

Flex Gateway Card

Installation and Operation Manual

For CPS 50kW/60kW 3-Phase String Inverters



CHINT POWER SYSTEMS AMERICA CO.

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Chapter 1 Overview

1.1 Product Description

This optional site level inverter data logger and gateway was developed to enable customers and 3rd parties to receive data directly via Ethernet based XML exchange and enable CPS to improve its service offering with remote FW capability. This manual is written specifically for installing the Flex Gateway into the wire box of the CPS SCA50KTL-DO-US-480 and SCA60KTL-DO/US-480 3-Phase String Inverters. The Flex Gateway acts as a Modbus master data logger and gateway solution for monitoring and controlling commercial and utility scale inverter applications. This flexible monitoring solution enables three parallel outbound communication options:

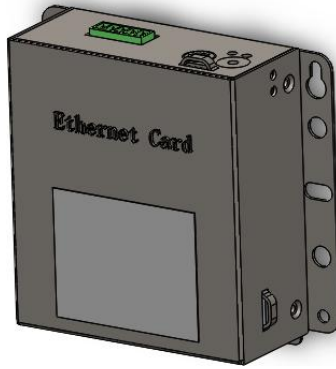
- (1) local pass-through Modbus data to 3rd party solutions;
- (2) Ethernet-based communications to the CPS portal;
- (3) a programmable Ethernet based connection to a location chosen by the customer.

The Flex Gateway enables remote F/W upload by the CPS Service team, enabling efficient field service solutions for our customers. The remote upload function is facilitated by the CPS Monitoring Portal.

Key Features include:

- 1 Installed in a single inverter wire-box: no power or extra equipment required
- 2 Modbus communications input (up to 32 inverters per card) - Modbus RS485
- 3 Complete controls functionality via Modbus (per inverter or broadcast command)
- 4 Flexible outbound communications
- 5 Programmable IP address for customer direct data (XML format)
- 6 Remote inverter F/W update capable
- 7 Pass-through data for local 3rd party solutions (Modbus RS485)

1.2 Appearance and Main Item Description



①



②



③



Figure 1-1 Diagram of the Flex Gateway

1.3 Main items of the Flex Gateway:

- 1) Flex Gateway housing and circuit board.
- 2) 5-pin connector for inverter daisy chain connection via Modbus RS-485 (for external installation only)
- 3) 3-pin connector for 3rd party data pass-through via Modbus RS-485 (for external installation only)

Chapter 2 Installation

This chapter describes the installation procedure for the Flex Gateway. Please read each section carefully and install the product following the step-by-step instructions.

The Flex Gateway and accessories are shipped in one package. Before installation, please check that the following items are included in the package:

Table 2-1 Main Items

No.	Item	Qty	Note
(1)	Main enclosure of Flex Gateway	1	
(2)	5 pin Molex connector	1	
(3)	3 pin Molex connector	1	
(4)	Mounting screws	2	
(5)	DIN Rail Mounting Clip	1	
(6)	Installation manual	1	

Before You Begin

Planning the Ethernet connection

1. The maximum cable length should be less than 100 meters;
2. The recommended termination connector is RJ45.
3. The recommended cable type is CAT5e 4x24AWG data communication cable (eg. Belden 1583A)
 - Characteristic Impedance (Z_0): 100 ohms
 - Mutual capacitance ≤ 15 pF/Foot
 - Capacitance to Shield ≤ 65 pF/Foot.
 - Propagation velocity $\geq 70\%$

Planning the Modbus RS-485 connection

1. The maximum cable length should be less than 800 meters;
2. The recommended termination connector is 5-pin Molex.
3. The recommended cable type is 3x 22~18AWG communication cable (eg. Belden 3106A)
 - Characteristic Impedance (Z_0): 100 to 200 ohms
 - Mutual capacitance ≤ 12.5 pF/Foot
 - Capacitance to Shield ≤ 60 pF/Foot.
 - Propagation velocity $\geq 60\%$

Network Connections

When the inverters are monitored via the Flex Gateway, a unique RS-485 address for each inverter can be set up through the inverter LCD interface. Up to 32 inverters can be connected together in the communication network. The daisy-chain topology is recommended for the network connection, as shown in Figure 2-1. Other communication topologies, such as the star networks are not recommended.

