CATALOGUE
Safe product solutions for Photovoltaic plants
2016/2017
The photovoltaic market is going to grow significantly in coming years as more and more investors and home owners are betting on solar power’s high margin electricity. With our ENYSUN distribution board systems for photovoltaic plants conforming to standards, we support you in accessing this market. ENYSUN is a high value, modular system, which generates additional sales potential for you on the growing photovoltaic market.

Profit from a system which offers you clear competitive advantages on the market and which you can always rely on.

**Solar powered by Hensel**

**ENYSUN**
Professional Photovoltaic Distributors

**Hensel is the market leader in innovative products and services for electrotechnical building facility.**

Founded in 1931, Hensel is now part of an international group of companies doing business around the world. It has its headquarters in Lennestadt, Germany and subsidiaries in the most important international markets to provide an international presence and assure that the company is never far away.

Successfully mastering the future means cooperation in dialog for Hensel. The exchange with market partners and the consistent focus on practical challenges is a transfer that provides valuable inspiration for further development of products and services.

Where environmental influences, dust and moisture demand particularly demanding installation technology, Hensel enables safe energy distribution with innovative solutions. The program of modern installation and distribution systems for national and international applications have made HENSEL a market leader in tapping, fusing and distributing electrical energy in the low voltage sector.

Hensel guarantees its customers continually high standard of quality with decades of production expertise and a quality management system strictly in adherence with the DIN EN ISO 9001-2008 standard at all its factories.
Safe Product Solutions for Photovoltaics

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Further technical information can be found on the Internet
www.hensel-electric.de/en -> Products
ENYSUN
Safe Product Solutions for Photovoltaics

1. Solar panels
2. PV generator junction boxes
3. Inverters
4. Solar inverter collectors
5. Distributor with metering
In the setting up of photovoltaic power supply systems a multitude of standards and regulations are to be observed.

The following standard requirements are listed in extract.

**IEC 60364-7-712**
Electrical installations of buildings –  
Part 7-712: requirements for special installations or locations –  
Solar photovoltaic (PV) power supply systems

**PV module**

712.511.1  
PV modules shall comply with the requirements of the relevant equipment standard, e.g. IEC 61215 for crystalline PV modules. PV modules of class II construction or with equivalent insulation are recommended if $U_{oc\ STC}$ of the PV strings exceeds 120 V d.c..

**Generator junction boxes**

712.413.2  
Protection by use of **class II** or equivalent insulation should preferably be adopted on the DC side.

712.536.2.2.5.1  
All junction boxes (PV generator and PV array boxes) shall carry a warning label indicating that active parts inside the boxes may still be live after isolation from the PV inverter.

712.512.1.1  
Electrical equipment on the DC side shall be suitable for direct voltage and direct current.

**IEC 61439-1**
Low-voltage switchgear and controlgear assemblies -  
Part 1: General rules

10.9.4 Testing of enclosures made of insulating material  
For assemblies with enclosures made of insulating material, an additional dielectric test shall be carried out,...  
For this additional test, the test voltage shall be equal to 1.5 times the values indicated in Table 8.

**Solar inverters**

712.434.1  
The PV supply cable on the AC side shall be protected by a short circuit or an overcurrent protective device installed at the connection to the AC mains.

712.536.2.2.1  
In the selection and erection of devices for isolation and switching to be installed between the PV installation and the public supply, the public supply shall be considered the source and the **PV installation shall be considered the load**.
Dependent on the system

Electrical parameters

Rated current: up to 630 A
Rated insulation voltage: 690 V a.c., **1000 V d.c.**, IEC 60664
The rated insulation voltage is possibly reduced by the installed equipment technology.

System properties

Ambient conditions

Ambient temperature
- for distribution boards according to IEC 61439:
  -5 °C up to 35 °C, max. + 40 °C
- Relative humidity: 50% at 40 °C, 100% at 25 °C

Degree of protection against mechanical load IK 08 (5 Joule) in accordance with IEC 62262

Impact strength

The enclosures are suitable for protected outdoor installation
However the climatic influences and effects on the equipment are to be considered, see pages “outdoor applications”.

Dust-proof
Degree of protection IP 65

Protection against foreign solid objects and direct contact

Insulation

Insulated enclosures
(Protection class II)

Protection against ingress of water with harmful effects

Protection against water jets
Degree of protection IP 65

Dependent on material

Material: Polycarbonat

Glow wire test 960 °C
in accordance with IEC 60695-2-11
flame-retardant, self-extinguishing

Resistance against acid
10% and lye 10%, petrol and mineral oil

Chemical resistance

UV resistance according to IEC 61439-1, Section 10.2.4:
the material is examined for UV resistance

Silicone- and halogen-free

Toxic behaviour
Connection:
- Ready for connection with plug-in connectors
- Electrical data:
  - Rated voltage: 1000 V d.c.
  - Rated current: up to 400 A
- Protective measure: Total insulation
- Ambient conditions:
  - UV resistant
  - Degree of protection: IP 65
  - Stainless steel external brackets optional: suitable products to effectively reduce the accumulation of condensation in enclosures (e.g. pressure compensation elements, canopy, ventilation flanges)
The materials used in Mi System enclosures are generally UV resistant meaning that the mechanical stability shall remain after UV exposure. Direct solar radiation as well as power dissipation within a box can overheat the interior of the box. Exterior temperatures that are too low e.g. under -5°C can also influence the functioning of the equipment. Therefore climatic influence on the equipment needs to be taken into consideration. The top of the box should be protected with a cover to protect against impact created by weather conditions such as rain, ice and snow. Possible impact from chemical influences also needs to be taken into consideration when selecting an installation location, as well as IP degree of protection and climate impact. Additional measures might be necessary such as ventilation (note degree of protection) to assure that the maximum ambient temperature allowed is not exceeded for the installed equipment as well as to prevent condensation from forming. In outdoor installations Hensel combi climate glands (KBM) can be used for cable entry and pressure compensation as well (see accessories).

**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.**

![System switched on](image)

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

**System switched on.**

![System switched on](image)

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.**

![System switched off](image)

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.

**Formation of condensed water for indoor installations:**

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

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

Here condensed water can be formed dependent on the weather, high air humidity, direct sunlight and temperature differences compared to the wall.

**Ambient conditions:**

Degree of protection: IP 65

Stainless steel external brackets, optional: suitable products to effectively reduce the accumulation of condensation in enclosures (e.g. pressure compensation elements, canopy, ventilation flanges).
Through the exposed assembly of photovoltaic generators on rooftops or in the free surface the lightning and surge protection is an important part of investment protection.

Direct lightning strikes in the PV generator can for example destroy PV modules and inverters (primary damage).

Since photovoltaic (PV) systems necessarily have a connection to the electrical installation of the building, damages throughout the whole plant can result from lightning strikes in the PV generator (secondary effect).

### Protection measures

Basically, it should be ensured that no direct lightning strike to the PV generator is possible. Well-known manufacturers offer suitable products for "external lightning protection systems."

If an external lightning protection system is installed, a lightning current arrester type 1 for the AC supply is required in the building main distribution board.

### Protection of solar inverters

To protect the inverters against surge voltages, both the DC inputs and AC outputs must be protected. When the inverter is installed at a distance of more than 10 m cable length to the building's main power distribution, then a surge protection device (SPD) type 2 for the AC line shall be used to prevent overvoltage damage, such as switching overvoltage from the electrical power supply.

For the string lines of the DC inputs special type 2 surge protection devices are to be provided, which are suitable for direct voltage. The decisive factor is the individual lightning and surge protection concept.

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*between lightning protection facility and PV plant*
How to choose the correct overload protection for PV generator

### PV panel technology

| Crystalline panels | Thin-film panels |

#### Which PV panel technology is used?

- **Crystalline panels**
- **Thin-film panels**

### Blocking diode

- **Manufacturer’s instructions must be checked!**

1. **Manufacturer’s instructions must be checked:** If thin-film panels are not reverse current proof, blocking diodes must be used. The manufacturer indicates the number of parallel strings, for which no blocking diodes are needed.

### String overload protection

2. **Please check, if overload protection is needed, see the requirements of IEC 60364 -7-712 Part 712.433.1**

- IEC 60364 -7-712 Part 712.433.1
- Overload protection may be omitted to PV string and PV array cables when the continuous current-carrying capacity of the cable is equal to or greater than 1,25 times $I_{SC\;STC}$ at any location.
- $I_{SC\;STC} = $ Short Circuit Current Under Standard Test Condition

### DC generator disconnect switch

3. **Please check, if additionally a DC generator disconnect switch must be used. This can be integrated already in the solar inverter! See the requirements of IEC 60364-7-712 Part 712.536.2.2.5!**

- IEC 60364 -7-712 Part 712.536.2.2.5
- A switch disconnector shall be provided on the DC side of the PV inverter.
DC surge arrester for PV plants (SPD)

<table>
<thead>
<tr>
<th>Required protection device in PV generator junction boxes</th>
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<tbody>
<tr>
<td>Generator junction box with terminals</td>
</tr>
<tr>
<td>Generator junction box with DC surge arrester for PV plants</td>
</tr>
<tr>
<td>Generator junction box with DC generator disconnect switch</td>
</tr>
<tr>
<td>Generator junction box with DC generator disconnect switch and DC surge arrester for PV plants</td>
</tr>
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</table>

**junctin boxes:**

- If DC lines are wired from one lightning protection zone into another, a surge protection device (SPD) must be installed in the proximity of the feed-through for cables.
- If an outside lightning protection installed, then also an internal overvoltage protection is necessary.

Is DC surge arrester required?

- NO
- YES

- NO
- YES

- NO
- YES

- NO
- YES

- NO
- YES

Please check, if a surge protection device (SPD) is necessary.
ENYSUN
PV generator junction boxes
with surge arrester or DC generator disconnect switch

**KV PV 1211**
1 x PV string for 1 x inverter input
1 x DC type 2 surge arrester
- ready for connection
- suitable for outdoor installation, UV resistant
- 1 x DC type 2 surge arrester
  - max. outgoing surge current DC (8/20) $I_{total}$: 40 kA
  - protection level DC: < 4 kV
- plug-in connectors compatible to MC4
- connection cable length: 2 x 500 mm
- rated connecting capacity PE: 1.5-16 mm², Cu
- with stainless steel mounting plate for wall and post installations

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<th>rated voltage</th>
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<tr>
<td>Rated current of a circuit RDF (Rated Diversity Factor)</td>
<td>$I_{NC} = 30$ A</td>
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</tbody>
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**KV PV 2211**
1 x PV string for 1 x inverter input
1 x DC generator disconnect switch
- ready for connection
- suitable for outdoor installation, UV resistant
- 1 x DC generator disconnect switch
  - utilization category for switch disconnectors: DC-21 A = Switching ohmic loads inclusively moderate overload
- plug-in connectors compatible to MC4
- connection cable length: 2 x 500 mm
- with stainless steel mounting plate for wall and post installations

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Installation of KV PV ...
generator junction box
Possible in standard wall and post mounting.
**ENYSUN**

PV generator junction boxes
with surge arrester or DC generator disconnect switch

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**KV PV 2411**

1 x PV string for 1 x inverter input  
1 x DC type 2 surge arrester and  
1 x DC generator disconnect switch

