



Copyright © 2024 Hubbell, Inc. All rights reserved.

All rights reserved. No part of this document may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photographic, magnetic, or otherwise, without the prior written permission of Hubbell, Inc.

Hubbell makes no representations, express or implied, with respect to this documentation or any of the equipment and/or software it may describe, including (with no limitation) any implied warranties of utility, merchantability, or fitness for any particular purpose. All such warranties are expressly disclaimed. Hubbell is not liable for any indirect, incidental, or consequential damages under any circumstances.

(The exclusion of implied warranties may not apply in all cases under some statutes, and thus the above exclusion may not apply)

Specifications are subject to change without notice. Every attempt has been made to make this document complete, accurate and up-to-date. Users are cautioned, however, that Hubbell reserves the right to make changes without notice and shall not be responsible for any damages, including indirect, incidental, or consequential damages, caused by reliance on the material presented, including, but not limited to, omissions, typographical errors, arithmetical errors or listing errors in the content material.

Revision History

Rev. No	Date	By	Description
1.0	07/1/2024	Schnieders, Matt	



IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

This manual contains important instructions for all Hubbell 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.

Implement the following warning/caution statements (these match the rest of our Installation sheets, and might be duplicating some information, but we should be consistent:

"Technical information, advice and recommendations contained in these documents are based on information that Hubbell believes to be reliable. All the information and advice contained in these documents is intended only for use by persons having been trained and possessing the requisite skill and know-how and to be used by such persons only at their own discretion and risk.

The nature of these instructions is informative only and do not cover all of the details, variations or combinations in which this equipment may be used, it's storage, delivery, installation, check out, safe operation, and maintenance. Since conditions of use of the product are outside of the care, custody and control of Hubbell, the purchaser should determine the suitability of the product for its intended use and assumes all risk and liability whatsoever in connection therewith."

CAUTION: Before installing, make sure you are compliant with area classifications, failure to do so may result in bodily injury, death and property damage. Do not attempt installation until you are familiar with the following procedures. All installation must comply with the applicable Electrical Code. Make sure that the circuit is Deenergized before starting installation or maintenance. Verify that the installation is grounded. Failure to ground will create electrical shock hazards, which can cause serious injury and or death.

Important: Please read these instructions carefully before installing or maintaining this equipment. Good electrical practices should be followed at all times and this data should be used as a guide only.

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 Hubbell equipment and/or other equipment connected to the Hubbell 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 Hubbell at the address, telephone number, or **Web Site listed on page 1 (to send e-mail, see the Contact section of the Hubbell Web Site: www.Hubbell.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: PV arrays produce electrical energy when exposed to light and thus create an electrical shock hazard.



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: The disconnect / combiner boxes use 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 box.



Introduction

Hubbell has introduced a new line of PV disconnect / combiner boxes designed for use with all module and inverter combinations. Features include:

- Listed to UL 1741 and CSA 22.2 No. 290.19
- Simplified input and output wiring
- Compact, low-cost, and flexible design
- Available in Type 3, 3R, 4 (powder-coated steel), and Type 4X (stainless steel or fiberglass enclosures) others available on request
- Integrated load-break disconnect switch.

Unpacking and Inspection

All Hubbell 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 Hubbell 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 Hubbell at (314) 531-0460.

