PV AC combiner box

Operating instructions

Weidmüller

Contents

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1 About this documentation

1.1 Target group and contents

This user manual is intended to personnel that is involved in mechanically installing and connecting a Weidmüller PV AC combiner box and moreover to service and maintenance personnel.
This user manual gives the general overview about the complete range of PV AC combiner boxes, the individual components, their function as well as their correct handling. An individual datasheet providing the specific information is attached to each combiner box. These information specifies the original features of each combiner box.

1.2 Symbols and notes

The warnings in this documentation are structured differently depending on the severity of danger.

DANGER

Imminent risk of life!

Notices with the signal word "DANGER" warn you of situations which will result in serious injury or death if you do not follow the instructions given in this manual.

WARNING

Possible risk of fatality!

Notices with the signal word "WARNING" warn you of situations which may result in serious injury or death if you do not follow the instructions given in this manual.

CAUTION

Risk of injury!

Notices with the signal word "CAUTION" warn you of situations which may result in injury if you do not follow the instructions given in this manual.

ATTENTION

Material damage!

Notes with the signal word "ATTENTION" warn you about hazards which may result in material damage.

The situation-dependant safety notices may contain the following warning symbols:

Symbol	Meaning
	Warning against hazardous electrical voltage
	Warning against explosive atmospheres
	Warning against electrostatically charged components
	Instruction: observe the documentation

Additional formatting is used in the rest of the text which has the following meaning:

Text items next to this arrow constitute information which is not related to safety, but which provides important information regarding correct and effective work.

► You can recognise handling instructions from the black triangle in front of the text.
– Lists are indicated with dashes.

Keep the manual as well as the attached data sheet stored so that it can be inspected by operating personnel at any time.
The document is available to download from the Weidmüller website.

2 Safety

This section includes general safety instructions for handling the PV AC combiner box. Specific warning notices for specific tasks and situations are given at the appropriate places in the documentation. Failure to observe the safety and warning notices can result in damage to persons and material.

2.1 General safety notice

Proper transport, storage, installation, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems.

The permissible ambient conditions must be observed.

Ensure protection against unauthorised opening. Unauthorised persons must neither open nor operate the combiner box.

Photovoltaic systems can generate hazardous voltages. Two different ways of service activities are allowed on these products:

– "Working under voltage": Only electricians who have a qualification for working under voltage are allowed to carry out service activities under voltage. Observe the local regulations and make use of appropriate personal protective equipment.
– "Working without voltage": Electricians and trained persons are allowed to carry out work without voltage, when input and output connections are safely disconnected and secured against re-connection. Observe the local regulations and make use of appropriate personal protective equipment.

Before connecting the cables to the input connectors, make sure that the fuses are not inserted and that the open circuit voltage of the corresponding string is equal to the other strings.

Do not extract or insert fuses under load. Before manipulating a fuse make sure there is no reverse current flowing into the corresponding string.

If the installation regulations are violated, all warranty and liability claims are void.

If a malfunction on a PV AC combiner box cannot be fixed after following the recommended measures, the product in question must be sent back to Weidmüller. Weidmüller does not assume any liability if the product has been tampered with.

2.2 Intended use

The PV AC combiner box series are intended for use in photovoltaic (PV) systems designed with string inverters. The product combines various (2 to 6) string inverter outputs into typically one output. The product contains overcurrent and overvoltage (optionally) protections at inverter level. Energy metering devices are provided optionally in order to monitor the electrical generation of the combiner box output.
Weidmüller products may only be used for the applications described in the catalogue and in the relevant technical documentation.
The observance of the documentation is part of the intended use.

2.3 Personnel

Work on combiner boxes in the photovoltaic field may only be performed by qualified electricians with the support of trained persons. As a result of their professional training and experience, an electrician is qualified to perform the necessary work and identify any potential risks.

It is a common practise in the sector to apply the five safety rules described in the standard EN 50110. Anyway, qualified electricians must analyse case by case on each installation the best way to proceed with safety.

The five safety rules are the following:

1. Disconnect completely
2. Secure against re-connection
3. Verify that the installation is dead
4. Carry our earthing and short-circuiting
5. Provide protection against adjacent live parts

2.4 Legal notice

PV AC combiner boxes are CE-compliant in accordance with Directive 2014/35/EU (Low Voltage Directive) and with Directive 2014/30/EU (EMC Directive).

3 Device description

Figure 3.1 Product range

3.1 Product overview

PV AC combiner boxes are a complete range of tailor-made solutions for utility-scale photovoltaic systems designed with string inverters. The combiner boxes are installed to connect, gather, collect and protect the AC cable outputs of various string inverters.
The product range offers solutions from 2 to 6 inputs and 1 output, depending on various plant designs. Input of this product ranges from 400 V to a maximum input voltage of 800 V per string inverter.
The necessary AC inverter outputs are to be connected at the PV AC combiner box inputs whereas one AC main cable will be at the output side of the combiner box as a result of inverters recombination.