- ready for connection  
- suitable for outdoor installation, UV resistant  
- 1 x DC type 2 surge arrester  
  max. outgoing surge current DC (8/20) \( I_{total} \): 40 kA  
  protection level DC: < 4 kV  
- 1 x DC generator disconnect switch  
  utilization category for switch disconnectors: DC-21 A =  
  Switching ohmic loads inclusively moderate overload  
- plug-in connectors compatible to MC4  
- connection cable length: 2 x 500 mm  
- rated connecting capacity PE: 1.5-16 mm², Cu  
- with stainless steel mounting plate for wall and post installations

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<td>RDF (Rated Diversity Factor)</td>
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To protect from unauthorized access

**Locking device**  
KV ES 3  
**Facility for sealing**  
KV PL 3
ENYSUN
PV generator junction box
with type 2 surge arrester

Mi PV 1111
1 x PV string for 1 x inverter input
1 x DC type 2 surge arrester
- ready for connection
- suitable for outdoor installation, UV resistant
- 1 x DC type 2 surge arrester
  - max. outgoing surge current DC (8/20) \( I_{\text{total}} \): 40 kA
  - protection level DC: < 4 kV
- plug-in connectors compatible to MC4
- rated connecting capacity PE: 1.5-16 mm², Cu
- lid fasteners for tool operation
- with stainless steel external brackets

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<td>( I_{\text{A}} = 1 \times 30 \text{ A} )</td>
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</table>

| Rated current of a circuit RDF (Rated Diversity Factor) | \( I_{\text{C}} = 30 \text{ A} \) | 1 |

Mi PV 1122
2 x PV string for 2 x inverter input
2 x DC type 2 surge arrester
- ready for connection
- suitable for outdoor installation, UV resistant
- 1 x DC type 2 surge arrester
  - max. outgoing surge current DC (8/20) \( I_{\text{total}} \): 40 kA
  - protection level DC: < 4 kV
- plug-in connectors compatible to MC4
- rated connecting capacity PE: 1.5-16 mm², Cu
- lid fasteners for tool operation
- with stainless steel external brackets

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| Rated current of a circuit RDF (Rated Diversity Factor) | \( I_{\text{C}} = 30 \text{ A} \) | 1 |
ENYSUN
PV generator junction box
with type 2 surge arrester

Mi PV 1133
3 x PV string for 3 x inverter input
3 x DC type 2 surge arrester

- ready for connection
- suitable for outdoor installation, UV resistant
- 1 x DC type 2 surge arrester
  - max. outgoing surge current DC (8/20) I_{total}: 40 kA
  - protection level DC: < 4 kV
- plug-in connectors compatible to MC4
- rated connecting capacity PE: 1.5-16 mm², Cu
- lid fasteners for tool operation
- with stainless steel external brackets

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<th>Item</th>
<th>Specification</th>
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<td>Rated voltage</td>
<td>U_{DC-STC} = 1000 V d.c.</td>
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<td>Rated current of the power switchgear</td>
<td>I_{PA} = 3 x 30 A</td>
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<td>and controlgear assembly</td>
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Accessories to reduce condensed water

- Canopy MI DB ..
- Ventilation flange MI BF 44
- Pressure compensation element MI BM x0 G
ENYSUN
PV generator junction box
with type 2 surge arrester

**Mi PV 1121**

2 x PV string for 1 x inverter input
1 x DC type 2 surge arrester

- ready for connection
- suitable for outdoor installation, UV resistant
- 1 x DC type 2 surge arrester
  - max. outgoing surge current DC (8/20) $I_{total}$: 40 kA
  - protection level DC: < 4 kV
- plug-in connectors compatible to MC4
- rated connecting capacity PE: 1.5-16 mm², Cu
- lid fasteners for tool operation
- with stainless steel external brackets

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</table>

**Mi PV 1242**

4 x PV string for 2 x inverter input
2 x DC type 2 surge arrester

- ready for connection
- suitable for outdoor installation, UV resistant
- 1 x DC type 2 surge arrester
  - max. outgoing surge current DC (8/20) $I_{total}$: 40 kA
  - protection level DC: < 4 kV
- plug-in connectors compatible to MC4
- rated connecting capacity PE: 1.5-16 mm², Cu
- lid fasteners for tool operation
- with stainless steel external brackets

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ENYSUN
PV generator junction box
with type 2 surge arrester

Mi PV 1263
6 x PV string for 3 x inverter input
3 x DC type 2 surge arrester

- ready for connection
- suitable for outdoor installation, UV resistant
- 1 x DC type 2 surge arrester
  - max. outgoing surge current DC (8/20) I_{total}: 40 kA
  - protection level DC: < 4 kV
- plug-in connectors compatible to MC4
- rated connecting capacity PE: 1.5-16 mm², Cu
- lid fasteners for tool operation
- with stainless steel external brackets

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Accessories to reduce condensed water

Canopy
Mi DB ..

Ventilation flange
Mi BF 44

Pressure compensation element
Mi BM x0 G
ENYSUN
PV generator junction boxes
with type 2 surge arrester and DC generator disconnect switch

**Mi PV 2111**
1 x PV string for 1 x inverter input
1 x DC type 2 surge arrester and
1 x DC generator disconnect switch
- ready for connection
- suitable for outdoor installation, UV resistant
- 1 x DC type 2 surge arrester
  - max. outgoing surge current DC (8/20) $I_{\text{total}}$: 40 kA
  - protection level DC: < 4 kV
- 1 x DC generator disconnect switch
  - utilization category for switch disconnectors: DC-21 A =
    - Switching ohmic loads inclusively moderate overload
- plug-in connectors compatible to MC4
- rated connecting capacity PE: 1.5-16 mm², Cu
- lid fasteners for tool operation
- with stainless steel external brackets

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**Mi PV 2222**
2 x PV string for 2 x inverter input
2 x DC type 2 surge arrester and
2 x DC generator disconnect switch
- ready for connection
- suitable for outdoor installation, UV resistant
- 1 x DC type 2 surge arrester
  - max. outgoing surge current DC (8/20) $I_{\text{total}}$: 40 kA
  - protection level DC: < 4 kV
- 1 x DC generator disconnect switch
  - utilization category for switch disconnectors: DC-21 A =
    - Switching ohmic loads inclusively moderate overload
- plug-in connectors compatible to MC4
- rated connecting capacity PE: 1.5-16 mm², Cu
- lid fasteners for tool operation
- with stainless steel external brackets

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Mi PV 2233
3 x PV string for 3 x inverter input
3 x DC type 2 surge arrester and
3 x DC generator disconnect switch
- ready for connection
- suitable for outdoor installation, UV resistant
- 1 x DC type 2 surge arrester
  max. outgoing surge current DC (8/20) I_{total}: 40 kA
  protection level DC: < 4 kV
- 1 x DC generator disconnect switch
  utilization catagory for switch disconnectors: DC-21 A =
  Switching ohmic loads inclusively moderate overload
- plug-in connectors compatible to MC4
- rated connecting capacity PE: 1.5-16 mm², Cu
- lid fasteners for tool operation
- with stainless steel external brackets

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To protect from unauthorized access

- Sealing cap Mi PL 2
- Lid lock with locking device Mi ZS 1x
- Lid fastener for tool operation Mi DR 04
ENYSUN
PV generator junction boxes
with type 2 surge arrester and DC generator disconnect switch

Mi PV 2121
2 x PV string for 1 x inverter input
1 x DC type 2 surge arrester and
1 x DC generator disconnect switch

- ready for connection
- suitable for outdoor installation, UV resistant
- 1 x DC type 2 surge arrester
  max. outgoing surge current DC (8/20) \(I_{\text{total}}\): 40 kA
  protection level DC: < 4 kV
- 1 x DC generator disconnect switch
  utilization category for switch disconnectors: DC-21 A =
  Switching ohmic loads inclusively moderate overload
- plug-in connectors compatible to MC4
- rated connecting capacity PE: 1.5-16 mm², Cu
- lid fasteners for tool operation
- with stainless steel external brackets

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Mi PV 2242
4 x PV string for 2 x inverter input
2 x DC type 2 surge arrester and
2 x DC generator disconnect switch

- ready for connection
- suitable for outdoor installation, UV resistant
- 1 x DC type 2 surge arrester
  max. outgoing surge current DC (8/20) \(I_{\text{total}}\): 40 kA
  protection level DC: < 4 kV
- 1 x DC generator disconnect switch
  utilization category for switch disconnectors: DC-21 A =
  Switching ohmic loads inclusively moderate overload
- plug-in connectors compatible to MC4
- rated connecting capacity PE: 1.5-16 mm², Cu
- lid fasteners for tool operation
- with stainless steel external brackets

<table>
<thead>
<tr>
<th>rated voltage</th>
<th>( U_{\text{DC STC}} = 1000 \text{ V d.c.} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>rated current of the power</td>
<td>( I_{\text{VA}} = 2 \times 30 \text{ A} )</td>
</tr>
<tr>
<td>switchgear and controlgear assembly</td>
<td></td>
</tr>
<tr>
<td>Rated current of a circuit</td>
<td>( I_{\text{IC}} = 15 \text{ A} )</td>
</tr>
<tr>
<td>RDF (Rated Diversity Factor)</td>
<td>1</td>
</tr>
</tbody>
</table>

To protect from unauthorized access

Sealing cap
Mi PL 2
Lid lock with locking device
Mi ZS 1x
Lid fastener for tool operation
Mi DR 04
ENYSUN
PV generator junction boxes
with type 2 surge arrester and DC generator disconnect switch

Mi PV 2263
6 x PV string for 3 x inverter input
3 x DC type 2 surge arrester and
3 x DC generator disconnect switch

- ready for connection
- suitable for outdoor installation, UV resistant
- 1 x DC type 2 surge arrester
  max. outgoing surge current DC (8/20) I_{total}: 40 kA
  protection level DC: < 4 kV
- 1 x DC generator disconnect switch
  utilization category for switch disconnectors: DC-21 A =
  Switching ohmic loads inclusively moderate overload
- plug-in connectors compatible to MC4
- rated connecting capacity PE: 1.5-16 mm², Cu
- lid fasteners for tool operation
- with stainless steel external brackets

<table>
<thead>
<tr>
<th>rated voltage</th>
<th>U_{DC-STC} = 1000 V d.c.</th>
</tr>
</thead>
<tbody>
<tr>
<td>rated current of the power switchgear and controlgear assembly</td>
<td>I_{VA} = 3 x 30 A</td>
</tr>
<tr>
<td>Rated current of a circuit</td>
<td>I_{IC} = 15 A</td>
</tr>
<tr>
<td>RDF (Rated Diversity Factor)</td>
<td>1</td>
</tr>
</tbody>
</table>
**ENYSUN**

PV generator junction boxes
with type 1 + 2 surge arrester

**Mi PV 1171 NEW**

2 x PV string for 1 x inverter input
1 x DC type 1 + 2 surge arrester

- ready for connection
- suitable for outdoor installation, UV resistant
- DC type 1 + 2 surge arrester
  - lightning surge current DC (10/350) [DC+/DC -> PE] \( I_{\text{imp}} \): 12.5 kA
  - protection level [DC+/DC- -> PE]: < 2.5 kV
- plug-in connectors compatible to MC4
- rated connecting capacity PE: 1.5-25 mm², Cu
- lid fasteners for tool operation
- with stainless steel external brackets

<table>
<thead>
<tr>
<th>rated voltage</th>
<th>( U_{\text{DC STC}} = 1000 \text{ V d.c.} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>rated current of the power switchgear and controlgear assembly</td>
<td>( I_{\text{A}} = 1 \times 30 \text{ A} )</td>
</tr>
<tr>
<td>Rated current of a circuit</td>
<td>( I_{\text{c}} = 15 \text{ A} )</td>
</tr>
<tr>
<td>RDF (Rated Diversity Factor)</td>
<td>1</td>
</tr>
</tbody>
</table>