Installation Procedure

Product Identification – Solar String Combiner box

Catalog Number Matrix

SSC	F	15	5	12	FP	25	S2	BVDH	S	G5	E2	PM	CL-MB-T
Series of content: SSC													Accessories:
Enclosure Material: C - Carbon Steel F - Fiberglass S - Stainless Steel													PF - Parallel Feed Brackets (Outgoing)
Voltage: 15 - 1500VDC													CL - Mechanical Compression Lugs (Outgoing)
Disconnect Switch Rating: 4 - 400A 2-Pole Disconnect 5 - 500A 2-Pole Disconnect 6 - 600A 2-Pole Disconnect													SB - Shear Bolt Lugs (Outgoing)
Number of Input Circuits: 6 - 6 input circuits 7 - 7 input circuits 8 - 8 input circuits 9 - 9 input circuits 10 - 10 input circuits 11 - 11 input circuits 12 - 12 input circuits 13 - 13 input circuits 14 - 14 input circuits													M - Mounting Unistrut Pre-Installed
													MB - Mounting Unistrut Pre-Installed with Mounting Bracket
													T - Customer ID Tag / Nameplate
													Input String Connector Configuration:
													CG - Cable Gland Only
													PM - Panel Mounted PV Connectors
													W - Whip Mounted PV Connector
													Blank - Blank Enclosure
													Ground Wire Entry Configuration:
													E1 - M16 Cable gland
													E2 - M20 Cable gland
													Blank - Blank Enclosure
													Main Power Wire Entry Configuration:
													G2 - M25 Cable gland
													G5 - M50 Cable gland
													G3 - M32 Cable gland
													G6 - M63 Cable gland
													G4 - M40 Cable gland
													Blank - Blank Enclosure
													Safety Shield Cover:
													S - Shield Cover
													Blank - No Shield Cover
													Breather vent or drain:
													BV - Breather Vertical
													BH - Breather Horizontal
													DH - Drain Horizontal
													Blank - No Vent or Drain
													Surge Protection:
													S1 - Surge Protection - Type 1
													S2 - Surge Protection - Type 2
													Blank - No Surge Protection

Combined maximum circuit current (String Isc X 1.25 X number of circuits)

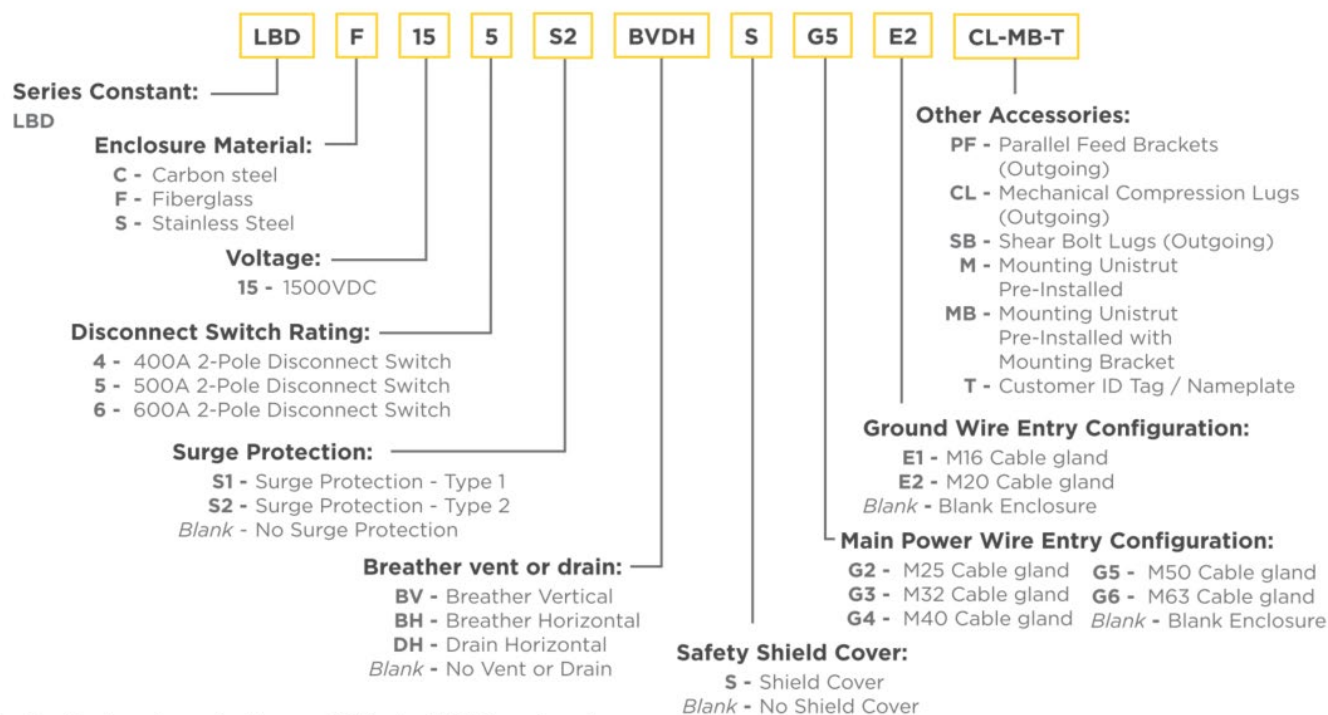
- Cannot exceed the disconnect ampacity rating.

