



Solar Combiner Solutions

Providing the most complete offering of combiners, smart combiners, recombiners, disconnects and pass through boxes for your grid-tied solar applications.

COOPER Crouse-Hinds



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

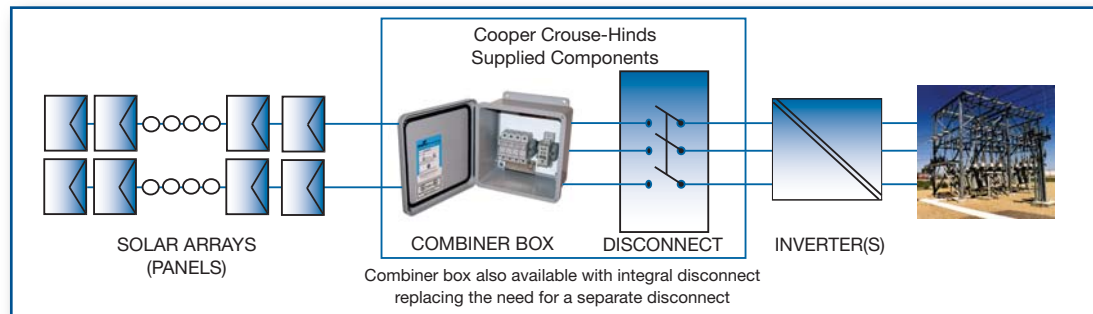
The Cooper Crouse-Hinds solar protection formula provides the enclosure the strength and durability to provide long, dependable service even in the most demanding environmental conditions. Cooper Crouse-Hinds fiberglass enclosures retain gloss and color when exposed to harsh UV light, offer superior 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 buss 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

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



No. Of Strings	Catalog Number		Description
	N4X Fiberglass	N3R Sheet Steel	
4	CCBF04 F15	CCBS04 F15	4 string, 15A fused
6	CCBF06 SP	CCBS06 SP	6 string, 600VDC surge protection
10	CCBF10	CCBS10	10 string
12	CCBF12 F15	CCBS12 F15	12 string, 15A fused

Combiner Boxes with Integral Disconnects



No. Of Strings	Catalog Number		Description
	N4X Fiberglass	N3R Sheet Steel	
8	CCBF08 F15 DS100	CCBS08 F15 DS100	8 string, 15A fused, 100A integral disconnect
12	CCBF12 F15 DS200	CCBS12 F15 DS200	12 string, 15A fused, 200A integral disconnect
16	CCBF16 DS200 SP	CCBS16 DS200 SP	16 string, 200A integral disconnect, 600VDC surge protection
24	CCBF24 F15 DS200	CCBS24 F15 DS200	24 string, 15A fused, 200A integral disconnect

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		WITH OPTIONAL FACTORY SUPPLIED FUSES		WITH OPTIONAL INTEGRAL DISCONNECT		W/OPTIONAL SURGE PROTECTION	DC MONITORING
CCBF	12	F	15	DS	200	SP	DCM
Enclosure Type	Number of Input Circuit	Fused	Fuse Amperage	Integral Disconnect	Trip Rating for Integral Disconnect	Surge Protection	DC Monitoring
CCBF (Fiberglass N4X) CCBS (Painted Steel N3R) CCBSS (Stainless Steel N4X)	01 (1 input circuit) 02 (2 input circuit) 03 (3 input circuit) 04 (4 input circuit) 05 (5 input circuit) 06 (6 input circuit) Offered up to 48 circuits	F (Fuses provided) BLANK (Fuses not supplied by factory) <ul style="list-style-type: none"> Cooper Bussmann fuses recommended - DCM fuses for 600VDC combiner boxes - PV fuses for 1000VDC combiner boxes 	08 (8A fuse) 10 (10A fuse) 12 (12A fuse) 15 (15A fuse) BLANK (Fuses not provided by factory)	DS (Disconnect Switch for use with 1 - 48 input circuits) BLANK (No integral disconnect)	100 (100A) 200 (200A) 400 (400A) BLANK (No integral disconnect)	SP (Surge protection) <ul style="list-style-type: none"> UL 1449 3rd Edition Listed 40kA Total Discharge Current (8/20 us) 30kA/600VDC Interrupting Rating Small size takes up minimal space in enclosure (Only 2 inches wide) BLANK (No surge protection)	DCM (DC monitoring units installed) BLANK (No DC monitoring)