DC

AC

WR 1

String 1

String 2
ENYSUN
PV generator junction boxes
with type 1 + 2 surge arrester and DC generator disconnect switch

Mi PV 2171  NEW
2 x PV string for 1 x inverter input
1 x DC type 1 + 2 surge arrester and
1 x DC generator disconnect switch

- ready for connection
- suitable for outdoor installation, UV resistant
- DC type 1 + 2 surge arrester
  lightning surge current DC (10/350) [DC+/DC- -> PE] I_{imp}: 12.5 kA
  protection level [DC+/DC- -> PE]: < 2.5 kV
- 1 x DC generator disconnect switch
  utilization catagory for switch disconnectors: DC-21 A = Switching ohmic loads inclusively moderate overload
- plug-in connectors compatible to MC4
- rated connecting capacity PE: 1.5-25 mm², Cu
- lid fasteners for tool operation
- with stainless steel external brackets

<table>
<thead>
<tr>
<th>rated voltage</th>
<th>U_{DC-STC} = 1000 V d.c.</th>
</tr>
</thead>
<tbody>
<tr>
<td>rated current of the power switchgear and controlgear assembly</td>
<td>I_{VA} = 1 x 30 A</td>
</tr>
</tbody>
</table>

| Rated current of a circuit | I_{IC} = 15 A |
| RDF (Rated Diversity Factor) | 1 |
**ENYSUN**

**PV generator junction boxes**

*with string overload and DC generator disconnect switch*

---

**Mi PV 3311**

*6 x PV string for 1 x inverter input*

*2 x DC generator disconnect switch*

- ready for connection
- suitable for outdoor installation, UV resistant
- 6 holder for fuses each + and -
- connection: 1.5-16 mm² Cu
- 2 x DC Generator disconnect switch
  - Utilization category for switch disconnectors: DC-21A = Switching ohmic loads inclusively moderate overload
- connection: 6-35 mm², Cu
- lid fasteners for tool operation
- included cable entry: 12 x AKM 16, 2 x AKM 25
- with stainless steel external brackets

<table>
<thead>
<tr>
<th>rated voltage</th>
<th>U_{DC STC}= 1000 V d.c.</th>
</tr>
</thead>
<tbody>
<tr>
<td>rated current of the power switchgear and controlgear assembly</td>
<td>I_{IA} = 60 A</td>
</tr>
<tr>
<td>Rated current of a circuit RDF (Rated Diversity Factor)</td>
<td>I_{IC} = 10 A</td>
</tr>
</tbody>
</table>

**Mi PV 3321**

*6 x PV string for 1 x inverter input*

*1 x DC type 2 surge arrester and 2 x DC generator disconnect switch*

- ready for connection
- suitable for outdoor installation, UV resistant
- 6 holder for fuses each + and -
- connection: 1.5-16 mm² Cu
- 2 x DC Generator disconnect switch
  - Utilization category for switch disconnectors: DC-21A = Switching ohmic loads inclusively moderate overload
- connection: 6-35 mm², Cu
- 1 x DC type 2 surge arrester
  - max. outgoing surge current DC (8/20) I_{total}: 40 kA
  - protection level DC: < 4 kV
- rated connecting capacity PE: 1.5-35 mm², Cu
- lid fasteners for tool operation
- included cable entry: 12 x AKM 16, 3 x AKM 25
- with stainless steel external brackets

<table>
<thead>
<tr>
<th>rated voltage</th>
<th>U_{DC STC}= 1000 V d.c.</th>
</tr>
</thead>
<tbody>
<tr>
<td>rated current of the power switchgear and controlgear assembly</td>
<td>I_{IA} = 60 A</td>
</tr>
<tr>
<td>Rated current of a circuit RDF (Rated Diversity Factor)</td>
<td>I_{IC} = 10 A</td>
</tr>
</tbody>
</table>
ENYSUN  
PV generator junction boxes  
with string overload and DC generator disconnect switch

**Mi PV 3611**

12 x PV string for 1 x inverter input  
1 x DC generator disconnect switch

- ready for connection
- for each 12 fuse holders + and -: connection: 1.5-16 mm² Cu
- 1 x DC Generator disconnect switch  
  connection: M 10 (max. 1 x 120 mm² per pole)
- lid fasteners for tool operation
- included cable entry: 12 x AKM 16, 12 x AKM 20, 2 x AKM 25
- with stainless steel external brackets

<table>
<thead>
<tr>
<th>rated voltage</th>
<th>U_{DC STC} = 1000 V d.c.</th>
</tr>
</thead>
<tbody>
<tr>
<td>rated current of the power</td>
<td>I_{RA} = 120 A</td>
</tr>
<tr>
<td>switchgear and controlgear assembly</td>
<td></td>
</tr>
<tr>
<td>Rated current of a circuit</td>
<td>I_{IC} = 10 A</td>
</tr>
<tr>
<td>RDF (Rated Diversity Factor)</td>
<td>1</td>
</tr>
</tbody>
</table>

**Mi PV 3621**

12 x PV string for 1 x inverter input  
1 x DC type 2 surge arrester and  
1 x DC generator disconnect switch

- ready for connection
- for each 12 fuse holders + and -: connection: 1.5-16 mm² Cu
- 1 x DC Generator disconnect switch  
  connection: M 10 (max. 1 x 120 mm² per pole)
- 1 x DC type 2 surge arrester  
  max. outgoing surge current DC (8/20) I_{total}: 40 kA  
  protection level DC: < 4 kV
- rated connecting capacity PE: 1.5-35 mm², Cu
- lid fasteners for tool operation
- included cable entry: 12 x AKM 16, 12 x AKM 20, 3 x AKM 25
- with stainless steel external brackets

<table>
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<tr>
<th>rated voltage</th>
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<td>Rated current of a circuit</td>
<td>I_{IC} = 10 A</td>
</tr>
<tr>
<td>RDF (Rated Diversity Factor)</td>
<td>1</td>
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</tbody>
</table>

**Accessories to reduce condensed water**

Canopy  
Mi DB ...

Ventilation flange  
Mi BF 44

Pressure compensation element  
Mi BM x0 G
ENYSUN
PV generator junction boxes
with string overload and DC generator disconnect switch

Mi PV 3931
24 x PV string for 1 x inverter input
1 x DC generator disconnect switch

- ready for connection
- for each 24 fuse holders + and -
  connection: 1.5-16 mm² Cu
- 1 x DC Generator disconnect switch
  connection: M 10 (max. 1 x 120 mm² per pole)
- lid fasteners for tool operation
- included cable entry: 24 x AKM 16, 24 x AKM 20, 2 x AKM 40
- with stainless steel external brackets

<table>
<thead>
<tr>
<th>rated voltage</th>
<th>U_{DC \ STC} = 1000 \text{ V d.c.}</th>
</tr>
</thead>
<tbody>
<tr>
<td>rated current of the power switchgear and controlgear assembly</td>
<td>I_{IA} = 240 \text{ A}</td>
</tr>
</tbody>
</table>

| Rated current of a circuit | I_{IC} = 10 \text{ A} |
| RDF (Rated Diversity Factor) | 1 |

Mi PV 3941
24 x PV string for 1 x inverter input
1 x DC type 2 surge arrester and
1 x DC generator disconnect switch

- ready for connection
- for each 24 fuse holders + and -
  connection: 1.5-16 mm² Cu
- 1 x DC Generator disconnect switch
  connection: M 10 (max. 1 x 120 mm² per pole)
- 1 x DC type 2 surge arrester
  max. outgoing surge current DC (8/20) I_{total}: 40 \text{ kA}
  protection level DC: < 4 \text{ kV}
- rated connecting capacity PE: 1.5-35 mm², Cu
- lid fasteners for tool operation
- included cable entry: 24 x AKM 16, 25 x AKM 20, 2 x AKM 40
- with stainless steel external brackets

<table>
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<th>rated voltage</th>
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<td>I_{IA} = 240 \text{ A}</td>
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</table>

| Rated current of a circuit | I_{IC} = 10 \text{ A} |
| RDF (Rated Diversity Factor) | 1 |

Accessories to reduce condensed water

- Canopy
  Mi DB ...
- Ventilation flange
  Mi BF 44
Generator junction boxes up to 1000 A
made of insulation material in protection class: II,
degree of protection: up to IP 65

Customised solutions? Contact us!
See check list in the appendix!
ENYSUN
Solar Inverter Collectors

- Complete set: pre-fabricated and tested solar inverter collector solutions
- Electrical data:
  Rated voltage: 230/400 V a.c.
  Rated capacity: up to 220 kVA
  Degree of protection: up to IP 65 optional with surge arrester
- Derating:
  Taking account of the thermal effects in generating plants, spacers ensure ventilation and degree of protection IP 2X
**EMC compliant busbar**

The busbar system comes standard with N/PEN conductors in the phase conductor area. The N busbars have the same current carrying capacity as the phase conductor.

These busbars are appropriate for:
- Harmonics created by the solar inverter.
- Unbalanced loads (Unbalanced load limit 4.6 kVA allowed by power supply companies) created by power supply companies.

**Connection of large cable cross-sections**

By using a cable insert in combination with strain relief for inverter-collectors from 140 kVA an easy connection of large cable cross-sections is possible.

When using a cable insertion the cables are inserted from the front. As a result, cables must not be inserted via cable glands.

To obtain degree of protection the strain relief keeps the cables connected centred within the stepped grommet. In addition, the cables are strain- and pressure relieved.
Solar inverter collector supplied as set

PV inverter collectors are supplied as a complete set. All necessary parts are put together in one set. The individual housings are ready for connection and tested. They can be mounted to distribution boards, in order to realize a customized assembly according to the individual locations.

PV inverter collectors can be extended with lightning or surge protection and residual current protection (RCD) basing on pre-engineered enclosure solutions, thus offering optimal solutions for all requirements.
Installation variations of a complete set

Wiring from the same direction

Wiring from different directions

Example: Extension of the complete set Mi PV 6123
- with surge protection device box (SPD)

<table>
<thead>
<tr>
<th>Parts list for example:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 x Mi PV 6123 Solar inverter collectors 140 kVA with circuit-breaker box</td>
</tr>
<tr>
<td>1 x Mi PV 5611 Surge protection device box (SPD)</td>
</tr>
</tbody>
</table>

- with enclosures for residual current protection (RCD)

<table>
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<tr>
<th>Parts list for example:</th>
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<tr>
<td>1 x Mi PV 6123 Solar inverter collectors 140 kVA with circuit-breaker box</td>
</tr>
<tr>
<td>2 x Mi PV 5711 circuit-breaker box</td>
</tr>
</tbody>
</table>

- with surge protection device box (SPD) and enclosures for residual current protection (RCD)

<table>
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<tr>
<th>Parts list for example:</th>
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</thead>
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<td>1 x Mi PV 6123 Solar inverter collectors 140 kVA with circuit-breaker box</td>
</tr>
<tr>
<td>1 x Mi PV 5611 Surge protection device box (SPD)</td>
</tr>
<tr>
<td>2 x Mi PV 5711 circuit-breaker box</td>
</tr>
</tbody>
</table>

Mi PV 6111 (70 kVA) complete set
Extension:
Mi 010X empty box, Mi WD 2 wall gasket and terminal for direct busbar connection KS 70 F

Extension of terminal compartment for the 70 mm² connection
Photovoltaic installations need special ratings.

