Assembly instruction

Mi Power Distribution Boards

up to 630 A

Power switchgear and controlgear assemblies (PSC)
in accordance with IEC 61439-2

Download at www.hensel-electric.de/61439
Design fast, simply, more clever
www.ENVYGUIDE.eu
Mi Power Distribution Boards up to 630 A

- in accordance with IEC 61439-2
- combinable enclosure system
- degree of protection IP 65
- made from polycarbonate
- protection class II

Standard-conforming rating of power switchgear and controlgear assemblies (PSC) according to IEC 61439-2
Requirements for special installations or locations according to IEC 60364-7-729
Recommendation for outdoor installations, humid and wet areas and locations
Formation of condensed water
System design

Assembly
- Lid hinges
- Wall opening, assembly of enclosures
- Flanges, cable entry
- Cable insertion, extension frame, box fin

Installation
- Wall mounting, floor standing
- Measures against condensation forming in enclosures
- Canopy

Device installation
- Mounting plates, DIN rails
- Device installation, protection against access to hazardous parts/covers

Wiring
- Busbar systems
- Terminals
- Bending of wiring strips
- Insulation cover for busbars
- Terminals for incoming cables, FIXCONNECT® plug-in terminals
- Aluminum conductors

Routine verification / inspection / routine test report (check list)
Manufacturer’s marking
Declaration of conformity (check lists for the manufacturer of an assembly)
Declaration of conformity of Mi Distribution Boards

Hensel specialist consultant on-site at www.hensel-electric.de
The new IEC 61439 - the standard for the construction of switchgear assemblies - brings changes that affect the planning of a switchgear assembly. In addition, new tasks and responsibilities are awaiting the manufacturer of a switchgear assembly.

Decisive for the optimal functioning of a switchgear assembly under operating conditions is the correct rating of the interface characteristics of the assembly. For this purpose, the assembly is considered as **BLACK-BOX** with four interface characteristics which shall ensure compatibility with the ratings of the circuits to which it is connected and the installation conditions and shall be declared by the assembly manufacturer using the criteria identified below.

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**Home Text**

**Assembly considered as BLACK BOX with the four interface characteristics according to IEC 61439-2**

**Installation and ambient conditions**

- For the protected outdoor installation
- Degree of protection IP 65
- Combinable enclosure system, extendable in all directions
- 6 enclosure sizes in a grid of 150 mm
- EMC compliant busbar system
- Wall-mounting or floor-standing

**Operation and maintenance**

- Electrical functions intended to be operated by electrotechnical skilled or unskilled persons
- Protection class II up to a rated current of 630 A
- Flexible by standardised and tested kits
- Spacious connection areas

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**Mi Power Distribution Board (PSC)**

**BLACK BOX with 4 interfaces**

**Connection to the electrical network**

- Electric circuit / final circuit
- Circuit-breaker up to 630 A
- Switch disconnector up to 630 A
- Fuse switch disconnector up to 630 A
- Bus-mounted fuse base up to 63 A
- Connection with cable from above / from below
- Connection: conductors from copper / aluminium
- Optional connection of CEE sockets according to EN 60309 and sockets with earthing contact

**Circuits and consumers**

- Rated voltage $U_{n} = 690$ V a.c. / $1000$ V d.c.
- Rated current $I_{n}$ up to 630 A
- Circuit-breaker up to 630 A
- Switch disconnector up to 630 A
- Fuse switch disconnector up to 630 A
- 5-conductor system
- Connection with cable from above / from below

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Inc and RDF must be specified in the documentation.

The requirements for all installed electrical functions within the assembly have been proved compliance with the applicable requirements of IEC 61439-2.
Requirements for special installations or locations according to IEC 60364-7-729

Requirements for gangway width

IEC 60364-7-729
Low-voltage electrical installations - Part 7-729: Requirements for special installations or locations - Operating or maintenance gangways (IEC 60364-7-729:2007, modified);
German implementation HD 60364-7-729:2009

Installation site
Switchgear assemblies must be set up so that the minimum aisle widths are not exceeded.

