

Photovoltaics

## Solutions for Photovoltaic Utility Scale Systems

Operate large-scale PV systems more efficiently





# Solutions for Your PV Value Chain

Weidmuller is a solution provider for connectivity cabinets and communication infrastructure

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### Tested & proven

Our PV boxes are designed and tested to withstand extreme climate fluctuations. See for yourself in our video straight from our lab.





## Our offering



### Connection & Combination

Connection & Combination of PV strings from field or array



### Protection

Protection against surges and touching



### Monitoring

Monitoring of string performance and component status

## Your benefits at a glance



### Standard models available in stock

Tailor-made solutions with only 8 weeks of delivery time



### 5 years warranty

We increase the warranty period due to the high quality of our combiner boxes



### Spare parts on stock

Easy supply for O&M companies



### Easy commissioning & maintenance

Products designed to reduce installation time and cost as well as future maintenance



### Logistic savings

Global production locations allow cost- and time-optimised production and supply



### Online selection tool

Online tool to choose the best model for each application.



# 1.1

## PV DC Combiner Boxes

### With and without string current monitoring

#### Bundle, protect and combine PV strings efficiently

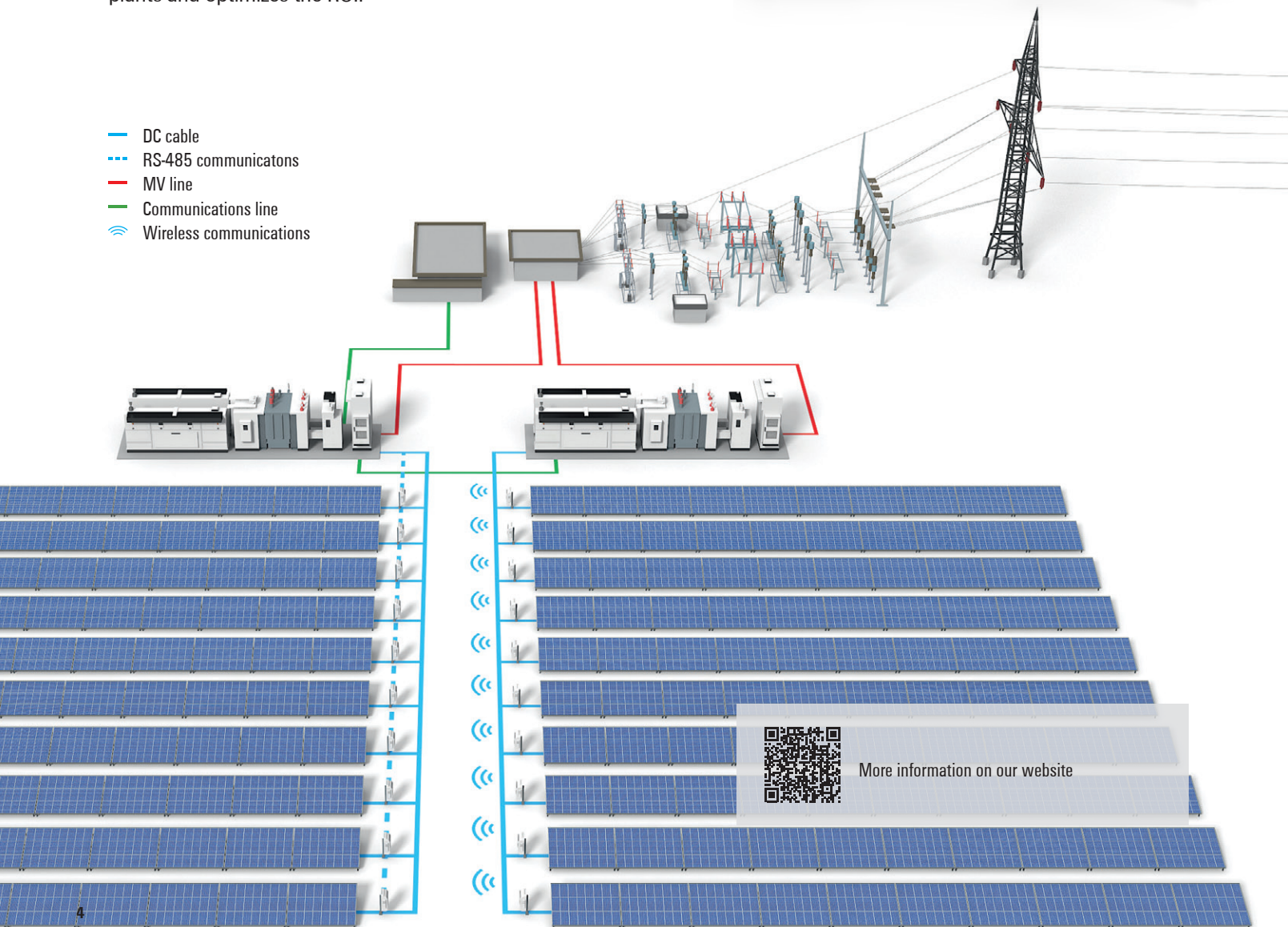
Our DC combiner boxes offer users the possibility to integrate short-circuit and overvoltage protection, as well as string monitoring solutions (I, V, T, SPD status, and switch isolator status) for PV systems using central inverters with PV panels in trackers and fix tilt systems.