Why are special solutions needed for PV plants?
The rating of photovoltaic installations differs significantly from normal building installations in that the installed devices are subject to a continuous load.

**Power distribution in buildings**
Protective device selection and rating to protect cables related to the current resp. the load of the consumer.

Select protective devices in the form of a fuse or miniature circuit breaker.

**Power distribution in photovoltaic plants**
Protective device selection and rating to protect cables related to the current resp. load of the solar inverter on the AC side.

Select protective devices in the form of a fuse or miniature circuit breaker.

**Applying the simultaneity factor**

Due to the low simultaneity factor, the installed distribution board is often dimensioned according to the number of modules.

**Influenced by heat from the simultaneity factor and load**

In consumption plants, power dissipation fluctuates depending on the number of consumers switched on at any one time.

**Low average effective power dissipation**

Constant high loads lead to high average power dissipation during the energy production phase.

Power dissipation therefore needs to be reduced to the point where the maximum temperature for devices is not exceeded.
Hensel solar inverter collectors correct dimensioned and tested: e.g. circuit-breaker box

High power dissipation levels can lead to exceeding the maximum permitted temperature for devices meaning that protection devices can trip even when beneath rated current levels. Photovoltaic installations require a special way of thinking about device dimensioning and selection! The equipment of a circuit breaker box can be inferred from the following table.

### Table: Rating of solar inverter collector

<table>
<thead>
<tr>
<th>Inverter</th>
<th>miniature circuit breaker</th>
<th>cable</th>
<th>glands</th>
<th>flange</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection device for 1– solar inverter with 1-pole miniature circuit breakers (MCB)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>maximum power output:</td>
<td>max. operating current</td>
<td>rated current</td>
<td>max. quantity</td>
<td>MU* between two MCB</td>
</tr>
<tr>
<td>2.8 kVA</td>
<td>12 A</td>
<td>16 A</td>
<td>6 per row</td>
<td>1</td>
</tr>
<tr>
<td>3.7 kVA</td>
<td>16 A</td>
<td>20 A</td>
<td>5 per row</td>
<td>1</td>
</tr>
<tr>
<td>4.8 kVA</td>
<td>21 A</td>
<td>25 A</td>
<td>4 per row</td>
<td>1</td>
</tr>
<tr>
<td>6.5 kVA</td>
<td>28 A</td>
<td>32 A</td>
<td>3 per row</td>
<td>1</td>
</tr>
</tbody>
</table>

| Protection device for 3– solar inverter with 1-pole miniature circuit breakers (MCB) | | | | |
| Inverter | miniature circuit breaker | cable | glands | flange |
| maximum power output: | max. operating current | rated current | max. quantity | MU* between two MCB | minimum cable cross section | minimum outside diameter |
| 8.4 kVA | 12 A | 16 A | 6 per row | 1 | 5 x 2.5 mm² | 13.5 mm | M 25 | M FM 32 |
| 11.1 kVA | 16 A | 20 A | 5 per row | 1 | 5 x 2.5 mm² | 13.5 mm | M 25 | M FM 32 |
| 14.4 kVA | 21 A | 25 A | 4 per row | 1 | 5 x 4 mm² | 15.5 mm | M 32 | M FM 32 |
| 19.5 kVA | 28 A | 32 A | 3 per row | 1 | 5 x 6 mm² | 18 mm | M 32 | M FM 32 |

| Protection device for 3– solar inverter with 3-pole miniature circuit breakers (MCB) | | | | |
| Inverter | miniature circuit breaker | cable | glands | flange |
| maximum power output: | max. operating current | rated current | max. quantity | MU* between two MCB | minimum cable cross section | minimum outside diameter |
| 8.4 kVA | 12 A | 16 A | 2 per row | 6 | 5 x 2.5 mm² | 13.5 mm | M 25 | M FM 32 |
| 8.9 kVA | 13 A | 20 A | 2 per row | 66 | 5 x 2.5 mm² | 13.5 mm | M 25 | M FM 32 |
| 11.7 kVA | 17 A | 25 A | 2 per row | 12 | 5 x 4 mm² | 15.5 mm | M 32 | M FM 32 |
| 14.4 kVA | 21 A | 25 A | 1 per row | 12 | 5 x 4 mm² | 15.5 mm | M 32 | M FM 32 |
| 19.5 kVA | 28 A | 32 A | 1 per row | 12 | 5 x 6 mm² | 18 mm | M 32 | M FM 32 |

Values are valid for max. ambient temperature of 35° C

---

### 1. Assessing simultaneity and load capacity

#### High simultaneity and load:

- Devices spaced apart allow a better radiation of the power dissipation.
- Additional slots assure increased air circulation in the enclosure.
- The larger enclosure increase the dissipated power loss.

### 2. Standard assembly support

- Installation devices are to be properly installed automatically with the help of spacers.
- At the same time the miniature circuit breaker is in the proper position relative to the cover plate.
ENYSUN
Solar inverter collectors with circuit-breaker box

**Mi PV 6111**

Rated capacity: 70 kVA

- complete enclosure set, not assembled
- incoming cables:
  - for inverters up to 6.4 kVA, 1~ or 19.3 kVA, 3~ rated operating current 28 A per inverter
  - max. 18 x 1~ inverters or 6 x 3~ inverters
- maximum quantity and ratings of MCBs according to table “Rating of PV solar inverter collector”
- connection: 1.5-16 mm², Cu
- 18 terminals per PE+N
- outgoing:
  - switch disconnector, 3 pole with knife links
  - connection: 35 mm², Cu
  - 1 terminal per PE+N for copper conductors
- outgoing cable changeable above or below
- maximum back-up fuse depending on the miniature circuit breakers used (manufacturer specifications)
- order cable entries separately
- with stainless steel external brackets

<table>
<thead>
<tr>
<th>rated voltage $U_n$</th>
<th>$U_n = 230/400$ V a.c.</th>
</tr>
</thead>
<tbody>
<tr>
<td>rated current of the power switchgear and controlgear assembly $I_n$</td>
<td>$I_n = 100$ A</td>
</tr>
</tbody>
</table>

**Mi PV 6123**

Rated capacity: 140 kVA

- complete enclosure set, not assembled
- incoming cables:
  - for inverters up to 6.4 kVA, 1~ or 19.3 kVA, 3~ rated operating current 28 A per inverter
  - max. 36 x 1~ inverters or 12 x 3~ inverters
- maximum quantity and ratings of MCBs according to table “Rating of PV solar inverter collector”
- connection: 1.5-16 mm², Cu
- 36 terminals per PE+N
- outgoing:
  - switch disconnector, 3 pole with knife links
  - connection: M 10 (max. 1 x 240 mm² per phase)
  - 1 terminal per PE+N for copper conductors
- outgoing cable changeable above or below
- order cable entries separately
- with stainless steel external brackets

<table>
<thead>
<tr>
<th>rated voltage $U_n$</th>
<th>$U_n = 230/400$ V a.c.</th>
</tr>
</thead>
<tbody>
<tr>
<td>rated current of the power switchgear and controlgear assembly $I_n$</td>
<td>$I_n = 200$ A</td>
</tr>
</tbody>
</table>
**ENYSUN**
Solar inverter collectors with circuit-breaker box

**Mi PV 6544**

**Rated capacity: 220 kVA**

- complete enclosure set, not assembled
- incoming cables:
  - for inverters up to 6.4 kVA, 1~ or 19.3 kVA, 3~
  - rated operating current 28 A per inverter
- max. 72 x 1~ inverters or 24 x 3~ inverters
- maximum quantity and ratings of MCBs according to table “Rating of PV solar inverter collector”
- connection: 1.5-16 mm², Cu
- 72 terminals per PE+N
- outgoing:
  - switch disconnector, 3 pole with knife links
  - connection: M 10 (max. 1 x 240 mm² per phase)
  - 1 terminal per PE+N for copper conductors
- outgoing cable changeable above or below
- order cable entries separately
- with mounting profiles

<table>
<thead>
<tr>
<th>rated voltage</th>
<th>$U_r = 230/400$ V a.c.</th>
</tr>
</thead>
<tbody>
<tr>
<td>rated current of the power switchgear and controlgear assembly</td>
<td>$I_{op} = 320$ A</td>
</tr>
</tbody>
</table>

Extension boxes for solar inverter collectors, see accessories

**Mi PV 5611**
Surge protection device box (SPD)

**Mi PV 5621**
Surge protection device box (SPD)

**Mi PV 5711**
12 modules: $1 \times 12 \times 18$ mm
ENYSUN
Solar inverter collectors
with switch disconnectors for D 02 fuses 63 A

**Mi PV 5311**
Rated capacity: 70 kVA for 3~ inverters
- complete enclosure set, not assembled
- incoming cables:
  - for inverters up to 33 kVA, 3~
  - rated operating current AC 48 A per inverter
- 3 x 63 A, 3-pole, D0 2
  1 or 3-pole switching
  rated connecting capacity: solid(sol) 1.5-6 mm², flexible(f) 1.5-16 mm², Cu
- 3 terminals per PE+N
- outgoing:
  - switch disconnector, 3 pole with knife links
  connection: 70 mm², Cu
  1 terminal per PE+N for copper conductors
- outgoing cable changeable above or below
- order cable entries separately
- with stainless steel external brackets

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>rated voltage</td>
<td>$U_n = 230/400$ V a.c.</td>
</tr>
<tr>
<td>rated current of the switchgear and controlgear assembly</td>
<td>$I_{A} = 100$ A</td>
</tr>
<tr>
<td>Rated current of a circuit</td>
<td>$I_c = 48$ A</td>
</tr>
<tr>
<td>RDF (Rated Diversity Factor)</td>
<td>1</td>
</tr>
</tbody>
</table>

**Mi PV 5323**
Rated capacity: 140 kVA for 3~ inverters
- complete enclosure set, not assembled
- incoming cables:
  - for inverters up to 33 kVA, 3~
  - rated operating current AC 48 A per inverter
- 6 x 63 A, 3-pole D0 2
  1- or 3-pole switching
  rated connecting capacity: solid (sol) 1.5-6 mm², flexible (f) 1.5-16 mm², Cu
- 6 terminals per PE+N
- outgoing:
  - switch disconnector, 3 pole with knife links
  connection: M 10 (max. 1 x 240 mm² per phase)
  1 terminal per PE+N for copper conductors
- outgoing cable changeable above or below
- order cable entries separately
- with stainless steel external brackets

<table>
<thead>
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<tbody>
<tr>
<td>rated voltage</td>
<td>$U_n = 230/400$ V a.c.</td>
</tr>
<tr>
<td>rated current of the switchgear and controlgear assembly</td>
<td>$I_{A} = 200$ A</td>
</tr>
<tr>
<td>Rated current of a circuit</td>
<td>$I_c = 48$ A</td>
</tr>
<tr>
<td>RDF (Rated Diversity Factor)</td>
<td>1</td>
</tr>
</tbody>
</table>
ENYSUN
Solar inverter collectors
with switch disconnectors for D 02 fuses 63 A

