

100kW Power Conditioning System (PCS)

Operation Manual



Version: 1.0.0

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Conventions

General Conventions

The following conventions are used in this manual:



Note:

Indicates additional information that is relevant to the current process or procedure.



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About this Manual

Version Control

Table 1: Version Control

Rev.	Change Description	Date



IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

General Safety Instructions

This manual contains important instructions for PCS that should be followed during installation and maintenance of the inverter.

PCS inverters are designed and tested to meet all applicable International safety standards. However, like all electrical and electronic equipment, safety precautions must be observed and followed during installation and operation of PCS inverters to reduce the risk of personal injury and to ensure a safe installation.

Installation, commissioning, service, and maintenance of PCS inverters must only be performed by qualified personnel that are licensed and/or satisfy state and local jurisdiction regulations.

Before starting installation or commissioning of the PCS, read through the entire manual and note all DANGER! WARNING! CAUTION!, and NOTICE! Statements.

All electrical installations must comply and be in accordance with all the state, local and utility regulations.



System Power On/Off

Powering on PCS

To power on the system, see the following guidelines:

- 1. After the PCS installation is completed, check to ensure that the upstream breaker is in the closed state before powering-on.
- 2. Turn the AC and DC switches on the front door to **ON** state as shown in Figure 1. The PCS powers on and enters standby mode.
- 3. Open PCS HMI Tool installed on the computer or PC, push the **PCS ON** button, then PCS will enter into **RUN** state.



- Note:
 The setting and description of PCS HMI Tool, please refer to PCS100 communication protocol.
- For how to use PCS HMI Tool, please refer to "PCS HMI Tool" on page 15.
- According to the user request, use PCS HMI Tool to do the setup on site or use other controller to setup PCS100 according to the communication protocol at customer side.



Figure 1. Turn AC and DC Switches to ON State



Powering off PCS

To power off the system, see the following guidelines:

- 1. Check the system status on the front display panel to ensure that the system is not in a **Soft-Start** or **Run** state.
- 2. If the system is in **Soft- Start** or **Run** state, push the **PCS OFF** button on PCS HMI Tool to switch the PCS system to Standby mode.



Note:

The **ON/OFF** button on PCS LCD panel doesn't work. Turning PCS on and off could only be available through the software such as PCS HMI Tool.



