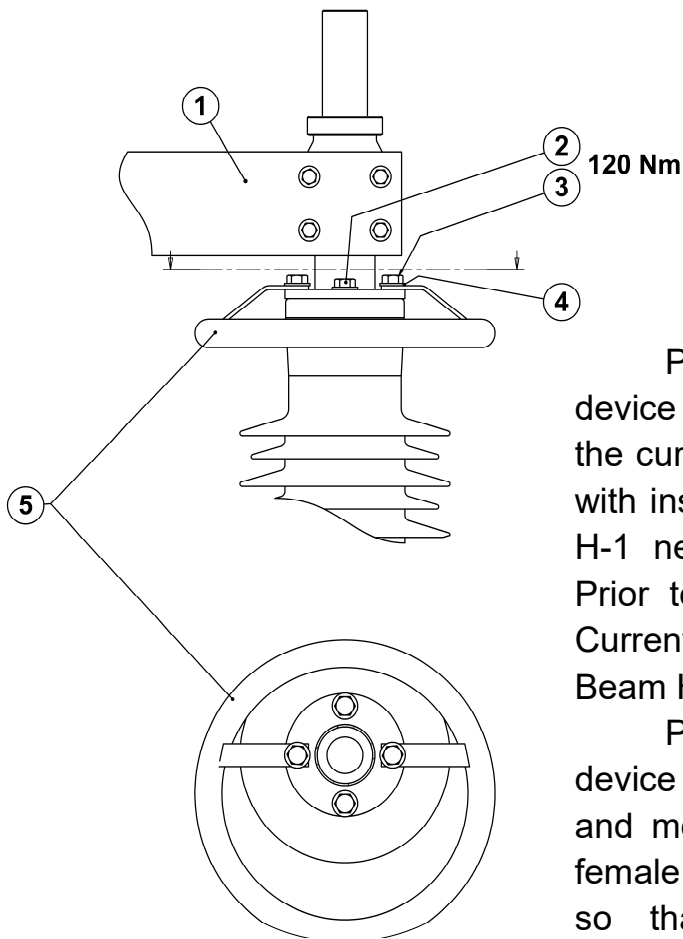
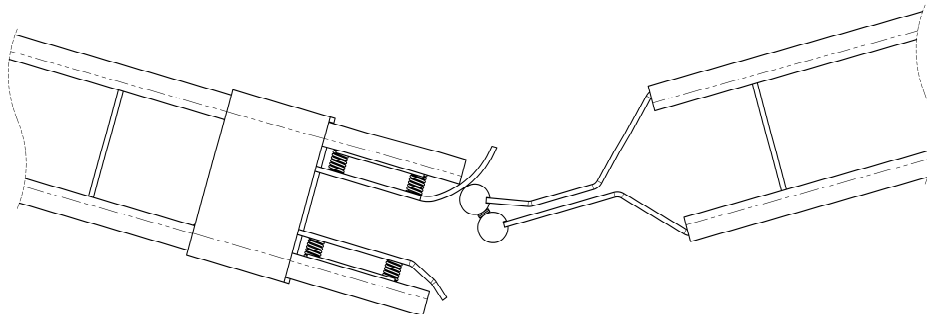


Figure MA	
MA -1	Current Path
MA -2	Screw M16x30 ( 120Nm)
MA -3	Screw 16x40 ( 120Nm)
MA -4	Flat Washer
MA -5	Corona Rings

Place the lever of the operating device in the closed position. Place the current path of the male contact with insulator column on the Flange H-1 nearest the operating device. Prior to tightening, check that the Current Path MA-1 is parallel with the Beam H-2.

Place the lever of the operating device in an intermediate position and mount the current path of the female contact with insulator column so that it, at closing of the disconnecter, meets and lightly touches the male contact as shown in Figure N. Check that the Corona

Rings MA-5 is turned so that the greatest possible flash-over distance is obtained when the disconnecter is open.



**Figure N**



9- The disconnecter shall be operated into the closed position. The current paths shall lie in a straight line with each other, both on the horizontal and the vertical plane. Adjustments shall be made if necessary:

- on the horizontal plane by means of utilizing the clearance in the holes for the Screw P-1.
- on the vertical plane by means of utilizing the clearance in the holes for the Screws M-2 and M-3. If this is not sufficient, the clearance in the holes for the mounting screws of the insulators can also be used.

In the closed position the dimension «a» shown in Figure P shall be maintained. If the dimension does not deviate too greatly, adjustment can be made after the line connections have been mounted, thus avoiding duplication of work.

The disconnecter shall be carefully operated 'between the closed and open positions and the movements of the current paths, which shall be 95°, shall be observed.

The disconnecter shall be toggle-joint locked in both the end positions with the Operating Arm K-7. For effective locking the locking mechanism has, prior to delivery, been adjusted so that a torque of approximately 50 Nm on the lever of the operating device is required for the Operating Arm K-7 to go into and out of the respective locking positions. A check shall be made of the locking moment in both the end positions!

Changing of the locking moment shall, at closing operation, be adjusted with the operating rod K-8 and at opening operation with the set screw for the End Position Stop K-1.

The disconnecter shall always be operated with moderate force and at moderate speed. Even during slow operation, the contacts shall go correctly into end out of each other if the disconnecter is correctly adjusted.

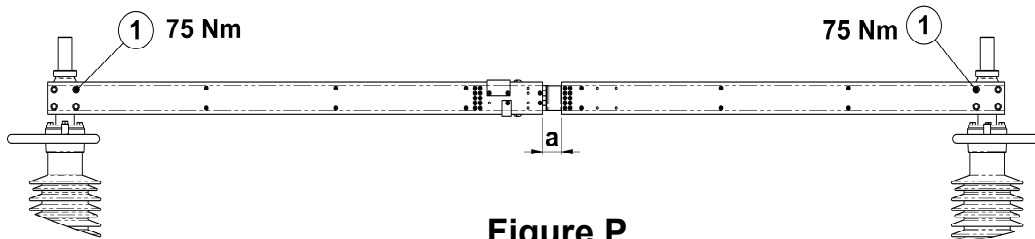
## **Line connections**

When the line connections are connected to the disconnecter a certain outward bending of the insulator columns occurs. This bending must



be compensated for with the help of washers as shown in Figure J. The number of washers shall be adapted so that the dimension «a» according to Figure P is maintained when the disconnecter is in the closed position.

Figure P	NSA 362 KV	NSA 420 KV
« a » dimension	$85 \pm 5$	$85 \pm 5$



**Figure P**

Several trial operations shall be made and the following shall be checked:

- 1- that the current path is in a straight line with the closed disconnecter.
- 2- that the contact engagement agrees with Figure N.

When all adjusting has been carried out, check by means of a dynamometric wrench, that all bolts are correct tightened

### **Permissible terminal load**

Pulling or pushing in the terminal bolts of the current paths is for standard design permitted to be as a maximum 1000 N in any direction. The value can, however, be increased to 2000 N if a stronger type of insulator is chosen.

### **Lubrication**

The contacts of the current paths shall be lubricated with grease G. existing ball bearings do not normally require lubrication. Other bearing. and sliding surfaces shall be lubricated with grease E or with oil B.

For lubrication of motor-operated devices the relevant instruction shall be consulted.

Regarding lubricants, the direction 5409 506E shall be referred to.



## **ERECTION MANUAL**

### **SINGLE-POLE EARTHING SWITCH FOR DISCONNECTOR TYPE NSA 362-420/3150 D**

#### **DESIGNATIONS AND REFERENCES**

When ordering spare parts, and in all inquiries and other correspondence, the data from the rating plate of the earthing switch shall be given and reference made to this instruction as in the following example: Contact 5309 868E-5-D-3.

#### **LIST OF CONTENTS**

General .....	2
Check on delivery .....	2
Storage prior to mounting.....	2
Construction.....	3
contacts.....	4
Mounting and adjustment of the earthing switch .....	6
Check of the contact setting.....	11
Electrical joint compound .....	11
Lubrication .....	11



## **General**

The earthing switch is intended for single-pole erection on disconnecter NSA 362-420/3150 D. Normally, the fixed contact of the earthing switch is placed in the current path of the male contact but it can also be made for placement in the current path of the female contact.

on the earthing switch, which is delivered ready-assembled, the balancing springs are removed for transport.

## **Check on delivery**

During unpacking a check shall be made with the accompanying packing specification that all the parts have arrived with the delivery. A check shall also be made for possible-damages received during transport, and if any are found they shall be reported. The fixed contact of the earthing switch is mounted on the disconnecter and therefore accompanies it.

## **Storage prior to mounting**

The earthing switch can be stored out of doors, blocked and covered with a tarpaulin. Care shall be taken that the goods are not left standing in any accumulations of water during rainy weather.

The operating device with any auxiliary apparatus shall be stored in accordance with the directions in the relevant instruction.





## Construction

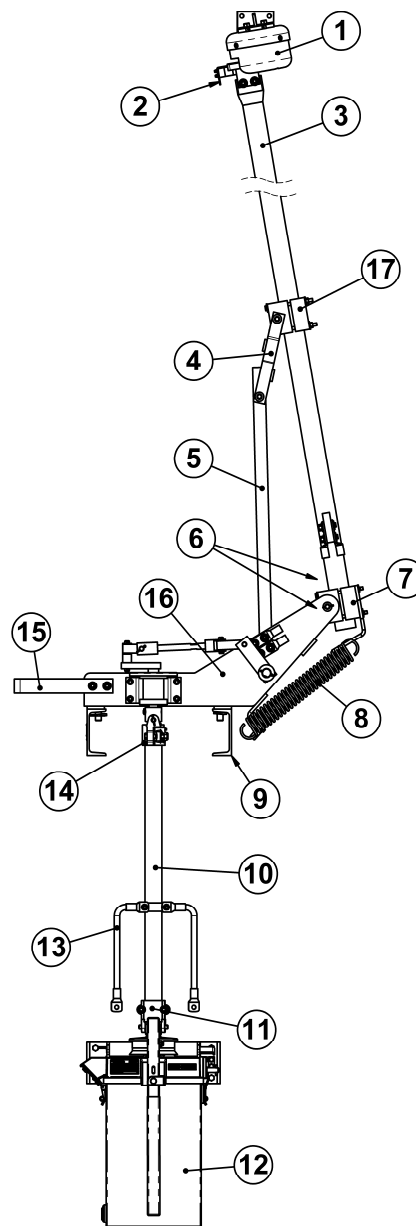
The earthing switch consists of the following main parts:

Figure A	
A-1	Fixed Contact See figures Band C
A-2	Moving Contact See Figure D
A-3	Contact Tube
A-4	Operating Link
A-5	Operating Arm
A-6	Conductor
A-7	Screw Joint
A-8	Balancing Springs
A-9	Disconnecter Beam
A-10	Operating Tube and Earthing Switch
A-11	Universal Joint With Earthing Clamp
A-12	Operating Device
A-13	Earthing Cable
A-14	Universal Joint
A-15	Supporting Bar
A-16	Link Gear
A-17	Clamp

The Balancing Spring A-8 counterbalances the weight of the contact tube during operation.

When the switch is in the open position the contact tube rests against the Supporting Bar A-15.

If the Operating Tube A-10 is not included in the delivery, the relevant dimension print shall be consulted regarding dimensions and quality.



