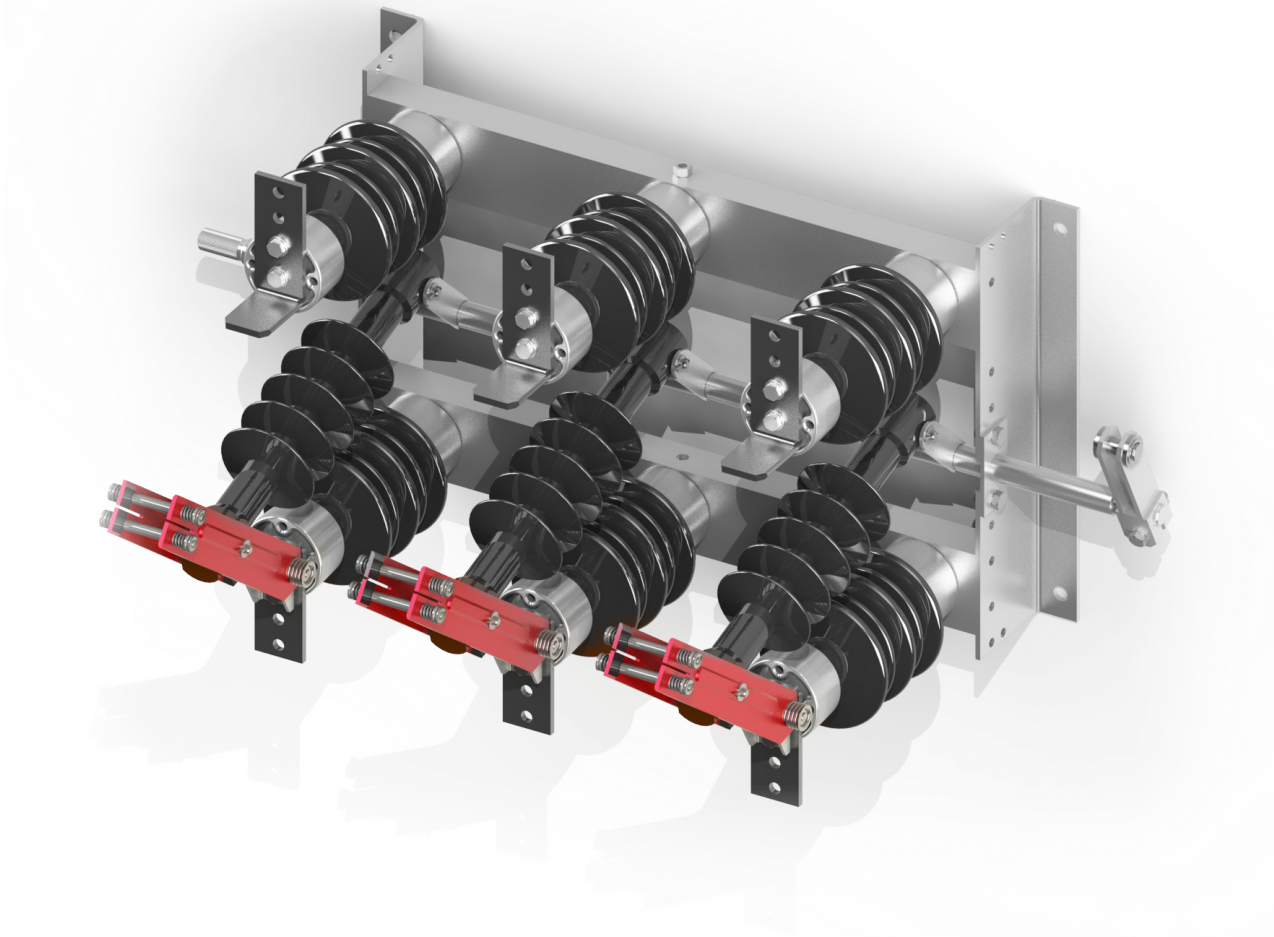
Zakład Wytwórczy Aparatów Elektrycznych Sp. z o.o.

INSTALLATION AND SERVICE MANUAL



ONIIS

Outdoor disconnector

Manual No DTR.01.03.03.EN

We connect with ENERGY

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.

