

UNIII

Outdoor HV earthing switch

Manual No DTR. 02.02.04.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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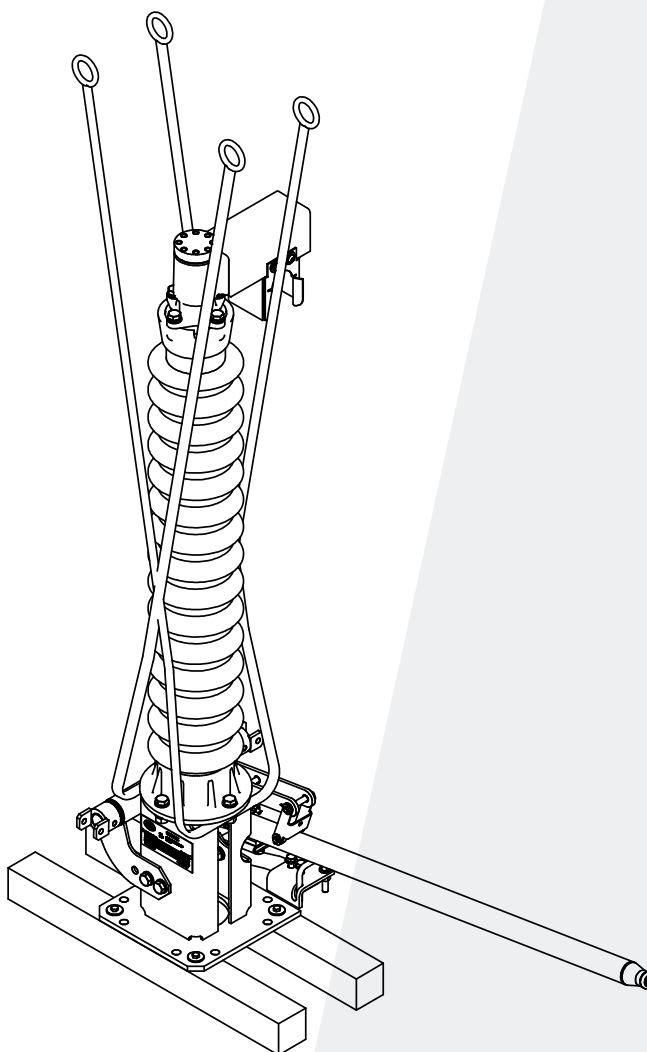
1. TRANSPORT

1.1. Unpacking and inspection

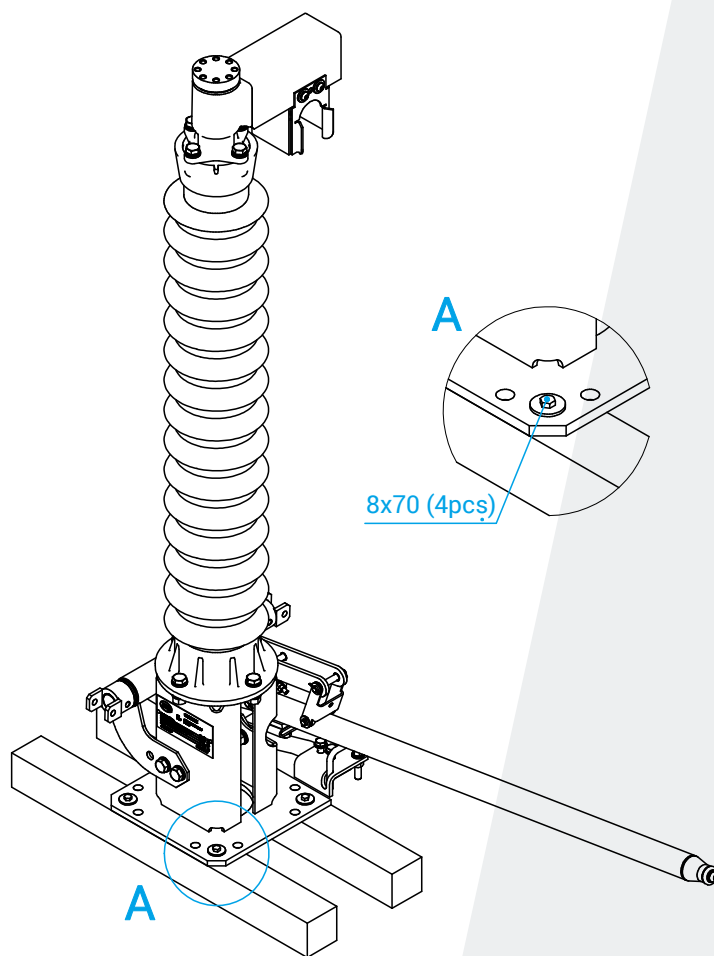
Immediately after receiving the earthing switch, the delivery compliance with packing list should be checked. Then check whether the earthing switch has not been mechanically damaged during transport and the data on the nameplate match with the order.

