ENYSUN

Safe and professional product solutions for

Photovoltaic plants

ENYSUN movie

Contents

Photovoltaic solutions from Hensel

Standardised and pre-fabricated

■ Our ENYSUN product solutions provide a number of advantages when selecting and installing photovoltaic systems. The distributors are prefabricated making them quick and easy to connect. The PV generator junction boxes only need to be connected on site. With plug-in connectors compartible to MC4 they are easy to connect to PV strings and solar inverters. The new solar inverter collectors are pre-fabricated enclosure sets, which can be individually adapted on site.

Busbars, overvoltage protection devices and terminals are already installed.

Proven and tested Hensel quality

■ All ENYSUN distribution system products fulfill the IEC 60 364-7-712 standard.

The general fulfilment of this standard demonstrates Hensel ENYSUN product series' high quality. Using high quality materials means that you can always count on them functioning perfectly. ENYSUN distributors are totally insulated ⧈, impact resistant, dust proof and water-proof (degree of protection **IP 65**), UV resistant and resistant to corrosion from rain, ice and snow.

Cable entry and ventilation

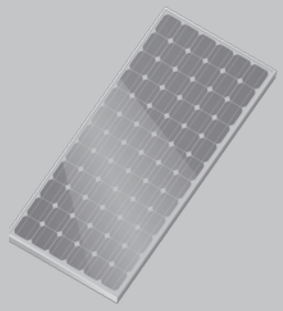
■ The formation of condensation water in closed boxes cannot be prevented in outdoor applications!

Combi climate glands in boxes with a high degree of protection prevent accumulations of condensation resulting from large temperature fluctuations caused by changing weather, intense solar radiation etc.

Your advantage:

Cable entry and ventilation in one.

1



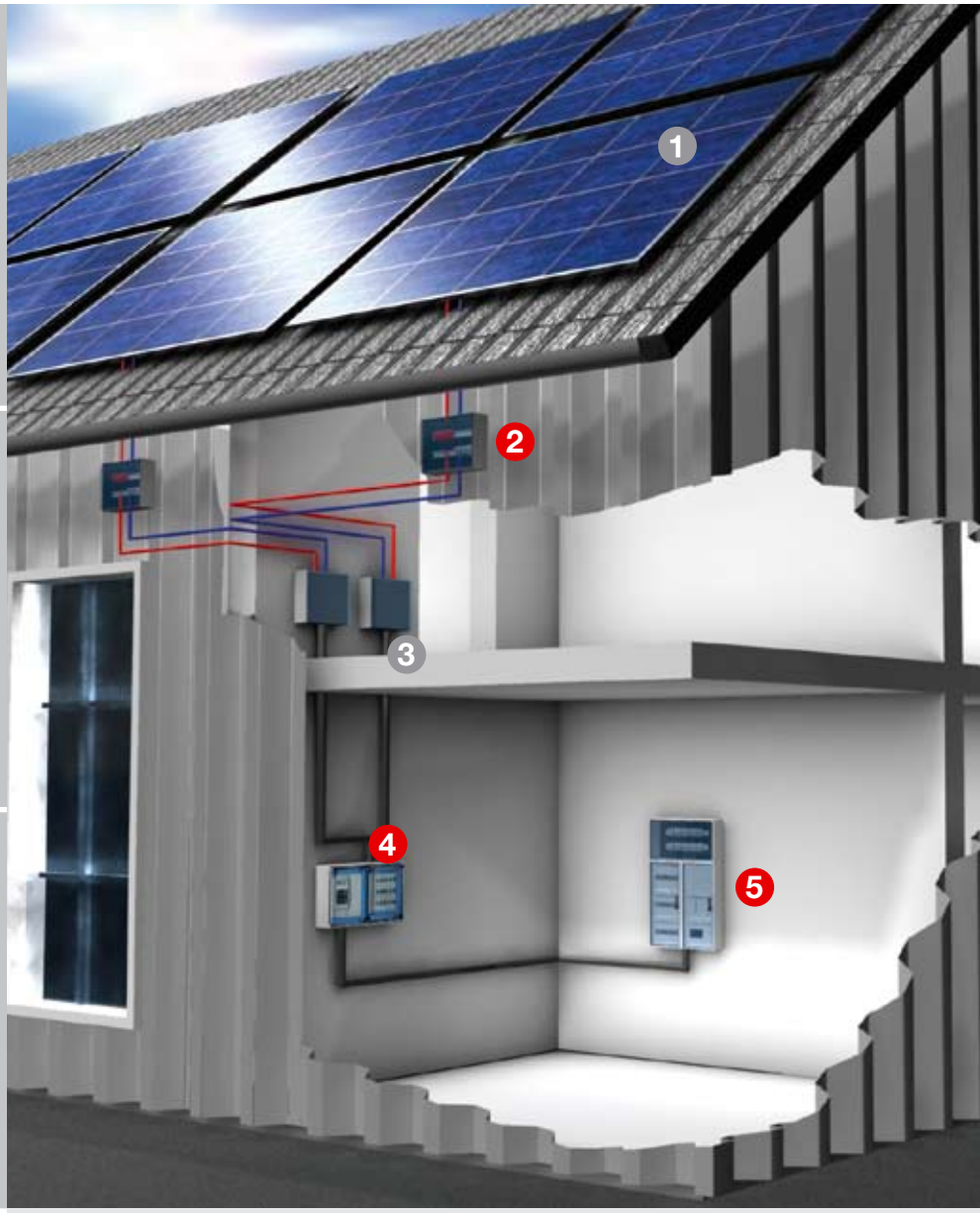
PV generators

2

PV generator junction boxes

3

Solar inverter

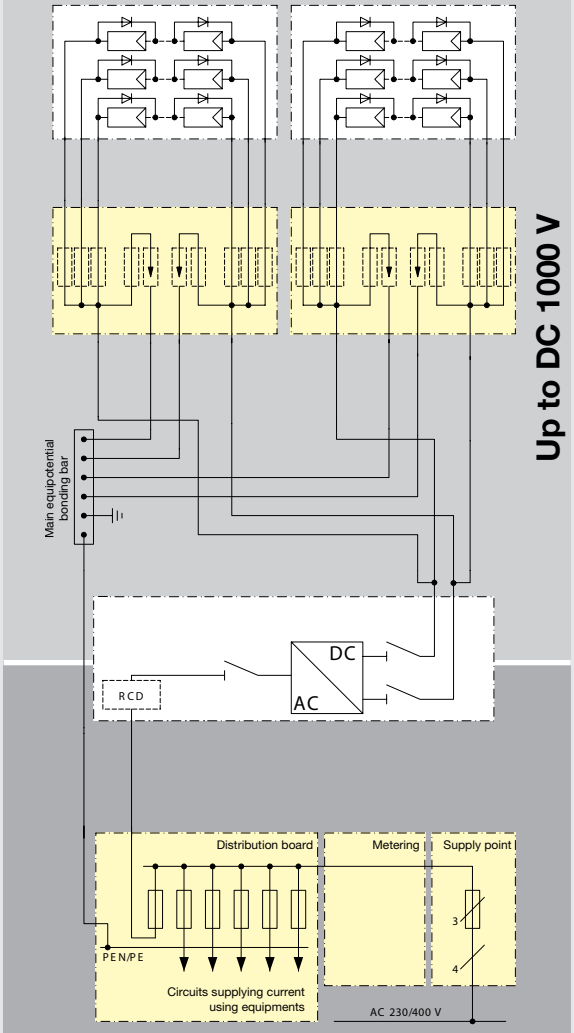


4

PV Solar inverter collector

5

Disconnection, metering, over-current protection device



What does the IEC 60 364-7-712 standard require when setting up photovoltaic (PV) power supply systems?

Equipment standards

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 $U_{OC\ STC}$[1] of the PV strings exceeds 120 V DC.
The PV array junction box, PV generator junction box and switchgear assemblies shall be in compliance with IEC 60439-1.

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.

Protection measures

712.312.2 **Types of system earthing**
Earthing of one of the live conductors of the DC side is permitted, if there is at least simple separation[2] between the AC side and the DC side.

NOTE
Any connections with earth on the DC side should be electrically connected so as to avoid corrosion.

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

Wiring

712.522.8.1
PV string cables, PV array cables and PV DC main cables shall be selected and erected so as to minimize the risk of earth faults and short-circuits.

NOTE This may be achieved for example by reinforcing the protection of the wiring against external influences by
the use of single-core sheathed cables.

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 $I_{SC\ STC}$[3] at any location.

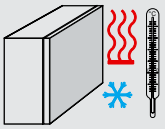
712.433.2
Overload protection may be omitted to the PV main cable if the continuous current-carrying capacity is equal to or greater than 1,25 times $I_{SC\ STC}$[3] of the PV generator.

NOTE The requirements of 712.433.1 and 712.433.2 are only relevant for protection of the cables. See as well the manufacturer's instructions for protection of PV modules.

712.444.4.4
To minimize voltages induced by lightning, the area of all wiring loops shall be as small as possible.

[1] $U_{OC\ STC}$ = no-load voltage under standard testing conditions
[2] Simple disconnect = disconnect between two circuits or between a circuit and an earthing using basic insulation
[3] $I_{SC\ STC}$ = Short circuit current under standard testing conditions

Dependent on the system



Ambient conditions

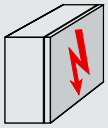
Ambient temperature
- for empty enclosures: - 25°C up to + 70° C
- for distribution boards [1] according to IEC 60 439:
  - 5°C up to + 35° C, max. + 40° C

Relative humidity: 50% at 40° C, 100% at 25° C

[1] The ambient temperature for distribution boards is reduced by the installed equipment technology!

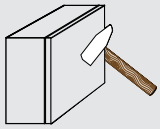
Application area

The enclosures are suitable for the outdoor installation - harsh environment and / or outdoor.
However the climatic influences and effects on the equipment are to be considered.



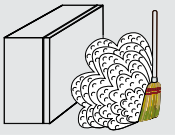
Insulation

Insulated enclosures
(Protection class II) ⧈



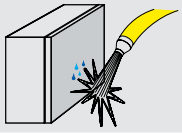
Impact strength

Degree of protection against mechanical load IK 08 (5 Joule)
in accordance with IEC 62 262



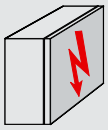
Protection against foreign solid objects and direct contact

Dust-proof
Degree of protection IP **6**5



Protection against ingress of water with harmful effects

Protected against water jets
Degree of protection IP 6**5**

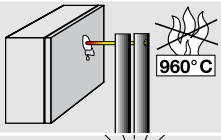


Electrical parameters

Rated current: 400 A
Rated insulation voltage: AC 690 V, **DC 1000 V***, IEC 60 664
* the rated insulation voltage is possibly reduced by the installed equipment technology

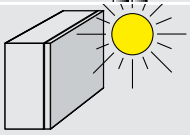
Dependent on material

Material: Thermoplastic



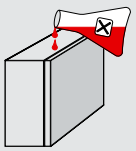
Burning behaviour

Glow wire test 960°C
in accordance with IEC 60 695-2-11
flame-retardant, self-extinguishing



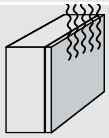
UV resistance

The Material is examined and therefore qualified for outdoor installation (harsh environment and / or outdoor) during direct sun radiation



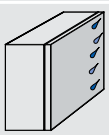
Chemical resistance

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



Toxic behavour

Silicone- and halogen-free



Resistance to corrosion

Resistant against weather-related demand such as rains, ice and snow.

The boxes are suitable for outdoor installation.
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 damage 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. Hensel combi climate glands (KBM) can be used in outdoor installations for cable entries and ventilation as well (see accessories).

Formation of condensed water and retaliatory actions

The problem of condensed water forming only occurs in enclosures with a high degree of protection ≥ IP 54 since the temperature adjustment that is carried out from inside to outside is too low due to the high density of the enclosure and its material.

Formation of condensed water in enclosures

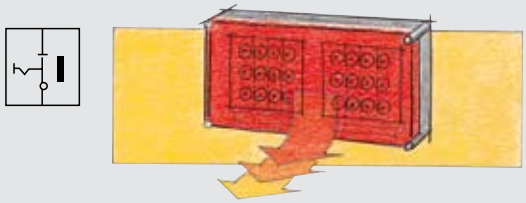
How does condensed water occur in enclosures with a high degree of protection?

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

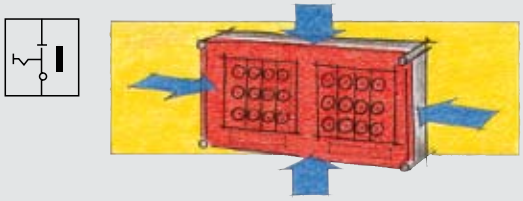
The warm air inside the enclosure attempts to accumulate moisture. This enters from outside through the seal as the enclosures are not gas-tight.

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.

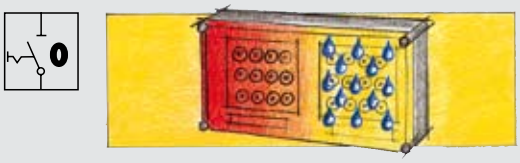
In which areas does condensed water occur?



System switched on

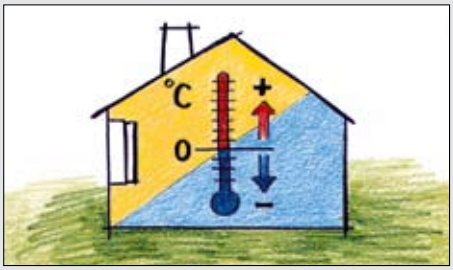


System switched on



System switched off

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

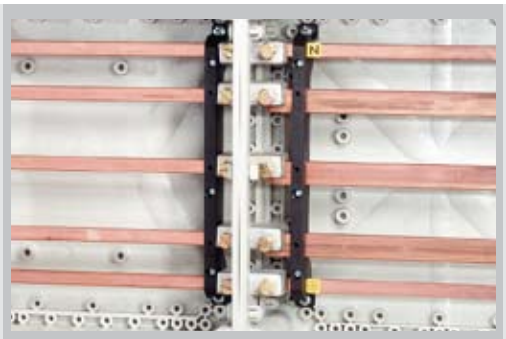


In areas where high levels of air humidity and large temperature fluctuations are expected e.g. in laundry rooms, kitchens, car washes etc.

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: Combi climate glands to reduce condensation formation in outdoor installations, order separately, see accessories.



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.

EMC
ompliant busbar system

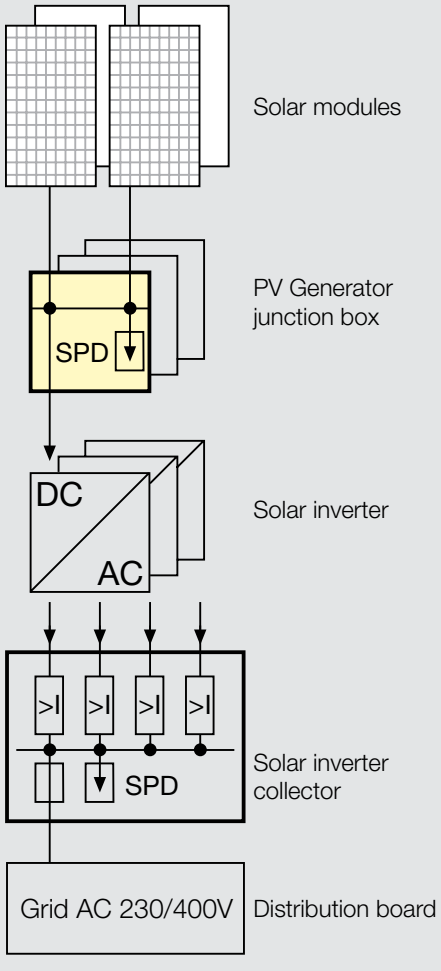
Overvoltage protection
The exposed sequence of photovoltaic generators on roofs or in fields make lightning and overvoltage protection an important part of protecting investments. A direct lightning strike in the PV generator can destroy the module and/or the inverter (primary damage). As photovoltaic (PV) systems are required have a connection to the building's electrical installation, lightning damage to the PV generator could damage the entire plant (secondary damage).
Many liability insurers call upon the **VdS-Merkblatt 2010** directive, the "Risk oriented lightning and surge protection directive to prevent damage," which requires lightning and surge protection for PV systems above 10 kWp.

Protection measures
In principal it must be assured that no direct lightning strike is possible in the PV generator. The necessary protection can be provided using "isolated lightning protection" products from numerous manufacturers and isolated outgoing cables when necessary.
Should an **external lightning protection facility** be available, then a **type 1** lightning current arrester for the AC power supply is to be installed on the building's main distribution board.
Should **no lightning protection** be available then a **type 2** surge arrester should be sufficient under certain circumstances.

Inverter protection
To protect the inverter, both the DC input and the AC output need to be protected. If the inverter is installed at a distance of **> 5 m** to the building's main distribution board, then a **type 2 for AC wire** overvoltage protection device shall be used to prevent surge damage, e.g. from switching overvoltages from the mains.

Type 2 surge protection devices are especially designed for string conductors from the **DC inputs**. The monitoring elements need to be specifically designed for direct voltage. Personnel need to be able to safely exchange the protection modules even with insulation faults in the plant.

It is of the utmost importance to integrate the individual lightning and overvoltage protection concept into the photovoltaic plant protection solution. Lighting and overvoltage protection experts can answer any questions in this area.

