Solar Recombiner, Array Fuse, Disconnect Box
CRB, CAFB, CDB
Installation & Maintenance Information

COOPER Crouse-Hinds
IF 1637

IMPORTANT SAFETY INSTRUCTION

SAVE THESE INSTRUCTIONS FOR FUTURE REFERENCE

SAVE THESE INSTRUCTIONS - This manual contains important instructions for Solar Recombiner Boxes that shall be followed during installation and maintenance for the CRB Series.

⚠ WARNING ⚠ AVERTISSEMENT

To avoid the risk of fire or electric shock, verify all electrical connections to specified torque requirements upon installation (See Table 1).

Pour éviter les risques d'incendie ou de choc électrique, vérifiez toutes les connexions électriques à couples spécifiés lors de l'installation (Vois Table 1).

⚠ WARNING ⚠ AVERTISSEMENT

To avoid the risk of fire or electric shock, do not connect or disconnect wires to the recombiner box when current from the modules or an external source is present. PV modules produce direct current (DC) when the module is under load. Direct current will arc across gaps and may cause injury or death if improper connection or disconnection is made.

Pour éviter les risques d'incendie ou de choc électrique, ne pas connecter ou déconnecter les fils de la boîte de combinaison lorsque le courant des modules ou une source externe est présent. Modules PV produisent du courant continu (DC) lorsque le module est en charge. Le courant continu sera arc à travers les lacunes et peut causer des blessures ou la mort si mauvaise connexion ou de déconnexion.

⚠ WARNING ⚠ AVERTISSEMENT

To avoid the risk of fire or electric shock, this product should be installed, inspected,and maintained by a qualified electrician only, in accordance with all electrical codes.

Pour éviter les risques d'incendie ou de choc électrique, ce produit doit être installé, inspecté et entretenu par un électricien qualifié, conformément aux codes électriques.

1.0 OVERVIEW

Cover all modules in the PV array with dark, opaque material before making electrical connections to the recombiner box or an approved disconnecting / de-energizing means from the panels. All U.S. installations must be performed in compliance with the National Electrical Code (NEC), ANSI/NFPA 70 and applicable local codes. Cooper Crouse-Hinds Recombiner Boxes comply with the National Electrical Code.

⚠ WARNING ⚠ AVERTISSEMENT

To avoid the risk of electric shock, remove all metallic jewelry prior to installing this product to reduce the chance of accidental exposure to live circuits.

Pour éviter tout risque de choc électrique, enlevez tout bijou métallique avant d'installer ce produit afin de réduire les risques d'exposition accidentelle à des circuits.

All Canadian installations (600V systems only) shall conform to Canadian Electrical Code Part I CSA 22.2 No. 107.1. Installation should be performed only by authorized personnel. The recombiner boxes comply with UL1741 safety listing for continuous rated current operation at range of -40°C to 50°C.

2.0 INTRODUCTION
(PLEASE SAVE THESE INSTRUCTIONS)

This manual provides important instructions for the Cooper Crouse-Hinds (CCH) Recombiner Boxes and shall be followed during installation and maintenance. The CCH Recombiner Boxes are designed and tested to stringent safety requirements. However, as with all electrical equipment, specific safety practices must be followed. To reduce the risk of injury, carefully read this instruction booklet in its entirety before installing, wiring, or using this product in any way.

2.1. DISCLAIMER OF LIABILITY

The installation techniques, handling and use of this product are beyond company control. Therefore, Cooper Crouse-Hinds does not assume responsibility for loss, damage or expense resulting from improper installation, handling or use of this product.

2.2. LISTING INFORMATION

This product meets or exceeds the requirements set forth by Underwriters Laboratories (UL) for components used with PV Modules. This UL Standard is UL1741 for accessories used with inverters.

2.3. LIMITED WARRANTY

⚠ WARNING ⚠ AVERTISSEMENT

To reduce your risk of electric shock, use insulated tools. Do not install or handle the recombiner box if it is wet. Contact Cooper Crouse-Hinds crouse.customerctr@cooperIndustries.com if the recombiner box enclosure is damaged or its contents are compromised.