Disconnectors are delivered on a transport pallet, to which they are screwed. When transporting the disconnector, excessive shocks should be avoided. Disconnectors are delivered to the customer in a completely assembled and adjusted condition.

Before moving the disconnector from the pallet to another place, four screws have to be unscrewed.

Disconnector should be moved by grabbing the base frame. It is unacceptable to lift the disconnector by grabbing the current paths.

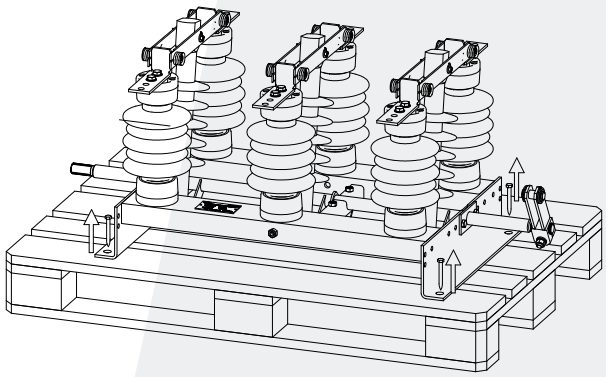


Figure 1 ONIIIS disconnector on the transport pallet screwed with screws.

WARNING !

In case of disconnector equipped with earthing knives, the fastening screws (item 3) of the blockade ring (item 2) mounted on earthing knives's shaft, are loosen for delivery time, what allows the earthing knives to be closed (with closed disconnector's current path).

After unpacking the disconnector at the recipient, the earthing knives (item 1) should be open leaving the current path closed and the blockade ring should be re-positioned (item 2) and the screws tightened (item 3).

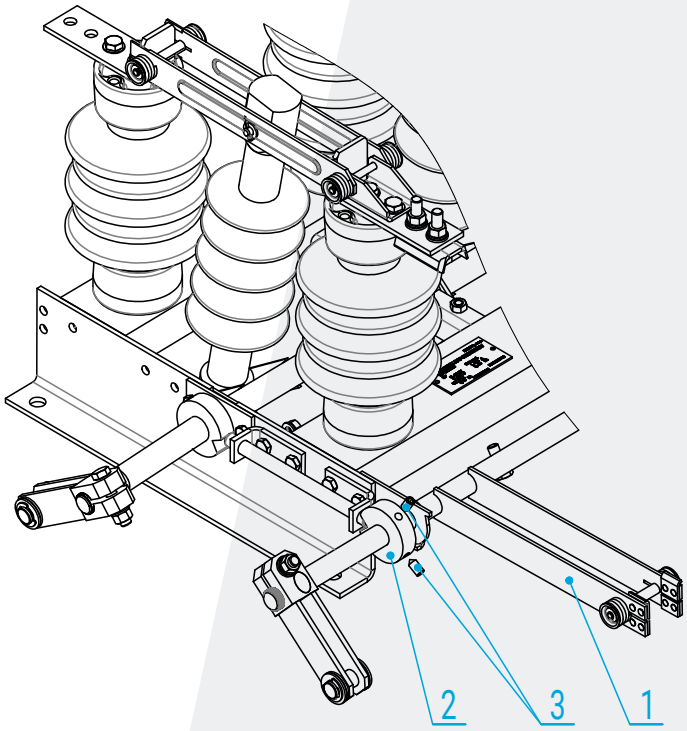


Figure 2 Regulation of disconnector's earthing switch.

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. It is not allowed to set the disconnectors directly on top of each other. It may damage the disconnector. The disconnector should be moved using straps as shown in the figure below.

Disconnectors should be stored indoors, in an atmosphere free from aggressive chemical agents.

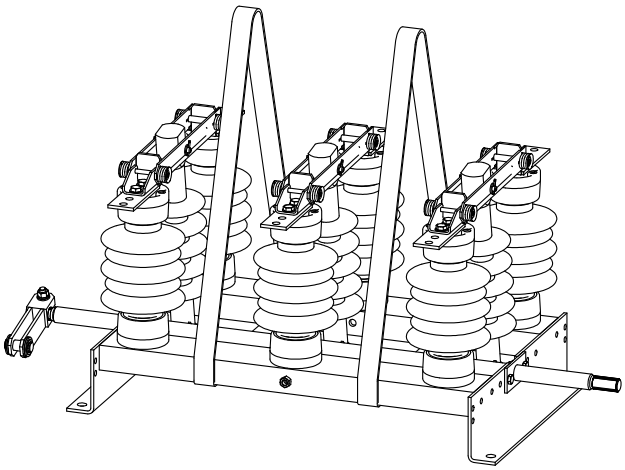


Figure 3 The way of moving the disconnector using straps.

