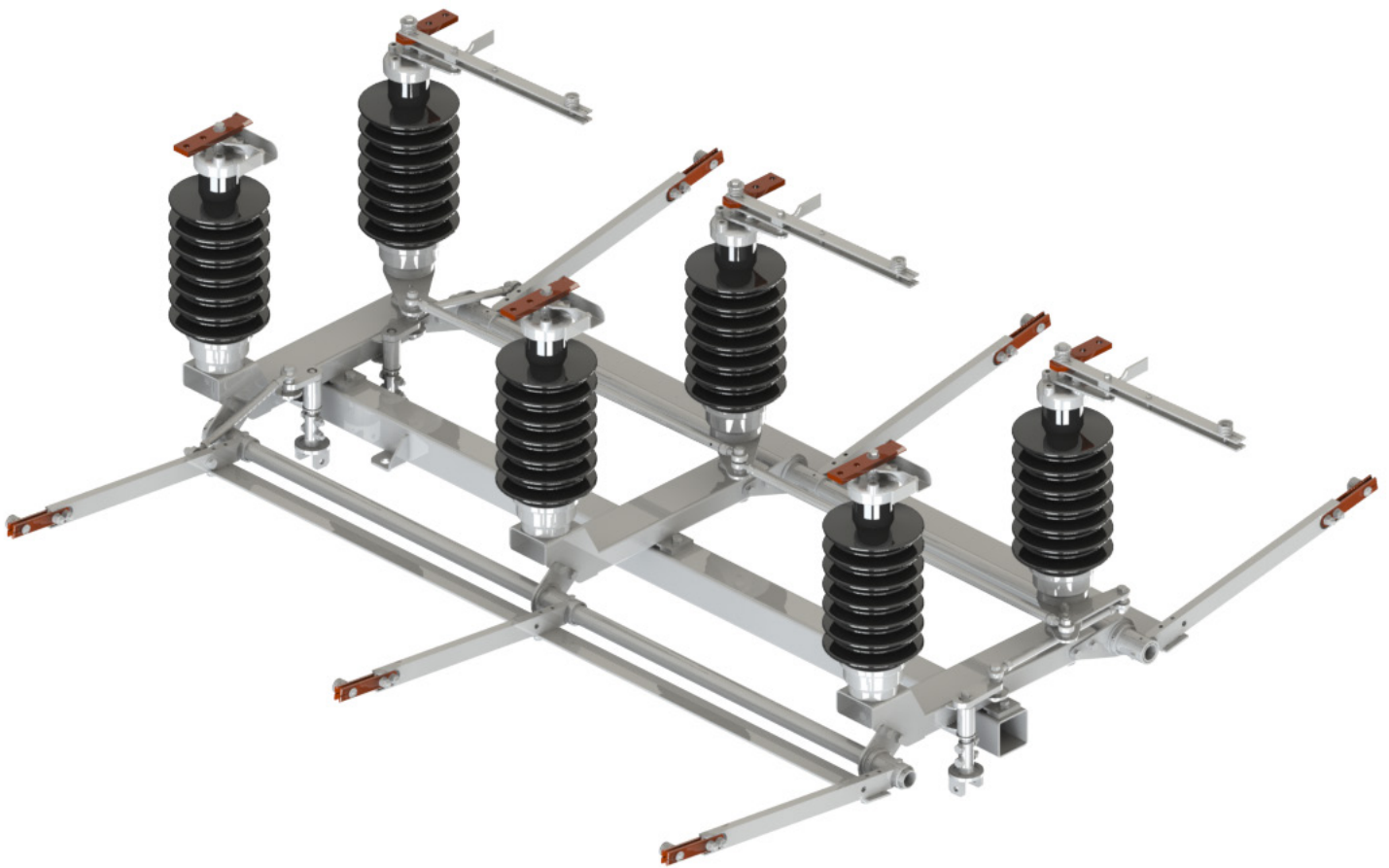




Zakład Wytwórczy Aparatów Elektrycznych Sp. z o.o.
INSTALLATION AND SERVICE MANUAL



ONIIO

MV outdoor disconnector

Manual no DTR.01.13.02.EN

.....○ **WARNING!**

During the operation of electrical equipment, certain parts of these devices are normally under dangerous voltage, and mechanical parts, also remotely controlled, can move quickly.

Failure to follow the warning instructions can result in serious personal injury or material damage.

Only suitably qualified personnel can work on or near the device. This personnel must know exactly all safety rules and rules for maintaining the device in accordance with these instructions.

The problem-free and safe operation of this device requires proper transport, proper storage, construction and assembly as well as careful service and maintenance.

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1. TRANSPORT AND STORAGE

1.1 Unpacking and inspection

Immediately after receiving the outdoor disconnector, the delivery's compliance with the packing list should be checked. Then one should check whether the apparatus has not been mechanically damaged during transport and the data on the nameplate match the order.

While transporting the disconnector, excessive tremors should be avoided.

1.2. Transport and storage

The disconnectors can be transported to a place of storage and installation by any means of transport. During transport, the disconnectors should be secured against moving and colliding with each other or parts of the vehicle. Transport, storage and installation should be in accordance to the handling marks on the packaging.