Aisle width
The aisle width in front of switchgear assemblies with drives, e.g. switches, must be at least 600 mm.

Building evacuation route
For distribution boards with lids or doors opening against the direction of evacuation, aisle widths must have a minimum of 500 mm.

Switchgear assemblies must be set up torsion-free, assembled and fixed.
Mi Distribution Boards

Recommendation for outdoor installations, humid and wet areas and locations

Requirements of German standard DIN VDE 0100 Part 737
for compliance with IP degree of protection

1. Requirement
Protection against ingress of water for all electrical equipment (devices) with the appropriate encapsulation (2nd characteristic numeral)

Note for outdoor installation:

1.1. Minimum requirement for electrical equipment:

<table>
<thead>
<tr>
<th>Degree of protection</th>
<th>Indoors</th>
<th>Protected outdoors</th>
<th>Unprotected outdoors</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP X 1</td>
<td>![House Icon]</td>
<td>![House Icon]</td>
<td>![House Icon]</td>
</tr>
</tbody>
</table>

"Protected outdoors"
Electrical equipment has to be protected from precipitation (like rain, snow or hail) as well as from direct sunlight.

"Non-protected outdoors"
Electrical equipment can be exposed to precipitation or direct sunlight.
With both assembly sites the climatic effects on the installed equipment must be observed, for example, high or low ambient temperatures or condensation.

1.2. Minimum requirements for electrical equipment, that must withstand higher environmental stresses:

degree of protection IP X 4
with non-direct jets of water within occasional cleaning procedures, e.g. agriculture

degree of protection IP X 5
with non-direct jets of water within operational cleaning procedures, e.g. carwash

degree of protection IP X 5
and additional consultation with the manufacturer:

with direct jets of water within occasional cleaning procedures of enclosures, e.g. butcher’s shop

Country-specific requirements have to be observed!

2. Requirement of German Standard DIN VDE 0100 Part 737

4.1 Electrical equipment must be selected taking into account the external influences to which they may be exposed. Proper operation and the effectiveness of the required degrees of protection must be assured.

Note: Data from the manufacturer!
Mi Distribution Boards
Formation of condensed water

How does condensed water occur in enclosures with a high degree of protection?

Condensed water only forms in enclosures with a higher degree of protection than IP 54 due to temperature difference from inside to outside. Humidity can not evaporate because of the high degree of protection of the enclosure.

System switched on.

The internal temperature is higher than the external temperature due to the power dissipation of the built-in devices.

System switched on.

The warm air inside the enclosure attempts to accumulate moisture. This comes from outside through the seal as the enclosures are not gas-tight.

System switched off.

The internal temperature is reduced by cooling down the system e.g. by switching off the loads. The cooler air emits moisture which is collected as condensed water on the cooling inner surfaces.

How does condensed water occur in enclosures with a high degree of protection?

Formation of condensed water for indoor installations:

The internal temperature is higher than the external temperature due to the power dissipation of the built-in devices.

Formation of condensed water in protected outdoor installations (protected against weather influences) or unprotected outdoor installations:

In areas where high levels of air humidity and large temperature fluctuations are expected e.g. in laundry rooms, kitchens, car washes etc.

Here condensed water can be formed dependent on the weather, high air humidity, direct sunlight and temperature differences compared to the wall.
The **modular design** in a basic grid of 150 mm allows free design of the outer form. The enclosures can be combined in all directions. Combining in all directions to follow given requirements on site.

**Different enclosure depths** allow the installation of equipment of different heights (Fig. 1). With an extension frame the depth of the enclosure sizes 4 and 8 can be extended by 85 mm (Fig. 2).

