



Solar Combiner Enclosure

Catalog Numbers 1000-SB006, 1000-SB012

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Description

The solar combiner enclosure combines inputs from multiple solar arrays into an output circuit. Two catalog numbers are available.

Table 1 - Product Selection

Cat. No.	Number of Poles	Voltage Rating
1000-SB006	6	600V DC (continuous duty)
1000-SB012	12	

Solar combiner enclosures support these features:

- Listed to UL 1741 – Inverters, Converters, Controllers, and Interconnecting System Equipment for Use with Distributed Energy Sources
- Line and load terminals marked for using 90 °C (194 °F) copper wire
- UL Type 3, 4/4X, 12, and 13 enclosure ratings
- Fuse holders and power distribution blocks
- Configured for positive and negative grounded arrays



Important User Information

Solid-state equipment has operational characteristics differing from those of electromechanical equipment. Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls (publication [SGI-1.1](http://www.rockwellautomation.com/literature) available from your local Rockwell Automation® sales office or online at <http://www.rockwellautomation.com/literature>) describes some important differences between solid-state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid-state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.



WARNING: Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.



ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence



SHOCK HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.



BURN HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.

IMPORTANT

Identifies information that is critical for successful application and understanding of the product.

These symbols are used in this publication.



Ground symbol



Direct current symbol

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS.

This publication contains important instructions for 6- and 12-pole solar combiner enclosures, catalog numbers 1000-SB006 and 1000-SB012, that must be followed during installation and maintenance:

- Use 90 °C (194 °F) copper wire only.
- This product is intended for operation in an environment with a maximum temperature rating of 40 °C (104 °F)
- For entry into the enclosure, use only UL-Listed raintight or wet location hubs (for UL Type 3R, 12, and 13) that comply with the requirements in the Standard for Conduit, Tubing, and Cable fittings (UL514B).
- Use only UL-Listed watertight hubs (for UL Type 4/4X) that comply with the requirements in the Standard for Conduit, Tubing, and Cable fittings (UL514B).

IMPORTANT Bonding between conduit connections is not automatic and must be provided as part of the installation.



SHOCK HAZARD: Disconnect and lock out power before entering or performing maintenance on the enclosure.



SHOCK HAZARD: Normally-grounded conductors may be ungrounded and energized when a ground fault is indicated.



SHOCK HAZARD: When the photovoltaic array is exposed to light, it supplies a DC voltage to this equipment.

Follow National Electric Code, ANSI/NFPA 70, Requirements


The system installer is responsible for the following:

- Follow National Electric Code wiring methods
- Follow cUL certification requirements, including CSA C22.2 No. 107.1-01, clause 154.5.2
- For Canadian installations, following the wiring methods per the Canadian Electrical Code, Part II
- System grounding, if required by Section 250 of the National Electric Code (DC input and output circuits are isolated from the enclosure)
- Install photovoltaic system grounding per the requirements of Sections 690.41...690.47 of the National Electric Code

Nameplate Data

Each solar combiner enclosure has a nameplate on the enclosure or enclosure door, similar to the example shown below.

Figure 1 - Nameplate Sample

COMBINER BOX			
CATALOG NO.		SERIES	
A-B SERIAL NO.	MAX. SYSTEM VOLTAGE [V]	MAX. AIR AMBIENT TEMP	
ENCL. TYPE	MAX. OP OUTPUT CURRENT [A]	MAX. FUSE RATING	FUSE TYPE
WIRING DIAGRAM		MAX. I _{sc} PER STRING [A]	
 Allen-Bradley		MADE IN _____	

The following product information is provided on the nameplate.

Table 2 - Nameplate Fields

Field	Description
CATALOG NO.	Catalog number
SERIES	Series letter of the product
A-B SERIAL NO.	Product serial number
MAX. SYSTEM VOLTAGE [V]	Voltage of the system in volts, max
MAX. AIR AMBIENT TEMP.	Air ambient temperature in degrees Celsius, max
ENCL. TYPE	UL enclosure type
RATED INPUT	Operating output current, max
MAX. FUSE RATING	Fuse rating, max
FUSE TYPE	Fuse type
WIRING DIAGRAM	Schematic number
MAX. I _{sc} PER STRING [A]	Short circuit current per string, max

Planning for Installation

When planning the location for your solar combiner enclosure, consider the following:

- Conduits
- Type of installation
- Product dimensions (see pages [10](#) and [11](#))
- Mounting requirements
- Connection to other equipment
- Enclosure rating
- Environmental conditions
- Future needs

Environment and Enclosure

Most applications require installation in an industrial enclosure to reduce the effects of electrical interference and environmental exposure. Locate your controller as far as possible from power lines, load lines, and other sources of electrical noise, such as hard-contact switches, relays, and AC motor drives.