Mi PV 5341
Rated capacity: 220 kVA
for 3~ inverters
- complete enclosure set, not assembled
- incoming cables:
- for inverters up to 33 kVA, 3~ rated operating current AC 48 A per inverter
- 9 x 63 A, 3-pole D0 2
  1- or 3-pole switching
  rated connecting capacity: solid (sol) 1.5-6 mm², flexible (f) 1.5-16 mm², Cu
- 9 terminals per PE+N
- outgoing:
  - switch disconnector, 3 pole with knife links
  - connection: M 10 (max. 1 x 240 mm² per phase)
  - 1 terminal per PE+N for copper conductors
- outgoing cable changeable above or below
- order cable entries separately
- with mounting profiles

<table>
<thead>
<tr>
<th>rated voltage</th>
<th>U_r = 230/400 V a.c.</th>
</tr>
</thead>
<tbody>
<tr>
<td>rated current of the power switchgear and controlgear assembly</td>
<td>I_{RA} = 320 A</td>
</tr>
<tr>
<td>Rated current of a circuit</td>
<td>I_{C} = 48 A</td>
</tr>
<tr>
<td>RDF (Rated Diversity Factor)</td>
<td>1</td>
</tr>
</tbody>
</table>

Extension boxes for solar inverter collectors, see accessories

Mi PV 5611
Surge protection device box (SPD)

Mi PV 5621
Surge protection device box (SPD)

Mi PV 5711
12 modules: 1 x 12 x 18 mm
ENYSUN
Boxes with electrical function
for the assembly of solar inverter collectors

Mi PV 1318
18 modules: 3 x 6 x 18 mm
without PE and N terminal
- 3-row
- for installation of DIN rail equipment in accordance with DIN 43880
- maximum quantity and ratings of MCBs and flange selection
  according to table "Rating of PV solar inverter collector"
- with blanking strips for unused DIN rail openings
- lid fasteners for hand operation

Mi 1335
36 modules: 3 x 12 x 18 mm
without PE and N terminal
- 3-row
- for installation of DIN rail equipment in accordance with DIN 43880
- order PE/N terminals separately
- with blanking strips for unused DIN rail openings
- lid fasteners for hand operation

More empty enclosures or enclosure with electrical function:
- see Hensel website: www.hensel-electric.de
- see Hensel International Catalogue
### Mi 3266
**with switch disconnectors with fuses**
**Rated current of busbars 250 A**
**only for combination**

- 3 x 63 A, 3-pole, D0 2
  - 1 or 3-pole switching
  - rated connecting capacity: solid(sol) 1.5-6 mm², flexible(f) 1.5-16 mm², Cu
- per PE and N terminal: 3 x 1.5-16 mm², Cu, round conductors
- N conductor with the same current carrying capacity as the phase conductors
- Lid fasteners for hand operation

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>$U_n = 400$ V a.c.</td>
</tr>
<tr>
<td>Rated current of a circuit</td>
<td>$I_{nc} = 50.4$ A</td>
</tr>
<tr>
<td>Number of circuits</td>
<td>3</td>
</tr>
<tr>
<td>rated short-time withstand current</td>
<td>$I_{cw} = 15$ kA / 1 s</td>
</tr>
<tr>
<td>Busbar system - polarity</td>
<td>5</td>
</tr>
<tr>
<td>Busbar thickness</td>
<td>L1-L3: 10 mm</td>
</tr>
<tr>
<td></td>
<td>N, PE: 5 mm</td>
</tr>
<tr>
<td>Centreline spacing of busbars</td>
<td>60 mm</td>
</tr>
</tbody>
</table>

### Mi 3267
**with switch disconnectors with fuses**
**Rated current of busbars 400 A**
**only for combination**

- 3 x 63 A, 3-pole, D0 2
  - 1 or 3-pole switching
  - rated connecting capacity: solid(sol) 1.5-6 mm², flexible(f) 1.5-16 mm², Cu
- per PE and N terminal: 3 x 1.5-16 mm², Cu, round conductors
- N conductor with the same current carrying capacity as the phase conductors
- Lid fasteners for hand operation

<table>
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<tr>
<th>Parameter</th>
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</thead>
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<td>$U_n = 400$ V a.c.</td>
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<td>Rated current of a circuit</td>
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<tr>
<td>Number of circuits</td>
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</tr>
<tr>
<td>rated short-time withstand current</td>
<td>$I_{cw} = 15$ kA / 1 s</td>
</tr>
<tr>
<td>Busbar system - polarity</td>
<td>5</td>
</tr>
<tr>
<td>Busbar thickness</td>
<td>L1-L3, N: 10 mm</td>
</tr>
<tr>
<td></td>
<td>PE: 5 mm</td>
</tr>
<tr>
<td>Centreline spacing of busbars</td>
<td>60 mm</td>
</tr>
</tbody>
</table>
**Mi PV 5511**

**Terminal box**
- extension set
- ready for connection
- with wall gasket
- per PE+N 12 x 1.5-16 mm², Cu, 1 x 4-35 mm², Cu
- with 100 A wiring between PE+N terminals and busbar
- lid fasteners for tool operation
- Separately order flange for cable entry.

| rated voltage | $U_n = 230/400$ V a.c. |

**Mi PV 5521**

**Terminal box**
- extension set
- ready for connection
- with wall gasket
- terminals per PE+N:
  - 9 x 1.5-16 mm², Cu
  - 1 x 4-35 mm², Cu
- with 100 A wiring between PE+N terminals and busbar
- lid fasteners for tool operation
- Separately order flange for cable entry.

| rated voltage | $U_n = 230/400$ V a.c. |

More empty enclosures or enclosure with electrical function:
- see Hensel website: www.hensel-electric.de
- see Hensel International Catalogue
Solar inverter collectors up to 560 kVA
made of insulation material, protection class II,
degree of protection up to IP 65

Customised solutions? Contact us!
See check list in the appendix!
ENYSUN

Disconnetion switch

Solar modules

PV Generator junction box

Solar inverter

Solar inverter collector

Disconnetion switch

Grid 230/400 V a.c.
Disconnection switch

Connection of generation systems in accordance with application guide VDE-AR-N 4105

- Distribution board with grid and system protection and two switches
- Completely assembled and ready for connection
- Integration of the simplified feed-in management

Customised solutions? Contact us!
ENYSUN
Accessories
**ENYSUN**

**Solar inverter collectors**

**Extension boxes**

---

**Mi PV 5611**

**Surge protection device box (SPD)**

1 x AC type 2 surge arrester

- extension set
- with wall gasket
- with pre-assembled connecting cables
- with terminals for direct connection on busbar
- with fuse bases 63 A, Neozed
- 1 x AC type 2 surge arrester
  - max. outgoing surge current AC (8/20) I_total: 40 kA
  - protection level AC: < 2,5 kV
  - defect display
  - for 3-phase TN
  - lid fasteners for hand operation

**Connection**

<table>
<thead>
<tr>
<th>rated voltage</th>
<th>U_n = 230/400 V a.c.</th>
</tr>
</thead>
</table>

---

**Mi PV 5621**

**Surge protection device box (SPD)**

1 x AC type 1 surge arrester

- extension set
- with wall gasket
- with pre-assembled connecting cables
- with fuse switch disconnectors HRC 00, 3-pole
  - with fuse links 3 x 160 A
- AC type 1 surge arrester
  - lightning surge current AC(10/350) [L+N -> PE] I_{imp}: 100 kA
  - protection level AC: < 4 kV
  - defect display
  - for 3-phase TN
  - lid fastener for tool operation

**Connection**

<table>
<thead>
<tr>
<th>rated voltage</th>
<th>U_n = 230/400 V a.c.</th>
</tr>
</thead>
</table>

---

**Mi PV 5711**

**12 modules: 1 x 12 x 18 mm**

- 1-row
- without PE and N terminal
- for installation of DIN rail equipment in accordance with DIN 43880
- with blanking strips for unused DIN rail openings
- with wall gasket
- lid fasteners for hand operation
## ENYSUN
**Accessories**

**terminals for direct connection on busbar for conductors and laminated wiring strip**

**Remarks:** For observance of insulation resistance clearances of 10 mm are necessary between different potentials and of 15 mm between conductive metal parts.

<table>
<thead>
<tr>
<th>Type</th>
<th>conductor cross section</th>
<th>type of cable</th>
<th>wiring strip</th>
<th>for busbars</th>
<th>width</th>
</tr>
</thead>
<tbody>
<tr>
<td>KS 16 F</td>
<td>1.5-16 mm²</td>
<td>Cu</td>
<td>-</td>
<td>... x 5 mm</td>
<td>11 mm</td>
</tr>
<tr>
<td>KS 16 Z</td>
<td>1.5-16 mm²</td>
<td>Cu</td>
<td>-</td>
<td>... x 10 mm</td>
<td>11 mm</td>
</tr>
<tr>
<td>KS 35 F</td>
<td>4-35 mm²</td>
<td>Cu</td>
<td>100 A: Mi VS 100 160 A: Mi VS 160</td>
<td>... x 5 mm</td>
<td>16 mm</td>
</tr>
<tr>
<td>KS 35 Z</td>
<td>4-35 mm²</td>
<td>Cu</td>
<td>100 A: Mi VS 100 160 A: Mi VS 160</td>
<td>... x 10 mm</td>
<td>16 mm</td>
</tr>
<tr>
<td>KS 70 F</td>
<td>10-70 mm²</td>
<td>Cu</td>
<td>100 A: Mi VS 100 160 A: Mi VS 160</td>
<td>... x 5 mm</td>
<td>21 mm</td>
</tr>
<tr>
<td>KS 70 Z</td>
<td>10-70 mm²</td>
<td>Cu</td>
<td>100 A: Mi VS 100 160 A: Mi VS 160</td>
<td>... x 10 mm</td>
<td>21 mm</td>
</tr>
<tr>
<td>KS 120 F</td>
<td>25-120 mm²</td>
<td>Cu</td>
<td>250 A: Mi VS 250 400 A: Mi VS 400</td>
<td>... x 5 mm</td>
<td>25 mm</td>
</tr>
<tr>
<td>KS 120 Z</td>
<td>25-120 mm²</td>
<td>Cu</td>
<td>250 A: Mi VS 250 400 A: Mi VS 400</td>
<td>... x 10 mm</td>
<td>25 mm</td>
</tr>
<tr>
<td>KS 240/12</td>
<td>Cu 35-240 mm²</td>
<td>Cu / Alu*</td>
<td>-</td>
<td>12 x 5 mm / 12 x 10 mm</td>
<td>34 mm</td>
</tr>
<tr>
<td>KS 150</td>
<td>35-150 mm²</td>
<td>Cu</td>
<td>630 A: Mi VS 630</td>
<td>12 x 5 mm / 12 x 10 mm</td>
<td>34 mm</td>
</tr>
<tr>
<td>KS 185</td>
<td>95-185 mm²</td>
<td>Cu/Alu*</td>
<td>-</td>
<td>20 x 10 mm / 25 x 10 mm / 30 x 10 mm</td>
<td>38 mm</td>
</tr>
<tr>
<td>KS 240 V</td>
<td>-</td>
<td>-</td>
<td>630 A: Mi VS 630</td>
<td>20 x 10 mm / 25 x 10 mm / 30 x 10 mm</td>
<td>38 mm</td>
</tr>
<tr>
<td>KS 300</td>
<td>120-300 mm²</td>
<td>Cu/Alu*</td>
<td>-</td>
<td>20 x 10 mm / 25 x 10 mm / 30 x 10 mm</td>
<td>38 mm</td>
</tr>
</tbody>
</table>

* Aluminium conductors must be prepared prior to connection in accordance with the relevant technical recommendation
## Mi fuse boxes Diazed/Neozed

<table>
<thead>
<tr>
<th>Current</th>
<th>N:</th>
<th>L1-L3:</th>
<th>PE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>250 A</td>
<td>12x5</td>
<td>12x10</td>
<td>12x5</td>
</tr>
<tr>
<td>400 A</td>
<td>12x10</td>
<td>20x10</td>
<td>12x5</td>
</tr>
<tr>
<td>630 A</td>
<td>25x10</td>
<td>30x10</td>
<td>12x5</td>
</tr>
</tbody>
</table>

### Mi HRC fuse boxes, fuse bases and fuse switch disconnecter

<table>
<thead>
<tr>
<th>Current</th>
<th>N:</th>
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<th>PE:</th>
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<tr>
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<td>25x10</td>
<td>30x10</td>
<td>12x5</td>
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</table>

### Mi busbar boxes

<table>
<thead>
<tr>
<th>Current</th>
<th>N:</th>
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<tr>
<td>630 A</td>
<td>25x10</td>
<td>30x10</td>
<td>12x10</td>
</tr>
</tbody>
</table>

1) Terminals in the delivery of the functional boxes, see technical descriptions.

