

The Disconnecting Combiner Box

Technical Benefits and Cost Savings

Tech Note 002

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The Disconnecting Combiner Box contains a load-break rated, high power switch. Installers, maintenance crews, and first responders can now safely disconnect the solar array at the source.

The following technical and product discussion further outline how this product should be used, why the product presents superior options to other methodologies and describes how the product saves money at installation.



1. Disconnects DC at the source

Installers can now put the DC disconnects closer to the source, the photovoltaic Panels. This increases safety and serviceability by de-energizing at the array.

2. Space savings & orientation flexibility

Some roof tops and ground applications will not accept awkwardly sized disconnects with limited mounting orientations. The Disconnecting combiner not only integrates multiple components, it also increases mounting options. Designers and installers dealing with low profile racking systems or roofs with limited installation space will appreciate the space savings.

3. Load-break rated disconnecting

The load-break rated switch at the heart of the disconnecting combiner is capable of breaking the circuit with sufficient speed to eliminate "arc" formation between the contacts that is common in DC circuits. The load-break rating means this switch is rated for disconnecting it's full current rating for more than 6000 cycles.

4. Increased granularity

The disconnecting combiner disconnects its individual homerun conductors from the inverter DC bus. Traditional methods might disconnect up to three homeruns at a time. The increased granularity not only keeps more of the solar array working during service, resulting in higher overall production, it also decreases a lot of confusion during maintenance and increases overall system safety.

"The 8-pole disconnecting combiner provided a robust solution at lower cost for a highly space constrained project. Not only did it reduce overall costs, but it also provided the localized disconnect for safety.

Zack Zoller, Engineering Leader

"The disconnecting capability, in a compact and low cost form factor, is what separates the Blue Oak PV Products disconnecting combiner from traditional combiner boxes and other methods safety disconnects. "

Ryan Zahner, Engineering Leader

5. Traditional DC Combining

Previously, installers connected the series strings into combiner boxes placed throughout the installation for a combined homerun conductor which leads to the inverter. For increased safety and serviceability designers and engineers often include a DC disconnect switch between the combiner (with or without fuses) and the inverter. Hopefully that disconnect is placed close to the array where it may be accessed for maintenance to the solar array. An example of this traditional method installation is shown in Figure 1.

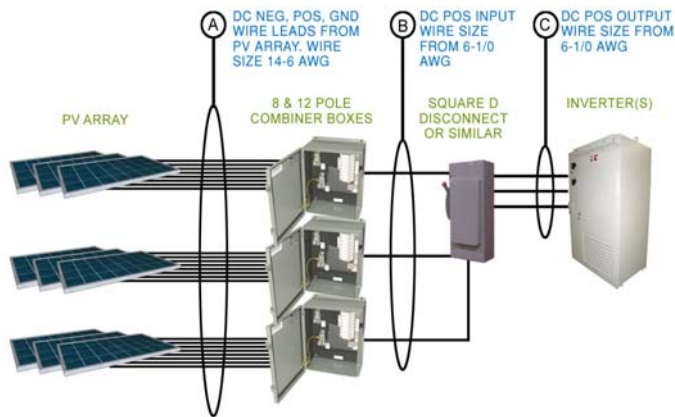


Figure 1 - Traditional Photovoltaic DC Circuit Design.

6. Contemporary DC Combining & Disconnecting

With the new disconnecting combiner boxes used in the same system, we have achieved a reduced component count, improved DC circuit safety and access, increased system granularity and greater operational flexibility. Figure 2 below shows the simplicity offered by this solution.

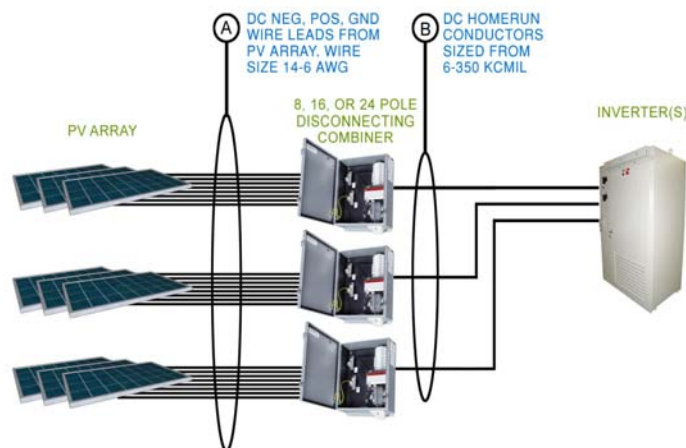


Figure 2 – Simplified Disconnecting Combiner Solution

7. Solar DC Design/Cost Comparison

The following cost comparison is representative of the savings achieved on a 250kW photovoltaic system. While there are many different design options and considerations that effect system cost, this comparison provides evidence that both time and money can be saved using Blue Oak PV Products' disconnecting combiner boxes.

	Traditional	Disconnecting
Number of Series Strings	98	
String Combiner	14ea. HCB8	7ea. HCB16-D
DC Disconnect	5ea. 100 Amp separate disconnects	-
Total Number of DC Side Components (requires additional labor and hardware to install)	19	7
Fused Inverter Input	15ea. 100A	7ea. 200A
Inverter	250 kW unit	
Estimated Total Combiner Box and Disconnect Cost	\$7,820	\$6,300
Labor Cost	\$1,520	\$560
Total Savings Estimate, per 250kW	\$2,480	

Table 1 - Case Study Comparison Table

8. Summary

In summary, we expect our DC Disconnecting Combiner Boxes to assist the photovoltaics industry in delivering photovoltaic systems at competitive costs while increasing system reliability and safety. Please contact us for additional information.