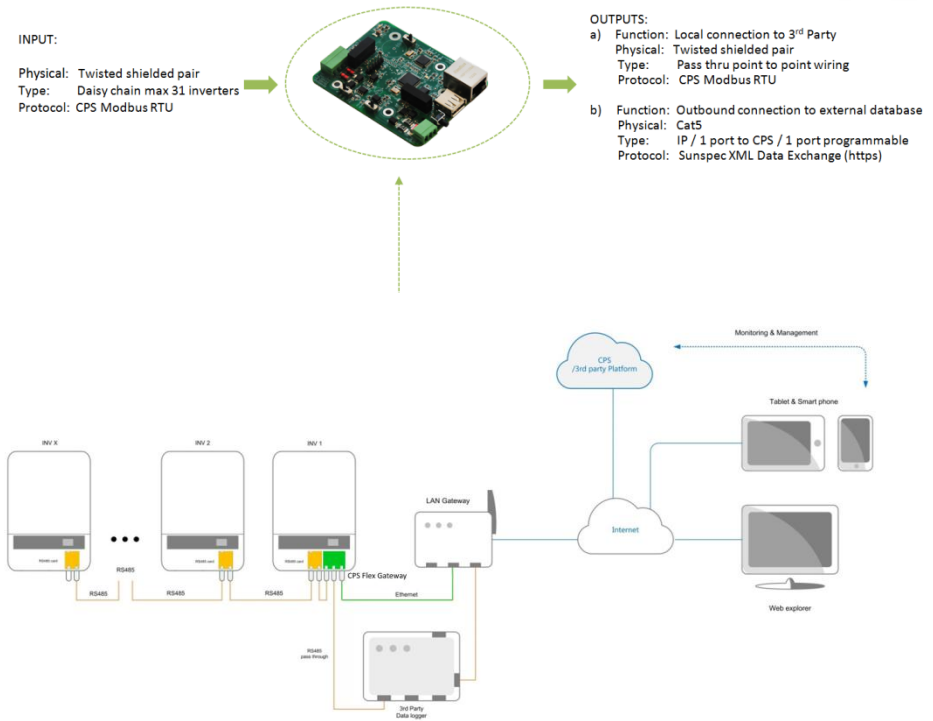


Figure 2-1 Network Connections

1. Communication Connection

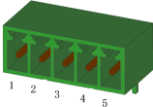
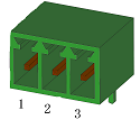



This step will provide instructions on making the following connections:

- Connection from the Flex Gateway to the inverter(s) via Modbus RS-485
- Connection from the Flex Gateway to 3rd party data pass-through via Modbus RS-485 monitoring
- Ethernet connection from Flex Gateway to external internet portal.
- Flex Gateway Communication board description as figure 2-2
- Connectors and Flex Gateway



Figure 2-2 Flex Gateway

Table 2-1 Communication Connection Interfaces

Item	Picture	Configuration description
① RS485 port (5-pin connector)		1 ----12V+ 2 ----12V- 3 ----RS485+ 4 ----RS485- 5 ----COM
② RS485 port (3-pin connector) Pass through function		1 ----RS485+ 2 ----RS485- 3 ----COM
③ Reset button		Restore the Flex Gateway to the factory setting including the default fixed IP address for data uploads.
④ USB port S200		Firmware upgrade via USB device
⑤ Ethernet Port		Ethernet connection via RJ45

1) Built-in Installation Method:

- (a) Only 50kW/60kW 3-Phase String Inverters support the built-in installation method.
- (b) Before install in the wiring box, the Flex Gateway metal housing must be disassembled and the card removed from the metal housing.