2. DESCRIPTION

2.1. Application

The outdoor disconnectors of type ONIIIS are intended for usage in outdoor 24 kV and 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 ONIIIS disconnectors are switches with a vertical movement of knifes of the current path. The base frame of the disconnector (item 1) is a welded steel frame in which sides the main shaft (item 2) is mounted. On the transverse shelves of the base frame there are porcelain support insulators (item 3), on which there is a disconnector's current path consisting of two fixed contacts (item 4) bolted to the insulators and movable contact (item 5). The movable contacts of the current path are connected to the main shaft by the driving insulator (item 6). The rotary movement of the main shaft is transmitted through the driving insulator to the movable contacts, causing them to move in a plane perpendicular to the base frame. The pressure of the knives on the contacts is ensured by springs (item 7). The disconnectors have an earthing point to connect the grounding connection (item 8).

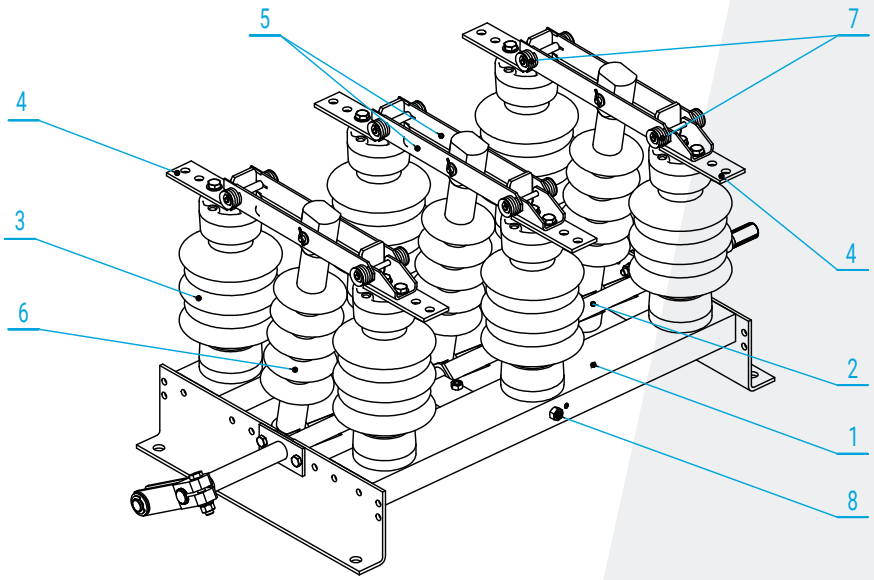


Figure 4 Outdoor disconnector type ONIIIS-24/800 (24 kV,800 A)