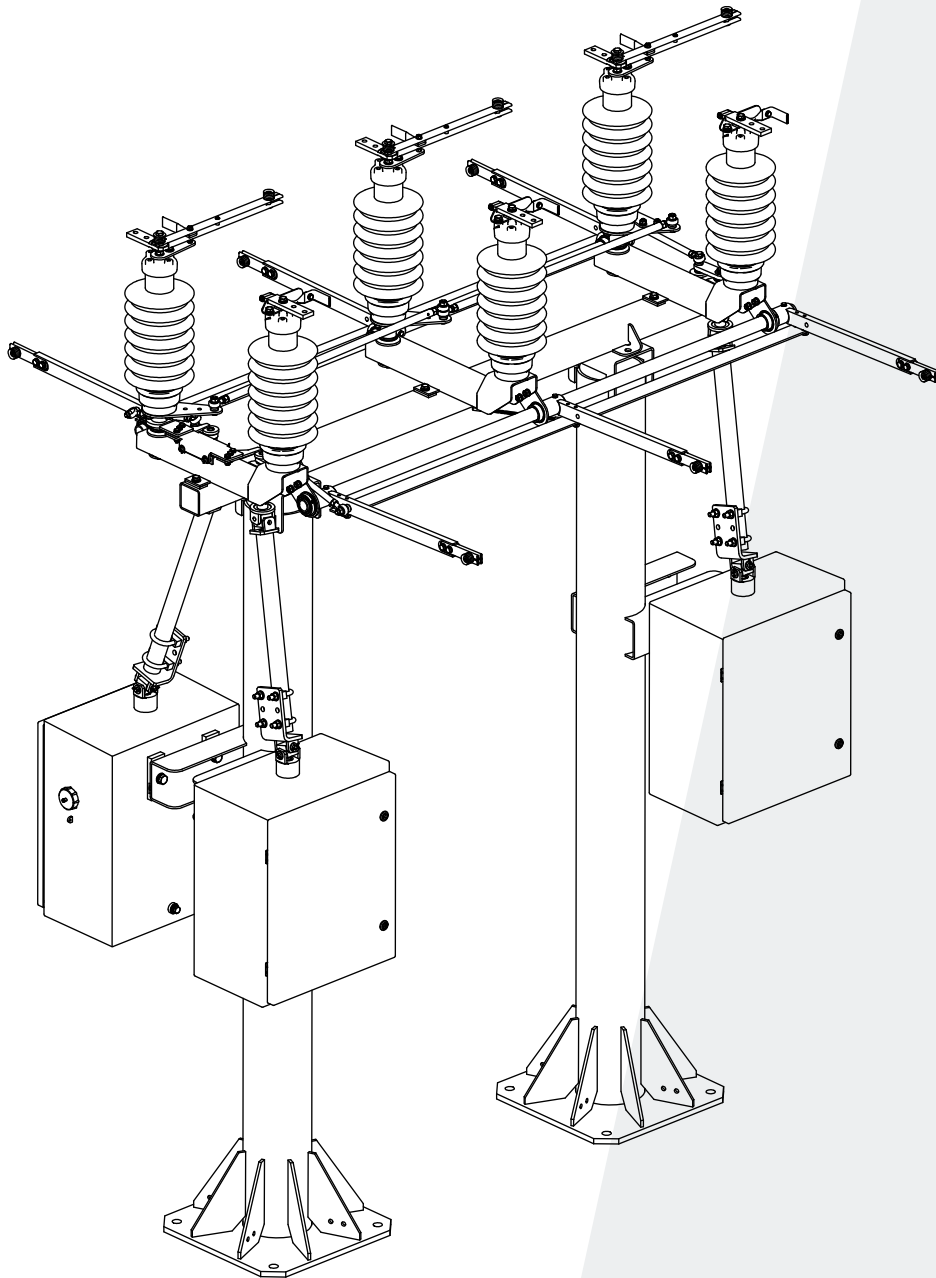
2. DESCRIPTION

2.1. Application

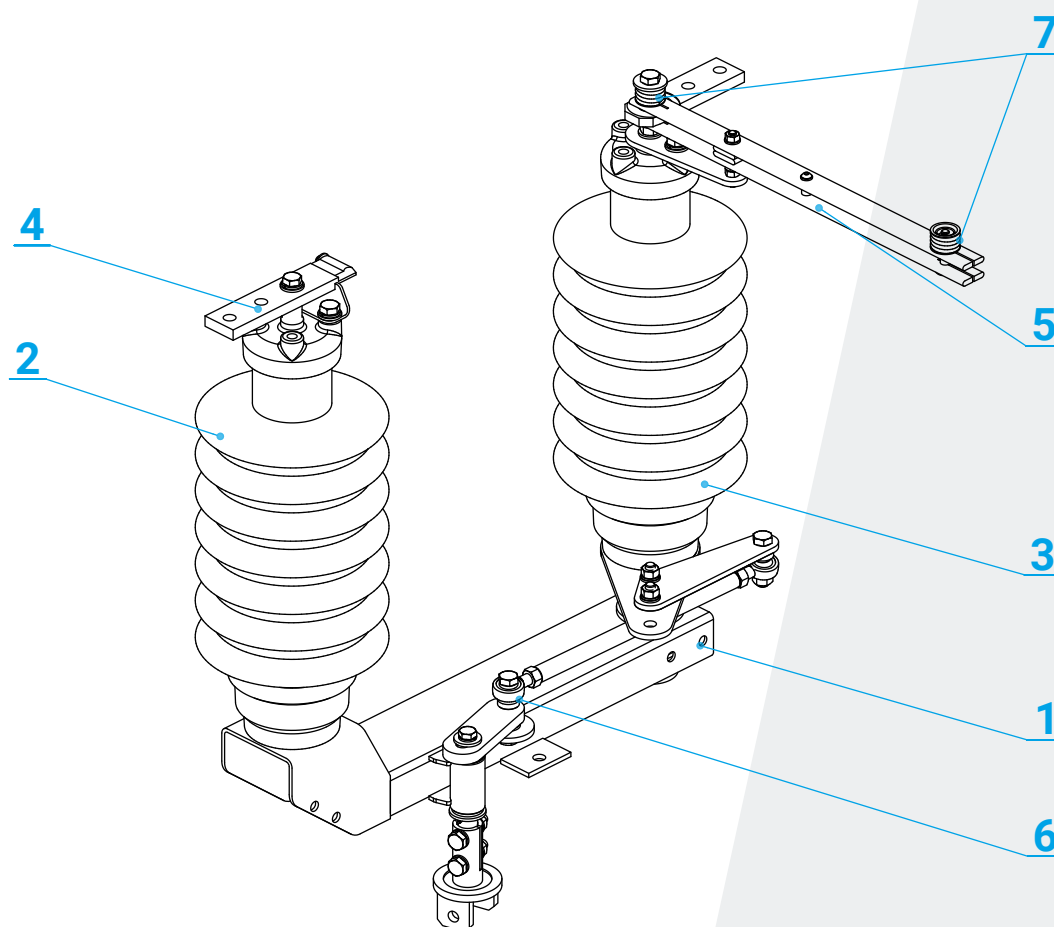
The outdoor disconnectors of type ONIII0 are intended for usage in outdoor 36 kV switchgears. They are designed to close and open electrical circuits in a off-load condition. In the open position disconnectors create a visible insulation gap in the air, thus meeting the relevant requirements of standards for disconnectors.

2.2. Construction and principle of operation

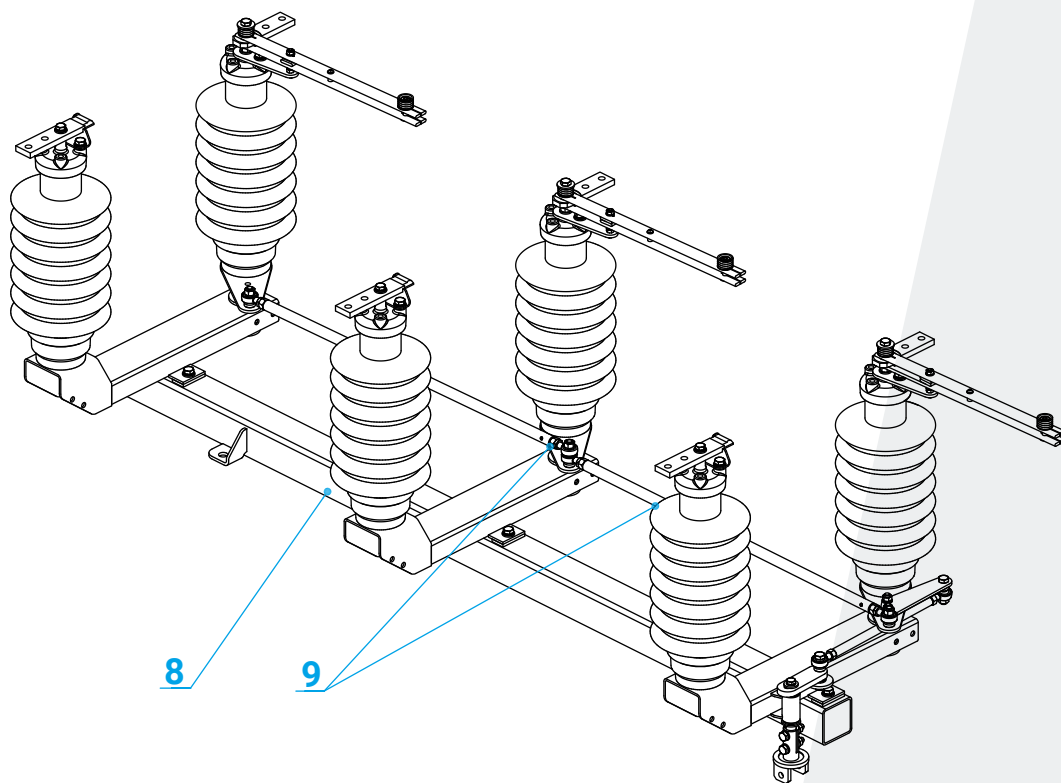
The ONIII0 disconnectors are switches with a rotary movement of contacts in a horizontal plane. They can be used as one-pole connector with idiosyncratic operating mechanism or as a three-pole set with one shared operating mechanism. The disconnector can be with left or right earthing switch or left and right simultaneously. An illustration of a three-pole disconnector with two earthing switches is shown on the next page.