Pour réduire les risques de choc électrique, utiliser des outils isolés. Ne pas installer ni manipuler la boîte de combinaison si elle est mouillée. Contact Cooper Crouse-Hinds à solarsolutions@CooperIndustries.com si le boitier est endommagé combineur ou de son contenu sont compromises.

Recombiner box limited warranties are for 1 year for materials and workmanship.

3.0 IMPORTANT SAFETY INSTRUCTIONS

There are no user-serviceable parts in this enclosure, other than the fuses. Do not alter any portion of this product; otherwise, the warranty will be invalidated. Storage temperature: -60ºC to +85ºC

4.0 ELECTRICAL CHARACTERISTICS

The combiner box electrical ratings are indicated on Table 1.

5.0 RECOMBINER BOX MOUNTING

⚠ WARNING ⚠ AVERTISSEMENT

To avoid personal injury, use approved mounting or anchoring.

Pour eviter dommages corporels, utiliser de montage et d'ancrage approuvées.

VENTILATION CONSIDERATION

Maintain a minimum clearance of 1” on all 4 sides of the enclosure.

Holes in the back plate are not recommended and shall void the product warranty. Place in desired location on a sturdy frame and use the appropriate hardware to mount the recombiner box.

The steel recombiner box may be mounted vertically (door opens out) only. The fiberglass recombiner box may be mounted both horizontally and vertically. Place the box in areas out of continuous water flow and extreme temperature. Nema 4X rated breather/drains are recommended for horizontal applications and climates prone to condensation. Desiccant can be added for corrosion inhibiting.

6.0 CONDUIT ROUTING

6.1. CONDUIT HOLES

Please refer to Figure 1 for conduit entry areas on the enclosure for all models. Cut conduit holes in the desired location. The preferred method is the use of a Greenlee® cutter of the appropriate size. The punch of the cutter should be placed on the inside of the enclosure and drawn to the outside. Remove all shavings and debris from enclosure.

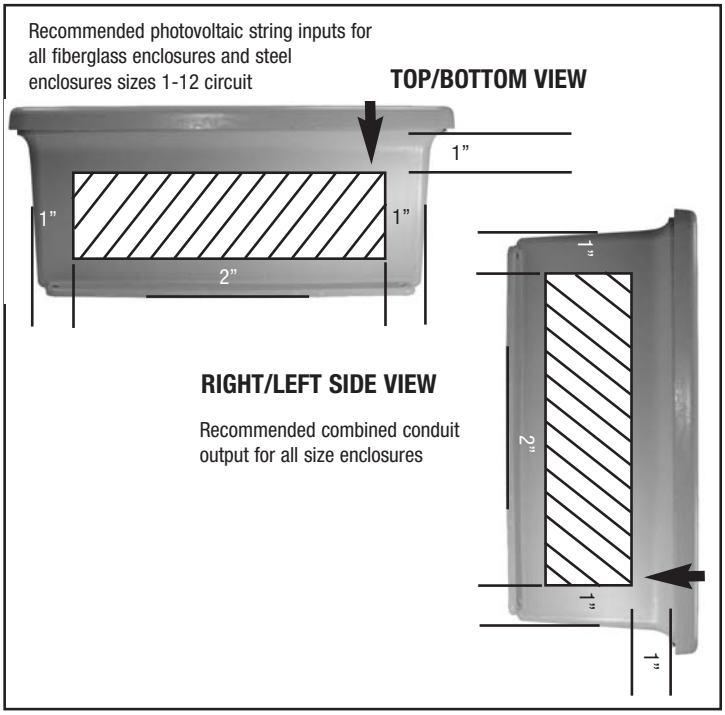

Figure 1 - Conduit Entry Locations

6.2. CONNECTOR TYPE

The use of UL514B or equivalent conduit fittings is required to maintain the environmental rating of the enclosure. Refer to the NEC for proper wire fill of conduit connections. Installation of fittings must comply with UL50 for USA installations and CSA C22.2 No. 94 for Canadian installations to maintain rating of the enclosure. See Figure 2 for suitable connectors. For use with rigid/IMC conduit use of Cooper Crouse-Hinds Myers™ conduit hub is recommended. For non-metallic liquidtight conduit, Cooper Crouse-Hinds Lt-NM series connector is recommended. For polymeric enclosures, the hub is to be connected to the conduit before the enclosure.
In lieu of a factory supplied output lug, a compression lug, to be supplied and installed in the field, may be used. Consult NEC for torque requirements. For use with USE-2and PV cable, Cooper Crouse-Hinds NCGS series solar cord grips are recommended.