1.2. Storage and transport

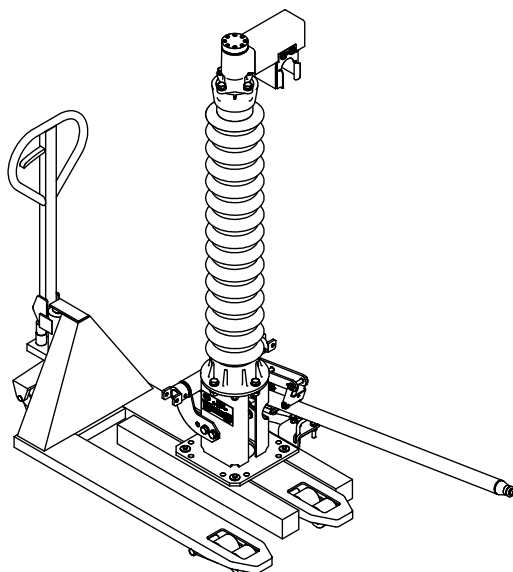
The earthing switch poles are transported in assembled condition (UNIII-72, UNIII-123, UNIII-145) or partially assembled (UNIII-245). During the unloading and assembly process, the earthing switch poles should be lifted using transport belts, placed in the manner shown in the following graphics.



During transport, earthing switches poles are placed on wooden beams, which should be removed immediately before placing the pole on the supporting structure, unscrewing the four screws with the key 13 for this purpose.



During transport the poles must be secured against tipping over and the movable contact of earthing switch should be open. Earthing switch can be transported by means of transport with open cargo area. On flat, hard, even surfaces, it is allowed to move the earthing switch poles using the pallet truck as shown below, with particular care to prevent the pole from tipping over.

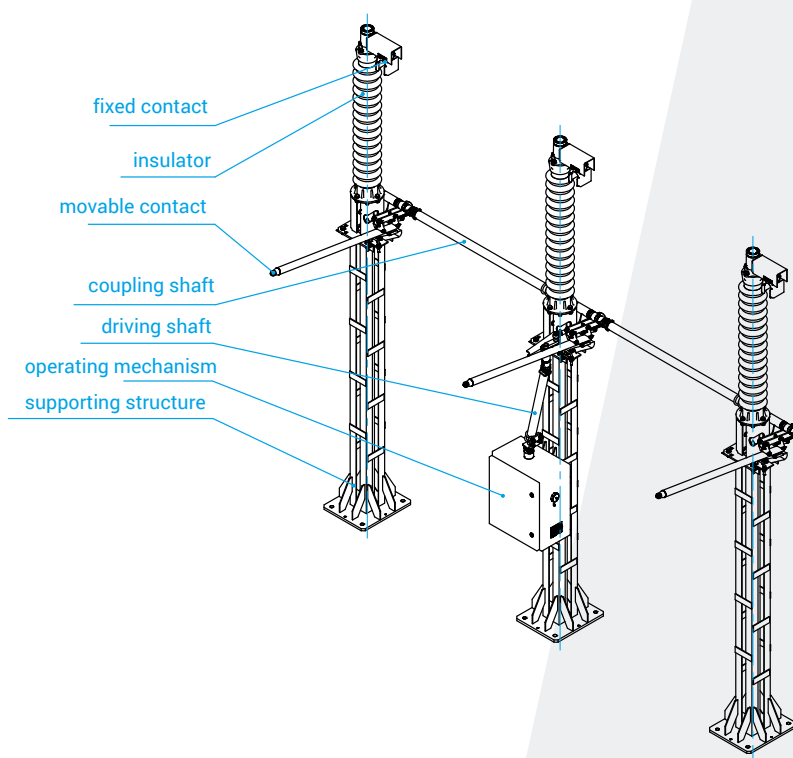


The earthing switch poles can be stored in an open space, but the poles should be set so that the base frame does not stand directly on the ground.