Environmental Ratings

The enclosure is rated for IP 66 and UL Type 3, 4, 4X, 12, and 13 applications when used with the proper UL Type hub or conduit fittings. The enclosures are constructed for either indoor or outdoor use, and provide a degree of protection to personnel against incidental contact with the enclosed environment. They provide a degree of protection against snow, windblown dust, splashing water, and hose-directed water. They will be undamaged by the external formation of ice on the enclosure and provide corrosion protection.

The unit is rated to function with a temperature range of -20 °C...40 °C (-4 °F...104 °F).

Install the Solar Combiner Enclosure

Follow these requirements during installation:

- Bonding between the grounding bushings and the equipment grounding terminals must be provided in accordance with applicable codes.
- A 1/2-in. minimum electrical clearance must be maintained between the grounding adapter wire terminal and electrically live components.

Prepare the Enclosure

Follow these steps to prepare the enclosure.

1. From the table below, select the appropriate combination of conduit connector and grounding adapter based on your type of installation, and determine the required hole size in the bottom or side of the enclosure.

Conduit Size	4/4X Conduit Connector (Hub)		Grounding Adapter		
	Hole Size	Cat. No.	Cat. No.	Ground Wire Range (AWG)	
				1000-SB006	1000-SB012
19.1 mm (3/4 in.)	28.6mm (1-1/8 in.)	1490-N9	1490-N20	12-8	14-8
25.4 mm (1 in.)	34.9 mm (1-3/8 in.)	1490-N10	1490-N21	12-8	14-8
31.8 mm (1-1/4 in.)	44.5 mm (1-3/4 in.)	1490-N11	1490-N22	12-4	14-4
38.1 mm (1-1/2 in.)	50.8 mm (2 in.)	1490-N5	1490-N23	8-1/0	8-1/0
50.8 mm (2 in.)	63.5 mm (2-1/2 in.)	1490-N6	1490-N24	8-1/0	8-1/0

Holes must be at least 6 in. (15.24 cm) below the output terminal in the enclosure side of the 12-pole assembly. When using 4 AWG wire in the 6-pole assembly, the hole must be at least 2 in. (5.08 cm) below the output terminal in the enclosure side.

For more details, reference table 7.2 of UL 1741.

2. Use a hole cutter or hole saw to create holes at the top and bottom of the enclosure.

TIP

When using a hole cutter, place the punch on the inside of the enclosure and draw it through to the outside.

Install the Conduit Connector and Grounding Adapter

Install the conduit connector (hub) and grounding adapter by following these steps.

IMPORTANT

To guard against enclosure damage, align the conduit to prevent unnecessary stress on the enclosure walls.

IMPORTANT

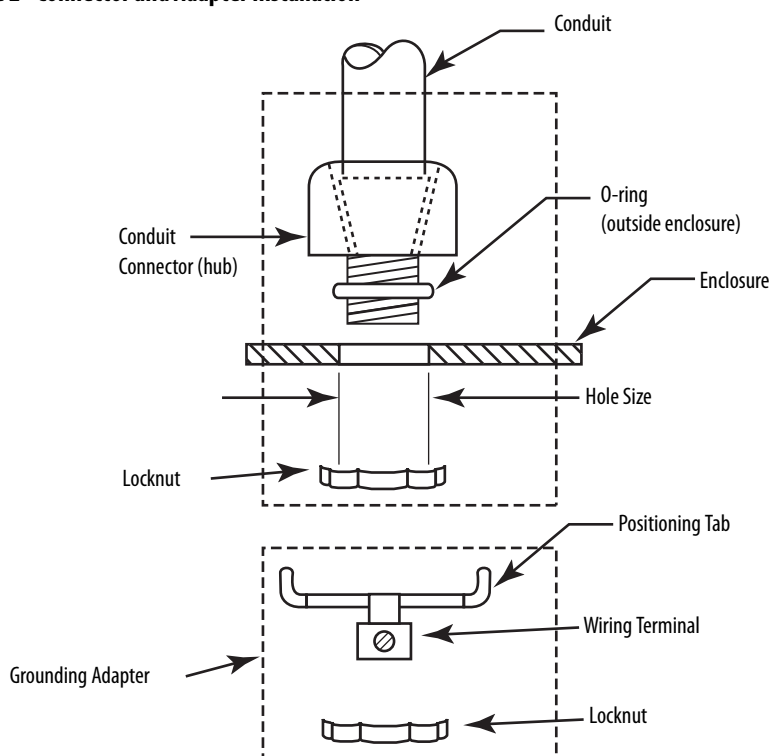
For conduit hubs, use only raintight or wet-location hubs that comply with the requirements in the UL514B standard for Fittings for Conduit and Outlet Boxes.