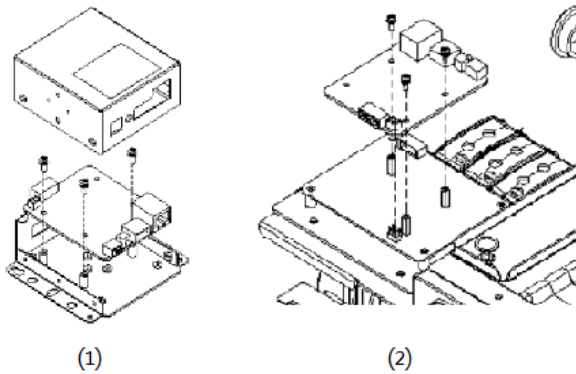


Figure 2-3 Built-in Options

1. Built-in Installation Mounting Method

The Flex Gateway is to be installed within the wire box of the 50kW/60kW 3-Phase String Inverter. To install the Flex Gateway inside the wire box perform the following steps:

- a) Remove wire box cover.
- b) Locate the Interface Board.
- c) Using the mounting screws provided in the package, mount the Flex Gateway onto the Interface Board by aligning the mounting holes and 6-pin header.
- d) Tighten screws until tight.

2. Wiring Method

As shown in Fig 2-4, once the Flex Gateway Card is installed, the card and additional inverters on the RS485 network are wired together via the 5-pin connector. The 3rd Party pass-through RS485 is terminated at the 3-pin connector. The Ethernet connection is terminated at the RJ45 port.

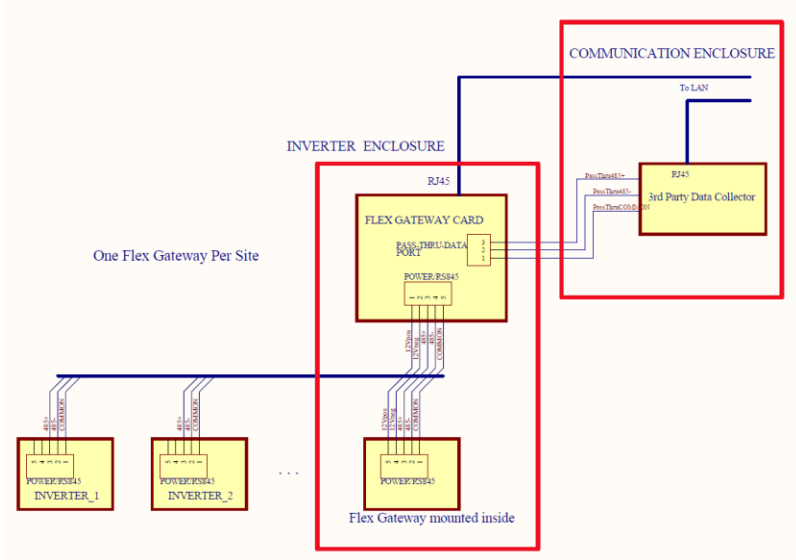


Figure 2-4 Built In Method Wiring Diagram

2) External Installation Method (Internally Powered):

(a) Only 50kW/60kW 3-Phase String Inverters support the external installation method using the internal inverter 12V power supply.

1. External Installation Mounting Method

The Flex Gateway may be installed within an external NEMA 4 rated communication enclosure using the DIN rail mount. To install the Flex Gateway perform the following steps:

- a) Using the mounting screws provided in the package, mount the Flex Gateway DIN rail mounting clip to the metal housing.
- b) Tighten screws until tight.
- c) Fasten the Flex Gateway to the DIN rail

2. Wiring Method

As shown in Fig 2-5, once the Flex Gateway Card is installed in the external communication enclosure, the card and additional inverters on the RS485 network are wired together via the 5-pin connector. The 3rd Party pass-through RS485 is terminated at the 3-pin connector. The Ethernet connection is terminated at the RJ45 port.