Parameters influencing the selection of the optimal PV AC combiner box

- Ambient temperature
- Degree of protection needed
- Rated AC voltage of the string inverter
- Rated current of the string inverter
- AC earthing system
- Number of inputs
- Number of outputs
- Over-current protection (fuse links and fuse holders)
- Need of surge protection (Type I + II SPD)
- Energy meter (optional)

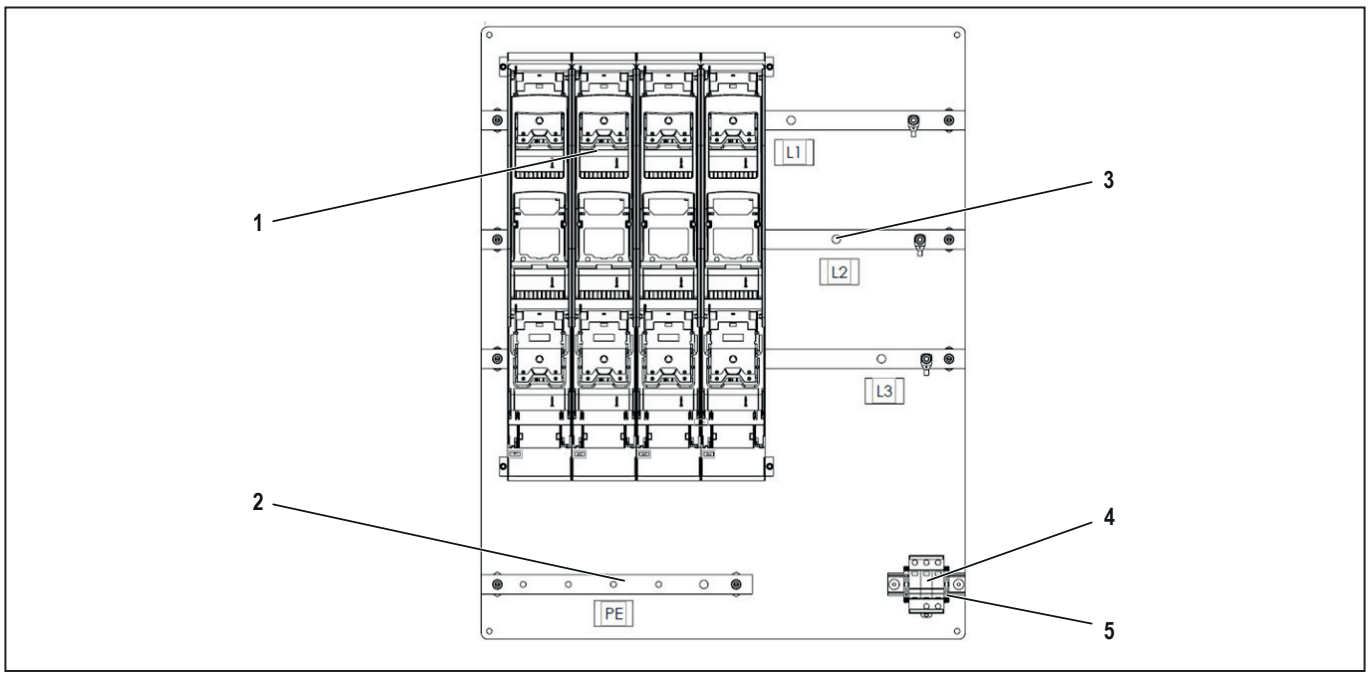


Figure 3.2 Main components of the PV AC combiner box (example)

1 Circuit breaker or fuses
2 Ground terminal
3 Output terminals
4 Surge protection device
5 End bracket

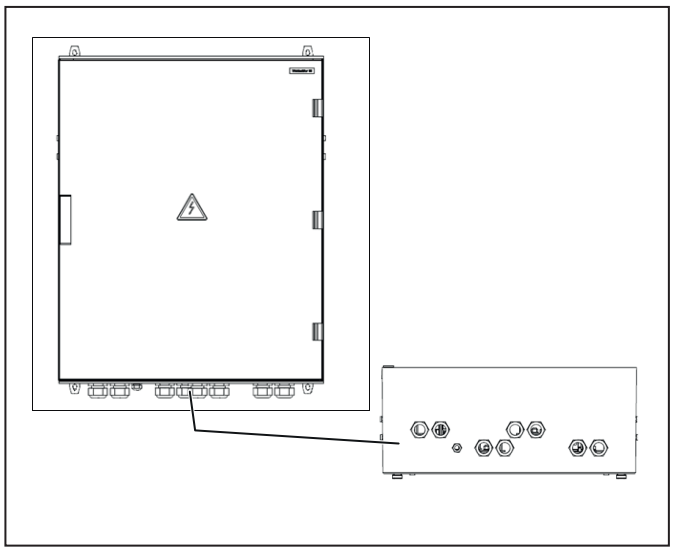


Figure 3.3 Inputs and outputs of the PV AC combiner box (example)

3.2 Enclosure

The enclosures of all PV AC combiner boxes are made of Glass Fibre Reinforced Polyester (GFRP). They provide IP65 and IK07 or higher in accordance with IEC 62208. Each enclosure is equipped with hinged door(s). Different enclosure sizes and shape (landscape or portrait) may be used depending on each project configuration and power dissipation needs.

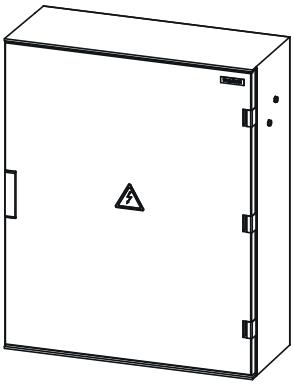


Figure 3.4 Enclosure

3.3 Switch disconnector

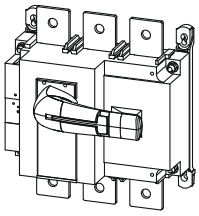


Figure 3.5 DC switch

PV AC combiner boxes have an AC switch disconnector as an optional component. The AC voltage of the switch depends on the voltage of the associated PV string inverters. The switch disconnector (according to the IEC 60947-3) has been selected to assure that it can switch the circuit at full load at the maximum operating temperature.