Figure 2. The Front Panel of PCS

PCS HMI Tool								5.	
Serial Port Mode Bau COM15 C RTU 384	vate Stop bits	Parity None	Flow control Sla	ve ID Timeout	Retries 1	Open Close		хіт 🛕	SELT/
ystem Control Alarm&Warning C	onfiguration N	laintenance						2019/5,	9 11:21:0
			PCS Main Cir	cuit Diagram &	Operation Statu	5			
Standby GRID	AC						DC		
Soft-Start Disc	AC I	Filter 🗧		AC/D	× –	DC Filter	Disconne	ctor	
Contraction of the second se				-			10	the second se	
Fault							1.00	and the second second	
 Fault Sleep 	Ļ	Ļ			Ļ		(bat		
 Fault Sleep SA Soft-Start SA Normal 	Vr. Vs.,Vt Vrs,Vst,Vtr,Freq.	le, is ,it			 ↓ dc		Vdc Vba	(A) (V) SoC (%)	
Fault Sleep S A Soft-Start S A Normal	Vr. Vs. Vt Vrs.Vst.Vtr.Freq. kW kVsr 150-;1" 150-;1" 1	kva 50.11 600.11 6	M 00 1 " 600 1 " 250 1	(A)	1501; [] 3501; [] 3501; []	V) (V) (A)	Vdc Vba	(A)]]]] [0 (V) SoC (%) (C) (00)] 100] [100]]	(Hz) (5-
Fault Sicep S.A. Soft-Start S.A. Normal	Vr, Vs, Vt Vrs, Vst, Vtr, Freq.	kva 50 - 600 - 6 50 - 5 50 - 5 50 - 5	(V) 00	(A)	550 550 550 550 550 5 500 5 500 5 500 5	V) (M) (A) 1200 - 200 - 1000 - 175 -	Vdc Vba	(A) (V) SoC (%) (V) SoC (%) (V) SoC (%) (V) SoC (%) (V) SoC (%)	(Hz) 65- 625-
Fault Steep S& Solt-Start S& Normal	Vr, Vs, Vt Vrs, Vst, Vtr, Freq. 150 100 110 1 100 100 1	kva 50 - 600 - 6 25 - 500 - 5 00 - 400 - 4	00 - 10 - 500 - 10 - 250 - 00 - 500 - 10 - 250 - 00 - 400 - 1 - 150	250 250 250 250 250 100	150 - 150 -	V) (V) (A) 1200 200- 1000 175- 150- 800 125-	Vdc Vba	(A) [2 (V) SoC (%) 0 100 100 (%)	(Hz) 65- 625- 60- 575-
Fault Steep 5.53 Solt-Start 5.54 Normal Active Power (AW) Reactive Power (AWar)	Vr, Vs. Vt Vrs. Vist. Vtr. Freq. 150 - 100 - 1 100 - 100 - 1 50 - 00 - 2 0 - 0	tr, is, h 50	00 00 10 250 00 500 200 00 400 150 00 500 150	(A) 250 - 250 - 250 - 200 150 - 150 -	550 550 550 500 500 500 500 500 500 500	V (M) (A) 1200 200 175- 150- 150- 125- 500 100-	Vdc Vbs	(IA) 0 (IV) 50C (%) 0 100- 100- 100- 100- 0 60- 80- 0 40- 40-	(Ha) 65- 625- 60- 575- 55-
Fault Steep SA Soft-Start SA Soft-Start SA Normal Active Power (kW) Reactive Power (kW/)	Vr, Vs, Vt Vrs, Viz Vtr, Freq. 50	kva 50 600 6 25 500 5 500 400 4 75 300 3 50 200 2	00 - (V) 20 - 500 - 200 00 - 500 - 200 00 - 100 - 150 00 - 500 - 100 00 - 100 - 100	(A) 259 250 200 200 150 150 100 108	500 550 530 300 100 100 200 200 200 100 100 100	V (V) (A) 1200 - 200- 175- 150- 150- 125- 600- 100- 125- 600- 100-	100 100 10 80 80 80 60 60 60 40 43 4 20 20 2	(IA) 0 at (V) 50C (%) 0 100-100-100- 100-100-100- 100-100-100- 100-100-100- 100-100-100- 100-100-100- 100-100-100- 100-100-100-100- 100-100-100-100- 100-100-100-100- 100-100-100-100-100- 100-100-100-100-100- 100-100-100-100-100- 100-100-100-100-100-100- 100-100-100-100-100-100-100-100-100-100	(Ha) 65- 625- 80- 575- 55- 525- 90-
Fault Steep Sta Solt-Start Sta Normal Active Power (kW) Reactive Power (kW) PCS ON PCS OFF	Vr. Vs. Vr Vrs. Vrs. Vrs. Vrs. Vrs. Vrs. Vrs. Vrs.	kvA 50	00	250 - 250 200 200 110 130 100 100 50 10	100 100 100 100 100 100 100 100 100 100 100	V) (V) (A) 1200 - 200- 1000 - 175- 150- 150- 125- 500 - 100- 400 - 75- 200- 25- 200- 25-	100-100-10 80-80-80 60-60-60 4	(4)	(Ha) 65- 625- 60- 555- 555- 50- 475-
Fault Steep SA Solt-Sert SA Normal It Active Power (MW) PCS ON	Vr. Vs. Vr Vrs. Vst. Vr. Vr. Vrst. Vrst. Vrst. Vrst. Vrst. Vrst. Vrst. Vr 150- 17 100 100 1 00 00 0 00 0 00 0 00 0 00	kc h , h 50 600 6 251 500 5 500 200 2 500 200 2 51 000 1 9 0 0 0	00 00 00 00 00 00 00 00 00 00 00 00 00	250 250 200 200 150 150 150 50 0 0	500 500 100 100 100 100 200 200 100 100 100 100 100 100 100 100 100 1	M M Ak 1200 200- 1000 175- 1000 125- 800 125- 800- 100- 400- 75- 300- 25- 00- 0-	Vdc Vbar 100 100 10 80 60 6 60 60 6 100 40 40 100 400 100 400 100 400 100 400 100 400 100 400 100 400 100 400 100 400 100 400 1	(A) 2 A (V) SoC (%) 0 - 100 - 100 0 - 100 -	(Ma) 65- 625- 60- 575- 555- 555- 555- 475- 475-

