



**CPS 4:1 AC Combiner**

**CPS DBA04-600V/US**

**Installation and Operation Manual - Rev 1.2**



**CHINT POWER SYSTEMS AMERICA CO.**

REVISION 1.2 DECEMBER 2021



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## **Before You Start...**



This Installation and Operation manual contains important information, safety guidelines, detailed planning and setup information for installation, as well as information about operating and maintaining the CPS 4:1 AC Combiner Box. Be sure to read this manual carefully before using.

Thank you for choosing a CPS AC Combiner Box. This AC Combiner Box is a high performance and highly reliable product specifically designed for the North American Solar market.






Installation, commissioning, and maintenance of the combiner box must be done only by qualified personnel. If you encounter any problems during installation or operation of this unit, first check the user manual before contacting your local dealer or supplier.

**Please keep this user manual on hand for quick reference.**

## Chapter 1 IMPORTANT SAFETY INSTRUCTIONS (SAVE THESE INSTRUCTIONS)

Please read this user manual carefully before product installation. CPS reserves the right to refuse warranty claims for equipment damage if the user fails to install the equipment according to the instructions in this manual.

### Warnings and symbols in this document

	<b>DANGER:</b> DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.
	<b>WARNING:</b> WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.
	<b>CAUTION:</b> CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
	<b>NOTICE:</b> NOTICE indicates a hazardous situation which, if not avoided, could result in equipment working abnormally or property loss.
	<b>INSTRUCTION:</b> INSTRUCTION indicates important supplementary information or provides skills or tips that can be used to help you solve a problem or save you time.



**WARNING:**

All installation and wiring connections should be performed only by qualified technical personnel.

**Electric shock Hazard.** In order to prevent the risk of electric shock during equipment maintenance or installation, please ensure that the connections are not energized and the enclosure is properly grounded.

**Shock Hazard.** Both the input and output of the AC Combiner may be live. Disconnect all sources before testing or servicing.

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**DANGER:**

Touching the internal terminals of this device may result in electric shock. Do not touch the terminals or connectors connected to photovoltaic modules or inverter as this may result in death by electric shock.

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**NOTICE:**

Pay attention to all safety instruction regarding the connections to the AC Combiner. All wiring and operations must comply with relevant standards in the region where the equipment is installed. As with all electronic equipment, it is recommended to avoid installation in humid areas or in direct sunlight if possible.

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**CAUTION:**

Be careful when handling the equipment to prevent falling or injury. All installations can be put into use only after the it has been verified that no problems or hazards are present. In order to ensure the safety of people and equipment, the wiring must be installed according to the marking on the equipment and the specifications in the manual to avoid short circuits. The AC Combiner generates heat during operation. Do not touch high-temperature components during operation.



**INSTRUCTION:**

The product nameplate contains important product information including model, serial number, and parameter details. If the product has problems or malfunction, you can contact the CPS service department and report the product serial number. Please avoid damage to the nameplate.





## Markings on the product

 A yellow triangular warning symbol with a black lightning bolt in the center, indicating a risk of electric shock.	<p><b>Risk of Electric Shock:</b></p> <p>Indicates that the machine contains high voltage and you must follow the instructions in the user manual when operating this product.</p>
 A circular symbol containing a vertical line with three horizontal bars at the bottom, representing a grounding terminal.	<p><b>Protective grounding:</b></p> <p>This symbol marks the location of the grounding terminal, which must be securely connected to the earth through the PE (protective earthing) cable to ensure operational safety.</p>

## Chapter 2 Overview

### 2.1 Distributed Photovoltaic Grid-tied Systems

The CPS DBA04-600V/US 4:1 AC Combiner is designed for use with CPS SCH100KTL-DO/US-600 and CPS SCH125KTL-DO/US-600 3-Phase String Inverters in PV grid-tied systems. The system is generally made up of PV modules, DC power distribution equipment, PV inverter and AC power distribution equipment (**Figure 2-1**). The inverter converts the DC from PV modules to AC with the same frequency and phase as the AC grid. After converging through the AC Combiner, all or part of the AC power is supplied to local loads, and the surplus power is supplied to the electricity grid.