3.4 Surge protection device (SPD)

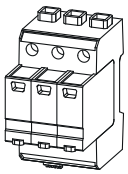


Figure 3.6 Surge protection device

The surge protection device as an optional component has been selected corresponding to the customers requirements and in accordance with the standard for low-voltage surge protective devices IEC 61643-32.

3.5 Fuse links

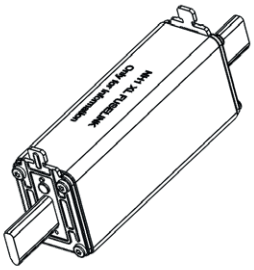


Figure 3.7 Fuse link

The fuses protect the different phases of each inverter from over-current situations. PV AC combiner boxes are provided with fuse links in accordance with IEC 60269-6:2010. Each design of PV AC combiner box contains the most suitable fuse rating specially selected for most common string inverters in the market, depending on voltage, ambient temperatures and operation conditions.

ATTENTION

Material damage!

Only use fuses with the selected rating as stated by Weidmüller technical department.
If you have to replace a fuse inside a PV AC combiner box, use the same type of fuses delivered with the original combiner box. Pay special attention to fuses voltage and current rate as well as its size and material.

3.6 Fuse holders

Fuse holders are the interface between the string inverters output cables and the fuse links. Fuse links provide over-current protection to the circuit in each and every phase. The fuse holders ensure that the fuses are placed in the optimum position to perform their protection function. Additionally, the type of fuse holders used in the PV AC combiner Boxes from Weidmueller (NH-0X fuse form in vertical opening under voltage and current) enable authorised personnel to operate the fuses in a safe manner and open the circuit under load.

3.7 Conductors

To realise the connections inside the combiner box regard the following conductor specifications:

Inputs	Cross section	Connection
NH 00	10 mm^2 ... 120 mm^2	M8
NH 1	25 mm^2 ... 300 mm^2	M10
NH 3	25 mm^2 ... 300 mm^2	M12
Outputs	**Cross section**	**Connection**
NH 00	240 mm^2 ... 300 mm^2	Bolt and nut M12
NH 1	240 mm^2 ... 300 mm^2	Bolt and nut M12
NH 3	240 mm^2 ... 300 mm^2	Bolt and nut M12
SPD	**Cross section**	
Screw conection	2.5 mm^2 ... 35 mm^2	

Conductor cross section	Tolerance of stripping length
< 4 mm^2	± 1 mm
6 – 10 mm^2	± 1.5 mm
> 16 mm^2	± 2 mm

In order to assure a reliable connection we recommend to use appropriate crimping tools, as an example PZ 10 HEX (Order No.1445070000). Please check the product catalogue to select the appropriate tool for each cable and wire-end ferrule.

3.8 Input terminals

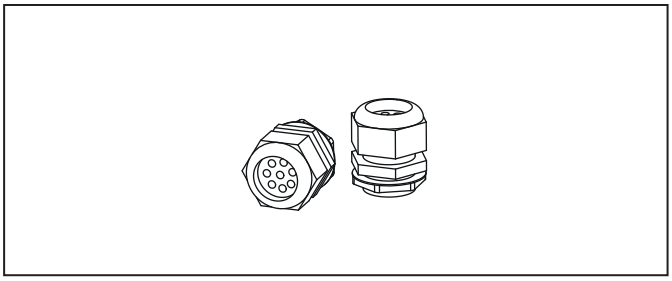


Figure 3.8 Cable glands

The PV AC combiner box is equipped with cable glands that comply with DIN EN 50521 and are TÜV certified. The cost-efficient cable glands allow the installer to adjust the necessary number of cables entering and exiting the AC combiner box to ensure the required water tightness.

3.9 Energy meter (optional)

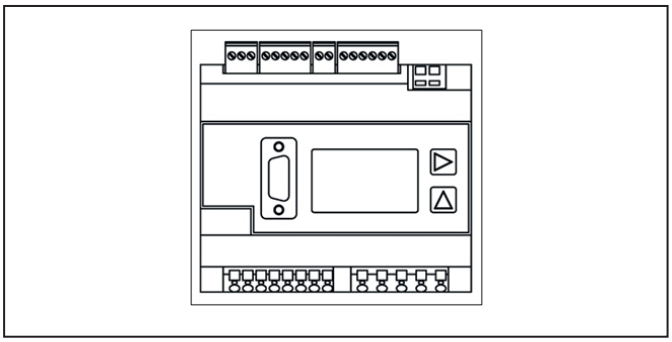


Figure 3.9 Energy meter D650

In case the PV AC combiner box is equipped with an energy meter, this device is a D650.
This device simplifies the connection work inside the combiner box and reduces maintenance tasks due to the PUSH IN terminals. The Transclinic 16i+ can operate at full load (25 Amps) at maximum temperature range (+70 ºC).

3.10 General technical data

Main application features	
Inputs	From 2 to 6 (string inverters)
Inverter size	3 phase string inverters from 60 kW to 250 kW
Output	1
Operating ambient temperature range	-10 ºC ... +50 ºC
Ambient conditions during storage	-25 °C ... +40 °C, RH 0 % ... 50 %
Installation location	Protected outdoors (> 1 km from the sea)
Altitude above sea level	Up to 2.000 m (standard), higher altitudes on demand
Main electrical features	
Earthing system	TN-S, TN-C and TN-C-S
Rated operational AC voltage	≤ 800 V AC (standard), other options on demand
Short-circuit and over-current protections	Fuse blocks (3p) with breaking capacity
Rated AC current per input	≤ 135 A
Breaking capacity	≤ 120 kA kA with fuses
Enclosure	
Enclosure material	GFRP (Glass Fiber Reinforced Polyester)
Enclosure shape	Portrait or landscape
Enclosure fixing system	Wall mounted or pedestal
Degree of protection (acc. to IEC 60529)	IP65
Form factor	Cabinet with hinged door
Polycarbonate protection plate	Optional
Surge protection	
Surge protection device	Type I + II
Auxiliary contacts	No
Surge protection on EIA-RS485 ports	No
Optional	
Main switch disconnector	Optional
Standards	
Standards	IEC 61439-2 ed 2.0 / EN 61439-2:2011

Please regard data sheet attached to each combiner box.