**Figure A**



## contacts

Figure B Fixed contact	
B-1	Contact Holder
B-2	Corona protection
B-3	Cover
B-4	Cover
B-5	Contact. See Figure c

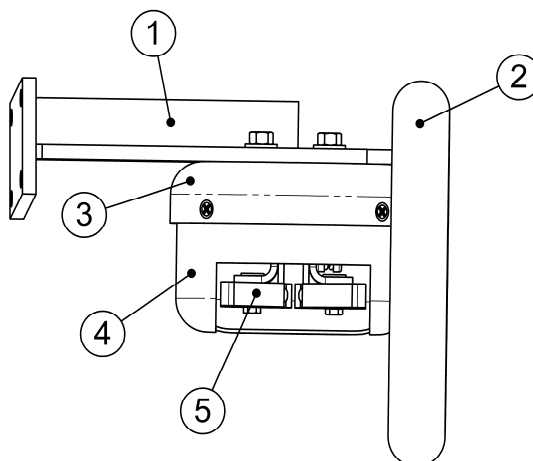
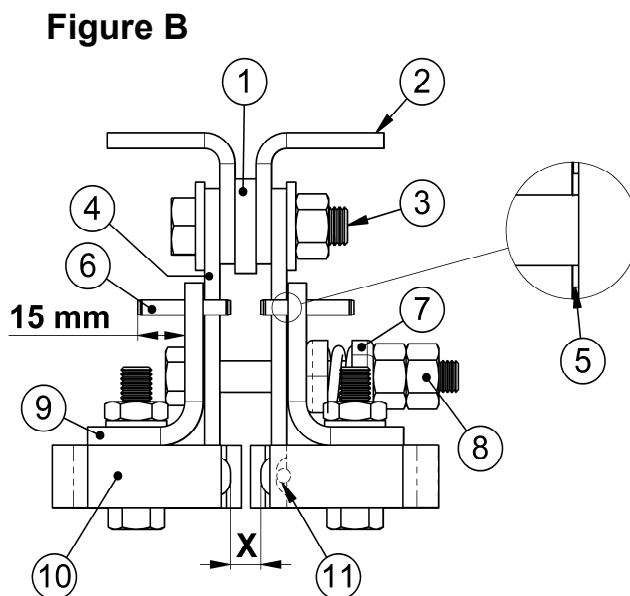


Figure C Contact.	
C-1	Spacer
C-2	Holder
C-3	Screw
C-4	Contact Finger
C-5	Washer
C-6	Roll Pin $\phi$ 5x30
C-7	Charging Device
C-8	Nut
C-9	Support
C-10	Magnet
C-11	Pin $\emptyset$ (four)



**Figure C**

The Magnet C-10 and the Armature D-2 together achieve increased contact pressure when the current increases, which will prevent the occurrence of arcs causing burn damages on the contacts.

All the fixed current passages in the fixed contact of the current path have, at mounting, been treated with electrical joint compound to prevent oxidation. When the Contact Fingers C-4 are replaced the contact surfaces on the new Contact Fingers must, therefore, also be treated in a similar way.

Replacement of contact fingers and adjustment of contact pressure shall be carried out as follows:



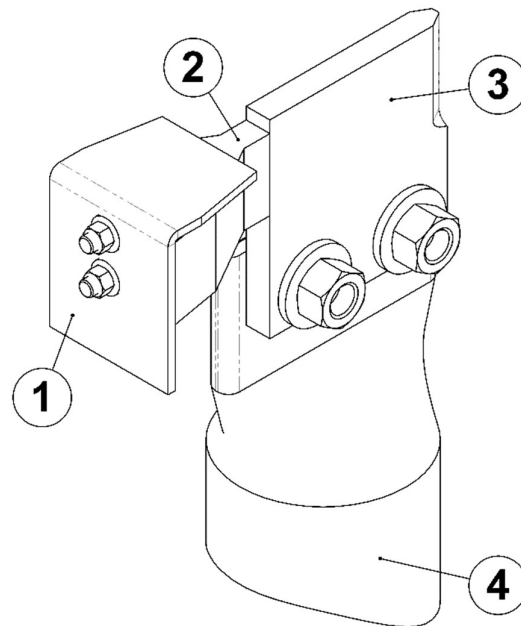
1- The Cover B-4 shall be loosened, the Screws C-3 shall be dismantled and the contact shall be drawn out.

2- The Nuts C-8 shall be dismantled so that the magnets can be removed. Care shall be taken that the Washer C-5 and the Pins C-11 do not get lost.

3- Mounting of the contact shall be carried out in the reverse order. Before the new contact fingers are mounted, they, including the Holder C-2, shall be treated with electrical joint compound on the contact surfaces against each other. See under the heading "Electrical joint compound". The nuts for the screws C-3 shall then be tightened.

4- The starting position for adjustment of the contact pressure is that the check dimension "x" on Figure C shall be 10 mm when the springs in the charging device C-7 are unloaded. Any adjustments shall be made by means of bending the contact fingers until the dimension is obtained, Then the internal nut C-8 shall be tightened until the check dimension "x" becomes approximately 9.5 mm. This corresponds to a pulling force of approximately 80 N on the moving contact.

The charging device shall be locked with the external nut C-8 and the cover B-5 shall be mounted.



**Figure D**

Figure D Moving contact	
D-1	End Position Stop
D-2	Armature
D-3	Contact
D-4	Contact Tube

When the Contact D-3 is being replaced, it and the Contact Tube D-4 shall be treated with electrical joint compound before the joint is tightened. See under the heading "Electrical joint compound".



## Mounting and adjustment of the earthing switch

1- The earthing switch shall be mounted on the disconnecter beams as shown in the dimension print, but the Fastening Screws F-6 shall not be definitively tightened. The moving contact shall be lubricated with a thin layer of grease G.

2- The Contact Tube A-3 of the switch shall be moved by hand into the closed position and the Balancing Springs A-7 shall be mounted. A check shall be made that the Moving Contact A-2 is pointing directly into the fixed contact. If this is not the case, the inclination of the contact tube shall be adjusted laterally with the Adjusting Screws F-5. Then the fastening screws F-6 shall be tightened, whereupon the adjusting screws will automatically be locked.

3- The moving contact shall be moved into the fixed contact with the loosened screw joints. A-7 and A-17 and the length of the Contact Tube A-3 shall be adjusted to agree with Figure E.

A check shall be made that the Moving Contact E-3 is touching all the warts on the contact fingers E-1

Figure E	
E-1	Contact Finger
E-2	Magnet
E-3	Moving Contact
E-4	Contact Tube
E-5	Armature
E-6	End position Stop

The lower Screw Joint A-7 shall be tightened. The nuts in the Screw Joint A-17 shall be only hand-tightened so that the screw joint can slide on the contact tube.

By using a spring balance, a check shall be made of the force required for drawing the moving contact out of the fixed contact. The pulling force, which shall be approximately 80 N, shall be applied to the upper part of the contact tube and perpendicularly to it. Adjustment shall be made with the Nuts C-8.

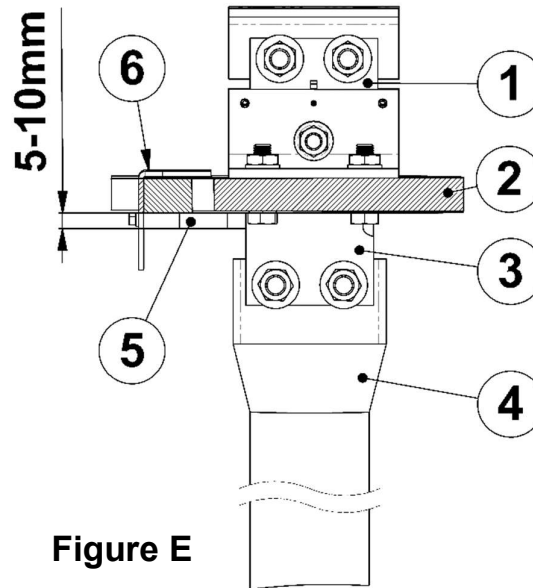


Figure E



4-The earthing switch shall be placed in the open position. The operating device with auxiliary apparatus shall be mounted on the framework as shown in the dimension print. The Universal Joint A-11 shall be placed on the outward-going shaft so that its position plates agree with the plates of the operating device.

5- The Operating Shaft A-10 shall be mounted, care being taken that all the Grooved Stud G-2 have a grip on the operating shaft. The nuts on the Universal Joint A-14 shall be tightened, while the nuts on the other universal joint shall, for the time being, be only hand-tightened.

6 - The Operating Arm F-4 of the link gear shall be adjusted in relation to the Lever F-7 of the operating device according to the text end Figure below.

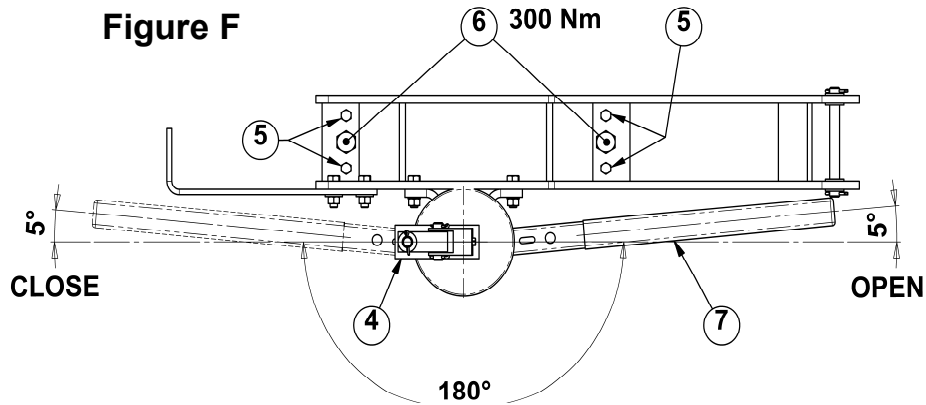
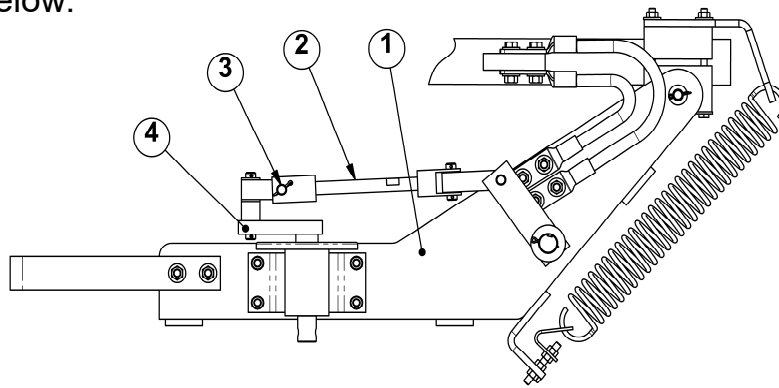


Figure F	
F-1	Link Gear
F-2	Stud Bolt (right- and left-hand thread respectively)
F-3	Pin
F-4	Operating Arm
F-5	Adjusting Screws
F-6	Fastening Screws M20 300 Nm
F-7	Lever