Weidmuller offers a track record of DC combiner boxes higher than 250,000 units sold in all climate regions of the planet for more than 15 years. The experience and expertise in DC engineering is used to provide high-end solutions covering the CAPEX and OPEX needs of the customer.

We also have models equipped with monitoring and measurement of voltage, string current and box temperature as well as SPD health and DC switch status. This helps to improve the performance ratio of plants and optimizes the ROI.



- DC cable
- - - RS-485 communications
- MV line
- Communications line
- ⊞ Wireless communications



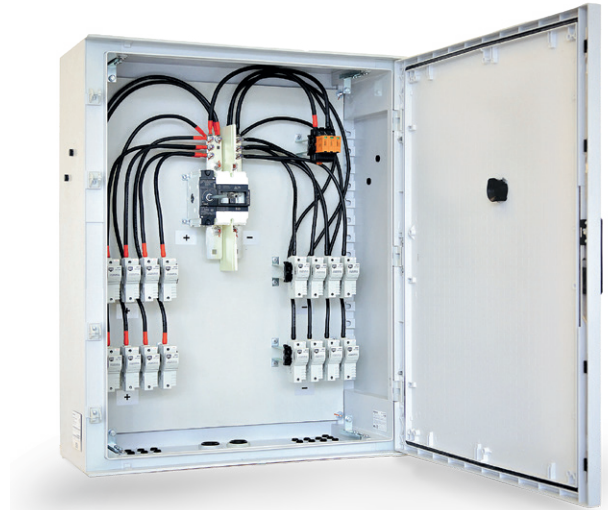
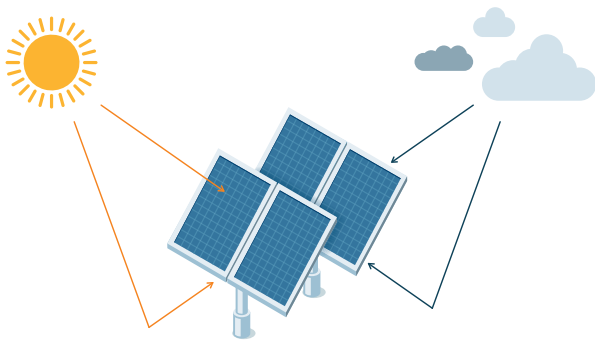
More information on our website

# 1.2 PV DC Combiner Boxes for High Power Panels

## Central inverter concepts & high voltages

### Compact and durable solutions for bifacial half-cell modules

Bifacial solar panels have solar cells on both the front and the back of the panel. This allows the solar energy to be collected on the back of the panel and increases the energy yield of the solar energy system. Our four new PV-DC combination boxes for bifacial half-cell modules allow a higher current consumption due to the fuse holders used.