4 Transport and storage

4.1 Transporting

► Always wear work shoes with foot protection when transporting and unpackage the combiner box.

► Regard the total weight and use appropriate transportation equipment.

4.2 Unpacking the delivery

► Before unpacking, check that the product contained is the one you have ordered (see the label laterally on the package).

If the product that you have received is not what you have requested or is incomplete, please do not open the cartoon boxes. Please contact your Weidmüller representative office, your distributor or the relevant contact person immediately.

► Check the delivery for completeness. For the scope of delivery, see the enclosed data sheet and dispatch documents.

If you detect any issue or damage, do not install the unit. Please contact your Weidmüller representative office, your distributor or the relevant contact person immediately.

► Store away the transport packaging.
► Ensure that the operating instructions are accessible to the user at all times.

4.3 Storage

Make sure that in case of long-term storage the following conditions are met:
– Ambient temperature: -25 °C to +40 °C
– Relative humidity: 0 % to 50 %

ATTENTION

Material damage!

The AC box must be stored lying flat on the rear side. Otherwise the cable glands and connectors at the bottom of the enclosure can be damaged.

In the event that after the storage there is any ingress of dirt, pollutants or liquid into the equipment, or the formation of condensation, damage or any other failures the equipment must not be commissioned until the correct remedial procedure has been discussed with and approved by Weidmüller.

4.4 Establishing connections

ATTENTION

Material damage!

The weight of the cables can cause mechanical stress to the enclosure. For this reason, depending on the installation height, a strain relief underneath the AC box may be needed. Regard the national regulations.

– Use only electrical cables rated for the voltages, currents and environmental conditions (temperature, UV, etc.) expected at the installation site.
– Ensure that you lay all cables with short-circuit protection and ground fault protection.
– To ensure short-circuit-proof and ground-fault-proof installation in accordance with IEC 60364-5-52, the following requirements must be fulfilled:
  – Cables must not be installed in the proximity of flammable materials or atmospheres.
  – Cables must be accessible.
  – Cables must be protected against mechanical damage.
– Do not lay the wires over sharp edges.

5 Installation

5.1 Installation site

The PV AC combiner boxes are suitable for protected outdoor installation. Regard the following aspects when selecting the installation site:

- The location must be protected from the weather and direct sunlight.
- The location must be easily accessible for installation work and maintenance work.
- The installation site must not be in close proximity to easily inflammable materials, gases or vapours.
- The combiner box must be positioned as described in the following section or in other position ensuring the needed requirements.
- It must be ensured that unauthorised personnel cannot access the combiner box.
- The installation area must be stable enough to enable installation and maintenance work safely.
- The combiner box and especially the feeder conductors must be installed in such a way that damage cannot be caused by rodents.
- Regard the permissible ambient conditions:
  - The temperature range is indicated on the label inside the box.
  - The relative humidity may temporarily be as high as 100 % at a maximum temperature of +25 °C.
- Ensure that no object is blocking the pressure compensation elements.
- When installing, ensure rain cannot penetrate the combiner box.

Exposure to direct sunlight and direct rain for extended periods and excessively high or low temperatures can result in a shorter lifetime or damage to the internal components of the combiner box.

To protect the combiner box against direct sunlight and rain, you can install it under the photovoltaic modules or a protective canopy. Make sure there is enough air circulation around the equipment

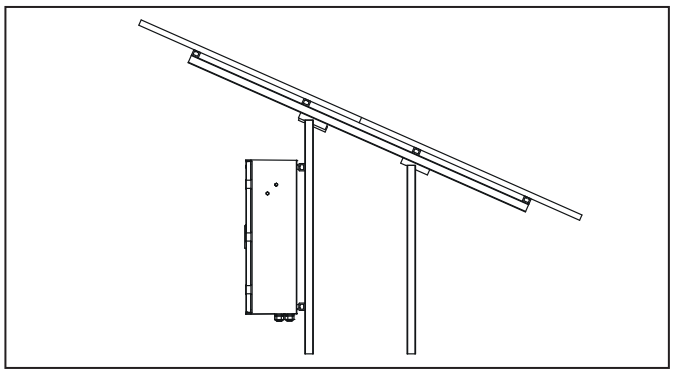


Figure 5.1 Installation under the PV modules

5.2 Positioning of the combiner box

The PV AC combiner boxes are designed to be installed vertically with the cable glands or connectors leading down. Merely a positive inclination from 15º to 90º is allowed.

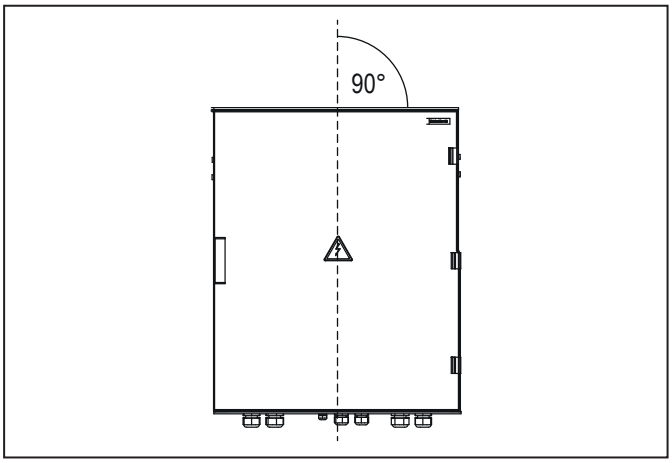


Figure 5.2 Installation in upright vertical position

The combiner box must not be installed horizontally laying flat on the rear neither in any other orientation.

