



# PV Combiner Box Solutions

## Photovoltaic Protection Made Simple

# Anatomy of a Cooper Bussmann Combiner Box

PV Surge Protection Device (SPD) – Class I or Class II

Optional 240Vac SPD for internal power supply (monitored units)

240Vac/24Vdc or PV 1000/24Vdc power supply (for monitored units)

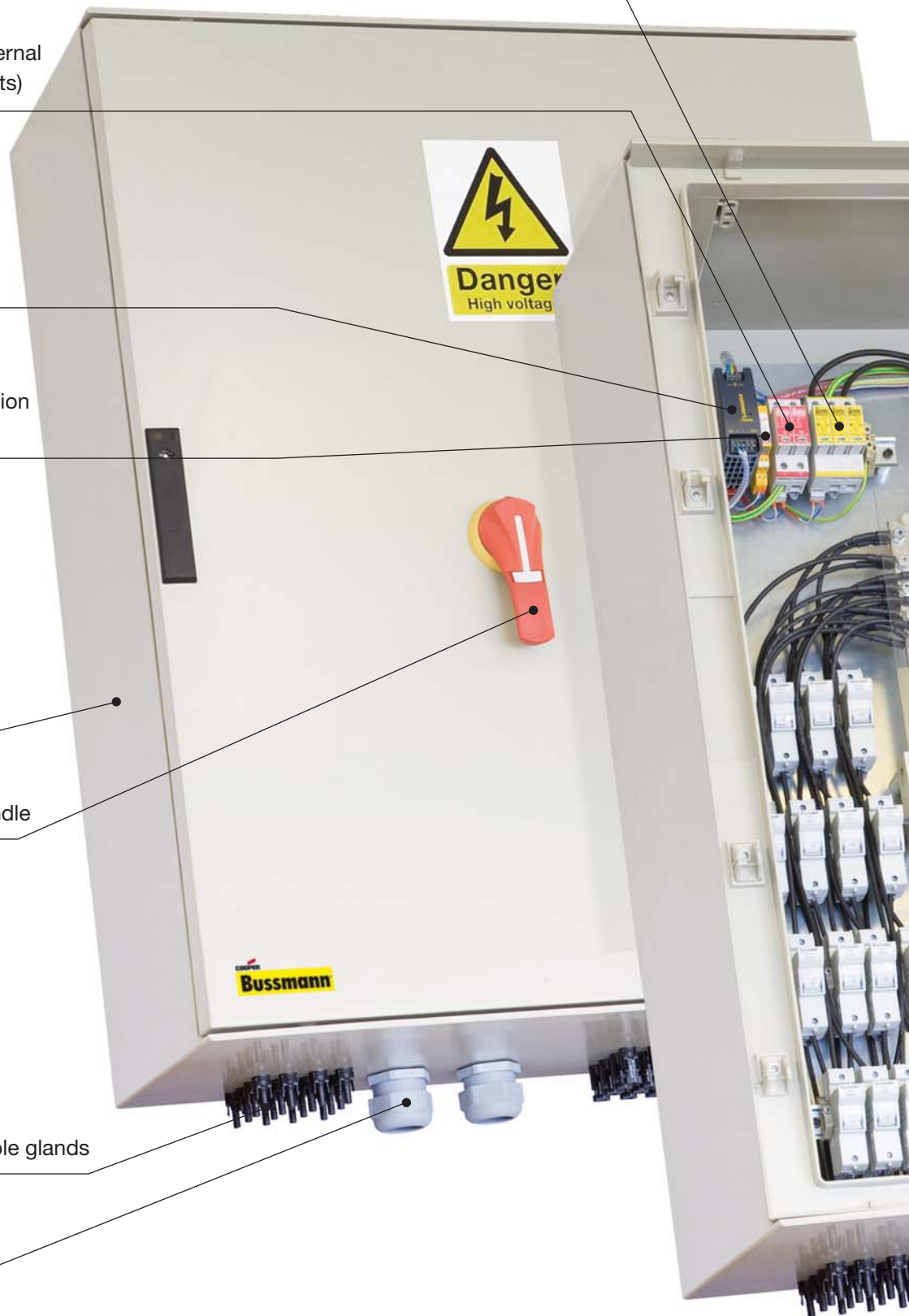
Optional SPD for 2-wire Modbus RS485 communication (monitored units)