### Space optimized and higher reliability

Increasing the power of PV panels (mono and bifacial) with half-cut cells leads to a rise of current in the strings. The need for higher rated fuses is then mandatory and requires a new approach to system design. Our new designs of PV DC high current combiner boxes offer easy adaptation and time saving for new developments.

### Standard and customized options tailored to your needs

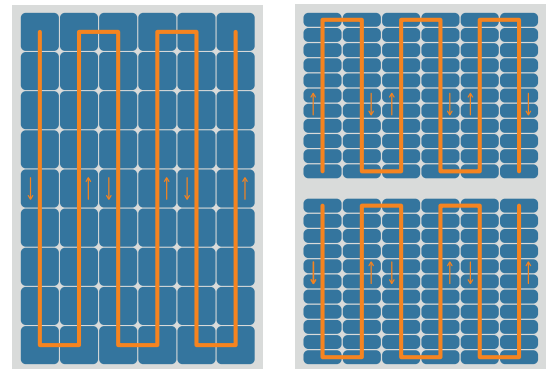
A wide range of solutions fit into the installation concepts with mono and bifacial PV panels. Variants: From 6 up to 8 inputs, with fuse protection in (+/-) poles and with gPV fuses from of 22x65 mm format and a rated current per fuse between 40 amps up to 75 amps.

### Overvoltage protections

With several configurations, Weidmuller offers the VPU surge protection series for 1500 V DC systems with SPD Type I+II or Type II variants.

### Optimized design

Through the use of advanced 3D simulation software, the product variants have been designed and tested to operate with maximum mechanical and thermal efficiency in the most compact enclosure possible.



## Product highlights

- **Optimized design** – By using advanced simulation 3D software, the product variants have been designed and tested to operate at the maximum mechanical and thermal efficiency in the most compact housing size.
- **All technical data available online with 1-click** – Weidmuller offers web tools to support the selection of the best model for your application. Technical data and certifications are available in the Weidmuller online catalog.
- **Cost-optimized variants** – The new product line cost optimized models with special accessories were designed to cover the most common applications in PV power plants.
- **Longer lifetime** – DC engineering expertise implemented in designs to allow longer lifetime and higher performance under extreme climatic conditions.
- **Better LCOE and ROI** – Proven track record, bankability and the reputation of our solutions simplify product due diligences, insurance contracts and even to increase value of the asset in case it is sold in the future.

### Technical Data: PV DC Combiner Boxes

<b>Main Application Features</b>	
Inputs	from 6 to 32
Outputs	1
Operating ambient temperature	-40°C up to 50°C
DC earthing system	Floating, negative grounded or positive grounded
Installation location	Protected outdoors
Altitude above the sea level	up to 2000m (standard) higher altitude on demand
<b>Main Electrical Features</b>	
Rated DC voltage	from 1000 V DC up to 1500 V DC
Rated DC current per input	up to 48 Amps
Maximum fuse size	up to 32 Amps for 10x85 mm up to 75 Amps for 22x65 mm
Protection against overcurrent	gPV fuses according to IEC 60269-6, ANSI/UL 248-19
Fuses	On both poles or on one pole
Switch disconnecter	Yes
Switch disconnecter rating	up to 500 A (other options on demand)
<b>Enclosure</b>	
Enclosure material	GFRP (Glass Fiber Reinforced Polyester)
Enclosure shape	Portrait or Landscape
Enclosure fixing system	Wall mounted, pedestal or piling fixation
Degree of protection	IP65 - NEMA 4X
Form factor	Cabinet with hinged door
Polycarbonate protection plate	Yes (optional)
<b>Surge protections</b>	
Surge protection device	Type I+II or Type II
Auxiliary contacts	Yes (optional)
Surge protection on RS-485 ports	Yes (optional)
<b>Option with String Current Monitoring</b> - Number of monitored inputs up to 16	
String monitoring device	Yes (optional)
Main monitored parameters	Voltage, current, temperature, SPD status, switch isolator status and auxiliary alarms
Voltage measurement	from 200 V DC up to 1500 V DC
Current measurement	up to 25 A per string/input
Communication port	RS-485 or wireless (LoRAWAN)
Protocol	Modbus/RTU
Power supply for string monitoring device	DC/DC converter (self powered string monitoring)
<b>Others</b>	
Input connectors	MC4 C PV connectors or cable glands (other options on demand)
<b>Standards</b>	
Standards	UL 1741, 3rd Edition, 2021-08 / CSA C22.2 NO 290.19