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

Catalog Number	Description
CPBF03	3 Circuit Pass Through Box
CPBF04	4 Circuit Pass Through Box

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

Catalog Number	Size	Description
NCGS39	1"	9 Hole Solar Cord Grip
NCGS413	1-1/4"	13 Hole Solar Cord Grip

Certifications and Compliances

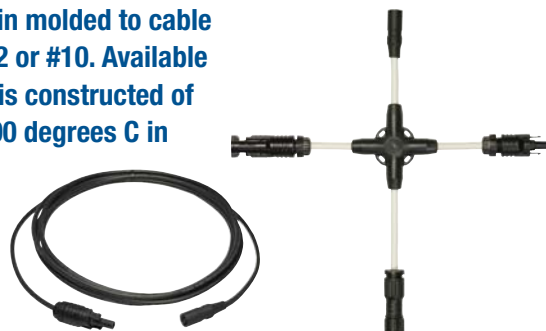
- UL / cUL Listed
- IP68
- Flammability rating: 94-V2

Solar Cable Assemblies, Recoiners and Disconnect Switches

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 Recoiner

Recombiner boxes are used in larger photovoltaic systems. A Recoiner 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

Heavy Duty Disconnect Switch - 600 VDC 3-Pole	30 Amp		60 Amp		100 Amp		200 Amp	
	Sheet Steel	Fiberglass	Sheet Steel	Fiberglass	Sheet Steel	Fiberglass	Sheet Steel	Fiberglass
Catalog Number - Fusible	CH361R	CH361F	CH362R	CH362F	CH363R	CH363F	CH364R	CH364F
Catalog Number - Non-fusible	CHU361R	CHU361F	CHU362R	CHU362F	CHU363R	CHU363F	CHU364R	CH364F

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

Combiner Technical Information

Number of input circuits	CCBF_	CCBS_	CCBF_	CCBS_	CCBF_	CCBS_	CCBF_	CCBS_	CCBF_	CCBS_	CCBF_	CCBS_	CCBF_	CCBS_	CCBF_	CCBS_	CCBF_	CCBS_	CCBF_	CCBS_	CCBF_	CCBS_		
	01	02	03	04	05	06	07	08	09	10	11	12												
Maximum Input Fuse Rating (A)	15	15	15	15	15	15	15	15	15	15	15	15												
Max. Continuous Op Current (A) Using Max Input Fuse	12	24	36	48	60	72	84	96	108	120	132	120												
SCCR at 600VDC (A)	7.69	15.38	23.08	30.77	38.46	46.15	53.85	61.54	69.23	76.92	84.62	76.92												
Max Voltage (VDC)	600						600																	
Operating Voltage Range - Combiner Only(VDC)	0-600						0-600																	
Pos Input Wire Size	#8-#18 AWG						#8-#18 AWG																	
Neg Input Wire Size	#10-#14 AWG						#4-#14 AWG																	
Pos Output Wire Size	1/0-#10 AWG						350kcmil-#4 AWG																	
Neg Output Wire Size	2/0-#8 AWG						500kcmil-#6 AWG						350kcmil-#4 AWG											
Ground Output Wire Sizes	#4-#14 AWG						250-#6 AWG																	
Enc Nema Rating	4X	3R	4X	3R	4X	3R	4X	3R	4X	3R	4X	3R	4X	3R	4X	3R	4X	3R	4X	3R	4X	3R	4X	3R
Enclosure Size	12X10 X06	12X10 X05	12X10 X06	12X10 X05	12X10 X06	12X10 X05	12X10 X06	12X10 X05	12X10 X06	12X10 X05	12X10 X06	12X10 X05	16X14 X06	16X16 X06	16X14 X06	16X16 X06	16X14 X06	16X16 X06	16X14 X06	16X16 X06	16X14 X06	16X16 X06	16X14 X06	16X16 X06
Max # of inputs	6						12																	

