

PV Floating DC Combiner Box

High-quality solutions for PV systems on water surfaces



Collect, protect, and monitor DC strings in extreme environments

Innovative combiner boxes for floating PV systems

The lack of available land requires the development of new locations for PV systems. In this case, water surfaces are particularly suitable because of the low shading and the cooling effect of the water. However, the ambient conditions place high demands on the combiner boxes.

Our PV DC floating combiner boxes are designed for use in floating PV systems on freshwater surfaces more than 1 km from the sea and equipped with central inverters. They comply with IEC 61439 (ed. 2) and 60058-2 and withstand high humidity, corrosive atmosphere, and intensive exposure to sunlight. We offer a wide range of plug and play variants from 8 to 24 inputs – with comprehensive protection and suitable covering solutions.

Your special advantages

- Suitable for high humidity environments according to IEC 61439 (ed. 2) and 60058-2
- Operation without additional sunshade – even in direct sunlight
- PMMA cover for better reflection of sunlight and increased thermal performance
- Plug-and-play solution for quick, easy, and flexible installation



Suitable for high humidity

PV-DC floating combiner boxes are specially designed for Severity Class B environments according to IEC 61439 (ed. 2) and 60058-2. Therefore, they are suitable for operation in extremely humid and corrosive environments.



Suitable for direct sunlight

PV-DC floating combiner boxes can be operated in direct sunlight without the need to install an additional sunshield. The pre-mounted PMMA cover also improves the performance of the system.



Suitable for PV systems in freshwater

The PV DC Floating Combiner Boxes can be operated in floating PV systems on freshwater surfaces. They have been extensively tested and are certified for long-term operation under these specific environmental conditions.

String Monitoring improves O&M activities reducing and the number of trips and site visits to pontoons. Identifying quickly failures at string level with the monitoring systems reduces the total cost of ownership and facilitates the entire operations of the plant throughout its entire lifetime.

The specially developed PMMA sunshade absorbs incident solar radiation and heat. Its glazed polymer surface increases the reflection index and efficiently deflects the incident radiation. This very effectively reduces the temperature inside the combiner box.

An air gap between the door housing and the PMMA cover ensures constant air convection. In this way, the combiner box and its components are reliably cooled.



Multivia cable glands ensure optimum watertightness. They reduce the number of mechanical parts and make the entire construction more robust.

The PMMA cover is fixed to the enclosure door with stainless steel blind rivets. The rivets are located outside the area of the door seal, so that the sealing function according to IP65 is reliably guaranteed at all times.

Ready for big challenges

PV DC Floating Combiner Boxes

Suitable for 1,500 V utility-scale projects

Our combiner boxes for floating applications are unique on the market. Only they can withstand the stress of harsh weather conditions with strong temperature fluctuations, high heat, and direct sunlight.

Easy to connect

Due to the pre-assembled PMMA cover, our combiner boxes do not require any additional preparation work during installation. The innovative PV connection makes the entire solution plug-and-play.

Low maintenance

Our combiner boxes are made of GRP and therefore do not need to be repainted regularly. A decisive advantage over metal housings.

Made for harsh environments

Whether temperature, humidity or corrosion: Extensive tests have proven our combiner boxes to withstand the harsh conditions on water surfaces, ensuring optimum functionality, and service life of all components. The air gap between door cover and housing provides constant ventilation to keep the temperature inside low.



PMMA cover and air gap



Multivia Cable Glands option

One solution – various differentiating features



Integrated cover: There is no need to install additional sun protection or shading elements.



Plug and play system: The door cover is already mounted by the manufacturer, so that the solution can be installed immediately after unpacking. A huge savings in work time – especially for floating installations.



Extensively tested: The solution meets the requirements for Severity B environments according to IEC 61439 (ed. 2), supplemented by a corrosion test with salt spray. The tougher test conditions ensure a longer service life of the floating solutions.



Reflective PMMA cover: The reflection of solar radiation is optimised by a coating, which significantly improves the thermal performance of our combiner boxes.



