Dear customer!

Thank you for purchasing our product. We are glad to deliver you a pantograph disconnector TFP, which has been designed in order to meet your expectations. We are deeply convinced that advantages of the apparatus would be confirmed during exploitation.

The instruction is intended for HV disconnectors type TFP. The instruction includes technical data, design description and also recommendation for adjustment and service. The instruction has been issued with an intention to help in proper installation, service and operation of the disconnectors. Follow carefully requirements specified in this instruction ensures troublefree service of disconnectors and determines the validity of manufacturer’s guarantee.

Carefully read and understand this instruction sheet before installation, operation and maintenance disconnectors. Would you have any questions, please contact ZWAE Sp. z o.o.

We kindly remind basic principles of disconnector’s exploitation:

• follow strictly the principles included in this instruction,
• perform periodic inspections, consistent with principles included in this instruction,
• use only recommended operational materials,
• all inspections and services perform consistent with health and safety at work rules.

Observance of recommendations included in this instruction ensures permanent disconnector’s efficiency.
1. APPLICATION.

Pantograph disconnectors TFP are intended for usage in outdoor HV switchgears. They can be used for separate electric circuits, through making visible insulating gap. In closed position they are able to conduct rated and short-circuits currents.

2. COMPLIANCE WITH STANDARDS.


3. SERVICE CONDITIONS.

Disconnector is adjusted to outdoor work in temperate climate in following conditions:
- a) temperature: from 233 (-40 °C) up to 313 K (+40 °C)
- b) air humidity: up to 100% with temperature 293 K (20 °C)
- c) altitude above the sea level: up to 1000 m
- d) wind pressure: up to 700 Pa
- e) ice coating thickness: up to 10 mm

4. BASIC TECHNICAL PARAMETERS.

<table>
<thead>
<tr>
<th>No.</th>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rated operating voltage:</td>
<td>123 [kV] 170 [kV] 245 [kV] 420 [kV] 550 [kV]</td>
</tr>
<tr>
<td>4</td>
<td>Short-circuit current:</td>
<td>40 [kA] 40/63 [kA] 63 [kA] t=3s 63 [kA] t=3s 63 [kA] t=3s</td>
</tr>
<tr>
<td>5</td>
<td>Test voltage (50 Hz) for insulation:</td>
<td>230 [kV] 265 [kV] 325 [kV] 375 [kV] 480 [kV] 530 [kV] 520 [kV] 610 [kV] 620 [kV] 760 [kV]</td>
</tr>
<tr>
<td>7</td>
<td>Insulation switching surge test voltage:</td>
<td>- - - 1050 [kV] 1245 [kV] 1175 [kV] 1330 [kV]</td>
</tr>
<tr>
<td>8</td>
<td>Dedicated operating mechanism:</td>
<td>NSO80 NSO80 NSO80 NSO80 NSO80 NSO80 NRO80 NRO80 NRO80</td>
</tr>
<tr>
<td>9</td>
<td>Disconnector’s weight:</td>
<td>[kg] [kg] [kg] [kg] 650 [kg]</td>
</tr>
</tbody>
</table>
5. DESIGN.

Disconnected’s TFP pole includes two insulators - post and driving. During disconnector’s switching, set of levers located in gearcase causes pantograph’s arms closing or opening operation. These arms tighten on hanging contact, thus closing electric circuit.
6. TRANSPORT AND TRANSFER.

• During pantograph disconnector’s lifting should be straps / ropes should be used, grabbing gearcase. **It is prohibited to lift grabbing pantograph sides!**

• In order to prevent pantograph unintentional open, pantograph should be tied with gearcase with the use of rope / strap.

7. ASSEMBLY.

**7.1 Disconnector’s pole assembly.**

7.1.1 Take off transmission’s cover.  
7.1.2 Set disconnector’s pole on the post insulator and assemble.  
7.1.3 Screw together disconnector’s coupling flange with driving insulator.  
7.1.4 Install transmission’s cover.  

**WARNING:** Before lifting pole assembled (point 7.1.2 and 7.1.3), disconnector’s coupling flange should be adjusted in upper position (Figure 3., + 10 mm). In that position install coupling flange to transmission with the use of rope, so that driving insulator’s weight lies on rope.

7.1.5 Install remaining insulators parts: post and driving.  
7.1.6 Lift assembled set and install on the supporting structure.  
7.1.7 Lift pantograph so that transmission’s coupling flange rotate 15 degrees. In such position lock pantograph with the use of wooden pieces, placed between cover and pantograph (Figure 4.).  
7.1.8 Tighten driving shaft’s screws. Verify guiding metal bearing’s distance bushing proper interval (320 mm).  
7.1.9 Connect driving shaft with operating mechanism’s lever.