**Enclosure walls with metric knockouts**

| Wall 1 | 1 x M 20  
|        | 1 x M 32/40 |
| Wall 2 | 2 x M 20  
|        | 10 x M 25  
|        | 1 x M 32/40 |
| Wall 3 | 4 x M 25  
|        | 3 x M 40/50 |
| Wall 4 | 1 x M 20  
|        | 4 x M 25  
|        | 1 x M 32/40  
|        | 3 x M 40/50 |
| Wall 5 | 8 x M 32  
|        | 4 x M 40/50 |
| Wall 6 | 4 x M 20  
|        | 20 x M 25  
|        | 2 x M 32/40 |

**Access and operation**

Clear separation of the operation areas for unskilled persons and areas to which only electrotechnical skilled persons have access.

- Depending on the electrical function, operate the cover manually (for unskilled persons) or with tool (for skilled persons)
- Lid lock prevents unauthorised opening of the cover
- A hinged lid for simple operation of equipment
Mi Distribution Boards
Assembly
Lid hinges

Lid hinges
Mi ZS 20
For operating installation device within a large area.
The lid keeps permanently connected to the box.
When assembling several boxes, the insertion can only be carried out for the external boxes.

Usable in Mi boxes:

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<tbody>
<tr>
<td></td>
<td>left</td>
<td>right</td>
</tr>
<tr>
<td>Size 1:</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Size 2:</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Size 3:</td>
<td>●</td>
<td>●</td>
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<tr>
<td>Size 4:</td>
<td>●</td>
<td>●</td>
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</tbody>
</table>

Heavy-duty hinge joints
Mi ZS 40
For operating installation device within a large area.
The lid keeps permanently connected to the box.
Wall connectors or flanges are necessary for assembly.
Lid is fastened with plastic screw to secure the total insulation L50385.

Hinge for lids
Mi ZS 60
For large-area operation of installation device within enclosures with extension frames.
The lid keeps permanently connected to the box.
**Mi Distribution Boards**

**Assembly**

Wall opening, assembly of enclosures

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**Assembly of Mi distribution boards according to assembly draft**

Pre-assembled and tested enclosures with electrical functions

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**Knock out of box walls for electrical connection and cable entry**

Box walls are knocked out for the electrical connection within the distribution board. For the assembly of the enclosures, the appropriate openings of the wedge joints are knocked out as well.

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**Assembly of boxes**

For sealing the boxes in position, a self-adhesive gasket is stuck to the box wall (applies to closed box walls, too).

The box assembly is carried out by a wedge connection.

To increase stability, press wall clamps onto the box fins.

Use a wall separator for subdividing 300 mm box walls into two 150 mm walls for flange or box mounting.
Mi Distribution Boards
Assembly
Flanges, cable entry

Connections of cables
Connect cables strain-relieved and pressure-relieved.

Cable entry
Close knockouts/openings for the cable entry according to the specified degree of protection.

Right:
Covering of cable entry with cable entry cover

Flanges
Attach flanges by means of 4 wedge links and 1 clamp to the box wall.

Cable entry
Knock out the appropriate cable entries within flanges or box walls with screwdriver.

Cable glands
Insert cable gland into the appropriate knockout and fasten with lock nut.
Assembly of cable insertion
Knock out the respective box wall and saw out the upper box fin next to the wedge fastening.

Screw mount the cable insertion and insert the rubber entries.

Adjust stepped grommet on the cable diameter.

Insert cable and fix it with cable ties.

Insert the cable into the box from the front.

Installation of extension frame
Fix attachments for extension frame in base of enclosure.

Right:
Place extension frame on base of enclosure.

Fix extension frame with screws onto base of enclosure.
**Mi Distribution Boards**

**Assembly**

**Box fin**

Mount removable box fin between two boxes to provide an easier wiring across two boxes.

Saw out box fin in side wall.

Insert cables across two boxes and connect them.

Insert box fin into the openings for the box connection and mount with screws.

The box fin Mi GS 30 provides for a mechanical connection between two boxes.

Degree of protection IP 65 is maintained.
Wall mounting

directly through the base of the box

External brackets

for external box fixing

Mi AL 40 (4 brackets)

Mounting profile

for wall-mounted installation of Mi-Distribution boards,
steel profile, 1950 mm long, dividable in the grid of 150 mm.

Mi MS 2

Note:

Please fix mounting profile in vertical position to enable a cable routing behind the assembly.