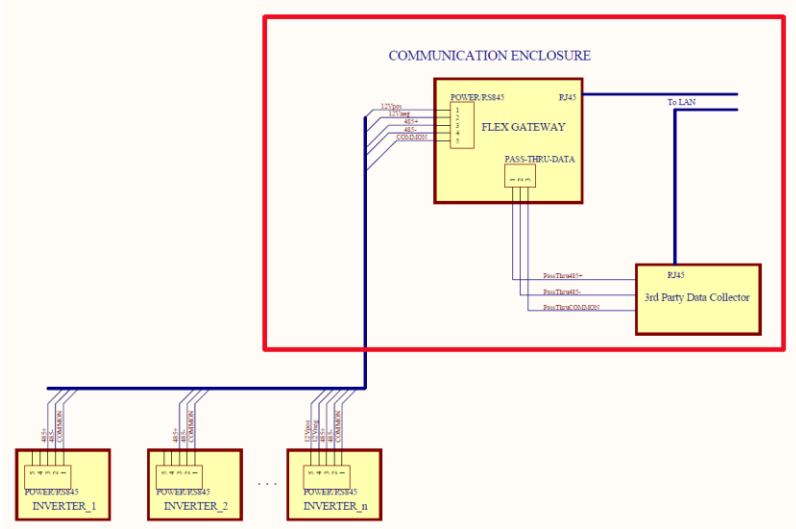


Figure 2-5 External Installation (internal power) Wiring Diagram

3) External Installation Method (Externally Powered):

(a) Only 50kW/60kW 3-Phase String Inverters support the external installation method using an external 12V power supply.

2. External Installation Mounting Method

The Flex Gateway may be installed within an external NEMA 4 rated communication enclosure using the DIN rail mount. To install the Flex Gateway perform the following steps:

- a) Using the mounting screws provided in the package, mount the Flex Gateway DIN rail mounting clip to the metal housing.
- b) Tighten screws until tight.
- c) Fasten the Flex Gateway to the DIN rail

2. Wiring Method

As shown in Fig 2-6, once the Flex Gateway Card is installed in the external communication enclosure, the card and additional inverters on the RS485 network are wired together via the 5-pin connector. The 3rd Party pass-through RS485 is terminated at the 3-pin connector. The Ethernet connection is terminated at the RJ45 port.

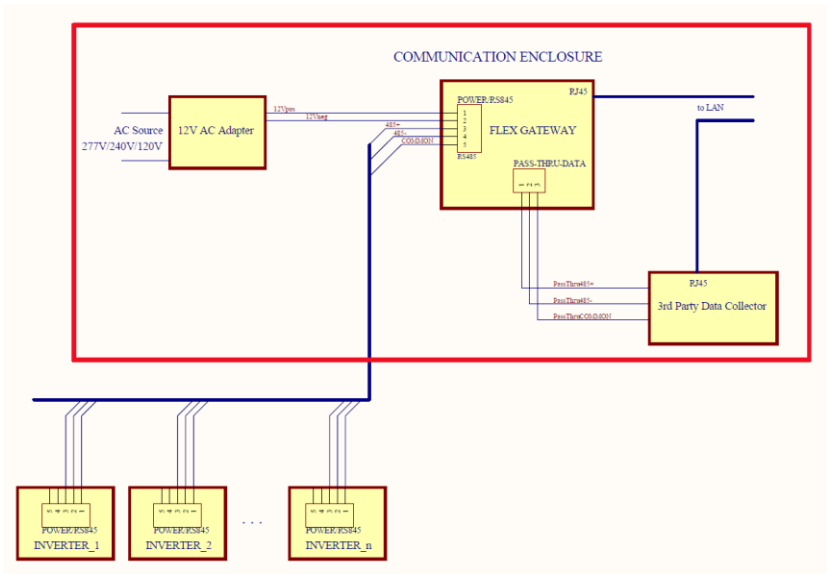


Figure 2-6 External Installation (external power) Wiring Diagram

Chapter 3 Configuration

3.1 Flex Gateway Settings

3.1.1 Connect the laptop to the Flex Gateway by CAT5 Ethernet cable, Flex Gateway;

3.1.2 Energize the inverter by turning on the DC disconnect switch. Next, press the Reset Button on the Flex Gateway for 8 seconds and release it after the red indicator light on the Flex Gateway stops flashing;

3.1.3 Set the laptop to a fixed IP address per the following instructions:

IP address: 10.122.1.x (x from 0-255 , except 25)