IP65 GFR, painted steel or stainless steel enclosure

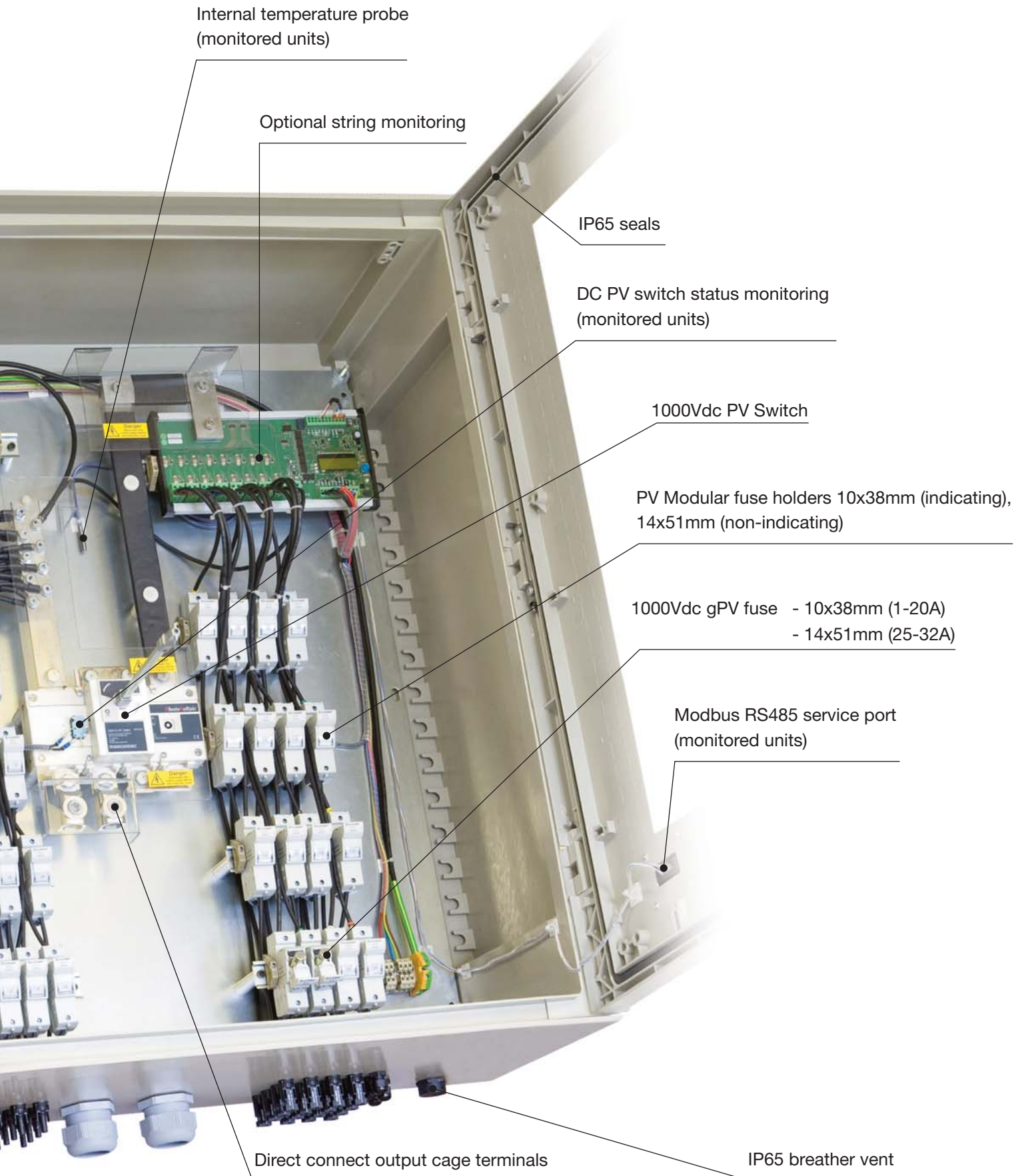
External interlock switch handle

PV string inputs, MC4 or cable glands

PV output cable glands







Internal temperature probe  
(monitored units)

Optional string monitoring

IP65 seals

DC PV switch status monitoring  
(monitored units)

1000Vdc PV Switch

PV Modular fuse holders 10x38mm (indicating),  
14x51mm (non-indicating)

1000Vdc gPV fuse - 10x38mm (1-20A)  
- 14x51mm (25-32A)

Modbus RS485 service port  
(monitored units)

Direct connect output cage terminals

IP65 breather vent

## Protect Your Investment

Today's PV market is rapidly evolving, creating fresh challenges for system builders, operators and owners. Cooper Bussmann recognises that, as PV systems have grown in size and complexity, the need to address specific protection requirements has increased in scope.