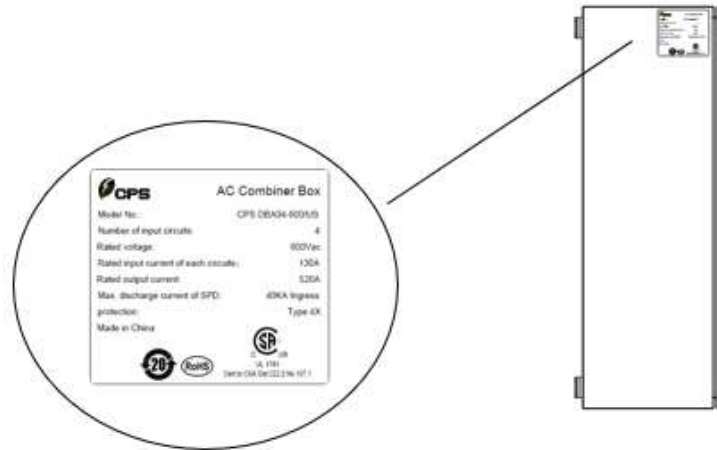
**Figure 2-1 Grid-tied PV system**

### 2.2 Product Features

- ◆ **High Reliability:** Includes AC Circuit Breakers in accordance with UL Standard and AC surge protector to protect photovoltaic equipment from lightning hazards.
- ◆ **Easy installation, easy maintenance, and long service life:** The AC Combiner is made of aluminum alloy, which reduces the overall weight of the product.
- ◆ **High protection degree:** NEMA 4X enclosure meets the demanding needs of both indoor and outdoor use.

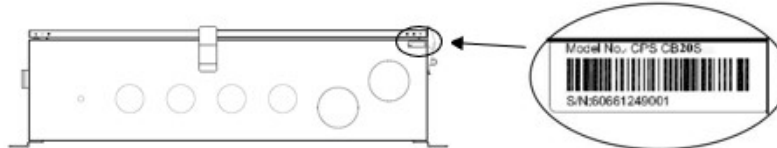
### 2.3 Nameplate Identification

The nameplate of the AC Combiner is located on the left side of the enclosure, as shown in **Figure 2-2**:



**Figure 2-2 Nameplate location**

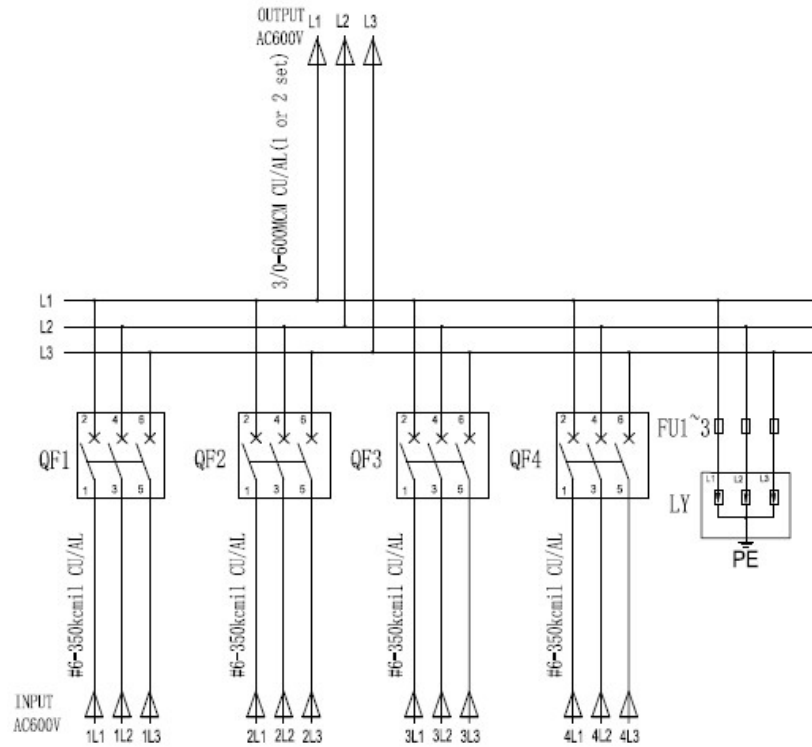
The serial number is located on the bottom of the enclosure, as shown in **Figure 2-3**:



**Figure 2-3 Serial Number location**

## 2.4 Schematic Diagram and Circuit Design

The basic electrical schematic diagram of CPS DBA04-600V/US AC Combiner is shown in **Figure 2-4**.



**Figure 2-4 Schematic Diagram of the DBA04-600V/US AC Combiner**

## 2.5 Appearance and Main Item Description

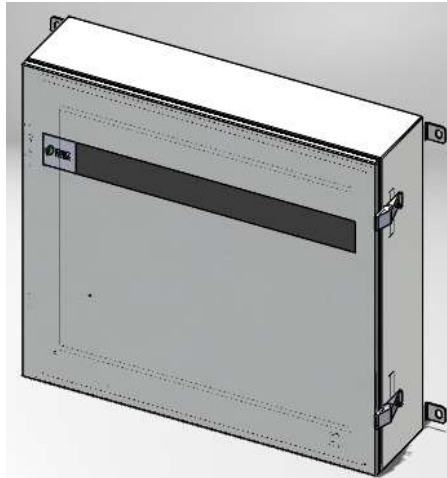


Figure 2-5 Appearance of the CPS DBA04-600/US

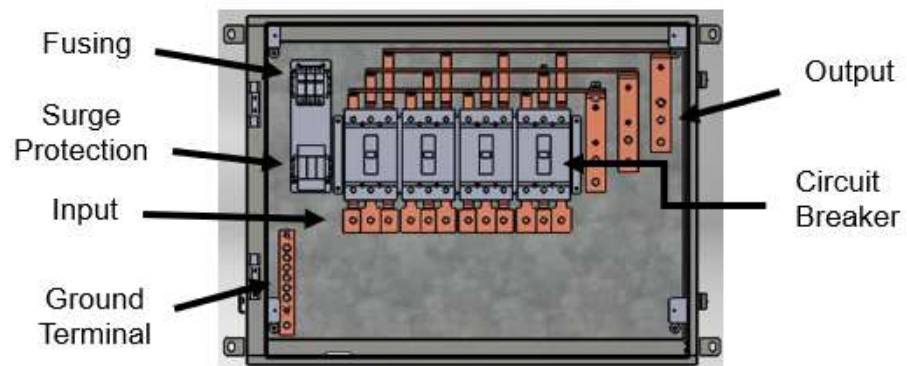


Figure 2-6 Internal Structure of the CPS DBA04-600/US

## **2.6 Surge Protection**

The DBA04-600V/US AC Combiner includes a voltage-limiting surge protector that exhibits high impedance when there is no surge in the system. When a surge strikes, its impedance drops rapidly, limiting the voltage at the outlet to the specified amplitude, thereby protecting back-end equipment. The surge protector is mainly composed of two parts: a protection module and a base. The protection module and the base adopt a plug-in structure and are completely independent of each other.

## **2.7 AC Circuit Breaker**

The DBA04-600V/US AC Combiner includes AC circuit breakers compliant to UL standards.

## Chapter 3 Installation

Below is the installation procedure for the DBA04-600V/US AC Combiner. Please read carefully and install the products following the step-by-step instructions. Before installation, please check that the following items are included in the packages:

**Table 3-1 Main Items**

No.	Item	QTY
(1)	AC Combiner	1
(2)	Installation & Operation Manual	1
(3)	Packing List	1
(4)	Chassis mounting bracket	4
(5)	Sets of M12x40 bolts, M12 flat washers, spring washer, nuts	4
(6)	M6x12 combination screws	12
(7)	Sets of M12x35 bolts, M12 flat washers, spring washer, nuts (for input terminations)	12
(8)	Sets of M12x40 bolts, M12 flat washers, spring washer, nuts (for output terminations)	6



**WARNING:**

All installation and wiring connections should be performed only by qualified technical personnel.