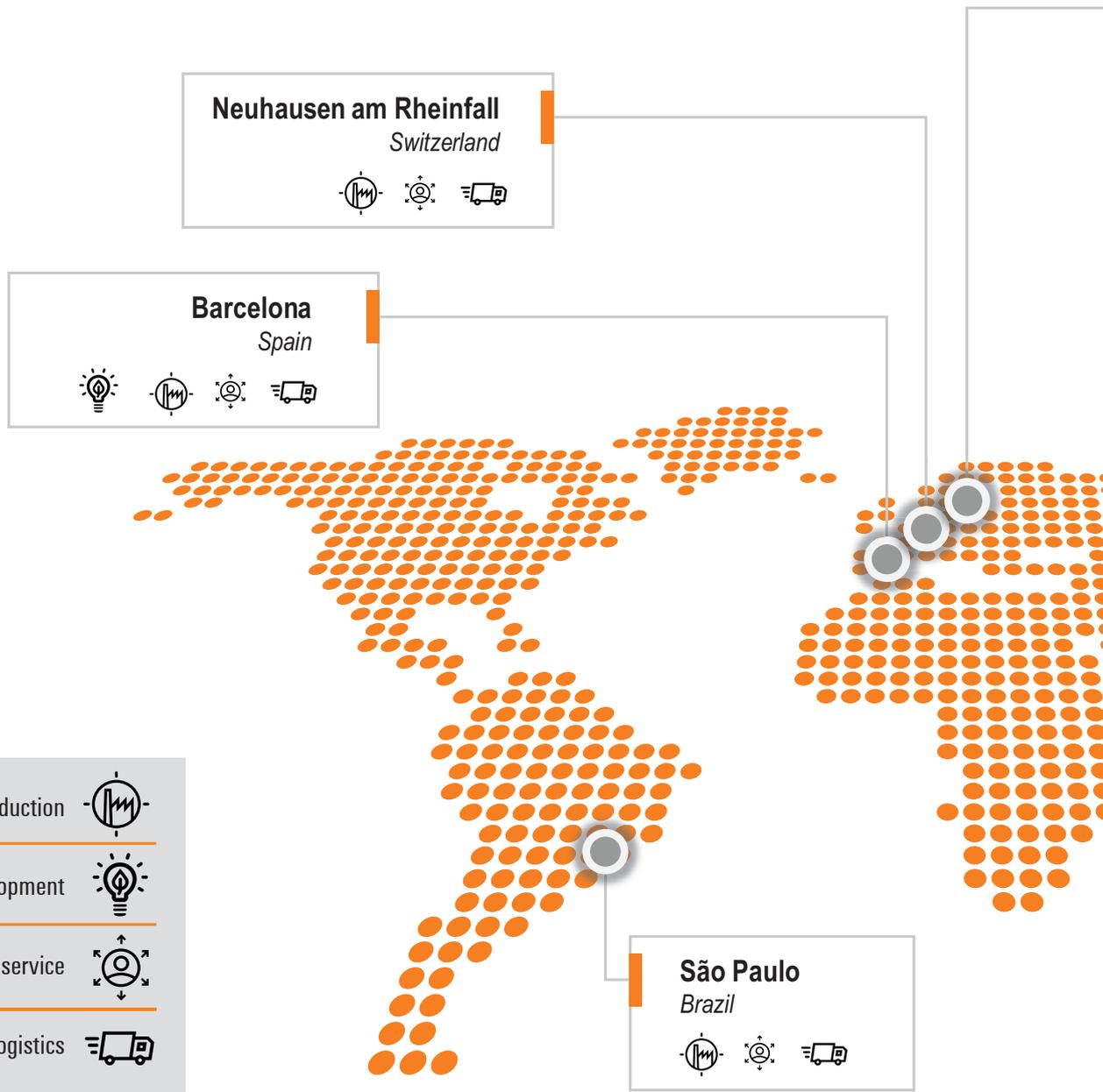
Fast delivery: High availability of standard products with shorter delivery time.



Increased watertightness: Optional solutions with Multivia cable glands further increase the watertightness of the combiner box.