1. Place the conduit connector (hub) and O-ring onto the conduit in the desired locations.
2. Secure the conduit connector to the enclosure by using the locknut.
3. Install the grounding adapter as shown in [Figure 2](#) and secure with the locknut.

TIP

Make sure that the wiring terminal is positioned so that it will be accessible after installation.

Figure 2 - Connector and Adapter Installation

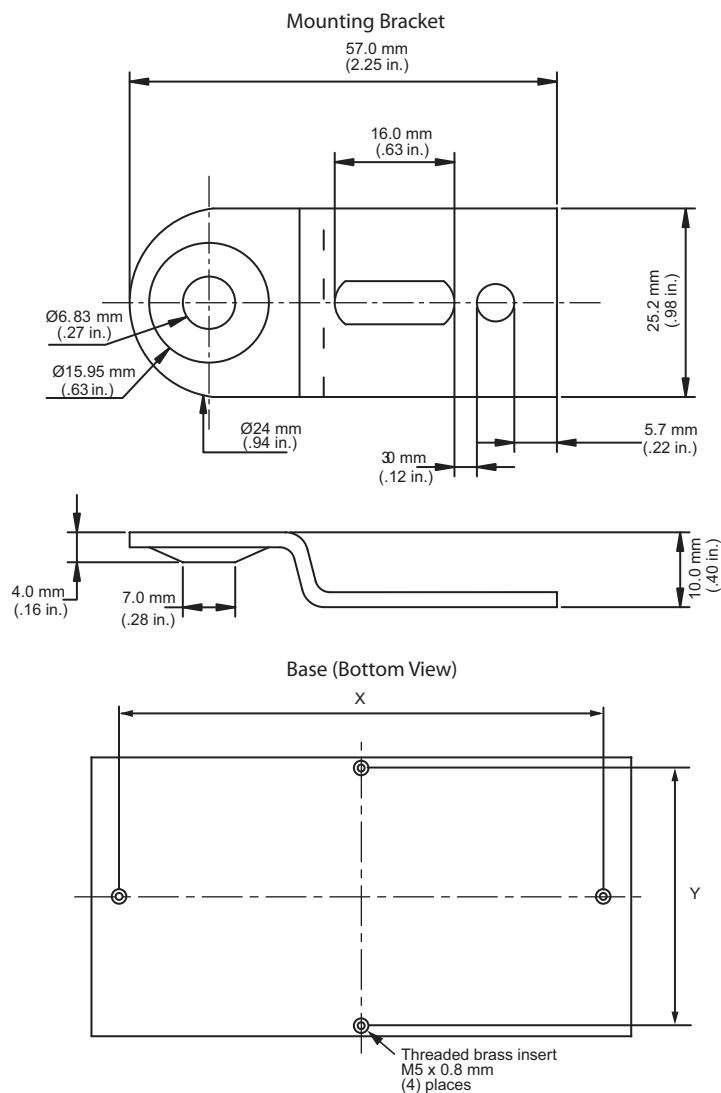


Install an External Mounting Bracket (optional)

You can install an optional mounting bracket, catalog number 598-N13, for the enclosure.

Use four #8 hardware with mounting brackets or four #10 hardware without mounting brackets.

Figure 3 - Mounting Bracket Dimensions



Enclosure	X	Y
1000-SB006	238 mm (9.38 in.)	238 mm (9.38 in.)
1000-SB012	340 mm (13.38 in.)	241 mm (9.50 in.)