Details of the ONIII0 construction are illustrated below. Each pole has an independent base frame [item 1] on which two porcelain insulators are mounted: solid [item 2] and driving insulator [item 3]. On the top of the insulators are attached: fixed contact [item 4] and movable contact [item 5]. The movable contact of the current path is connected with the driving insulator. The rotary movement of the main shaft is transmitted through the crank [item 6] and the driving insulator to the movable contact, causing it to move in a horizontal plane. The pressure of the blades on the contacts is ensured by springs [item 7].



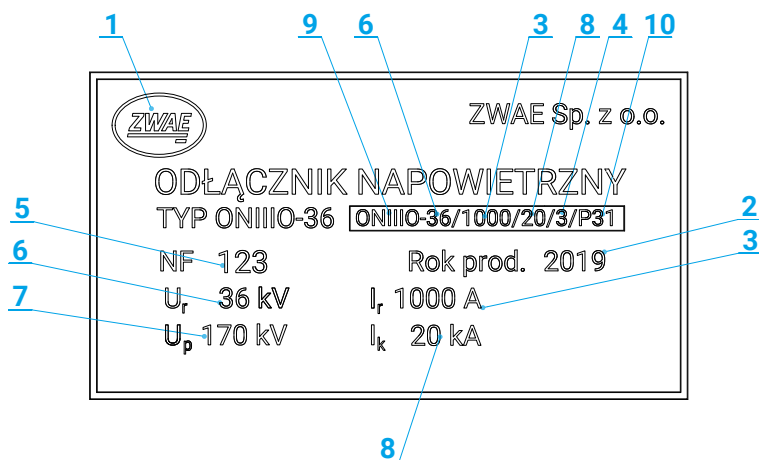
In the case of a three-pole disconnector, the poles are screwed to the supporting beam [item 8] and coupled with pulling rods [item 9] with each other, as shown below.



2.3. Ambient conditions during operation

The ONIII0 disconnectors are adapted for outdoor operation, at ambient temperature from -40 to +40 ° C and relative humidity to 100%.

2.4. Nameplate



1. Manufacturer
2. Year of production
3. Rated current I_r A
4. Rated duration of short-circuit t_k [s]
5. Serial number
6. Rated operating voltage U_r [kV]
7. Surge test voltage U_p [kV]
8. Rated short-circuit current I_k [kA]
9. Number of poles
10. Creepage distance, 31 mm/kV

2.5. Technical parameters

No	Parameter	Value
1.	Rated operating voltage	36 [kV] (40,5 kV)
2.	Rated current	1000 [A]
3.	Peak current	50 [kA]
4.	Short-circuit current, 1 sec.	20 [kA]
5.	Test voltage (50 Hz) for insulation: - to earth and between phases, - between contacts of one pole	70 [kV] (95 kV) 80 [kV] (120 kV)
6.	Surge test voltage for insulation: - to earth and between phases, - between contacts of one pole.	170 [kV] (190 kV) 195 [kV] (220 kV)
7.	Peak current of the earthing switch	63 [kA]
8.	Short-circuit current of the earthing switch, 1 sec.	25 [kA]
9.	Rated mechanical operating life:	2000 cykli
10.	Dedicated operating mechanism: - motor, - manual.	NS080 NR-5

3. INSTALLATION AND ADJUSTMENT

Persons performing switching activities should have adequate professional qualifications and experience in servicing high-voltage equipment. When switching disconnectors or their earthing switches (if installed) all health and safety regulations in force at the place where they are installed have to be obeyed.

Before switching (closing or opening) of the disconnector or its earthing switch, one should ensure that the switching is permissible, taking into account the conditions indicated above and the arrangement conditions of the switchgear.

The disconnectors are delivered to the recipient in modules (single poles are already regulated).

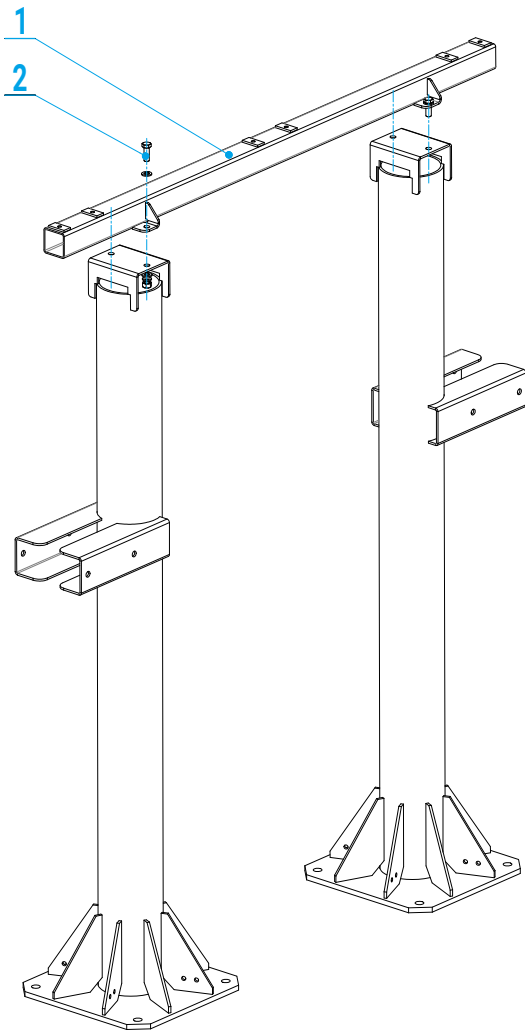
Installation is limited to:

- a) installing and leveling the supporting beam on the supporting structure
- b) installing the poles on the supporting beam
- c) installing the pulling rods engaging the poles
- d) installing and engaging the operating mechanism with the disconnector
- e) installing the earthing switches (if such occur)
- f) installing and engaging the operating mechanism with the earthing switch

3.1. Preparation of the supporting structure

The ONIII0 disconnectors are destined to work in a vertical position. Keeping the appropriate insulating-to-earth distances should be taken into consideration in the construction plan and the structure should have sufficient rigidity.

3.2. Supporting beam installation



Used items:

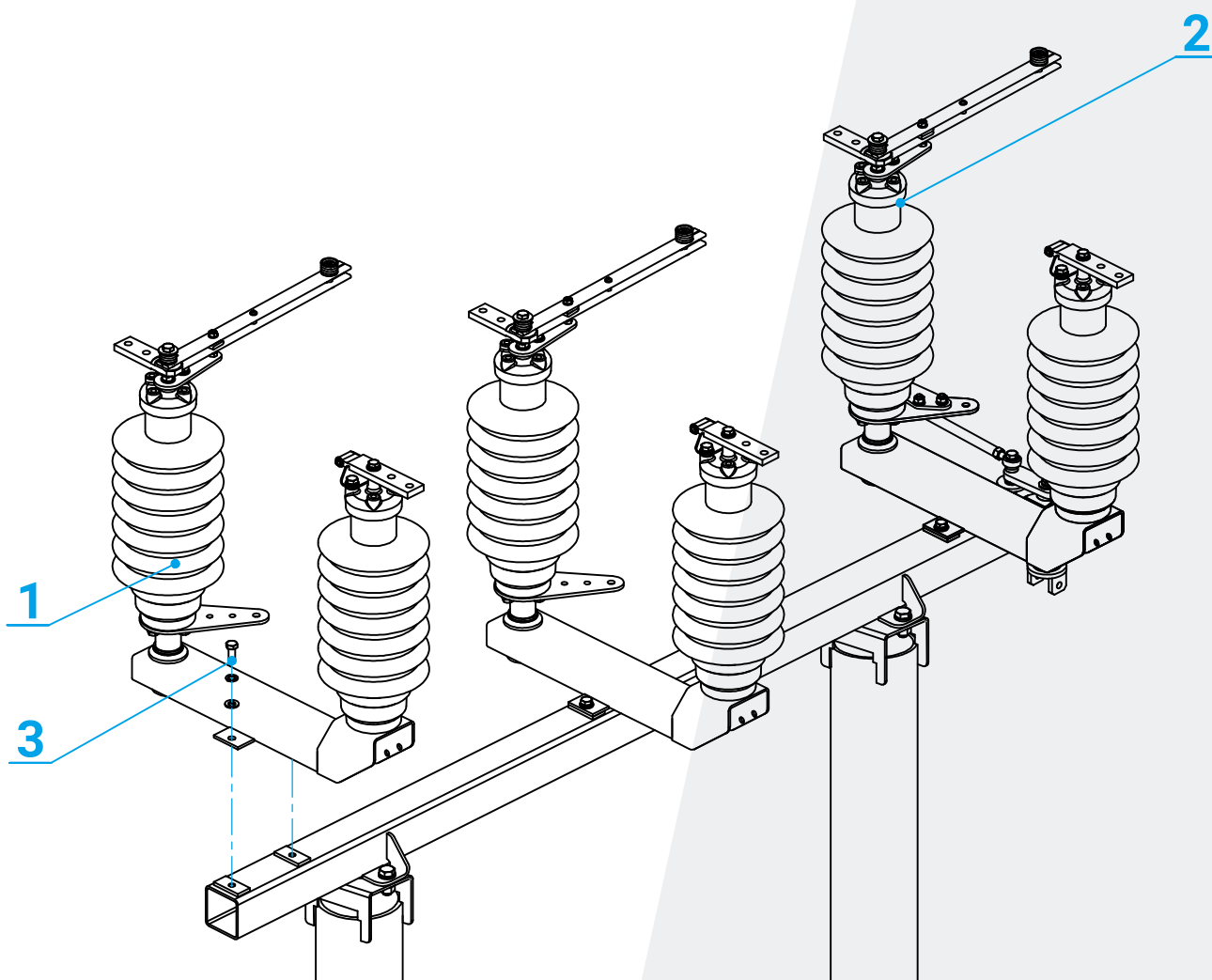
- 1.** Supporting beam – 1 pc.
- 2.** Screw M16 – 4 pcs.
- Washer 16 – 8 pcs.
- Resilient washer 16 – 4 pcs.
- Nut M16 – 4 pcs.

After installing the base please check level of both planes.

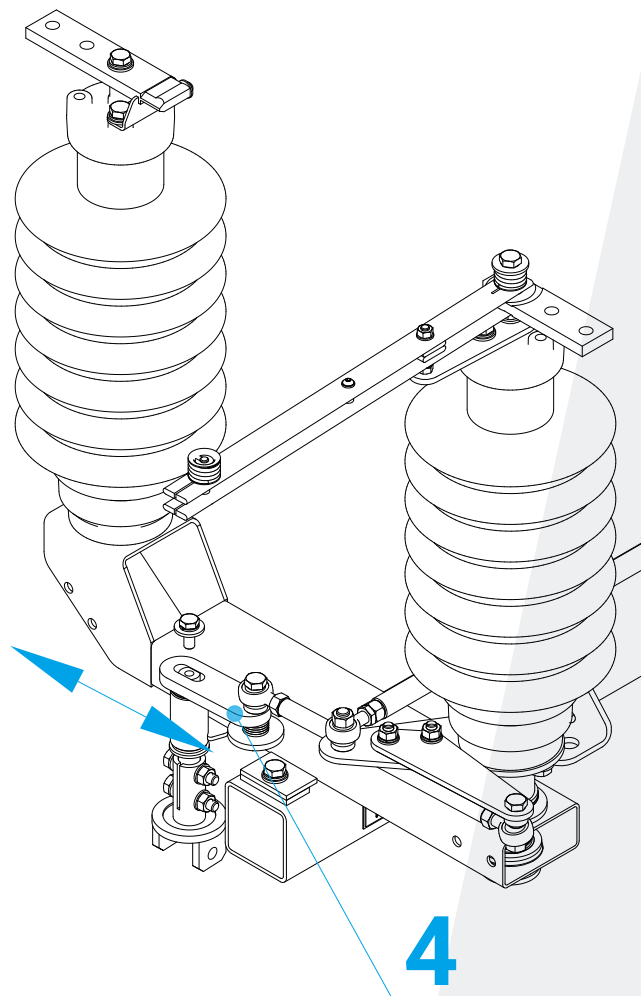
3.3. Poles installation

Used items:

- 1. Disconnecter pole – 2 pcs.
- 2. Driving pole – 1 pc.
- 3. Screw M12x25 – 6 pcs.
- Washer 13 – 6 pcs.
- Resilient washer 12 – 6 pcs.
- Nut M16 – 4 pcs.

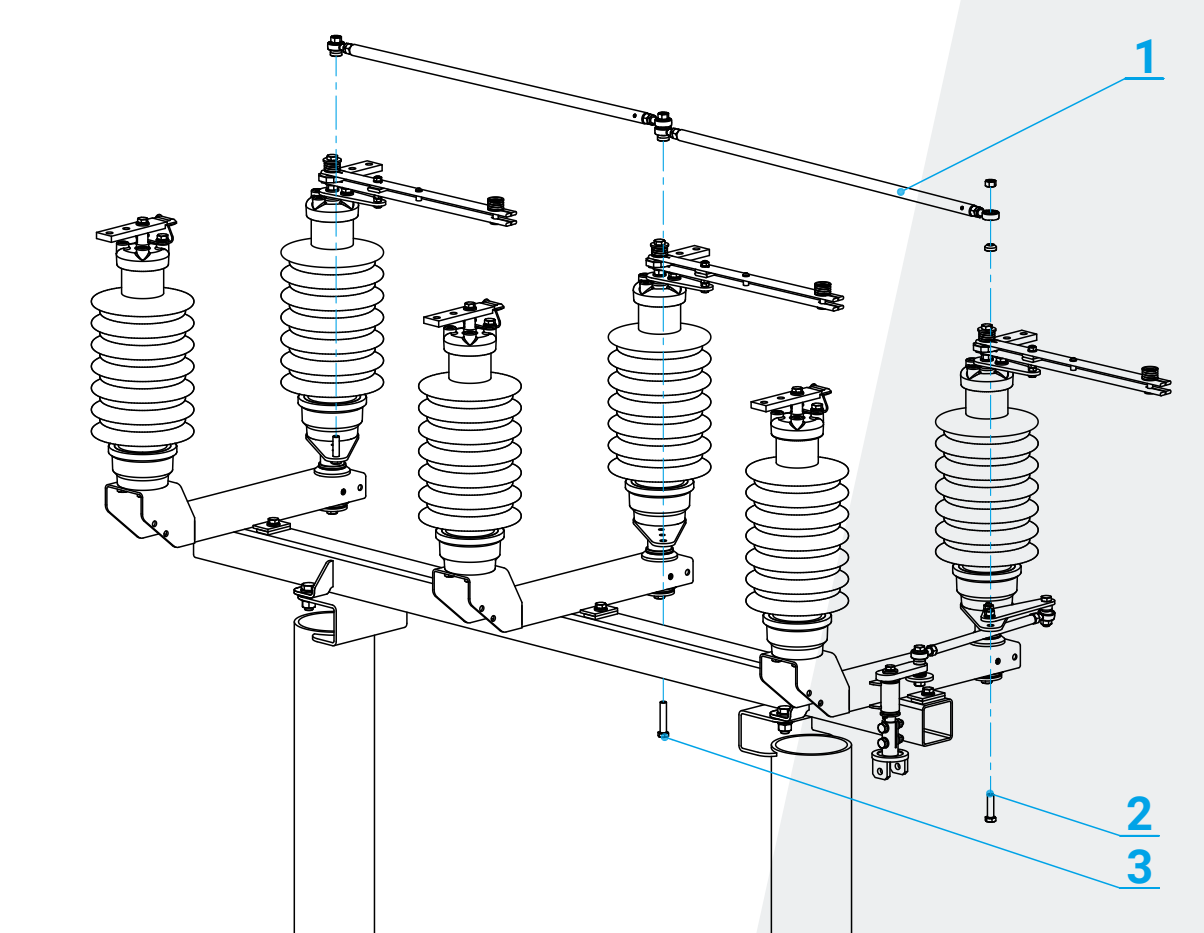


If needed, please regulate the driving crank [4], so that the contact would open and close properly.