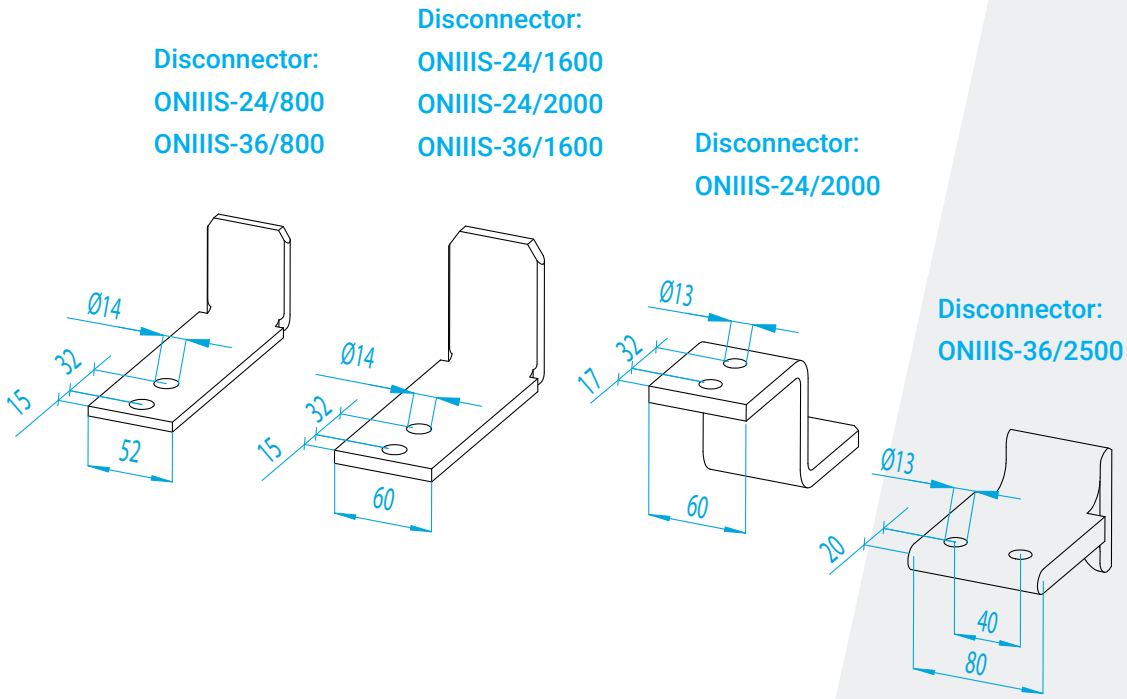
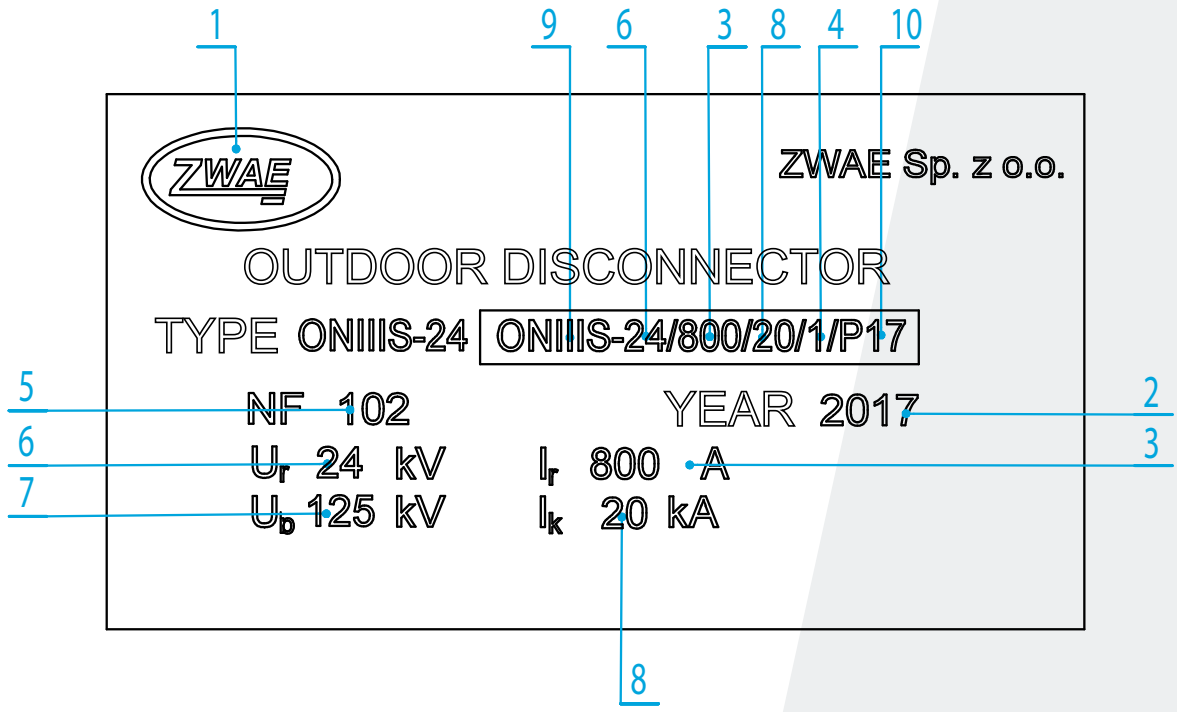