Figure 3. PCS HMI Tool - PCS ON/OFF Control



3. Turn the AC and DC switches on the front door to **OFF** state as shown in Figure 4.



Figure 4. Turn AC and DC Switches to OFF State



Operations

Front Panel

Through the front panel the user can perform various PCS operations.

Introduction of Front Panel

The layout of the front panel is shown in Figure 5. It is divided into three areas: buttons, the LCD screen, and LED indicators.

- The LCD screen is located in the center of the front panel.
- The buttons are located on the left and right sides of the screen. The **ON/OFF** button on the left of PCS HMI doesn't work, and the four function buttons are distributed on the right side of the screen. Each function button can perform the relevant function described in the text box at the right side of the screen. For example, the first function button corresponding to ratings can show the PCS ratings, as shown in Figure 5.
- The LED indicators are located below the screen. From left to right, they are STANDBY (yellow), RUN (green), and FAULT (red), corresponding to the system operation status for standby, running, and fault. All three LEDs will be lighted if the user has not set the operation mode of the PCS.



Figure 5. PCS Functional Keypad on Control Panel



Front Panel Flowchart

The figure below shows the function structure and information displayed of the front panel:



Figure 6. Front Panel Flowchart

View PCS Operation Status

The user can check the operation status of the PCS through the LEDs and the screen display. Please refer to Table 2 for the definitions of the LEDs below the screen.

LED	Status		
STANDBY (orange)	Standby		
RUN (green)	Blinking: System soft-starting		
	On: System running		
FAULT (red)	System fault		
All three LEDs are lighted	The system operation mode is not set		



The current operation mode and status of the system can be seen in the top left corner of the screen home page, as shown in Figure 7 and Figure 8.

The block displays the system operation mode in the first line and the system operation status in the second line.



Figure 7. Operation Mode of PCS (1/2)

	A NELTA
ON	PCSIOCKW 2000000 V A MOVER Basing A 200,2 L 4 0.0 B 221,4 0.0 B 221,2 0.0 B 22

Figure 8. Operation Mode of PCS (2/2)

The specific operation mode definitions are shown in Table 3.

Table 3: Definition	is of System	Operation	Modes
---------------------	--------------	-----------	-------

Operation Mode	Definition
NULL	A NULL display indicates no specific operation mode is configured.
Demand	A Demand display indicates the PCS is configured for Demand mode. In this mode, the PCS accepts the external P or Q commands and charges/ discharges the battery according to the grid requirements.
HMI Com Loss	An HMI Com Loss display indicates a loss of connection between the PCS internal controller and the HMI. The currently displayed information is not valid.





Figure 9. Illustration for Demand Mode

Refer to Table 4 for operation status definitions.

Table 4: Definitions	of System	Operation	Statuses
----------------------	-----------	-----------	----------

Operation Status	Definition	Remark
Init	System is under initializing process	
Standby	System is in standby mode	
Soft Start	System is under soft-starting process	
Run	System is in normal operation	
Fault	System encountered any fault event	



View the PCS Configuration Data

Press the keypad on the right side of the panel, as shown in Figure 10, to enter the system configuration information page. PCS information is displayed in Figure 11. The user can return to the main page by pressing the corresponding **HOME** function in the current menu.