**CAUTION:**

The items are heavy. Be careful when handling the equipment to prevent falling or injury.

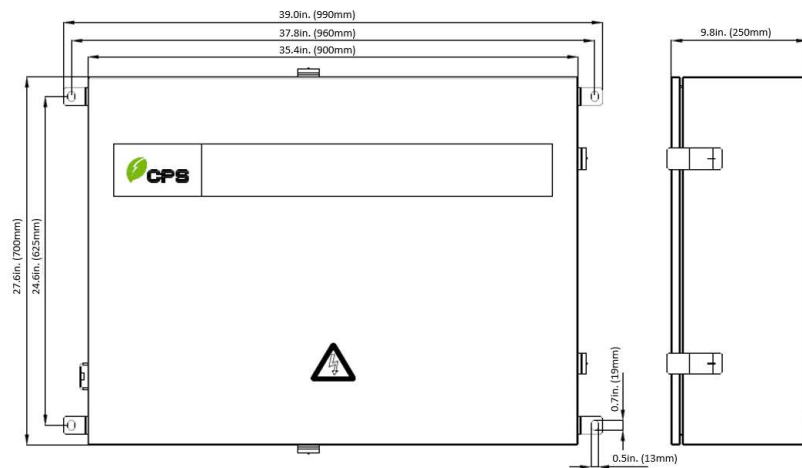


**NOTICE:**

Pay attention to all safety instruction regarding the connections to the AC Combiner. All wiring and operations must comply with relevant standards in the region where the equipment is installed. As with all electronic equipment, it is recommended to avoid installation in humid areas or in direct sunlight if possible.

### 3.1 Mechanical Installation

(1) Dimensions



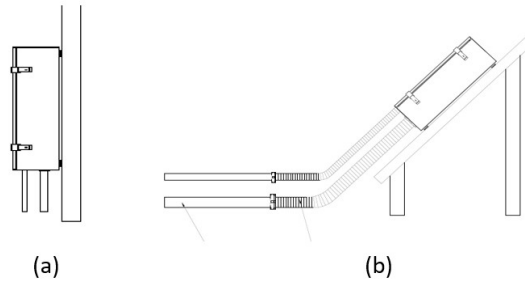
**Figure 3-1 Dimensions of CPS DBA04-600V/US AC Combiner**



(2) **Installation Method (see Figure 3-2):**

Make sure that the mounting structure (bearing wall, rack, etc.) is suitable to support the AC Combiner weight. Follow the mounting guidelines below:

- (a) If the location permits, install the AC Combiner vertically.
- (b) If the AC Combiner cannot be mounted vertically, it may be tilted backward to 15 degrees from horizontal.



**Figure 3-2 AC Combiner Mounting Options**



**NOTICE:**

If the installation environment allows, avoiding direct sunlight from the AC Combiner and avoiding direct rain and snow can extend the life of the equipment.



**CAUTION:**

The total weight of the CPS DBA04-600V/US AC Combiner is approx. **45.36kg (100lbs)**. Please ensure the mounting surface is capable of supporting this weight.

(3) **Mounting the AC Combiner onto the Brackets**

- (1) First attach the 4PCS chassis mounting brackets to the four corners of the enclosure with 12PCS m6x12 combination screws.
- (2) Install the enclosure to a flat surface using the 4 sets of M12x40 bolts, M12 flat washers, spring washers, and nuts.



**NOTICE:**

The mounting bracket of the chassis must be on a flat surface.