Subnet mask: 255.255.255.0

Gateway: 10.122.1.254

3.1.4 Launch an internet browser and enter the IP address: 10.122.1.25. Next, enter the username as “admin” and password as “admin”, in the fields shown in Figure 3-1:

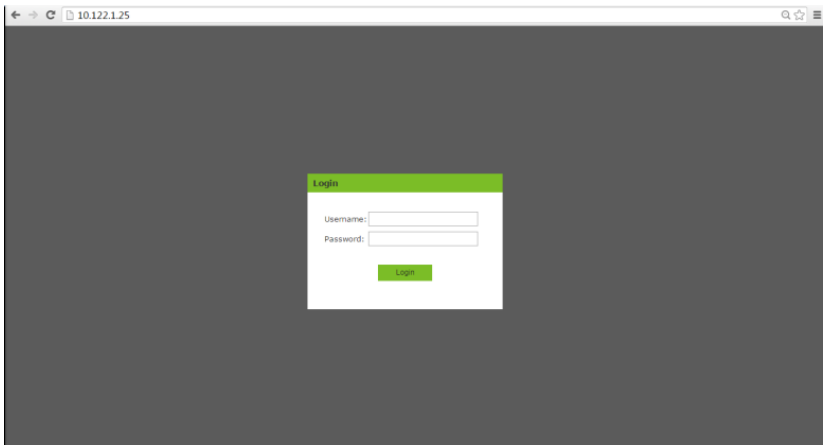


Figure 3-1

3.1.5 After entering the username and password the display will automatically show the Device tab.

Navigating the Flex Gateway Menu

The first tab, Device View, will display information for the inverters connected to the Flex Gateway.

The second tab, Configure, will allow the user to set up connections to the LAN network and remote upload server.

The third tab, Firmware, shows the firmware version of the Flex Gateway.

The fourth tab, Security, can be used to change the password for the Flex Gateway.

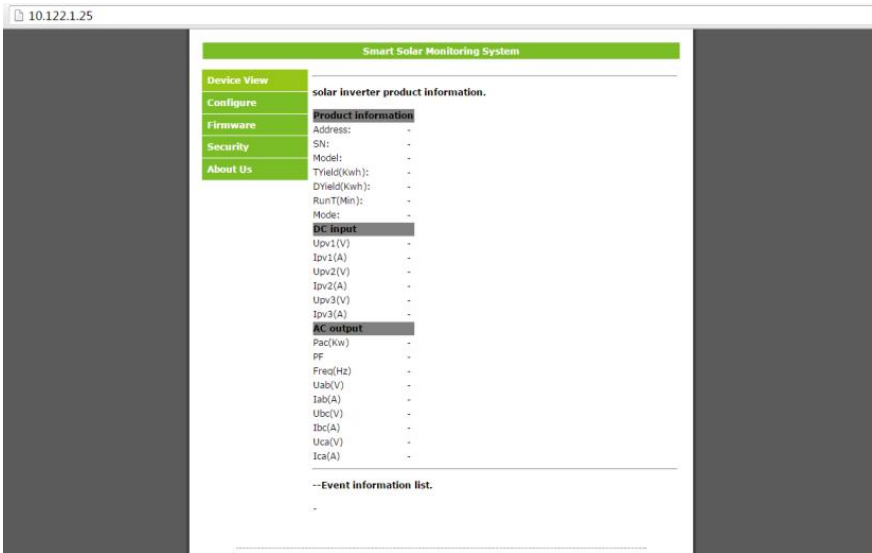


Figure 3-2

Device Page

The display will auto-scroll through all the inverters that are discovered on the Modbus network and auto-populate the fields for each device.

Configure Page (Set-Up LAN Network)

3.1.6 The Flex Gateway must be set-up with a static IP address. To set the static IP address the user needs to identify the default gateway of the host network.

IP address: aaa.bbb.ccc.xxx (xxx from 0-255, except the network Default Gateway number)

Subnet mask: 255.255.255.0

Gateway: aaa.bbb.ccc.ddd (enter the network Default Gateway)

DNS Server: leave this field empty and allow the network to assign

Then click “Apply” field adjacent to the DNS Servers field.