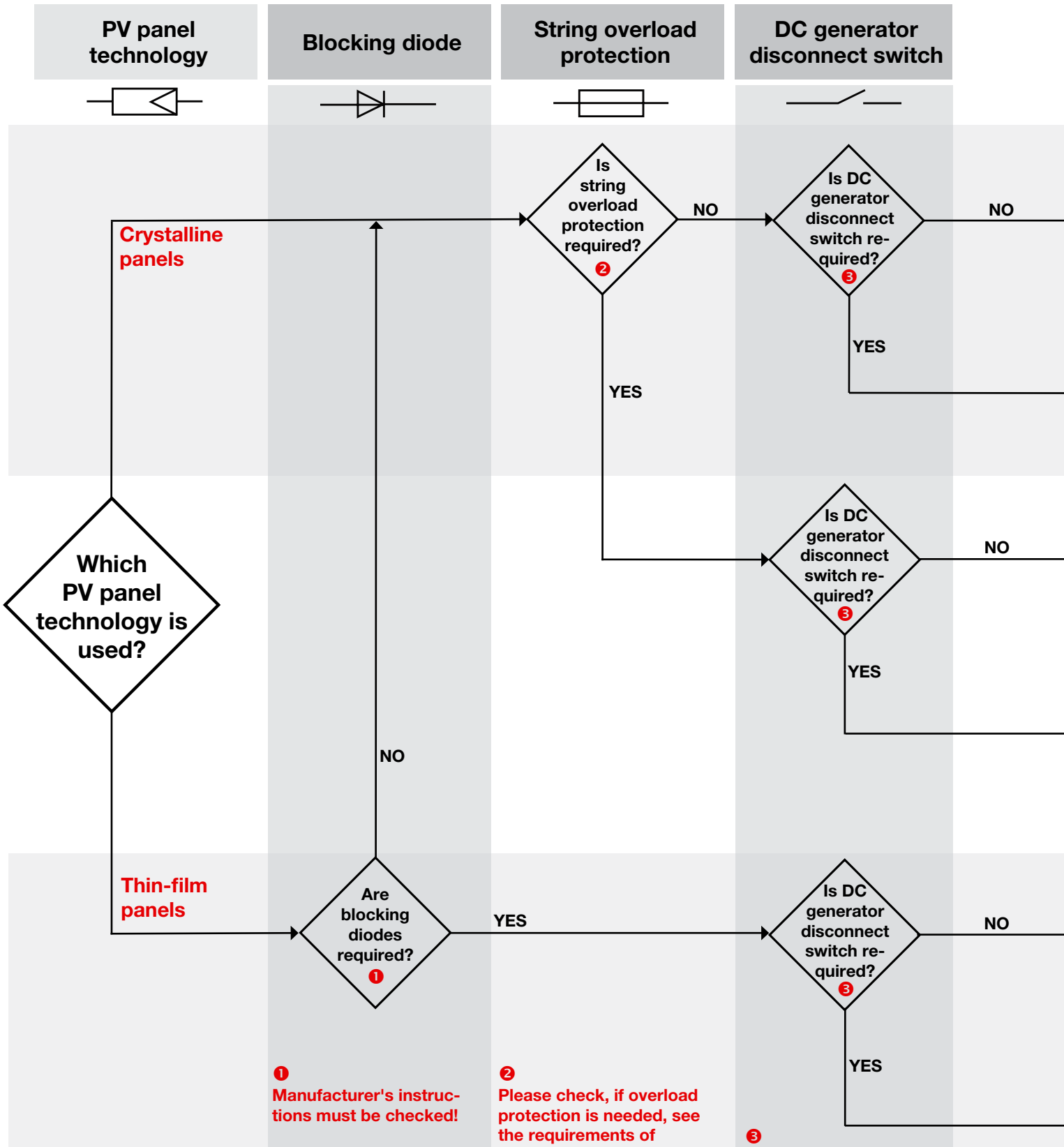


Connection:
Ready for connection with plug-in connectors

Electrical data:
Rated voltage: **DC 1,000 V**
Rated current: DC 30 A
Protective measure:
Total insulation ⧈

Ambient conditions:
UV resistant
Degree of protection: **IP 65**
Stainless steel external brackets optional: Combi climate glands to reduce condensation formation in outdoor installations.
(Order separately, see accessories).

How to choose the correct overload protection for PV generator



❶ **Manufacturer's instructions must be checked!**

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

❸ **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!

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.

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 Standard Test Condition)

IEC 60364 -7-712 Part 712.536.2.2.5
A switch disconnector shall be provided on the DC side of the PV inverter.

junction boxes:

DC surge arrester for PV plants (SPD)		Required protection device in PV generator junction boxes
Is DC surge arrester required? ❹	NO	Generator junction box with terminals
	YES	Generator junction box with DC surge arrester for PV plants
Is DC surge arrester required? ❹	NO	Generator junction box with DC generator disconnect switch
	YES	Generator junction box with DC generator disconnect switch and DC surge arrester for PV plants
Is DC surge arrester required? ❹	NO	Generator junction box with overload protection
	YES	Generator junction box with overload protection and DC surge arrester for PV plants
Is DC surge arrester required? ❹	NO	Generator junction box with overload protection and DC generator disconnect switch
	YES	Generator junction box with overload protection, DC generator disconnect switch and DC surge arrester for PV plants
Is DC surge arrester required? ❹	NO	Generator junction box with blocking diodes
	YES	Generator junction box with blocking diodes and DC surge arrester for PV plants
Is DC surge arrester required? ❹	NO	Generator junction box with blocking diodes and DC generator disconnect switch
	YES	Generator junction box with blocking diodes, DC generator disconnect switch and DC surge arrester for PV plants

❹
Please check, if a surge protection device (SPD) is necessary.

- If DC lines are wired from one lightning protection zone into another, a type 2 surge protection device (SPD) must be installed in the proximity of the feed-through for cables.
- Is an outside lightning protection installed, then also an internal overvoltage protection is necessary.

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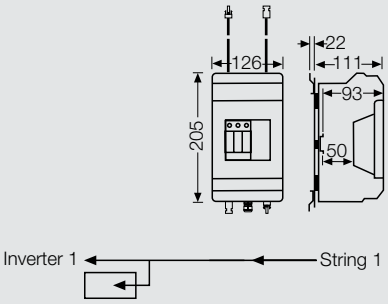
PV generator junction boxes with surge arrester or DC generator disconnect switch

- current per PV string **DC 30 A max.**
- rated voltage: DC 1000 V ($U_{OC\ STC}$)
- protection class: II ⧈
- suitable for outdoor installation, UV resistant
- ready for connection
- with stainless steel mounting plate for wall and post installations
- with transparent door
- material: thermoplastic
- colour: grey, RAL 7035
- degree of protection: IP 65

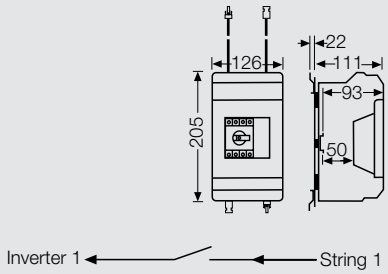
KV PV 1211 DC Surge arrester

1 x DC type 2 surge arrester
rated current: DC 30 A
plug-in connectors compartible to MC4
1 x PV string for
1 x inverter input
connection cable length:
outgoing cable 2 x 500 mm
rated connecting capacity PE:
1.5 - 16 mm², copper



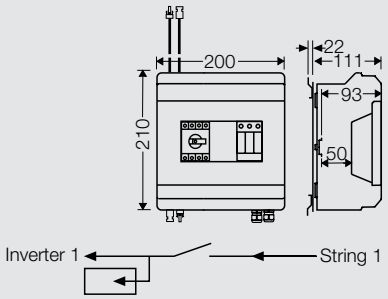
KV PV 2211 DC Generator disconnect switch

1 x DC generator disconnect switch
rated current: DC 30 A
*utilization category: DC-21A
plug-in connectors compartible to MC4
1 x PV string for
1 x inverter input
connection cable length:
outgoing cable 2 x 500 mm



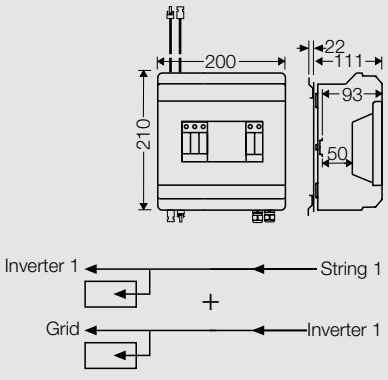
KV PV 2411 DC Surge arrester and DC Generator disconnect switch **new**

1 x DC type 2 surge arrester
1 x DC generator disconnect switch
rated current: DC 30 A
*utilization category: DC-21A
plug-in connectors compartible to MC4
1 x PV string for
1 x inverter input
connection cable length:
outgoing cable 2 x 500 mm
rated connecting capacity PE:
1.5-16 mm², Cu



KV PV 1411 DC/AC Surge arrester

1 x DC type 2 surge arrester
rated current: DC 30 A
plug-in connectors compartible to MC4
1 x PV string for
1 x inverter input
connection cable length:
outgoing cable 2 x 500 mm
1 x AC type 2 surge arrester
2 terminals per L/N/PE: 6 mm², copper



Customised solutions? Contact us!

See check list in the appendix!

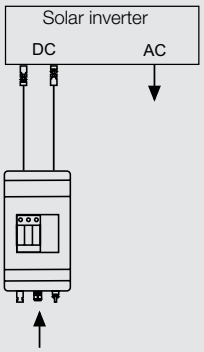
* Utilization category for switch disconnectors:
DC-21A = Switching ohmic loads inclusively moderate overload

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

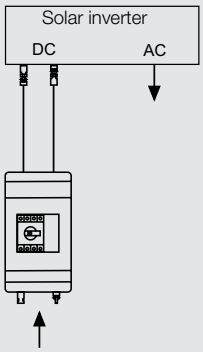
Installation of KV PV ... generator junction box
Possible in standard wall and post mounting.

Post-mounted installation of generator junction box KV PV ... close to the inverter

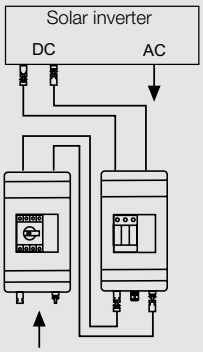
Connection to solar inverter only with DC surge arrester



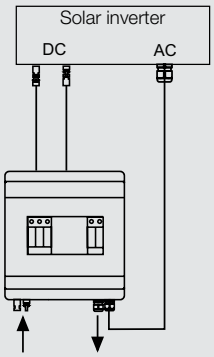
Connection to solar inverter only with DC generator disconnect switch



Connection to solar inverter with combination DC generator disconnect switch and DC surge arrester



Connection to solar inerter with DC and AC surge arrester



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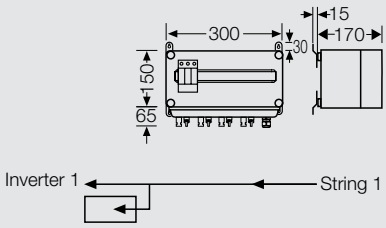
PV generator junction boxes with surge arrester

DC / AC

- current per PV string **DC 30 A max.**
- rated voltage: DC 1000 V ($U_{OC\ STC}$)
- protection class: II ⧈
- suitable for outdoor installation, UV resistant
- ready for connection
- with stainless steel external brackets
- lid fasteners for tool operation
- material: thermoplastic
- colour: grey, RAL 7032
- degree of protection: IP 65

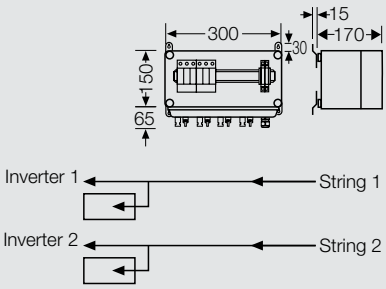
Mi PV 1111 **1 x PV string for 1 x inverter input**

1 x DC type 2 surge arrester
rated current: DC 30 A
plug-in connectors compatible to MC4
rated connecting capacity PE:
1.5 - 16 mm², copper



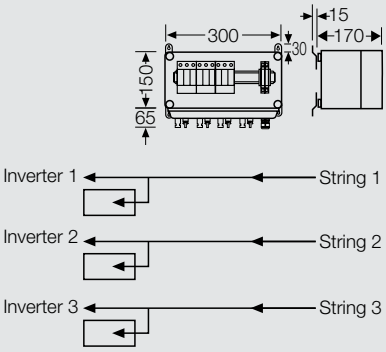
Mi PV 1122 **2 x PV string for 2 x inverter input**

2 x DC type 2 surge arrester
rated current: DC 30 A
plug-in connectors compatible to MC4
rated connecting capacity PE:
1.5 - 16 mm², copper



Mi PV 1133 **3 x PV string for 3 x inverter input**

3 x DC type 2 surge arrester
rated current: DC 30 A
plug-in connectors compatible to MC4
rated connecting capacity PE:
1.5 - 16 mm², copper



Customised solutions? Contact us!

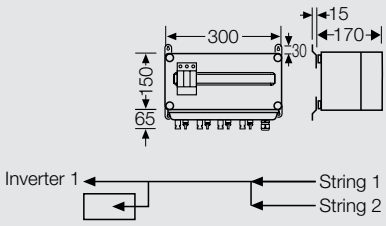
See check list in the appendix!

PV generator junction boxes with surge arrester

- current per PV string **DC 15 A max.**
- rated voltage: DC 1000 V ($U_{OC\ STC}$)
- protection class: II ⧈
- suitable for outdoor installation, UV resistant
- ready for connection
- with stainless steel external brackets
- lid fasteners for tool operation
- material: thermoplastic
- colour: grey, RAL 7032
- degree of protection: IP 65

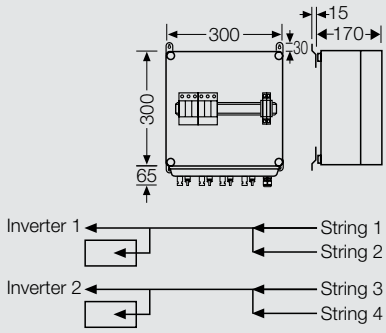
Mi PV 1121 **2 x PV string for 1 x inverter input**

1 x DC type 2 surge arrester
rated current: DC 30 A
plug-in connectors compatible to MC4
rated connecting capacity PE:
1.5 - 16 mm², copper



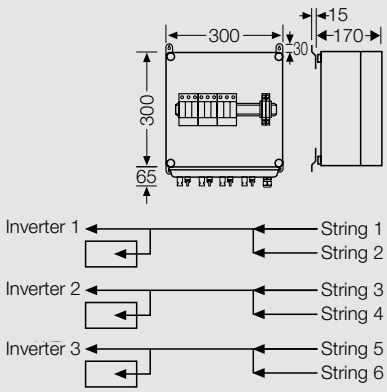
Mi PV 1242 **4 x PV string for 2 x inverter input**

2 x DC type 2 surge arrester
rated current: DC 30 A
plug-in connectors compatible to MC4
rated connecting capacity PE:
1.5 - 16 mm², copper



Mi PV 1263 **6 x PV string for 3 x inverter input**

3 x DC type 2 surge arrester
rated current: DC 30 A
plug-in connectors compatible to MC4
rated connecting capacity PE:
1.5 - 16 mm², copper



Customised solutions? Contact us!

See check list in the appendix!

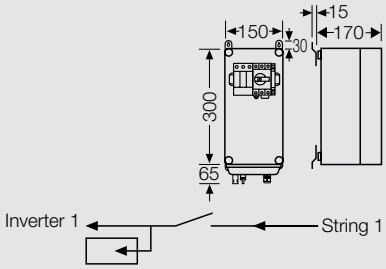
ENYSUN

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

- current per PV string **DC 30 A max.**
- rated voltage: DC 1000 V ($U_{OC\ STC}$)
- protection class: II ⧈
- suitable for outdoor installation, UV resistant
- ready for connection
- with stainless steel external brackets
- lid fasteners for tool operation
- material: thermoplastic
- colour: grey, RAL 7032
- degree of protection: IP 65

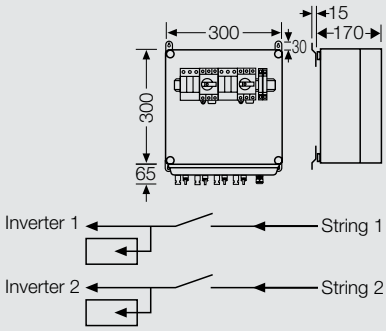
Mi PV 2111 — **1 x PV string for 1 x inverter input**

1 x DC type 2 surge arrester
1 x DC generator disconnect switch
rated current: DC 30 A
*utilization category: DC-21A
plug-in connectors compatible to MC4
rated connecting capacity PE:
1.5 - 16 mm², copper



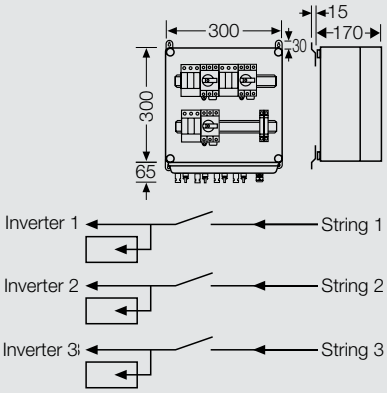
Mi PV 2222 — **2 x PV string for 2 x inverter input**

2 x DC type 2 surge arrester
2 x DC generator disconnect switch
rated current: DC 30 A
*utilization category: DC-21A
plug-in connectors compatible to MC4
rated connecting capacity PE:
1.5 - 16 mm², copper



Mi PV 2233 — **3 x PV string for 3 x inverter input**

3 x DC type 2 surge arrester
3 x DC generator disconnect switch
rated current: DC 30 A
*utilization category: DC-21A
plug-in connectors compatible to MC4
rated connecting capacity PE:
1.5 - 16 mm², copper



* Utilization category for switch disconnectors:
DC-21A = Switching ohmic loads inclusively moderate overload

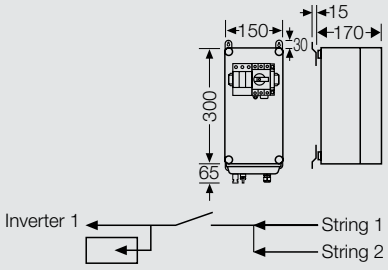
PV generator junction boxes with surge arrester and DC generator disconnect switch

DC/AC

- current per PV string **DC 15 A max.**
- rated voltage: DC 1000 V ($U_{OC\ STC}$)
- protection class: II ⧈
- suitable for outdoor installation, UV resistant
- ready for connection
- with stainless steel external brackets
- lid fasteners for tool operation
- material: thermoplastic
- colour: grey, RAL 7032
- degree of protection: IP 65

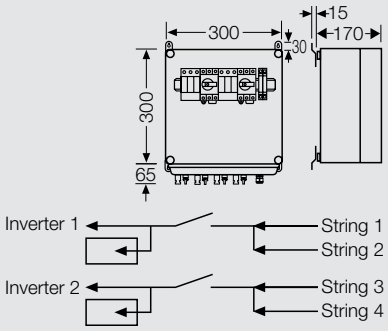
Mi PV 2121 — 2 x PV string for 1 x inverter input

1 x DC type 2 surge arrester
1 x DC generator disconnect switch
rated current: DC 30 A
*utilization category: DC-21A
plug-in connectors compatible to MC4
rated connecting capacity PE:
1.5 - 16 mm², copper



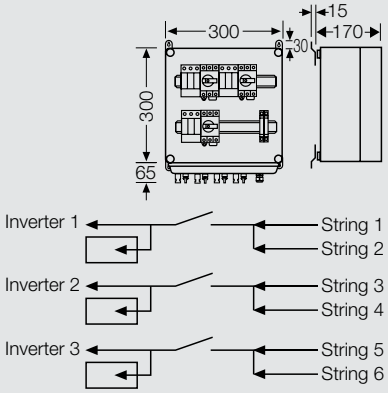
Mi PV 2242 — 4 x PV string for 2 x inverter input

2 x DC type 2 surge arrester
2 x DC generator disconnect switch
rated current: DC 30 A
*utilization category: DC-21A
plug-in connectors compatible to MC4
rated connecting capacity PE:
1.5 - 16 mm², copper



Mi PV 2263 — 6 x PV string for 3 x inverter input

3 x DC type 2 surge arrester
3 x DC generator disconnect switch
rated current: DC 30 A
*utilization category: DC-21A
plug-in connectors compatible to MC4
rated connecting capacity PE:
1.5 - 16 mm², copper



Customised solutions? Contact us!