2. DESCRIPTION

2.1. Construction and principle of operation

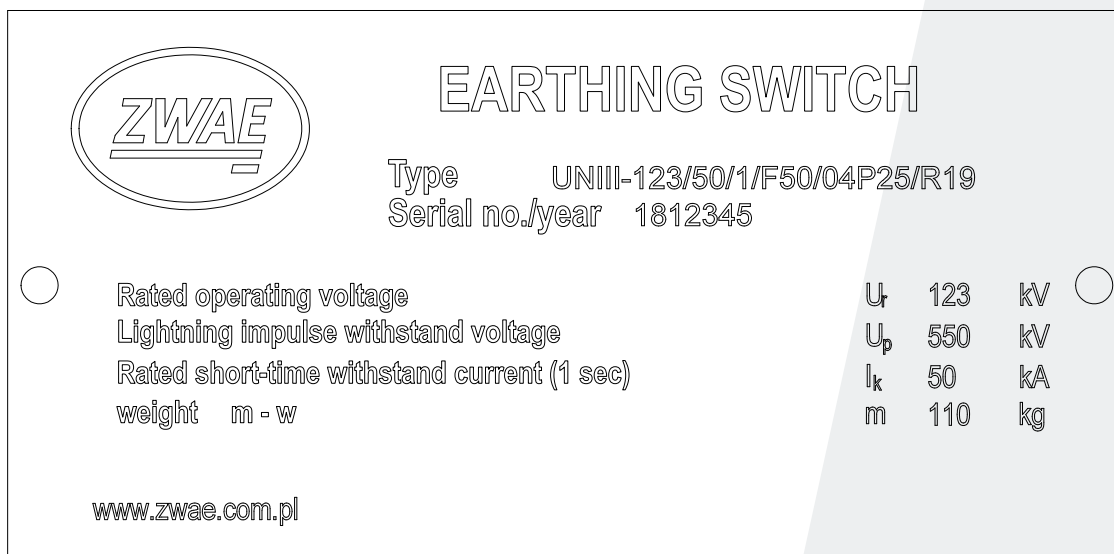
UNIII type outdoor earthing switch is an insulating connector with rotary contact movement in the vertical plane, intended for operation in networks with voltage corresponding to the nominal voltage, at frequencies up to 60 Hz inclusive. The earthing switch can be used as single pole switch with individual operating mechanism or in three pole unit with a common operating mechanism. The earthing switch poles can be set in parallel or in series. The sketch of the earthing switch in parallel configuration is shown below.



2.2. Climatic conditions

The earthing switch is adapted to outdoor work, at ambient temperature from -50 to +40 ° C and relative humidity up to 100%.

2.3. Nameplate



2.4. Basic technical parameters

No.	Parameter	Value			
1.	Rated operating voltage	72,5 [kV]	123 [kV]	145 [kV]	245 [kV]
2.	Peak current	125 [kA]	125 [kA]	125 [kA]	125 [kA]
3.	Short-circuit current, 1 sec.	50 [kA]	50 [kA]	50 [kA]	50 [kA]
4.	Test voltage (50 Hz) for insulation: - earth and pole to pole insulation, - contact to contact insulation.	140 [kV] 160 [kV]	230 [kV] 265 [kV]	275 [kV] 315 [kV]	460 [kV] 530 [kV]
5.	Surge test voltage for insulation: - earth and pole to pole insulation, - contact to contact insulation.	325 [kV] 375 [kV]	550 [kV] 630 [kV]	650 [kV] 750 [kV]	1050 [kV] 1200 [kV]
6.	Mechanical endurance	2000 cycles	2000 cycles	2000 cycles	2000 cycles
7.	Operating mechanisms: - motor - manual	NS080 NR-5	NS080 NR-5	NS080 NR-5	NS080 NR-5

3. INSTALLATION AND ADJUSTMENT

The earthing switch is fully adjusted and prepared for operation. Installation is limited to:

- a) setting poles on a supporting structure,
- b) operating mechanism mounting,
- c) driving pole regulation,
- d) coupling poles and regulation,
- e) grounding the base frames and operating mechanisms.

