COMMISSIONING

Make sure that all commissioning works can be performed safely according to national and international standards, and that the personnel has an adequate qualification for the works concerned.

Main requirements for occupational safety are described in standard EN 50110-2 / SFS 6002. Part 1TFL 328 246 of this Manual gives more detailed instructions concerning the safety at work.

Checking list

The following checking list enumerates the items to be gone through before switching the voltage on to the switchboard with the operational earthing on.

If the manufacturer has carried out factory inspections and attached the inspection reports to the delivery, you don't need to check the same items any more during the commissioning.

Earthing disconnected, always check that the earthing of the switchboard has been made correctly. It is recommended to check also the functioning of the leakage protection.

In addition to the a.m. items, follow the instructions of national and international standards.

Checking of installation

During the installation check mechanical functions of equipment, and if necessary, do readjustments.

- functioning of door lockings and locking devices
- mechanical lockings of control devices

Ensure that the protection meets the set requirements

- enclosure class and sealing of cable entries
- protection meets the requirements of apparatus compartments

Checking of cabling

After cabling check the following

- correctness of phase sequence
- implementation of system earthing and/or separate protective earthing
- connections and markings of N-, PE- and PEN-conductors
- safe disconnection of PE/PEN-conductors and markings
- visual checking of tightness of connections and random checking of high current connections
- clearances after each connection work fulfilled

Min. clearances, voltage tests fulfilled:

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Clearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>400 V</td>
<td>4 mm</td>
</tr>
<tr>
<td>500 V</td>
<td>6 mm</td>
</tr>
<tr>
<td>690 V</td>
<td>8 mm</td>
</tr>
</tbody>
</table>

- general cleanliness
INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

Checking of markings

Adequacy of markings

- markings of wires to be connected
- identifiability of neutral and protection conductor in each group
- identifiability of circuits, switches, terminals etc.
- identifiability of drawings, warning signs and related data
- label markings: separation point of neutral, main switch
- rating label of switchboard

Checking of apparatus

Operational checks for mounted apparatus, such as switching, control and interlocking devices are to be carried out in order to verify that their installation meets the requirements

- fuse sizes agree with apparatus lists and circuit diagram
- mounting of possible residual current circuit-breakers, especially neutral conductors
- measuring of fault current required for each feeder
- checking of fuse base contacts, rated current and tripping curve
- checking of tripping curves and rated currents of MCBs

Fuse mounting

- all fuses of main and control circuits are to be mounted

Switch settings

- values of overload and short-circuit current relays are to be set to meet the requirements of loadings and selectivity
- magnetic tripping of incoming circuit breaker can be set temporarily to the minimum value in order to ensure a fast tripping in case of short-circuit

Checking of current transformers

- check that the secondary circuits of current transformers are connected. If not, the secondary terminals must be short-circuited

Setting of starters

- set thermal relays to correspond to the rated current of motor

Checking of main busbars

- check visually the adequacy of the joints of transportation units
INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

Checking of PE- and N-busbars

- check visually the adequacy of the joints of transportation units
- check the safe and easy disconnection of neutral

Checking of phase sequence

- check the phase sequence and markings

Internal wirings

- check that the wirings between transportation units have been connected correctly
- check the earthing of control circuits

Measuring of insulation resistance

- measuring is described in the instruction 1TFL 328 232
- after measuring, connect the relays, control voltage fuses and circuits, which were disconnected for the measuring

<table>
<thead>
<tr>
<th>Phase</th>
<th>Insulation resistance MΩ</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1 – N</td>
<td></td>
</tr>
<tr>
<td>L2 – N</td>
<td></td>
</tr>
<tr>
<td>L3 – N</td>
<td></td>
</tr>
<tr>
<td>L1 – L2</td>
<td></td>
</tr>
<tr>
<td>L2 – L3</td>
<td></td>
</tr>
<tr>
<td>L3 – L1</td>
<td></td>
</tr>
</tbody>
</table>

Connection of supply

- check that the incoming switching device is in open position
- check that the doors are closed and locked
- close the main switch
- check the phase sequence in one groupe, because it has been checked already earlier

Final checking

- check that the tripping values, which were set to the minimum level for the commissioning, are set to the correct operating values
- check the qualities of other protective devices, check visually the current settings of switches and rated currents of fuses and test the residual current circuit-breakers
- check the automatic disconnection of supply
- check that all important electrical interlockings function according to the circuit diagram
- check the functioning of all voltmeters, ammeters and energy meters
- check that there are no vibration noises from the busbar
- check the transformation ratio of possible current transformers, connections and short-circuiting on terminal blocks, as well as other measuring connections
- check the disconnection of SELV- and PELV-systems by measuring the insulation resistance, if required