The lever of the operating device shall be put in the open position. The Pin F-3 shall be loosened and the pull-rod (Stud Bolt) F-2 shall be moved aside. The operating Arm F-4 shall be turned approximately 5° over the center so that it is in a straight line with the lever, as shown in Figure F. The nuts on the Universal Joint A-11 shall then be tightened. A fine adjustment of the setting shall be made as follows:

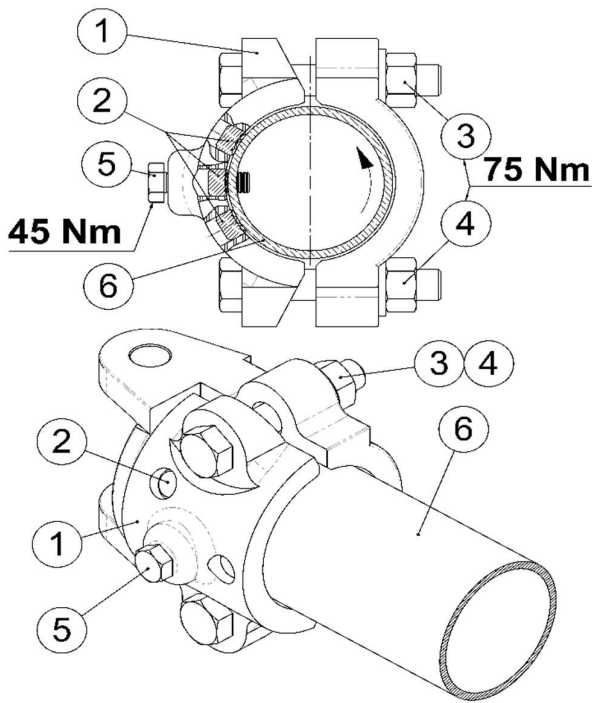


Figure G	
G-1	Clamp
G-2	Grooved Stud
G-3	Nut (75 Nm)
G-4	Nut (75 Nm)
G-5	Screw M10x30 (45 Nm)
G-6	Operating Shaft

**Figure G**

The Nut G-3 shall be loosened by one turn and the Nut G-4 shall be correspondingly tightened. The operating Shaft G-6 will then be turned in relation to the universal joint in the direction of the arrow, and the angle 5° for the operating Arm F-4 will

increase in the "open" position and decrease in the "closed" position.

If an adjustment in the opposite direction is required, the opposite procedure to the one described above shall be followed.

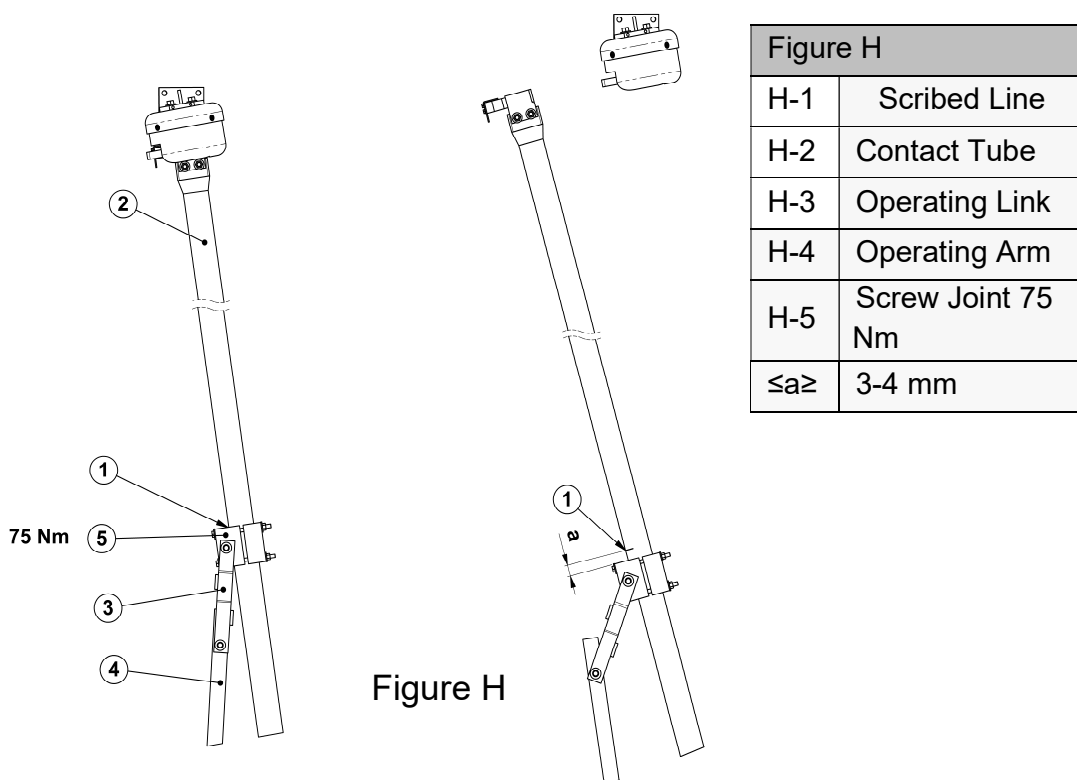
After an adjustment has been completed a check shall be made that the nuts on both the universal joints are well tightened. If a final fixation of the operating shaft is desired there is a possibility of drilling and threading for a screw G-5 through the joint. A screw for each universal joint accompanies the delivery.

The pull-rod (Stud Bolt) F-2 and the Pin F-3 shall be mounted.



7- The lever of the operating device shall be carefully moved towards the closed position. An adjustment shall be made with the right- and left-hand threaded Stud Bolts F-2 so that the moving contact goes fully into the fixed contact when the parts H-3 and H-4 are in the locked position as shown in the left. hand figure, and the lever is in the closed position.

The position of the Screw Joint H-5 shall be marked with a Scribed Line H-1 on the Contact Tube H-2 according to the left hand figure.



The earthing switch shall be placed in an intermediate position and the Screw Joint H-5 shall be tightened at the distance  $a=3-4$  mm from the scribed line according to the right-hand Figure H.

This adjustment of the screw joint is intended to give the contact tube a certain resilience "b" according to Figure K, which shall prevent the moving contact from being thrown out of the fixed contact by the electrodynamic forces.

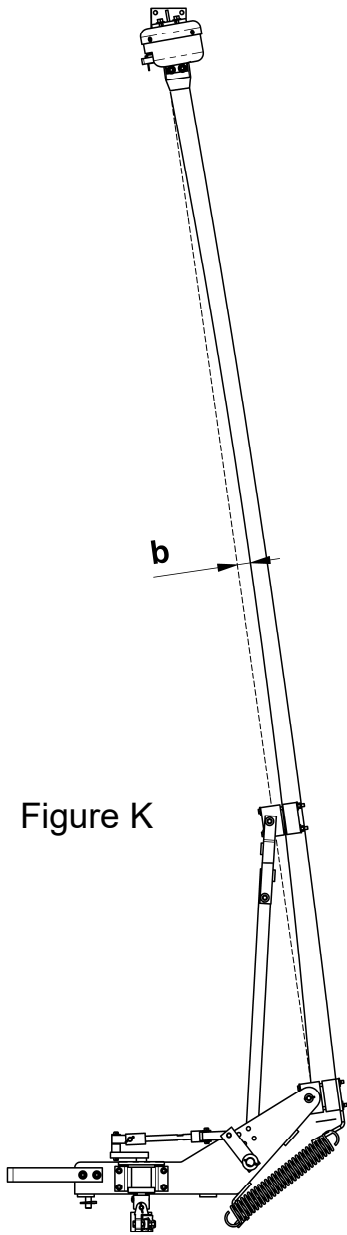


Figure K

Figure K	
b	Resilience in the Contact Tube

The resilience shall be so great that if the moving contact is forcibly drawn 15-20 mm out from the bottom position in the fixed contact the resilience in the tube will draw the moving contact back to the bottom position.

The extent of the resilience shall be adjusted with the Screw Joint H-5. If the dimension "a" is increased as shown in the right hand Figure H, the resilience "b" will increase.

The lever shall be slowly moved into the closed position and a check shall be made that a moment of approximately 50 Nm is required for moving the lever over the dead point. See Figure L. Any adjustment shall be made by means of the Stud Bolt F-2.

Figure L	
L-1	Operating Device
L-2	Lever

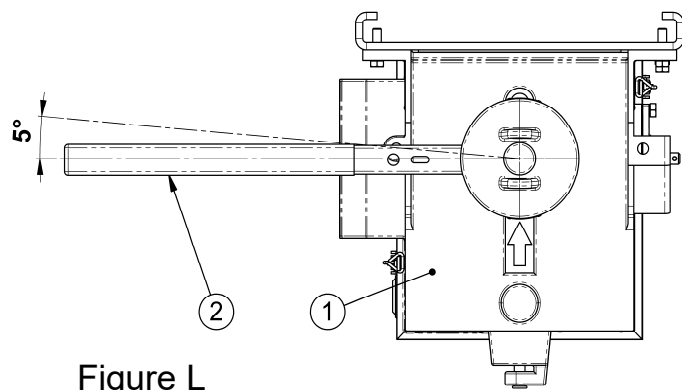


Figure L

The earthing switch shall be placed in the open position. the fastening screw for the Supporting Bar A-15 shall be loosened and the position of the bar shall be adjusted so that the contact tube is held up by the supporting bar.





## Check of the contact setting

A check shall be made that:

- The moving contact goes directly towards the opening of the fixed contact
- The length of the contact tube is correctly adjusted
- The contact tube has resilience in the closed position
- The moving contact touches all the warts on the contact is approximately 80 N.

## Electrical joint compound

Electrical joint compound is used to prevent oxidation of the contact surfaces in the fixed screw joint of the current paths.

The treatment shall be carried out as follows:

- 1- The contact surfaces shall be cleaned from grease and old compound.
- 2- The surface shall either be brushed with a clean steel brush or polished with an emery cloth.
- 3- Immediately afterwards, the contact surface shall be coated with ASEA electrical joint compound 16901-202, article number 12690012-202 in joints aluminum against aluminum or aluminum against tinned copper.
- 4- The joint shall be mounted together.
- 5- Superfluous compound shall be wiped away.

The electrical joint compound shall only be used in fixed joints.

## Lubrication

The contact should, at approximately two-year interval, be cleaned and sparingly lubricated with grease G.

