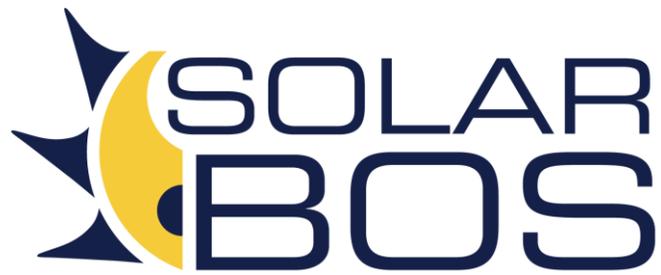


Disconnect Combiner Box Installation Manual



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Revision History

Rev. No.	Date	By	Description
1.0	9 Nov 2009	AS	Preliminary Release
1.1	3 Oct 2011	CS	250/400A
1.2	14 March 2014	WC	Torque Values

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IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

This manual contains important instructions for all SolarBOS disconnect combiner box models that must be followed during the installation and use of the disconnect combiner boxes.

The disconnect combiner boxes are designed and tested according to international safety requirements, but as with all electrical and electronic equipment, certain precautions must be observed when installing the disconnect combiner boxes. To reduce the risk of personal injury and to ensure the safe installation and operation of the disconnect combiner boxes, you must carefully read and follow all instructions and warnings in this *Installation Guide*.

Safety and Hazard Symbols



This symbol appears beside instructions and warnings that deal with dangerous voltages that can injure people who come in contact with them.

Warnings



WARNING: A warning describes a hazard to equipment or personnel. It calls attention to a procedure or practice, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the SolarBOS equipment and/or other equipment connected to the SolarBOS equipment or personal injury.

Warnings may also be accompanied by one or more of the safety and hazard symbols described above to indicate the type of hazard described therein.

Other Symbols

In addition to the safety and hazard symbols described previously, the following symbol is also used in the *Installation Guide*:



This symbol accompanies notes that call attention to supplementary information that you should know to ensure optimal operation of the system.



This GROUND symbol marks areas in the combiner box for connecting equipment grounds only.

Warranty

All disconnect combiner boxes sold in the USA have a five-year warranty. For warranty coverage, or if you have questions about the disconnect combiner box warranty, contact SolarBOS at the address, telephone number, or Web Site listed on page 1 (to send e-mail, see the Contact section of the SolarBOS Web Site: www.solarbos.com).



WARNING: All electrical installation must be done in accordance with the National Electrical Code ANSI/NFPA 70, local building codes, and the requirements of the authority having jurisdiction.



WARNING: To prevent electrical shock or injury, all wiring and commissioning procedures must be performed by qualified personnel.



WARNING: Before installing or using the disconnect combiner box, read all of the instructions and warnings on the combiner box and in this *Installation Guide*.



WARNING: PV arrays produce electrical energy when exposed to light and thus create an electrical shock hazard.



WARNING: The disconnect combiners use an integrated disconnect switches, yet both the line and load side of the switch may still be energized in the OFF position. Always test both sides of the disconnect before servicing the disconnect combiner.

Introduction

SolarBOS has introduced a new line of PV disconnect combiner boxes designed for use with all module and inverter combinations.

Combiner box features include:

- Listed to UL 1741
- Simplified input and output wiring
- Compact, low-cost, and flexible design
- Available in NEMA 3, 3R, 4 powder-coated steel, and NEMA 4X stainless steel or fiberglass enclosures (others available on request)
- Integrated load-break disconnect switch

Unpacking and Inspection

All SolarBOS disconnect combiner boxes are thoroughly checked before they are packaged and shipped. Although they are shipped in sturdy packaging, damage can still occur during shipping and delivery. It is important to carefully inspect the shipping container and contents prior to installation. If you detect any external damage after unpacking, report the damage immediately to SolarBOS and the shipping company that delivered the unit. Items not rejected within 10 days of delivery are considered accepted without recourse. If it becomes necessary to return the combiner, please use the original packing material.

If you need assistance in dealing with a damaged unit, contact SolarBOS at 925-456-7744.

Installation

Refer to Figure 1 and Table 1 for enclosure dimensions. Use appropriate hardware for the mounting surface. The weight of the unit is shown in Table 1.