5.3 Fixation

The fixation of the combiner box directly affects the proper performance and the lifetime of the product.
Ensure that the requirements described in chapters 5.1 and 5.2 will also be observed.

Mounting material

Most of the Weidmüller combiner boxes are supplied with metal or plastic mounting lugs, depending on the model. Fixation screws are not delivered as standard with each product. Please make sure all needed material is available before starting the installation.

Requirements

The PV AC combiner box shall be fixed to a suitable and stable metallic structure or a wall that will support the weight of the combiner box during the entire lifetime.
Always use all fixations that are supplied with the combiner box.
In case the installation is done on a pedestal, the combiner box should be fixed on the top of it with the specific supplied accessories.

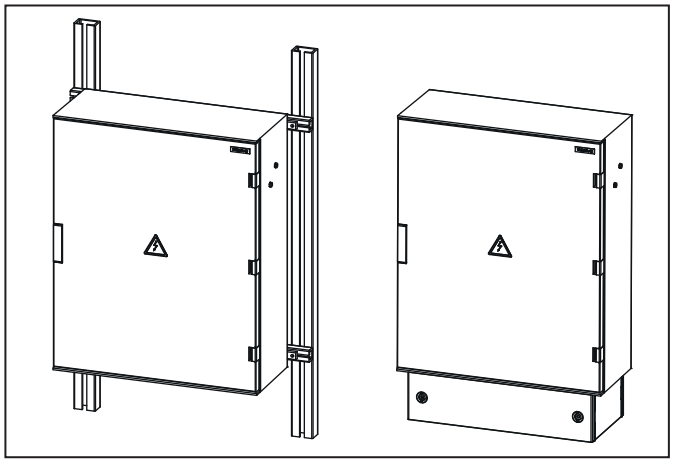


Figure 5.3 Fixing the enclosure to a structure or on a pedestal

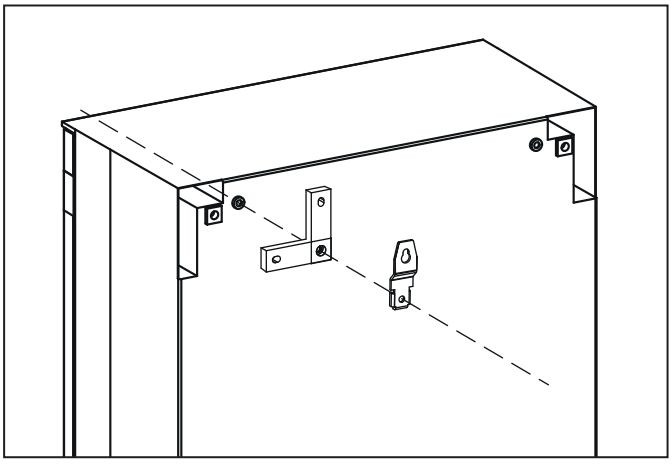


Figure 5.4 Fixing lugs enclosure type A

5.4 Installing the combiner box

CAUTION

Risk of injury due to the size and the weight!

► Always install the combiner box with two persons to avoid any injury or accident.

Installers should be qualified for the specific works according IEC standards and/or local regulations and should bring the necessary safety equipment.

ATTENTION

The product can be destroyed!

– Never drill the enclosure to add any extra hole or to modify any of the existing holes. Otherwise the IP protection will get lost as well as the product warranty.
– Lay down the combiner box only on the rear side after unpacking. Otherwise the cable glands and connectors at the bottom of the enclosure can be damaged.

► Remove the combiner box from the original packaging.
► Measure the exact distances between the drilling holes and mark the positions in the mechanical structure (or wall).
► Drill the holes in the mechanical structure (or wall).
► Mount the combiner box using the fixing lugs.
► Check the installation:
  – Verify that the combiner box is correctly secured and fixed.
  – The surface of the enclosure should be totally flat. Ensure that the combiner box is not bended over the edges, otherwise the water tightness is not guaranteed.

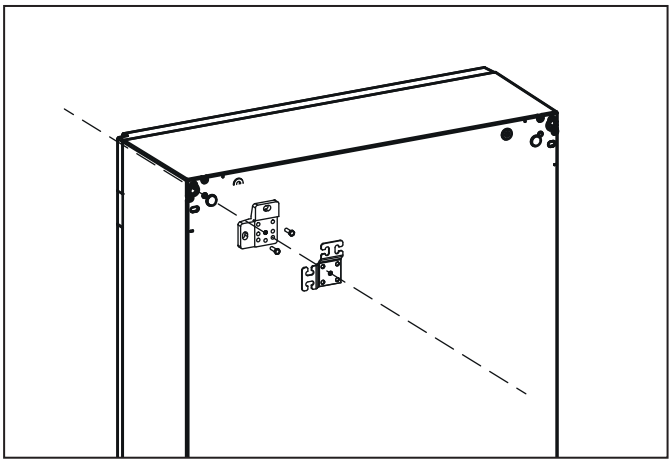
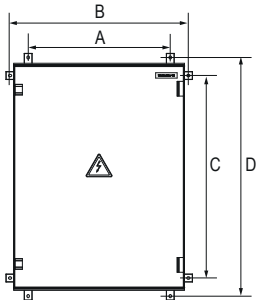
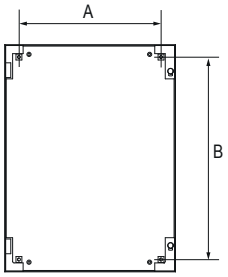
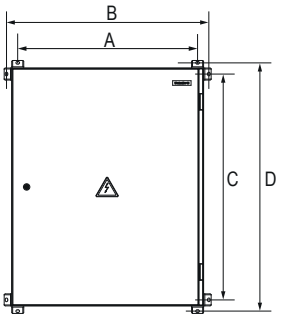


Figure 5.5 Fixing lugs enclosure type B

Each model has been designed according individual specifications and this has been approved by customer. Please make sure that during mounting process all specifications and requirements are met according to the present manual.