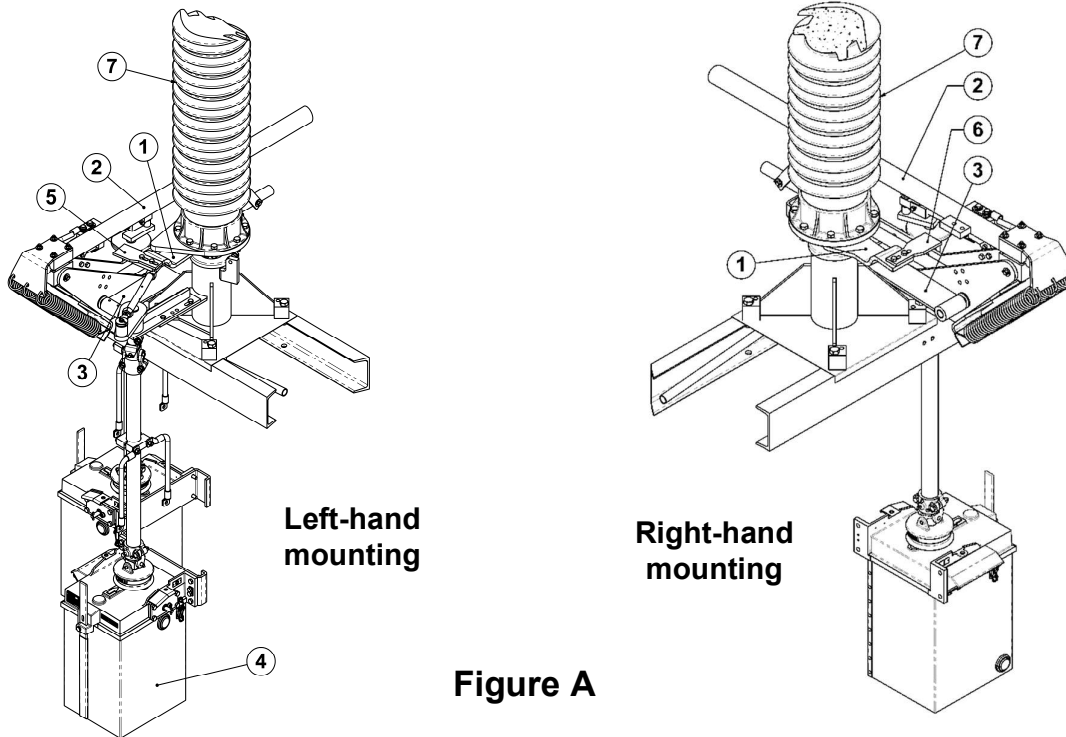
The ball bearing of the operating joint does not normally need to be greased. Other bearing and sliding surfaces shall be lubricated with oil B.

For lubrication of the operating device, the relevant instruction shall be consulted.

For choice of lubricant direction 5409406E shall be consulted.



## INTERLOCKING DEVICE EARTHING SWITCH NVA 420



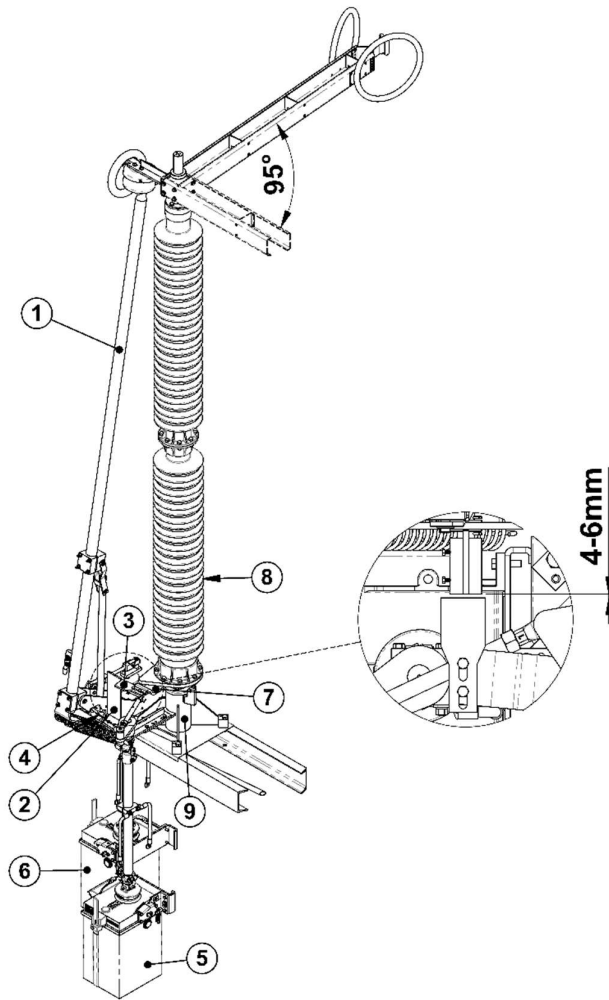
**Figure A**

Figure A Interlocking Closed disconnector	
A-1	Catch Plate
A-2	Contact Pipe
A-3	Operating Arm
A-4	Operating Device
A-5	Catch Plate (left-hand)
A-6	Catch Plate (right-hand)
A-7	Insulator

On completion of the 190° operation of the disconnectors Operating Device A-4, the turning movement is decreased to 95° on the disconnector Insulator A-7.

When the disconnector is in closed position, Figure A, operation of the earthing switch is prevented by the Catch Plate A-1, which blocks the Contact Pipe A-2 of the earthing switch.

Figure B Interlocking Open disconnector	
B-1	Contact Pipe



B-2	Catch Arm
B-3	Catch Dog
B-4	Operating Shaft
B-5	Operating Device, Disconnector
B-6	Operating Device, Earthing Switch
B-7	Catch Plate
B-8	Insulator
B-9	Bearing Housing

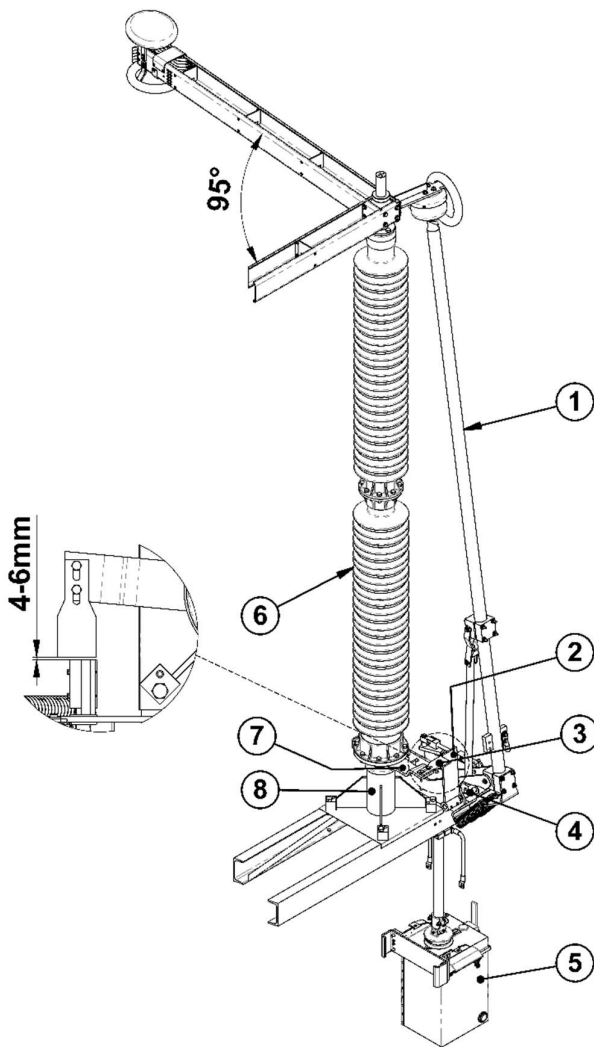
**Figure B**

Figure B shows the disconnector in open position. The earthing switch can then be operated easily.

If Contact Pipe B-1 of the earthing switch is in closed position according to figure B, operation of the disconnector is prevented by Catch Dog B-3 on Catch Arm B-7, mounted on Bearing Housing B-9, which is blocked by Catch Arm B-2 on Operating Shaft B-4 of the earthing switch.

The play between Catch Dog B-3 and Catch Arm B-2 is adjusted by the set screws on the catch dog. Catch Arm B-2 is adjusted axially by set screws on its hub

Figure C Interlocking Open Disconnector	
C-1	Contact Pipe
C-2	Catch Arm



C-3	Catch Dog
C-4	Operating Shaft
C-5	Operating Device
C-6	Insulator
C-7	Catch Plate
C-8	Bearing Housing

**Figure C**

**Right-hand mounting**

switch.

Figure C shows the disconnector in open position. The earthing switch can then be operated freely.

When the contact pipe of the earthing switch is in closed position according to figure C, operation of the disconnector is prevented by Catch Dog C-3 on Catch Plate C-7, mounted on Bearing Housing C-8, which is blocked by Catch Arm C-2 on Operating Shaft C-4 of the earthing

The play between Catch Dog C-3 and Catch Arm C-2 is adjusted by the set screws on the catch dog. Catch Arm C-2 is adjusted axially by set screws on its hub.



**PRODUCT INFORMATION**  
**MOTOR-OPERATED DEVICE BCM-F FOR**  
**DISCONNECTORS AND EARTHING SWITCHES**  
**INTERLOCKING CASSETTE FOR REMOTE**  
**INTERLOCKING AGAINST HAND OPERATION LOCKING**  
**DEVICE FOR ELECTRICAL AND MECHANICAL**  
**INTERLOCKING BY KEY**

**DESIGNATIONS AND REFERENCES**

When ordering spare parts and in all inquiries and other correspondence, the number of this Information shall be given, and the parts concerned designated as in the following example:

Motor 5275 826E-23-B-1

**LIST OF CONTENTS**

LIST OF CONTENTS .....	1
Storage Prior to Erection .....	2
General Description .....	2
Design of the Motor Operated Device.....	3
Gear and Mechanism.....	6
Slip and Free Coupling .....	7
Auxiliary Contact.....	8
Interlocking Cassette .....	10
Locking Device .....	11
Technical Data.....	12
Maintenance.....	12



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**RODUCT INFORMATION**  
**HAND-OPERATED DEVICE BCH-F FOR DISCONNECTORS**  
**AND EARTHING SWITCHES INTERLOCKING CASSETTE**  
**FOR REMOTE INTERLOCKING AGAINST HAND-**  
**OPERATION LOCKING DEVICE FOR MECHANICAL**  
**INTERLOCKING BY KEY**

**DESIGNATIONS AND REFERENCES**

When ordering spare parts and in all inquiries and other correspondence, the number of this Information shall be given, and the parts concerned designated as in the following example:  
Heat Resistor 5275 826E-24-C-7

**CONTENTS**

Storage Prior to Erection .....	2
General Description.....	2
Design of the Hand-Operated Device.....	3
Auxiliary Contact .....	5
Interlocking Cassette.....	7
Locking Device.....	8
Technical Data .....	9
Maintenance.....	9



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## Storage Prior to Erection

If the operating device is to be stored prior to erection it shall, as the first alternative, be placed indoors in dry premises. As a second alternative it can be stored out of doors, covered with tarpaulin but well ventilated and arranged so that it will not stand in water. At outdoor storage, the heat shall be switched on.

When heat to the operating device is switched on the bag containing desiccator, which is in the protective Cover B-2, shall be removed.

## General Description

The hand-operated device is intended for operating disconnectors and earthing switches of outdoor design. The operating device shall be mounted on the frame under the disconnector in accordance with the relevant dimension print.

The following description for disconnectors applies also for earthing switches.

At hand operation the vertical operating shaft of the disconnector is driven 190° in an optional direction.

The operating device can be completed with the interlocking functions stated below:

- Interlocking cassette for interlocking by remote control against hand operation.
- Locking device for mechanical interlocking of the operating device in one or both end positions (so-called key interlocking).

In standard form the operating device is equipped with a 2+2, 6+6, 12+12, or 18+18 pole auxiliary contact. All auxiliary contacts are normally connected to the terminal blocks.