Wire the Solar Combiner Enclosure

Refer to the wiring diagrams below when installing the enclosure.

Figure 4 - Wiring the 6-pole Solar Combiner Enclosure

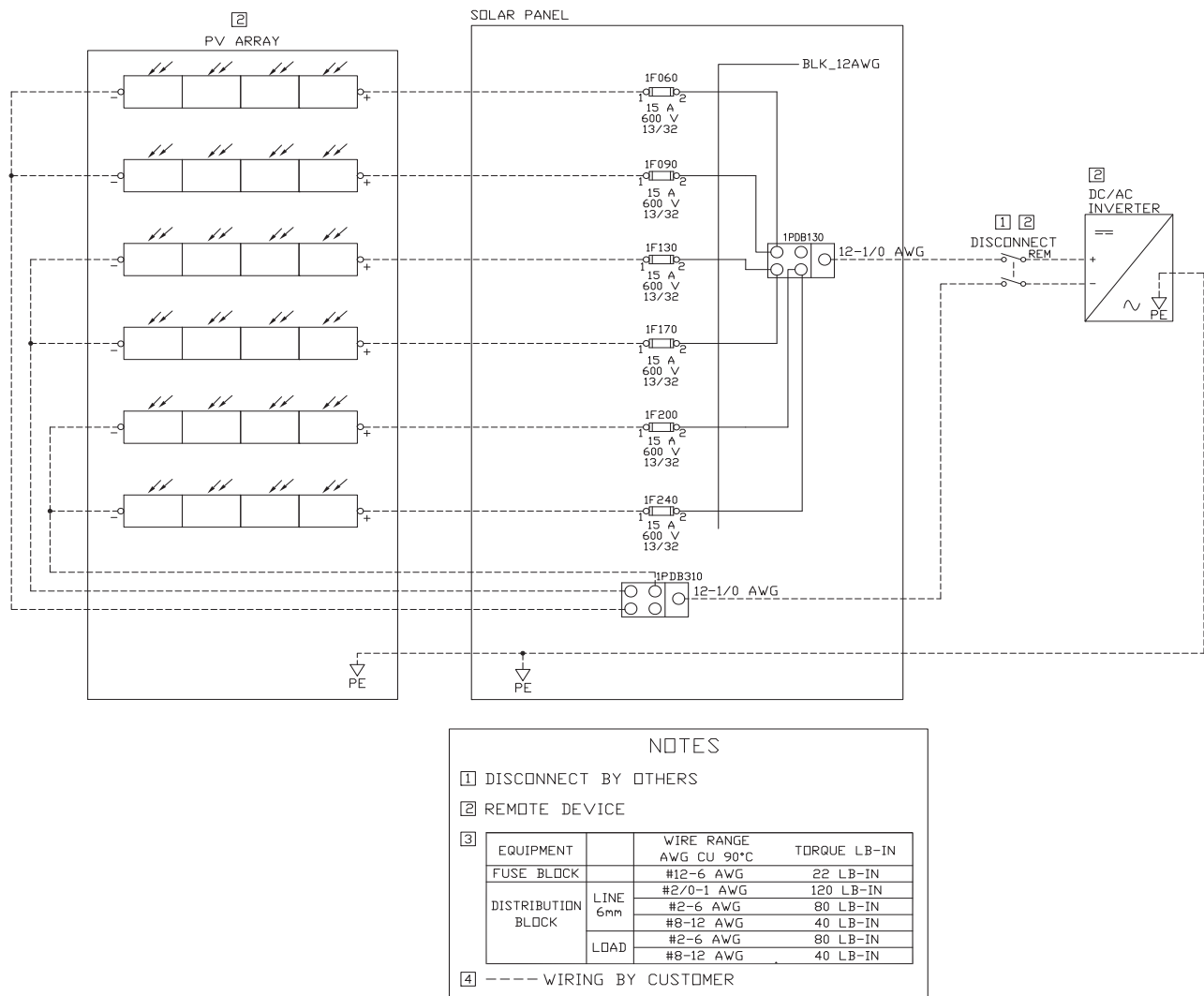
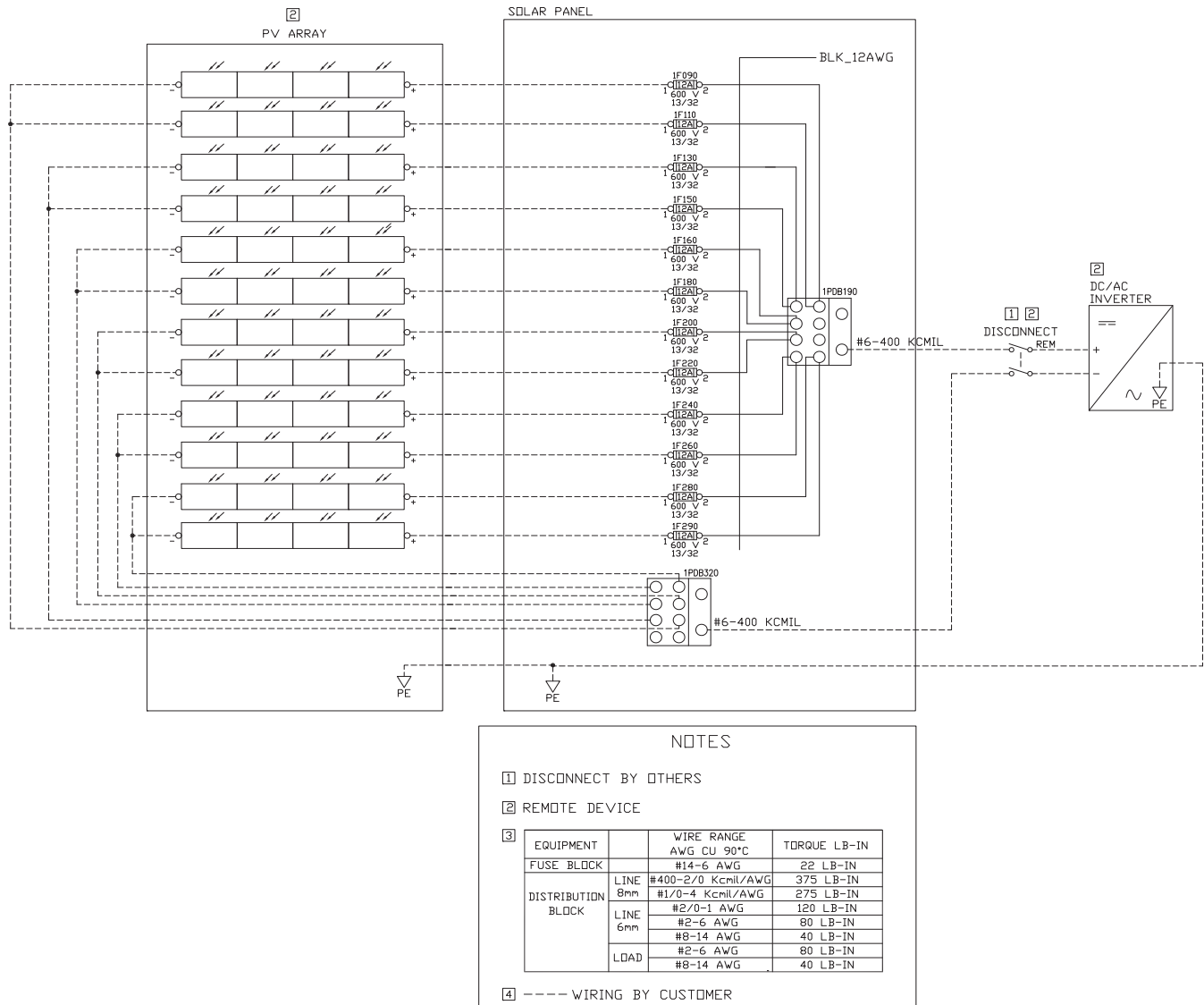