### International abbreviations: type of cable

<table>
<thead>
<tr>
<th>Type of Cable</th>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(rigid)</td>
<td>r</td>
<td>round conductors</td>
</tr>
<tr>
<td>(flexible)</td>
<td>f</td>
<td>sector-type conductors</td>
</tr>
<tr>
<td>sol</td>
<td>s</td>
<td>with gas-tight end ferrule</td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>Current</th>
<th>N:</th>
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### Mi busbar boxes

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<td>630 A</td>
<td>25x10</td>
<td>30x10</td>
<td>12x10</td>
</tr>
</tbody>
</table>

1) Terminals in the delivery of the functional boxes, see technical descriptions.
DA 240
Terminal for direct connection up to 400 A max. 240 mm²
- for mounting onto switchgear with flat contact M10
- with insulating cover
- rated connecting capacity:
  - 35-70 mm² s (round), Cu/Alu
  - 50-185 mm² s (sector), Cu/Alu
  - 35-50 mm² sol, Cu/Alu
  - 70-240 mm² sol (sector) Cu/Alu
- before connecting, aluminum conductors must be pre-treated according to the appropriate technical recommendations, see technical information aluminum conductors

| tightening torque for terminal | 22.0 Nm |

MS NH 00
Fuse switch disconnector 160 A, HRC 00, 3-pole for retrofitting on busbars
- for the exchange and complement in Mi fuse boxes
- height: 200 mm x width: 106 mm
- Connection: 1.5-70 mm², Cu, round conductor
  Connection of wiring strip Mi VS 100/160

<table>
<thead>
<tr>
<th>rated voltage</th>
<th>Uᵣ = 690 V a.c.</th>
</tr>
</thead>
<tbody>
<tr>
<td>busbar thickness</td>
<td>10 mm</td>
</tr>
<tr>
<td>centreline spacing of busbars</td>
<td>60 mm</td>
</tr>
<tr>
<td>tightening torque for terminal</td>
<td>terminal 6.0 Nm</td>
</tr>
</tbody>
</table>

Mi SP 18
switch disconnector with fuse D02
63 A, 3-pole, D0 2
- for the exchange and complement in Mi fuse boxes
- 1 or 3-pole switching
- rated connecting capacity: solid(sol) 1.5-6 mm², flexible(f) 1.5-16 mm², Cu
- width: 27 mm

<table>
<thead>
<tr>
<th>rated voltage</th>
<th>Uᵣ = 400 V a.c.</th>
</tr>
</thead>
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<tr>
<td>busbar thickness</td>
<td>10 mm</td>
</tr>
<tr>
<td>centreline spacing of busbars</td>
<td>60 mm</td>
</tr>
<tr>
<td>tightening torque for terminal</td>
<td>3.0 Nm</td>
</tr>
</tbody>
</table>

Mi BA 6
blanking cover
in Mi-HRC fuse boxes
- for sealing protection covers
- Width: 108 mm
**ENYSUN accessories**

**Mi WD 2**

wall gasket
for box walls 150/300 mm
- for the assembly of Mi boxes
- consisting of 1 seal, 4 wedge links, 1 bracket

**Mi SV 25**

busbar connector
for busbars 250 A, 5-pole
- with wall gasket
- for the assembly of Mi boxes containing busbars
- Busbars 250 A and 400 A can only be connected with busbar connector Mi SV 25. Connecting of busbars with different rated current only under care and attention of the corresponding short circuit and overload standards.

<table>
<thead>
<tr>
<th>tightening torque for terminal</th>
<th>6.0 Nm</th>
</tr>
</thead>
</table>

**Mi SV 45**

busbar connector
for busbars 400/630 A, 5-pole
- with wall gasket
- for the assembly of Mi boxes containing busbars

<table>
<thead>
<tr>
<th>tightening torque for terminal</th>
<th>10.0 Nm</th>
</tr>
</thead>
</table>

**AS 12**

blanking strip
12 modules
- 12 x 18 mm, divisible every 9 mm
- for the covering of spare equipment openings, for material thickness up to 3 mm

**DAE 12**

Spacer
- for improvement in the heat dissipation of DIN rail mounted devices
- consisting of 12 items
Mi FM 25
Flange
knockouts: 19 x M 16/25
- box wall 300 mm
- with fixing wedges and seal

Mi FM 32
Flange
knockouts: 8 x M 25/32, 1 x M 25/32/40
- box wall 300 mm
- with fixing wedges and seal

Mi FM 40
Flange
knockouts: 2 x M 25/32, 5 x M 32/40
- box wall 300 mm
- with fixing wedges and seal

Mi FM 50
Flange
knockouts: 2 x M 20, 4 x M 32/40/50
- box wall 300 mm
- with fixing wedges and seal

Mi FM 60
Flange
knockouts: 3 x M 40/50/63
- box wall 300 mm
- with fixing wedges and seal

Mi FP 70
flange
sealing range: 1 x Ø 30-72 mm
- box wall 300 mm
- with fixing wedges and seal

Mi FP 72
flange
sealing range: 2 x each Ø 30-72 mm
- box wall 300 mm
- with fixing wedges and seal
**ENYSUN**
Accessories
Cable entry

---

**Mi FM 63**
flange with cable arrangement space
knockouts: 3 x M 40/50/63
- box wall 300 mm
- with fixing wedges and seal

---

**Mi FP 82**
Cable insert
sealing range: 2 x each Ø 30-72 mm
- box wall 300 mm
- divisible for cable insertion from the front
- degree of protection IP 54 only with additional strain and pressure relief (e.g. Mi ZE 62)

---

**Mi ZE 62**
Cable strain relief
for 2 cables with max. 60 mm external diameter
- with fixing rail 284 mm long
- to be used only in connection with cable insertion Mi FP 82
AKM 12
Cable glands for knockouts M 12
- sealing range: Ø 4-6 mm
- ISO thread M 12 x 1.5
- bore-hole: Ø 12.3 mm
- wall thickness up to 3 mm
- with strain relief and locknut
- for indoor (normal environment and/or protected outdoor) and outdoor installation (harsh environment and/or outdoor)
- ambient temperature - 25 °C to + 55 °C
- glow wire test IEC 60695-2-11: 960 °C
- colour: grey, RAL 7035

| tightening torque | 0.9 Nm |

AKM 16
Cable glands for knockouts M 16
- sealing range: Ø 5-10 mm
- ISO thread M 16 x 1.5
- bore-hole: Ø 16.3 mm
- wall thickness up to 3 mm
- with strain relief and locknut
- for indoor (normal environment and/or protected outdoor) and outdoor installation (harsh environment and/or outdoor)
- ambient temperature - 25 °C to + 55 °C
- glow wire test IEC 60695-2-11: 960 °C
- colour: grey, RAL 7035

| tightening torque | 3.0 Nm |

AKM 20
Cable glands for knockouts M 20
- sealing range: Ø 6.5-13.5 mm
- ISO thread M 20 x 1.5
- bore-hole: Ø 20.3 mm
- wall thickness up to 3 mm
- with strain relief and locknut
- for indoor (normal environment and/or protected outdoor) and outdoor installation (harsh environment and/or outdoor)
- ambient temperature - 25 °C to + 55 °C
- glow wire test IEC 60695-2-11: 960 °C
- colour: grey, RAL 7035

| tightening torque | 4.0 Nm |

AKM 25
Cable glands for knockouts M 25
- sealing range: Ø 11-17 mm
- ISO thread M 25 x 1.5
- bore-hole: Ø 25.3 mm
- wall thickness up to 3 mm
- with strain relief and locknut
- for indoor (normal environment and/or protected outdoor) and outdoor installation (harsh environment and/or outdoor)
- ambient temperature - 25 °C to + 55 °C
- glow wire test IEC 60695-2-11: 960 °C
- colour: grey, RAL 7035

| tightening torque | 7.5 Nm |
## AKM 32
### Cable glands for knockouts M 32
- Sealing range: Ø 15-21 mm
- ISO thread: M 32 x 1.5
- Bore-hole: Ø 32.3 mm
- Wall thickness up to 3 mm
- With strain relief and locknut
- For indoor (normal environment and/or protected outdoor) and outdoor installation (harsh environment and/or outdoor)
- Ambient temperature: -25 °C to +55 °C
- Glow wire test: IEC 60695-2-11: 960 °C
- Colour: grey, RAL 7035

| Tightening torque | 10.0 Nm |

## AKM 40
### Cable glands for knockouts M 40
- Sealing range: Ø 19-28 mm
- ISO thread: M 40 x 1.5
- Bore-hole: Ø 40.3 mm
- Wall thickness up to 3 mm
- With strain relief and locknut
- For indoor (normal environment and/or protected outdoor) and outdoor installation (harsh environment and/or outdoor)
- Ambient temperature: -25 °C to +55 °C
- Glow wire test: IEC 60695-2-11: 960 °C
- Colour: grey, RAL 7035

| Tightening torque | 10.0 Nm |

## AKM 50
### Cable glands for knockouts M 50
- Sealing range: Ø 27-35 mm
- ISO thread: M 50 x 1.5
- Bore-hole: Ø 50.3 mm
- Wall thickness up to 3 mm
- With strain relief and locknut
- For indoor (normal environment and/or protected outdoor) and outdoor installation (harsh environment and/or outdoor)
- Ambient temperature: -25 °C to +55 °C
- Glow wire test: IEC 60695-2-11: 960 °C
- Colour: grey, RAL 7035

| Tightening torque | 10.0 Nm |

## AKM 63
### Cable glands for knockouts M 63
- Sealing range: Ø 35-42 mm
- ISO thread: M 63 x 1.5
- Bore-hole: Ø 63.3 mm
- Wall thickness up to 3 mm
- With strain relief and locknut
- For indoor (normal environment and/or protected outdoor) and outdoor installation (harsh environment and/or outdoor)
- Ambient temperature: -25 °C to +55 °C
- Glow wire test: IEC 60695-2-11: 960 °C
- Colour: grey, RAL 7035

| Tightening torque | 10.0 Nm |
**ENYSUN**
Accessories
Outdoor applications

**Mi BF 44**
Ventilation flange
for vertical installation on box walls
- box wall 300 mm
- for ventilation of Mi-Distribution boards in the event of extremely high internal temperatures or a risk of water condensation