When fixing the M12x40 bolts, install the first two bolts on diagonally opposite corners. When installing the other two bolts, observe whether there is any gap between the mounting surface and the chassis bracket. If any gap is present, this indicates that the mounting surface is not flat and does not meet the requirements. Do not forcibly attach the remaining screws on the onto the mounting brackets. This will cause the chassis to deform and the protection level of the enclosure may be compromised.

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## 3.2 Electrical Installation

### 3.2.1 Pad-lockable Enclosure

To prevent unauthorized access to live parts, the DBA04-600V/US AC Combiner is equipped with a dead-front panel and a pad-lockable enclosure. A lock can be placed in the snap locks with lock holes during Lockout Tagout (LOTO) procedures and/or to prevent unauthorized access into the enclosure.



**NOTICE:**

During construction and maintenance, ensure that the door of the AC Combiner is completely closed before leaving the site to prevent possible water ingress and damage to the internal components.

### 3.2.2 Recommended Cable Torque Values

Select the appropriate torque value as specified in the table below:

**Table 3-2 Common Material Screw Torque Values (Nm)**

Material	Steel	Copper	Aluminum
M4 ± 20%	1.6	1	0.8
M5 ± 10%	3.5	2	1.6
M6 ± 10%	6.0	3.6	2.8
M8 ± 10%	12.5	8.8	7.0
M10 ± 10%	25	17	14
M12 ± 10%	50	30	24

Wiring precautions:

- (1) The instructions in this User Manual and on the product labels must be followed.
- (2) Ensure the wiring of the circuits have been installed correctly and confirm the phase sequence is correct.



**WARNING:**

There may be high voltage, please check and confirm that all input and output wiring or terminals have no voltage before connecting to avoid electric shock.



**CAUTION:**

The wiring must be installed in accordance with the specifications in this User Manual and the marking on the product to avoid risk of short circuits.

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### 3.2.3 Terminal Diagram

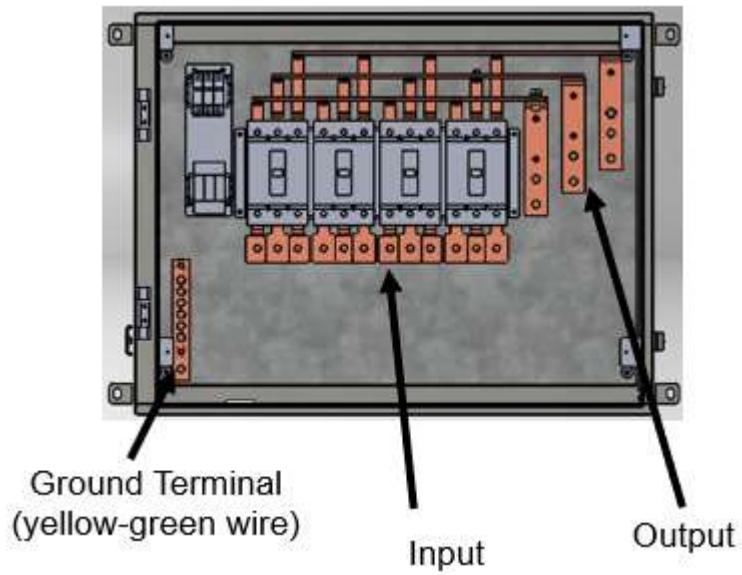


Figure 3-2 Terminals of CPS DBA04-600V/US AC Combiner

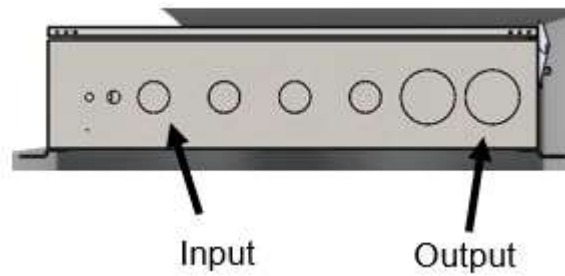


Figure 3-3 Knockout Hole Locations for Conduit Entry

**CAUTION:**

To ensure the safety of people and equipment, the wiring must be installed according to the phase positions marked on the equipment to avoid the risk of short circuit.