Number of input circuits	CCBF_	CCBS_	CCBF_	CCBS_	CCBF_	CCBS_	CCBF_	CCBS_	CCBF_	CCBS_	CCBF_	CCBS_	CCBF_	CCBS_	CCBF_	CCBS_	CCBF_	CCBS_	CCBF_	CCBS_	CCBF_	CCBS_		
	13	14	15	16	17	18	19	20	21	22	23	24												
Maximum Input Fuse Rating (A)	15	15	15	15	15	15	15	15	15	15	15	15												
Max Continuous Op Current (A) Using Max Input Fuse	104	112	120	128	136	144	152	160	168	176	184	192												
SCCR at 600VDC (A)	66.67	71.79	76.92	82.05	87.18	92.31	97.44	102.56	107.69	112.82	117.95	123.08												
Max Voltage (VDC)	600						600																	
Operating Voltage Range - Combiner Only(VDC)	0-600						0-600																	
Pos Input Wire Size	#8-#18 AWG						#8-#18 AWG																	
Neg Input Wire Size	14 AWG ONLY						14 AWG ONLY																	
Pos Output Wire Size	350kcmil-#4 AWG						350kcmil-#4 AWG						350kcmil-#4 AWG											
Neg Output Wire Size	350kcmil-#4 AWG						350kcmil-#4 AWG						350kcmil-#4 AWG											
Grnd Output Wire Sz	250-#6 AWG						250-#6 AWG																	
Enc Nema Rating	4X	3R	4X	3R	4X	3R	4X	3R	4X	3R	4X	3R	4X	3R	4X	3R	4X	3R	4X	3R	4X	3R	4X	3R
Enclosure Size	18X16 X08	18X18 X06	18X16 X08	18X18 X06	18X16 X08	18X18 X06	18X16 X08	18X18 X06	18X16 X08	18X18 X06	18X16 X08	18X18 X06	18X16 X08	18X18 X06	18X16 X08	18X18 X06	20X16 X08	20X16 X06	20X16 X08	20X16 X06	20X16 X08	20X16 X06	20X16 X08	20X16 X06
Max # of inputs	20						24																	

Combiner Dimensional Information - Base Combiners Only

# of Input Circuits	Enclosure Size Inches (HxWxD)	Overall Dimensions Inches (HxWxD)	Inside Dimensions Inches (HxWxD)	Mounting Dimensions Inches (HxW)	Approximate Weight (lbs)
1-6	12x10x5	13.56 x 11.43 x 5.21	11.79 x 9.80 x 4.94	12.75 x 8.00	10
7-12	16x14x6	17.53 x 15.46 x 6.23	15.63 x 13.60 x 5.94	16.75 x 12.00	18
13-20	18x16x8	19.62 x 17.61 x 8.82	17.69 x 15.69 x 8.45	18.88 x 12.00	27
21-24	20x16x8	22.00 x 17.68 x 8.83	19.72 x 15.72 x 8.45	21.25 x 10.00	33
25-28	24x20x8	27.00 x 21.24 x 9.90	24.05 x 20.39 x 9.25	25.75 x 14.00	47
29-37	30x20x6	32.86 x 20.99 x 7.89	29.90 x 20.14 x 7.23	30.75 x 14.25	60
38-48	36x30x8	39.31 x 32.50 x 10.05	36.31 x 31.69 x 9.36	38.13 x 23.88	112

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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