3.4. Poles engaging

After setting the driving crank, the pulling rods coupling the poles have to be put on and their length adequately regulated.

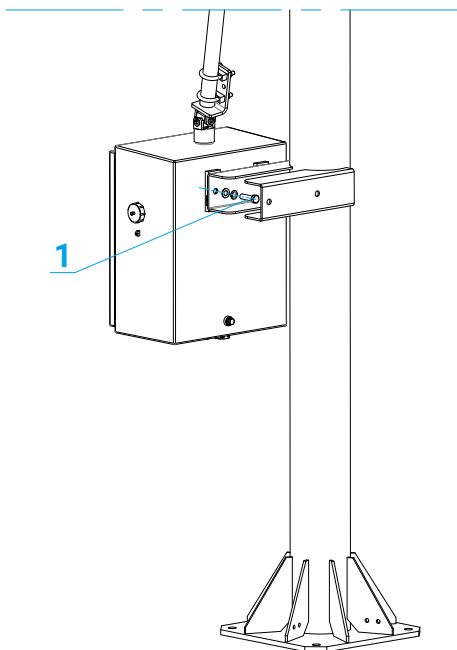


Used items:

- 1.** Pulling rod – 2 pcs.
- 2.** Screw M12x45 – 2 pcs.
 - Sleeve – 3 pcs.
 - Nut M12 – 3 pcs.
- 3.** Screw M12x60 – 1 pc.

3.5. Operating mechanism installation

The operating mechanism has to be attached to the support with screws, as shown in the illustration.

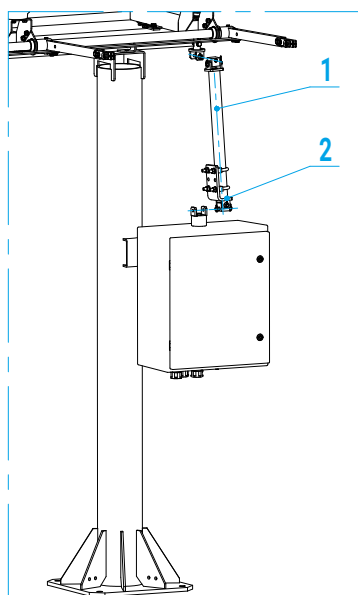


Used items:

- 1. Screw M16x45 – 2 pcs.
- Washer 17 – 2 pcs.
- Resilient washer 16 – 2 pcs.

3.6. Driving shaft installation

After mounting the operating mechanism on the support, the mechanism has to be coupled with the disconnect using the driving shaft.

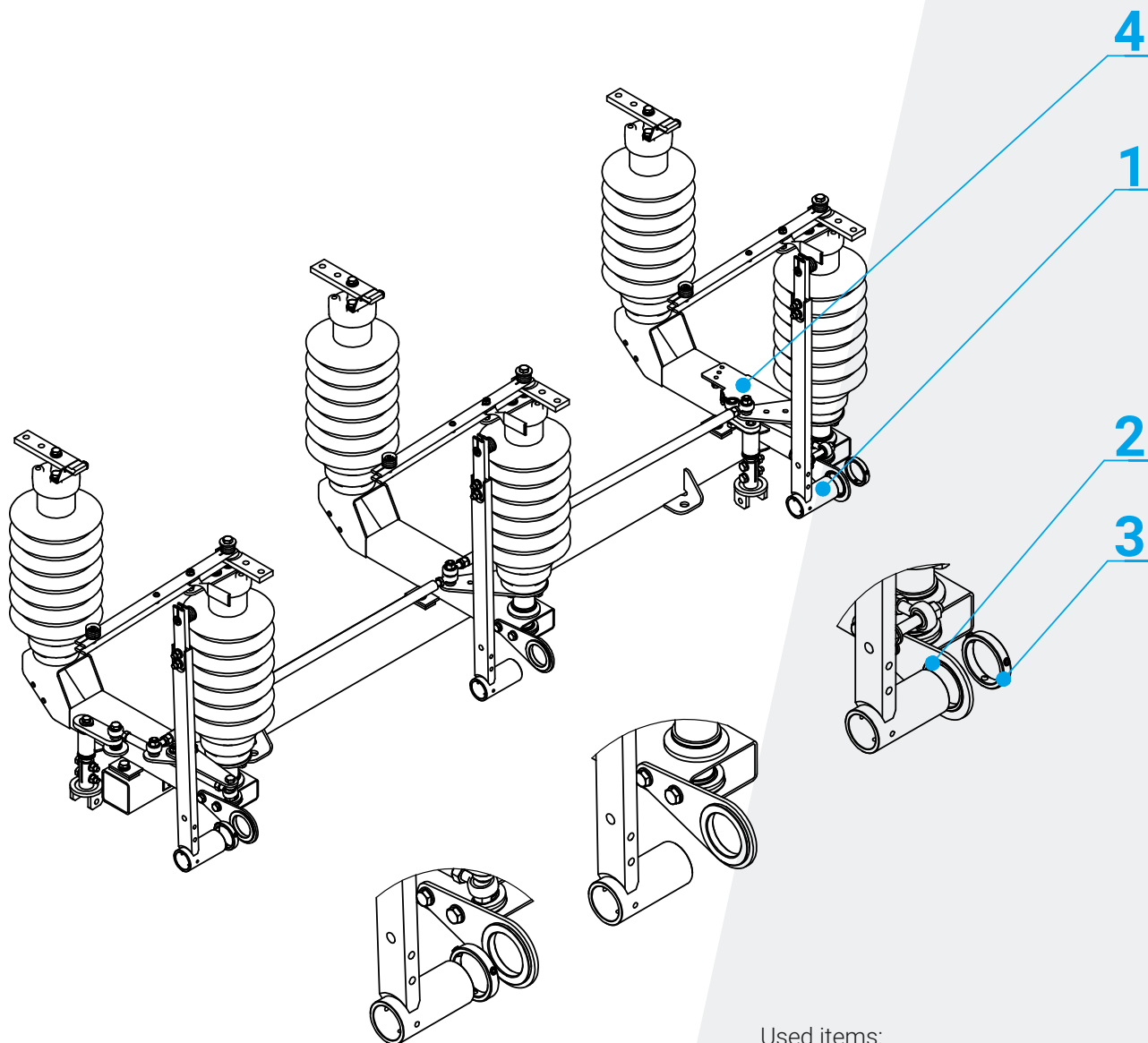


Used items:

- 1. Driving shaft – 1 pc.
- 2. Ball joint – 1 pc.