**7.2 Fixed contact assembly.**

7.2.1 Fixed contact is delivered in partly assembled condition.  
7.2.2 Install fixed contact’s handles on pipe (distance approximately 930 mm).  
7.2.3 Tighten suspended contact to the handles.  
7.2.2 Disconnector’s contact pressure force is adjusted during assembly (650 N ± 50 N measured in the middle of contact).  
7.2.3 For rails, adjust fixed contact height so that during disconnector’s closing, fixed contact is located in the middle of pantograph’s contact surface.  

**Allowed deviation between disconnector and fixed contact is ±15 mm.**

In case of necessity, correct position through:

– fixed contact rotation,  
– usage proper washers between post insulator and supporting structure.
7.3 Disconnectors adjustment

7.3.1 Remove wooden elements and take off transmission’s cover.

7.3.2 Clean contacts and lubricate them by graphite oil.

7.3.3 Carefully close manually the disconnector, using electric operating mechanism’s manual lever.
   - Check if driving shaft and disconnector’s lever are in deadlock.
   - Tighten screw on a lever so that it stops on transmission cover and works as an end stop. Disconnector should not more open itself anytime.

7.3.4 Loosen operating mechanism’s screws and switch manually operating mechanism to closed position.

7.3.5 Tighten the screws.

7.3.6 Perform several manually controlled switching operations, simultaneously verifying adjustment correctness.
   - Check whether screw [31] remains in position described in chapter 7.3.3.

7.3.7 If adjustment is incorrect, it is also allowed to perform slight correction at operating mechanism NSO-80 end stops (details in operating mechanism’s instruction).
Figure 2. Pantograph disconnector
Figure 3. Disconnector’s transmission

1. Post insulator
2. Axis of operating stack
3. Gearcase
4. Coupling flange
5. Cover
6. Pantograph
7. Wooden piece

Figure 4. Pantograph disconnector’s parts
8. OPERATING MANUAL.

Disconnector’s manoeuvring is an effect of appropriate motor or manual operating mechanism’s functioning.

8.1 Notes about connecting activities.

- While disconnector’s manoeuvring all safety at work rules applicable in installation’s location should be respected.

- Energized disconnector can be manoeuvred only when capacity of intermittent current will have negligible value or any significant voltage change between any pole’s contact elements would appear.

- Do not close the disconnector when earthing switch is closed (regards disconnectors equipped with earthing switch).

- Energized disconnector’s earthing switch can be manoeuvred from open to closed position only if the disconnector is in open position and after ensuring that earthing switch will be working under discharging current of the bushings, rails, incoming supplies, short cables and power lines capacities, with current and voltage parameters specified in technical data.

9. INSPECTIONS AND MAINTENANCE.


It is recommended to carry out visual inspections in accordance with rules being in force in switchgear or after each failure or short circuit. Check in particular:

a) disconnector’s contacts condition,

b) earthing switch’s contacts condition (regards disconnector’s equipped with earthing switch).


It is recommended to perform periodical and maintenance check-ups in accordance with rules being in force in switchgear. During check-up and maintenance the using of energetic devices rules and health and safety at work rules have to be respected. Check and perform in particular:

- condition of current path’s central contacts,
- condition of earthing switch’s contacts,
- condition of mechanisms, bearings and connection components,
- correction of achieving limit positions,
- condition of anti-corrosion protective coatings,
- lubricate current path’s central contacts and earthing switch’s contacts,
- lubricate ball joints.

9.3. Spare parts and recommended service materials.

The use of high quality components and exploitation experience indicate long liveness of disconnectors (about 30 years). However in case of damages, the manufacturer provides spare parts in accordance to customers order. Ordered spare parts could be assembled only with the producer’s knowledge and agreement in guarantee’s period.

For disconnectors maintenance, materials listed below have to be used:

- GRAPHITE OIL used for lubrication electric contacts (earthings, contacts of HV switches),
- LUBRICANT for bearings, for example Shell Rhodina SD 2 or similar for ball joints lubricating.

10. SPARE PARTS.

Disconnector type TFP does not possess parts, which should be replaced during normal operation in service life. Due to damages caused by unfortunate chance occurrence the manufacturer provides spare parts.
11. PACKING, STORAGE AND TRANSPORT.

11.1. Shipment packing and transport.

Disconnecter’s poles are transported in assembled condition. During delivery it is necessary to protect disconnecters against knocking over. Disconnector is allowed to be transported in open means of transport.

11.2. Storage.

Disconnecter’s poles could be keep in open spaces, on condition that poles have to be placed so that supporting structure is not standing directly on the ground.

11. GUARANTEE.

Guarantee’s conditions are under manufacturer and customer negotiations.

12. FIGURES LIST.

- Pantograph disconnector.........................................................................................................................page 4
- Pantograph disconnector.........................................................................................................................page 7
- Disconnnector’s transmission..................................................................................................................page 8
- Pantograph disconnector’s parts .............................................................................................................page 8