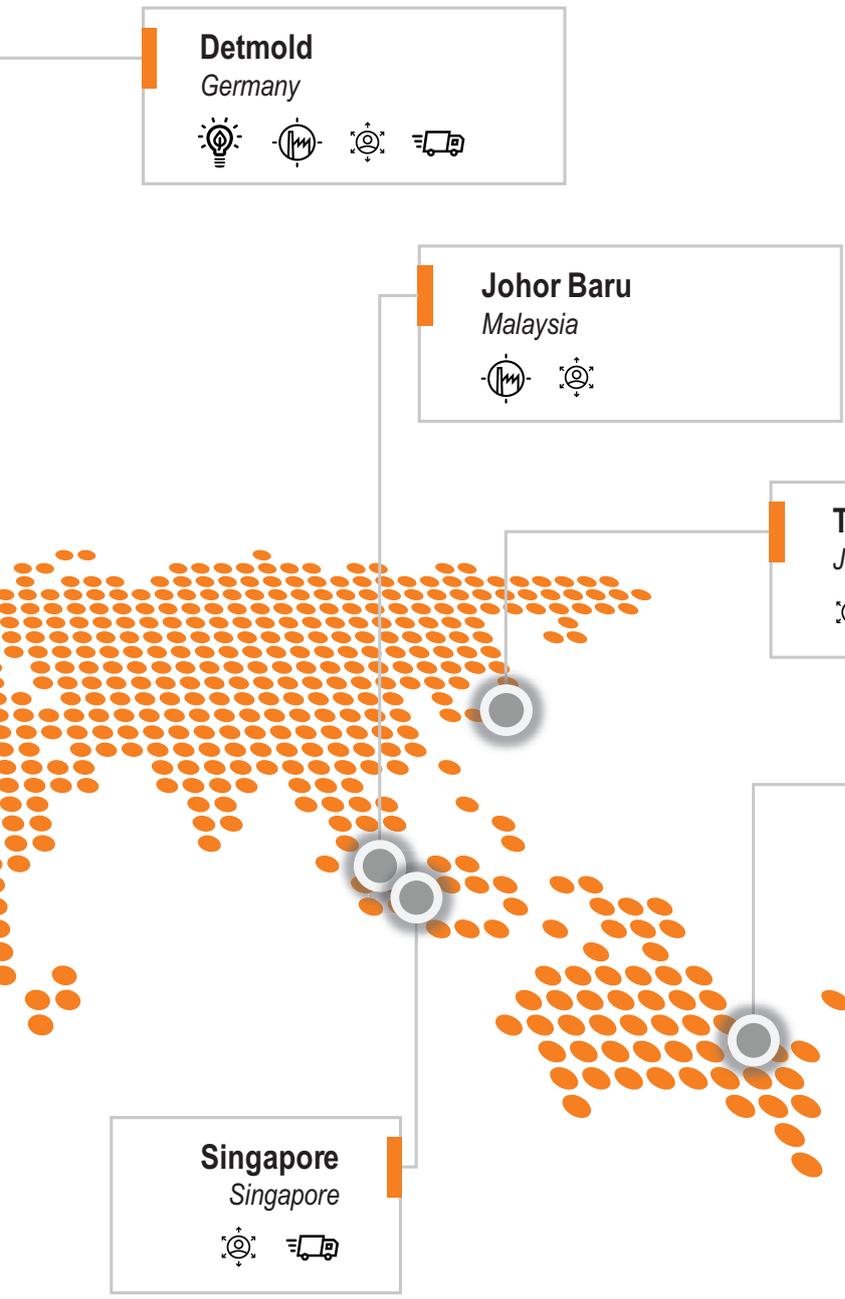
Our photovoltaic locations

Impressive in competence and experience



- Weidmüller has many years of experience in the field of PV applications
- We have been working with Spanish utilities and EPCs since 2007 and supported the upswing of the Spanish solar industry.

- We followed the development of the solar business all over the world – e.g. in Italy, France, the UK, India, Japan, Brazil, or Australia.
- We were among the main suppliers of string monitoring equipment and combiner boxes in Australia, Italy, the UK, Japan, South Korea, and Spain.



Worldwide Weidmüller logistics hubs

Sweden Malmö	Russia Moscow	Korea Seoul	UAE Sharjah
Italy Milano	USA Virginia	China Shanghai	India Bangalore
Turkey Istanbul	Germany Dortmund	Mexico Puebla	Canada Toronto

- We expanded our experience together with the different countries where government and administration pushed the PV business

- We have supplied our PV products all over the world for more than 13 years. Our experience, reliability, and quality have made us a major player in string monitoring technology.

PV combiner boxes for floating installations up to 1,500 V

Areas of application and conditions

The rapid growth in the number of large-scale PV systems is leading to a shortage of available land for solar energy in some countries. Nations with little land are even restricting the use of large-scale PV plants. Therefore, new areas must be developed for the installation of solar power plants in order to gain space for additional electrical power. Southeast Asia and Far Eastern regions such as Japan, Korea and Taiwan in particular are increasingly using water areas for their solar plants in order to meet their national energy plans – with the resulting need for DC combiner boxes for this field of application. To meet this special application area, Weidmüller has developed a complete range of combiner boxes for floating use on fresh water. They withstand high humidity, corrosive environments, and direct sunlight while lying horizontally (0° to 45°) on their back.