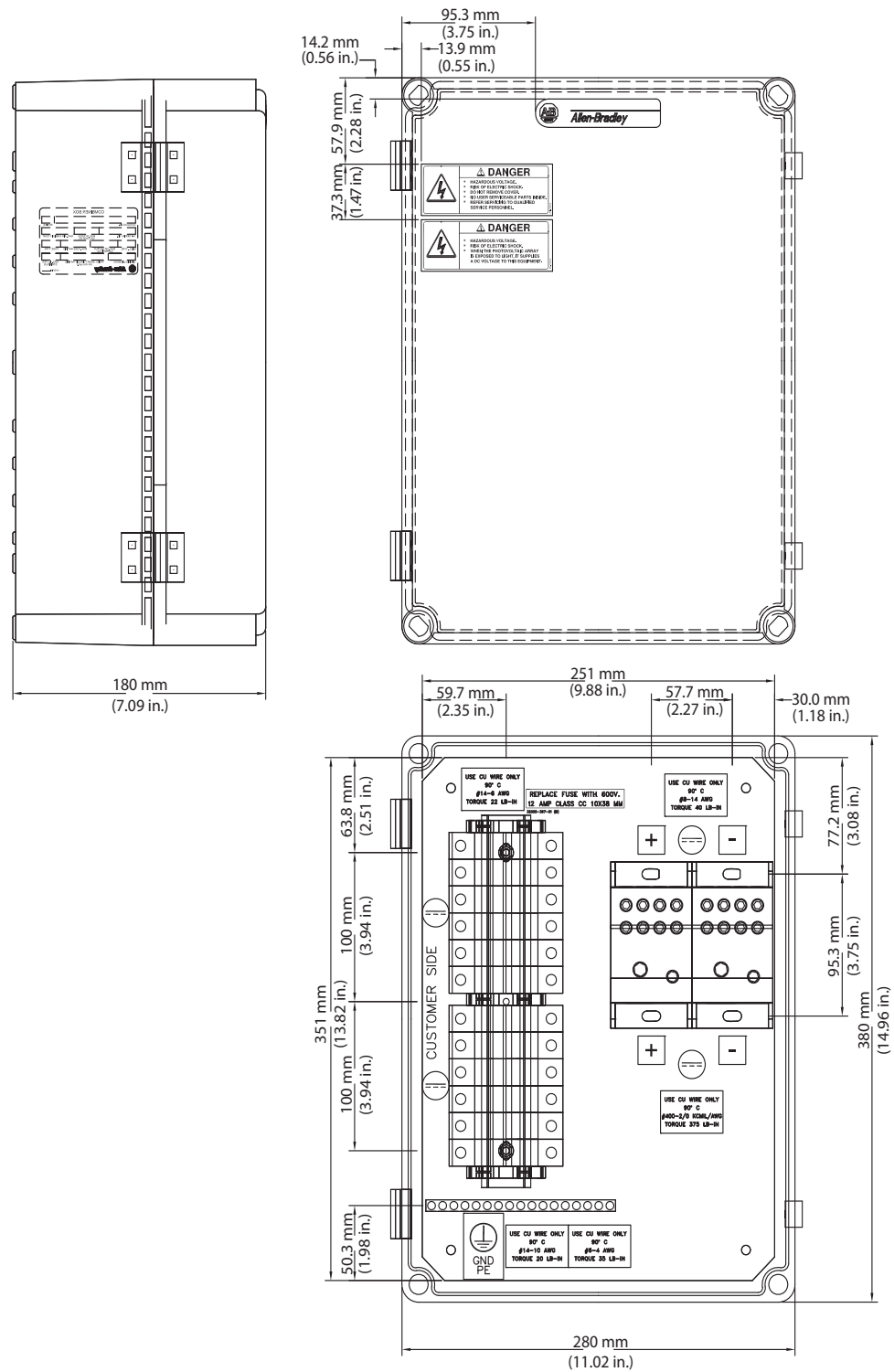
Figure 5 - Wiring the 12-pole Solar Combiner Enclosure



[illegible]

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Figure 7 - 12-pole Solar Combiner Enclosure (Catalog Number 1000-SB012)



Dimensions are in inches (mm).

Specifications

Attribute	1000-SB006	1000-SB012
Number of input circuits, max	6	12
Number of poles	6	12
Voltage rating (continuous duty)	600V DC	600V DC
Operating current (DC), max	72	144
Rated input current (DC)	12 A ⁽¹⁾	12 A ⁽¹⁾
Fuse rating (Class CC), max	15 A	12 A
Ambient air temperature, max	40 °C (104 °F)	40 °C (104 °F)

(1) Consult the factory for higher currents up to 15 A.

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

Resource	Description
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, http://www.ab.com	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at <http://www.rockwellautomation.com/literature/>. To order paper copies of technical documentation, contact your local Allen-Bradley® distributor or Rockwell Automation sales representative.

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