The DBA04-600V/US AC Combiner includes 4 knockout hole plugs for the input conduit entries. If the installation does not require all of the input conduit entries to be used, the hole plugs must be kept on all unused input knockout holes to prevent water ingress.

**2 sets of 3" (trade size) conduit and conduit fittings must be used for the output of the DBA04-600V/US AC Combiner.**

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## Chapter 4 Commissioning & Maintenance

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**WARNING:**

Both the input and output of the AC Combiner may be live.  
Disconnect all sources before testing or servicing.

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### 4.1 Commissioning Steps

- (1) Confirm that all circuit breakers are in the OFF position.
- (2) Check the conductor connections. If loose, tighten all connections, referring to **3.2 Electrical installation**.
- (3) Use a multimeter to measure the input voltage of each connection. Confirm that the voltage is within the range required by the system and the polarity is in accordance with the labels on the equipment.
- (4) Turn the first circuit breaker to the ON position and confirm that the voltage and phase sequence are correct.
- (5) Turn the remaining circuit breakers to the ON position.
- (6) Check to confirm that the voltage and phase sequence for all connections are correct.



**INSTRUCTION:**

If there is an abnormality, disconnect the corresponding circuit and check.

After the connected inverters are operating, check the current of each branch circuit through the data monitoring software.

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## 4.2 Maintenance

To ensure the AC Combiner is operating properly, it should be checked periodically. If problems are found, please contact Chint Power Systems. The electrical components contained in the AC Combiner are designed for use with CPS inverters and should not be mixed with other products.

Periodic checks should include:

- (1) Tighten the wire terminations and confirm that the ground wire is intact.
- (2) Check the status of the circuit breakers.
- (3) Check the status of the surge protector.
- (4) Ensure the AC Combiner is clean and free of debris.

## 4.3 Troubleshooting

Issue	Cause Analysis	Solution Method	Notes
Surge Protector failure	Lightning protection module damage	Replace the lightning protection module	The indicator is red to indicate that the protection module has deteriorated
No output	1. Circuit Breaker Trip 2. Faulty Line	1. Check if the circuit breaker is closed or tripped 2. Check the line and re-energize after no fault	



## Chapter 5 Technical Data

<b>Model Name</b>	<b>CPS DBA04-600V/US</b>
<b>System</b>	
Number of Input Circuits	4
Poles of Input Circuit Breaker	3
Rated Voltage	600Vac
Rated Frequency	60Hz
Input Circuit Breaker	Noark M2H175T3 (175A)
Interrupting Capacity	25KA
Surge Protection	PE600-40M2-30
Max Discharge Current (8/20 $\mu$ s)	40KA
Rated Output Current	800A
<b>Environment</b>	
Enclosure Protection Degree	NEMA 4X
Operation Temperature Range	-13°F to +122°F / - 25°C to +50°C
Operating Humidity	0-95%, Non-condensing
Operating Altitude	6562ft / 2000m
<b>Mechanical Data</b>	
Dimensions (WxHxD) (in/mm)	35.4x27.6x9.8in (900x700x250mm)
Weight (lbs./kg)	100lbs / 45.36kg
Input Conductor Size Range	#6AWG – 350kcmil CU/AL
Input Terminations	M12 Clearance Hole (1-hole)
Input Knockout Hole Size	2" (Trade Size)
Output Conductor Size Range	3/0AWG – 600kcmil CU/AL (1 or 2 sets)
Output Terminations	M12 Clearance Hole (2-hole)
Output Knockout Hole Size	3" (Trade Size)
<b>Safety</b>	
Certification	UL1741

## **Chapter 6 Limited Warranty**

The warranty policy of this product is specified in the contract; otherwise, the standard warranty is 2 years.

For service, Chint Power Systems America will provide local support. For

Warranty terms, please refer to the CPS America standard warranty policy in place at time of purchase.

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