3.1. Preparing contact surfaces

The contact resistance of the connected elements depends primarily on the quality and cleanliness of the contacting surfaces. Therefore, these surfaces should be prepared very carefully. The method of preparing aluminum and silver contact surfaces is presented below:

- **aluminium – aluminium connection**

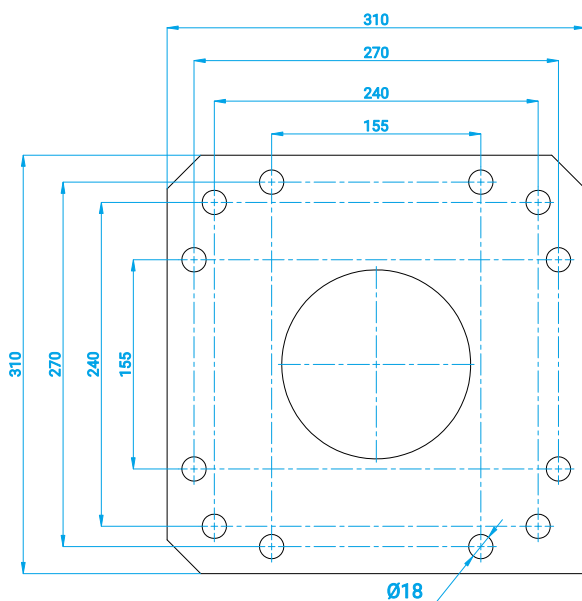
The oxide layer from the contact surface has to be removed with a wire brush. After this treatment, the surface should be matt gray, devoid of shiny areas. Any chips and aluminum dust has to be precisely removed from the surface, e.g. by lubricating with acid-free vaseline and then removing it. After this treatment, the surface should be greased with acid-free grease to protect it from oxidation of aluminum. So prepared surface should not be exposed to the atmosphere longer than the time needed to prepare the cooperating surface. So prepared surface should not be exposed to the atmosphere longer than the time needed to prepare the cooperating surface.

- **copper – silver connection**

The copper surfaces should be cleaned of oxides with a brass wire brush and then proceed as for the aluminum surface. Silvered surfaces do not need to be cleaned with a brush, but they can be cleaned with a delicate abrasive, e.g. steel wool. After cleaning, the surface should be covered with a thin layer of acid-free vaseline.

3.2. Poles setting

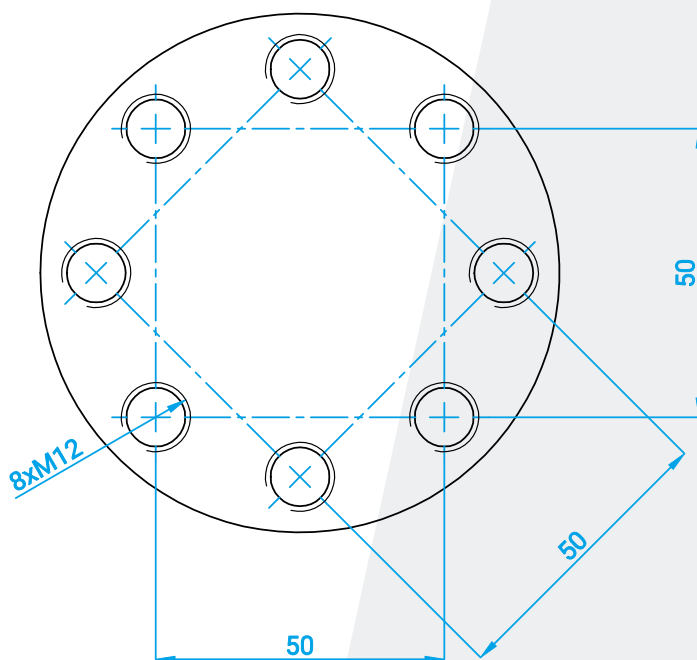
The earthing switch poles should be placed on the supporting structure, which has mounting holes in accordance with the drawing below.