## Ordering Data for DC Combiner Boxes

### PV DC Combiner Boxes without Monitoring

Type	Inputs	Fuse protection	Fuse value	Rated voltage	Max Isc per input	String monitoring	Enclosure orientation	Enclosure size	Qty.	Order No.
PV 232S0FOC20V100TXPX15PUS	32 strings	Both poles	20 Amp	1500Vdc	12.8 Amp	No	Portrait	1056 x 852 x 350 mm	1	8000089220
Other variants on request										

### PV DC Combiner Boxes with Monitoring

Type	Inputs	Fuse protection	Fuse value	Rated voltage	Max Isc per input	String monitoring	Enclosure orientation	Enclosure size	Qty.	Order No.
PV 216S0FOC32V100T7P015PUS	16 strings	Both poles	32 Amp	1500Vdc	20 Amp	Yes	Portrait	1056 x 852 x 350 mm	1	8000089216
Other variants on request										

### PV DC Combiner Boxes for High Power Panels

Type	Inputs	Fuse protection	Fuse value	Rated voltage	Max Isc per input	String monitoring	Enclosure orientation	Enclosure size	Qty.	Order No.
PV 208S0FOC75V100TXPX15PUS	8 Harness	Both poles	75 Amp	1500Vdc	48 Amp	No	Portrait	1056 x 852 x 350 mm	1	8000089171
Other variants on request										

### PV DC Combiner Boxes Enclosure Accessories

Type	Type of Accessory	Enclosure Brand	Material	Type of enclosure	Enclosure size	Qty.	Order No.
PK FIXATION KIT NSYPLM108	Mounting kit for 2 poles	Schneider Electric	Steel-235 HDG	Portrait	1056 x 852 x 350 mm	1	8000045007
PK FIXATION KIT NSYPLM75	Mounting kit for 1 or 2 poles	Schneider Electric	Steel-235 HDG	Portrait	747 x 536 x 300 mm	1	8000045005
PK FIXATION KIT NSYPLM86	Mounting kit for 1 or 2 poles	Schneider Electric	Steel-235 HDG	Portrait	847 x 636 x 300 mm	1	8000045006
PK FIXATION KIT ARIA75	Mounting kit for 1 or 2 poles	ABB	Steel-235 HDG	Portrait	747 x 536 x 300 mm	1	8000045008
PK FIXATION KIT ARIA86	Mounting kit for 1 or 2 poles	ABB	Steel-235 HDG	Portrait	847 x 636 x 300 mm	1	8000045011
PK FIXATION KIT ARIA108	Mounting kit for 2 poles	ABB	Steel-235 HDG	Portrait	1056 x 852 x 350 mm	1	8000045013
SUNLIGHT COVER ARIA86 ALU	Cover for floating PV DC CB	ABB	AL-5754	Portrait	847 x 636 x 300 mm	1	4000004177
SUNLIGHT COVER SCH86 ALU	Cover for floating PV DC CB	Schneider Electric	AL-5754	Portrait	847 x 636 x 300 mm	1	4000004848
SUNLIGHT COVER SCH108 ALU	Cover for floating PV DC CB	Schneider Electric / ABB	AL-5754	Portrait	1056 x 852 x 350 mm	1	4000004854
METAL SUNCANOPY GALVANIZED ABB/SCH75	Canopy for ground-mounted PV DC CB	Schneider Electric / ABB	Steel-275 HDG	Portrait	747 x 536 x 300 mm	1	4000004772
METAL SUNCANOPY GALVANIZED ABB/SCH86 V2	Canopy for ground-mounted PV DC CB	Schneider Electric / ABB	Steel-275 HDG	Portrait	847 x 636 x 300 mm	1	4000004024
METAL SUNCANOPY GALVANIZED ABB/SCH108 (**)	Canopy for ground-mounted PV DC CB	Schneider Electric / ABB	Steel-275 HDG	Portrait	1056 x 852 x 350 mm	1	4000004771



# 2.1

## PV Communication Boxes Plant communication

### Connecting photovoltaic power plants through reliable and safe industrial communications

We combine extensive experience with photovoltaic projects and industrial communication to create a complete portfolio of PV communication cabinets for PV power plants.