See check list in the appendix!

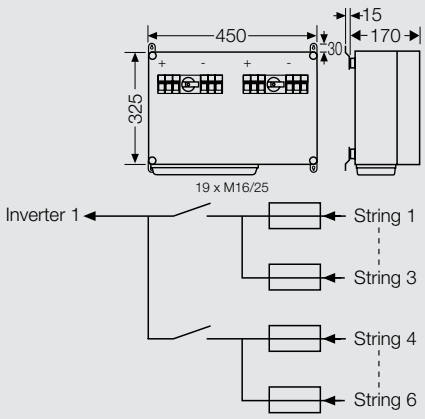
* Utilization category for switch disconnectors:
DC-21A = Switching ohmic loads inclusively moderate overload

PV generator junction boxes
with string overload protection and DC generator disconnect switch

- current per PV string **DC 10 A max.**
- rated voltage: DC 1000 V ($U_{OC\ STC}$)
- protection class: II ⧈
- suitable for outdoor installation, UV resistant
- ready for connection
- with stainless steel external brackets
- lid fasteners for tool operation
- material: thermoplastic
- colour: grey, RAL 7032
- degree of protection: IP 65

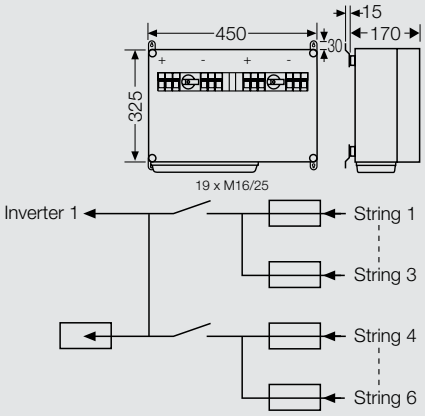
Mi PV 3311 **6 x PV string for 1 x inverter input** **new**

6 holder for fuses each + and —
connection: 1.5-16 mm²
2 x DC generator disconnect switch
connection: 6-35 mm², Cu
rated current: DC 60 A
included cable entry:
12 x ASM 16, 2 x ASM 25



Mi PV 3321 **6 x PV string for 1 x inverter input** **new**

6 holder for fuses each + and —
connection: 1.5-16 mm²
1 x DC type 2 surge arrester
rated connecting capacity PE:
1.5 - 35 mm², Cu
2 x DC generator disconnect switch
connection: 6-35 mm², Cu
rated current: DC 60 A
included cable entry:
12 x ASM 16, 3 x ASM 25

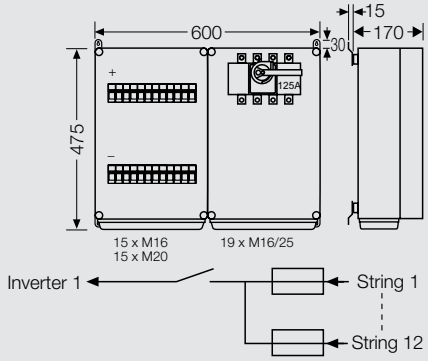


PV generator junction boxes
with string overload protection and DC generator disconnect switch

- current per PV string **DC 10 A max.**
- rated voltage: DC 1000 V ($U_{OC\ STC}$)
- protection class: II ⧈
- suitable for outdoor installation, UV resistant
- ready for connection
- with stainless steel external brackets
- lid fasteners for tool operation
- material: thermoplastic
- colour: grey, RAL 7032
- degree of protection: IP 65

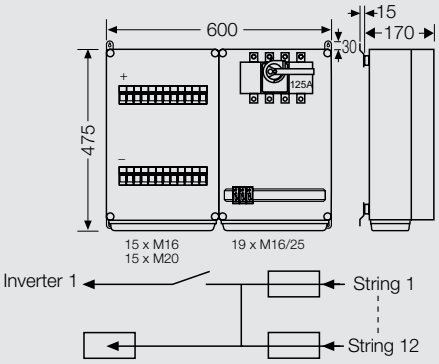
Mi PV 3611 **12 x PV string for 1 x inverter input**

12 holder for fuses each + and —
connection: 1,5-16 mm²
1 x DC generator disconnect switch
connection: M10 (max. 1x120 mm² per pole)
rated current: DC 125 A
included cable entry:
12 x ASM 16, 12 x ASM 20, 2 x ASM 25



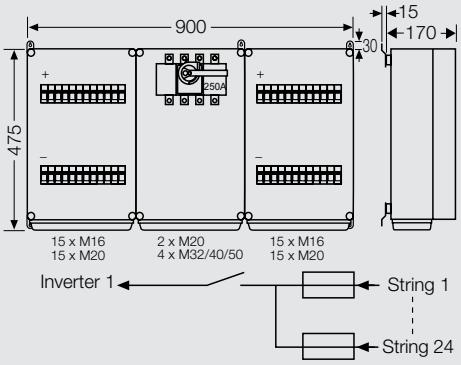
Mi PV 3621 **12 x PV string for 1 x inverter input**

12 holder for fuses each + and —
connection: 1,5-16 mm²
1 x DC type 2 surge arrester
rated connecting capacity PE:
1,5 - 35 mm², Cu
1 x DC generator disconnect switch
connection: M10 (max. 1x120 mm² per pole)
rated current: DC 125 A
included cable entry:
12 x ASM 16, 12 x ASM 20, 3 x ASM 25



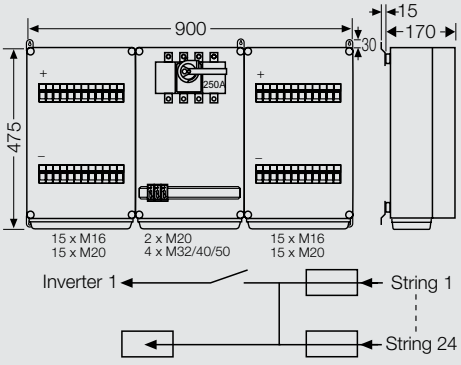
Mi PV 3931 **24 x PV string for 1 x inverter input**

24 holder for fuses each + and —
connection: 1,5-16 mm²
1 x DC generator disconnect switch
connection: M10 (max. 1x120 mm² per pole)
rated current: DC 250 A
included cable entry:
24 x ASM 16, 24 x ASM 20, 2 x ASM 40



Mi PV 3941 **24 x PV string for 1 x inverter input**

24 holder for fuses each + and —
connection: 1,5-16 mm²
1 x DC type 2 surge arrester
rated connecting capacity PE:
1,5 - 35 mm², Cu
1 x DC generator disconnect switch
connection: M10 (max. 1x120 mm² per pole)
rated current: DC 250 A
included cable entry:
24 x ASM 16, 25 x ASM 20, 2 x ASM 40



Customised solutions? Contact us!

See check list in the appendix!

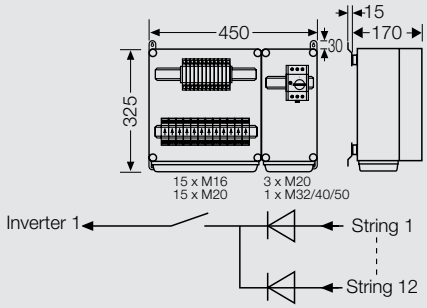
PV generator junction boxes with blocking diodes and DC generator disconnect switch

DC/AC

- current per PV string **DC 1,5 A max.**
- rated voltage: DC 1000 V ($U_{OC\ STC}$)
- protection class: II ⧈
- suitable for outdoor installation, UV resistant
- ready for connection
- with stainless steel external brackets
- lid fasteners for tool operation
- material: thermoplastic
- colour: grey, RAL 7032
- degree of protection: IP 65

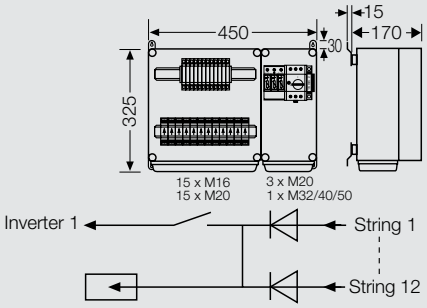
Mi PV 4311 — **12 x PV string for 1 x inverter input**

12 blocking diodes + and
12 terminal blocks —
connection: 1,5-6 mm²
1 x DC generator disconnect switch
rated current: DC 30 A
*utilization category: DC-21A
connection: 1.5-6 mm²
included cable entry:
12 x ASM 16, 14 x ASM 20



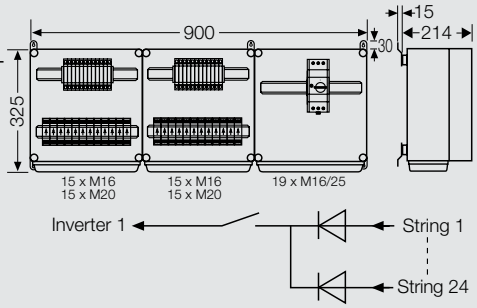
Mi PV 4321 — **12 x PV string for 1 x inverter input**

12 blocking diodes + and
12 terminal blocks —
connection: 1.5-6 mm²
1 x DC type 2 surge arrester
rated connecting capacity PE:
1,5 - 16 mm², Cu
1 x DC generator disconnect switch
rated current: DC 30 A
*utilization category: DC-21A
connection: 1.5-6 mm²
included cable entry:
12 x ASM 16, 15 x ASM 20



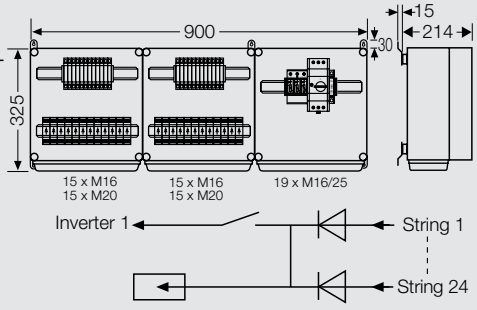
Mi PV 4631 — **24 x PV string for 1 x inverter input**

24 blocking diodes + and
24 terminal blocks —
connection: 1,5-6 mm²
1 x DC generator disconnect switch
rated current: DC 63 A
*utilization category: DC-21A
connection: 1.5-35 mm²
included cable entry:
24 x ASM 16, 24x ASM 20, 2 x ASM 25



Mi PV 4641 — **24 x PV string for 1 x inverter input**

24 blocking diodes + and
24 terminal blocks —
connection: 1,5-6 mm²
1 x DC type 2 surge arrester
rated connecting capacity PE:
1,5 - 16 mm², Cu
1 x DC generator disconnect switch
rated current: DC 63 A
*utilization category: DC-21A
connection: 1.5-35 mm²
included cable entry:
24 x ASM 16, 24 x ASM 20, 3 x ASM 25



Delivery date of PV generator junction boxes with blocking diodes on request.

* Utilization category for switch disconnectors:
DC-21A = Switching ohmic loads inclusively moderate overload

Customised solutions? Contact us!

See check list in the appendix!

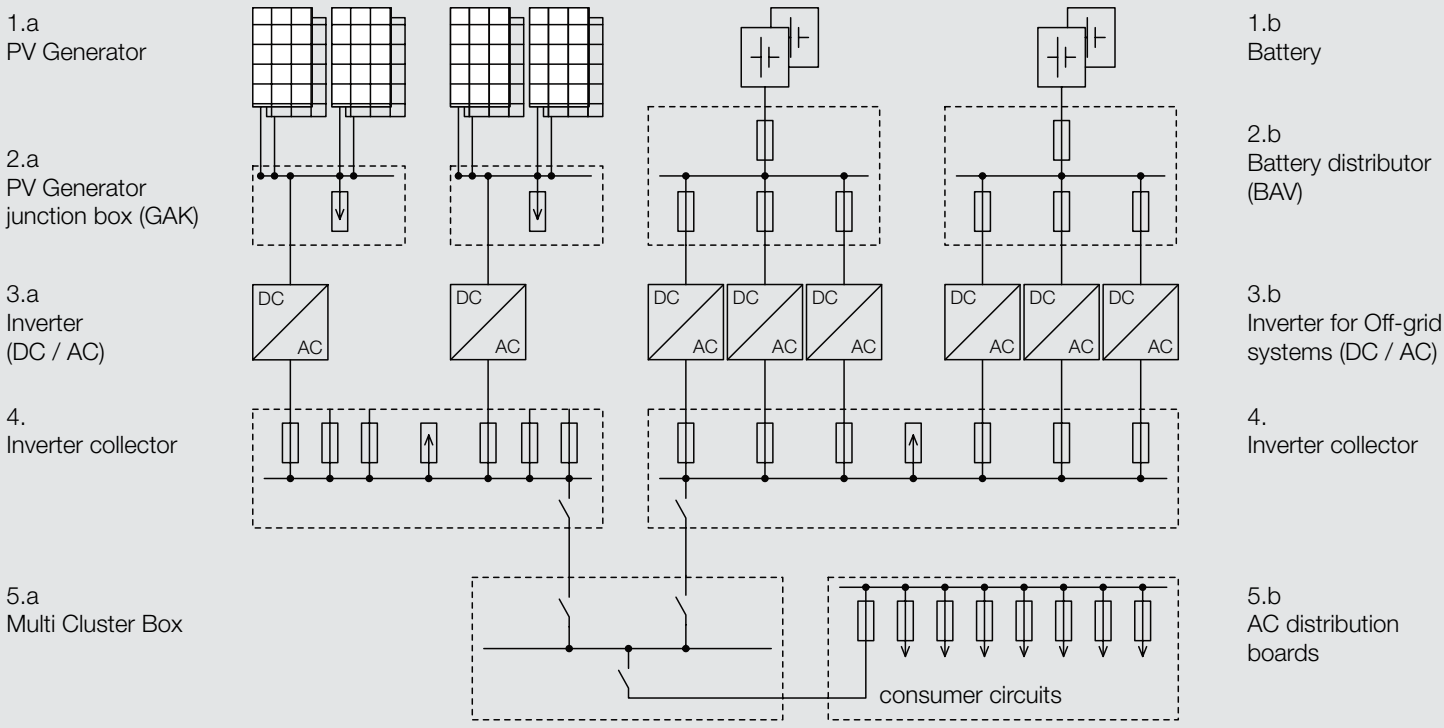
Photovoltaic

Standardised and individual solutions for generator junction boxes
Ready for connection in accordance with IEC 60 364-7-712.