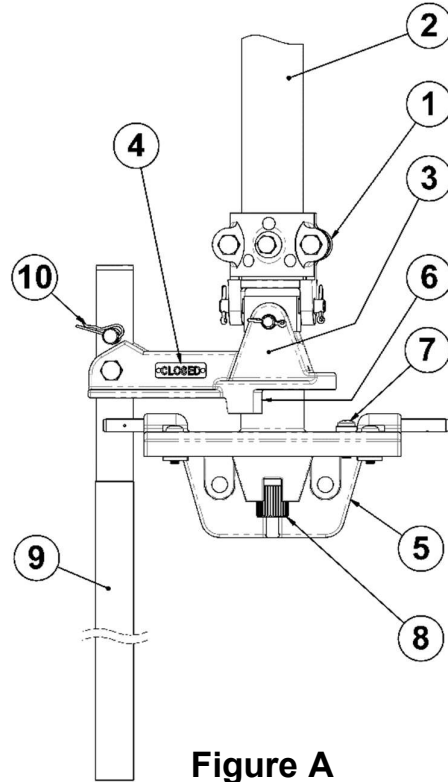
Included in the operating parts of the disconnectors is a universal joint with a pipe coupling for connection of operating pipes to the operating device. The universal joint can also be delivered separately.



## Design of the Hand-Operated Device

### Operating Device

Figure A Hand-Operated Device, Basic Design	
A -1	Universal Joint (included in the disconnecter)
A -2	Operating Pipe (included in the disconnecter)
A -3	Lever
A-4	Position Signs (OPEN/CLOSED)
A-5	Bracket With Cast Position Symbols (O/I)
A -6	End Position Stop
A -7	Earth Terminal
A -8	Output Shaft
A -9	Operating Lever
A -10	Bolt for Padlock



In basic design the hand-operated device has a lever according to Figure A which, via Universal Joint A-1 and Operating Pipe A-2, is coupled to the disconnecter.

The Figure shows the operating device in closed position with Operating Lever A-9 in locked position. When opening the disconnecter, lift the operating lever to horizontal position, move it over to the opposite end position and lower into locked position.

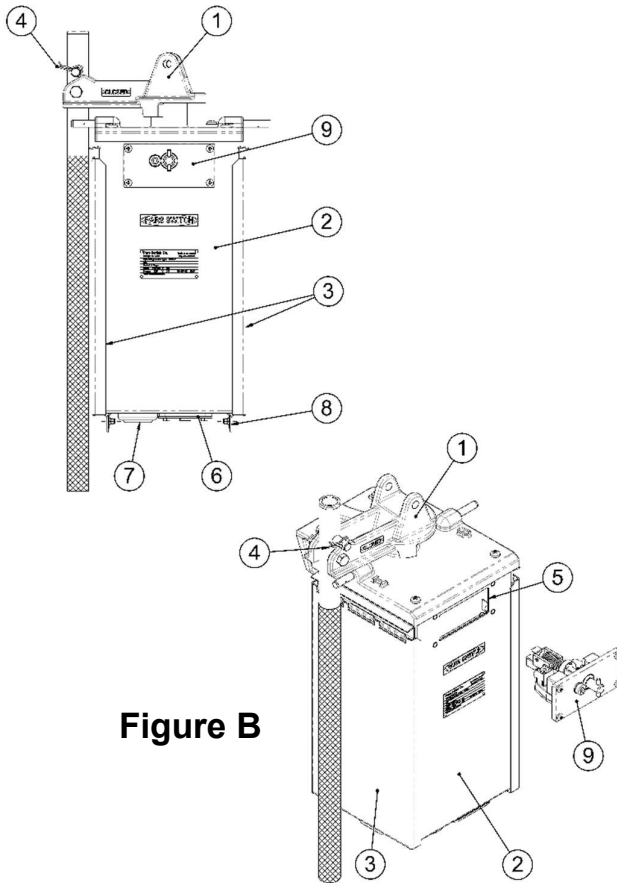
Pin A-6 forms a mechanical end stops in both directions and limits the movement of the Lever A-3, and thereby the vertical Operating Pipe A-2, to 190°.

Operating Lever, A-9 can be locked by padlock, through the hole in the Locking Bolt A-10, both in closed and open positions.





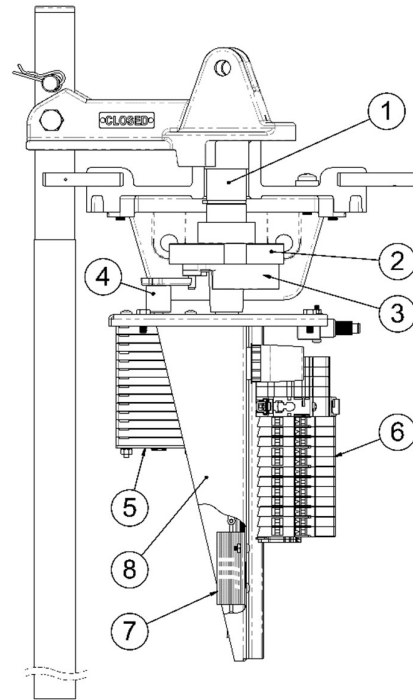
## Operating Device and Auxiliary Contacts



**Figure B**

Figure B Hand-Operated Device With Cover	
B -1	Lever Function (Figure A)
B -2	Protective Cover
B -3	Doors
B-4	Bolt For Padlock
B-5	Cavity For Interlocking
B -6	Cassette
B -7	Cable Inlet, FL 21
B -8	Ventilation Device
B -9	Hole for Padlock
B -10	Interlocking Cassette (optional)

Figure C Operating Device Without Cover	
C -1	Output Operating Shaft (A-8)
C -2	Driving Disc (F-10)
C -3	Operating Disc
C-4	Driving Arm
C-5	Auxiliary Contact
C -6	Terminal Blocks
C -7	Heat Resistor
C -8	Mounting Plate



**Figure C**

Figures B and C show the mechanism of the operating device in closed position



The operating device can, on request, be equipped with a two-way auxiliary contact C-5. Driving Disc C-2 and Operating Disc C-3 are directly coupled to the Output Shaft C-1 of the operating device. In the vicinity of the end positions of the operating device, the Arm System C-2-3-4 gives the auxiliary contact a rapid movement in relation to the output shaft. During the interjacent movement the auxiliary contact is immovable. The Operating Disc C-3 has been adjusted at delivery test to give the auxiliary contact correct turning movement.

The Protective Cover B-2 has a built-in Heat Resistor C-7. In order to avoid moisture, the resistor must be connected continuously.

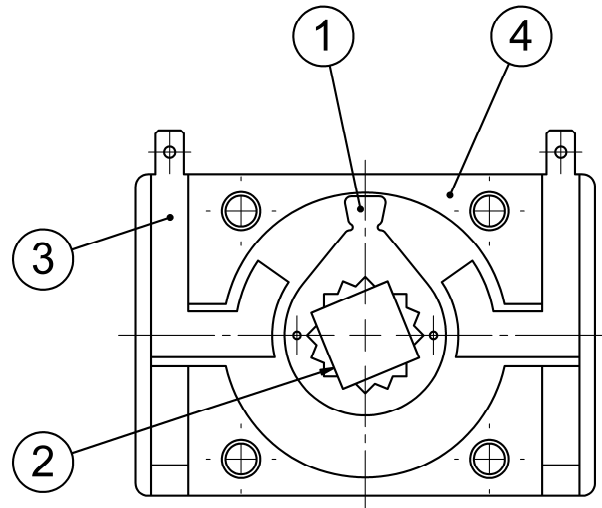
The electrical equipment of the operating device is assembled on Mounting Plate C-8. Doors B-3 are hinged. Since the doors are removable, the inner parts of the operating device are accessible for inspection and overhaul. When necessary, the doors can be locked with padlock in Hole B-8.

## Auxiliary Contact

The auxiliary contact of the hand-operated device consists of a number of separate units, each containing an a-contact (closed in the case of a closed disconnecter) and b-contact (closed in the case of an open disconnecter). In the separate units the a and the b-contacts are closed alternately with the spring contact discs D-1 mounted on the common Shaft D-2.

The Contact Plates D-3 are, as standard, suited for contact change-over according to Figure E. Other contact change-over can be supplied on request.

Figure D Auxiliary contact unit	
D -1	Spring Contact Disc (movable)
D -2	Shaft
D -3	Contact Plates (fixed)
D-4	Insulation Disc



**Figure D**

CLOSED	OPEN	
DISCONNECTOR		11-12, 21-22, 31-32
AUXILIARY CONTACT		41-42, 51-52, 61-62
(6+6 POLES)	190°	13-14, 23-24, 33-34 43-44, 53-54, 63-64

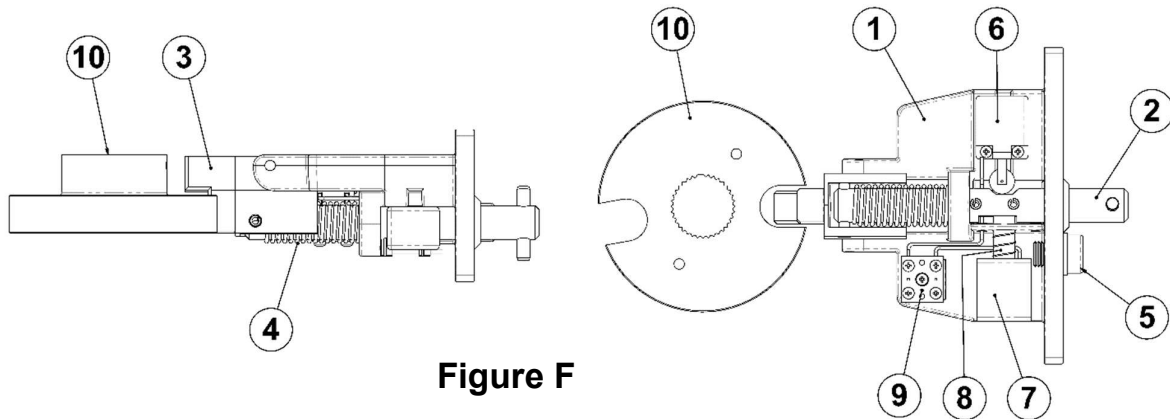
**Figure E**

**Figure E Diagram of connection and disconnection of auxiliary contact in relation to the disconnector**

The shaded columns indicate the section for closed contact and show that the a and b contacts close when the disconnector is self-activated in the end positions.



## Interlocking Cassette



**Figure F**

Figure F		Auxiliary Contact Unit	
F -1	Cassette	F -6	Contact
F -2	Interlocking Rod	F -7	Interlocking Magnet
F -3	Catch	F -8	Locking Pin
F-4	Compression Spring	F-9	Terminal Block
F-5	Screw	F-10	Driving Disc (C-2)

The hand-operated device can be delivered with or without Interlocking Cassette B-9 for remote blocking by the interlocking magnet. The operating device can also be completed afterwards with a cassette. When the operating device does not have interlocking, the interlocking cassette is replaced by a covering lid. In both cases the joints against Cover B-2 are sealed with a rubber gasket.