Our portfolio offers certified and ready-to-use cabinets for PV power plants that meet the specific environmental, electrical and data transmission requirements according to customer specifications. Weidmuller can customize the communication infrastructure requirements of the PV power plant, enabling perfect data collection for the plant owner, ultimately improving the long-term investment.

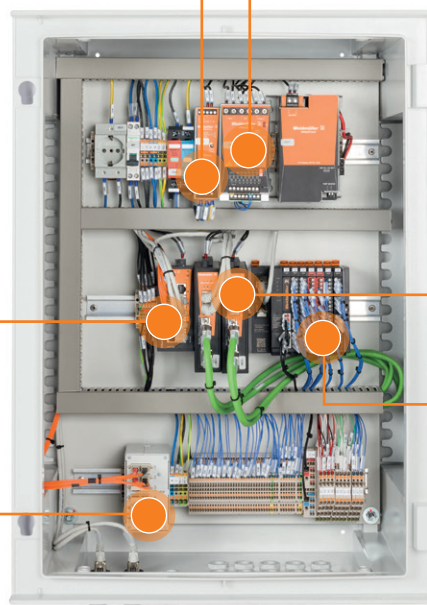
### Product highlights

- Safe function due to optimal protection
- Maximum availability due to integrated energy backup
- Highly reliable industry standard with built-in communication protocols
- High cost-effectiveness through modular designs based on standard references
- TCP/RS cards for RS485 field buses
- IP certification for outdoor or indoor use

**Power supply**  
24 VDC @ 3 ADC

**RJ-45 Switch & Fibre-optic Converter**  
IE managed switch 6x RJ-45 ports  
2x SC Multi-mode ports

**Fibre-optic patch panel box**  
6x SC Multi-mode fibre-optic ports



**Battery & UPS**  
Battery 24 VDC @ 3.4 Ah  
UPS 24 VDC @ 20A/10A

**2 x Serial / Ethernet converter**  
Serial / Ethernet converter  
2x RJ45  
2x DB9 for RS-485

**U-Control with multiple I/O**  
U-Control controller  
16x Digital inputs  
4x Analogue inputs  
8 GB data storage



#### Other designs on request

Simply contact us and describe the application and the requirements for the PV Communication Box. We will then provide you with a custom-fit design and quote.



# 2.2 PV Weather Boxes

## Plant communication

### Increase your energy production, monitor your system output

PV systems should deliver optimum performance. In order to use as many plant resources as possible for energy generation, regular monitoring of weather parameters is crucial.

Our PV Weather Boxes provide reliable information on all important weather parameters. Values such as temperature, irradiance, wind speed and direction, precipitation, relative humidity and much more can be permanently recorded. The certified housings are equipped with regard to customer-specific requirements such as environmental conditions, electrics and data transmission. They are ready for immediate use, extremely robust and protected against all weather influences.

### Product highlights

- Reliable function due to optimal protection
- Maximum availability due to integrated power backup
- High cost-effectiveness through modular designs based on standard references
- IP certification for outdoor or indoor use
- Connection of the required weather sensors (not included in the scope of delivery) via modular I/O cards

