

## Instructions for installation, operation and maintenance

The operation of these switchgears has to be undertaken with consideration of the subsequently described test- and maintenance instructions. All the named points apply as urgently necessary and are to be implemented in the described intervals by the operator. The costs for these tests and maintenance work are borne by the operator. The specialist company of electricians carrying out the work has to refer the operator in writing to the prerequisites of these tests and maintenance work. Furthermore, a written tender is to be given to the operator. The implementation of these tests and maintenance work is to be documented by the erection firm in writing and must be submitted by these at the first request. In the event of the non-compliance with these test- and maintenance instructions any claim to the warranty becomes invalid.

### Necessary measures and tests prior to the initial start-up of the switchgears

- Compliance of the width of the drive pursuant to DIN EN 60439-1 par. 7.4.5
- Compliance of the maximum permissible ambient temperature (room temperature) pursuant to DIN EN 60439-1 par. 6.1 as well as of our cover sheet data specifications.
- Consideration of the operating conditions at the place of installation (e.g. mechanical, chemical, corrosive stress) pursuant to DIN EN 60439-1 par. 6.
- Test of the switchgears supplied by us with respect to the upstream protective equipment pursuant to DIN EN 60439-1 par. 7.4.3.2.
- Test of the cable connection pursuant to DIN EN 60439-1 par. 7.1.3.
- Test of the protective equipment in the cable / incoming feeder pursuant to DIN EN 60439-1 par. 7.5.
- Test of the selectivity with consideration of the safety components employed on and connected to the switch cabinet pursuant to DIN EN 60439-1.
- Rated current and short-circuit strength capacity of the main bus bar systems with consideration of the connected protective equipment pursuant to DIN EN 60439-1 par. 4.2, 4.4 and 4.5.
- Rated surge withstand capability (Uimp) with respect to the application of a coordinated overvoltage protector pursuant to DIN EN 60439-1 par. 7.1.2.3.1 and appendix G.
- Rated current of all connected departure circuits pursuant to DIN EN 60439-1.
- Test of the local harmonic wave component (depending on the site) with respect to an endangering of the compensation facility.
- The measurement of the local harmonic wave component has to be undertaken by the means of suitable measuring devices in the case of the initial start-up of the switchgears. The minimum measuring period of this measurement amounts to 7 weekdays. If the measurement shows critical values, then not only the built-in but also external, unchoked compensation facilities are to be immediately disconnected from the network. In this case the manufacturer of the switchgears is to be demonstrably made aware of this matter and moreover in writing.
- If the touch guard cover was re-mounted over the main entrance- terminal block after the connection of the main lead.
- Test of all main lead terminals and all other access and exit terminals for stable seat.
- Stable mechanical seat of the N-connector bars with the N- separating terminals.
- Mechanically perfect condition of all installed devices (no visible breaking points).

- Test of the touch guard in the switch cabinet, if necessary request covers, seals or cover strips from the manufacturer.
  - Possibility for the technically perfect air suction/ air emission (depending on the site) with consideration of the minimum clearances specified by the manufacturer.
  - Technically perfect functioning of all movable parts such as contactors, relays etc. incl. capacitor contactors after the connection of all access and exit cables (remainder of core insulations can fall during the connection work in movable switch appliances and as a result impede its functioning).
  - Mechanically / technically perfect condition of all installed devices (no breaking points).
  - Test of the tripping (release) currents in the case of fault-current circuit breakers with consideration of the site-specific circumstances.
  - Test of the earth connection with consideration of the site-specific circumstances.
  - Test of the load capacity of the foundation with consideration of the static and site-specific circumstances as well as the maximum weight of the supplied switchgears.
- The duty of reproach in the case of discrepancies or defects within the switchgears is to be inferred from our terms and conditions of business and delivery.**

### Necessary semi-annual tests

- Test of all capacitor contactors for traces of fire or scorching.
- Test of all compensation capacitors for mechanical rigidity and/or cracks.
- Test of the filter in the incoming air and exhaust air grille of the suction for contamination.
- Functioning of the switch cabinet ventilator as well the possibility for the technically perfect air suction / air emission.
- Test of the lightning-stroke current arrester (fine, coarse, medium earthing) on full function.

**Contaminated filters or damaged components are to be replaced immediately.**

### Necessary annual tests

- Test of the main line terminals and all other access and exit terminals for stable seat
- Stable mechanical seat of the N-connector bar at the N-separating terminals.
- Mechanically perfect condition of all installed devices (no visible breaking points).
- Technically perfect functioning of all movable parts such as contactors, relays etc. incl. capacitor contactors.
- Technically perfect functioning of the espagnolette lock on the switch cabinet door.

### Necessary semi-annual maintenance

- None

### Necessary annual maintenance

- Replacement of the air intake and outlet filter.
- Cleaning of all open components such as contactors, relays etc.

### Necessary biennial maintenance

- Exchange of all installed capacitor contactors for identical or equivalent protectors.

Technical instructions provided by the company Mangelberger Elektrotechnik GmbH  
date 10/2002