Figure 5 Types of terminals of ONIIIS type disconnector

2.3. Ambient conditions during operation

The ONIIIS 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 =800 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, 17 mm/kV

3. ACCESSORIES, ADDITIONAL EQUIPMENT

1. ONIIIS disconnector
2. Manual sliding operating mechanism NNP with fixing
3. Coupling tie rod
4. Supporting bracket
5. Clamp

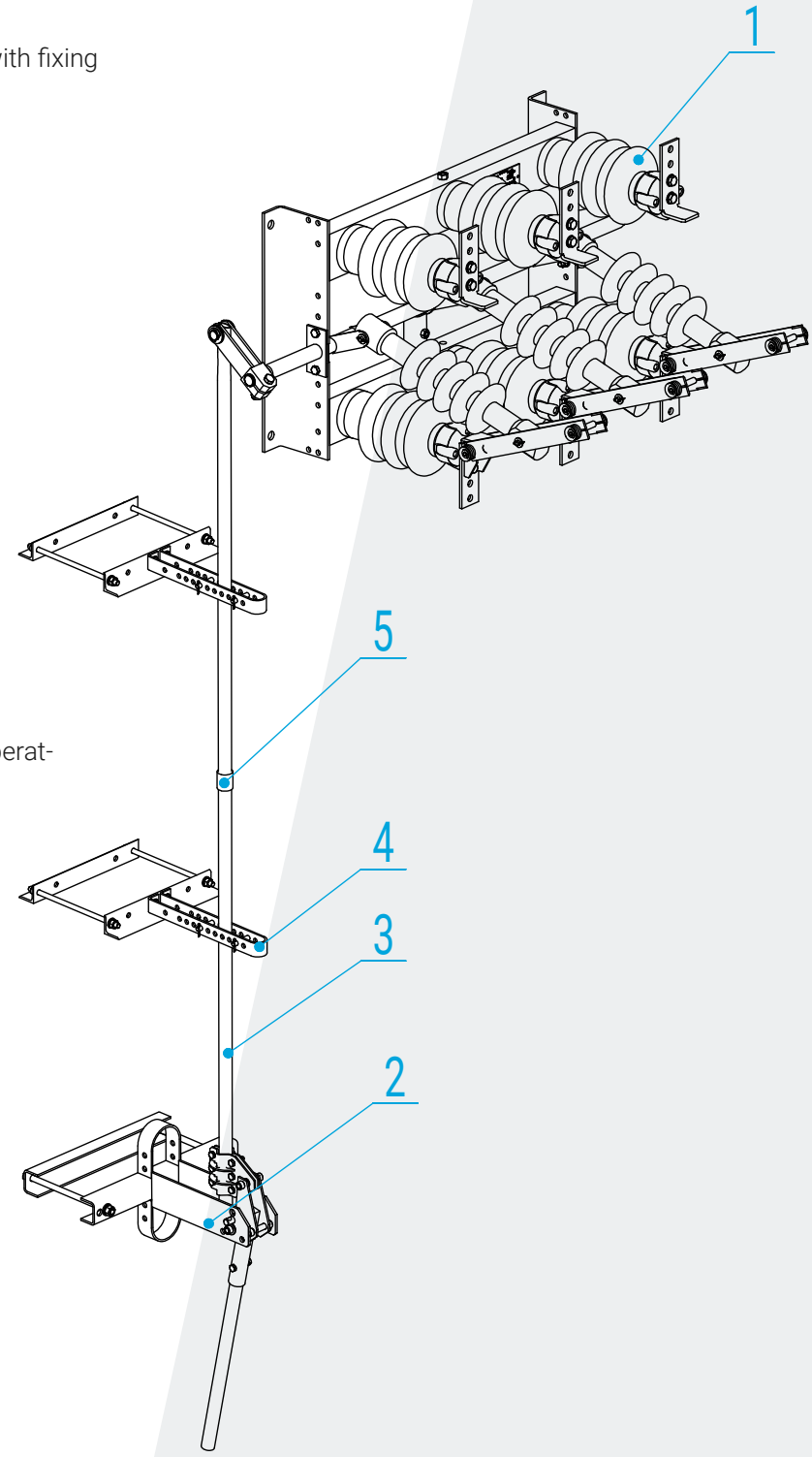


Figure 6 ONIIIS type disconnector with NNP operating mechanism mounted on the ZN pillar