For cutting the required profile length fix mounting profile e.g. with a clamp to a desk.

Transport

Regarding transportation its recommendable to protect the assembly against deflection.
For that please screw the assembly to a solid timber.
Mi Distribution Board
Floor standing

U profiles for constructing a mounting frame

Mounting profile
To stabilize larger distributions boards for the transport and assembly on site.

MX 0101
MX 0112
MX 0105
MX 0111

T-connection
Profile connector
Wall fixing
depth-adjustable by 18 mm

Coupling of mounting profiles
Cross connection
Mi Distribution Boards
Installation
Measures against condensation forming in enclosures

Ventilation flange
Mi BF 44
For ventilation of Mi distribution boards in the event of extremely high internal temperatures or a risk of water condensation. For vertical installation on box walls, degree of protection IP 44.

Pressure compensation element BM 32
for the reduction of condensation by pressure compensation in power distribution systems.

Combi climate glands
KBM / KBS ...
for reduction of condensation by pressure compensation
Via an inserted climate membrane they ensure pressure compensation between enclosure interior and ambient air. Ingress of water through the cable gland is prevented. The degree of protection of the enclosure is obtained!
Canopy for the unprotected installation outdoors

Knock out box wall and assemble flange with pre-mounted canopy to the box.

In case of box assembly connect trusses with stop plate.

Mount canopy and/or canopy end plate

**Hint:**
Insert canopy end plate under the canopy until it hits backstop.
**Mi Distribution Boards**

**Device Installation, Mounting plates, DIN rails**

**Device installation on mounting plates or DIN rails**

Fasten installation devices on mounting plates with self-threading screws.

Screw mounting plate onto base of box.

Mount DIN rails directly onto base of boxes or on spacers Mi DS .. in heights of 25 or 50 mm.

**Installation of equipment in cover plates**

Pre-drill the sections at the corners and saw out with piercing saw. Use saw blades with rough teeth for plastics.

Screw support for the protection cover Mi EP .. onto base of box.

Attach protection cover.

Close unused equipment openings in protection covers with attached blanking strips.
Mi Distribution Boards

Device installation
Covers

Device installation in circuit breaker boxes
Circuit breaker boxes can be fitted with any DIN rail equipment, if per row (12 modules 12x18 mm) the assigned backup fuse won’t exceed 80 A.

PE and N terminals for copper conductors (installed)

Note to Mi Circuit breaker boxes:
Spare equipment openings in protection covers are to be covered with blanking strips to prevent accidental contact (blanking strips are enclosed for 50 % of equipment openings)

Dimension of 1 module:
1 Module = 18 mm

Dimensions according to DIN 43880 for DIN rail mounted device

Protection covers
Cover unused equipment openings with blanking strips to prevent accidental contact.

Provide for total protection against access to hazardous parts for accessible devices and busbar-mounted equipment.

Protection class II, (Total insulation)
### Mi Distribution Boards

#### Wiring

**Busbar systems**

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**EMC compliant busbar system**

As standard with N/PEN conductors:
- with the same current carrying capacity as phase conductors
- most favourable for EMC compliance in the area of phase conductors

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### Rated values for voltages

<p>| | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>rated voltage</td>
<td>$U_e = 690 \text{ V a.c.}$</td>
</tr>
<tr>
<td>rated insulation voltage</td>
<td>$U_i = 690 \text{ V a.c.}, 1000 \text{ V d.c.}$</td>
</tr>
</tbody>
</table>

### Rated values of currents

<table>
<thead>
<tr>
<th>Busbars</th>
<th>250 A</th>
<th>400 A</th>
<th>630 A</th>
</tr>
</thead>
<tbody>
<tr>
<td>rated busbar current</td>
<td>250 A</td>
<td>400 A</td>
<td>630 A</td>
</tr>
<tr>
<td>rated short-time withstand current</td>
<td>$I_{cw} = 15 \text{ kA} / 1 \text{ s}$</td>
<td>$I_{cw} = 15 \text{ kA} / 1 \text{ s}$</td>
<td>$I_{cw} = 21 \text{ kA} / 1 \text{ s}$</td>
</tr>
<tr>
<td>rated peak withstand current resistance</td>
<td>$I_{PK} = 30 \text{ kA}$</td>
<td>$I_{PK} = 30 \text{ kA}$</td>
<td>$I_{PK} = 45 \text{ kA}$</td>
</tr>
</tbody>
</table>