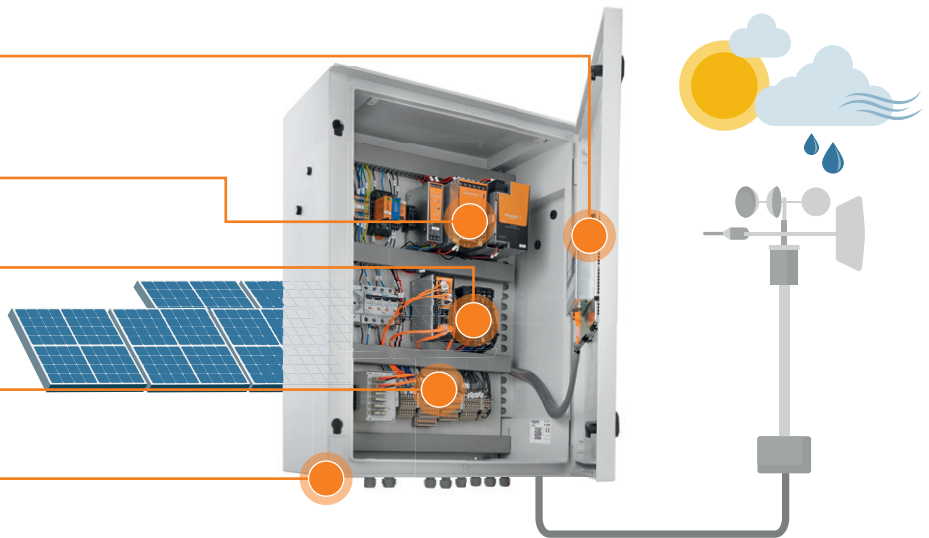
Robust and durable capacitive multi-touch panel monitor for data visualization and HMI

Safe switching, protection and integrated energy back-up

Modular I/O cards for connecting sensors to manage digital/ analogue signals

Modular designs based on standard references

IP degree certified for outdoor or indoor solutions



#### Suitable for the most well-know brands of weather sensors

The Weidmuller PV Weather Boxes are suitable for all well known weather sensors on the market e.g.use, extremely robust and protected against all weather influences.



#### Ordering data: PV Weather Boxes

Type	Type of control device	Type of IE device	UPS control unit	Type of SPD	Qty.	Order No.
PV WUCI05T1U2D1A1WXRXXWW	- UC20-WL2000-IOT - 10.1" capacitive multitouch-panel	- IE network managed switch 6x RJ45 2x SC multi-mode - Remote I/O 16-CH digital input - Remote I/O 4-CH analog input signals - Remote I/O communication 1-CH RS-485	- CP DC UPS 24V 20A/10A - DURA ECO LA-BAT 24V 3.4AH	AC SPD	1	8000094420
PV WUCI05TXU2D1A1WXRXXWW	- UC20-WL2000-IOT	- IE network managed switch 6x RJ45 2x SC multi-mode - Remote I/O 16-CH digital input - Remote I/O 4-CH analog input signals - Remote I/O communication 1-CH RS-485	- CP DC UPS 24V 20A/10A - DURA ECO LA-BAT 24V 3.4AH	AC SPD	1	8000094711

# 3.0

## PV Components for an Effective Running System Plant equipment

### PV Fuses



#### gPV cylindrical fuse cartridges

The gPV cylindrical fuse cartridges are designed to provide compact, safe and economical protection of photovoltaic modules. They provide protection against both overload and short circuit.

### Lightning and Surge Protection



#### VARITECTOR PU PV for more safety

PV systems are directly exposed to environmental influences because they are always installed in exposed locations. The probability of lightning strikes and resulting overvoltage is high and the components of unprotected PV systems are again and again considerably damaged.