Product: Mi PV 1263 ENYSUN
Property: Poco Furniture Store, Herne, Germany
Area of application: Outdoor installation
Details: Total power 300 kWp, 40 inverters
Requirements: High degree of protection IP 65: dust-proof and water-protected, high impact strength, temperature and UV resistance, corrosion resistance

Product: Customised solution ENYSUN
Subject: Kiefer-Glas-Solar
Area of application: Indoor installation
Unique features: DC collector with six strands at one inverter input
Strand fuse, type 2 surge arrester and 63 A generator disconnect switch

Schematic drawing: Off-grid system (stand-alone grid)



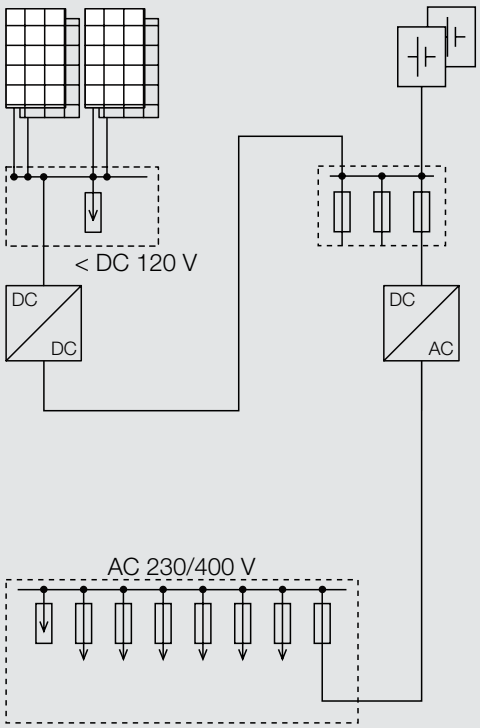
Off-grid system (stand-alone grid)
with DC-coupling

1.a
PV Generator

2.a
PV Generator junction box (GAK)

3.a
Charger (DC / DC)

4.
AC distributiion board



1.b
Battery

2.b
Battery distributor (BAV)

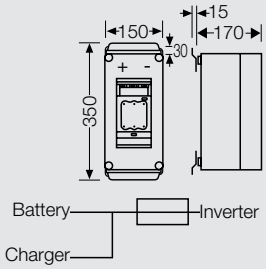
3.b
Inverter for Off-grid systems (DC / AC)

Battery distributors
with protective devices for outgoing circuits to solar inverters

- current per inverter **DC 125 A max.**
- rated voltage: DC 120 V
- protection class: II ⧈
- with stainless steel external brackets
- in accordance with IEC 61 439-1/-2 and EN 50 272-2
- lid fasteners for tool operation
- material: thermoplastic
- colour: grey, RAL 7032
- degree of protection: IP 65

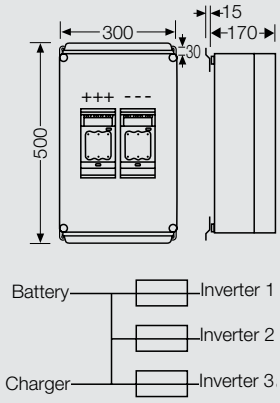
Mi PV 3101 **1 x battery on 1 x inverter** **new**

ready for connection,
1 x fuse switch disconnector HRC 00, 2-pole
rated current: 125 A
connection: M8, Cu
included cable entry:
2 x ASM 25, 4 x ASM 32



Mi PV 3302 **1 x battery on 3 x inverter** **new**

ready for connection,
2 x fuse switch disconnector NH 00, 3-pole
rated current: 125 A
connection: M8, Cu
included cable entry:
2 x ASM 25, 8 x ASM 32



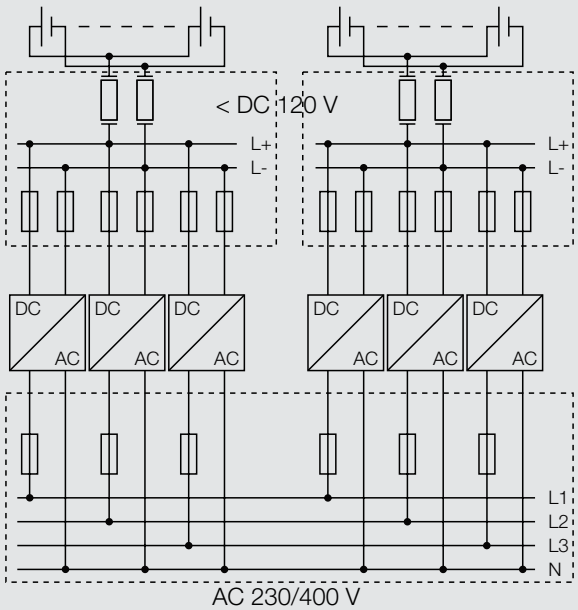
Off-grid systems (stand-alone grid)
with AC-coupling

1.
Battery

2.
Battery distributor
(BAV)

3.
Inverter for Off-grid
systems (DC / AC)

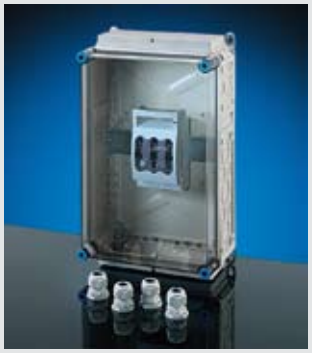
4.
AC distribution board



Battery distributors with disconnect switch and protective devices for outgoing circuits to solar inverters

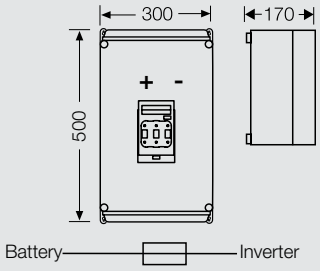
DC/AC

- current per inverter **DC 125 A max.**
- rated voltage: DC 120 V
- protection class: II ⧈
- with stainless steel external brackets
- in accordance with IEC 61 439-1/-2 and EN 50 272-2
- lid fasteners for tool operation
- material: thermoplastic
- colour: grey, RAL 7032
- degree of protection: IP 65



Mi PV 3301 **1 x battery on 1 x inverter** new

ready for connection,
1 x fuse switch disconnector HRC 00, 2-pole
rated current: 125 A
connection: M8, Cu
included cable entry: 4 x ASM 40

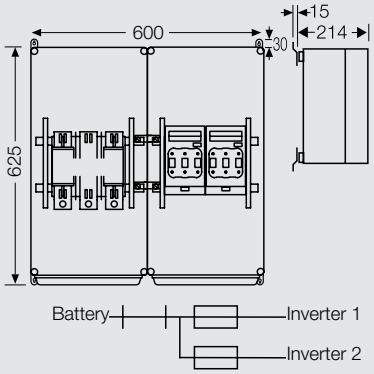


Mi PV 3802 **1 x battery on 2 x inverter** new

complete enclosure set, not assembled
busbar rated current: 400 A, 2-pole
prospective short circuit current I_{cp} = 70 kA

1 x fuse base HRC 2, 2-pole,
rated current: 400 A
connection: M 10

2 x fuse switch disconnectors HRC 00, 2-pole
rated current: 125 A
connection: 4-70 mm², Cu
included cable entry: 8 x ASM 40

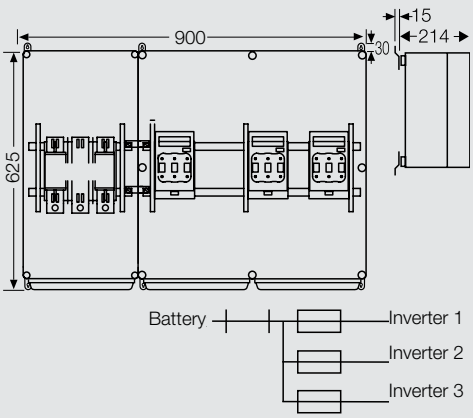


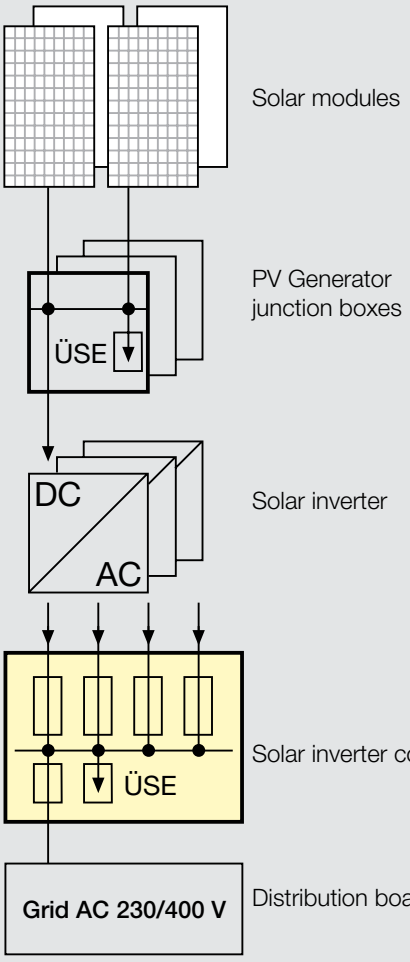
Mi PV 3903 **1 x battery on 3 x inverter** new

complete enclosure set, not assembled
busbar rated current: 400 A, 2-pole
prospective short circuit current I_{cp} = 70 kA

1 x fuse base HRC 2, 2-pole,
rated current: 400 A
connection: M 10

3 x fuse switch disconnector HRC 00, 2-pole
rated current: 125 A
connection: 4-70 mm², Cu
included cable entry: 10 x ASM 40





Complete set:
pre-fabricated and tested solar inverter collector solutions

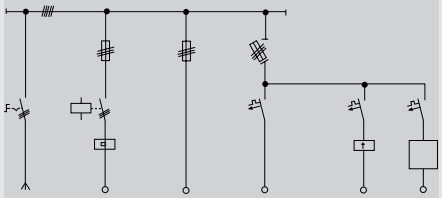
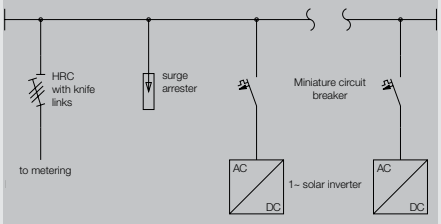
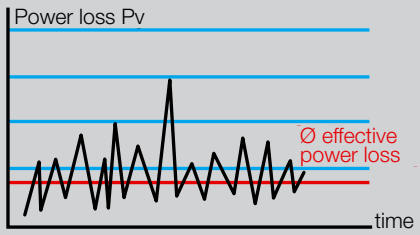
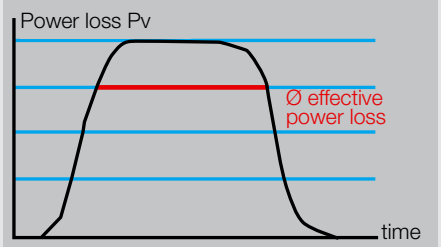
Electrical data:
Rated voltage: AC 230/400 V
1~ Inverters up to 11 kW
3~ Inverters up to 33 kW
optional with surge arrester

Ambient conditions:
UV resistant
Degree of protection: **IP 65**
Protective measure: Total insulation ⧈
Stainless steel external brackets
optional: Combi climate glands to reduce condensation formation in outdoor installations.
(order separately, see accessories).

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	Power distribution in photovoltaic plants
Protective device selection	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.	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.	**PV plants have a simultaneity factor of 1!** Which is why the distribution boards in PV plants have to be dimensioned differently and not simply 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.

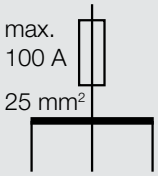
Table: Rating of solar inverter collector

1~ solar inverter		Miniature circuit breaker		cable		glands	flange
maximum power output:	max. operating current	rated current	max. quantity	minimum cable cross section	minimum out-side diameter		
2.8 kW	12 A	16 A	6 per row	3 x 2.5 mm²	11 mm	M 25	Mi FM 25
3.7 kW	16 A	20 A	5 per row	3 x 2.5 mm²	11 mm	M 25	Mi FM 25
4.8 kW	21 A	25 A	4 per row	3 x 4 mm²	13 mm	M 25	Mi FM 25
6.4 kW	28 A	32 A	3 per row	3 x 6 mm²	15 mm	M 25	Mi FM 25

3~ solar inverter		Miniature circuit breaker		cable		glands	flange
maximum power output:	max. operating current	rated current	max. quantity	minimum cable cross section	minimum out-side diameter		
8.4 kW	12 A	16 A	6 per row	5 x 2.5 mm²	13.5 mm	M 25	Mi FM 32
11.1 kW	16 A	20 A	5 per row	5 x 2.5 mm²	13.5 mm	M 25	Mi FM 32
14.4 kW	21 A	25 A	4 per row	5 x 4 mm²	15.5 mm	M 32	Mi FM 32
19.3 kW	28 A	32 A	3/ per row	5 x 6 mm²	18 mm	M 32	Mi FM 32

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

Wiring of the busbar and connection at the switch disconnector



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 aid

- Installation devices are to be properly installed automatically with the help of positioning aids on the DIN rails.

- At the same time the miniature circuit breaker is in the proper position relative to the cover plate.

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Solar inverter collectors with circuit-breaker boxes

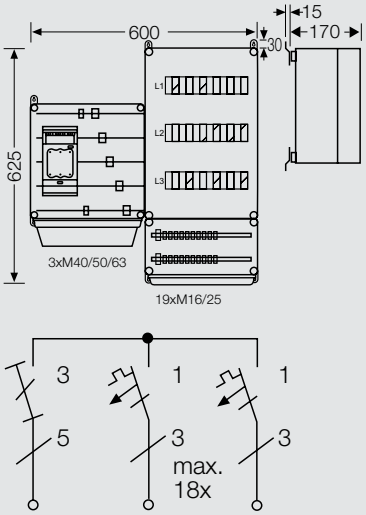
DC / AC

Leading inverter manufacturers recommend using MCBs as load disconnection devices.

- for inverters up to **6.4 kW**, 1~
- rated operating current **AC 28 A** per inverter
- rated voltage: AC 230/400 V
- suitable for outdoor installation, UV resistant
- with stainless steel external brackets
- in accordance with IEC 60 439-1
- busbar rated current: 250 A
- busbar system: 5-pole
- material: thermoplastic
- colour: grey, RAL 7032
- protection class: II ⧈
- degree of protection: IP 65

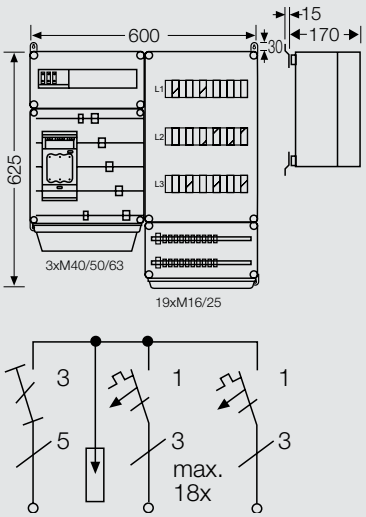
Mi PV 6111 **Rated power 70 kW, connection of 1~ inverters**

complete enclosure set, not assembled
order cable entries separately
Feeding:
maximum 18x 1~ inverters
maximum quantity and ratings of MCBs according to table "Rating of solar inverter collectors"
terminals for outgoing cables:
1.5-16 mm², copper
18 terminals per PE+N
lid fastener for manual operation
Outgoing:
switch disconnector, 3-pole with knife links
1 terminal per PE+N
PE and N terminals for copper conductors
maximum back up fuse: 100 A
outgoing cable can be above or below
terminals for outgoing cables:
max. 35 mm², copper
lid fasteners for tool operation



Mi PV 6211 **Rated power 70 kW, connection of 1~ inverters**

complete enclosure set, not assembled
order cable entries separately
Feeding:
maximum 18x 1~ inverters
maximum quantity and ratings of MCBs according to table "Rating of solar inverter collectors"
terminals for outgoing cables:
1.5-16 mm², copper
18 terminals per PE+N
lid fastener for manual operation
Outgoing:
switch disconnector, 3-pole with knife links
1 terminal per PE+N
PE and N terminals for copper conductors
maximum back up fuse: 100 A
outgoing cable can be above or below
terminals for outgoing cables:
max. 35 mm², copper
lid fasteners for tool operation
Overvoltage protection:
1 x AC type 2 surge arrester
with connection directly on the busbar in the outgoing cable box



Customised solutions? Contact us!

See check list in the appendix!

Solar inverter collectors with circuit-breaker boxes

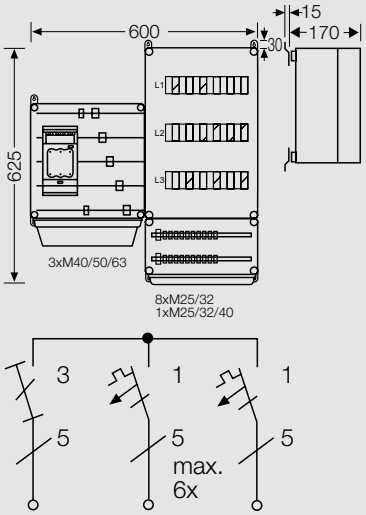
DC / AC

Leading inverter manufacturers recommend using MCBs as load disconnection devices.

- for inverters up to **19.3 kW, 3~**
- rated operating current **AC 28 A** per inverter
- rated voltage: AC 230/400 V
- suitable for outdoor installation, UV resistant
- with stainless steel external brackets
- in accordance with IEC 60 439-1
- busbar rated current: 250 A
- busbar system: 5-pole
- material: thermoplastic
- colour: grey, RAL 7032
- protection class: II ⧈
- degree of protection: IP 65

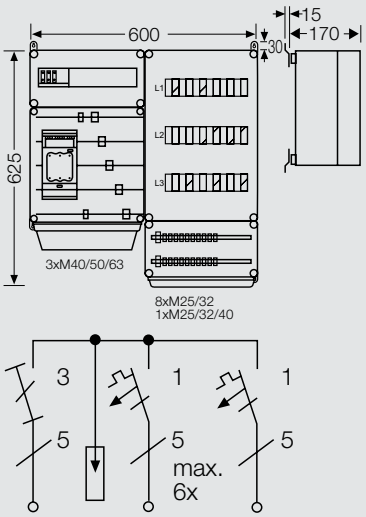
Mi PV 6311 — Rated power 70 kW, connection of 3~ inverters

complete enclosure set, not assembled
order cable entries separately
Feeding:
max. 6x 3~ inverters
maximum quantity and ratings of MCBs according to table "Rating of solar inverter collectors"
terminals for outgoing cables:
1.5-16 mm², copper
12 terminals per PE+N
lid fastener for manual operation
Outgoing:
switch disconnector, 3 pole with knife links
1 terminal per PE+N
PE and N terminals for copper conductors
maximum back up fuse: 100 A
outgoing cable can be above or below
terminals for outgoing cables:
max. 35 mm², copper
lid fasteners for tool operation



Mi PV 6411 — Rated power 70 kW, connection of 3~ inverters

complete enclosure set, not assembled
order cable entries separately
Feeding:
max. 6x 3~ inverters
maximum quantity and ratings of MCBs according to table "Rating of solar inverter collectors"
terminals for outgoing cables:
1.5-16 mm², copper
12 terminals per PE+N
lid fastener for manual operation
Outgoing:
switch disconnector, 3 pole with knife link
1 terminal per PE+N
PE and N terminals for copper conductors
maximum back up fuse: 100 A
outgoing cable can be above or below
terminals for outgoing cables:
max. 35 mm², copper
lid fasteners for tool operation
Overvoltage protection:
1 x AC type 2 surge arrester
with connection directly on the busbar in the outgoing cable box



Customised solutions? Contact us!

See check list in the appendix!

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Solar inverter collectors with circuit-breaker box

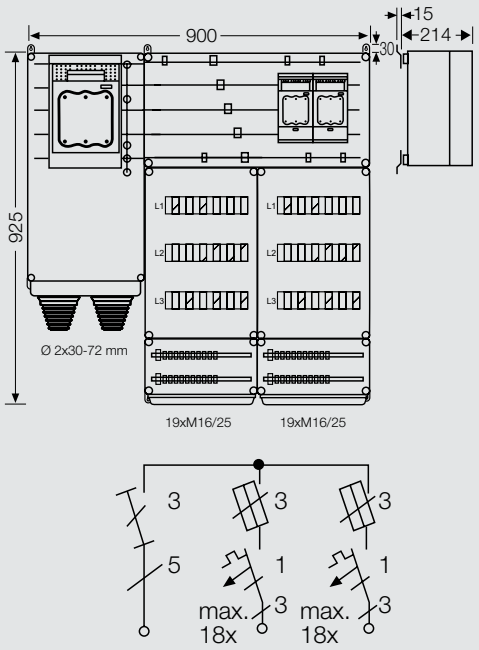
DC AC

Leading inverter manufacturers recommend using MCBs as load disconnection devices.