### Power dissipation of busbar system

<table>
<thead>
<tr>
<th>busbar system 5-pole</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>length: 1 meter</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$42.7 \text{ W/m}$</td>
</tr>
</tbody>
</table>

### Position of busbars

For containing short-circuit resistance the distance between busbar supports must not exceed 300 mm.

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### Equipment for busbar supports

<table>
<thead>
<tr>
<th></th>
<th>Mi ST 25</th>
<th>Mi ST 41</th>
<th>Mi ST 63</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1, L2, L3</td>
<td>12x10 mm</td>
<td>20x10 mm</td>
<td>30x10 mm</td>
</tr>
<tr>
<td>N</td>
<td>12x6 mm</td>
<td>12x10 mm</td>
<td>25x10 mm</td>
</tr>
<tr>
<td>PE</td>
<td>12x5 mm</td>
<td>12x5 mm</td>
<td>12x10 mm</td>
</tr>
</tbody>
</table>

### Possible combinations of busbars with different rated currents

<table>
<thead>
<tr>
<th>Busbar connector</th>
<th>Rated current of busbars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mi SV 25</td>
<td>250 A 250 A</td>
</tr>
<tr>
<td>Mi SV 25</td>
<td>250 A 400 A</td>
</tr>
<tr>
<td>Mi SV 45</td>
<td>400 A 400 A</td>
</tr>
<tr>
<td>Mi SV 45</td>
<td>630 A 630 A</td>
</tr>
</tbody>
</table>

**Hint:**

Busbar systems 250 A and 400 A must not be combined with 630 A-busbar systems!
Direct connection of conductors to busbars
Capacity of terminals for direct busbar connection see HEN-SEL Catalogue.

Wiring
Assignment of terminals for direct busbar connection to cross sections and enclosures with electrical functions.
Electrical connection 100 A up to 630 A from busbars to electrical equipment.
Wiring strip from laminated copper, insulated, supplied length 2 meters.

Connection of wiring strip Mi VS ... with terminal for direct busbar connection KS ...

Direct connection of wiring strip Mi VS ... to electrical equipment with flat contact M 10 with wiring supply terminal for direct connection of laminated copper wiring strip Mi VA ...

Connection of cables to devices with flat contact M 10 with terminal for direct connection DA 240.

Example:
Wiring with wiring strip Mi VS 400, terminals for direct connection on busbars and wiring strip connection terminals VA 400.
Wiring Strip
Strip at the connection point by a suitable length.

Right:
First bend forward wiring strip by 180° and then 90° to the side.

Wiring strip
In order to adjust differences in height, bend a step.
Insulation cover for busbars
Attach cover for insulating busbars if necessary.
## Terminal for incoming cables

<table>
<thead>
<tr>
<th>Terminal for incoming cables</th>
<th>Mi VE 120, 4-pole</th>
<th>Mi VE 125, 5-pole</th>
<th>Mi VE 240, 4-pole</th>
<th>Mi VE 245, 5-pole</th>
<th>Mi VE 302, 2-pole</th>
<th>Mi VE 303, 3-pole</th>
<th>Mi VE 304, 4-pole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated connecting capacity</td>
<td>150 mm²</td>
<td>240 mm²</td>
<td>240 mm²</td>
<td>300 mm²</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current carrying capacity</td>
<td>250 A</td>
<td>400 A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tightening torque</td>
<td>20 Nm</td>
<td>40 Nm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clamping units per pole</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

### Type of conductor

- Copper/aluminum sol (round)
  - 16-50
  - 16-50
  - 25-50
  - 25-50

- Copper/aluminum s (round), f (flexible)
  - 16-150
  - 16-70
  - 25-240
  - 25-120
  - 150-300
  - 35-70