1. ONIIIS disconnector
2. NR5S manual operating mechanism with fixing
3. Coupling tie rod
4. Supporting bracket
5. Clamp

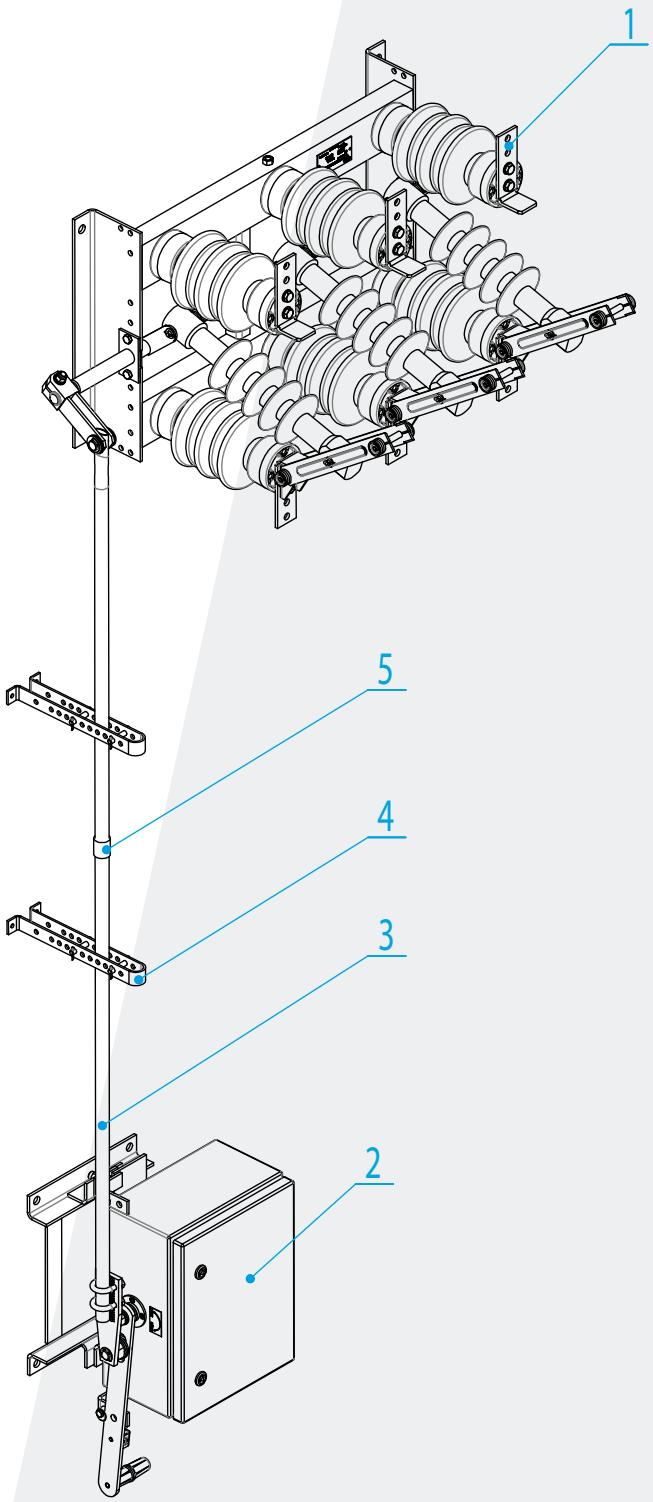


Figure 7 ONIIIS disconnector with a wall-mounted NR-5S operating mechanism

1. ONIIIS disconnector
2. NSL-60 motor operating mechanism with fixing
3. Coupling tie rod
4. Supporting bracket
5. Clamp