Areas and conditions of use:

- Floating solar PV systems on freshwater reservoirs, ponds, and lakes.
- Water surfaces at a minimum distance of 1 km from the sea or saline environments
- Solar system configurations with central inverters
- Monitored and non-monitored solutions (with single strings up to 16 inputs)
- Ambient temperatures up to a maximum of 50 °C
- IEC-61439-2-ed-2 compliant countries
- Direct solar radiation up to 1,000 W/m² with uniform incidence
- Ambient humidity up to 100 % (HR) with daily cycle



Special features

Various monitoring options

As standard, single strings with up to 16 inputs and a maximum I_{sc} of 10 A per input can be monitored. For monitoring solutions of more than 16 inputs, double line monitoring is possible.

Efficient double line monitoring

With double line monitoring, two lines can be monitored via one channel. This reduces the number of connections required, the amount of components in the enclosure, the size of the control cabinet and thus also the costs. The maximum I_{sc} per channel is 25 A.

Reduction of maintenance costs

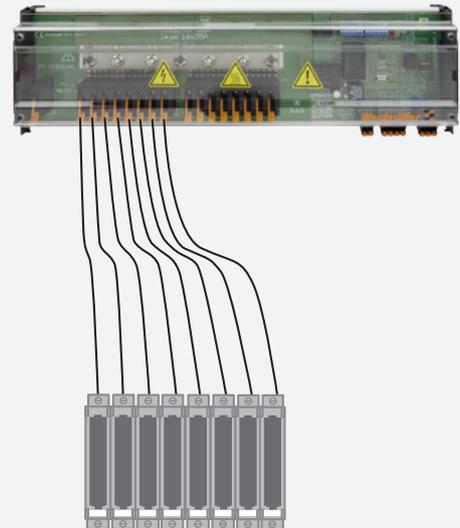
All wiring is done with PUSH-IN connectors. There is no need to check the torque as required with screw connections. No further connection testing is necessary during the entire service life of the system.

Reliable even under extreme conditions

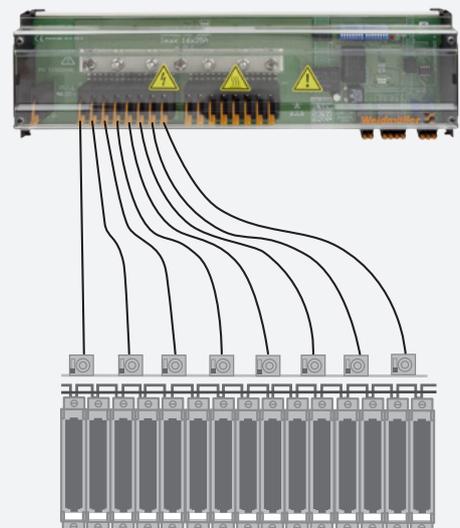
Transclinic 16i+ 1k5 H allows the measurement of 25 A per input even at 70 °C with an accuracy of $\pm 1\%$ (voltage/ current). This helps pair monitoring in combiner boxes in difficult environments by using only one string monitor and optimising the cost of the solution.

RS485 SPD on board

A specific overvoltage protection for RS485 interfaces is already integrated to increase robustness and reliability of the device throughout its operational lifetime.



Individual monitoring:
≤16 inputs
≤70 °C
I_{sc} ≤10 Amp



2-in-1 monitoring:
≤16 inputs
≤70 °C
I_{sc} ≤20 Amp

Technical data

Level 1 combiner box for potential-free applications

The new Level 1 PV combiner boxes are used to collect the output lines of individual strings and to connect them to an inverter or to a Level 2 combiner box (optional). The intelligent design has been specially adapted for use in floating solar installations. Advanced surge protectors, fuse links, and load break switches ensure reliable operation and optimum protection of the system. The PV combiner boxes meet the requirements of IEC 61439 (ed. 2) and ensure maximum reliability.