- Copper/aluminum sol (sector)
  - 50-150
  - 50-70
  - 50-185
  - 50-120
  - 150-185
  - 95-185

- Copper s (sector)
  - 35-150
  - 35-70
  - 35-240
  - 35-120
  - 150-240
  - 95-185

- Aluminum s (sector)
  - 50-120
  - 35-50
  - 95-185
  - 50-95
  - 150-240
  - 95-185

### Outgoing Cu-strip

- Mi VS 100 up to Mi VS 630
- Mi VS 100 up to Mi VS 630
- Mi VS 630

Prior to connection, aluminum conductors must be prepared according to the appropriate technical recommendations, see technical information Aluminum conductors.

## Rated connecting capacity of PE and N terminals

### Clamping unit

<table>
<thead>
<tr>
<th>Clamping unit</th>
<th>Corresponding cross-sections / copper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screw-type terminal 25 mm²</td>
<td>max. number</td>
</tr>
<tr>
<td>1</td>
<td>25 mm², s</td>
</tr>
<tr>
<td>1</td>
<td>16 mm², s</td>
</tr>
<tr>
<td>1</td>
<td>10 mm², sol</td>
</tr>
<tr>
<td>3</td>
<td>6 mm², sol</td>
</tr>
<tr>
<td>3</td>
<td>4 mm², sol</td>
</tr>
<tr>
<td>4</td>
<td>2.5 mm², sol</td>
</tr>
<tr>
<td>4</td>
<td>1.5 mm², sol</td>
</tr>
</tbody>
</table>

**Tested as connecting terminal for several conductors of the same cross-sections for using in one circuit**

### Plug-in terminal 4 mm²

<table>
<thead>
<tr>
<th>Clamping unit</th>
<th>Corresponding cross-sections / copper</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.5 - 4 mm², sol</td>
</tr>
</tbody>
</table>

**Without end ferrule; clamping unit has to be opened with a tool when conductor is inserted.**

### Current carrying capacity of N bar: 75 A

All terminals are secured against self-loosening.
Mi Distribution Boards
Wiring
Aluminum conductors

Connection of aluminum conductors

I. Chemical basics

The special conducting characteristics of aluminum can be seen in the fact that the surface of an aluminum conductor is immediately covered in a non-conducting oxide layer upon exposure to oxygen.

This characteristic leads to an increase in the temporary resistance between the aluminum conductors and the terminal body.

II. Special terminal requirements for the connection of aluminum conductors

The suitability of terminal for connections with aluminum conductors needs to be evaluated and confirmed by the terminal manufacturer.

1. These terminals will thus meet the requirements for an aligned electrochemical voltage sequence. A disintegration of the base material (aluminum) will be prevented.

2. The terminal has an appropriate shape and surface to penetrate the grease layer or a very thin oxide layer on the aluminum conductor upon connection.

III. Appropriate preparation and handling of aluminum conductors

The non-insulated conductor ends need to have the oxide layer carefully scraped clean using a knife for example. In doing so no files, sand paper or brushes may be used.

Immediately after removing the oxide layer, the conductor end needs to be rubbed with an acid and alkali free grease such as technical vaseline and then immediately connected to the terminal. This in turn prevents oxygen from forming a non-conducting oxide layer.

Due to the flow tendency in aluminum the terminals need to be tightened before start up and after the first 200 operating hours (note the appropriate torque).

The steps listed above need to be repeated if the conductor is removed and re-connected. I.e. the conductor has to be scraped again, greased and immediately connected, because it will be connected at a different position.

This can lead to terminal overheating and in the worst case fire.