	Enclosures mounting lugs and fixing points[1]			
Size Dimensions H x W x D (mm)				
		mm		mm
86 847 x 636 x 300	A	530	A	560
	B	665	B	755
	C	755		
	D	890		
108 1056 x 853 x 362	A	750	A	750
	B	885	B	955
	C	955		
	D	1090		

1) This table is a reference. For specific measure of your product please refer to the documentation delivered with the product.

	Enclosures mounting lugs and fixing points[1]	
Size Dimensions H x W x D (mm)		
		mm
86 847 x 636 x 300	A	583
	B	680
	C	782
	D	880
108 1056 x 853 x 362	A	783
	B	880
	C	982
	D	1080

1) This table is a reference. For specific measure of your product please refer to the documentation delivered with the product.

5.5 Inserting the fuses

Each input associated to one inverter has a set of 3 fuses, one for each phase. The fuses are carried by a fuse holder with breaking capacity.

WARNING

Do not operate under load.

A serious damage on persons and equipment can occur by high voltage.

► When inserting the fuse links please make sure to wear all safety equipment.
► Ensure that the AC switch disconnector is in OFF position.

Work through the following steps quickly to avoid arcing in the fuse contacts.

► First pull the lever of the fuse holder in order to open the fuse link carrier.
► When the carrier is open, insert the three fuse links and its blades into the fuse holder carrier clip.
► Once all three fuse links are inserted properly, close the carrier decisively and quickly until the fuse holder carrier is fully closed and three fuse-links are fully connected to the fuse holders.

5.6 Connection of the inputs

The enclosure is equipped with cable glands. No tools are necessary to fix the cables in their position and cover the gap existing between the cables and the holes drilled in the enclosure.
In order to realise proper connections we recommend to use wire end ferrules as well as appropriate stripping and crimping tools.

Input connections via cable glands

There are various cable entries with their associated cable gland. Pay attention to the number of inputs as well as their phases to avoid mistakes during connection.
Make sure that you have the electrical drawing provided with the combiner box to hand. Make sure that the final input connections match the electrical drawing provided.

► Insert the AC string input cables (output cables of the string inverters) through the designated holes at the bottom of the enclosure into the combiner box.
► Make sure the wires pass through their designated cable gland with their thread in correct position.
► Strip the conductor for the input cross section according to the ring terminal used with an appropriate tool.
► Crimp the conductor with a tubular wire end ferrule with 15 mm length of the sleeve (the conductive part).
► Pull softly down the cables to ensure that all of them are properly connected.
► Make sure there is sufficient strain relief for the AC input cables.
► Make sure that the cables are not mounted under stress conditions.
► Tighten the cable glands.

5.7 Connection of the outputs

The output connections depend on the design of each tailor-made PV AC combiner box. The output cables must be connected to the poles of the switch disconnector or to the terminals prepared for this purpose.

Please ensure that the cable that you are going to use fits with the specifications.
– The cross section of the conductor must be selected according to the rated current of the system and to the size of the cable gland of the combiner box.
– Use copper or aluminium cables only. When using aluminium cables regard the section "Preparing aluminium conductors" before starting the installation.
– Weidmüller is not responsible for the performance of the terminal lugs, terminal ring or terminal cage neither the output cable selected.

WARNING

Do not operate output cables under load.

A serious damage on persons and equipment can occur with components under high voltage load.

► If AC output cables from the field are connected to the terminals ensure the power supply is disconnected.
► Ensure that the AC switch disconnector is in OFF position.
► Ensure that there is no voltage in the output cables and that all safety measures are taken.

► Insert the AC main cables through the designated holes at the bottom of the enclosure into the combiner box.
► Make sure the wires pass through their designated cable gland with their thread in correct position.

► Regard the correct phase of the cables when connecting the AC conductor to the appropriate terminal lug, ring terminal or cage terminals and follow the instructions of that component to crimp it in the right way.
► Connect the AC conductors to the stud terminals or direct to the switch disconnector.
► Check that all connections are performed according to electrical drawing provided
► Check and apply the right tightening torques to the terminal lugs of the switch disconnector. The correct tightening torques can be found in the specific documentation inside each PV AC combiner box.
► Tighten the cable glands.
► Make sure there is sufficient strain relief for the AC main lines/AC feeder cables.
► Close all unused cable glands with blanking plugs to prevent moisture penetrating the combiner box.

Preparing aluminium conductors

– Aluminium conductors are only suitable for installation sites that are free from humidity or aggressive atmospheres.
– It is highly recommended to use bimetallic connectors.
– Use neutral gease (e.g. acidfree and alkalifree vaseline) to protect the surface of the alumimium from oxidation.

As a well known characteristic aluminium forms a thin, non-conductive layer of oxide as soon as it is exposed to the air. This layer increases the contact resistance between the aluminium conductor and the current bar of the terminal which can lead to poor contact. As a precondition regard the following steps to prepare the aluminium conductors:

► Scrape the stripped end of the conductor carefully, e.g. with a knife, to remove the layer of oxide.