3.7. Earthing switch installation

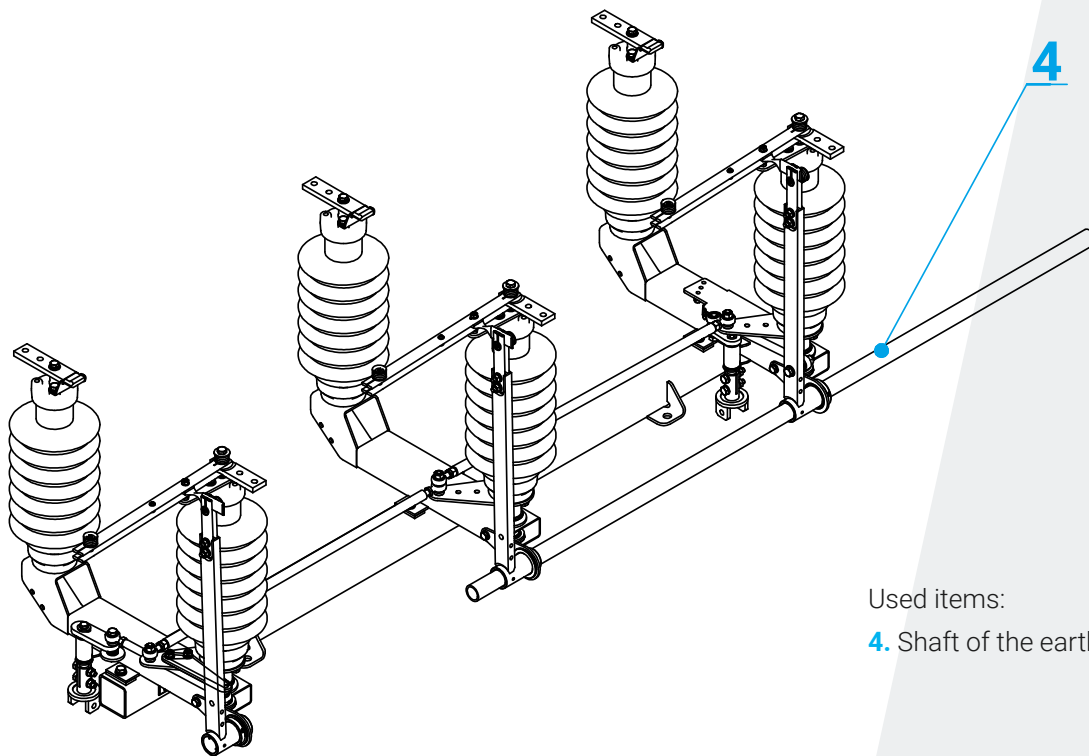
First, the earthing blades [1] need to be set, along with bearings [2] and retainer rings [3], as shown below.



Used items:

- 1. Earthing blade – 3 pcs.
- 2. Bearing – 3 pcs.
- 3. Retainer ring – 2 pcs.
- 4. Pole with interlock

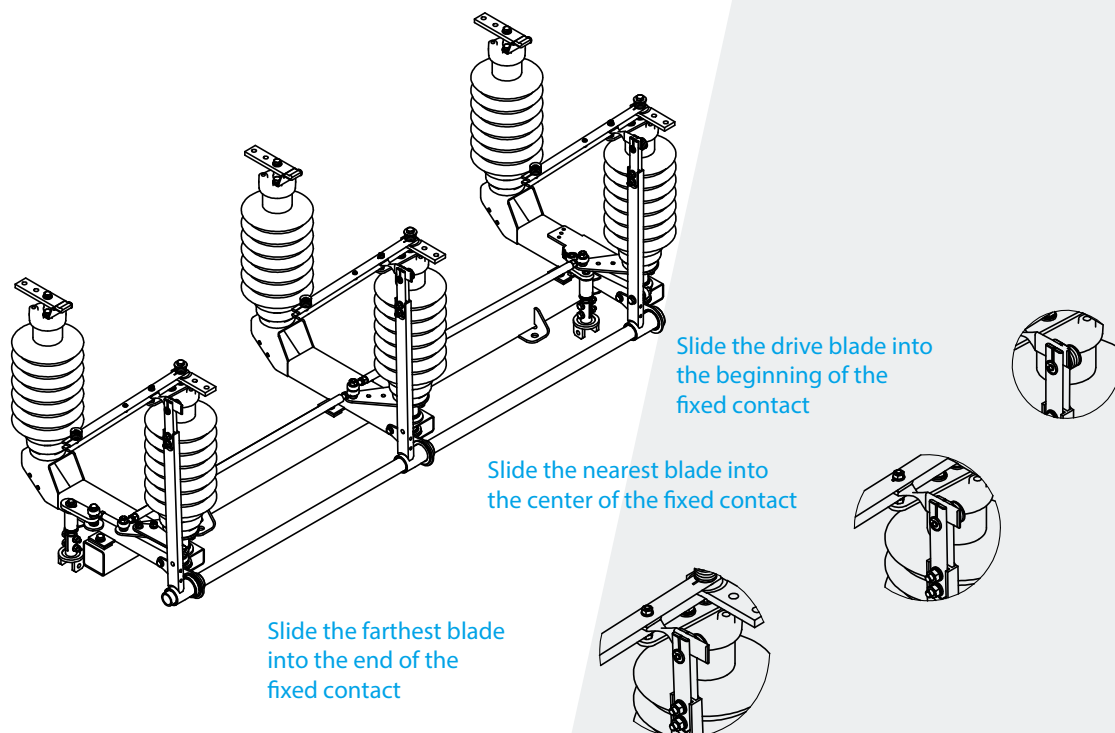
Then, the shaft [4] of the earthing switch needs to be put in, just like illustrated in the picture below.



Used items:

- 4. Shaft of the earthing switch – 1 pc.

The blades of the earthing switch have to be set according to the picture below.



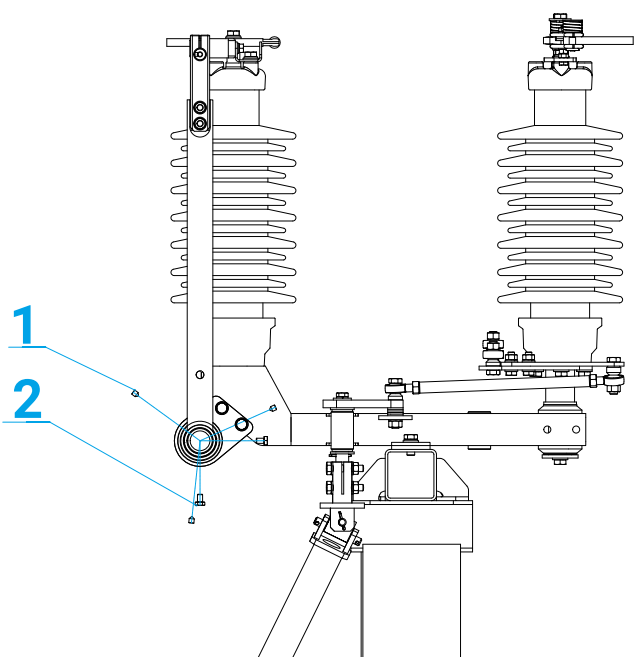
Slide the drive blade into the beginning of the fixed contact

Slide the nearest blade into the center of the fixed contact

Slide the farthest blade into the end of the fixed contact

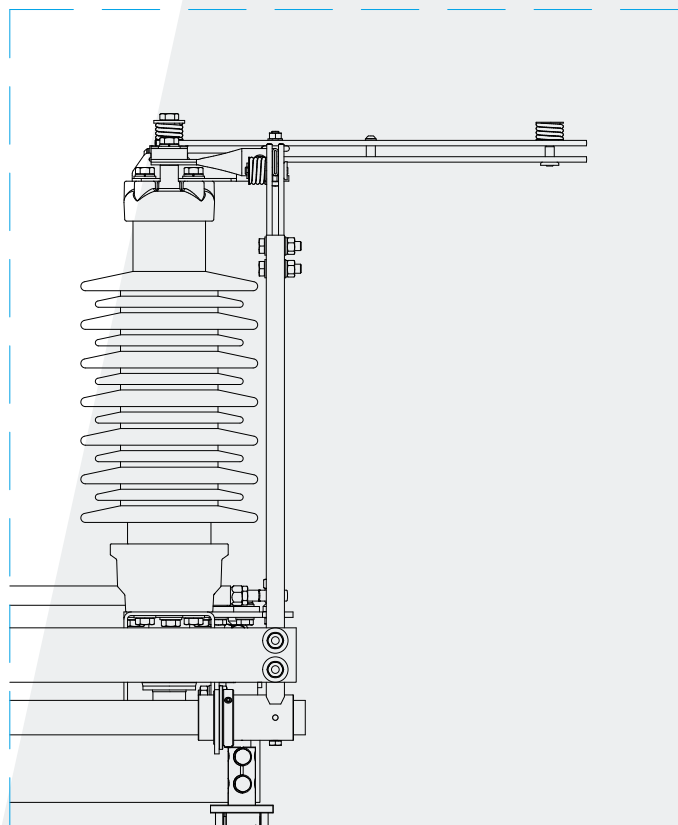
3.8. Earthing blades installation.