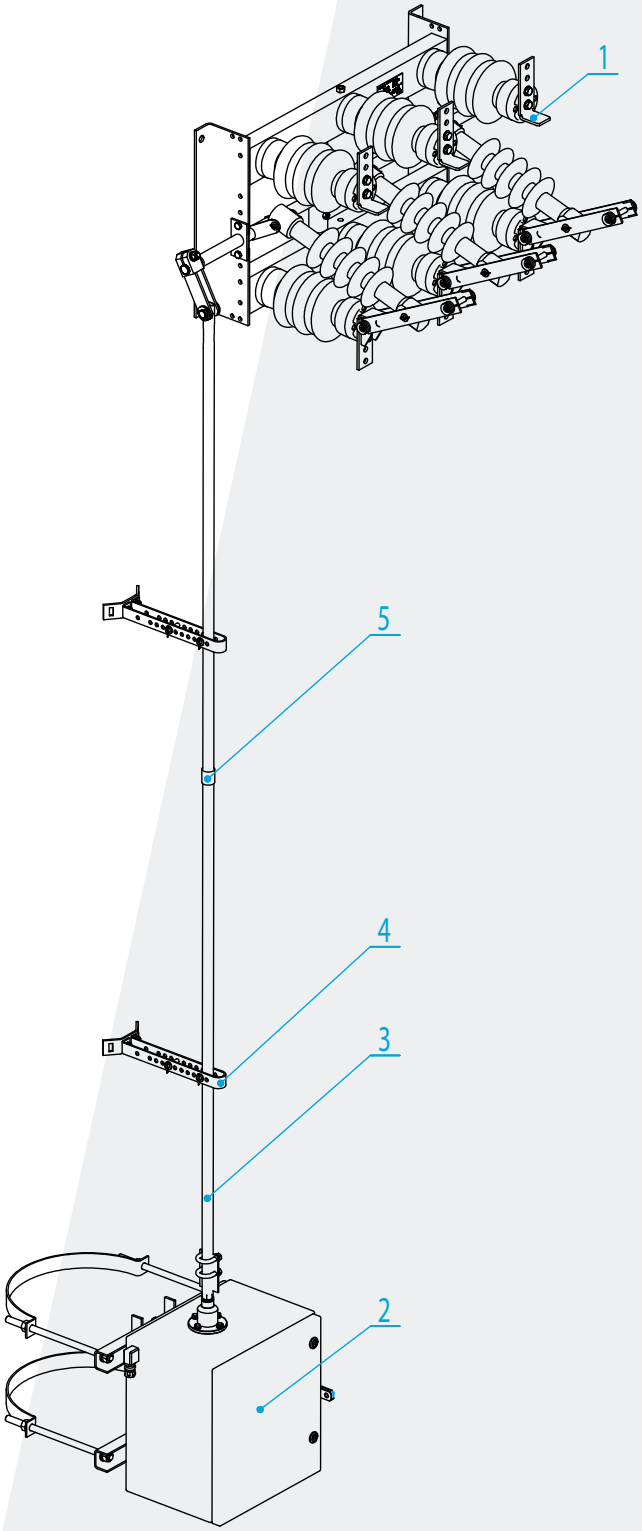


Figure 8 ONIIIS disconnector with NSL-60 operating mechanism mounted on a spun pillar.

4. INSTALLATION AND ADJUSTMENT

Persons performing switching activities should have adequate professional qualifications and experience in servicing high-voltage equipment. During moving the disconnector or its earthing switch (if equipped), the safety regulations must be obeyed at the installation site

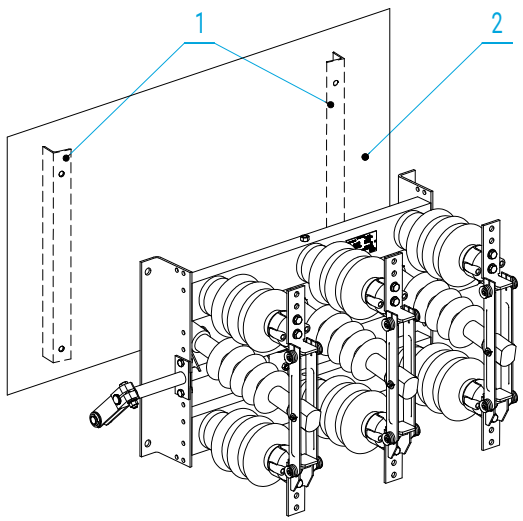
Before switching (closing or opening) of the disconnector or its earthing switch, one should ensure that the switching is permissible, taking into account the conditions indicated above and the arrangement conditions of the switchgear.