- for inverters up to **6.4 kW**, **1~**
- rated operating current **AC 28 A** per inverter
- rated voltage: AC 230/400 V
- suitable for outdoor installation, UV resistant
- with stainless steel external brackets
- in accordance with IEC 60 439-1
- busbar rated current: 250 A
- busbar system: 5-pole
- material: thermoplastic
- colour: grey, RAL 7032
- protection class: II ⧈
- degree of protection: IP 65

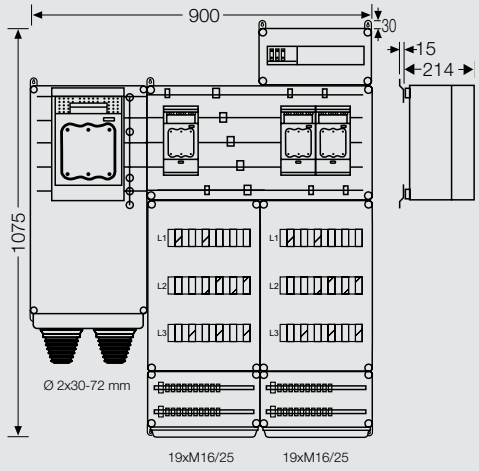
Mi PV 6123 — Rated power 140 kW, connection of 1~ inverters

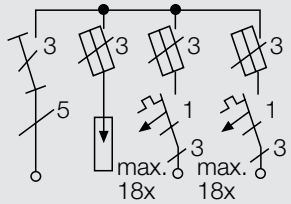
complete enclosure set, not assembled
order cable entries separately
Feeding:
maximum 36x 1~ inverters
maximum quantity and ratings of MCBs according to table "Rating of solar inverter collectors"
terminals for outgoing cables:
1.5-16 mm², copper
36 terminals per PE+N
lid fastener for manual operation
Outgoing:
switch disconnector, 3 pole with knife links
M 10 connection
maximum back up fuse: 250 A
outgoing cable can be above or below
lid fasteners for tool operation



Mi PV 6223 — Rated power 140 kW, connection of 1~ inverters

complete enclosure set, not assembled
order cable entries separately
Feeding:
maximum 36x 1~ inverters
maximum quantity and ratings of MCBs according to table "Rating of solar inverter collectors"
terminals for outgoing cables:
1.5-16 mm², copper
36 terminals per PE+N
lid fastener for manual operation
Outgoing:
switch disconnector, 3 pole with knife links
M 10 connection
maximum back up fuse: 250 A
outgoing cable can be above or below
lid fasteners for tool operation
Overvoltage protection:
1 x AC type 2 surge arrester
with connection via HRC 00 fuse switch disconnector





Customised solutions? Contact us!

See check list in the appendix!

Solar inverter collectors with circuit-breaker box

DC/AC

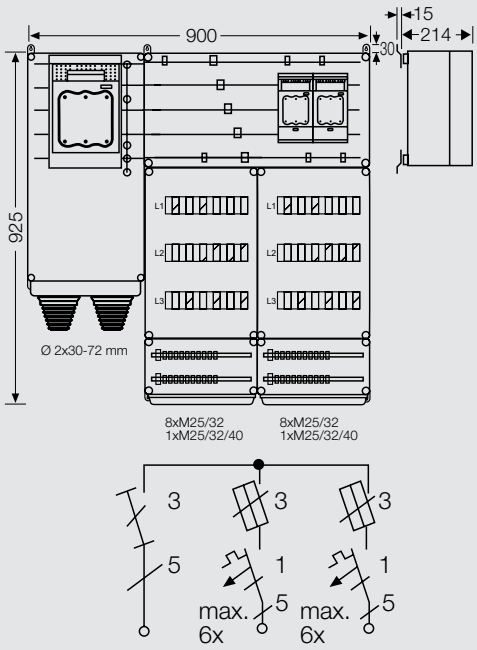
Leading inverter manufacturers recommend using MCBs as load disconnection devices.

- for inverters up to **19.3 kW, 3~**
- rated operating current **AC 28 A** per inverter
- rated voltage: AC 230/400 V
- suitable for outdoor installation, UV resistant
- with stainless steel external brackets
- in accordance with IEC 60 439-1
- busbar rated current: 250 A
- busbar system: 5-pole
- material: thermoplastic
- colour: grey, RAL 7032
- protection class: II ⧈
- degree of protection: IP 65


Sample installation

Mi PV 6323 **Rated power 140 kW, connection of 3~ inverters**

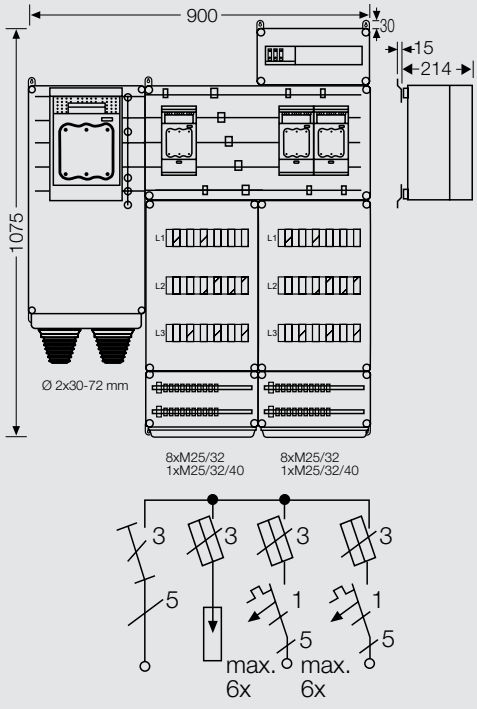
complete enclosure set, not assembled
order cable entries separately
Feeding:
maximum 12x 3~ inverters
maximum quantity and ratings of MCBs according to table "Rating of solar inverter collectors"
terminals for outgoing cables:
1.5-16 mm², copper
24 terminals per PE+N
Lid fastener for manual operation
Outgoing:
switch disconnector, 3 pole with knife links
M 10 connection
maximum back-up fuse: 250 A
outgoing cable can be above or below
lid fasteners for tool operation




Sample installation

Mi PV 6423 **Rated power 140 kW, connection of 3~ inverters**

complete enclosure set, not assembled
order cable entries separately
Feeding:
maximum 12x 3~ inverters
maximum quantity and ratings of MCBs according to table "Rating of solar inverter collectors"
terminals for outgoing cables:
1.5-16 mm², copper
24 terminals per PE+N
lid fastener for manual operation
Outgoing:
switch disconnector, 3 pole with knife links
M 10 connection
maximum back-up fuse: 250 A
outgoing cable can be above or below
lid fasteners for tool operation
Overvoltage protection:
1 x AC type 2 surge arrester
with connection via HRC 00 fuse switch disconnector



Customised solutions? Contact us!

See check list in the appendix!

HENSEL

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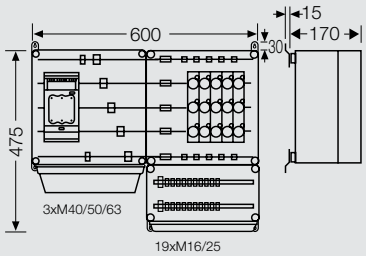
Solar inverter collectors with neozed fuse bases 63 A

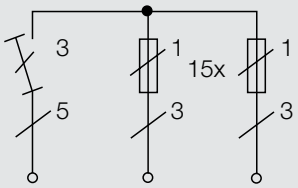
DC/AC

- for inverters up to **7 kW, 1~**
- rated operating current **AC 30 A** per inverter
- rated voltage: AC 230/400 V
- suitable for outdoor installation, UV resistant
- with stainless steel external brackets
- in accordance with IEC 60 439-1
- busbar rated current: 250 A
- busbar system: 5-pole
- material: thermoplastic
- colour: grey, RAL 7032
- protection class: II ⧈
- degree of protection: IP 65

Mi PV 5112 — Rated power 70 kW, connection of 1~ inverters

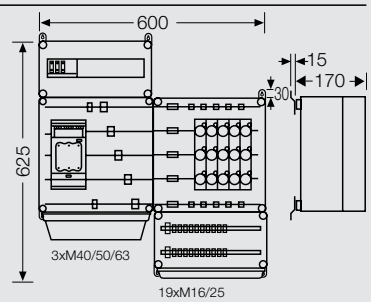
complete enclosure set, not assembled
order cable entries separately
Feeding:
5 x 63 A, 3-pole D 02, E 18,
gauge sleeve system
for 63 A fuse links
terminals for incoming cables:
4-35 mm², copper
terminals for outgoing cables:
1.5-16 mm², copper
15 terminals per PE+N
lid fastener for manual operation
Outgoing:
switch disconnector, 3 pole with knife links
1 terminal per PE+N
PE and N terminals for copper conductors
maximum back-up fuse: 125 A
outgoing cable can be above or below
terminals for outgoing cables:
max. 35 mm², copper
lid fasteners for tool operation

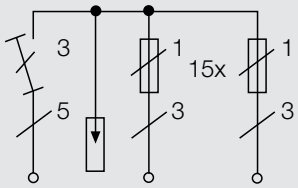




Mi PV 5212 — Rated power 70 kW, connection of 1~ inverters

complete enclosure set, not assembled
order cable entries separately
Feeding:
5 x 63 A, 3-pole D 02, E 18,
gauge sleeve system
for 63 fuse links
terminals for incoming cables:
4-35 mm², copper
terminals for outgoing cables:
1.5-16 mm², copper
15 terminals per PE+N
lid fastener for manual operation
Outgoing:
switch disconnector, 3 pole with knife links
1 terminal per PE+N
PE and N terminals for copper conductors
maximum back-up fuse: 125 A
outgoing cable can be above or below
terminals for outgoing cables:
max. 35 mm², copper
lid fasteners for tool operation
Overvoltage protection:
1 x AC type 2 surge arrester
with connection directly on the busbar in the outgoing cable box





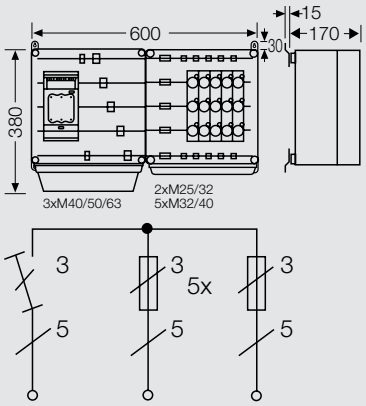
Solar inverter collectors with neozed fuse bases 63 A

DC/AC

- for inverters up to **21 kW, 3~**
- rated operating current **AC 30 A** per inverter
- rated voltage: AC 230/400 V
- suitable for outdoor installation, UV resistant
- with stainless steel external brackets
- in accordance with IEC 60 439-1
- busbar rated current: 250 A
- busbar system: 5-pole
- material: thermoplastic
- colour: grey, RAL 7032
- protection class: II
- degree of protection: IP 65

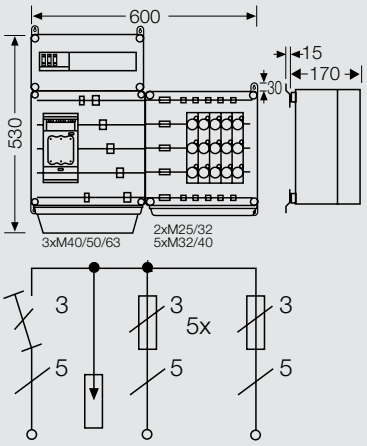
Mi PV 5312 — Rated power 70 kW, connection of 3~ inverters

complete enclosure set, not assembled
order cable entries separately
Feeding:
5 x 63 A, 3-pole D 02, E 18,
gauge sleeve system
for 63 A fuse links
terminals for incoming cables:
4-35 mm², copper
terminals for outgoing cables:
1.5-16 mm², copper
5 terminals per PE+N
lid fastener for manual operation
Outgoing:
switch disconnector, 3 pole with knife links
1 terminal per PE+N
PE and N terminals for copper conductors
maximum back-up fuse: 125 A
outgoing cable can be above or below
terminals for outgoing cables:
max. 35 mm², copper
lid fasteners for tool operation



Mi PV 5412 — Rated power 70 kW, connection of 3~ inverters

complete enclosure set, not assembled
order cable entries separately
Feeding:
5 x 63 A, 3-pole D 02, E 18,
gauge sleeve system
for 63 A fuse links
terminals for incoming cables:
4-35 mm², copper
terminals for outgoing cables:
1.5-16 mm², copper
5 terminals per PE+N
lid fastener for manual operation
Outgoing:
switch disconnector, 3 pole with knife links
1 terminal per PE+N
PE and N terminals for copper conductors
maximum back-up fuse: 125 A
outgoing cable can be above or below
terminals for outgoing cables:
max. 35 mm², copper
lid fasteners for tool operation
Overvoltage protection:
1 x AC type 2 surge arrester
with connection directly on the busbar in the outgoing cable box



Customised solutions? Contact us!

See check list in the appendix!

HENSEL

ENYSUN

Solar inverter collectors with neozed fuse bases 63 A

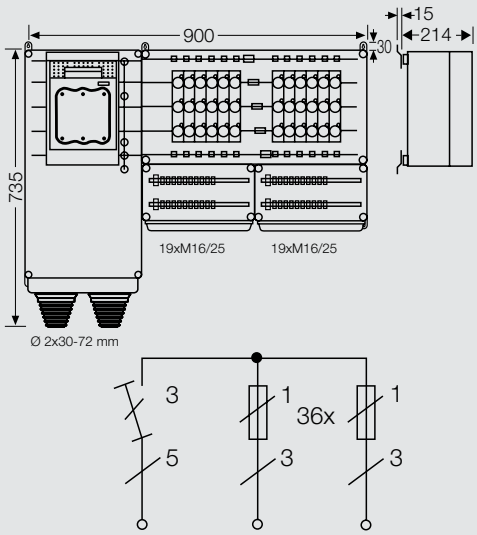
DC AC

- for inverters up to **7 kW, 1~**
- rated operating current **AC 30 A** per inverter
- rated voltage: AC 230/400 V
- suitable for outdoor installation, UV resistant
- with stainless steel external brackets
- in accordance with IEC 60 439-1
- busbar rated current: 250 A
- busbar system: 5-pole
- material: thermoplastic
- colour: grey, RAL 7032
- protection class: II ⧈
- degree of protection: IP 54


Sample installation

Mi PV 5124 — Rated power 140 kW, connection of 1~ inverters

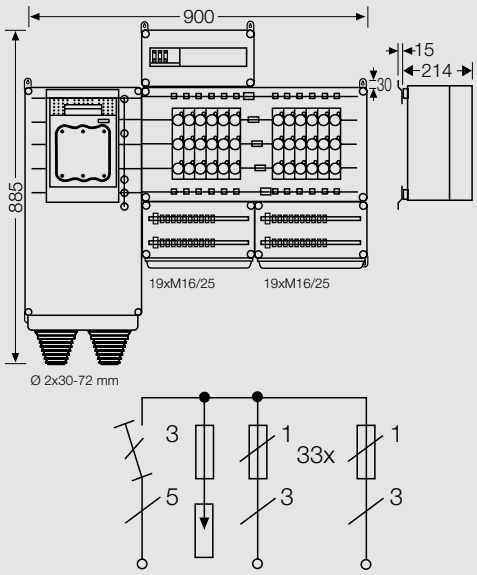
complete enclosure set, not assembled
order cable entries separately
Feeding:
12 x 63 A, 3-pole D 02, E 18,
gauge sleeve system
for 63 A fuse links
terminals for incoming cables:
4-35 mm², copper
terminals for outgoing cables:
1.5-16 mm², copper
36 terminals per PE+N
lid fastener for manual operation
Outgoing:
switch disconnector, 3 pole with knife links
M 10 connection
maximum back-up fuse: 250 A
outgoing cable can be above or below
lid fasteners for tool operation




Sample installation

Mi PV 5224 — Rated power 140 kW, connection of 1~ inverters

complete enclosure set, not assembled
order cable entries separately
Feeding:
12 x 63 A, 3-pole D 02, E 18,
gauge sleeve system
for 63 A fuse links
terminals for incoming cables:
4-35 mm², copper
terminals for outgoing cables:
1.5-16 mm², copper
36 terminals per PE+N
lid fastener for manual operation
Outgoing:
switch disconnector, 3 pole with knife links
M 10 connection
maximum back-up fuse: 250 A
outgoing cable can be above or below
lid fasteners for tool operation
Overvoltage protection:
1 x AC type 2 surge arrester
with connection via neozed fuse base



Customised solutions? Contact us!

See check list in the appendix!