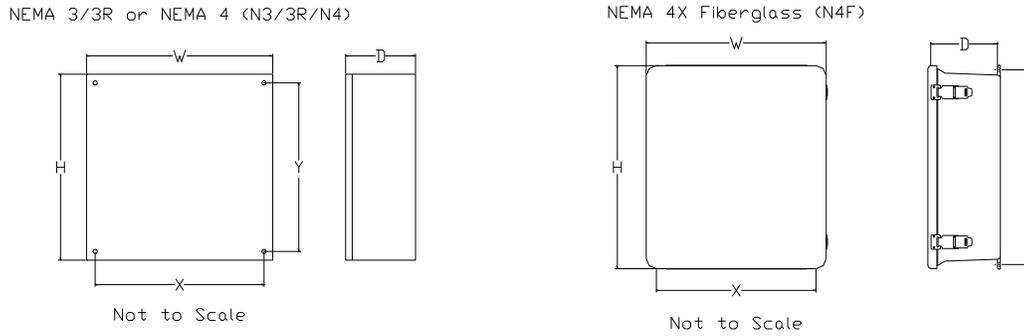


Figure 1 Combiner Enclosure Dimensions

Table 1 Disconnect Combiner Dimensions and Weights

Enclosure Type	Max. Output	# input circuits	(inches) H	(inches) W	(inches) D	(inches) X	(inches) Y	(lbs.) Weight
N3/N4	100	6-18	20	20	6	18.5	18.5	45
N3/N4	100	20-24	24	24	6	22.5	22.5	50
N3/N4	150	6-18	20	20	6	18.5	18.5	45
N3/N4	150	20-24	24	24	6	22.5	22.5	50
N3/N4	200	6-18	20	20	6	18.5	18.5	50
N3/N4	200	20-36	24	24	6	22.5	22.5	55
N3/N4	250	8-18	20	20	6	18.5	18.5	50
N3/N4	250	20-36	24	24	6	22.5	22.5	55
N3/N4	400	8-22	24	24	6	22.5	22.5	85
N3/N4	400	24-36	30	30	8	28.5	28.5	95
4XF	100	6-12	20	18	8	14.75	20.85	30
4XF	100	14-18	26	22	8	18.75	26.85	33
4XF	100	20-24	26	26	8	22.75	26.85	35
4XF	150	6-12	20	18	8	14.75	20.85	30
4XF	150	14-18	26	22	8	18.75	26.85	33
4XF	150	20-24	26	26	8	22.75	26.85	35
4XF	200	6-12	20	18	8	14.75	20.85	30
4XF	200	14-18	26	22	8	18.75	26.85	33
4XF	200	20-32	26	26	8	22.75	26.85	35
4XF	200	34-36	32	26	8	22.75	32.85	38
4XF	250	8-12	26	22	8	18.75	26.85	30
4XF	250	14-18	26	26	8	22.75	26.85	33
4XF	250	20-32	26	26	8	22.75	26.85	35
4XF	250	34-36	32	26	8	22.75	32.85	38
4XF	400	8-20	26	26	8	22.75	26.85	60
4XF	400	22-36	38	32	8	28.75	38.85	65

Disconnect Combiner Orientation

NEMA-3R enclosures may only be installed in the vertical orientation. This applies to disconnect combiners with the “3R” designation.

NEMA-3/4/4X enclosures may be installed in either the vertical or the horizontal orientation. This applies to disconnect combiners with the “N3” “N4” “4XF” “4XP” and “4XSS” designation.

The disconnect handle base carries a NEMA-4X rating.

Disconnect Switch Assembly

The disconnect combiner contains an integrated disconnect assembly that includes a handle installed on the enclosure door with clearly marked ON and OFF positions. The disconnect assembly is pre-jumpered with the positive PV output labeled.

Defeating the Integrated Disconnect

For some applications, it may be necessary to temporarily defeat the integrated disconnect switch on the disconnect combiner box.

The switch handle (located on the enclosure door) allows padlocking in the OFF position with the door open or closed, which can be used for Lock Out/Tag Out procedures.

With the switch on, the handle door interlock may be defeated with a tool to allow the door to be opened. The door interlock may be defeated in the ON position but reactivates automatically when the enclosure door is closed. See item 1 on Figure 2.

With the enclosure door open, it is possible to operate the switch with an auxiliary handle by defeating the handle interlock without using a special tool.

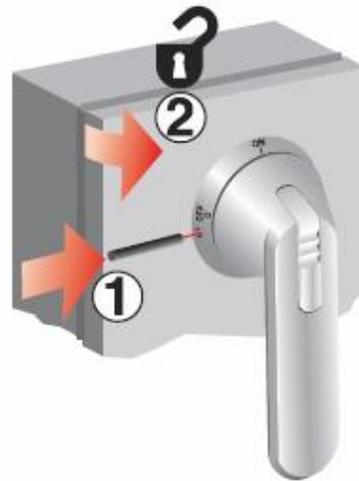
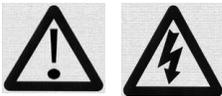


Figure 2 Defeating the Switch Handle



WARNING: Only qualified personnel should defeat the handle door interlock on the disconnect combiner box.

Wiring



NOTE: The disconnect combiner enclosure is shipped with no entry holes. A knock-out is required for the appropriate conduit size. SolarBOS recommends wire entry be made according to Figure 2.

Input Wiring

Refer to Figure 3 and Table 2 for the input wiring locations of the disconnect combiner box. PV positive and negative conductors are wired into the positive lug and negative distribution block, respectively. These terminal locations are clearly marked. All PV safety ground conductors are wired into the ground bus located at the bottom of the disconnect combiner box.

Output Wiring

Many of our disconnect combiners have large fault current ratings.

When temperature and voltage drop adjustments are considered, the output conductor sizes can become quite large (500 MCM or greater) and difficult to manage. NEC Article 310.4 allows paralleling of conductors greater than AWG 1/0 to achieve higher ampacities.