Combined maximum circuit current (String Isc X 1.25 X number of circuits)
- Cannot exceed the disconnect ampacity rating



Product Identification – Load Break Disconnect switch

Catalog Number Matrix



Mounting Arrangement

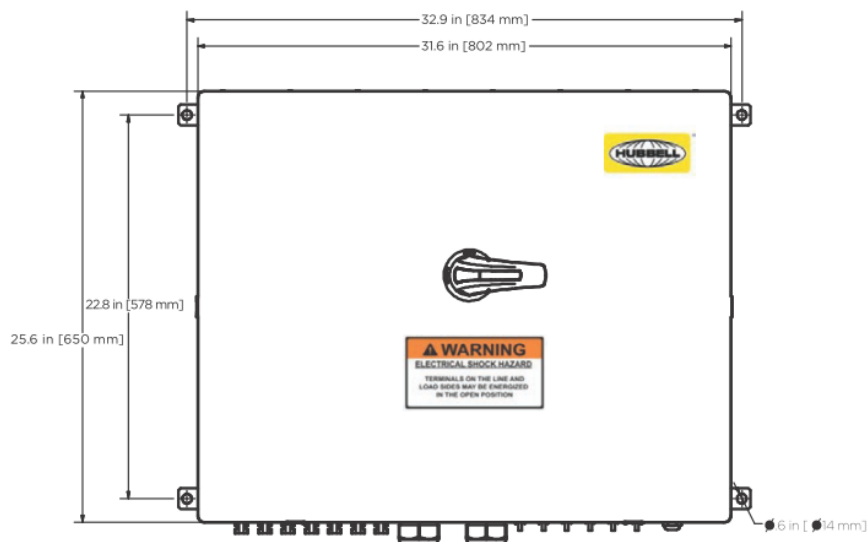


Figure 1: Solar String Combiner enclosure dimensions

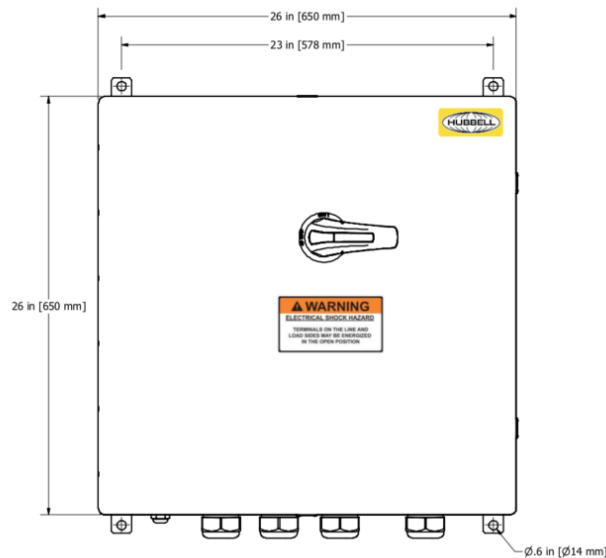


Figure 2: Load Break Disconnect enclosure dimensions

- To mount the device to a structure, drill a hole 14mm (0.6") in diameter, on four corners on the structure.
- Four (4) mounting brackets will be present inside the box and needs to be terminated on box side as shown below:



Figure 3: Mounting brackets

- Note:
 - Avoid exposing the box to the direct sunlight, try to install the box in shadow.
 - Maintain a minimum 300 mm (11.8 in) space on all the side of the boxes for ease of cable termination at the bottom and proper ventilation.