Set-Up Remote Upload Server IP Address

1. The Remote Main IP and RemoteMainPort settings should not be changed. Leave default settings.
2. Set the Remote Secondary IP (currently shown in Figure 3-3 as Remote Back IP) address to the server IP address that the customer provides. This is the location that the data from the inverter(s) will be uploaded to by the Flex Gateway.
3. Set the Remote Secondary Port (currently shown in Figure 3-3 as RemoteBackPort) to 10000.
4. Set the Upload Window to the time interval for inverter data collection. Data will be uploaded at the time interval set in this field.

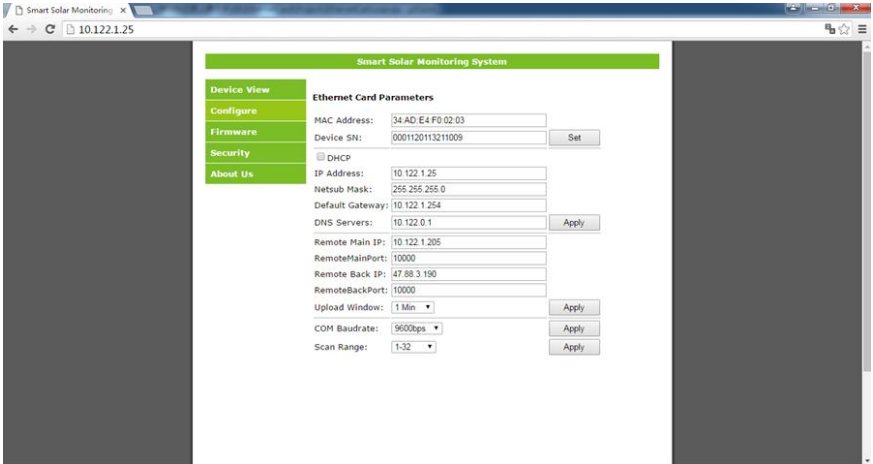


Figure 3-3

3.1.7 The Mac address and Device SN are the factory settings and should not be modified. The IP address/subnet mask/gateway setting is to connect to the local router. Remote Domain IP/Remote Port is the CPS webserver address and the US server domain IP is 47.88.3.190, the port number is 10000; the below figure 3-4 shows all the data need to be modified ;

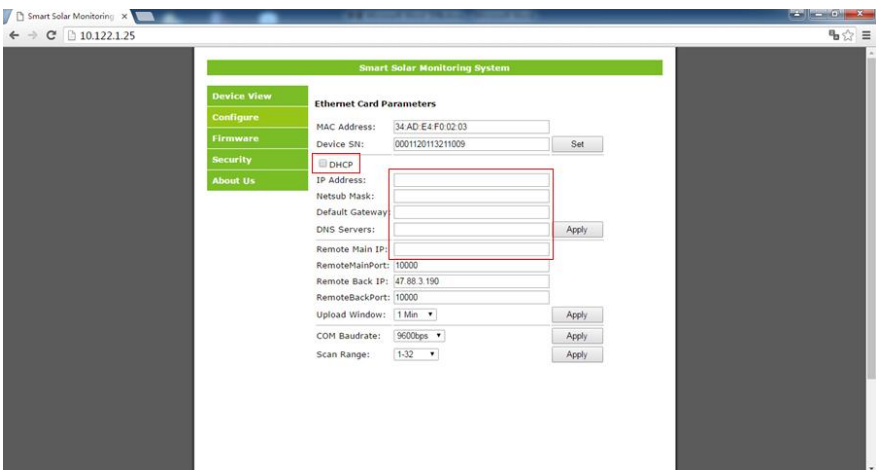


Figure 3-4

Chapter 4 Specifications

Model Name CPS GW-3PKTL-US

Communications

Inverter interface	RS485
User interface	Standard: RS485, Ethernet, USB
Inverter connections per card	32
Protocol	XML, HTTPS, DHCP, DNS Resolution, Modbus RTU