Figure 10. Enter Ratings Page through Function Keypad



Figure 11. Ratings Page



View the PCS Operation Data

The main data of the system will be presented through the main page of the screen display, including the system's operation mode, operation status, electrical metering, and event recording. Refer to Figure 12 and Table 5 for detailed descriptions.



Figure 12. Main Page

Table 5: Descriptions of PCS Operation Data

Block	Functional Description	Remark
1	Line 1: Operation mode Line 2: Operation status	When the communication between control panel and master controller is lost, HMI Com Loss is displayed on line 1 and line 2 is blank.
2	Display of the ambient temperature, three- phase voltage and current measurement data, the system output active power, and reactive power	
3	Event record	The system records the latest three events in chronological order.
4	Line 1: Date Line 2: Time	
5	Menu selection (associated with the functional buttons on the right side)	Blank means no next level menu to be displayed.



View PCS Fault Information

Press the function button corresponding to the Alarm function on the main page of the screen display to enter the alarm information pages. These pages display the current system alarm information, with each page showing up to 8 alarms. If the current number of faults exceeds 8 alarms, you can use the **NEXT** function to go to the next page for more information. In these fault pages, the user can press the **BACK** function button to return to the previous page or the **HOME** function button to the main page.



Figure 13. Alarm Page

View PCS Software Version & Adjust LCD Contrast

Press the Info function button on the main page of the screen display to enter the alarm information page. The page presents the current system software version information and can be returned from to the main page via the **HOME** function button.



Figure 14. Software Version Information Page



Under the interface of Info, press the **NEXT** button to enter the interface of LCD CONTRAST RATIO ADJ. According to user condition, adjust the ADJ value (Range 0 to 100) through **UP** and **DOWN** buttons.



Figure 15. Software Version Information Page

Check the Battery System Status and Data

The **Battery** function button on the main page allows the user to access information about the associated battery management system, as shown in Figure 16. The battery information is presented in multiple pages that can be accessed via the **NEXT** and **BACK** function buttons.

The user can return to the main page directly via the **HOME** function button as well.



Figure 16. Battery Information Page (1/4)





Figure 17. Battery Information Page (2/4)



Figure 18. Battery Information Page (3/4)



Figure 19. Battery Information Page (4/4)



PCS HMI Tool

Introduction

PCS HMI Tool could simulate and test the Modbus communication protocol, could use on monitoring, testing and adjusting Modbus communication equipment, also Modbus RTU protocol. PCS HMI Tool will install on PC and control PCS remotely.

PCS HMI Tool Installation Environment

- Operating System: from Windows 7 SP1 to Windows 10
- Hardware: 2 GB memory/800 MHz CPU/ USB or serial port

Installation

1. Open software setup package, double click **setup.exe** to start installation.

\rightarrow \checkmark \uparrow	L « 本地	也磁盘 (E:) > Software Tool > PCS H	MI Tool v ひ	搜索"PCS HMI Tool"	5
◆ 快速访问	^	名称	修改日期	类型	大小
		🧯 bin	2019/3/12 11:21	文件夹	
■ 未回		license	2019/3/4 15:36	文件夹	
● 下主	*	supportfiles	2019/3/12 11:22	文件夹	
■ 文档	A	nidist.id	2019/3/12 11:22	ID 文件	1 K
▶ 图片	*	🐙 setup	2018/9/5 12:50	应用程序	1,429 K
Informatic LabView	on	📓 setup	2019/3/12 11:22	配置设置	27 K

Figure 20. Software Setup Package

2. Installation interface as shown, you can also modify the default installation file path, then click **Next**.



Figure 21. Installation (1/5)