In interlocked position Spring F-4 holds the Catch F-3 pressed in one of the grooves in the Driving Disc F-10 and thereby blocks the operating device against hand-operation. To remove the interlocking simply pull out the Interlocking Rod F-2. The rod will then cause Contact F-6 to close somewhat before the lug of the interlocking rod reaches the Locking Pin F-8. If the outer interlocking contacts are closed, the Magnet F-7 will be energized and thereby the locking pin is drawn out of the locking position. The interlocking rod can then be drawn out so far that Catch F-3 releases the Driving Disc F-10 and permits hand operation. When the disconnecter is operated to one of its end positions, the operating device automatically returns to interlocked position.



Note that the interlocking magnet is energized during the time the disconnect is operated. The magnet is, however, dimensioned for continuous connection which is why there is no risk for overheating.

Interlocking can be temporarily removed by inserting a screw driver in the hole for Screw F-5 and pushing aside the locking pin.

## Locking Device

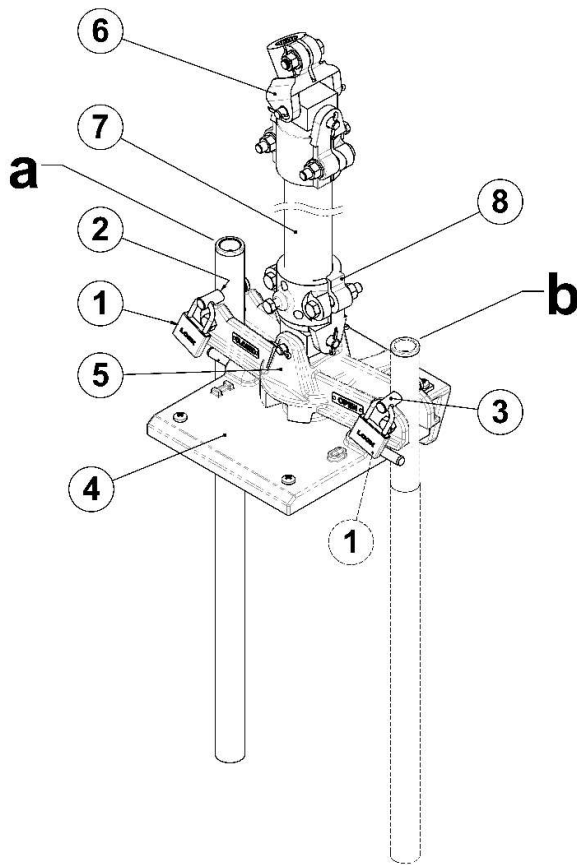


Figure G Interlocking By Lock	
G -1	lock
G -2	Lock Cylinder Of Interlocking Lock
G -3	Locking Pin
G-4	Bracket
G-5	Interlocking Disc
G-6	Universal Joint
G-7	Pipe shaft From Operating Device
G-8	Clamp

The Pipe Shaft from Operating vice G-7 is connected to the Interlocking disc G-5 via Clamp G-8. The interlocking disc is provided with two holes to block the operating device in its end positions. The lock G-1 is fastened with Locking Pin G-3 in desired position. Lock "a" is intended for locking the operating device in closed position, lock "b" in open position,

Figure G shows an interlocking device with a lock for each position "a, b".

**Figure G**



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## Technical Data

Rotary movement of output shaft	190°
Coupling for vertical operating pipe	60 mm (2")

### Auxiliary contacts

breaking current	5 A, 110 V Is 2.5 A, 220 V Is
rated current	25 A

<u>Operating coils</u> - interlocking magnet, power consumption	approx. 7 w
--	-------------

### Heater

power consumption (continuously)	approx. 25 W
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## Maintenance

The operating device should be looked over at intervals of approx. 10 years and all sliding surfaces lubricated with grease "G". All lubricants shall be sparingly applied and superfluous lubricant wiped off. Bushings around the output shaft are of lubrication free design and do not normally require lubrication.

For choice of lubricant, see Information 5409 506.



## Storage Prior to Erection

If the operating device is to be stored prior to erection it shall, as the first alternative, be placed indoors in dry premises. As a second alternative it can be stored out of doors, covered with tarpaulin but well ventilated and arranged so that it will not stand in water. At outdoor storage, the heat shall be switched on.

When heat to the operating device is switched on the bag containing desiccator, which is in the Protecting Cubicle A-13, shall be removed.

## General Description

The motor operated device is intended for operating disconnectors and earthing switches of outdoor design. The operating device shall be mounted on the frame under the disconnector in accordance with the relevant dimension print.

The following description for disconnectors applies also for earthing switches.

The operating device consists in principle of a gear with reversible driving motor which, when an impulse is given, drives the vertical operating shaft to the disconnector 190° in an optional direction and thereafter automatically comes to a stop in the end position.

The operating device can be completed with the interlocking functions stated below:

- Interlocking cassette for interlocking by remote control against hand operation.
- Locking device for electrical and mechanical interlocking of the operating device in one or both end positions (so-called key interlocking).

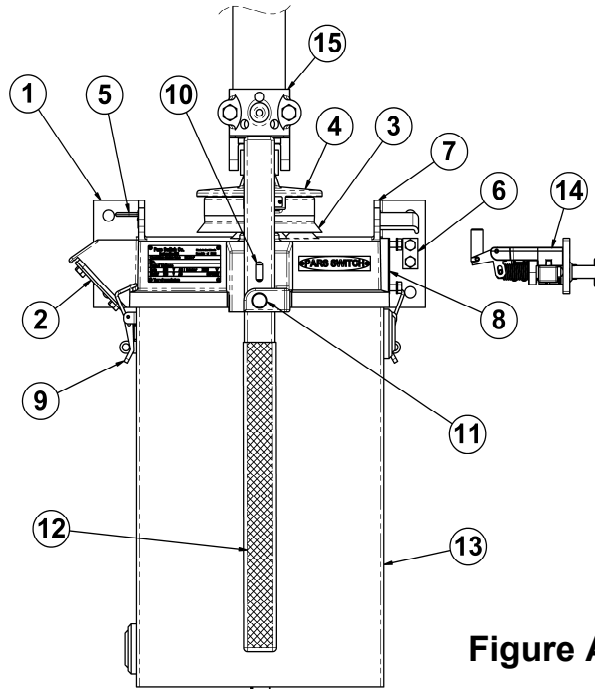
In standard form the operating device is equipped with a 6+6 pole, 12+12 pole or 18+18 pole auxiliary contact. All auxiliary contacts are normally connected to the terminal blocks.

Included in the operating parts of the disconnectors is a universal joint with a pipe coupling for connection of operating pipes to the operating device. The universal joint can also be delivered separately.

The operating device BCM-F is adjustable for an outgoing torque of 500-800 Nm.



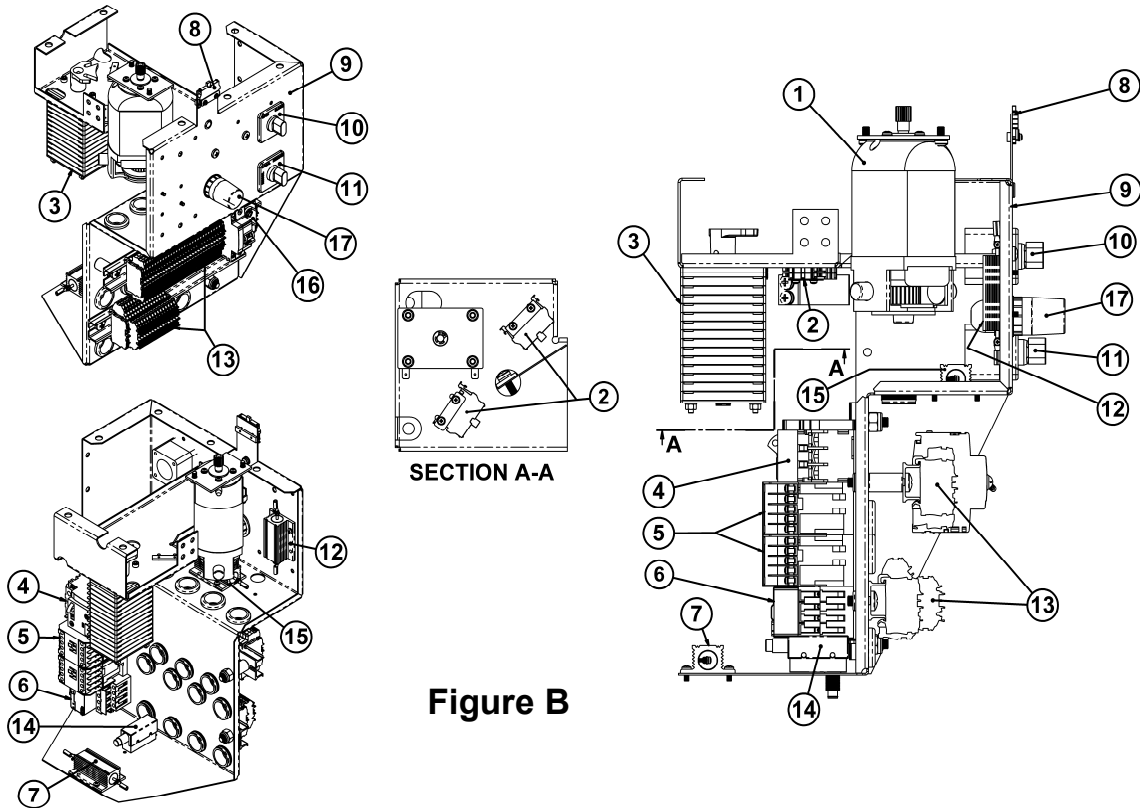
## Design of the Motor Operated Device



**Figure A**

Figure A Motor-Operated Device	
A -1	Frame With Gear
A -2	Cable Inlet, FL 21
A -3	Interlocking Disc (option)
A-4	Driver
A-5	Hole for Padlock
A -6	Earth Terminal
A -7	Lug For Locking The Hand Lever In End Position
A -8	Cavity For Interlocking Cassette
A -9	Quick-Acting Lock For A-13 (lockable by padlock)
A -10	Peg For Hand Lever
A -11	Bolt for Padlock
A -12	Hand-Operated Lever
A -13	Protective Cover
A -14	Interlocking Cassette ( option )
A -15	Universal Joint With Operating Pipes (included in the disconnecto





**Figure B**

Figure B Operating device without protective cover			
B -1	Motor	B -10	Control Switch
B -2	Limit Switch	B -11	Selector Switch
B -3	Auxiliary Contact	B -12	Parallel Resistor
B-4	Direct-On-Line Starter	B-13	Terminal Blocks
B-5	Control Contactors	B-14	Limit Switch
B-6	Under-Voltage relay	B-15	Heater 25 W
B -7	Heater 50 W	B-16	Thermostat
B -8	Blocking Contact	B-17	Lamp
B -9	Control Board		

The electrical equipment of the operating device is assembled on the control board B-9. Since the Protective Cover A-13 is removable the components on the back of the board and the interior of the operating device become accessible for inspection and overhaul.

Selector Switch B-11 has as standard separate positions for "Remote" and "Local" and also a third position "Disconnected" when the operating circuits are open.



Selector Switch 8-10 is intended for direct operation of the motor-operated device when the Selector Switch B-11 is in «Local» position.