Disconnect Switch

The disconnect / combiner contains an integrated disconnect that includes a handle installed on the enclosure door with marked ON and OFF positions.

The disconnect handle allows padlocking in the OFF position with the door open or closed and can be used for Lock Out/Tag Out procedures.

Disconnect Door Interlock

The door interlock prevents opening the door while the disconnect handle is in the “ON” position. In some instances, it may be helpful to temporarily defeat the door interlock.

With the switch ON, the door interlock may be defeated with a slender tool to allow the door to open (see figure 4) The door interlock reactivates automatically when the enclosure door is closed.



Figure 4: Mounting brackets

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

NOTE: The disconnect / combiner enclosure is shipped with no entry holes. A knock-out is required for the appropriate conduit size. Hubbell recommends wire entry be made according to (Figure 5)

Wiring Connections

Input wiring

Refer to Figure 5 for the input wiring locations of the disconnect / combiner box. PV positive and negative conductors are wired to the corresponding marked locations within the combiner. Ground conductors are wired into the ground bus located at the bottom of the disconnect / combiner box.

- Important- Prior to connection, check the polarities of each string
- Please ensure DC switch is in OFF position before cable termination.
- Connect the incoming PV cable coming from field on to the MC4 connectors provided at the bottom of the box. String nos. are provided on the box and connect the same string nos. accordingly.

Output wiring

Refer to Figure 5 for output wiring locations. Many combiner products have high 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. Some combiner products provide output terminals for paralleling two conductors.

- Important! - Prior to connection, check the polarities of O/P cables.
- Please ensure DC switch is in OFF position before cable termination.
- Suitable cable glands have been provided at the bottom to get the cables inside the box for the termination.

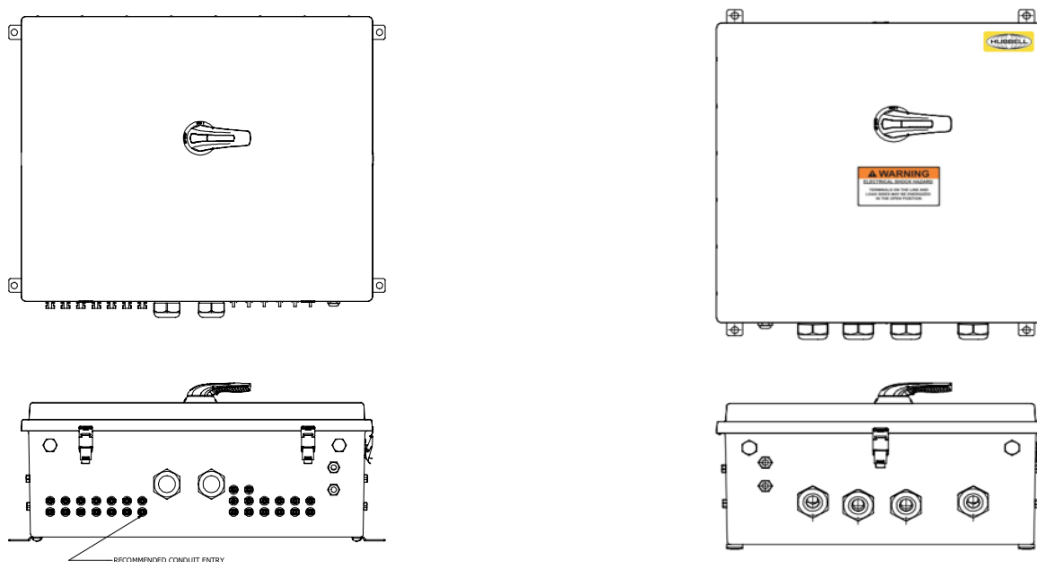


Figure 5: Wire Entry Locations

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. Dimensions are project specific. Please request a submittal drawing for further details.