Do not use brushes, files or emery paper because particles of aluminium can be deposited on other conductors.

► Coat the end of the conductor immediately with a neutral grease, and connect it to the terminal immediately.
► Tighten the screws of the DC-disconnector with the maximum permissible tightening torque.

Repeat the above procedure each time after the conductor has been disconnected and shall be reconnected.

5.8 Connection of the grounding cable

The PV AC combiner boxes are designed with metallic mounting plates. The enclosures are made of GFRP (Glass Fiber Reinforced Polyester). Therefore the unique ground connector is used for the surge protection. Note that the earthing cable must be connected to provide the correct operation of the surge protection device (SPD).

Protective conductors and other earthing conductors for functional and protective purposes cannot generally be considered as equipotential bonding dedicated for surge and lightning protection.

According to the standard CLC-TS 50539-12, the cross section of connecting conductors to SPDs on the AC side of PV installations must be as follows:
– Earthing conductors of SPDs Type I+II shall have a minimum cross section of 16 mm^2 copper or equivalent or equal to the cross section of live connectors, if greater than 25 mm^2.
– The cross section of the connecting conductors from the SPD to live conductors shall not be smaller than the cross section of the live conductors of the associated circuit.

6 Commissioning

Preconditions for the commissioning

– The installation work has been made according to the “Installation” chapter of this user manual.
– The ground around the PV AC combiner box is firm and easily accessible so that work can be done safe.

► Wear appropriate clothes and personal protective equipment.
► Use appropriate tools with the correct insulation.

A multimeter is necessary in order to verify the absence of voltage in the live parts of the combiner box.
► Check that the multimeter is capable to read the maximum voltage of the string inverter output and the maximum current flowing through before starting any operation.

DANGER

Imminent risk of life!

High voltages up to 800 V AC are present in the live parts. Touching live parts can result in death or serious injury due to electric shock.
► Before starting any work in the PV AC combiner box:
  – disconnect the main switch
  – ensure that there are no fuses inserted into the fuse-holders.
► Ensure that nobody reconnects the unit while work is not finished or any operator is still working.
► Ensure that no voltage is present in parts that are going to be manipulated or that could be accessible.
► Do not touch live components.
► If specific live parts cannot be insulated or disconnected, it is mandatory to use additional safety elements to avoid any risk to persons or equipment.

6.1 Main indications and inspections

It is recommended to carry out a general inspection on the PV AC combiner box and the status of the installation before commencing operation.
The installation must comply with either local and international regulations.

Visual inspection

Check the following issues:
– All cables are in good condition.
– There are no hazards around the installation that could create any damage.
– The cables are connected to the correct phase and according to electrical drawing provided.
– The enclosure is firmly fixed to the structure, all mounting elements are tightened properly.
– The door of the enclosure is properly closed and the seal fits all around the door to provide the insulation. As a check press the door while locking the key-locks a few times.
– The cable glands are tightened correctly.
– The grounding cable is connected through its own cable gland and the cable gland is tightened correctly.
– Check the correct status of the SPD. The viewing window should be in green colour.

Additional inspections issues for combiner boxes with Energy meter

– The RS485 wire is correctly connected to the specific terminals inside the combiner box or alternatively to the D650 connector through its own cable gland.
– The cable gland for communications cable is tightened correctly.

Measurements

DANGER

Imminent risk of life!

High voltages up to 800 V AC are present in the live parts. Touching live parts can result in death or serious injury due to electric shock.
► Before starting any work in the PV AC combiner box:
  – disconnect the main switch
  – ensure that there is no current flowing through any of the wires of the box.

6.2 Start up

DANGER

Imminent risk of life!

High voltages up to 800 V AC are present in the live parts.

► Insert fuses into the fuse holders only if all previous tasks have been finished with satisfactory results. Never insert fuses under load.

► Use only fuses provided by Weidmüller within each individual PV AC combiner box.

► In case the PV AC combiner box has been provided without fuses, please use the authorised fuses or contact with your Weidmüller representative for more information.

► Insert the fuses provided with the PV AC combiner box into the fuse holders using the appropiate tool from Weidmüller (or equivalent appropriated for this activity).

► Switch on the main switch disconnector (from OFF to ON position).

► Close and secure the door with the key-tool lock.

7 Accessories and replacing parts

Some parts of the PV AC combiner box can be replaced in case of damage. Before proceeding with any of these replacements, we highly recommend to contact with your Weidmüller representative to clarify any doubt.

7.1 Replacing fuses

DANGER

Imminent risk of life!

High voltages up to 800 V AC are present in the live parts.

- ► Ensure that the AC switch disconnector is in OFF position.
- ► Make sure there is no current flowing through any of the wires of the PV AC combiner box.

- ► Use only fuses provided by Weidmüller.
- ► Use only the same type of fuse like the ones inserted in the other fuse clips of the PCB board (same model and rate).
- ► Before replacing fuses, verify that there is no electrical issue active in the circuit which could cause the blowing of the new fuse.
- ► Use the appropriate tool to extract the damaged fuse and to insert the new one.
- ► Verify by visual check, that the fuse holder and the fuse links are free from any damage.

7.2 Replacing surge protection arresters

DANGER

Imminent risk to life!

The contacts in the sockets of the surge protection arresters are live.

- ► Do not reach into the sockets when the arrester is removed.

Weidmüller SPDs have three individual arresters. If the SPD is damaged, the status indicator of the respective arrester will be red.