- 8 to 24 inputs
- Fuse holder in one or both poles (plus and minus)
- Surge protection device for DC system voltages
- String inputs with cable glands or MC4 terminals (or comparable box connectors)
- Wall mounting with metal lugs or for horizontal installation
- Single string monitoring for up to 16", double string monitoring for more than 16" available

Technical data

Application data	
Ambient temperature during operation	-20 °C to +50 °C
Intended installation location	Outdoors (< 1 km from the sea) and on freshwater surfaces
Conformity to standards	IEC 61439 (ed. 2)
Altitude above sea level installation	Up to 3,000 m (higher altitudes on request)
Country of installation	IEC-compliant countries higher altitudes on-demand
Electrical characteristics	
DC rated voltage (Un)	1,500 V DC
DC rated current per input (In)	10 A to 20 A per string input at 50 °C ambient temperature (depending on total number of strings per box)
DC earthing	Earth-free positive and negative, positive earthed, negative earthed
Switch-disconnector making and breaking capacity (acc. to IEC 60947-3)	400 A (DC21B 1,500 V)
Position of switch-disconnector, circuit-breaker or contactor handle	Direct access inside the enclosure
Overvoltage protection on DC connections	1,500 V DC, type I+II or type II
Enclosure	
Dimensions (H x W x D)	360 x 635 x 835 mm (laid horizontally)
Material	Glass-fibre reinforced polyester (GRP)
Protection class acc. to IEC 60529	IP65
Form factor	Enclosure with hinged door(s)
Mounting system	Horizontal installation on floating units (0-35° from horizontal)
Door cover material	PMMA - Methacrylate

Technical data

PV DC Floating combiner box



Feature	Description	Comments
Operating voltage	1,500 V	Max String Voc.
Max. Number of inputs	24	In principle 8 to 24 (most likely 16" and 20")
Input type	Single or double string	Fuse links up to 32 A rated current (fuses from 10 to 302 A)
Polarity protection	1 or 2 pole	Positively polarised protection (negatively earthed) or vice versa
Monitoring	yes	Single line monitoring up to 16" (double from 17" to 24")
Self-powered monitoring	yes	BKE power supply
Switch-disconnector	1,500 V - 400 A	Reduces power dissipation in the enclosure
Enclosure IP protection class	IP65	(enclosure made of GRFP) - A ria 86
Standards to be observed	IEC 61439 (ed. 2)	Complies with existing IEC standard (not UL) including IP2X and finger safety requirements
Cable inputs and outputs	Cable glands	Cable glands - input up to 16 mm ² , output up to 300 mm ²
Overvoltage protection level	Class II	Class I+II not available

Range of products and combinations

Type	Features	Order No.
PV 216SOF0C15V001TXPX15PFWWW	16 inputs, 15 A fuse, 2-pole fuse protection, 50 °C, Non Mon	8000057078
PV 216SOF3CXXV003T7P015PFJJP	16 inputs, No fuses, 2-pole fuse protection, 45 °C, Mon	8000057079
PV 216SOF3CXXV003TXPX15PFJJP	16 inputs, No fuses, 2-pole fuse protection, 45 °C, Non Mon	8000057080
PV 224SOF3CXXV003TXPX15PFJJP	24 inputs, No fuses, 2-pole fuse protection, 45 °C, Non Mon	8000057077
PV 220SOF3CXXV003TXPX15PFJJP	20 inputs, No fuses, 2-pole fuse protection, 45 °C, Non Mon	8000057081
PV 224SOF1C15V003TXPX15PFWWW	24 inputs, 15 A fuse, 1-pole fuse protection, 50 °C, Non Mon	8000057088
PV 216SOF0C15V003TXPX15PFWWW	16 inputs, 15 A fuse, 2-pole fuse protection, 50 °C, Non Mon	8000057082
PV 218SOF0C15V003TXPX15PFWWW	18 inputs, 15 A fuse, 2-pole fuse protection, 50 °C, Non Mon	8000057083
PV 216SOF0C15V003T7P015PFWWW	16 inputs, 15 A fuse, 2-pole fuse protection, 50 °C, Mon	8000057084
PV 224SOF1C15V003T7P015PFWWW	24 inputs, 15 A fuse, 1-pole fuse protection, 50 °C, Mon	8000057085
PV 224SOF0C15V003TXPX15PFWWW	24 inputs, 15 A fuse, 2-pole fuse protection, 50 °C, Non Mon	8000057086

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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 Interface GmbH & Co. KG
Klingenbergstraße 26
32758 Detmold, Germany
T +49 5231 14-0
F +49 5231 14-292083
www.weidmueller.com

Personal support can
be found on our website:
www.weidmueller.com/contact

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01/2021/SMC