Solar inverter collectors with neozed fuse bases 63 A

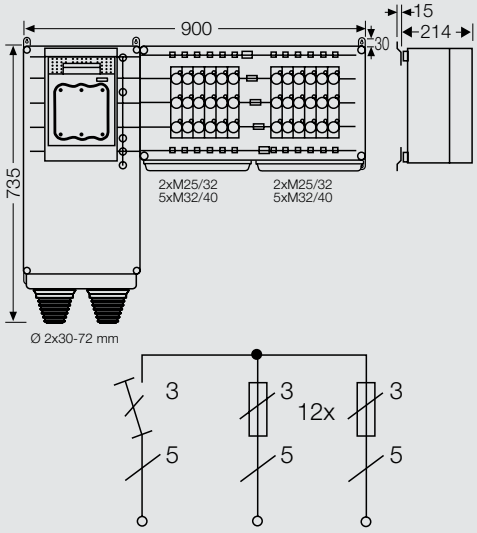
DC/AC

- for inverters up to **21 kW, 1~**
- rated operating current **AC 30 A** per inverter
- rated voltage: AC 230/400 V
- suitable for outdoor installation, UV resistant
- with stainless steel external brackets
- in accordance with IEC 60 439-1
- busbar rated current: 250 A
- busbar system: 5-pole
- material: thermoplastic
- colour: grey, RAL 7032
- protection class: II ⧈
- degree of protection: IP 54


Sample installation

Mi PV 5324 — Rated power 140 kW, connection of 3~ inverters

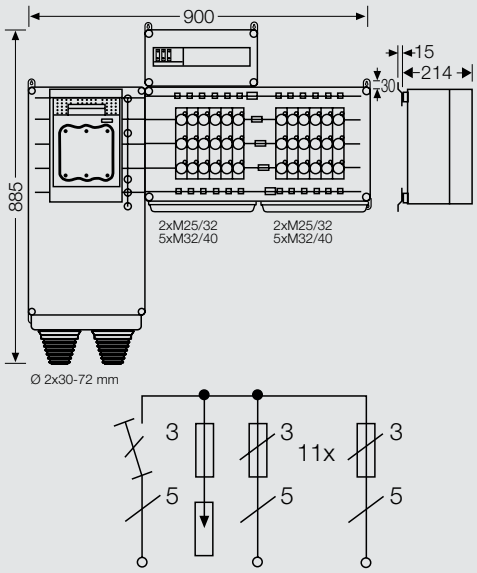
complete enclosure set, not assembled
order cable entries separately
Feeding:
12 x 63 A, 3-pole D 02, E 18,
gauge sleeve system
for 63 A fuse links
terminals for incoming cables:
4-35 mm², copper
terminals for outgoing cables:
1.5-16 mm², copper
12 terminals per PE+N
lid fastener for manual operation
Outgoing:
switch disconnector, 3 pole with knife links
M 10 connection
maximum back-up fuse: 250 A
outgoing cable can be above or below
lid fasteners for tool operation




Sample installation

Mi PV 5424 — Rated power 140 kW, connection of 3~ inverters

complete enclosure set, not assembled
order cable entries separately
Feeding:
11 x 63 A, 3-pole D 02, E 18,
gauge sleeve system
for 63 A fuse links
terminals for incoming cables:
4-35 mm², copper
terminals for outgoing cables:
1.5-16 mm², copper
12 terminals per PE+N
lid fastener for manual operation
Outgoing:
switch disconnector, 3 pole with knife links
M 10 connection
maximum back-up fuse: 250 A
outgoing cable can be above or below
lid fasteners for tool operation
Overvoltage protection:
1 x AC type 2 surge arrester
with connection via neozed fuse base



Customised solutions? Contact us!

See check list in the appendix!

HENSEL

ENYSUN

Solar inverter collectors with switch disconnectors for D 02 fuses 63 A

DC / AC

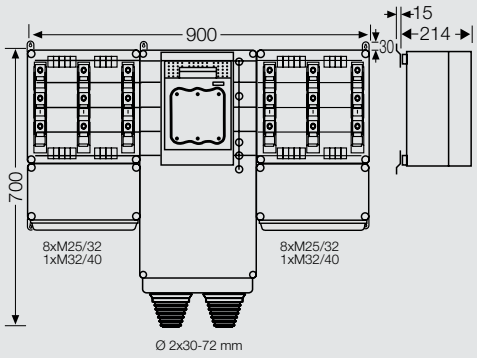
Leading inverter manufacturers recommend using switch disconnectors as disconnection devices.

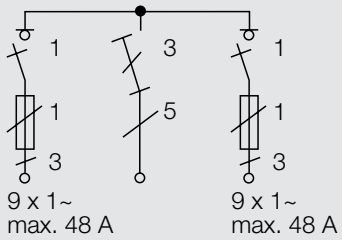
- for inverters up to **11 kW, 1~**
- rated operating current **AC 48 A** per inverter
- rated voltage: AC 230/400 V
- suitable for outdoor installation, UV resistant
- with stainless steel external brackets
- in accordance with IEC 60 439-1
- busbar rated current: 250 A
- busbar system: 5-pole
- material: thermoplastic
- colour: grey, RAL 7032
- protection class: II ⧈
- degree of protection: IP 54


Sample installation

Mi PV 5123 — Rated power 140 kW, connection of 1~ inverters

complete enclosure set, not assembled
order cable entries separately
Feeding:
6 x 63 A, 3-pole D 02, E 18,
1 or 3-pole switching
for 63 A fuse links
terminals for outgoing cables:
1.5-16 mm², copper
18 terminals per PE+N
lid fastener for manual operation
Outgoing:
switch disconnector, 3 pole with knife link
M 10 connection
maximum back-up fuse: 250 A
outgoing cable can be above or below
lid fasteners for tool operation

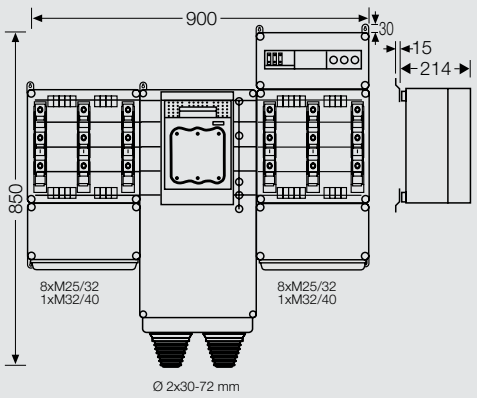


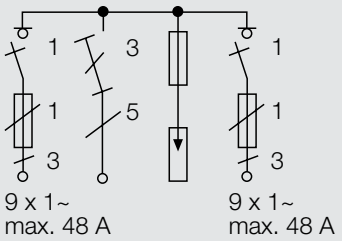



Sample installation

Mi PV 5223 — Rate power 140 kW, connection of 1~ inverters

complete enclosure set, not assembled
order cable entry separately
Feeding:
6 x 63 A, 3-pole D 02, E 18,
1 or 3-pole switching
for 63 A fuse links
terminals for outgoing cables:
1.5-16 mm², Cu
18 terminals per PE+N
lid fastener for manual operation
Outgoing:
switch disconnector, 3 pole with knife links
M 10 connection
maximum back-up fuse: 250 A
outgoing cable can be above or below
lid fasteners for tool operation
Overvoltage protection:
1 x AC type 2 surge arrester
with connection via neozed fuse element





Customised solutions? Contact us!

See check list in the appendix!

Solar inverter collectors with switch disconnectors for D 02 fuses 63 A

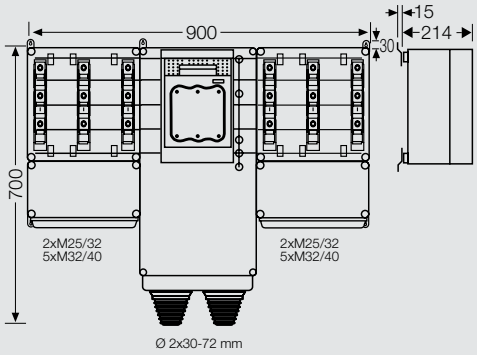
DC / AC

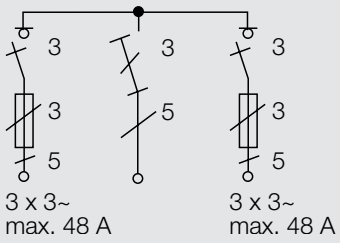
Leading inverter manufacturers recommend using switch disconnectors as disconnection devices.

- for inverters up to **33 kW, 3~**
- rated operating current **AC 48 A** per inverter
- rated voltage: AC 230/400 V
- suitable for outdoor installation, UV resistant
- with stainless steel external brackets
- in accordance with IEC 60 439-1
- busbar rated current: 250 A
- busbar system: 5-pole
- material: thermoplastic
- colour: grey, RAL 7032
- protection class: II ⧈
- degree of protection: IP 54

Mi PV 5323 — Rated power 140 kW, connection of 3~ inverters

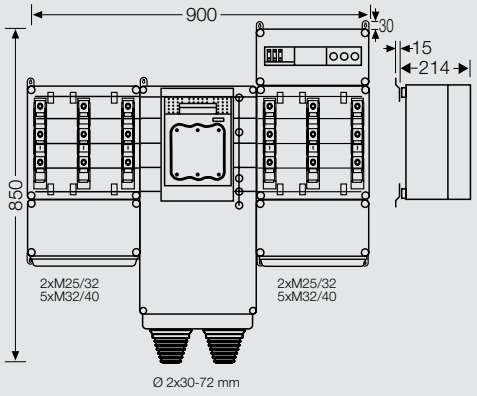
complete enclosure set, not assembled
order cable entry separately
Feeding:
6 x 63 A, 3-pole D 02, E 18,
1 or 3-pole switching
for 63 A fuse links
terminals for outgoing cables:
1.5-16 mm², Cu
6 terminals per PE+N
lid fastener for manual operation
Outgoing:
switch disconnector, 3 pole with knife links
M 10 connection
maximum back-up fuse: 250 A
outgoing cable can be above or below
lid fasteners for tool operation

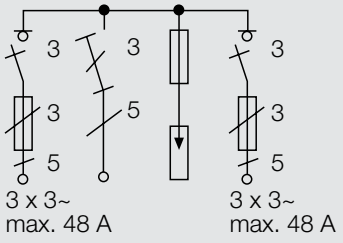




Mi PV 5423 — Rated power 140 kW, connection of 3~ inverters

complete enclosure set, not assembled
order cable entry separately
Feeding:
6 x 63 A, 3-pole D 02, E 18,
1 or 3-pole switching
for 63 A fuse links
terminals for outgoing cables:
1.5-16 mm², Cu
6 terminals per PE+N
lid fastener for manual operation
Outgoing:
switch disconnector, 3 pole with knife links
M 10 connection
maximum back-up fuse: 250 A
outgoing cable can be above or below
lid fasteners for tool operation
Overvoltage protection:
1 x AC type 2 surge arrester
with connection via neozed fuse element





Customised solutions? Contact us!

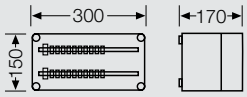
See check list in the appendix!

DC / AC

- suitable for outdoor installation, UV resistant
- material: thermoplastic
- colour: grey, RAL 7032
- protection class: II
- degree of protection: IP 65

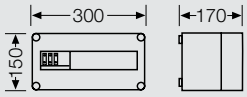
Mi PV 5511 **PV terminal box**

extension set, ready for connection
number of terminals per PE+N
12 x 1.5-16 mm², Cu
1 x 4-35 mm², Cu
with wall gasket,
with 100 A wiring between PE+N terminals and busbars
separately order flange for cable entry



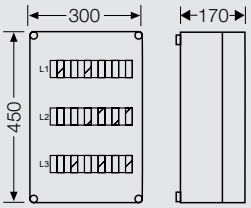
Mi PV 5611 **Surge protection device box (SPD)**

extension set, ready for connection
with wall gasket
with pre-assembled connection cables
with blanking strip for unused DIN rail openings
1 modular AC type 2 surge arrester
for 3-phase TN
rated voltage: AC 230/400 V
protection level ≤ 1.0 kV
defect display through red marking
Connection:
for 70 kW solar inverter collector
outgoing cable box directly on the busbar
order busbar terminals for direct connection separately
at 140 kW solar inverter collectors via neozed fuse element or HRC 00 fuse switch disconnector

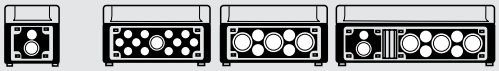


Mi PV 1318 **Circuit-breaker box 18 modules, 3 x 6 x 18 mm**

3-row
for installation of DIN rail equipment in accordance with DIN 43 880
maximum quantity and ratings of MCBs and flange selection according to table "Rating of PV solar inverter collectors"
without PE and N terminal
with blanking strips for unused DIN rail openings
lid fastener for manual operation



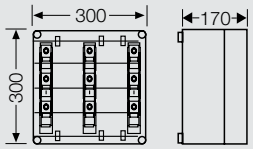
Box walls with metric cable entries:



Wall 1	Wall 2	Wall 3	Wall 4
1 x M 20 1 x M 32/40	2 x M 20 10 x M 25 1 x M 32/40	4 x M 25 3 x M 40/50	1 x M 20 4 x M 25 1 x M 32/40 3 x M 40/50

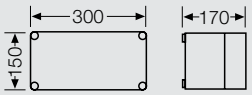
- suitable for outdoor installation, UV resistant
- material: thermoplastic
- colour: grey, RAL 7032
- protection class: II
- degree of protection: IP 65

Mi PV 3266 **Fuse box with switch disconnector for D 02 fuses, 63 A**



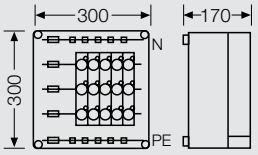
3 x 63 A, 3-pole, D 02, E 18,
1- or 3-pole switching
terminals for outgoing cables:
1.5 -16 mm², copper
3 terminals per PE+N
rated voltage: AC 400 V
busbar rated current: 250 A
busbar system: 5-pole
lid fastener for manual operation
order busbar connector Mi SV 25 separately for combination

Mi 0101 **Empty box, box size 1**



maximum installation depth
with built-in mounting plate 146 mm
with built-in DIN rail 135 mm

Mi 3235 **Fuse box with neozed fuse bases 63 A**

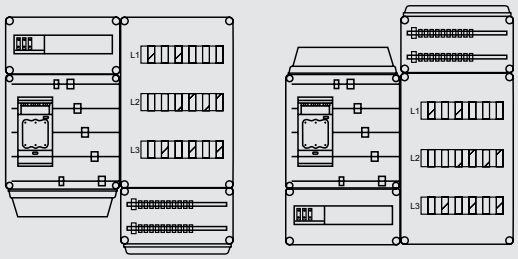


5 x 63 A, 3-pole
D0 2, E 18, gauge sleeve system
terminals for incoming cables:
4-35 mm², copper
terminals for outgoing cables:
1.5-16 mm², copper
5 terminals per PE+N
rated voltage: AC 400 V
busbars rated current: 250 A
busbar system: 5-pole
lid fastener for manual operation
order busbar connector Mi SV 25
separately for combination

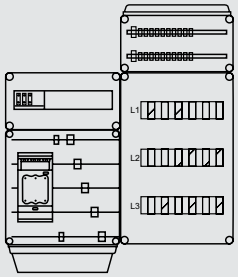
Box walls with metric cable entries:

Wall 1	Wall 2	Wall 3
1 x M 20 1 x M 32/40	2 x M 20 10 x M 25 1 x M 32/40	4 x M 25 3 x M 40/50

Installation variations of a complete set



Wiring from the same direction

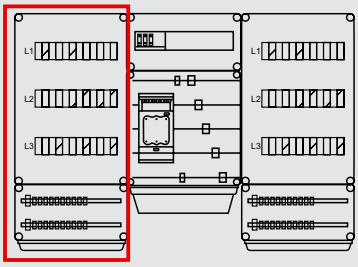


Wiring from different directions

Extension of a complete set

Mi PV 6211 (70 kW) complete set

Extension:
Mi PV 1318 circuit breaker box, Mi PV 5511 PV terminal box, Mi WD 2 wall gasket and Mi FM 32 flange



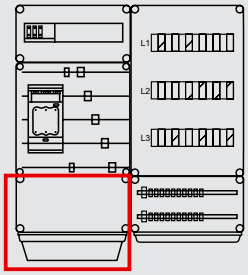
Extention part **Complete set**

Extension of terminal compartment for the 70 mm² connection

Mi PV 6211 (70 kW) complete set

Extension:

Mi 010X empty box, Mi WD 2 wall gasket and terminal for direct busbar connection KS 70 F



Assembly of a complete set

Photovoltaic

Every photovoltaic object has its own topology. The challenges can often be met with pre-fabricated solutions. Individually engineered solar inverter collectors are also not a problem, even as part of metering in adherence to regulations of power supply companies.

Product: Customised solution ENYSUN
Subject: Hannes management company, Herten, Germany
Area of application: Indoor installation
Details: Total power 450 kWp, 8 inverters
Unique features: 8 central inverters via RCD and screw-type fuse bases

Product: Customised solution ENYSUN
Subject: Solarpark Edertal II
Area of application: Outdoor installation
Details: Total power 1200 kWp, 151 inverters, delivery directly into mid-voltage grids
Unique features: Inverter collector with mains disconnect switch in polyester outdoor cabinet

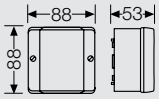
Product: Mi PV 5324 ENYSUN
Subject: Frankfurt Trade Fair, Frankfurt/Main, Germany
Area of application: Outdoor installation
Details: Total power 490 kWp, 45 inverters

Empty boxes
Box walls without knockouts

- suitable for outdoor installation, UV resistant
- rated voltage: DC 1000 V
- **protection class: II** ⧈
- **degree of protection: IP 66**
- material: thermoplastic
- colour: black, RAL 9011

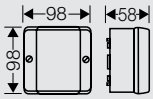
KF PV 0100

wall surface can be drilled individually for
cable entry max. M 20
mounting width: 59 mm
mounting height: 66 mm
max. installation depth: 37 mm



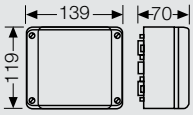
KF PV 0200

wall surface can be drilled individually for
cable entry max. M 20
mounting width: 69 mm
mounting height: 76 mm
max. installation depth: 42 mm



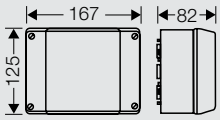
KF PV 0300

wall surface can be drilled individually for
cable entry max. M 32
mounting width: 114 mm
mounting height: 94 mm
max. installation depth: 52 mm



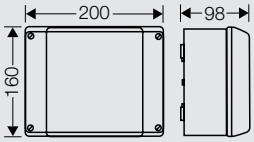
KF PV 0400

wall surface can be drilled individually for
cable entry max. M 32
mounting width: 141 mm
mounting height: 99 mm
max. installation depth: 64 mm



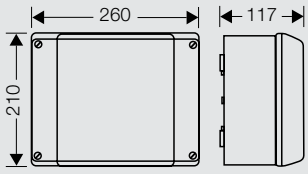
KF PV 0500

wall surface can be drilled individually for
cable entry max. M 40
mounting width: 173 mm
mounting height: 133 mm
max. installation depth: 97 mm



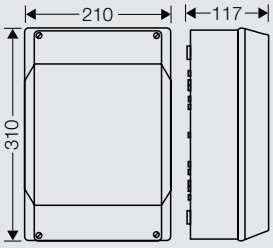
KF PV 0600

wall surface can be drilled individually for
cable entry max. M 50
mounting width: 230 mm
mounting height: 180 mm
max. installation depth: 95 mm



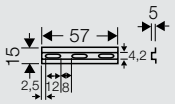
KF PV 0700

wall surface can be drilled individually for
cable entry max. M 50
mounting width: 280 mm
mounting height: 180 mm
max. installation depth: 88 mm