After the proper setting, the retainer rings need to be screwed to the farthest earthing blades using the pressure screws M8x10, as shown in the illustration. Each earthing blade has to be attached to the shaft with M8x12 screws. To do this, holes for the screws have to be drilled and threaded where the holes on the earthing blade occur. Then screw in two screws for each blade.



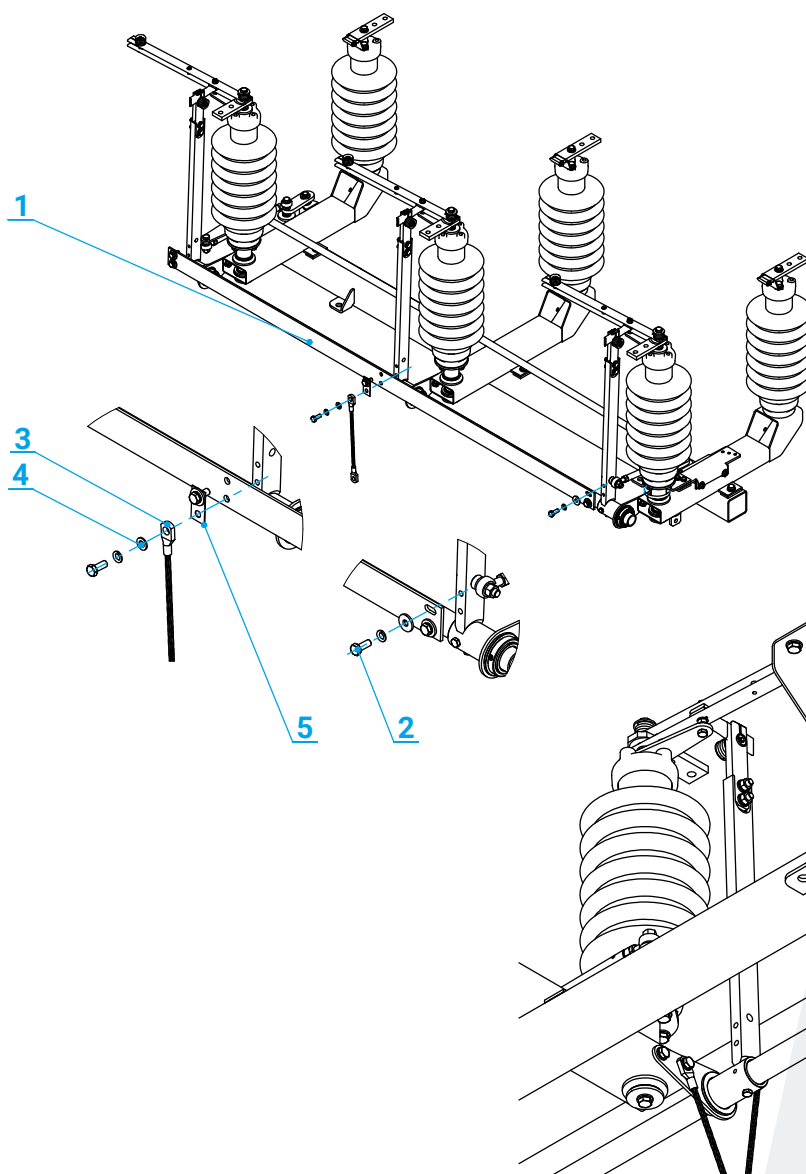
Used items:

1. Screw M8x12 – 6 pcs.
2. Pressure screw M8x10 – 6 pcs.



3.9. Earthing busbar installation

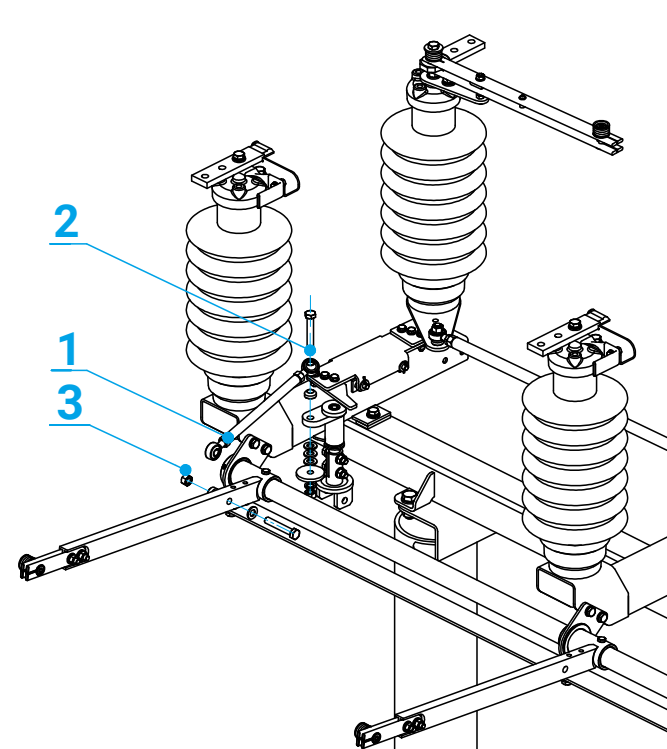
Next step is attaching the earthing busbar [1] and the earthing linkwire [3] to the earthing blades. This has to be done according to the illustration below



Used items:

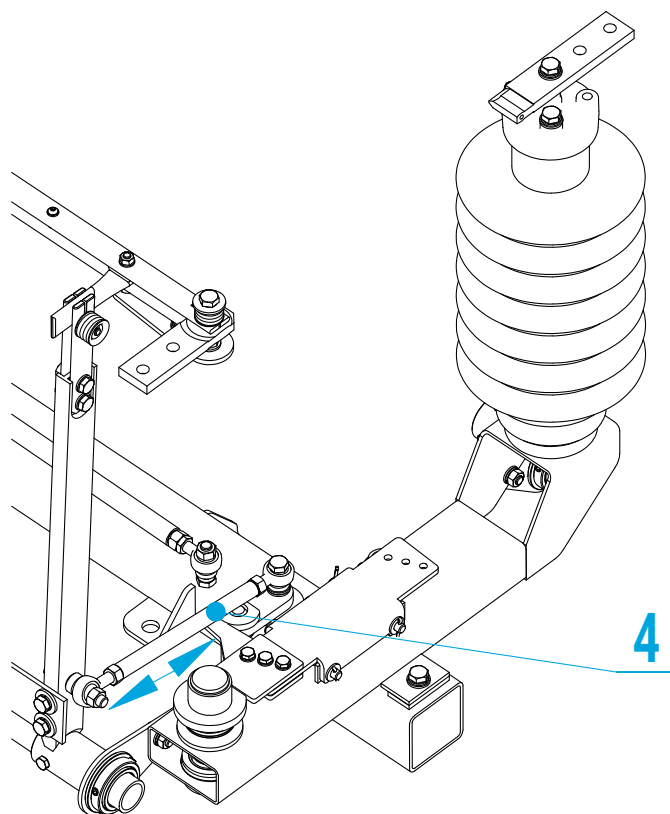
1. Earthing busbar – 1 pc.
2. Screw M10x25 – 6 pcs.
- Supersized washer 10 – 5 pcs.
- Resilient washer 10 – 6 pcs.
3. Earthing linkwire – 1 pc.
4. Washer 10 – 1 pc.
5. Washer Cu/Al – 1 pc.

