Solar Combiner Solutions

Providing the most complete offering of combiners, smart combiners, recombiners, disconnects and pass through boxes for your grid-tied solar applications.
Leading the way in Solar Technology
Cooper Crouse-Hinds® solar combiner boxes and disconnects for the solar market integrate a comprehensive line of electrical products with expert support, industry insights, and local availability to improve safety and productivity in the most demanding industrial, commercial and residential environments worldwide.

Solar Background Information
A solar array may be one panel or many in series, and may range from a single 12 volt panel to high voltage multi-panel arrays for grid-tie systems. Grid-tied systems can go as high as 1000 VDC, while battery systems are typically 12, 24, or 48 V.

Higher voltage systems (over 48 V) have different NEC code requirements than those for low voltage battery systems, and the two types are NOT interchangeable.

Cooper Crouse-Hinds Solar Combiners are designed for higher voltage circuits used in grid-tied applications. All meet NEC requirements, are made in accordance with UL requirements and are protected by Cooper Bussmann® families of fast-acting fuses specifically designed for the protection and isolation of photovoltaic strings.

Cooper Crouse-Hinds Solar Protection for Fiberglass Enclosures
The Cooper Crouse-Hinds solar protection formula provides the enclosure the strength and durability to provide long, dependable service even in the most demanding environmental conditions. Cooper Crouse-Hinds fiberglass enclosures retain gloss and color when exposed to harsh UV light, offer superior resistance to chemicals and are fire retardant.

A special UV absorber is added into this solar protection formula and works to absorb UV energy and release it without damaging the fiberglass enclosure thus providing increased protection of the polyester material and increased resistance to the damaging effects of UV radiation. For additional information on Cooper Crouse-Hinds Solar Protection, choose Fiberglass Enclosures from: http://www.crouse-hinds.com/contractorcorner

Typical Solar Grid System Diagram
(CCBF04 setup shown)

Cooper Crouse-Hinds Product Offering
Solar Combiners
Cooper Crouse-Hinds Solar Combiners are used to group input wires/circuits from several arrays and/or solar panels. The combined circuit results in fewer output circuits and combines them into one main bus or feed going to the inverter saving labor and material costs. Available with optional integral disconnect and DC string monitoring capabilities.

Solar Pass Through Boxes
Solar Pass Through Boxes are used in residential applications to provide a low profile, cost effective way to group input wires/circuits from several arrays and/or solar panels and transition from solar (PV) cable to traditional building wire. The Pass Through Box was designed for PV applications where over current protection is not necessary due to the low power rating of the PV string.

Solar Cord Grips
Solar Cord Grips are used in both commercial and residential grid-tied PV solar applications and are designed to accommodate the entry of multiple PV wires coming into a combiner or pass through box. The Solar Cord Grips provide mechanical strain relief as well as a liquid tight seal around the solar panel wires.

Solar Cable Assemblies
A comprehensive offering of solar cable assemblies are also available in molded to cable or mechanical termination configurations. Typical conductor size is #12 or #10. Available in standard or custom cable lengths, with or without an in-line fuse. Consult factory for more details.

Solar Recombiners
Cooper Crouse-Hinds Recombiner boxes are used in larger photovoltaic systems. A Recombiner box effectively groups the output wires from several combiner boxes into one main output feed which then goes to the inverter.

Solar Disconnects
The National Electrical Code® requires a disconnect switch which provides circuit interruption to the down stream inverter. The disconnect can be internally mounted in the combiner or externally mounted between the combiner and inverter. The disconnect switch can be located at one of two places: either inside the building nearest the point of entrance of the system conductors, or outside the building. If the solar disconnect is not located near the utility company’s meter, then a plaque is required by the front door stating where the solar disconnect is located.

®National Electrical Code is a registered trademark of the National Fire Protection Association, Inc.
Solar Combiners and Combiners with Integral Disconnects

Solar Combiners

Cooper Crouse-Hinds Solar Combiner Solutions are designed and built to provide long dependable service, lower installed costs and a wide range of options and accessories to meet demanding customer requirements. They are available in 1 to 48 input circuits, with a durable fiberglass (NEMA 4X) enclosure, engineered and manufactured to perform in the harshest environmental conditions. UL1741 Listed* as standard; providing peace of mind and plenty of wiring room for ease of installation.

Features

- cULus 1741 Listed* - UL File No. E330318
- Rated for 600 VDC - continuous duty
- Touch-Safe fuse holders and power distribution blocks for safe operation
- 90°C output terminals
- Fiberglass enclosures with captive stainless steel screws and formed-in-place polyurethane seamless gasket provided as standard
- Also available in NEMA 3R painted steel or NEMA 4X stainless steel
- Configured for positive and negative grounded arrays
- 1000VDC rated capability - consult factory
- Smart combiners available (DC string monitoring) - consult factory

*1-24 input circuits

Solar Combiners with Integral Disconnect

Cooper Crouse-Hinds Integral disconnects save material costs, installation time and labor by joining the combiner box and disconnect within one enclosure and eliminating the need for a disconnect in a separate enclosure. Combiners with integral disconnects available in 1-24 circuits and up to 400A.