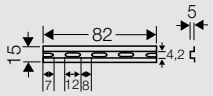
TSD 02 **DIN rail**

max. installation depth 32 mm
for cable junction boxes D x020, D x120, KF x020, KD x020
and empty box KF PV 0100, top hat profile 15 mm
with fixing screws



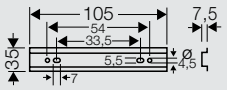
TSD 04 **DIN rail**

max. installation depth 40 mm
for cable junction boxes D x040, KF x040, KD x040
and empty box KF PV 0200, top hat profile 15 mm
with fixing screws



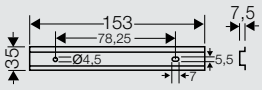
TSK 06 **DIN rail**

max. installation depth 44.5 mm
for cable junction boxes K x060, KF x060, KD x060
and empty box KF PV 0300, top hat profile 15 mm
with fixing screws



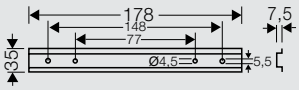
TSK 10 **DIN rail**

max. installation depth 56.5 mm
for cable junction boxes K x100, KF x100, KD x100
and empty box KF PV 0400, top hat profile 15 mm
with fixing screws



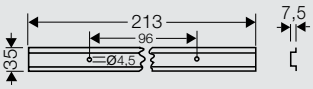
TSK 25 **DIN rail**

max. installation depth 71.5 mm
for cable junction boxes K x250, KF x250, K x350, KF x350,
KD x250, KD x350 and empty boxes KF PV 0500, KF PV 0600
top hat profile 15 mm
with fixing screws



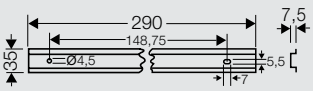
TSK 35 **DIN rail**

max. installation depth 80,5 mm
for cable junction boxes K x350, KF x350, KD x350
and empty box KF PV 0600, top hat profile 15 mm
with fixing screws



TSK 50 **DIN rail**

max. installation depth 80,5 mm
for cable junction boxes K x500, KF x500
and empty box KF PV 0700, top hat profile 15 mm
with fixing screws



DK AL 2 **External brackets**

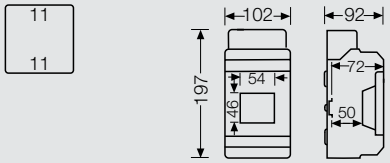
for external wall fixing of cable junction boxes type D, K, KF, KX, KD
and empty box KF PV,
external brackets: 2 items
material: V2A stainless steel

KV small-type distribution boards with metric knockouts

- for indoor (normal environment and/or protected outdoor) and outdoor installation (harsh environment and/or outdoor)
- for the installation of DIN rail equipment, top hat profile 35 mm
- **without PE and N terminals**
- with transparent lid, sealable
- locking device for hinged lid and sealing facility see accessories
- with cable entry cover
- protective cover can be cut out
- material: thermoplastic
- colour: grey, RAL 7035

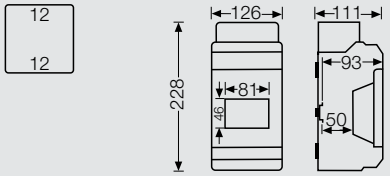
KV PC 6103 **IP 65**

3 modules, 1 x 3 x 18 mm
1-row
insulated box for photovoltaic plants
up to AC 690 V / DC 1000 V
protection class: II ⧈



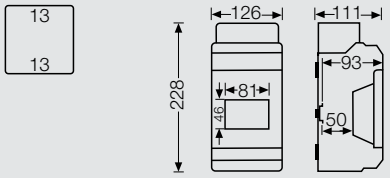
KV PC 6104 **IP 65**

4.5 modules, 1 x 4.5 x 18 mm
1-row
insulated box for photovoltaic plants
up to AC 690 V / DC 1000 V
protection class: II ⧈



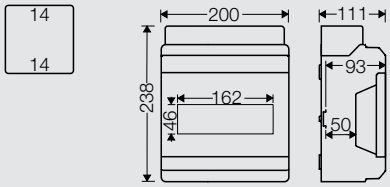
KV PC 6106 **IP 65**

6 modules, 1 x 6 x 18 mm
1-row
insulated box for photovoltaic plants
up to AC 690 V / DC 1000 V
protection class: II ⧈



KV PC 6109 **IP 65**

9 modules, 1 x 9 x 18 mm
1-row
insulated box for photovoltaic plants
up to AC 690 V / DC 1000 V
protection class: II ⧈



Box walls with metric knock outs for cable entry:

Wall 11: 3 x M 16

Wall 12: 2 x M 20, 1 x M 20/32

Wall 13: 2 x M 20, 1 x M 20/32

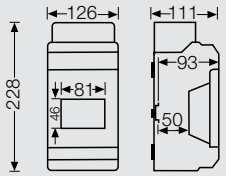
Wall 14: 4 x M 20, 1 x M 20/32

KV small-type distribution boards
Box walls without knockouts

- suitable for outdoor installation, UV resistant
- for the installation of DIN rail equipment, top hat profile 35 mm
- with cable entry cover
- with transparent door
- protective cover can be cut out
- material: thermoplastic
- colour: grey, RAL 7035

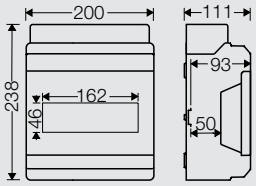
KV PC 8104 **IP 65**

4.5 modules, 1 x 4.5 x 18 mm
1-row
protection class: II ⧈
insulated box for photovoltaic plants
up to AC 690 V / DC 1000 V



KV PC 8109 **IP 65**

9 modules, 1 x 9 x 18 mm
1-row
insulated box for photovoltaic plants
up to AC 690 V / DC 1000 V
protection class: II ⧈



KV ES 3 **Locking device**

for small-type distribution boards 3 - 9 modules
for KV 9325, KV 9363
with profile cylinder lock
with 2 keys

KV EB 04 **Cable entry cover**

for small-type distribution boards with 4.5 modules
for replacement purposes (1 cable entry cover included with supply of the board)

KV EB 09 **Cable entry cover**

for small-type distribution boards with 9 modules
for KV 9325, KV 9363
for replacement purposes (1 cable entry cover included with supply of the board)

KV BP 04 **Mounting plate**

for wall and post installation
for outdoor box installation with KV XX04 and KV PC XX04
assembly kit containing 1 stainless steel plate, screws and fixing brackets
post diameter at least 40 mm

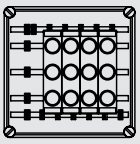
KV BP 09 **Mounting plate**

for wall and post installation
for outdoor box installation with KV XX09 and KV PC XX09
assembly kit containing 1 stainless steel plate, screws and fixing brackets
post diameter at least 40 mm

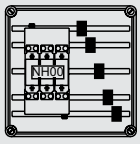
Terminals for direct busbar connection

For solid (sol), stranded (s), flexible (f) copper conductors with gas-tight crimped end sleeve and for laminated wiring strip

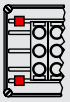
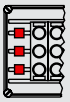
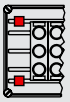
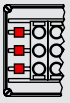
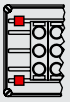
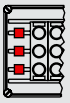
Hint:
For observance of insulation resistance clearances of 10 mm are necessary between different potentials and of 15 mm between conductive metal parts.



Mi fuse boxes diazed/neozed



Mi HRC fuse boxes, fuse bases and fuse switch disconnector

	Type	for busbars	width	conductor cross section	wiring strip	tightening torque	busbar rated current 250 A	busbar rated current 250 A
	**KS 16 F**	... x 5 mm	11 mm	1.5-16 mm² Cu		4 Nm	 N PE	 N PE
	**KS 16 Z**	... x 10 mm	11 mm	1.5-16 mm² Cu		4 Nm	 L1 L2 L3	 L1 L2 L3
	**KS 35 F**	... x 5 mm	16 mm	4-35 mm² Cu	100 A: Mi VS 100 160 A: Mi VS 160	6 Nm	 N PE	 N PE
	**KS 35 Z**	... x 10 mm	16 mm	4-35 mm² Cu	100 A: Mi VS 100 160 A: Mi VS 160	6 Nm	 L1 L2 L3	 L1 L2 L3
	**KS 70 F**	... x 5 mm	21 mm	10-70 mm² Cu	100 A: Mi VS 100 160 A: Mi VS 160	10 Nm	 N PE	 N PE
	**KS 70 Z**	... x 10 mm	21 mm	10-70 mm² Cu	100 A: Mi VS 100 160 A: Mi VS 160	10 Nm	 L1 L2 L3	 L1 L2 L3
	**KS 120 F**	... x 5 mm	25 mm	25-120 mm² Cu	250 A: Mi VS 250	20 Nm		 N PE
	**KS 120 Z**	... x 10 mm	25 mm	25-120 mm² Cu	250 A: Mi VS 250	20 Nm		 L1 L2 L3

DA 240 **Terminal for direct connection**

up to 400 A
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
tightening torque terminal: 22.0 Nm

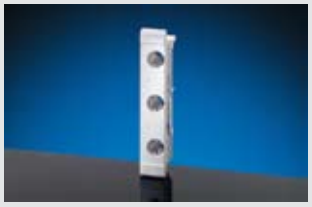
Prior to connection, aluminium conductors must be prepared according to the relevant technical recommendations.

Further accessories and terminals (e.g. for aluminum cables) see Hensel main catalogue!

Accessories
for solar inverter collectors

MS NH 00 **NH bus-mounted fuse switch disconnector**

3-pole
for retrofitting on busbars
busbar thickness 10 mm and centreline spacing of busbars 60 mm
rated current: 125 A
rated voltage: AC 690 V
terminal connection 5-70 mm² Cu



Mi RS 18 **D0 2-bus-mounted fuse base**

63 A, E 18, D0 2, Neozed, width: 36 mm
3-pole
rated voltage: AC 400 V
with cover
busbar thickness 10 mm and centreline spacing of busbars 60 mm
for replacement in Mi-HRC fuse boxes, neozed
rated connecting capacity: sol/s/f 1.5 - 25 mm², Cu

Mi BA **Blanking cover**

for sealing protection covers with cut-outs for bus-mounted fuse bases
in Mi-screw-type fuse boxes, diazed or neozed
width: 108 mm

Mi BA 6 **Blanking cover**

for sealing protection covers
in Mi-HRC fuse boxes
width: 108 mm

Mi WD 2 **Wall gasket**

for the assembly of Mi boxes
box walls 150 or 300 mm
consisting of 1 seal, 4 wedge links, 1 bracket

Mi SV 25 **Busbar connector**

5-pole
busbar rated current 250 A
with wall gasket
for the assembly of Mi boxes containing busbars
tightening torque for terminal 6.0 Nm
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.

Mi BE **Fixing spares**

for the assembly of Mi boxes
when converting existing installations
consisting of 4 wedge links and 5 wedges

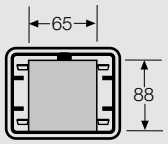
AS 12 **Blanking strip**

for the covering of spare equipment openings, for material thickness up to 3 mm
12 modules 18 mm each
divisible every 9 mm
colour grey, similar RAL 7035

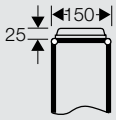
Accessories
for solar inverter collectors

Mi FP 15 **Flange**

with fixing wedges and seal
box wall 150 mm
without knockouts

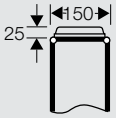


useable mounting area



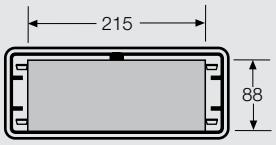
Mi FM 15 **Flange**

with fixing wedges and seal
box wall 150 mm
knockouts:
3 x M 20, 1 x M 32/40/50

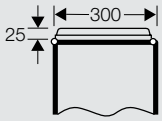


Mi FP 20 **Flange**

with fixing wedges and seal
box wall 300 mm
without knockouts

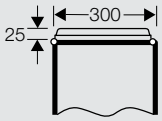


useable mounting area



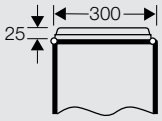
Mi FM 20 **Flange**

with fixing wedges and seal
box wall 300 mm
knockouts:
15 x M 16, 15 x M 20



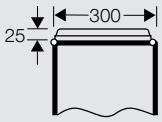
Mi FM 25 **Flange**

with fixing wedges and seal
box wall 300 mm
knockouts:
19 x M 16/25



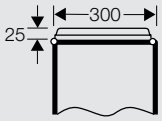
Mi FM 32 **Flange**

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



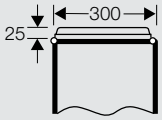
Mi FM 40 **Flange**

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



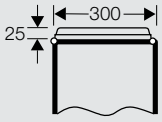
Mi FM 50 **Flange**

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



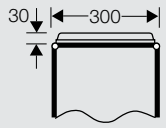
Mi FM 60 **Flange**

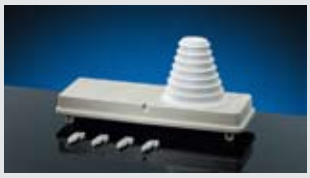
with fixing wedges and seal
box wall 300 mm
knockouts:
3 x M 40/50/63



Mi FP 38 **Flange**

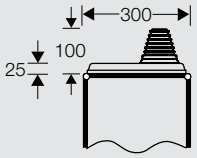
with fixing wedges and seal
cable entry via integrated elastic membranes
degree of protection: IP 65
box wall 300 mm
sealing range:
29 x Ø 7-12 mm
4 x Ø 7-14 mm
4 x Ø 11-20 mm
1 x Ø 16-29 mm





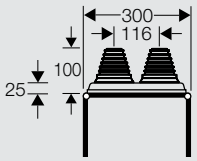
Mi FP 70 **Flange**

with fixing wedges and seal
using 1 cable entry
max. 72 mm external diameter
degree of protection: IP 65
box wall 300 mm
sealing range: Ø 30-72 mm



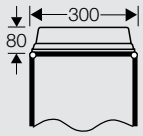
Mi FP 72 **Flange**

with fixing wedges and seal
for 2 cables
max. 72 mm external diameter
degree of protection: IP 65
box wall 300 mm
sealing range: 2 x Ø 30-72 mm each



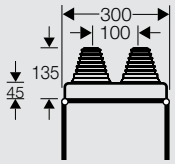
Mi FM 63 **Flange**

with fixing wedges and seal
with extended cable arrangement space
degree of protection: IP 65
box wall 300 mm
knockouts:
3 x M 40/50/63



MI FP 82 **Cable insert**

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



Mi ZE 62 **Cable strain relief**

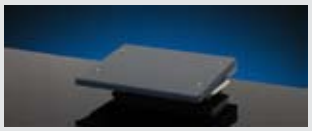
for 2 cables with max. 60 mm external diameter
with fixing rail 284 mm long
to be used only in connection with cable insertion Mi FP 82
cannot be installed in Mi 6856

Mi BF 20 **Ventilation flange**

for ventilation of Mi-Distribution boards
in the event of extremely high internal temperatures or a risk of water condensation
for vertical installation on the lateral box walls
degree of protection: IP 23

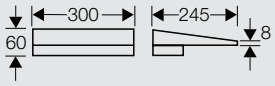
Mi DB 15	**Canopy**	**new**

for box wall150 mm
width 150 mm
depth 245 mm
with fastening material



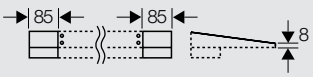
Mi DB 30	**Canopy**	**new**

for box wall150 mm
width 300 mm
depth 245 mm
with fastening material



Mi DB 01	**End plate for canopy**	**new**

for conopy width 150 mm and 300 mm



Example:
PV outdoor application with Mi distribution board protected by canopy.

- for indoor (normal environment and/or protected outdoor) and outdoor installation (harsh environment and/or outdoor)
- with strain relief and locknut
- material: thermoplastic
- **degree of protection: IP 65**
- **colour: grey, RAL 7035**

	Cable glands			
AKM 12	ISO thread M 12 x 1.5	Sealing range Ø 3-6.5 mm	Bore-hole Ø 12.5 mm	Wall thickness bis 3 mm
AKM 16	ISO thread M 16 x 1.5	Sealing range Ø 5-10 mm	Bore-hole Ø 16.5 mm	Wall thickness bis 3 mm
AKM 20	ISO thread M 20 x 1.5	Sealing range Ø 6.5-13.5 mm	Bore-hole Ø 20.5 mm	Wall thickness bis 3 mm
AKM 25	ISO thread M 25 x 1.5	Sealing range Ø 10-17 mm	Bore-hole Ø 25.5 mm	Wall thickness bis 3 mm
AKM 32	ISO thread M 32 x 1.5	Sealing range Ø 14-21 mm	Bore-hole Ø 32.5 mm	Wall thickness bis 3 mm
AKM 40	ISO thread M 40 x 1.5	Sealing range Ø 20-28 mm	Bore-hole Ø 40.5 mm	Wall thickness bis 3 mm
AKM 50	ISO thread M 50 x 1.5	Sealing range Ø 25-35 mm	Bore-hole Ø 50.5 mm	Wall thickness bis 3 mm
AKM 63	ISO thread M 63 x 1.5	Sealing range Ø 35-48 mm	Bore-hole Ø 63.5 mm	Wall thickness bis 3 mm

- indoor (normal environment and/or protected outdoor) and outdoor installation (harsh environment and/or outdoor)
- with strain relief and locknut
- material: thermoplastic
- **degree of protection: IP 66 / IP 67**
- **colour: black, RAL 9005**

	Cable glands			
ASS 12	ISO thread M 12 x 1.5	Sealing range Ø 2-5 mm	Bore-hole Ø 12.5 mm	Wall thickness bis 3 mm
ASS 16	ISO thread M 16 x 1.5	Sealing range Ø 3-10 mm	Bore-hole Ø 16.5 mm	Wall thickness bis 3 mm
ASS 20	ISO thread M 20 x 1.5	Sealing range Ø 5-13.5 mm	Bore-hole Ø 20.5 mm	Wall thickness bis 3 mm
ASS 25	ISO thread M 25 x 1.5	Sealing range Ø 8-17 mm	Bore-hole Ø 25.5 mm	Wall thickness bis 3 mm
ASS 32	ISO thread M 32 x 1.5	Sealing range Ø 12-21 mm	Bore-hole Ø 32.5 mm	Wall thickness bis 3 mm
ASS 40	ISO thread M 40 x 1.5	Sealing range Ø 16-28.5 mm	Bore-hole Ø 40.5 mm	Wall thickness bis 3 mm
ASS 50	ISO thread M 50 x 1.5	Sealing range Ø 21-35 mm	Bore-hole Ø 50.5 mm	Wall thickness bis 3 mm
ASS 63	ISO thread M 63 x 1.5	Sealing range Ø 27-48 mm	Bore-hole Ø 63.5 mm	Wall thickness bis 3 mm

- for indoor (normal environment and/or protected outdoor) and outdoor installation (harsh environment and/or outdoor)
- with strain relief and locknut
- material: thermoplastic
- **degree of protection: IP 66 / IP 67**
- **colour KBM: grey, RAL 7032**
- **colour KBS: schwarz, RAL 9005**

	Combi climate gland			
KBM 20 **KBS 20**	ISO thread M 20 x 1.5	sealing range Ø 6-13 mm	bore-hole Ø 20.5 mm	wall thickness up to 3.5 mm

In order not to exceed leakage limit of 0.07 bar with pressure compensation,
one combi climate gland M20 must be used per 6 litres (6000 cm³)
of enclosure volume.
Example: enclosure size 27 cm x 27 cm x 17 cm = 12393 cm³ = 12.393 litres.
Number of necessary KB. 20 (M20) ≥ 3 pieces.