**BE 44**
Ventilation insert
BM 20G
Pressure compensation element for M 20 knockouts

- for the reduction of condensation by pressure compensation in power distribution systems
- ISO thread M 20 x 1.5
- bore-hole: Ø 20.3 mm
- wall thickness up to 4 mm
- with counter nut
- for indoor (normal environment and/or protected outdoor) and outdoor installation (harsh environment and/or outdoor)
- ambient temperature - 25 °C to + 55 °C
- In order not to exceed leakage limit of 0.07 bar with pressure compensation, one pressure compensation element BM 20G must be used per 28 litres (28000 cm³) of enclosure volume.
  Example: enclosure size 30 cm x 60 cm x 17 cm = 30600 cm³ = 30.6 litres. Number of necessary BM 20G (M32) = 2 piece.
- technical changes reserved
- colour: grey, RAL 7035

BM 40G
Pressure compensation element for M 40 knockouts

- for the reduction of condensation by pressure compensation in power distribution systems
- ISO thread M 40 x 1.5
- bore-hole: Ø 40.3 mm
- wall thickness of up to 8 mm
- with counter nut
- for indoor (normal environment and/or protected outdoor) and outdoor installation (harsh environment and/or outdoor)
- ambient temperature - 25 °C to + 55 °C
- In order not to exceed leakage limit of 0.07 bar with pressure compensation, one pressure compensation element BM 40G must be used per 122 litres (122000 cm³) of enclosure volume.
  Example: enclosure size 60 cm x 60 cm x 17 cm = 61200 cm³ = 61.2 litres. Number of necessary BM 40G (M40) = 1 piece.
- technical changes reserved
- colour: grey, RAL 7035
**Mi DB 15**

**Canopy**
for box wall 150 mm

- with fixing wedges and seal
- suitable for outdoor installation, UV resistant

| material       | stainless steel powder-coated |

**Mi DB 30**

**Canopy**
for 300 mm box walls

- with fixing wedges and seal
- suitable for outdoor installation, UV resistant

| material       | stainless steel powder-coated |

**Mi DB 01**

**Canopy end plate**

- for canopies FP DB xx and Mi DB xx

<p>| material       | stainless steel powder-coated |</p>
<table>
<thead>
<tr>
<th>ENYSUN Accessories</th>
<th>Locking facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mi PL 2</strong></td>
<td>Sealing cap</td>
</tr>
<tr>
<td>- 2 sealing caps for converting the lid fasteners</td>
<td></td>
</tr>
<tr>
<td><strong>Mi SR 4</strong></td>
<td>conversion set for manual operation on tool operation</td>
</tr>
<tr>
<td>- 4 fastening covers</td>
<td></td>
</tr>
<tr>
<td><strong>Mi SN 4</strong></td>
<td>conversion set for converting lid fasteners from tool to manual operation</td>
</tr>
<tr>
<td>- 4 manual actuators</td>
<td></td>
</tr>
<tr>
<td><strong>Mi DV 01</strong></td>
<td>locking device insertion</td>
</tr>
<tr>
<td>- only in connection with Mi PL 2, Mi SR 4 or Mi SN 4</td>
<td></td>
</tr>
<tr>
<td><strong>Mi ZS 11</strong></td>
<td>Lid lock with locking device I</td>
</tr>
<tr>
<td>- Is being used instead of fasteners for hand or tool operation in order to prevent unauthorised opening of the lids</td>
<td></td>
</tr>
<tr>
<td>- consisting of: cylinder lock, keys, locking device insertion, dust cover</td>
<td></td>
</tr>
<tr>
<td><strong>Mi ZS 12</strong></td>
<td>Lid lock with locking device II</td>
</tr>
<tr>
<td>- Is being used instead of fasteners for hand or tool operation in order to prevent unauthorised opening of the lids</td>
<td></td>
</tr>
<tr>
<td>- consisting of: cylinder lock, keys, locking device insertion, dust cover</td>
<td></td>
</tr>
<tr>
<td><strong>Mi DR 04</strong></td>
<td>lid fastener for tool operation triangle 8 mm</td>
</tr>
<tr>
<td>- is used instead of fasteners for hand- or tool operation, in order to make unauthorized opening of lids more difficult</td>
<td></td>
</tr>
<tr>
<td>- 4 locking devices with triangle 8 mm and key</td>
<td></td>
</tr>
<tr>
<td><strong>DS 1</strong></td>
<td>Triangular key 8 mm</td>
</tr>
<tr>
<td><strong>Mi SA 2</strong></td>
<td>Dust protection cover</td>
</tr>
<tr>
<td>- for box sizes 1 to 4</td>
<td></td>
</tr>
<tr>
<td>- for 2 lid fittings</td>
<td></td>
</tr>
</tbody>
</table>
ENYSUN
Accessories
Wall mounting

**Mi AL 40**
4 stainless steel external brackets
- for external fixing of enclosures

**Mi MS 2**
Profile for wall mounting
- for Mi distribution board assemblies up to 900 x 1200 mm
- with 8 screws M6 x 16, washers and nuts for mounting enclosures

<table>
<thead>
<tr>
<th>Length</th>
<th>1950 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
<td>sendzimir galvanised steel profile with structured powder coating</td>
</tr>
</tbody>
</table>
## Material Properties

<table>
<thead>
<tr>
<th>Products</th>
<th>Material used</th>
<th>Glow-wire test IEC 60695-2-11</th>
<th>UL Subject 94</th>
<th>Temperature resistance</th>
<th>Chemical resistance</th>
<th>Acid 10 %</th>
<th>Lye 10 %</th>
<th>Alcohol</th>
<th>Petro (MAK)</th>
<th>Benzene (MAK)</th>
<th>Mineral oil</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>bases of Mi ...</strong></td>
<td>PC (polycarbonate) (with GFS)</td>
<td>960 °C</td>
<td>V-0</td>
<td>-40 °C / +120 °C</td>
<td>+</td>
<td>+</td>
<td>0</td>
<td>+</td>
<td>—</td>
<td>—</td>
<td>+</td>
</tr>
<tr>
<td><strong>lid Mi ...</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>door and lid KV ... /</strong></td>
<td>PC (polycarbonate)</td>
<td>960 °C</td>
<td>V-0</td>
<td>-40 °C / +120 °C</td>
<td>+</td>
<td>+</td>
<td>0</td>
<td>+</td>
<td>—</td>
<td>—</td>
<td>+</td>
</tr>
<tr>
<td><strong>Sealings KV ... / Mi FP ...</strong></td>
<td>TPE (thermoplastic elastomer)</td>
<td>750 °C</td>
<td>—</td>
<td>-25 °C / +100 °C</td>
<td>+</td>
<td>+</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Sealings KV ... Mi ...</strong></td>
<td>PUR (polyurethane)</td>
<td></td>
<td>—</td>
<td>-25 °C / +80 °C</td>
<td>0</td>
<td>+</td>
<td>0</td>
<td>0</td>
<td>—</td>
<td>+</td>
<td>—</td>
</tr>
<tr>
<td><strong>AKM .. BM ...</strong></td>
<td>PA (polyamide)</td>
<td>960 °C</td>
<td>V-0</td>
<td>-40 °C / +100 °C</td>
<td>+</td>
<td>0</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td><strong>Sealings AKM ..</strong></td>
<td>CR/NBR (polychloroprene - nitrile rubber)</td>
<td></td>
<td>—</td>
<td>-20 °C / +100 °C</td>
<td>+</td>
<td>+</td>
<td>0</td>
<td>—</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

( + = resistance; 0 = partially resistance; — = not resistant)

1) The specifications on chemical resistance are a general guide. In individual cases it may be necessary to check resistance in combination with other chemicals and ambient conditions (temperature, concentration, etc.)

2) (MAK) - Maximum allowable concentration (work place)

As at: June 2016
### ENYSUN

#### Technical Data

#### Operating and Ambient Conditions

<table>
<thead>
<tr>
<th>Application area</th>
<th>Cable glands</th>
</tr>
</thead>
<tbody>
<tr>
<td>KF PV-, KV PC-, KV PV-, Mi PV enclosures and cable glands are suitable for the outdoor installation - harsh environment and / or outdoor according to DIN VDE 0100 part 737. However the climatic influences and effects on the equipment are to be considered.</td>
<td>AKM ASM, ASS, KBM, KBS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Ambient temperature</strong></th>
<th><strong>Cable glands</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Average value over 24 hours</td>
<td>+ 35 °C + 55 °C + 55 °C</td>
</tr>
<tr>
<td>Maximum value</td>
<td>+ 40 °C + 70 °C + 70 °C</td>
</tr>
<tr>
<td>Minimum value</td>
<td>- 5 °C - 25 °C - 25 °C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Relative humidity</strong></th>
<th><strong>Cable glands</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-time</td>
<td>50% at 40 °C 100% at 25 °C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Fire protection</strong></th>
<th><strong>Cable glands</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>in the event of internal faults</td>
<td>Demands placed on electrical devices from standards and laws</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Burning behaviour</strong></th>
<th><strong>Cable glands</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Glow wire test IEC 60 695-2-11</td>
<td>960 °C V-2 flame-retardant self-extinguishing</td>
</tr>
<tr>
<td>- UL Subject 94</td>
<td>750 °C V-2 flame-retardant self-extinguishing</td>
</tr>
<tr>
<td></td>
<td>960 °C V-2 flame-retardant self-extinguishing</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Degree of protection against mechanical load</strong></th>
<th><strong>Cable glands</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>IK 08 (5 Joule)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Toxic behaviour</strong></th>
<th><strong>Cable glands</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Halogen-free 1) silicone-free</td>
<td></td>
</tr>
</tbody>
</table>

1) “Halogen-free” in accordance with IEC 754-2 “Common test methods for cables - Determination of the amount of halogen acid gas”.
Distribution boards assembled and wired according to manufacturer data without essential deviations from the original type or system. To meet these requirements for Hensel Mi Distribution Boards, the following must be noted:

1. The distribution boards must consist of the verified enclosures documented in this list.
2. The wiring of the equipment must be carried out with the cross-sections and conductor types indicated in Table “Rating of insulated conductors in switchgear assemblies”, Index Techniques.
3. Once the distribution board is completed, a routine test must be carried out in accordance with this standard.
4. The test must be certified with a test report.
5. The assembly must be provided with a manufacturer's identification mark.

Compliance with important data such as:
- limit of temperature rise
- dielectric strength
- IP degrees of protection
- creepage distances and clearances
is verified for this system.

- **IEC 61439-1**
  Low voltage switchgear and controlgear assemblies

- **IEC 60999**
  Safety requirements for screw-type and screwless-type clamping units for electrical copper conductors

- **DIN EN 50262**
  Metric threaded cable glands for electrical installations

- **IEC 60269**
  Low voltage fuses

- **DIN 43880**
  Built-in equipment for electrical installations; overall dimensions and related mounting dimensions

- **IEC 60529**
  Degrees of protection provided by enclosures (IP-Code)

- **IEC 60364–7-712**
  Electrical installations of buildings
  Requirements for special installations or locations – Solar photovoltaic (PV) power supply systems
The outside diameters are average values of different products.