By working closely with solar system manufacturers and through coordinated research and development, Cooper Bussmann has developed a range of protection products dedicated to meet this need.

The new combiner box range offers a completely customised solution that provides both circuit protection and system monitoring for your PV power distribution network, protecting personnel, assets and your investment.

## Designed with Your System in Mind

Cooper Bussmann understands that no two PV installations are alike and that the harsh environmental conditions typically experienced can place tough demands on the components used.

The result is a fully customisable combiner box, engineered to meet the most stringent safety standards and long term reliability of any PV installation. With superior characteristics, such as intelligent thermal spacing and cable layout, the need for forced ventilation in extreme ambient temperatures is eliminated. With a choice of materials such as the IP65 rated, UV stabilised vented enclosures you can be sure that there is a Cooper Bussmann combiner box suited to any environment.

Our dedicated PV Field Application Engineers work with you to configure and design the optimum combiner box solution specific to your PV project needs. Options include protection system selection and configuration as well as the inclusion of system monitoring of each active string, system voltage, system temperature and critical component status.

With worldwide manufacturing capabilities and an integrated common system approach, we can locally develop and manufacture your custom combiner boxes within a competitive timeframe while maintaining the exceptional levels of quality for which Cooper Bussmann is widely recognised.



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## Built for You

We build to your specification. Our unique configuration process allows each combiner box to be built to your requirement. It features a part number system that helps identify and select the necessary components for the application. Further help is available from our team of specialist engineers.

Use the following steps to demonstrate how Cooper Bussmann creates a part number specific to your needs.

### Ce - Combiner Box Enclosure Type

The enclosure is critical for securely housing and protecting the internal components. All our combiner boxes are rated to IP65 and include breather drains making them suitable for tropical and sub-tropical environments. Depending on the geographic location and application, we are able to offer UV stabilised Glass Reinforced Polyester (GRP) with or without transparent polycarbonate window, painted steel and stainless-steel enclosures.



### nn - Number of Strings

The primary function of the combiner box is to group together incoming PV strings to achieve higher output currents. Depending on the scale and topology of the PV installation, differing numbers of PV input strings will be needed. The Cooper Bussmann combiner box can accommodate from 3 to 24 input strings.





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## xxA - String Current Rating

Depending on the PV panel type and system topology, the combiner box can accommodate a wide range of input currents. Built around the Cooper Bussmann gPV fuses, we can offer combiner boxes using 1-20A ratings in 10x38mm fuses and 25-32A ratings in 14x51mm fuses.

Each fuse is housed in a gPV rated fuse holder with the 10x38mm modular fuse holders benefiting from fuse status indication.



## yy - System Voltage

As with string current, the system voltage is largely dependent on panel selection and system topology. Depending on the type of PV system we can offer voltages from 600Vdc to 1000Vdc.

## p - String Protection Type

The type of PV installation design will influence the fuse protection configuration. We recommend both positive and negative fusing for maximum system protection, and our combiner boxes come as floating ground as standard. If required, we can also accommodate negative or positive only fusing.



## s - Switch

The DC disconnect switch plays an important role in ensuring the safe operation and maintenance of the combiner box. The Cooper Bussmann combiner box only uses true DC rated disconnect switches, giving confidence in repeated operations without the risk of fire or injury. In addition the switch handle is located on the outside. This allows the combiner box to be safely disconnected from the downstream load before maintenance work is carried out. The lockout feature of the switch handle also ensures safe PV isolation for maintenance of downstream components. Where the combiner box is used in configurations with a downstream disconnect it can be supplied without a switch.



## h - PV String Input Connection Type

Cooper Bussmann offers the choice of MC4 connectors to simplify installation and to create labour savings. The combiner box also features direct connect output cage terminals helping to make connection to the main grid cabling significantly easier. We offer a choice of bottom or side inputs as well as standard input cable glands to fulfil a wide range of installation configurations.