PV String Fuses

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

Torque Values

Recommended Torque Values





BOX LUG OUTPUTS		SMALL CONDUCTORS		
CONDUCTOR SIZE	TORQUE	ITEM	TORQUE	
1/0 - 2/0	180 in-lbs	DINRAIL TERMINAL	11 in-lbs	
3/0 - 4/0	250 in-lbs	FUSEHOLDER	18 in-lbs	
250 - 350	325 in-lbs	SURGE (TVSS)	22 in-lbs	
400 - 600	375 in-lbs	DISTRIBUTION BLOCK INPUT	25 in-lbs	
700 - 800	500 in-lbs	SMALL GROUND SCREW	25 in-lbs	
900 - 1000	600 in-lbs	LARGE GROUND SCREW	50 in-lbs	
<div>*For Contactor Terminals</div> <div>** "Torque Values" after applicable tightening</div>		THREADED FASTENERS AND COMP LUGS		
		THREAD	SOCKET	TORQUE
		1/4"	7/16"	120 in-lbs
		M8*	13mm	110 in-lbs
		M8	13mm	220 in-lbs
		M10*	17mm	275 in-lbs
		M10	17mm	550 in-lbs
		M12	19mm	600 in-lbs

*For Contactor Terminals

** "Torque Values" after applicable tightening




Recommended Annual Maintenance

	WARNING: To prevent electrical shock or injury, all wiring and commissioning procedures must be performed by qualified personnel.
	WARNING: Before opening the disconnect / combiner box, read all the instructions and warnings on the combiner box and in the Installation Guide.
	WARNING: PV arrays produce electrical energy when exposed to light and thus create an electrical shock hazard.
	WARNING: Hubbell disconnect / combiners use an integrated disconnect switch(es), yet both the line and load side of the switch may be energized in the OFF position. Always test both sides of the disconnect before servicing the disconnect / combiner.



With the system de-energized:

1	Check for hazards before beginning inspection.
2	Visually check the exterior of the enclosure to ensure it is structurally sound without any damage from environmental factors.
3	Inspect door gasket for damage. Check inside of enclosure for moisture or condensation. Moisture can enter through conduit, if present, determine source of moisture.
4	Look for discoloration of fuses, lugs, disconnect tabs or other current carrying components. Thermal imaging is a valuable tool to assess disconnect / combiner condition. This is best done around solar noon and at the time the system is shut down or still operating. If any connections are found abnormally hotter than others, it may be an indication of a bad connection.
5	Check for signs of animals or rodents which can nest or chew away material.
6	Check condition of conductors including insulation particularly around entry locations.
7	Check all connections: Grounds, positive/negative input and outputs, control, and monitoring wiring (if equipped). Small conductor connections may be checked by gently pulling on conductors.
8	<p>Check torques. A list of torque specs can be found on the label inside the door of the disconnect / combiner box (see torque table). Use a quality calibrated torque tool with current calibration. Checking torque at 80% of spec allows confirmation of appropriate torque without moving the fastener and disturbing the torque mark.</p> <div>  <p>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.</p> </div> <div>  <p>NOTE: System voltage is present at the string input (and fuse holder) unless the input string is disconnected. System voltage is present at the bus bar (and fuse holders) if any fuse holders are closed or the disconnect is in the ON position</p> </div>
9	<p>Optional: Check fuses. Caution: fuses may be hot. Remove fuses and check for continuity. Also check fuses for proper rating. Fuse rating can be found on product label on inside of enclosure door. The fuse holder screw terminals may be used to avoid fuse removal.</p> <p>Caution: System voltage may be present at fuse holder screw terminals.</p> <p>NOTE: When system is operating each string input conductor can be checked for expected current with a clamp on meter.</p>
10	Check Transient surge suppressor (if equipped). The windows in the modules should be green.

If any problems are found, take action to correct the problem and/or reach out to Hubbell for assistance.