Monitoring

Web connections	IP addresses: CPS + Programmable location
Local monitoring	Wired connection to the Data logger (integrated web GUI)
Remote monitoring	CPS platform or 3rd party platform

Data logging Specifications

Data sampling rate	Programmable data sampling (1 to 15 minute sample rate)
Local data storage	Log data for 30 days based on 15 minute intervals
Upgradeability	Remotely via CPS platform or 3rd party platform / locally via USB
Data parameters	Modbus ID, Inverter S/N's, Model, TYield/DYield(kWh), RunT(min), Mode, Upv(V), Ipv(A), Pac(kW), PF, Freq(Hz), Uabc(V), Iabc(A)

Advanced Functions	
Remote O&M operations	Inverter parameter settings / inverter firmware upgrade
Controls Capability	Capable of control commands via Modbus (ie; PF control, Active power curtailment, Remote reset)
Power Supply	
DC power supply	9-12Vdc, ~ 2W
Environmental Parameters	
Ambient temperature range	-30 to +85°C
Environmental protection	Installed in NEMA 4X wire-box
Relative humidity	<85% Non-condensing
Mechanical Parameters (per unit)	
Dimensions (H x W x D)	86mm x 69mm x 16mm
Weight	50g

Chapter 5 CPS America Accessories Warranty

Chint Power Systems America Co. (“CPS”) and its parent company, Shanghai Chint Power Systems Co., Ltd, warrant that all new inverter accessories sold by CPS are free of any defects in material and workmanship for a standard warranty period of two (2) years. The warranty period begins one (1) month from the date CPS ships the product or the date of installation, whichever comes first. Inverter accessories include; shade covers, disconnect covers, data monitoring hardware, rack mounting equipment and energy balancer.

Scope of Warranty Services:

- Covers new accessory products installed in North America.
- CPS will repair, replace with a product of the similar type, or refund the purchase price, at its sole discretion, at no cost to the customer if the customer notifies CPS of any breach of warranty within the warranty period.
- CPS will, with commercially reasonable efforts, respond to customer inquiries within 24 hours and provide a resolution plan within 48 hours to rapidly resolve warranty issues.
- If the unit is replaced in the field, the customer agrees to utilize the CPS Return Material Authorization Policy (“RMA”) in place at the time of replacement.
- CPS warrants that any repaired or replaced product will be free from defects in material or workmanship for the remainder of original unit warranty period.

Warranty Exclusions:

- Damage from shipping or transportation.
- Damage caused by improper installation, operation and maintenance according to the installation manual or any local, state or federal codes and requirements.
- Replaceable service items.
- Any costs incurred by the customer or installer for troubleshooting, installation, removal or the value of lost energy production.
- Damage caused by force majeure, including but not limited to flood, fire, earthquakes and lightning.
- Material or workmanship not provided by CPS or its approved service providers.
- Damage caused by rust or corrosion.
- Use with non-CPS branded inverters.

If your product requires troubleshooting or warranty service, contact your installer or dealer. If you are unable to contact your installer or dealer, or the installer or dealer is unable to provide service, contact CPS directly at:

North American call center: 1-855-584-7168

AmericaSales@ChintPower.com

CPS LIABILITY FOR LOSSES CAUSED BY PRODUCT FAILURE OR DAMAGE IS ONLY LIMITED TO THE VALUE OF THE PURCHASE PRICE OF THE ORIGINAL PRODUCT AND EXCLUDES CONSEQUENTIAL LOSSES. IN THE EVENT OF ANY DISCREPANCY BETWEEN OTHER APPLICABLE QUALITY GUARANTEE OR AFTER-SALES PROVISIONS AND THIS WARRANTY, THIS WARRANTY SHALL PREVAIL. IN THE EVENT THAT PROVISIONS OF THIS WARRANTY ARE IN CONTRADICTION WITH APPLICABLE STATE OR FEDERAL LAWS OR REGULATIONS, THE LATTER SHALL HAVE TOP PRIORITY. THE RIGHT OF MODIFICATION AND INTERPRETATION OF THIS WARRANTY IS RESERVED BY SHANGHAI CHINT POWER SYSTEM CO., LTD.

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