Features

- Integral Disconnects available in 100A, 200A and 400A
- Constructed in accordance to UL 1741 Standards
- Rated for 600 VDC - continuous duty
- Touch-Safe fuse holders and power distribution blocks for safe operation
- 90°C output terminals
- Fiberglass enclosures with captive stainless steel screws and formed-in-place polyurethane seamless gasket provided as standard
- Also available in NEMA 3R painted steel or NEMA 4X stainless steel
- Configured for positive and negative grounded arrays
- 1000VDC rated capability - consult factory
- Smart combiners available (DC string monitoring) - consult factory
Solar Combiners and Combiners with Integral Disconnects

Ordering Information

Most commonly ordered configurations

### Combiner Boxes

<table>
<thead>
<tr>
<th>No. Of Strings</th>
<th>N4X Fiberglass</th>
<th>N3R Sheet Steel</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>CCBF04 F15</td>
<td>CCBS04 F15</td>
<td>4 string, 15A fused</td>
</tr>
<tr>
<td>6</td>
<td>CCBF06 SP</td>
<td>CCBS06 SP</td>
<td>6 string, 600VDC surge protection</td>
</tr>
<tr>
<td>10</td>
<td>CCBF10</td>
<td>CCBS10</td>
<td>10 string</td>
</tr>
<tr>
<td>12</td>
<td>CCBF12 F15</td>
<td>CCBS12 F15</td>
<td>12 string, 15A fused</td>
</tr>
</tbody>
</table>

### Combiner Boxes with Integral Disconnects

<table>
<thead>
<tr>
<th>No. Of Strings</th>
<th>N4X Fiberglass</th>
<th>N3R Sheet Steel</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>CCBF08 F15 DS100</td>
<td>CCBS08 F15 DS100</td>
<td>8 string, 15A fused, 100A integral disconnect</td>
</tr>
<tr>
<td>12</td>
<td>CCBF12 F15 DS200</td>
<td>CCBS12 F15 DS200</td>
<td>12 string, 15A fused, 200A integral disconnect</td>
</tr>
<tr>
<td>16</td>
<td>CCBF16 DS200 SP</td>
<td>CCBS16 DS200 SP</td>
<td>16 string, 200A integral disconnect, 600VDC surge protection</td>
</tr>
<tr>
<td>24</td>
<td>CCBF24 F15 DS200</td>
<td>CCBS24 F15 DS200</td>
<td>24 string, 15A fused, 200A integral disconnect</td>
</tr>
</tbody>
</table>

### Catalog Numbering System

Use the table below to build a catalog number for a combiner configuration that matches your specific project requirement.

#### BASE SOLAR COMBINER

<table>
<thead>
<tr>
<th>Enclosure Type</th>
<th>Number of Input Circuit</th>
<th>Fused</th>
<th>Fuse Amperage</th>
<th>Integral Disconnect</th>
<th>Trip Rating for Integral Disconnect</th>
<th>Surge Protection</th>
<th>DC Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCBF (Fiberglass N4X)</td>
<td>01 (1 input circuit)</td>
<td>F</td>
<td>06 (8A fuse)</td>
<td>DS (Disconnect Switch for use with 1 - 48 input circuits)</td>
<td>100 (100A)</td>
<td>SP</td>
<td>DCM</td>
</tr>
<tr>
<td>CCBF (Painted Steel N3R)</td>
<td>02 (2 input circuit)</td>
<td></td>
<td>10 (10A fuse)</td>
<td>BLANK (No integral disconnect)</td>
<td>200 (200A)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CCBF (Stainless Steel N4X)</td>
<td>03 (3 input circuit)</td>
<td></td>
<td>12 (12A fuse)</td>
<td>BLANK (No integral disconnect)</td>
<td>400 (400A)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CCBF (Stainless Steel N4X)</td>
<td>04 (4 input circuit)</td>
<td>F (Fuses provided)</td>
<td>15 (15A fuse)</td>
<td>BLANK (No integral disconnect)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CCBF (Stainless Steel N4X)</td>
<td>05 (5 input circuit)</td>
<td>BLANK (Fuses not supplied by factory)</td>
<td></td>
<td></td>
<td>SP (Surge protection)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CCBF (Stainless Steel N4X)</td>
<td>06 (6 input circuit)</td>
<td>Offered up to 48 circuits</td>
<td></td>
<td></td>
<td>• UL 1449 3rd Edition Listed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CCBFS (Fiberglass N4X)</td>
<td>07 (7 input circuit)</td>
<td></td>
<td></td>
<td></td>
<td>• 40kA Total Discharge Current (8/20 us)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CCBFS (Fiberglass N4X)</td>
<td>08 (8 input circuit)</td>
<td></td>
<td></td>
<td></td>
<td>• 30kA/600VDC Interrupting Rating</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CCBFS (Fiberglass N4X)</td>
<td>09 (9 input circuit)</td>
<td></td>
<td></td>
<td></td>
<td>Small size takes up minimal space in enclosure (Only 2 inches wide)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CCBFS (Fiberglass N4X)</td>
<td>10 (10 input circuit)</td>
<td></td>
<td></td>
<td></td>
<td>BLANK (No surge protection)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CCBFS (Stainless Steel N4X)</td>
<td>11 (11 input circuit)</td>
<td></td>
<td></td>
<td></td>
<td>BLANK (No surge protection)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CCBFS (Stainless Steel N4X)</td>
<td>12 (12 input circuit)</td>
<td></td>
<td></td>
<td></td>
<td>BLANK (No surge protection)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Cooper Bussmann fuses recommended
* DCM fuses for 600VDC combiner boxes
* PV fuses for 1000VDC combiner boxes
Solar Pass Through Boxes