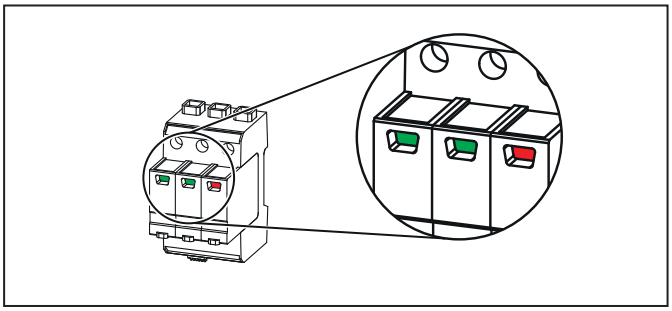


Figure 7.1 Status indicators of the SPD

► In order to replace an arrester, proceed as shown below.

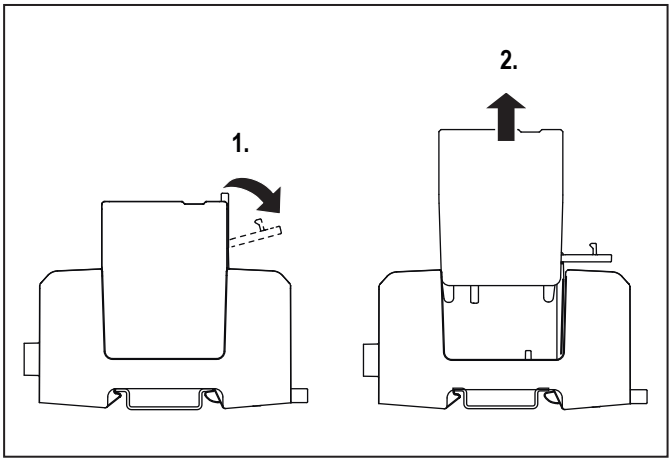


Figure 7.2 Removing a surge voltage arrester

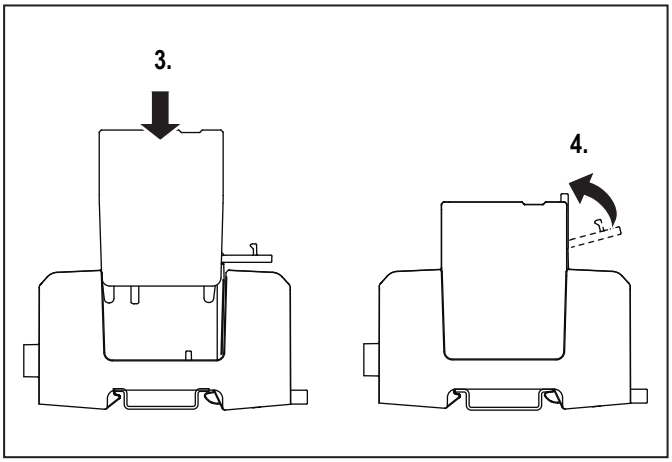


Figure 7.3 Inserting a surge voltage arrester

8 Cleaning

ATTENTION

The product can be destroyed!

The enclosure and cover may be damaged by detergents, scouring agents, solvents and high-pressure cleaners.

► Use a cloth moistened with clear water for cleaning.

► Clean the enclosure at regular intervals so that the warning symbols are always clearly visible.
► Only clean the exterior of the enclosure when it is closed.
► Take care not to damage the sticker with warning symbols.

9 Maintenance and Service

9.1 Maintenace

The PV AC combiner box is a product with minimum maintenance.

► Carry out a visual inspection once per year checking the issues listed below.

DANGER

Imminent risk of life!

High voltages up to 800 V AC are present in the live parts.

► Ensure that string inverters connected to the AC Combiner box are switched off and that then combiner box is free of hazardous voltage

Check list for the annual inspection of the PV AC combiner box		
Remarks	**Issue**	**Checked**
Enclosure and seals		
Temperature fluctuations on outdoor sites strains the seals.	► Check that the cover seals are in proper condition.	
Porous or squeezed seals decrease the tightness and therefore the IP class of the enclosure.	► Check that there is no or dust inside the enclosure.	
Humidity inside the enclosure can cause corrosion.	► Check the seals and screw connections as well as the drainage inserts. ► Check that there are no signs of corrosion, water or humidity inside the enclosure.	
Regard the tightening torques in the specific documentation inside each PV AC combiner box.	► Check the cable glands and retighten them if needed.	
Surge protection arresters (optional)		
The inspection windows of the surge arresters should be green.	► Replace each surge arrester the inspection window of which is red.	
PV AC combiner boxes have a mark on all screws and nuts to indicate the torque position. If the mark is unchanged since the previous inspection, there is no loss of torque. Regard the tightening torques in the specific documentation inside each PV AC combiner box.	► Check if any of the marks on screws and nuts have been changed. ► Retighten the screws if needed.	
Fuses		
Blown fuses diminish the yield of the PV plant.	► Check the continuity of all fuses.	
AC switch		
PV AC combiner boxes have a mark on all screws and nuts to indicate the torque position. If the mark is unchanged since the previous inspection, there is no loss of torque. Regard the tightening torques in the specific documentation inside each PV AC combiner box.	► Check if any of the marks on screws and nuts have been changed. ► Retighten the screws if needed.	

Check list for the annual inspection of the PV AC combiner box		
Remarks	**Issue**	**Checked**
Fuse holders		
Burn marks	► Check that there are no burn marks on the terminals.	
Measure voltage	► Check the voltage of the strings by using the testing points in the terminals.	
General inspection		
	► Check that there are no burn marks on the terminals.	

9.2 Service

If you have any questions about PV AC combiner boxes, please contact the Weidmüller representative in your country.
Information about PV AC combiner boxes like videos, installation guides and FAQ's re provided on the Weidmuller website.