The earthing base frame should be tightened with four M16 screws; any of four holes should be chosen from the base frame (one from each corner of it).

3.3. Connecting power cables

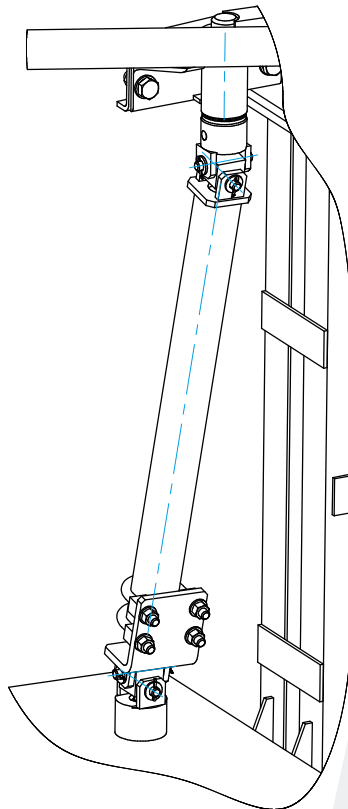
After tightening the earthing switch poles to the supporting structures, power cables have to be connected, remembering to clean off the contact surfaces. Power cables should be bolted with four M12 screws. The spacing of mounting holes is 50x50, as shown in the figure below.



Prepared mounting holes allow for tightening the cable from several directions in relation to the earthing switch. The direction of the cable entry does not affect the earthing switch operation. Tightening torque: M12 - 80 Nm, M16 - 100 Nm.

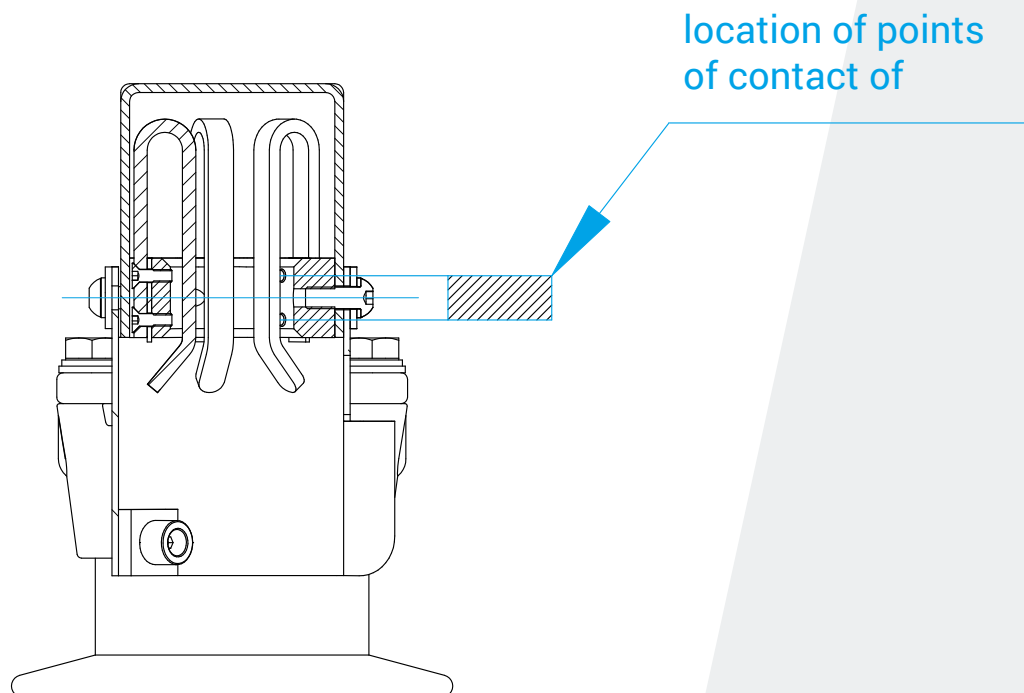
3.4. Mounting an operating mechanism

The operating mechanism should be mounted to the supporting structure, under the crank gear/crank drive located on the base frame of earthing switch. After the operating mechanism is suspended, a drive shaft must be mounted that connects the operating mechanism to the crank. The assembly method is shown in the figure below.