Myers® Hubs

HUB BASIC SCRU-TITE* – NEMA 2, 3, 3R, 4, 4X and 12 – Optional nickel-chrome plate finish available.†

UL File No. E-27258

Size	ZINC Cat. #	ALUMINUM Cat. #
½"	ST-1†	STA-1
¾"	ST-2†	STA-2
1"	ST-3†	STA-3
1¼"	ST-4†	STA-4
1½"	ST-5†	STA-5
2"	ST-6†	STA-6

*For metallic enclosures only

GROUND HUB – NEMA 2, 3, 3R, 4, 4X and 12

UL File No. E-59509

Size	ZINC Cat. #	ALUMINUM Cat. #
½"	STG-1	STAG-1
¾"	STG-2	STAG-2
1"	STG-3	STAG-3
1¼"	STG-4	STAG-4
1½"	STG-5	STAG-5
2"	STG-6	STAG-6

†For metallic or non-metallic enclosures

Non-Metallic Liquidtight

Cat. #	Cat. #
STRAIGHT	
GRAY	BLACK
LT38NM	LT38NMBL
LT50NM	LT50NMBL
LT75NM	LT75NMBL
LT100NM	LT100NMBL
LT125NM	LT125NMBL
LT150NM	LT150NMBL
LT200NM	LT200NMBL

Solar Non-Metallic Cord Grips

Cat. #	Trade Size
NCGS25	¾"
NCGS237	¾"
NCGS39	1"
NCGS357	1"
NCGS413	1¼"
NCGS497	1¼"
NCGS631	2"
NCGS6197	2"

Figure 2 - Suitable Conduit Connectors

6.3 INSTALL CONNECTOR

6.3.1 METALLIC CONDUIT

Place Myers hub through hole as shown in Figure 3 with the o-ring on the outside of the enclosure. Screw on and tighten the locknut. Next screw on the grounding bushing, rotate to desired location and tighten set screws. If ground hub configuration is used, terminate ground wire to ground screw on locknut. If standard configuration is used screw on grounding bushing (Cooper Crouse-Hinds HGLL series recommended). Rotate to desired location, tighten set screw and terminate ground wire to ground lug.

6.3.2 NON-METALLIC LT CONDUIT

Place connector through hole as shown in Figure 3 with the o-ring on the outside of the enclosure. Screw on and tighten the locknut. Screw Insulated or plastic bushing onto connector threads to protect conductors from damage. Grounding bushings are not used with non-metallic conduit.

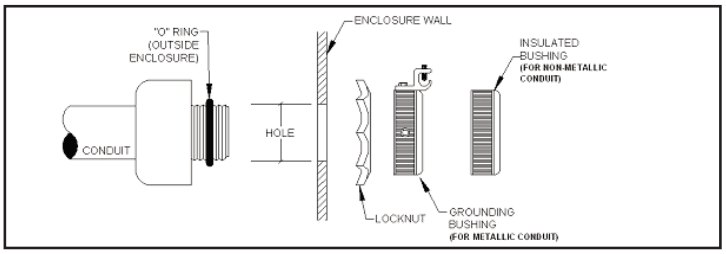

Figure 3 - Conduit Connector Exploded View

6.3.3 PVC CONDUIT

⚠ CAUTION ⚠ AVERTISSEMENT

To ensure proper grounding, bonding between conduit connection is not automatic and must be provided as a part of installation.

La liaison entre le cadre conduit n'est pas automatique et doit être fournie dans le cadre de l'installation.

Place Cooper Crouse-Hinds male adapter connector (MA-NM series recommended) through hole. Secure with steel locknut (Cooper Crouse-Hinds 11, 12 etc. - order separately). Grounding bushings are not used with PVC conduit.

7.0 BUS BAR

⚠ WARNING ⚠ AVERTISSEMENT

To avoid personal injury, ensure ample time to cool. Bus bar may still be hot while servicing.

Pour eviter dommages corporels, assurez-vous suffisamment de temps pour refroidir. Barre de bus peut être encore chaude pendant l'entretien.