3. Select "I accept the above 2 License Agreement(s)" and click Next.

	Licens	e Agreement		A	AFIT	
	You	nust accept the licenses displayed below to proceed.		Smarter.	Greener.	Toget
NI	IVI					
		LICENSE AGREEMENT				^
BEF	ORE YO	U CLICK ON THE ACCEPT BUTTON AT	THE END	OF TH	HIS	
000	CUMEN	I, CAREFULLY READ ALL THE TERMS A	ND CONI	DITIO	NS OF	
HI	S AGRE	EMENT. BY CLICKING ON THE ACCEPT	BUTTON	YOU	ARE	
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		NO TO BE DOUND BI AND ARE DECOM	ING A PAP	CIXI	O THIS	
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Figure 22. Installation (2/5)

4. Click Next.

Setup					×
Start Installation Review the following summa	ary before continuing.		Smarter.	Graener.	Toget
Adding or Changing • PCS HMI Tool Files • NI-VISA 18.5 Runtime Support					
lick the Next button to begin installation	. Click the Back butt	on to change the	installation settings.		

Figure 23. Installation (3/5)



5. After installation complete, click **Finish** and **Restart** computer.



Figure 24. Installation (4/5)



Figure 25. Installation (5/5)

Making RS485 Connections

The RS485 communication link on the PCS100 uses a two-wire electrical interface in accordance with the EIA/TIA-485 standard. There are actually three wires in use, the third wire is considered a common connection. A shielded cable must be used for all links between devices with the shield of each segment being connected to ground at one end only.

Note on RS485 Pinout Markings

The polarity of the data lines must be verified. On some devices, the Data (+) may be labeled Data A and Data (-) may be labeled Data B. However, not all manufacturers follow this convention for A and B. It recommended to use the (+) and (-) labels for polarity to ensure a connection. If a device does not respond, try reversing the lines to see if the device responds (no damage will occur).



Connecting Devices

Controlling master devices must be connected to the PCS system using a daisy-chain technique (Figure 26 and Figure 27).

See the following guideline for further information.

- 1. Find the CNJ11/CNJ12 or CNJ7 on the J board. For more details, see "Communication and I/O Wiring" in the Installation Manual.
- 2. Connect one end of the cable to the PCS100 and the other end of the cable to the PC or the controller, see the following figures.



Figure 26. Connecting PCS and PC



Figure 27. Connecting PCS and Controller

3. Use the PCS HMI Tool to control, configure and monitor the PCS.



PCS HMI Tool Instruction

1. Connect PCS HMI Tool.

Step 1: Plug the RS485-USB converter into available USB port on both PCS100 and PC, check the COM port number for communication. Open the device manager, and select the port (COM and LPT) for finding the corresponded USB serial port



Figure 28. Selecting the Port

Step 2: Connect PCS HMI Tool.

Major settings are as below red frame (Figure 29).

- a. Select correspond serial port number from "Serial Port" drop down box.
- b. Enter the PCS ID number in the "Slave ID" input box.
- c. Generally, the others keep default value.

After completing the communication parameter configuration, click the **Open** button. If the connection is successful, the status indicator " **m**" will show green.



Figure 29. Connecting PCS HMI Tool

Step 3: Disconnect PCS HMI Tool. Click the **Close** button to disconnect communication. The status indicator " and " will show red.

Step 4: Exit PCS HMI Tool, click the "EXIT" button to close PCS HMI Tool application.



2. PCS ON/OFF Operation.

The PCS control area is shown in the red box below (Figure 30). including PCS ON/OFF command, Active power and Reactive power command input.



Figure 30. PCS Operation Command

- PCS ON: PCS run command.
- PCS OFF: PCS stop command.



Note:

Indicates additional information that is relevant to the current process or procedure.

- Active Power: Active power command input. Default: 0, unit: kW.
- Reactive Power: Reactive power command input. Default: 0, unit: kVar.
- 3. System status monitoring.

As Figure 31, it display the running status of the PCS device, including the following information.