Most SolarBOS disconnect combiner boxes provide output terminals for paralleling two conductors for the PV positive and negative, as well as the equipment ground conductors. Refer to Figure 2 and Table 2 for the output wiring locations.



NOTE: On units with provision for using crimp lugs use Panduit part number LAA250-38-5 for 250MCM wire or a UL listed equivalent part from another manufacturer. Be sure to use the appropriate part number for the intended wire gauge.



NOTE: Raintight or wet location hubs that comply with the Standard UL514B must be used for NEMA 3/3R outdoor applications. NEMA 4 or 4X applications must use watertight hubs that comply with the Standard UL514B. Use Myers-type, water-tight conduit fittings such as Thomas & Betts H200TB (for 2" conduit) or H300TB (for 3" conduit) or equivalent from others. Install fittings per manufacturer's recommendations.

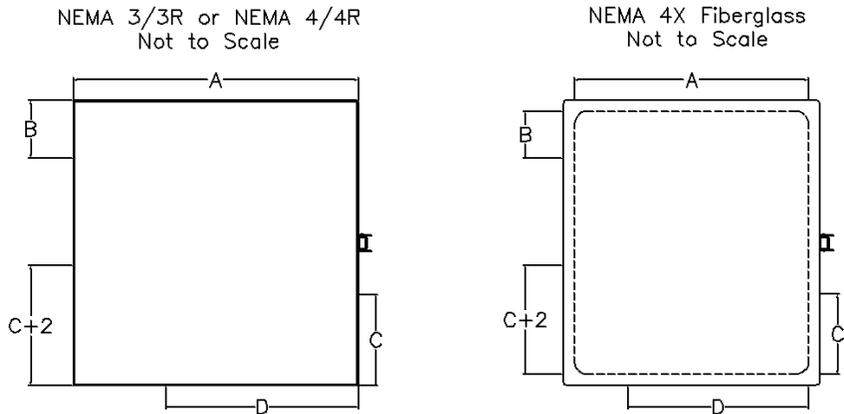
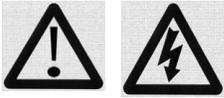


Figure 3 Combiner Wire Entry Locations

Dimension “A” and “B” are for input wire locations. Dimensions “C” and “D” are for output wire locations. These locations are recommendations only. Care should always be taken to assure there is enough wire bend space for the desired output wire gauge when choosing a conduit entry location.

Table 2 Wire Entry Dimensions

Enclosure Type	Max. Output	# input circuits	(inches) A	(inches) B	(inches) C	(inches) D
N3/N4	100	6-18	20	5	6	14
N3/N4	100	20-24	24	7	8	18
N3/N4	150	6-18	20	5	6	14
N3/N4	150	20-24	24	7	8	18
N3/N4	200	6-18	20	5	6	14
N3/N4	200	20-36	24	7	8	18
N3/N4	250	8-18	20	5	6	14
N3/N4	250	20-36	24	7	8	18
N3/N4	400	8-22	24	7	8	18
N3/N4	400	24-36	30	9	11	24
4XF	100	6-12	16	4	5	11
4XF	100	14-18	20	7	8	15
4XF	100	20-24	24	7	8	19
4XF	150	6-12	16	4	5	11
4XF	150	14-18	20	7	8	15
4XF	150	20-24	24	7	8	19
4XF	200	6-12	16	4	5	11
4XF	200	14-18	20	7	8	15
4XF	200	20-32	24	7	8	19
4XF	200	34-36	24	7	8	19
4XF	250	8-12	20	7	8	15
4XF	250	14-18	24	7	8	19
4XF	250	20-32	24	7	8	19
4XF	250	34-36	24	9	11	19
4XF	400	8-20	24	7	8	19
4XF	400	22-36	30	12	14	25



WARNING: Never open a fuse holder while it is under load. Electrical arcing and damage to the fuse holder will occur if a fuse holder is opened under load.

PV String Fuses

All SolarBOS disconnect combiner boxes ship with fuses installed according to the user's predetermined requirements. All fuses and connection points are electrically tested prior to shipment. SolarBOS maintains stock of common fuse sizes if replacements are necessary or spares desired.

Combiner Box Torque Values

BOX LUG OUTPUTS		SMALL CONDUCTORS		
CONDUCTOR SIZE	TORQUE	ITEM	TORQUE	
1/0 - 2/0	180 in-lbs	FUSEHOLDER/SURGE (TVSS)	22 in-lbs	
3/0 - 4/0	250 in-lbs	NEGATIVE/NEUTRAL INPUTS	25 in-lbs	
250 - 350	325 in-lbs	SMALL GROUND SCREW	25 in-lbs	
400 - 600	375 in-lbs	LARGE GROUND SCREW	50 in-lbs	
700 - 800	500 in-lbs	BOLTED CONNECTIONS & COMPRESSION LUGS		
900 - 1000	600 in-lbs			
 <p>*For Contactor Combiners</p>		THREAD	SOCKET	TORQUE
		1/4"	7/16"	120 in-lbs
		M8	13mm	220 in-lbs
		M10*	17mm	275 in-lbs
		M10	17mm	550 in-lbs
		M12	19mm	600 in-lbs