If bus bar construction is used, all bolted connections should be torqued periodically to ensure adequate connection. See Section 16.0 Maintenance.

8.0 DISCONNECT SWITCH (OPTION)

If no Integral Disconnect Switch is provided one must be utilized in the PV system at time of installation and any conductor not opened through disconnect switch must be grounded during installation. All disconnects to be turned to the OFF position and locked out prior to servicing.

9.0 SURGE PROTECTION (OPTION)

Only replace with approved surge protection module. Cooper Crouse-Hinds recommends the use of Cooper Bussmann fast-acting PV series surge protection.
Surge Protective Device (Thermally Protected) for PV applications
The Surge-Trap PV provides advanced overvoltage protection to photovoltaic systems, which does not require additional over-current protection due its high short circuit withstand.

10.0 GROUNDING

A ground bar has been provided for the convenience of combining several grounds into one larger ground wire. Please refer to NEC Article 690 on grounding PV arrays for specific requirements. Any conductors not wired through disconnect must be grounded upstream.

11.0 FUSE SELECTION

⚠ WARNING ⚠ AVERTISSEMENT

To prevent damage to your photovoltaic system and equipment, the CRB Series Solar Recombiner Box and CAFB Array Fuse Box must have fuses installed into each fuse holder in order to operate properly.

Cooper Crouse-Hinds recommends use of Cooper Bussmann R Series PV Series fuses.

Pour éviter d'endommager votre système photovoltaïque et de l'équipement, la CRB Série solaire Recombiner Box doit avoir fusibles installés dans chaque porte-fusible afin de fonctionner correctement. Un seul fil d'entrée par fusible.

Cooper Crouse-Hinds recommande l'utilisation de Cooper Bussmann fusibles série DCM.

Please consult the module manufacturer and/or rating label to select the appropriate fuse size. Please consult NEC Article 690 for more information. A maximum of a 400 Amp fuse may be used with this product (see Table 1 for electrical properties). Cooper Crouse-Hinds Recombiners are not shipped with fuses unless ordered with fuses.

12.0 DC MONITORING

A 24VDC supply must be provided at time of installation for units with DC monitoring if not supplied by factory. Route positive input conductors through DC monitoring hardware then into input fuse terminals.

13.0 OUTPUT CONDUCTOR SIZING

The recombiner box output design current is determined by: (total PV module Isc x 125%) divided by a temperature correction factor. Select the appropriate temperature correction factor from the NEC. See NEC Articles 310.15 and 690.31 for proper wire sizing.

⚠ WARNING ⚠ AVERTISSEMENT

To prevent injury, death, or damage to your photovoltaic system, do not install fuses prior to completing Section 15.2.

Pour éviter toute blessure, décès ou des dommages à votre système photovoltaïque, ne pas installer les fusibles.

⚠ WARNING ⚠ AVERTISSEMENT

To prevent injury, death, or damage to your photovoltaic system, extreme caution should be taken whenever entering the control cabinet due to energized components.

Photovoltaic panels generate power whenever exposed to ANY light. Cover the panel entirely prior to wiring or servicing with an opaque cover.

Prior to installation or servicing, switch all disconnects to OFF position and use only insulated tools and proper Personal Protection Equipment.

Pour éviter toute blessure, décès ou des dommages à votre système photovoltaïque, la prudence extrême doit être pris lors de chaque entrée de l'armoire électrique grâce à des composants sous tension.

Les panneaux photovoltaïques produire de l'énergie à chaque fois exposés à la lumière. Recouvrez le panneau entièrement avant de câbler ou de l'entretien avec un couvercle opaque.

Avant l'installation ou l'entretien, mettez tous les déconnecte à la position OFF et utilisez uniquement des outils isolés et le bon équipement de protection individuelle.

14.0 WIRING

- Remove factory lexan protective cover before installation.
- Make ground connections first. This includes source circuit grounds, conduit grounds, and enclosure grounds if using a metallic enclosure.
- Insert positive input conductor from the source circuit to the Touch Safe fuse holder and tighten to torque specifications in Table 1.
- Insert negative input conductor from the source circuit to the negative collector holder and tighten to torque specifications in Table 1.
- Insert positive output wire to the inverter (or other destination) into the positive output terminal and secure to the torque requirements in Table 1.
- Insert negative output wire to the inverter (or other destination) into the negative output terminal and secure to the torque requirements in Table 1.
- Reattach factory lexan protective cover.

