NAL-type switch disconnectors are based on a modular principle, which gives it a wide range of functionality. With a unique design that extinguishes electric arcs and enables high switching capacity, they represent an attractive solution as a key breaking element for applications in enclosed switchgear and transformer compact substations. In combination with type CEF current limiting fuses, NALF fuse switch disconnectors ensure control over the full range of overload and short-circuit currents.

**Introduction**

The basic unit of NAL/NALF consists of a frame with insulators and current carrying parts. Two different types of operating mechanisms, snap action mechanism type K or stored spring energy mechanism type A, can be mounted on the frame. Fuse bases type F, with or without fuse tripping mechanism, and an earthing switch type E/EB, suitable for both direct mounting and free standing components, complete the basic equipment of a switch disconnector. These modules can be easily configured according to customer expectations. Accessories, such as shunt trip, under-voltage release, auxiliary switches, motor operation and various systems for manual operation can easily be added.

To ensure correct operation for all relevant currents, the switch disconnector system NAL/NALF is equipped with a dual arc extinguishing system (arc balst and air balst). A well balanced utilization of these two effects has resulted in high reliability for all relevant currents.

NAL/NALF switch disconnectors are manufactured according to global quality and environmental standards and confirmed by ISO 9001 and ISO 14001 certificates. In addition, they are 98.64 percent recyclable.

The NAL/NALF brand is well known around the world, and more than 600,000 switches have been produced so far. It has been undergoing continuous development to satisfy users’ demands.

The main areas of application of NAL/NALF switch disconnectors are as:

- Line switch disconnectors in medium-voltage networks,
- Switch disconnectors with fuses for the switching and protection of:
  - Distribution transformers
  - Motors
### TABLE I. Main data

<table>
<thead>
<tr>
<th>Rated voltage Un</th>
<th>kV</th>
<th>12</th>
<th>17.5</th>
<th>24</th>
<th>36</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated current Ii</td>
<td>A</td>
<td>400</td>
<td>630</td>
<td>1250</td>
<td>400</td>
</tr>
<tr>
<td>Max. rated current Ii</td>
<td>A</td>
<td>400</td>
<td>630</td>
<td>1150</td>
<td>400</td>
</tr>
<tr>
<td>Short circuit making capacity Ima</td>
<td>kA peak</td>
<td>67</td>
<td>67</td>
<td>67</td>
<td>50</td>
</tr>
<tr>
<td>Peak withstand current</td>
<td>I &lt;sub&gt;in&lt;/sub&gt;</td>
<td>kA peak</td>
<td>82</td>
<td>82</td>
<td>82</td>
</tr>
<tr>
<td>Short time current 1 sec.</td>
<td>I &lt;sub&gt;t&lt;/sub&gt;</td>
<td>kA eff.</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Mainly active load breaking capacity</td>
<td>I &lt;sub&gt;t&lt;/sub&gt;</td>
<td>kA eff.</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
</tbody>
</table>

- **IEC 60265-1 (IEC 265)**
- **Rated cable/line charging breaking capacity**
- **Mainly inductive breaking capacity cos φ = 0.15**
- **Rated earth fault breaking capacity**
- **Short-circuit current 1 sec.**
- **Short-circuit making capacity Ima**
- **Power frequency withstand voltage 50 Hz 1 min.**
  - to earth and between poles
  - across isolating distance
- **Impulse withstand voltage 1.2/50 µs**
  - to earth and between poles
  - across isolating distance
- **Pole distance**
  - mm
  - Max. operating torque at:
    - closing K/A mech.
    - opening K/A mech.
  - Operating angle on the shaft degrees
  - Arc time ms

### Earthing switch type E for NAL/NALF and type EB

<table>
<thead>
<tr>
<th>Rated voltage Un</th>
<th>kV</th>
<th>12</th>
<th>17.5</th>
<th>24</th>
<th>36</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak withstand current</td>
<td>I &lt;sub&gt;in&lt;/sub&gt;</td>
<td>kA peak</td>
<td>62/82</td>
<td>40/82</td>
<td>38/82</td>
</tr>
<tr>
<td>Short-circuit current 1 sec.</td>
<td>I &lt;sub&gt;t&lt;/sub&gt;</td>
<td>kA eff.</td>
<td>31.5</td>
<td>31.5</td>
<td>31.5</td>
</tr>
<tr>
<td>Power frequency withstand voltage 50 Hz 1 min.</td>
<td>kV</td>
<td>42</td>
<td>42</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Impulse withstand voltage 1.2/50 µs</td>
<td>kV</td>
<td>62/67</td>
<td>40/62.5</td>
<td>38/50</td>
<td>40</td>
</tr>
</tbody>
</table>

- **Earthing switch type E for NAL/NALF and type EB**
- **When fed from switch disconnector/earthing switch side.**
- **Power factor = 0.1**
- **With insulating barriers**
- **At 18,2 kV**

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