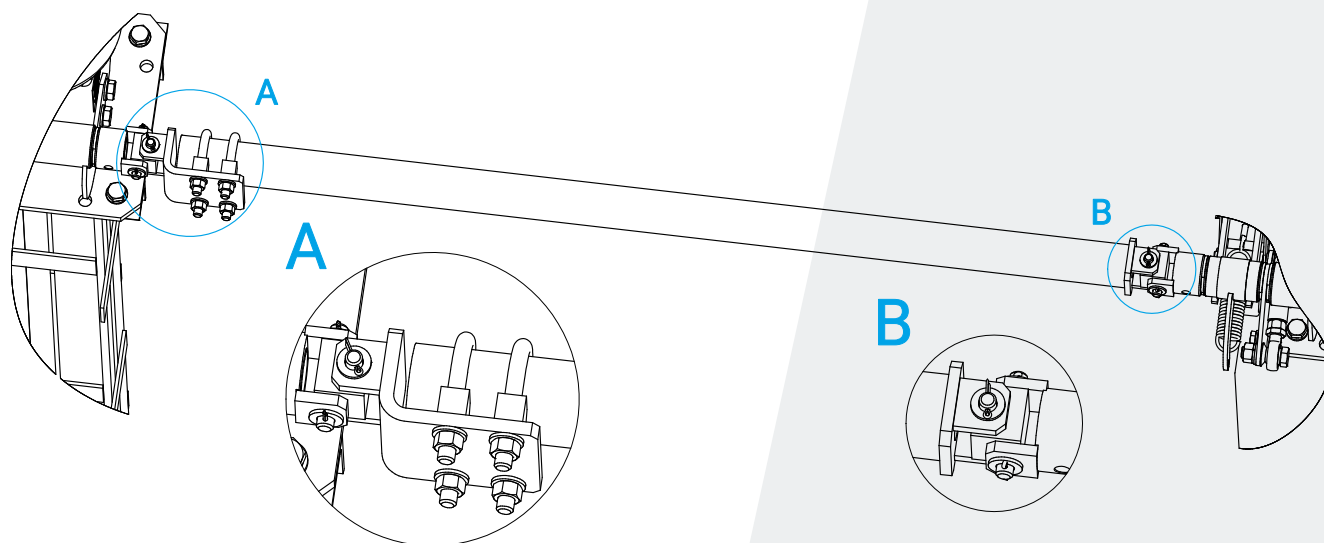


3.5. Poles coupling and adjustment

After setting the poles on the construction and connecting the operating mechanism, the position of movable contact after the entry into fixed contact terminal of the drive pole should be checked. The correct location of the points of contact is shown on the next graphic.



If the points of contact are in a different place, the tie connecting to the crank gear should be shorten or lengthen. After adjusting, the pole coupling shafts can be mounted as shown in the figure below.



The coupling shafts should be connected in such a way that the movable contact, when closed, reaches the appropriate position in the fixed contact in every pole.

Tightening torque: M12 - 80 Nm.

3.6. Grounding of base frames

After adjusting the earthing switch, the base frames should be grounded. The grounding connection places are marked on the earthing switch base frame. The grounding cable should be connected as close as possible to flexible connection the earthing switch knife with the base frame - the flexible connection should be unscrewed and the grounding wire inserted between the construction and flexible connection.

4. OPERATING MANUAL

Operation of earthing switch is achieved by operating it with a suitable motor or manual operating mechanism. When operating the earthing switch, the work safety regulations in force at the place of its installation have to be observed.

5. INSPECTION AND MAINTENANCE

5.1. Visual inspection

Visual inspection is recommended to be carried out in accordance with the regulations in force at the switch-gear or after any failure or short circuit.