3.10. Earthing switch installation



Used items:

- 1.** Driving tie rod - 1 pc.
- 2.** Screw M12x70 - 1 pc.
 - Sleeve - 1 pc.
 - Washer 13 - 3 pcs.
 - Bumper - 1 pc.
 - Resilient washer 12 - 1 pc.
 - Nut M12 - 1 pc.
- 3.** Screw M12x70 - 1 pc.
 - Washer 13 - 1 pc.
 - Sleeve - 1 pc.
 - Nut M12 - 1 pc.



If needed, the length of the driving crank[4] has to be regulated, so the earthing switch opens and closes properly.

4. OPERATING MANUAL

.....○ **WARNING!**

Before putting disconnectors into service under voltage, the user should make sure that the assembly has been made correctly and check that the condition of the disconnectors and operating mechanisms as well as the method and place of installation correspond to the conditions of safe operation. In particular, it is necessary to inspect the apparatus paying attention to the condition of insulators, contacts and correct tightening of screw connections.

Failure to perform inspection activities can lead to serious breakdowns of switchgears. In case of difficulties, adjustment should be ordered from the manufacturer.

During the switching operations, it is advisable to do visual inspection of disconnector in each case, paying attention to the correct achievement of limit positions by the apparatus, as well as the condition of the insulators contamination, main contacts connections and operating mechanisms condition.

In case of finding any significant faults that could damage the disconnector or threaten the safety of operation, the disconnector should be immediately disconnected from voltage and the faults should be removed.

4.1. Periodic inspections

It is recommended that disconnector inspections be carried out during periodic inspections of the indoor switchgear. During inspections should be checked in particular:

- condition of insulators, special attention should be paid to contamination of their surfaces and possible mechanical damages (scratches, cracks, etc.);
- main contacts condition paying attention to possible damage (traces of melting, silver coating defects) in places of their mutual contacts.

4.2 . Permitted repairs carried out by the user.

Disconnecter repairs performed if necessary by the user should not go beyond the adjustment of contacts and mechanisms conditioning the proper operation of the apparatus.

More complicated repairs requiring dismantling of the disconnecter can only be carried out by the manufacturer. The manufacturer is not responsible for the work of disconnecters repaired by the user, if the repair included the performance of actions without consulting the manufacturer.

5. MAINTENANCE

Maintenance of the disconnecter is recommended to be carried out after each inspection.

The scope of maintenance includes:

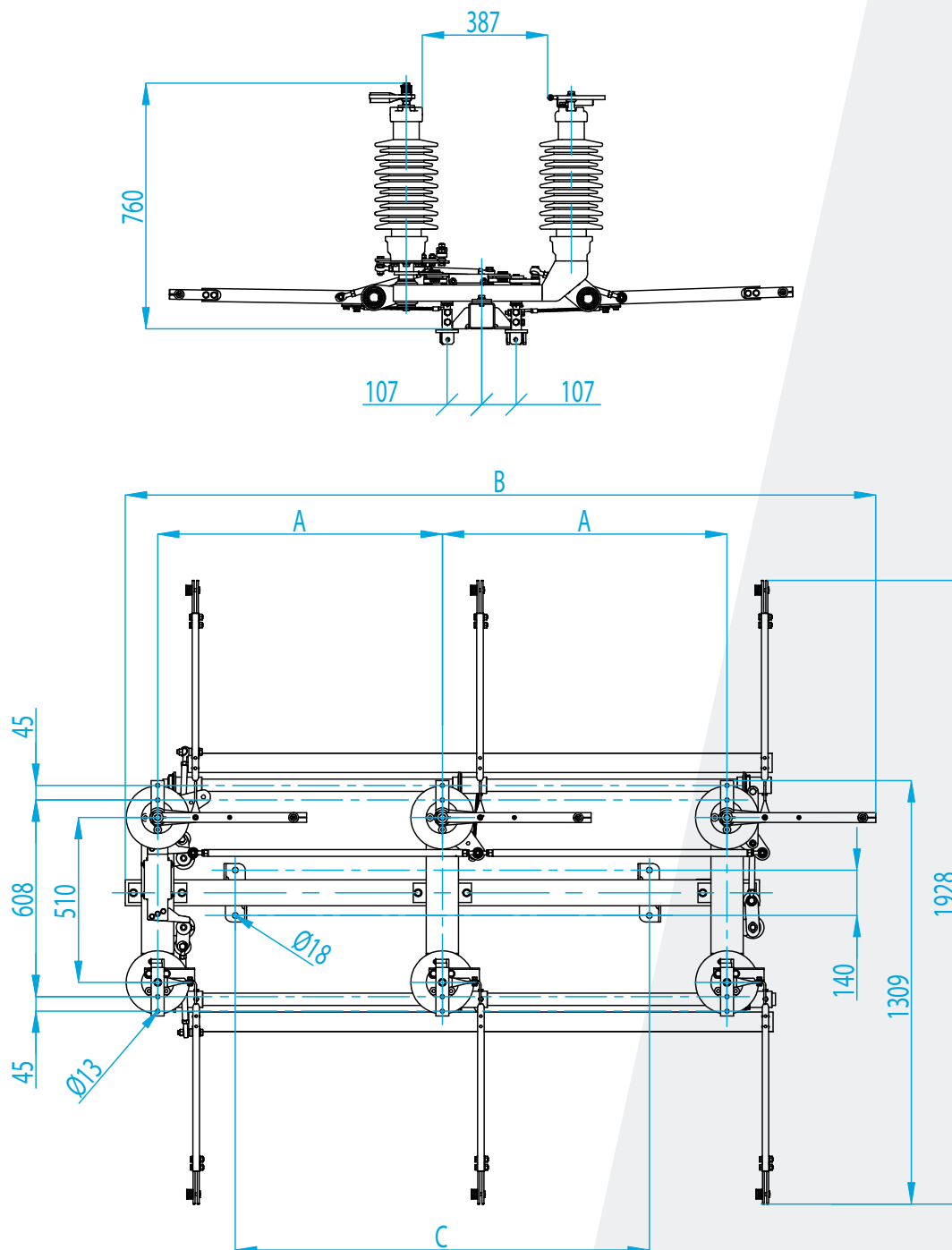
- cleaning insulators using such tools and cleaning substances that do not cause damage to their surface. For cleaning, a soft, lint-free cloth should be used.
- lubrication of main contacts with MobilGrease 28
- replacement of contacts in the case when the surfaces of their mutual contact are significantly damaged;
- tightening of loose screw connections if needed;
- complement of damaged protective coatings.

5.1. Regular tests

After the inspection, maintenance and possible repair of the disconnecter, each time it is necessary to check the correctness of apparatus mechanical action and if necessary - perform adequate adjustment of mechanisms. It is also recommended, especially in the case of doubts regarding the assessment of surface damage of the main contacts at places of their mutual contact, to additionally check the resistance of the main current path. This is especially important for disconnecters that conduct continuous currents with values close to their rated current. The measured resistances should not exceed the values given in the following table 1.

Measurements of resistance of disconnecter's current path and isolation should be carried out in accordance with the regulations in force in the power industry.

6. DIMENSION DRAWING



A	B	C
880 mm	2320 mm	1280 mm
1000 mm	2560 mm	1520 mm
1200 mm	2960 mm	1920 mm



7. UTILIZATION

The ONIII O type disconnecter is made of materials that are recyclable.

The main materials from which the disconnecters are built are:

- steel (painted, galvanized);
- copper (painted, silver-plated);

The disconnecters do not contain any dangerous substances. In accordance with applicable regulations, it is possible to return a worn out, complete disconnector to the manufacturer.

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