In the closed position of the disconnector, earthing switch, the lever of the operating mechanism should be directed upwards. The actuating lever for the operating mechanism (in the case of a sliding operating mechanism) must be turned downwards by 180 ° until it stops, causing the disconnector to open. When closing, the course of action is similar, except that the lever movement takes place in the opposite direction.

4.1. Preparation of the supporting structure and assembly ot the disconnector

ONIIIS disconnectors are intended for operation in horizontal and vertical positions, with movable contacts at the top. The design of the supporting structure should take into account keeping the appropriate insulation level to earth, and the construction itself should have adequate stiffness.

The base frame of the disconnector should be pre-screwed in three places (with three M16 bolts), and then optionally washers should be placed under the base frame to align the plane of the supporting structure. The contact points between the support structure and the disconnector's base frame should lie in one plane (pos.2).



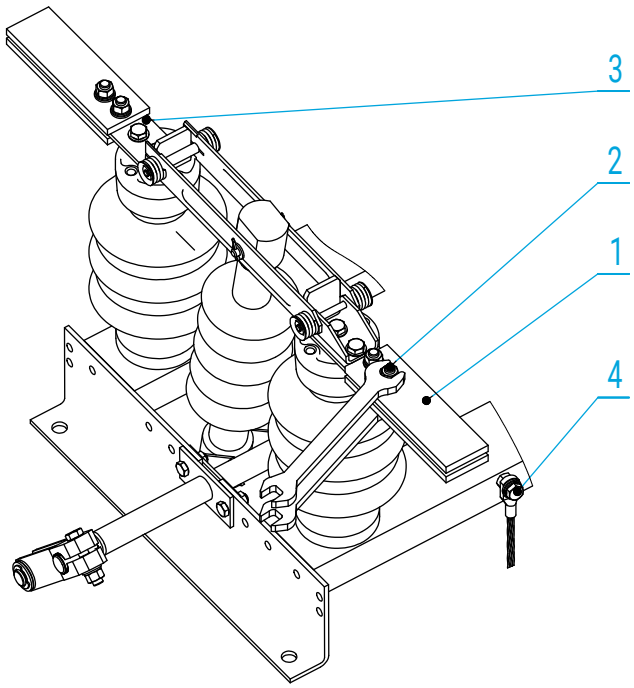
1. Elements of the supporting structure
2. The plane in which contact points of the supporting structure should be located.

Figure 9 Installation of the disconnector to the supporting structure.

4.2. Connecting feeding wires and grounding wire.

Before screwing the rails, the terminals (item 3) of the disconnector should be cleaned of any contamination by a method that does not damage the silver coatings. It is recommended to use a soft, lint-free cloth for this purpose. Next, one should lubricate the contact surfaces of terminals and rails with a thin layer of acid-free vaseline or other conductive grease. The screws (item 2) should be tightened carefully with a torque of 62 Nm using two wrenches. When tightening the screws, caution must be maintained to not change the settings of the disconnector itself. Slight change to the position of the terminal may cause the apparatus to work improperly.

The earthing conductor should be connected by using a screw (item 4) (torque 54 Nm) placed in the earthing point located on the shelf of the disconnector's base frame. The earthing point must be previously greased with acid-free vaseline.



1. Rail
2. Terminal's screw
3. Terminal
4. Earthing terminal screw

Figure 10 Screwing the rails and earthing conductor

5. 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.

5.1. 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;

5.2. Permitted repairs carried out by the user

Disconnector 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 disconnector can only be carried out by the manufacturer. The manufacturer is not responsible for the work of disconnectors repaired by the user, if the repair included the performance of actions without consulting the manufacturer.

6. MAINTENANCE

Maintenance of the disconnector 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 shoud be used a soft, lint-free cloth.
- 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.

6.1. Regular tests

After the inspection, maintenance and possible repair of the disconnector, 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 disconnectors 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 disconnector's current path and isolation should be carried out in accordance with the regulations in force in the power industry.

Current path resistance	Disconnector 24kV	Disconnector 36kV
phase L1, L2, L3	Rmax 65 μΩ	Rmax 70 μΩ

Table 1 Resistances of ONIIIS type disconnectors

7. UTILIZATION

The ONIIIS type disconnector is made of materials that are recyclable.
The main materials from which the disconnectors are built are:
- steel (painted, galvanized);
- copper (painted, silver-plated);

The disconnectors 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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