Despite these special conditions, aluminum conductors can be connected if the terminal used is appropriate and the following conditions are taken into consideration when connecting.
Routine test protocol in accordance with IEC 61439-1

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Type of testing*</th>
<th>Content of routine test</th>
<th>IEC 61439 Section</th>
<th>Result of routine test</th>
<th>Test engineer</th>
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<tbody>
<tr>
<td>1</td>
<td>S</td>
<td>Degree of protection</td>
<td>11.2</td>
<td>i. O.</td>
<td></td>
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<td></td>
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<td>of cabinets /enclosures</td>
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<td>(sealings, protection</td>
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<td>covers)</td>
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<td>Incorporation of built-</td>
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<td>in components</td>
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<td>7</td>
<td>P</td>
<td>Mechanical operation</td>
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<td>lockings)</td>
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<td>2</td>
<td>S/P</td>
<td>Creepage and clearance</td>
<td>11.3</td>
<td>i. O.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>distances</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>S/P</td>
<td>Internal electrical</td>
<td>11.6</td>
<td>i. O.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>circuits and connections</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>S</td>
<td>Terminals for external</td>
<td>11.7</td>
<td>i. O.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>conductors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>P</td>
<td>Dielectric properties</td>
<td>11.9</td>
<td>≥200 MΩ</td>
<td></td>
</tr>
</tbody>
</table>

*Type of testing S: visual inspection
Type of testing P: testing with mechanical or electrical test equipment

Routine verification / inspection

The manufacturer must specify measures that must be implemented to maintain the designated degree of protection.

Check that seals and covers were installed according to the manufacturer’s instructions.

The effectiveness of mechanical actuating elements, interlocks and locks including those associated with removable parts shall be checked.

Conductors must be checked for consistency with circuit diagrams and bolted connections have to be checked at random.

A power-frequency withstand test shall be performed on all circuits in accordance with IEC 61439-1 Section 10.9.2 for a duration of 1 s. The test voltage for power switchgear and controlgear assemblies with a rated insulation voltage between 300-690 V a.c. is 1,890 V. The test values for different rated insulation voltages are given in Table 8 of IEC 61439-1.

The protective circuits shall be subjected to a test for integrity of electrical connection.

The clearances between different potentials should be greater than the values in Table 1 of the standard. We recommend a minimum distance of 10 mm.

The guide to design and assemble in accordance with EN 61439 for ENYSTAR distribution boards up to 250 A and Mi Power distribution boards up to 630 A can be downloaded:

www.hensel-electric.de/61439
## Power switchgear and controlgear assembly (PSC),
Verification according to IEC 61439-2

### Distribution boards intended to be operated by ordinary persons (DBO),
Verification according to IEC 61439-3

<table>
<thead>
<tr>
<th>No.</th>
<th>Type of testing*</th>
<th>Content of routine test</th>
<th>IEC 61439 Section</th>
<th>Result of routine test</th>
<th>Inspector</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>S</td>
<td>Degree of protection of cabinets /enclosures (sealings, protection covers)</td>
<td>11.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>S/P</td>
<td>Creepage and clearance distances</td>
<td>11.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>S/P</td>
<td>Protection against electric shock and integrity of protective circuits</td>
<td>11.4</td>
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<tr>
<td>4</td>
<td>S</td>
<td>Incorporation of built-in components</td>
<td>11.5</td>
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<tr>
<td>5</td>
<td>S/P</td>
<td>Internal electrical circuits and connections</td>
<td>11.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>S</td>
<td>Terminals for external conductors</td>
<td>11.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>P</td>
<td>Mechanical operation (actuating elements, lockings)</td>
<td>11.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>P</td>
<td>Dielectric properties</td>
<td>11.9</td>
<td>MΩ</td>
<td></td>
</tr>
</tbody>
</table>

A power-frequency withstand test shall be performed on all circuits in accordance with IEC 61439-1 Section 10.9.2 for a duration of 1 s. The test voltage for power switchgear and controlgear assemblies with a rated insulation voltage between 300-690 V a.c. is 1,890 V. The test values for different rated insulation voltages are given in Table 8 of IEC 61439-1.

Alternatively, for switchgear assemblies with a protective device in the power supply and a rated current up to 250 A applies:
Measurement of the insulation resistance with an insulation tester at a voltage of at least 500 V d.c. The test is passed with an insulation resistance of at least 1000 Ω / V.