Cooper Crouse-Hinds Solar Pass Through Boxes are used in residential applications to provide a low profile, cost effective way to group input wires/circuits from several arrays and/or solar panels and transition from solar (PV) cable to traditional building wire. The Pass Through Box was designed for PV applications where over current protection is not necessary due to the low power rating of the PV string.

Features

- Constructed in accordance with UL 1741 standards
- Rated for 600 VDC - continuous duty
- Factory installed multi-hole solar cord grip provides dependable secure wire termination to enclosure and saves field installation – eliminating the need for enclosure drilling – saving time & labor
- Fiberglass enclosures with captive stainless steel screws and formed-in-place polyurethane seamless gasket provided as standard
- Available in N3R sheet steel enclosures – consult factory
- Light weight design offers easy mounting capabilities. Optional mounting feet are available for increased customer flexibility - consult factory

Ordering Information

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPBF03</td>
<td>3 Circuit Pass Through Box</td>
</tr>
<tr>
<td>CPBF04</td>
<td>4 Circuit Pass Through Box</td>
</tr>
</tbody>
</table>

Solar Non-Metallic Cord Grips

Cooper Crouse-Hinds Solar Cord Grips are used in commercial and residential grid-tied PV solar applications and are designed to accommodate the entry of multiple PV wires into a combiner or pass through box. The Solar Cord Grips provide mechanical strain relief as well as a liquid tight seal around each individual solar panel wire or string.

Features

- Multi-hole cord grip to allow for entry of multiple PV wires
- Solar cord grips offer customer flexibility by allowing the termination from 1 to 13 PV wires in a single connector
- Skinned over glands provide a durable, liquid tight seal around the wires
- No disassembly required for installation
- Accommodates USE-2, 12AWG and 10AWG wire
- Temperature rating: -22°F (-30°C) to 212°F (100°C) to meet the most demanding environmental conditions

Ordering Information

<table>
<thead>
<tr>
<th>Catalog Number</th>
<th>Size</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCGS39</td>
<td>1&quot;</td>
<td>9 Hole Solar Cord Grip</td>
</tr>
<tr>
<td>NCGS413</td>
<td>1-1/4”</td>
<td>13 Hole Solar Cord Grip</td>
</tr>
</tbody>
</table>

Certifications and Compliances

- UL / cUL Listed
- IP68
- Flammability rating: 94-V2
Solar Cable Assemblies

A comprehensive offering of solar cable assemblies are also available in molded to cable or mechanical termination configurations. Typical conductor size is #12 or #10. Available in standard or custom cable lengths, with or without an in-line fuse. It is constructed of stranded copper conductors with single layer XLP insulation, rated to 90 degrees C in exposed or concealed, wet or dry locations, and sunlight and direct burial resistant per the NEC and CEC requirements.

Consult factory for ordering information.

Solar Recombiner

Recombiner boxes are used in larger photovoltaic systems. A Recombiner box effectively groups the output wires from several combiner boxes into one main output feed which then goes to the inverter. Cooper Bussmann PVS-R family of fast acting fuses are recommended for circuit protection in Cooper Crouse-Hinds recombiner boxes.

Consult factory for ordering information.

Heavy Duty Disconnect Switches

Cooper Crouse-Hinds Solar Disconnects are used as a disconnecting means, to meet NEC® code requirements and are rated for 600 VDC. These stand alone disconnects are sold separately.