KBM 25 **KBS 25**	ISO thread M 25 x 1.5	sealing range Ø 9-17 mm	bore-hole Ø 25.5 mm	wall thickness up to 3.5 mm

In order not to exceed leakage limit of 0.07 bar with pressure compensation,
one combi climate gland M25 must be used per 11 litres (11000 cm³)
of enclosure volume.
Example: enclosure size 27 cm x 27 cm x 17 cm = 12393 cm³ = 12.393 litres.
Number of necessary KB. 25 (M25) ≥ 2 pieces

KBM 32 **KBS 32**	ISO thread M 32 x 1.5	sealing range Ø 13-21 mm	bore-hole Ø 32.5 mm	wall thickness up to 3.5 mm

In order not to exceed leakage limit of 0.07 bar with pressure compensation,
one combi climate gland M32 must be used per 13 litres (13000 cm³)
of enclosure volume.
Example: enclosure size 27 cm x 27 cm x 17 cm = 12393 cm³ = 12.393 litres.
Number of necessary KB. 32 (M32) ≥ 1 piece.

VSB 13	**Sealing plug**

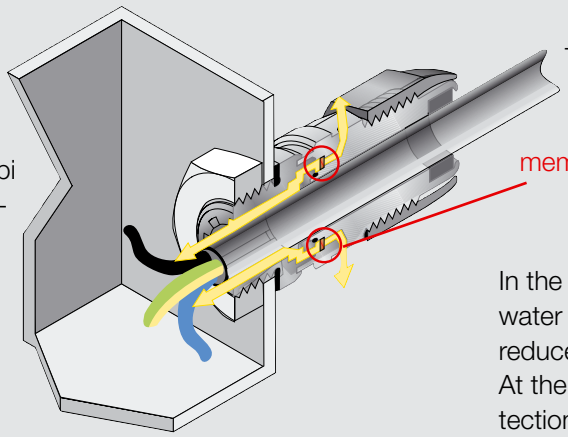
diameter: 13 mm
for sealing combi climate glands M20 or M25, which are not used for cable entry
material: thermoplastic
colour: red, RAL 3000

VSB 21	**Sealing plug**

diameter: 21 mm
for sealing combi climate glands M25 or M32, which are not used for cable entry
material: thermoplastic
colour: red, RAL 3000

For adherence to the requested degree of protection the ventilation of the enclosure is effected via a special combi climate gland.

Via an inserted, breathable membrane combi climate glands ensure pressure compensation between enclosure interior and ambient air.



The ingress of humidity from outside is prevented by this membrane.

In the consequence accumulated water dries by air exchange away or reduces itself in the course of time. At the same time the degree of protection of the enclosure is obtained (up to IP 67)!

When using different gland sizes the values for the enclosure volumes of the used combi climate glands can be added on. If the quantity of the necessary climate glands for pressure compensation is larger, than the number of necessary cable glands für cable entry, the unused climate glands can be sealed with sealing plugs.

Mi PL 2	Sealing caps
	2 sealing caps for converting the lid fasteners

Mi SR 4	Conversion set
	4 fastening covers for converting lid fasteners for manual operation to tool operation

Mi SN 4	Conversion set
	4 manual actuators for converting lid fasteners from tool operation to manual operation

Mi DV 01	Locking device insertion
	only in connection with Mi PL 2, Mi SR 4 or Mi SN 4

Mi ZS 11	Lid lock
	locking device I Is being used instead of fasteners for hand or tool operation in order to prevent unauthorised opening of the lids consisting of: cylinder lock, key, locking device insertion, dust cover

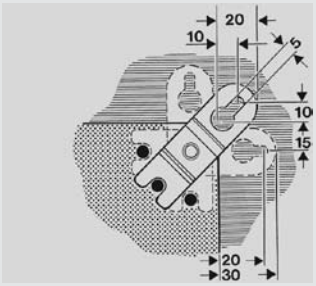
Mi ZS 12	Lid lock
	locking device II Is being used instead of fasteners for hand or tool operation in order to prevent unauthorised opening of the lids consisting of: cylinder lock, key, locking device insertion, dust cover

Mi DR 04	Lid fastener for tool operation
	triangle 8 mm is used instead of fasteners for hand- or tool operation, in order to make unauthorized opening of lids mor difficult 4 locking devices with triangle 8 mm and key

Mi SA 2	Dust protection cover
	for 2 lid fittings for box sizes 1 to 4

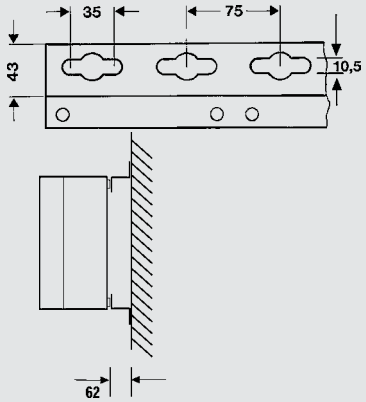
Mi AL 40 **Stainless steel external brackets**

for external box fixing with Mi enclosures
set consisting of 4 fixing brackets, 4 screws



Mi MS 2 **Mounting profile**

for wall-mounted assembly of Mi-distribution boards
up to 900x1200 mm
with 8 screws M6 x 16 for box fixing
sendzimir galvanised steel profile with structured powder coating
colour: grey, RAL 7032
length 1950 mm




HENSEL
Technische Angaben
DIN
TÜV

Operating and ambient conditions	KF PV.., KV PC.., KV PV ..., Mi PV..	Cable glands	
		AKM	ASS
Application area	**KF PV-, KV PC-, KV PV ..., Mi PV enclosures and cable glands are suitable for the outdoor installation - harsh environment and / or outdoor.** However the climatic influences and effects on the equipment are to be considered. [1]		
Ambient temperature - Average value over 24 hours - Maximum value - Minimum value	 + 35° C + 40° C - 5° C	 + 55° C + 70° C - 25° C	 + 55° C + 70° C - 25° C
Relative humidity - short-time	50% at 40° C 100% at 25° C		
Fire protection in the event of internal faults	**Demands** placed on electrical devices from standards and laws **Minimum requirements** - Glow wire test in accordance with IEC 60 695-2-11: - 650° C for boxes and cable glands - 850° C for conducting components		
Fire protection in the event of specific risks or hazards	**Demands** placed on electrical installations and devices in areas and facilities subject to fire risk, e.g. DIN VDE 0100 Part 482, official regulations, VdS directives **Minimum requirements** - Glow wire test in accordance with IEC 60 695-2-11: - 850° C for boxes and cable glands - 850° C for cavity wall installation - Use of fire resistant cables		
Burning behaviour - Glow wire test IEC 60 695-2-11 - UL Subject 94	 960° C V-2 flame-retardant self-extinguishing	 750° C V-2 flame-retardant self-extinguishing	 960° C V-2 flame-retardant self-extinguishing
Degree of protection against mechanical load	IK 08 (5 Joule)		
Toxic behaviour	halogen-free [2] silicone-free		

1) Supplementing references regarding outdoor installation - harsh environment and / or outdoor:
- **The materials used for the Mi System are basically UV resistant, so that the mechanical resistance of the boxes is maintained during UV effect. Depending on the intensity of the UV effect e.g. transparent lids can become intransparent.**
- **The top side of the boxes should be protected by a cover against weather influences such as rains, ice and snow.**
- **Further on, also chemical influences have to be considered with the selection of the installation place - apart from the IP rating and climatic effects.**
- **In order to keep the maximum permissible ambient temperature of the installed equipment as well as for the prevention from condensation additional measures as ventilation and/or heating may be necessary.**

2) "Halogen-free" in accordance with IEC 754-2 "Common test methods for cables - Determination of the amount of halogen acid gas".

Outside diameter of conventional cable cross sections. The outside diameters are average values of different products.

Cable cross section	NYM	NYY	NYCY NYCWY
mm²	mm Ø	mm Ø	mm Ø
1x4	8	9	–
1x6	8.5	10	–
1x10	9.5	10.5	–
1x16	11	12	–
1x25	–	14	–
1x35	–	15	–
1x50	–	16.5	–
1x70	–	18	–
1x95	–	20	–
1x120	–	21	–
1x150	–	23	–
1x185	–	25	–
1x240	–	28	–
1x300	–	30	–
2x1.5	10	12	–
2x2.5	11	13	–
2x4	–	15	–
2x6	–	16	–
2x10	–	18	–
2x16	–	20	–
2x25	–	–	–
2x35	–	–	–
3x1.5	10.5	12.5	13
3x2.5	11	13	14
3x4	13	16	16
3x6	15	17	17
3x10	18	19	18
3x16	20	21	21
3x25	–	26	–
3x35	–	–	–
3x50	–	–	–
3x70	–	–	–
3x95	–	–	–
3x120	–	–	–
3x150	–	–	–
3x185	–	–	–
3x240	–	–	–
3x25/16	–	27	27
3x35/16	–	28	27
3x50/25	–	32	32
3x70/35	–	32-36	36
3x95/50	–	37-41	40
3x120/70	–	42	43
3x150/70	–	46	47
3x185/95	–	52	48-54
3x240/120	–	57-63	60
3x300/150	–	63-69	–

Cable cross section	NYM	NYY	NYCY NYCWY
mm²	mm Ø	mm Ø	mm Ø
4x1.5	11	13.5	14
4x2.5	12.5	14.5	15
4x4	14.5	17.5	17
4x6	16.5	18	18
4x10	18.5	20	20
4x16	23.5	23	23
4x25	28.5	28	28
4x35	32	26-30	29
4x50	–	30-35	34
4x70	–	34-40	37
4x95	–	38-45	42
4x120	–	42-50	47
4x150	–	46-53	52
4x185	–	53-60	60
4x240	–	59-71	70
4x25/16	–	–	30
4x35/16	–	–	30
4x50/25	–	–	36.5
4x70/35	–	–	40
4x95/50	–	–	44.5
4x120/70	–	–	48.5
4x150/70	–	–	53
4x185/95	–	–	–
4x240/120	–	–	–
5x1.5	12	15	15
5x2.5	13.5	16	17
5x4	15.5	16.5	18
5x6	18	19	20
5x10	20	21	–
5x16	26	24	–
5x25	31.5	–	–
7x1.5	13	16	–
7x2.5	14.5	16.5	–
19x1.5	–	22	–
24x1.5	–	25	–

Assignment of cable outside diameters to cable entries (glands, grommets etc.)

Outside diameters of cables		Cable entry
min. mm Ø	max. mm Ø	metric
3	6	ASM/AKM/ASS 12
5	10	ASM/AKM/ASS 16
6.5	13.5	ASM/AKM/ASS 20
11	17	ASM/AKM/ASS 25
15	21	ASM/AKM/ASS 32
19	28	ASM/AKM/ASS 40
27	35	ASM/AKM/ASS 50
35	48	ASM/AKM/ASS 63
4.8	11	ESM 16
6	13	ESM 20
9	17	ESM 25
9	23	ESM 32
17	30	ESM 40
3.5	12	STM 16
5	16	STM 20
5	21	STM 25
13	26.5	STM 32
13	34	STM 40

Outside diameters of cables		Cable entry
min. mm Ø	max. mm Ø	metric
5	10	EDK 16
6	13	EDK 20
9	17	EDK 25
8	23	EDK 32
11	30	EDK 40
conduit connection		
M 16		EDR 16
M 20		EDR 20
M 25		EDR 25
M 32		EDR 32
M 40		EDR 40

Generator junction boxes and solar inverter collector comply with the requirements for type-tested switchgear and controlgear assemblies (TTA) in accordance with IEC 60 439-1/ EN 60 439-1.

Type-tested switchgear assemblies are switchgear and controlgear assemblies which are 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 switchgear must consist of the type-tested 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 Technics.
3. Once the switchgear 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 switchgear must be provided with a manufacturer’s identification mark. Compliance with important data such as
   - limit of temperature rise
   - dielectric strength
   - short-circuit withstand capacity
   - short-circuit withstand capacity of the PE conductor
   - IP degrees of protection
   - creepage distances and clearances

   is verified by type tests for this system.

Standards and requirements

- IEC 60 439-1
  Low voltage swichgear and control gear assemblies

- IEC 60 999
  Safety requirements for screw-type and screwless-type clamping units for electrical copper conductors

- DIN EN 50 262
  Metric threaded cable glands for electrical installations

- IEC 60 269
  Low voltage fuses

- DIN 43 880
  Built-in equipment for electrical installations; overall dimensions and related mounting dimensions

- IEC 60 529
  Degrees of protection provided by enclosures (IP-Code)

- IEC 60 364-7-712
  Electrical installations of buildings
  Requirements for special installations or locations – Solar photovoltaic (PV) power supply systems

Check list for PV generator junction boxesw

❑ **Request/offer** ❑ **Order** **Date:** _____

Gustav Hensel GmbH & Co. KG · Industrial Electrical Power Distribution Systems
Altenhundem · Gustav-Hensel-Straße 6 · D-57368 Lennestadt · Germany · www.hensel-electric.de
Phone: 0 27 23/6 09-4 23 · Fax: 0 27 23/6 09-3 71 · E-Mail: enysun@hensel-electric.de · www.enysun.eu

Contractor:

Name: _____

Address: _____

_____

Tel. (for any questions): _____

Project:

_____

_____

_____

- protection class II ⧈
- suitable for outdoor installation, UV resistant
- ready for connection
- with external stainless steel bracket for box mounting

- rated voltage: DC 1000 V
- lid fasteners for tool operation
- material: thermoplastic
- colour: grey, RAL 7032
- degree of protection IP 65

Number of boxes:	_____ **pieces**				
Number of strings per box:	❑ **1**	❑ **2**	❑ **3**	❑ **4**	❑ _____
Current per string:	❑ **15 A**	❑ **30 A**	❑ _____ A		
Connection of strings coming from PV modules:	❑ **Multi Contact MC4-compatible**		❑ _____		
	❑ **Screw connection and terminals**				
Cable cross-section:	❑ _____ **mm²**				
Solar inverter feeding (MPP tracker)	❑ **1**	❑ **2**	❑ **3**	❑ _____	
Connection of conductors going to inverter:	❑ **Multi Contact MC4-compatible**		❑ _____		
	❑ **Screw connection and screw terminals**				
Cable cross-section:	❑ _____ **mm²**				
Overvoltage protection:	❑ **no**	❑ **type 1**	❑ **type 2**	❑ **Floating remote indication**	
DC generator disconnect switch:	❑ **yes**	❑ **no**			
String overload protection:	❑ **yes**	❑ **no**			
Blocking diodes:	❑ **yes**	❑ **no**			
Earthing					
Cable type and diameter:	❑ **NYY 1 x 16 mm²**		❑ _____		
Cable entry:	❑ **Cable glands**				
	❑ **Combi climate glands**		❑ **also for additional ventilation**		
	❑ _____				

Notes:

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Check list for solar inverter collectors

DC / AC

❑ **Request/offer** ❑ **Order** **Date:** _____

Gustav Hensel GmbH & Co. KG · Industrial Electrical Power Distribution Systems
Altenhundem · Gustav-Hensel-Straße 6 · D-57368 Lennestadt · Germany · www.hensel-electric.de
Phone: 0 27 23/6 09-4 23 · Fax: 0 27 23/6 09-3 71 · E-Mail: enysun@hensel-electric.de · www.enysun.eu

Contractor:

Name: _____

Address: _____

_____

Tel. (for any questions):: _____

Project:

_____

_____

_____

- protection class II ⧈
- suitable for outdoor installation, UV resistant
- with external stainless steel bracket for box mounting
- material: thermoplastic
- colour: grey, RAL 7032

Rated voltage:		❑ **AC 230/400 V**		❑ _____	
Inverter Manufacturer/type:					
Quantity:	**(pieces)**				
Output:	**(kW)**				
Current:	**(A)**				
Solar inverter connection:	**1~/3~**	❑ / ❑	❑ / ❑	❑ / ❑	❑ / ❑
Cable going to inverter:	**Type of cable:**				
	Number of conductors:				
	Cross-section:				
	Conductor material:				
RCD (residual current protective):		❑ **yes**	❑ **no**	❑ **type A**	❑ **type B**
Wire protection to solar inverter:		❑ **MCB**	❑ **fuse element**	❑ **fuse switch disconnector**	
Cable going to distribution board:	**Type of cable:**				
	Number of conductors:				
	Cross-section:				
	Conductor material:				

Overvoltage protection:	❑ **no**	❑ **type 1**	❑ **type 2**	❑ **floating remote indication**
Cable entry:	❑ **with strain relief**		❑ **without strain relief**	_____
Installation site:	❑ **unprotected outdoors**		❑ **protected outdoors**	
	❑ **indoors**		❑	
Degree of protection:	❑ **IP 65**	❑ **IP 54**	❑ **IP 23** _____	

Notes:

Checklist on the Internet at www.enysun.eu as editable PDF file.