Check in particular:

- a) the condition of earthing switch contacts,
- b) the condition of the flexible connection.

5.2. Periodical check-ups

In order to ensure continuous and failure-free operation of the disconnecter, it is necessary to perform periodic check-ups. While the internal regulations in force in the distribution centre do not oblige to more frequent maintenance, inspections are required in accordance with the following schedule:

- Periodic inspection - after 5 years of operation or after 1000 operation cycles;
- General inspection - after 10 years of operation or after 2000 operation cycles.

During inspection and maintenance, the applicable regulations for the operation of energy devices and the requirements determining the safety of work of the inspectors must be obeyed.

The scope of activities to be performed during each maintenance is as follows:

a) Periodic inspection:

- check the condition of the current path contacts;
- check the condition of the earthing switch contacts;
- check the correctness of taking the end positions;
- check the condition of mechanisms and bearings;
- check tightness of screw connections and fasteners;
- clean the outer surfaces of insulators;
- check the condition of protective coatings and parts protecting against corrosion;
- lubricate the current path contacts and the earthing switch contacts (not required for disconnectors equipped with graphite AgC contacts) ¹⁾;
- perform thermal inspection of the disconnector at rated current ²⁾.

b) General inspection:

- perform the complete set of activities described above for the periodic inspection;
- clean all moving parts;
- measure the voltage drop of the disconnector's main circuits at current $I = 100A$ DC ³⁾;
- check dimensional compliance of the disconnector with the dimensional drawing, in particular insulation gaps and spaces between live parts;
- check the condition of anti-interference screens (if installed);
- check technical condition of insulators ⁴⁾;
- check the operation and condition of arcing contacts (if installed) ⁵⁾;
- check earthing of the disconnector bases.

When assessing condition of the disconnector's contacts, check if the silver coating on the contact surfaces has not been permanently damaged. If necessary, replace damaged contacts with new ones.

²⁾ In case of thermal imaging tests, the permissible temperature values given in Table 14 of the PN-EN 62271-1: 2018-02 standard should be adopted as a criterion for assessing the correct operation of the disconnector.

³⁾ In case of measuring the voltage drop of the main circuits of a disconnector not connected to the busbar system, the acceptable values indicated in the factory test report of the finished product should be taken as the criterion for assessing the correct operation of the disconnector. In the case of a disconnector connected to the busbar system, the voltage drop should not exceed 250 $\mu\Omega$.

⁴⁾ When assessing the condition of insulators, it is necessary to check if there are no losses or damage to the insulators, with particular emphasis on the surface of the shade. If necessary, replace damaged insulators with new ones.

⁵⁾ When assessing the condition of the apparatus' arcing contacts, it is necessary to check whether there are no

cavities or pits on the contact surfaces. If necessary, replace damaged contacts with new ones.

5.3. Spare parts and recommended service materials

The use of high quality components and operational experience indicate long live service of disconnectors (not less than 40 years). If the earthing switch is damaged due to improper assembly or operation, it is possible for the manufacturer to repair it for a fee. Earthing switch UNIII does not possess parts, which during normal operation should be replaced in service life.

For maintenance of earthing switches should be used the following materials:

- a) MOBILGREASE 28 used for lubrication of electric contacts (earthings, contacts of HV switches),
- b) LUBRICANT for bearings, for example LT4 or similar, used for lubricating ball joints.

6. UTILIZATION

UNIII earthing switches are made of materials that are recyclable.

The main materials from which the earthing switches are built are:

- steel (hot-dip galvanized)
- aluminium;
- copper.

Earthing switches do not contain any dangerous substances. In accordance with applicable regulations, it is possible to return a worn-out, complete earthing switch to the manufacturer.

Zakład Wytwórczy Aparatów Elektrycznych Sp. z o.o.

Gdańska 60, 84-300 Lębork
POLAND

zwae@zwae.com.pl
tel.: +48 59 863 36 15

www.zwae.com.pl

Correspondence address

Kębłowo Nowowiejskie, ul. Łąkowa 2
84-351 Nowa Wieś Lęborska
POLAND