Features

- Switches are heavy duty 3-Pole, with visible blades; a quick make-and-break mechanism with reinforced, positive pressure type blade and jaw construction. Fusible types have fuse clips with steel reinforcing springs of positive pressure type. Pressure connectors are used for wire connectors.
- Switch enclosure covers are interlocked with the body and operating mechanism and cannot be opened when the switch is closed (“ON”). When the switch is open (“OFF”), the switch cannot be put in a closed (“ON”) position with the door open.
- The switch operating handle may be padlocked in the “ON” or “OFF” position. In addition, the interlock construction has been designed to allow the door of the unit to be padlocked. This feature allows operation while preventing unqualified or unauthorized entry.

Electrical Rating Ranges

- 3 and 4† Pole; fusible or non-fusible; 250 VDC; 600 VDC
- 30, 60, 100, 200 or 400 amperes†

Ordering Information

<table>
<thead>
<tr>
<th>Heavy Duty Disconnect Switch - 600 VDC 3-Pole</th>
<th>30 Amp</th>
<th>60 Amp</th>
<th>100 Amp</th>
<th>200 Amp</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sheet Steel</td>
<td>Fiberglass</td>
<td>Sheet Steel</td>
<td>Fiberglass</td>
</tr>
<tr>
<td>Catalog Number - Fusible</td>
<td>CH361R</td>
<td>CH361F</td>
<td>CH362R</td>
<td>CH362F</td>
</tr>
<tr>
<td>Catalog Number - Non-fusible</td>
<td>CHU361R</td>
<td>CHU361F</td>
<td>CHU362R</td>
<td>CHU362F</td>
</tr>
</tbody>
</table>

† For 4-Pole, 400 Amp or disconnect switches in stainless steel enclosure - Consult Factory.
## Technical Information

### Combiner Technical Information

<table>
<thead>
<tr>
<th># of Inputs</th>
<th>CCBF</th>
<th>CCBF</th>
<th>CCBF</th>
<th>CCBF</th>
<th>CCBF</th>
<th>CCBF</th>
<th>CCBF</th>
<th>CCBF</th>
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<th>CCBF</th>
<th>CCBF</th>
<th>CCBF</th>
<th>CCBF</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>02</td>
<td>104</td>
<td>112</td>
<td>120</td>
<td>128</td>
<td>136</td>
<td>144</td>
<td>152</td>
<td>160</td>
<td>168</td>
<td>176</td>
<td>184</td>
<td>192</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03</td>
<td>66.67</td>
<td>71.79</td>
<td>76.92</td>
<td>82.05</td>
<td>87.18</td>
<td>92.31</td>
<td>97.44</td>
<td>102.56</td>
<td>107.69</td>
<td>112.82</td>
<td>117.95</td>
<td>123.08</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Combiner Dimensional Information - Base Combiners Only

<table>
<thead>
<tr>
<th># of Input Circuits</th>
<th>Enclosure Size Inches (HxWxD)</th>
<th>Overall Dimensions Inches (HxWxD)</th>
<th>Inside Dimensions Inches (HxWxD)</th>
<th>Mounting Dimensions Inches (HxW)</th>
<th>Approximate Weight (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-6</td>
<td>12x10x5</td>
<td>13.56 x 11.43 x 5.21</td>
<td>11.79 x 9.80 x 4.94</td>
<td>12.75 x 8.00</td>
<td>10</td>
</tr>
<tr>
<td>7-12</td>
<td>16x14x6</td>
<td>17.53 x 15.46 x 6.23</td>
<td>15.63 x 13.60 x 5.94</td>
<td>16.75 x 12.00</td>
<td>18</td>
</tr>
<tr>
<td>13-20</td>
<td>18x16x8</td>
<td>19.62 x 17.61 x 8.82</td>
<td>17.69 x 15.69 x 8.45</td>
<td>18.88 x 12.00</td>
<td>27</td>
</tr>
<tr>
<td>21-24</td>
<td>20x16x8</td>
<td>22.00 x 17.68 x 8.83</td>
<td>19.72 x 15.72 x 8.45</td>
<td>21.25 x 10.00</td>
<td>33</td>
</tr>
<tr>
<td>25-28</td>
<td>24x20x8</td>
<td>27.00 x 21.24 x 9.90</td>
<td>24.05 x 20.39 x 9.25</td>
<td>25.75 x 14.00</td>
<td>47</td>
</tr>
<tr>
<td>29-37</td>
<td>30x20x6</td>
<td>32.86 x 20.99 x 7.89</td>
<td>29.90 x 20.14 x 7.23</td>
<td>30.75 x 14.25</td>
<td>60</td>
</tr>
<tr>
<td>38-48</td>
<td>36x30x8</td>
<td>39.31 x 32.50 x 10.05</td>
<td>36.31 x 31.69 x 9.36</td>
<td>38.13 x 23.88</td>
<td>112</td>
</tr>
</tbody>
</table>
For more information:
If further assistance is required, please contact an authorized Cooper Crouse-Hinds Distributor,
Sales Office, or Customer Service Department.

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