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## v - Over Voltage Protection (Surge Protective Devices SPDs)

The unique nature of PV installations makes them vulnerable to overvoltages and surges from lightning strikes and static discharges. As standard, we recommend fitting the minimum of a Class II PV SPD; however, in some instances the fitting of a Class I device may be necessary. The Class II device includes patented, fast acting Short Circuit Interrupting (SCI) technology, which adds an additional level of protection in the event of voltage surge.

Where PV system monitoring is selected additional protection of the 240Vac mains supply and Modbus wired communication lines may be required to safeguard the monitoring electronics from voltage surges.

Monitoring the status of the PV and 240Vac SPDs' health is also made simple with the inclusion of remote indication communication which integrates seamlessly with the combiner box monitoring system.

The replacement of activated surge devices is made easy thanks to the easyID™ visual indication and colour-coded plug and play modular design.



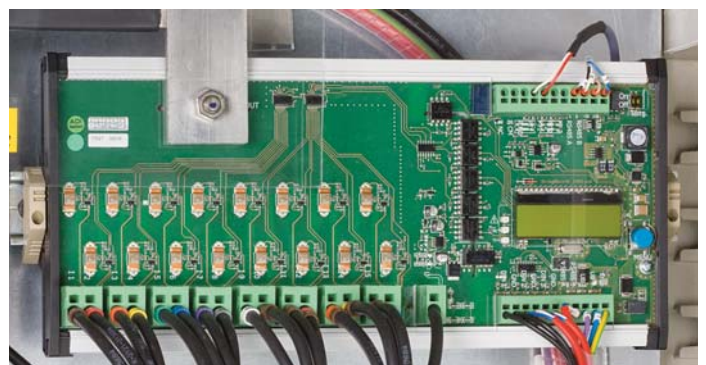
## mm - Monitoring System

Monitoring the health of a PV installation is a critical requirement in managing the system uptime, maximising productivity and efficiency.

Monitoring the current of each input string and system voltage enables the system operator to identify areas of concern and to take appropriate maintenance action. The Cooper Bussmann monitoring system has a number of options depending on the system requirements. Choose between Hall Effect or Shunt based monitoring units, and power supply options such as self-powered or externally powered. Our technical experts will work with you to identify the best solution based on the overall system design.

Conscious of the need for fast deployment and ease of system inspection, we have designed the Cooper Bussmann combiner box to include an external Modbus RS485 service port, allowing service engineers to programme or interrogate each unit without the need to disconnect from the grid or open the enclosure.

Integration with the PV installation SCADA system is made seamless with the use of industry standard Modbus communication protocols and the choice of standard 2-wire RS485 connection or wireless Zigbee or Cooper Bussmann industrial wireless system.



## Customer Assistance

### Customer Satisfaction Team

The Cooper Bussmann® Customer Satisfaction Team is available to answer questions regarding Cooper Bussmann products.

Europe calls can be made between:

Monday - Thursday 7.30 a.m. - 5.30 p.m. GMT  
Friday 7.30 a.m. - 5.00 p.m. GMT

The Customer Service Satisfaction Team can be reached via:

- Phone: 00 44 (0) 1509 882 600
- Fax: 00 44 (0) 1509 882 786
- Email: [bulesales@cooperindustries.com](mailto:bulesales@cooperindustries.com)

### C3 Cooper Customer Center

The Cooper C3 portal supports the following Cooper Divisions: Cooper B-Line, Cooper Bussmann, Cooper Crouse-Hinds, Cooper Lighting, Cooper Power Systems, Cooper Safety, and Cooper Wiring Devices.

Get started today at [www.cooperc3.com](http://www.cooperc3.com) by clicking Request User ID and Password.

- Easy to Navigate
- Simple to Use
- Real-Time Data

### Online Resources

Visit [www.cooperbussmann.com](http://www.cooperbussmann.com) for the following resources:

- Product cross reference
- Product profiles
- Online catalogues for the latest United States and European catalogues

### Application Engineering

Application Engineering assistance is available to all customers. The Application Engineering team is staffed by university-qualified electrical engineers who are available with technical and application support.

Europe calls can be made between:

Monday - Thursday 8.30 a.m. - 4.30 p.m. GMT  
Friday 8.30 a.m. - 4.00 p.m. GMT

Application Engineering can be reached via:

- Phone: 00 44 (0) 1509 882 699
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