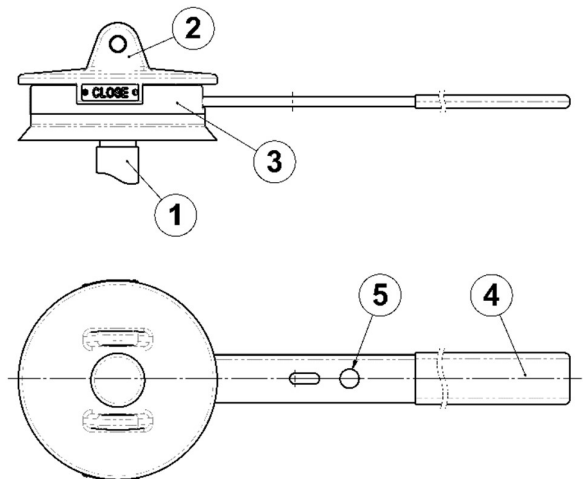
The Direct-On-Line Starter B-4, is of thermal type, with magnetic rapid release. Driving motor voltage is switched on and off by means of the starter. The thermal release of the direct-on-line starter has been adjusted at delivery so that it releases after approx. 30 seconds if the output shaft of the device is locked.

When operating by motor, the Hand-Operated Lever A-12 must be kept hung as shown in Figure A. At hand operation the Lever A-12 is turned and thereby Peg A-10 will also be turned, at which the operating device will be electrically blocked by Contact B-8 opening the operating circuit. At the same time, parts of the gear will be mechanically disengaged by the arm system of the friction coupling. See Figure E.

The hand-operated lever is lockable by padlock both at the place where it is hung (A-10) and in the end position of the Operating Device (A-5). The Lugs A-7 automatically blocks the hand-operated lever in the respective end positions after a completed manual operation.

The figure below shows the operating device prepared for hand operation.

Figure C Hand-operated mechanism	
C -1	Operating Shaft
C -2	Driver
C -3	Interlocking Disc
C -4	Hand Operated Lever
C -5	Hole for Padlock



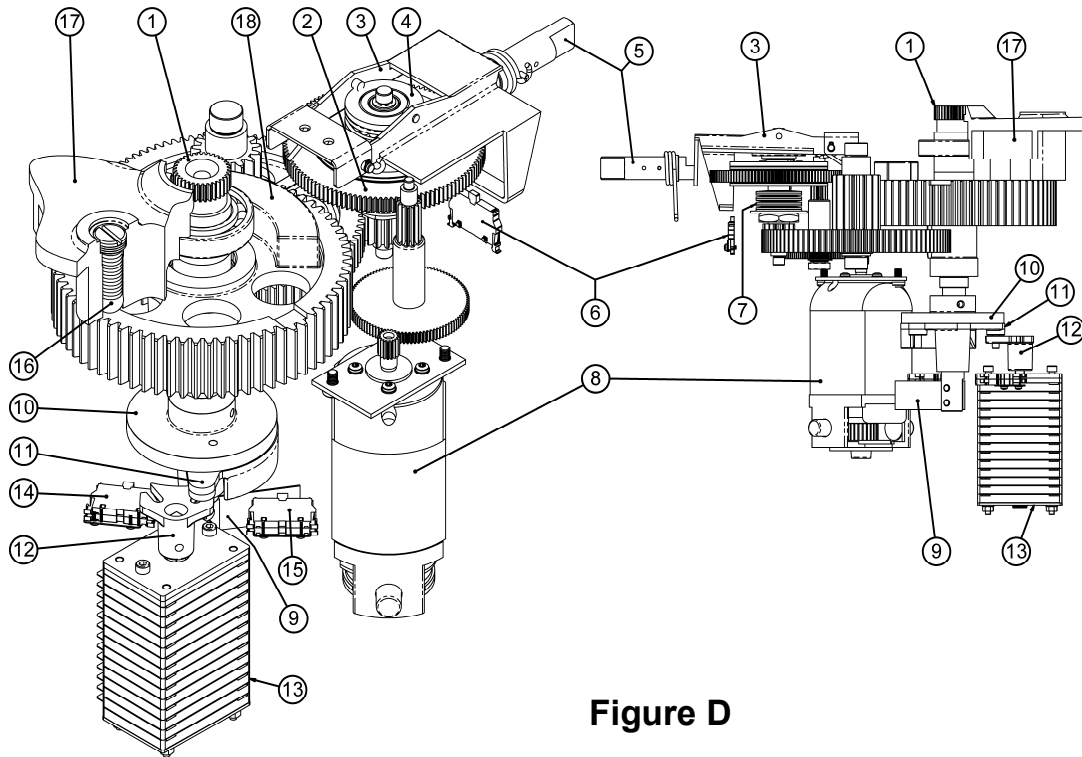
**Figure C**

The Driver C-2 is fixed to the operating Shaft C-1. At hand operation the lever is therefore turned 190° towards open or closed position.

When the operating device is delivered with interlocking cassette the Interlocking Disc C-3 is also supplied.



## Gear and Mechanism



**Figure D**

Figure D		Gear and mechanism	
D -1	Output Operating Shaft	D -10	Driving Disc
D -2	Free Coupling Arm	D -11	Operating Disc
D -3	Slip And Free Coupling	D -12	Driving Arm
D-4	Axial Ball Bearing	D -13	Auxiliary Contact
D-5	Turn Able Peg	D -14	Limit Switch "ON"
D -6	Blocking Contact For Motor	D -15	Limit Switch "OFF"
D -7	Cup Springs For Slip Coupling	D -16	Blocking Ball
D -8	Motor	D -17	Mechanical Stop
D -9	Arm For Limit Switches	D -18	Movable Stop Lug

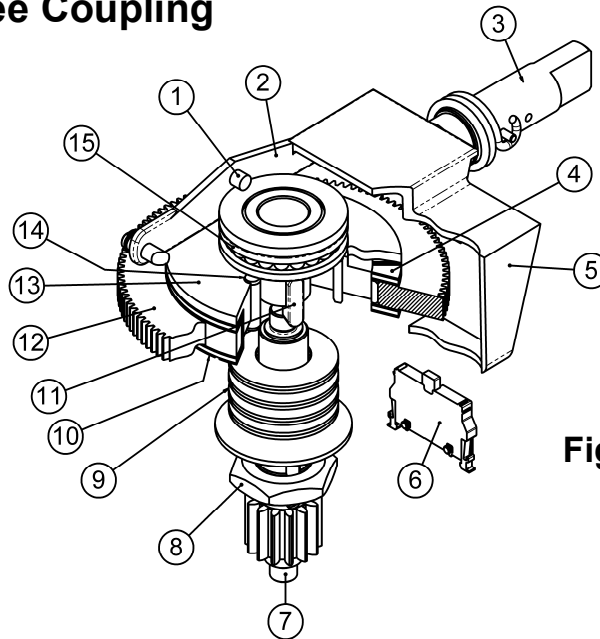
Figure D shows the mechanism of the operating device in end position prepared to operate the disconnector towards the closed position. The Main Shaft D-1, of the motor-operated device is directly coupled to the last wheel in power transmission from the Driving Motor D-8. To Shaft D-1 are also Connected Arm D-9 (for operating both Limit



Switches D-14 and D-15), Driving Disc D-10, and Operating Disc D-11 (for the Auxiliary Contact D-13). The last wheel in the gear is also fitted with a Lug D-18 which, together with Stop D-17, serves as a stop in both end positions of the operating device. In the end positions the spring loaded Ball D-16 is pressed down into the corresponding depressions in the gear, and thereby the mechanism is held in the end positions.

In the vicinity of the end positions of the operating device, the arm system D-10-11-12 gives the auxiliary contact a rapid movement in relation to the output shaft of the device. During the interjacent movement the auxiliary contact is immovable. The Operating Disc D-11 has been adjusted at delivery test to give the auxiliary contact correct turning movement.

### Slip and Free Coupling



**Figure E**

Figure E		Slip And Free Coupling	
E -1	Pin	E -9	Cup Springs
E -2	Free Coupling Arm	E -10	Displaceable Friction Disc
E -3	Peg (A-10)	E -11	Wedge
E-4	Friction Segments	E -12	Gear Wheel
E-5	Arm	E -13	Fixed Friction Disc
E -6	Blocking Contact	E -14	Actuators
E -7	Shaft	E -15	Axial Ball Bearing
E -8	Nut For Adjustment Of Slipping Torque		



The slip coupling protects the power transmission from overloading when the movable parts are stopped in the end positions.

The Wedge E-11 joins the Shaft E-7 to both the Friction Discs E-10 and E-13, of which the first-mentioned is movably carried on the shaft. The Cup Springs E-9 press the Disc E-10 via two Friction Segments E-4 against the Upper Disc E-13. During an operation by motor the Gear Wheel E-12 will thereby be joined to the Shaft E-7 as long as the transmitted torque is less than the adjusted friction torque.

The Friction Segments E-4 are fixed by the upper and lower friction discs, respectively, and slip in the end positions against Gear Wheel E-12.

During an operation by hand, the hand lever shall be removed from place where it is hung, whereupon Peg E-3 is rotated a quarter turn clockwise. The peg will then press down the Coupling Arm E-2, which, via Arm E-5, activates the Contact E-6 so that the motor current is interrupted. The movement is transmitted also to Pin E-1 and Ball Bearing E-15, and further via the three Actuators E-14 to the lower Friction Disc E-10. As the friction disc is pressed downwards, the pressure on the friction segments is eliminated. The Gear Wheel E-12 can then rotate freely on the Shaft E-7, thereby facilitating operation by hand lever.

The frictional force from the Springs E-9, which is adjustable by Nut E-8, has been adjusted at the delivery tests for an outgoing torque of 500 or 800 Nm.

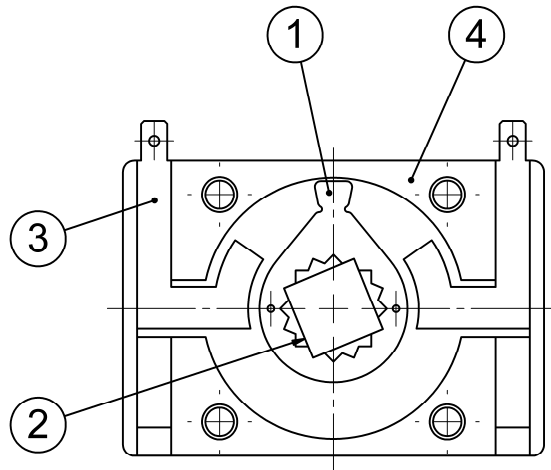
## **Auxiliary Contact**

The auxiliary contact of the motor operating device consists of a number of separate units, each containing an a-contact (closed in the case of a closed disconnecter) and b-contact (closed in the case of an open disconnecter). In the separate units the a- and b- contacts are closed alternately with the Spring Contact Discs F-1 mounted on the common Shaft F-2.

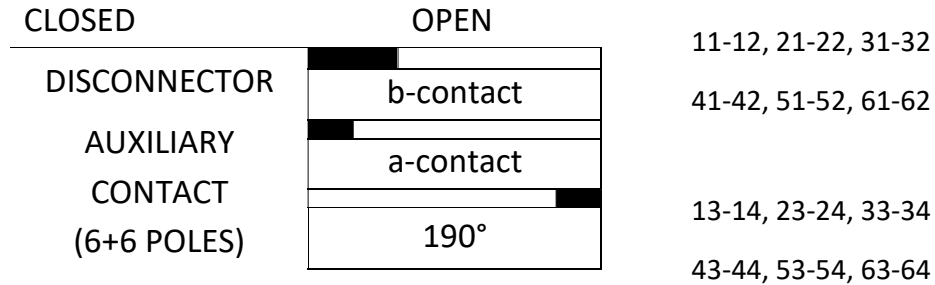
The Contact Plates F-3 are, as standard, suited for contact change-over according to Figure G. Other contact change-over can be supplied on request.