<table>
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<th>Inspector</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>P</td>
<td>Wiring, operational performance and function</td>
<td>11.10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

S - Visual inspection
P - Testing with mechanical or electrical test equipment

Installer: ................................................................. Inspector: ..........................................................

Date: ................................................................. Date: .............................................................
The company / panel builder that is responsible for the ready-for-use switchgear assembly is considered the manufacturer (EN 61439-1). Upon completion and assessment of the switchgear assembly by means of a routine verification, a manufacturer’s label must be affixed. It must be legible when the system is connected.

HENSEL adds a manufacturer’s marking to all circuit breaker boxes.

**Manufacturer’s marking**
- Manufacturer’s name or trademark
- Type, name or ID number
- Date of manufacture
- Applied Standard
  IEC 61439-2/-3 / EN 61439-2/-3

**Example**

![Manufacturer's marking example]

**Installation note:**
- Complete label.
- Affix visibly on the exterior of the assembly.
- Protect with enclosed protective film.

**Order** 20130815

HENSEL adds a manufacturer’s marking to all circuit breaker boxes.
The manufacturer of a switchgear assembly finally performs a conformity assessment according to LVD2014/35EU.

This can be done with the checklist for conformity assessment procedure (Sheet 2).

Finally, the CE Declaration of Conformity (Sheet 3) can be created. Both forms are editable and are made available for download at www.hensel-electric.de/61439.

CE marking

The laws for the safety of electrical equipment stipulate that a conformity assessment procedure has to be performed for assemblies as well. It is to prove that the assembly complies with the applicable regulations and conforms to the respectively valid safety standards.

Subsequently, a declaration of conformity must be created and the CE marking shall be affixed to the distributor.

Producing a new manufactured product from already existing manufactured goods, constitutes a manufacturer!
Erklärung
der EG-Konformität

Declaration of EC-Conformity

Nr./No. K 2010b

Das Produkt,
The product

Typ / Type:
Mi-Verteiler
Mi-Distributor
Typ / type: Mi ....

Hersteller:
Gustav Hensel GmbH & Co. KG
Gustav-Hensel-Straße 6
57368 Lennestadt

Beschreibung:
Niederspannungs-Schaltgerätekombination „PSC“
Low-voltage switchgear and controlgear assemblies “PSC”

auf das sich diese Erklärung bezieht, stimmt mit folgenden Normen oder normativen Dokumenten überein:
to which this declaration relates is in conformity with the following standard(s) or normative document(s):

Norm / Standard:
DIN EN 61439-2
IEC 61439-2
EN 61439-2

und entspricht den Bestimmungen der folgenden EG-Richtlinie(n):
and is in accordance with the provisions of the following EC-directive(s)

Niederspannungs-Richtlinie 2006/95/EG
Low voltage directive 2006/95/EC
EMV-Richtlinie (EMC) 2004/108/EG

Diese Konformitätserklärung entspricht der Europäischen Norm EN 17050-1 „Allgemeine Anforderungen für Konformitätserklärungen von Anbietern“. Das Unternehmen Gustav Hensel GmbH & Co. KG ist Mitglied von ALPHA im VDE. Diese Erklärung gilt weltweit als Erklärung des Herstellers zur Übereinstimmung mit den oben genannten internationalen und nationalen Normen.

This Declaration of Conformity is suitable to the European Standard EN 17050-1 „General requirements for supplier’s declaration of conformity“. The company Gustav Hensel GmbH & Co. KG is member of ALPHA at VDE. The declaration is world-wide valid as the manufacturer’s declaration of compliance with the requirements of the a.m. national and international standards.

Jahr der Anbringung der CE-Kennzeichnung: 2012
Year of affixing CE-Marking.

Ausstellungsdatum: 31.03.2015
Date of issue:

Gustav Hensel GmbH & Co. KG

O. Gutzeit
- Technische Geschäftsleitung -
- Technical Managing Director -

Declaration of Conformity can be downloaded at:

www.hensel-electric.de/61439