#### VPU I+II / VPU II - lightning and surge protection for PV systems

Type	Rated voltage / discharge current	Version	Network	Qty.	Order No.
<b>Requirements class: Type I+II</b>					
VPU PV I+II 3 1000	1000 V / 40 kA	without remote signalling contact	2 horizontal pitches	1	2530610000
VPU PV I+II 3 R 1000	1000 V / 40 kA	with remote signalling contact	2 horizontal pitches	1	2530620000
VPU PV I+II 3 1500	1500 V / 30 kA	without remote signalling contact	3 horizontal pitches	1	2530580000
VPU PV I+II 3 R 1500	1500 V / 30 kA	with remote signalling contact	3 horizontal pitches	1	2530590000
<b>Requirements class: Type II</b>					
VPU II 2 PV 600V DC	600 V / 40 kA	without remote signalling contact	2 horizontal pitches	1	1351340000
VPU II 2 R PV 600V DC	600 V / 40 kA	with remote signalling contact	2 horizontal pitches	1	1351370000
VPU PV II 3 1000	1100 V / 40 kA	without remote signalling contact	3 horizontal pitches	1	2530550000
VPU PV II 3 R 1000	1100 V / 40 kA	with remote signalling contact	3 horizontal pitches	1	2530180000
VPU PV II 3 1500	1500 V / 30 kA	without remote signalling contact	3 horizontal pitches	1	2530640000
VPU PV II 3 R 1500	1500 V / 30 kA	with remote signalling contact	3 horizontal pitches	1	2530650000



#### VPU AC I - lightning protection for PV systems

Type	Continuous current / lightning impulse current ( $I_{imp}$ )	Version	Network	Qty.	Order No.
<b>Type I arrester - 275 V AC / 25 kA - S-line</b>					
VPU AC I 3+1 275/25 LCF S 2PE	275 V AC / 25 kA	without remote signalling contact, leakage current free	TN-C-S, TN-S, TT	1	2726760000
VPU AC I 3+1 R 275/25 LCF S 2PE	275 V AC / 25 kA	with remote signalling contact, leakage current free	TN-C-S, TN-S, TT	1	2726770000



#### VPU AC II - surge protection for PV systems

Type	Continuous current / discharge current ( $I_{max}$ )	Version	Network	Qty.	Order No.
<b>Type II arrester - 300 V AC / 50 kA</b>					
VPU AC II 3+1 300/50	300 V AC / 50 kA	without remote signalling contact	TN-C-S, TN-S, TT	1	2591080000
VPU AC II 3+1 R 300/50	300 V AC / 50 kA	with remote signalling contact	TN-C-S, TN-S, TT	1	2591090000





# 4.0 Tested Quality

## Standard tests and services guarantee a long service life

### Trust in approved quality

Our laboratory is accredited according to international standards. It operates independently and is recognized by institutions, registration services and other authorities. As a member of the CTD program, Weidmuller is regularly audited by UL, especially about test methods, quality management and documentation.

All combiner boxes are tested according to IEC-61439-ed-2 and are constructed on the basis of the test results as well as assembled for the specific application. This ensures that each of the requirements of the target application is fully met.



### Your benefits at a glance

- ✓ 5 years warranty
- ✓ Laboratory testing
- ✓ Commissioning Services
- ✓ On-Site Inspection

# 5.0 Proven Competence

## Reference projects around the globe

The best proof of the quality of our solutions is their worldwide use. More than 250,000 of our photovoltaic combiner boxes are installed in over 100 countries worldwide. They connect 120 million photovoltaic modules.



**Floating dynamic solar park**      Dynamic solar islands

- Location: Andijk, Netherlands
- Start-up: 2021
- Performance: 22 MWp
- Solution: 21 PV Floating DC Combiner Boxes



**Suria Sungai Petani**      PV Utility Park

- Location: Kuala Muda, Malaysia
- Start-up: 2021
- Performance: 116 MW
- Solution: 437 DC Combiner Boxes



**Droogfontein**      PV Utility Park

- Location: South Africa
- Start-up: 2019
- Performance: 80 MWp
- Solution: 450 Combiner Boxes



**Sol do Sertão**      PV Utility Park

- Location: Oliveira dos Brejinhos, Brazil
- Start-up: 2021
- Performance: 474 MWp
- Solution: 2,318 DC Combiner Boxes

# Weidmuller – Your Partner in Industrial Connectivity

As experienced experts we support our customers and partners around the world with products, solutions and services in the industrial environment of power, signal and data. We are at home in their industries and markets and know the technological challenges of tomorrow. We are therefore continuously developing innovative, sustainable and useful solutions for their individual needs. Together we set standards in Industrial Connectivity.

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**Weidmüller** 