Figure F Auxiliary contact unit	
F -1	Spring Contact Disc (movable)
F -2	Shaft
F -3	Contact Plates (fixed)
F-4	Insulation Disc



**Figure F**



**Figure G**

**Figure G Diagram of connection and disconnection of auxiliary contact in relation to the disconnector**

The shaded columns indicate the section for closed contact and show that the «a» and «b» contacts close when the disconnector is self-activated in end positions.



## Interlocking Cassette

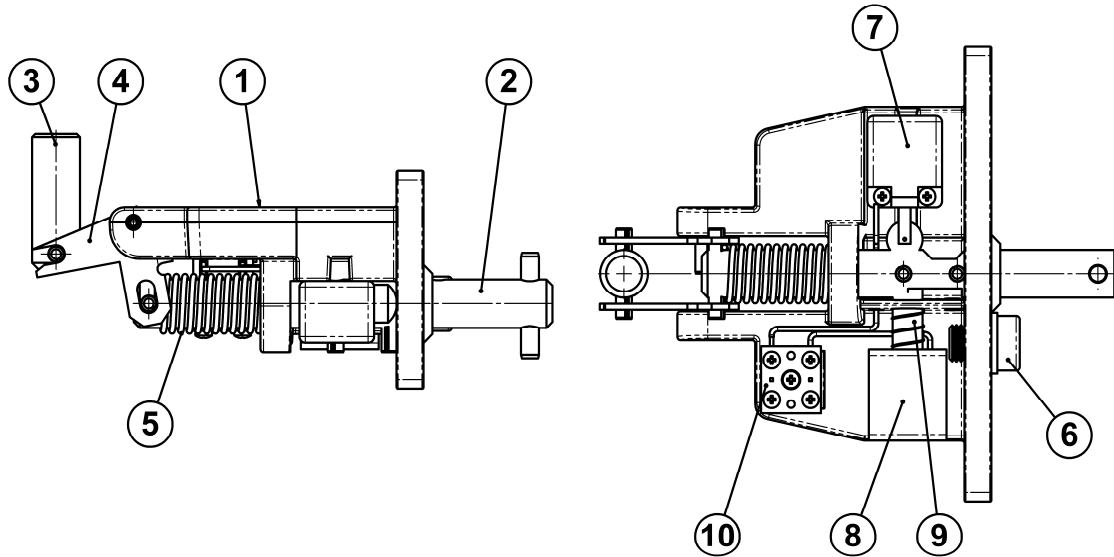


Figure H		Interlocking Magnet And Mechanism	
H -1	Cassette	H -6	Screw
H -2	Interlocking Rod	H -7	Contact
H -3	Interlocking Pin	H -8	Interlocking Magnet
H-4	Interlocking Lever	H-9	Locking Pin
H-5	Compression Spring	H-10	Terminal Block

The motor operating device can be delivered with or without the Interlocking Cassette A-14 for remote blocking by the interlocking magnet. The operating device can also be completed afterwards with a cassette. When the operating device does not have interlocking, the interlocking cassette is replaced by a covering lid. In both cases the joints against Frame A-1 are sealed with a rubber gasket.

The magnet interlocks unpermitted hand operation of the disconnecter. Note, however, that the interlocking does not prevent operation by motor.

In interlocked position, the Spring H-5 holds the interlocking Pin H-3 pressed in one of the holes in the Interlocking Disc A-3, and thereby interlocks the device against hand operation. To remove interlocking simply pull out the Interlocking Rod H-2. The rod will then cause contact H-7 to close somewhat before the lug of the interlocking rod reaches the



Locking Pin H-9. If the outer interlocking contacts are closed, the magnet H-8 will be energized and thereby the locking pin is drawn out of the locking position. The interlocking rod can then be drawn out so far that the interlocking pin disengages the Interlocking Disc A-3 and permits hand operation. When the disconnecter is operated to one of its end positions, the operating device automatically returns to interlocked position.

Note that the magnet is energized during the time the disconnecter is operated. The magnet is, however, dimensioned for continuous connection which is why there is no risk for overheating.

Interlocking can be temporarily removed by inserting a screw driver in the hole for Screw H-6 and pushing aside the locking pin.

## Locking Device

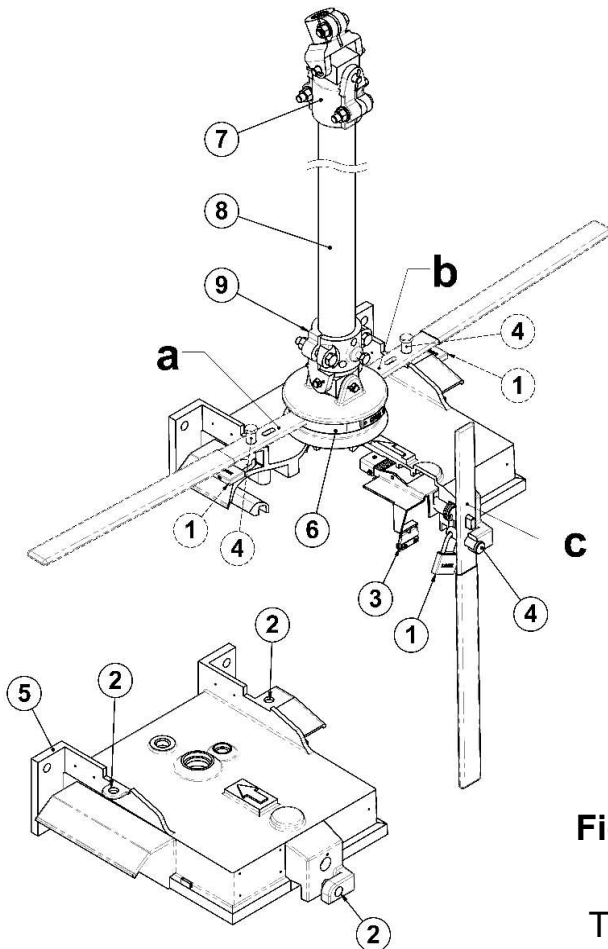


Figure J Interlocking By Lock	
J-1	lock
J-2	Hole For Lock In Position "a,b,c"
J-3	Interlocking Microswitch
J-4	Locking Pin
J-5	Bracket
J-6	Interlocking Disc
J-7	Universal Joint
J-8	Pipe Shaft From Operating Device
J-9	Clamp

**Figure J**

The through Shaft J-8 is connected to the Interlocking Disc J-6 via Clamp J-9. The interlocking disc is provided with three holes to block the operating device in its end positions.





The lock J-1 is fastened with Locking Pin J-4 in desired position. Lock “a” is intended for locking the operating device in closed position, lock “b” in open position, and lock” c “for locking in both closed and open positions.

**Figure J shows an interlocking device with a lock for each position “a, b, c”.**

## Technical Data

Rotary movement of output shaft	190°
Coupling for vertical operating pipe	60 mm (2")
Output torque (adjustable)	500-800 Nm
Operating time	3-5 sec

### Motor

	<b>110 V Is</b>	<b>220 V Is</b>
current consumption at full load		
500 Nm	4.7 A	2.6 A
800 Nm	5.8 A	3.0 A
starting current	12-16 A	6-10 A
(depending on network)		

### Auxiliary contacts

breaking current	5 A	2.5 A
rated current	25 A	

### Operating coils

power consumption	approx. 10 W (open-close)
	approx. 2 W (under voltage relay)
	approx. 7 W (interlocking magnet)

### Heater

power consumption (continuously)	approx. 50 W
-------------------------------------	--------------

## Maintenance

The operating device should be looked over at intervals of approx. 6 years and all sliding surfaces lubricated with grease "G". The cogs in the gear of the motor-operated device shall be brushed thinly with grease "G". All lubricants shall be sparingly applied and all superfluous lubricant wiped off so that it cannot, during operation, splash into the slip coupling D-2, which must not be lubricated.

All the ball bearings are permanently lubricated with grease "G" and do not normally require lubrication. For choice of lubricant, see Information 5409 506.



## TYPES OF LUBRICANTS FOR SWITCHING DEVICES

As a guide to the selection of lubricants and oils, a description is given below of the range of application together with a list of suppliers arranged in alphabetical order and their trade names.

### Oil "A":

Thin lubricating oil for precision parts in operating mechanisms and air-blast circuit-breakers. Also for relubricating of bearings, which cannot be Lubricated with grease G without dismounting - e.g. links and link gears. Viscosity at 30°C: 8±2 cst.

### Oil "C":

Circuit-breaker oil with viscosity -17 cst at +20°C. Suitable only for temperatures > -10°C.

### Oil "D":

Circuit-breaker oil with low viscosity - 6.0 cst. at +20°C. Shall also be used as oil in dashpots. For dashpots with the letter "S" stamped on the cover - oil "S" shall be used.

### Oil "S":

Silicon oil intended for oil dashpots in heavy operating mechanisms. Only dashpots with the letter "S" stamped on the cover shall be filled with

	Oil "A"		Oil "C"	Oil "D"	Oil "S"
ABB No.	1171 2039-1		1171 3011-101	1171 3011-102	1173 7011-106
MOBIL	MOBIL 1 (481127)		Energol ISH-V	Circuit-br. oil	-
		SW-30	Univolt N61	Univolt 42 (44)	-
CASTROL	formula	RS S}-SQ	-	-	-
			-	-	-
SHELL	TMO Synthetic		NYTRO 10X	NYSWITCHO 3 and 3X	-
		SW-30	-	-	DC 200 Fluid 200 CS
			-	Circuit-br.oil A65	-
OK	Supersynthetic			Kalte Schalteroel X	
		SW-30	-	-	-

Note: Oil "B" is from 1986-10-01 replaced by Oil "A".



**Grease "P":**

Vaseline for treatment of contact surfaces in current conductor joints.

**Grease "R":**

EP-grease for heavily-loaded roller bearings, slide bearings, cam discs and catches (Lithiumgrease. Solvent refined mineral oil with lithium soaps and molybdenum disulphide) in operating mechanisms type FSA.

**Grease "S":**

Fluorsilicon grease for greasing of Oings made from EPOM and as a corrosion prevention of gaps in circuit breakers type ED.  
Also for greasing of rotating shaft sealings in low energy breakers type LTB:

	Grease "P"	Grease "R"	Grease 11S11
ABB nr	1171 5011-102	1171 4013-303	1171 4014-406
Svenska Shell G.A. Lindberg & Co. AB Linatex Molystria	Shell vaseline 8401	Molykote Longterm 2 plus	Dow Corning FS-3451 No. 2

### After sales services:

After sales services department is always ready to provide necessary accessories and spare parts and repair all its products.

### خدمات پس از فروش:

واحد خدمات پس از فروش همواره آماده ارائه خدمات و لوازم یدکی و سرویس محصولات شرکت می باشد.

# مَبسان

(مهندسی بازرگانی سیستم‌های انتقال نیرو)

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