Make sure all connections are tight, secure and safe.

15.0 CHECK YOUR WORK

⚠ WARNING ⚠ AVERTISSEMENT

To prevent injury, death, or damage to your photovoltaic system, extreme caution should be taken whenever entering the control cabinet due to energized components.

Photovoltaic panels generate power whenever exposed to ANY light. Cover the panel entirely prior to wiring or servicing with an opaque cover.

Prior to installation or servicing, switch all disconnects to OFF position and use only insulated tools and proper Personal Protection Equipment.

Pour éviter toute blessure, décès ou des dommages à votre système photovoltaïque, la prudence extrême doit être pris lors de chaque entrée de l'armoire électrique grâce à des composants sous tension.

Les panneaux photovoltaïques produire de l'énergie à chaque fois exposés à la lumière. Recouvrez le panneau entièrement avant de câbler ou de l'entretien avec un couvercle opaque.

Avant l'installation ou l'entretien, mettez tous les déconnecte à la position OFF et utilisez uniquement des outils isolés et le bon équipement de protection individuelle.

These steps need to be completed with your personal safety in mind. Before installing fuses, complete these simple time-saving checks:

15.1. MEASURE VOLTAGE (VOC)

Check the open circuit positive voltage (Voc) from each individual solar array string to the negative bus bar. Ensure each Voc is the proper polarity and within the intended range. Voc does not vary much with irradiance and temperature conditions.

15.2. CHECK GROUND CURRENTS

Check the DC current from each individual string (fuse holder) to ground. If current is present, locate and repair any ground faults.

15.3. INSERT FUSES

Check that the fuses are the proper rating and type and insert fuses into fuse holders and secure it in the closed position.

15.4. FINAL INSPECTION

Check the DC voltage from the combined output lug to the negative bar. Ensure voltage is the proper polarity and within the desired voltage range.

- Check to ensure that all conduit connections are clean and tight and are properly sealed against environmental concerns.
- Reattach factory lexan protective cover.
- Close and secure the enclosure door.

16.0 MAINTENANCE

⚠ WARNING ⚠ AVERTISSEMENT

To prevent component damage or electric shock, avoid touching any component or any part of the circuitry while the equipment is operating. Do not place heavy loads on associated system cables or maneuver them in a manner which may expose personnel or equipment to current. Do not connect system cables when the terminals are wet or damp. Do not disconnect cables under load.

Pour éviter des dommages aux composantes ou de choc électrique, évitez de toucher tout composant ou toute partie du circuit tandis que l'équipement est en marche. Ne placez pas de lourdes charges sur les câbles du système associés ou les manœuvres d'une manière qui peut exposer le personnel ou les équipements actuels. Ne pas brancher les câbles du système lorsque les bornes sont mouillées ou humides. Ne pas déconnecter les câbles sous charge.

Please review this manual fully before beginning work on recombiner boxes. Follow all safety guidelines and warnings.
Every 6 months inspect and re-torque all electrical connections per Table 1.
Replace desiccant if applicable.

We recommend an Electrical Preventive Maintenance Program as described in the National Fire Protection Association Bulletin NFPA 70B: Recommended Practice for Electrical Equipment Maintenance (www.nfpa.org).