<table>
<thead>
<tr>
<th>Cable cross-section mm²</th>
<th>NYM</th>
<th>NYY</th>
<th>NYCY</th>
<th>NYCWY</th>
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<td>8</td>
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<td>1x150</td>
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<td>1x300</td>
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<tr>
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</tr>
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<td>32-36</td>
<td>36</td>
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<td>3x95/50</td>
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<td>37-41</td>
<td>40</td>
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<tr>
<td>3x120/70</td>
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<td>42</td>
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<td>3x240/120</td>
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<td>57-63</td>
<td>60</td>
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<tr>
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<td>—</td>
<td>63-69</td>
<td>60</td>
<td>—</td>
</tr>
</tbody>
</table>

### Short forms of cables

- **NYM**: Light plastic-sheathed cable
- **NYY**: Plastic-sheathed cable
- **NYCY**: Plastic-sheathed cable with concentric conductor
- **NYOWY**: Plastic-sheathed cable with concentric, undulated conductor
## ENYSUN
Technical Data
Assignment of Cable Outside Diameters to Cable Entries
Standards and Requirements

Hensel cable entries comply with the following standards and regulations:

- **EN 50262**
  Metric cable entries for electrical installations

- **EN 60423**
  Conduits for electrical purposes - Outside diameter of conduits for electrical installations and threads for conduits and fittings

- **IEC 60529**
  Degrees of protection provided by enclosures (IP-Code)

### Cable entries

#### Cable glands AKM/ASS
Degree of protection: up to IP 67
With strain relief and counternut.

### Grommets ESM
Degree of protection: IP 55
Grommets are inserted into knockouts.
No nut is necessary!

### Stepped grommets STM
Degree of protection: IP 55
Stepped grommets are inserted into knock outs.
No nut is necessary!

### Grommets EDK
Degree of protection: IP 65
Grommets are inserted into knock outs.
No nut is necessary!

### Grommets for conduits EDR
Degree of protection: IP 65
Grommets for conduits are inserted into knock outs.
No nut is necessary!
ENYSUN
Technical Data
Definition of terms

Rated voltage (Uₐ)
Highest nominal value of the a.c. (r.m.s.) or d.c. voltage, declared by the assembly manufacturer, to which the main circuit(s) of the assembly is (are) designed to be connected.

Rated operational voltage (Uₑ) (of a circuit of an assembly)
Value of voltage, declared by the assembly manufacturer, which combined with the rated current determines its application.

Rated insulation voltage (Uᵢ)
R.m.s. withstand voltage value, assigned by the assembly manufacturer to the equipment or to a part of it, characterising the specified (long-term) withstand capability of the insulation.

Rated impulse voltage (Uₚₐₚ)
Impulse withstand voltage value, declared by the assembly manufacturer, characterising the specified withstand capability of the insulation against transient overvoltages.

Rated current (Iₚₐ)
Value of current, declared by the assembly manufacturer taking into consideration the ratings of the components, their disposition and application, which can be carried without the temperature-rise of various parts of the assembly exceeding specified limits under specified conditions.

Prospective short circuit current (Iₑₑₑₑ)
Current which flows when the supply conductors to the circuit are short-circuited by a conductor of negligible impedance located as near as practicable to the supply terminals of the assembly.

Rated peak withstand current (Iₚₚₚₑₑₑₑ)
Value of peak short-circuit current, declared by the assembly manufacturer, that can be withstood under specified conditions.

Rated short-time withstand current (Iₑₑₑₑₑₑₑₑₑₑ)
R.m.s. value of short-time current, declared by the assembly manufacturer, that can be carried without damage under specified conditions, defined in terms of a current and time.

Rated current of the assembly (Iₐₐ)
The rated current of the assembly is the smaller of:
- the sum of the rated currents of the incoming circuits within the assembly operated in parallel;
- the total current which the main busbar is capable of distributing in the particular assembly arrangement.

This current shall be carried without the temperature rise of the individual parts exceeding the limits specified in the standard.

Rated current of a circuit (Iₑₑₑₑₑₑₑₑₑₑ)
The rated current of a circuit is stated by the assembly manufacturer, taking into consideration the ratings of the devices within the circuit, their disposition and application. This current shall be carried without the temperature rise of the various parts of the assembly exceeding the limits specified in the standard when the circuit is loaded alone.

Rated diversity factor (RDF)
Per unit value of the rated current, assigned by the assembly manufacturer, to which outgoing circuits of an assembly can be continuously and simultaneously loaded taking into account the mutual thermal influences.

Definition of Terms
Rated values for setting up low-voltage switchgear are given in the standard IEC 61439-1.
ENYSUN
Check List for PV Generator Junction Boxes

- Request/offer
- Order

Date: ____________________

<table>
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<tr>
<th>Contractor</th>
<th>Project</th>
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<td>Address:</td>
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<td>Tel.:</td>
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<tr>
<td>E-Mail:</td>
<td></td>
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</tbody>
</table>

- protection class II 
- ready for connection
- with external stainless steel bracket

Quantity of PV generator junction boxes (pieces): ______________

Installation und ambient conditions

Ambient temperature (°C): ______________

Installation
- Indoor installation: □ in closed electrical operating room □ in factory
- Outdoor installation: □ protected outdoor □ unprotected outdoor

Available wall surface in mm:

<table>
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<tr>
<th>Width:</th>
<th>Height:</th>
<th>Depth:</th>
</tr>
</thead>
</table>

Assembly type:
□ wall-mounted □ floor-standing

Degree of protection:
□ IP 44 □ IP 54 □ IP 55 □ IP 65 □ IP _______________

Connection inverter

Rated voltage (U_{OC STC}): ___________ V d.c.

Solar inverter feeding
□ 1 □ 2 □ 3 □ ___________ (MPP tracker)

DC generator disconnect switch:
□ yes □ no

Connection of conductors going to inverter:
□ Multi Contact MC4 □ ___________

Cable cross-section (mm²):
□ ___________

Overvoltage protection:
□ no □ yes □ Type 1 □ Type 2 □ Floating remote indication

Manufacturer:
□ Dehn □ ___________

Earthing cable type and diameter:
□ NYY 1 x 16 mm² □ ___________

Cable entry:
□ Cable glands

Anschluss Stränge

Number of strings per box:
□ 1 □ 2 □ 3 □ 4 □ ___________

Current per string:
□ 15 A □ 30 A □ ___________

String overload protection:
□ yes □ no □ ___________

Blocking diodes:
□ yes □ no □ ___________

Connection of conductors:
□ Multi Contact MC4 □ ___________

Cable cross-section (mm²):
□ ___________

Gustav Hensel GmbH & Co. KG ∙ Elektroinstallations- und Verteilungssysteme ∙ 57368 Lennestadt ∙ www.hensel-electric.de

Checklist provided as an editable PDF file on the Internet at www.enysun.eu
### Request/offer

- [ ] Contractor
- [ ] Order

**Name:**

**Address:**

**Tel.:**

**E-Mail:**

**Date:**

**Project:**

---

### Contractor

- Protection class II [ ]
- Ready for connection [ ]

Quantity of Solar inverter collectors (pieces): __________

### Installation und ambient conditions

**Ambient temperature (°C):** __________

**Installation**

- **Indoor installation:**
  - [ ] in closed electrical operating room
  - [ ] in factory
- **Outdoor installation:**
  - [ ] protected outdoor
  - [ ] unprotected outdoor

**Available wall surface in mm:**

- Width: __________
- Height: __________
- Depth: __________

**Assembly type:**

- [ ] wall-mounted
- [ ] floor-standing

**Degree of protection:**

- [ ] IP 44
- [ ] IP 54
- [ ] IP 55
- [ ] IP 65
- [ ] IP ________

### Connection to the public power supply system

**Rated voltage:** __________ V a.c. __________ Hz

**Conductor designation:**

- [ ] L1, L2, L3
- [ ] N
- [ ] PE
- [ ] PEN

**Protection class:**

- [ ] I
- [ ] II

**Incoming device:**

- [ ] HRC fuse switch disconnector
- [ ] switch disconnector

**Connection incoming:**

- [ ] from top
- [ ] from below
- [ ] from left
- [ ] from right
- [ ] __________

- [ ] copper
- [ ] aluminium
- [ ] with cable lug
- [ ] with terminal
- [ ] conductor

**Cross-section (mm²):** __________

### Circuits and consumer

**Solar inverter connection:**

- [ ] from top
- [ ] from below
- [ ] from left
- [ ] from right
- [ ] __________

**Inverter (manufacturer/type):**

**Quantity (pieces):** __________

**Output (kVA):**

**Current (A):**

**Solar inverter connection (1~/3~):**

- [ ] / [ ]

**RCD (residual current protective):**

- [ ] no
- [ ] yes

**Wire protection to solar inverter:**

- [ ] MCB
- [ ] fuse element
- [ ] fuse switch disconnector

**Overvoltage protection:**

- [ ] yes

**Protection class:**

- [ ] I
- [ ] II

**Notes:**

____________________________________________________________________________________________________________________

____________________________________________________________________________________________________________________

---

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Checklist provided as an editable PDF file on the Internet at www.enysun.eu
Erklärung der EG-Konformität  
Declaration of EC Conformity

Nr./No. K-2016-8

Das Produkt / Typ  The product / Type
ENYSUN, Typen MI PV...., Mi AE..., KV PV....  
ENYSUN, types MI PV...., Mi AE..., KV PV....

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

Beschreibung  Description
Generatoranschlusskästen, Wechselrichtersammler und  
Freischaltstellen für Erzeugungsanlagen  
Generator junction boxes, solar inverter collectors and  
switching devices for generation plants

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):

<table>
<thead>
<tr>
<th>Norm</th>
<th>Standard</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>DIN EN 61439-2</td>
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<td>EN 61439-2</td>
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<tr>
<td></td>
<td>IEC 61439-2</td>
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</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Richtlinie</th>
<th>Directive</th>
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<tr>
<td>Niederspannungs-Richtlinie 2014/35/EG</td>
<td>Low voltage directive 2014/35/EG</td>
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<tr>
<td>EMV Richtlinie 2014/30/EG</td>
<td>EMV directive 2014/30/EG</td>
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<tr>
<td>RoHS Richtlinie 2011/65/EG</td>
<td>RoHS directive 2011/65/EU</td>
</tr>
</tbody>
</table>

Diese Konformitätserklärung entspricht der Europäischen Norm EN 17050-1 „Allgemeine Anforderungen für Konformitätserklärungen von  
Anbietern“. 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 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  Year of affixing CE-Marking
2012

Ausstellungsdatum  
Date of issue
22.04.2016

Gustav Hensel GmbH & Co. KG  
O. Gutzeit  
- Technische Geschäftsleitung -  
- Technical Managing Director -
The Company

Highest quality for the highest requirements

Since 1931 HENSEL has been developing and manufacturing innovative solutions for electrical equipment in buildings. Electrical installation and distribution systems made of high quality thermoplastic are used today because of their special properties in areas where dust and humidity place high demands on the electrical installation.

Subsidiaries abroad

<table>
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<tr>
<th>Region</th>
<th>Name</th>
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<tr>
<td>Czech Republic</td>
<td>Hensel s.r.o.</td>
<td><a href="http://www.hensel.cz">www.hensel.cz</a></td>
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<tr>
<td>Hungary</td>
<td>Hensel Hungaria Villamossági Kft.</td>
<td><a href="http://www.hensel.hu">www.hensel.hu</a></td>
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<td>Poland</td>
<td>Hensel Polska Sp. z o. o.</td>
<td><a href="http://www.hensel-electric.pl">www.hensel-electric.pl</a></td>
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<tr>
<td>Russia</td>
<td>OOO Hensel + Mennekes Elektro</td>
<td><a href="http://www.hensel-electric.ru">www.hensel-electric.ru</a></td>
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<td>People’s Republic of China</td>
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Representations abroad

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Headquarters in Germany