Standard Design:			Tech Spec									Mechanical Spec*	
4.0 CRB Series		Description	Voltage	Max Current	Max Fuse Size	Max PV Module Short Circuit Current	Ambient	Input Conductors (Cu/Al)		Output Conductors (Cu/Al)		Dimensions	NEMA Rating
			(Vdc)	(A)	(A)	(A)	(°C)	Wire Gauge (Cu/Al)	Torque (in-lbs)	Wire Gauge	Torque (in-lbs)	(in)	Type
3.1	CRB_03	3 Array Recombiner Box (01 - 03 Strings)	600/1000	1200	400	256.4	50	#4 - 500MCM	450	#2 - (2)600MCM	150-450	48 x 36 x 12	4X/ 4/ 3R
3.2	CRB_06	6 Array Recombiner Box (01 - 06 Strings)	600/1000	1200	200	128.2	50	#6 - 250MCM	275-375	#2 - (2)600MCM	150-450	48 x 36 x 12	4X/ 4/ 3R
3.3	CRB_12	12 Array Recombiner Box (01 - 12 Strings)	600/1000	1200	100	64.1	50	1/0 - 8	100	#2 - (2)600MCM	150-450	48 x 36 x 12	4X/ 4/ 3R
3.4	CRB_03 DS	3 Array Recombiner Box w/ Integral Disconnect Switch (01 - 03 Strings)	600/1000	1200	400	256.4	50	#4 - 500MCM	450	#2 - (2)600MCM	150-450	60 x 36 x 12	4X/ 4/ 3R
3.5	CRB_06 2DS	6 Array Recombiner Box w/ Integral Disconnect Switch (04 - 06 Strings)	600/1000	1200	200	128.2	50	#6 - 250MCM	275-375	#2 - (2)600MCM	150-450	60 x 36 x 12	4X/ 4/ 3R
3.6	CRB_12 2DS	12 Array Recombiner Box w/ Integral Disconnect Switch (07 - 12 Strings)	600/1000	1200	100	64.1	50	1/0 - 8	100	#2 - (2)600MCM	150-450	60 x 36 x 12	4X/ 4/ 3R
5.0 CDB Series		Description	Voltage	Max Current	Max Fuse Size	Max PV Module Short Circuit Current	Ambient	Input Conductors (Cu/Al)		Output Conductors (Cu/Al)		Dimensions	NEMA Rating
			(Vdc)	(A)	(A)	(A)	(°C)	Wire Gauge	Torque (in-lbs)	Wire Gauge	Torque (in-lbs)	(in)	Type
4.1	CDB DS100	100A Disconnect Box (01 - 12 Strings)	600/1000	(12) 100	NA	NA	50	#6 - 250MCM	110-325	#6 - 250MCM	110-325	Varies	4X/ 4/ 3R
4.2	CDB DS250	250A Disconnect Box (01 - 12 Strings)	600/1000	(12) 250	NA	NA	50	#6 - 250MCM	110-325	#6 - 250MCM	110-325	Varies	4X/ 4/ 3R
4.3	CDB DS400	400A Disconnect Box (01 - 12 Strings)	600/1000	(12) 400	NA	NA	50	#2 - (2)600MCM	150-450	#2 - (2)600MCM	150-450	Varies	4X/ 4/ 3R
4.4	CDB DS600	600A Disconnect Box (01 - 12 Strings)	600/1000	(12) 600	NA	NA	50	#2 - (2)600MCM	150-450	#2 - (2)600MCM	150-450	Varies	4X/ 4/ 3R
6.0 CAFB Series		Description	Voltage	Max Current	Max Fuse Size	Max PV Module Short Circuit Current	Ambient	Input Conductors (Cu/Al)		Output Conductors (Cu/Al)		Dimensions	NEMA Rating
			(Vdc)	(A)	(A)	(A)	(°C)	Wire Gauge	Torque (in-lbs)	Wire Gauge	Torque (in-lbs)	(in)	Type
5.5	CFB_03	3 Array Fuse Box (01-02 Strings)	600/1000	(3) 400	400	256.4	50	#4 - 500MCM	450	#4 - 500MCM	150-450	Varies	4X/ 4/ 3R
5.6	CFB_06	6 Array Fuse Box (01-06 Strings)	600/1000	(6) 200	200	128.2	50	#6 - 250MCM	275-375	#6 - 250MCM	275-375	Varies	4X/ 4/ 3R
5.7	CFB_12	12 Array Fuse Box (01-12 Strings)	600/1000	(12) 100	100	64.1	50	1/0 - 8	100	1/0 - 8	100	Varies	4X/ 4/ 3R

* For Fiberglass Only, Consult Factory for additional information

* Dual ratings indicate 600V Rating Followed by 1000V Rating

* Consult Factory for special ouput conductor requirements

* CSA for 600Vdc only

Table 1 - Electrical and Mechanical Ratings

COOPER Crouse-Hinds

Cooper Industries, Inc.
Crouse-Hinds Division
P.O. Box 4999, Syracuse, New York 13221 • U.S.A.

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