Table 6: Running Status

Index	Description
1	 Grid side voltage line-line voltage: Vrs, Vst, Vtr phase voltage: Vr, Vs, Vt Load current (Ir, Is, It) Grid side frequency (Freq.)
2	DC bus voltage (Vdc)DC bus current (ldc)
3	 Battery voltage (Vbat) Battery current (lbat) Battery SoC (SoC)
4	 Active power (P) Reactive power (Q) Apparent power (S)



Table 6: Running Status (Continued)

Index	Description	
5	 Power module temperature (IGBT#1, 2, 3, 4) Sink temperature (Sink) Ambient temperature (Ambient) 	
6	PCS running status (Initial, Standby, Soft-start, Normal, Fault, Sleep, SA soft-start, SA Normal)	
7	 DC disconnect status (Close/Open) AC disconnect status (Close/Open) 	



Figure 31. PCS Running Status Information

4. Alarm & Warning.

Monitor PCS system fault and alarm information, including PCS device, battery and power module fault information. Click the **CLEAR FAULT** button to clear all fault. Detailed fault information can be found in the appendix.

a. Device Alarm & Warning

Serial P	Iort Mode Baud rate	Stop	bits Parity Flow control	Slave ID	Timeout Retries	Open Close	EXIT	NELT
System 0	Control Alarm&Warning Config	guration	Maintenance				2019	/5/9 11:34:
Device	Module	Battery	Status		-	20	CS Device Status	
Communication Error			BMS Fan Error		Start Up Voltage Over Limit		AC Phase B Over Voltage	
	Over Temp. Alarm		BMS Contactor Status Error	-	Battery Input Revent Fault		AC Phase S Over Voltage	0
Under Temp. Alarm Under Temp. Alarm Over Temp. Warning			8MS Ground Fault		EPO Fault		AC Phase T Over Voltage	
		•	8MS Door Open Error		Remote EPO Fault		AC Phase R Under Voltage	
	Under Temp. Warning		8MS Other Alarm		AC Disconnector Fault		AC Phase S Under Voltage	
	Under Temp. Warning Charge Over Current Alarm Discharge Over Current Alarm		BMS Other Warning		DC Disconnector Fault	0	AC Phase T Under Voltage	
	Under Temp. Alarm Over Temp. Warning Under Temp. Warning Charge Over Curreet Alarm Charge Over Curreet Warning Discharge Over Curreet Warning		Battery Available Charle Error		SPD Fault	۲	AC Over Frequency	0
	Charge Over Current Warning		Datery Handbe Creck Dros		Heater Fault		AC Under Frequency	•
	Discharge Over Current Warning		and the second second second	1	Fan Lock Fault	٠	AC Phase Sequence Error	
	Voltage Imbalance Warning		CLEAR FAULT		Aux Power Fault		Synchronize Fail Fault(PLL)	
	Current Imbalance Warning	•	1		Door Open Fault	0	AC Phase R Over Load Light	
	Discharge Over Current Alarm Discharge Over Current Marning Discharge Over Current Warning Voltage Imbalance Warning Current Imbalance Warning Over Voltage Alarm	-0	BMS CAN/RS485 Loss Fau	a 🗣	Ambient OTP	•	AC Phase S Over Load Light	0
	Under Voltage Alarm	•	PCS CAN Loss		Ambient UTP		AC Phase T Over Load Light	0
	Over Voltage Warning		PCS System Soft-Start Fas	a 🛛	DSP RS485 Loss	0	AC Phase R Over Load Heavy	
	Under Voltage Warning		System Restart Fault		EEPROM Fault		AC Phase S Over Load Heavy	
	BMS Contactor Error		LC RS485 Loss		HMI RS485 Loss	0	AC Phase T Over Load Heavy	

Figure 32. PCS Device Alarm & Warning



b. Battery Alarm & Warning

erial P OM15	fort Mode Baud rate	Stop	bits Parity	Flow control	Slave ID	Timeout 1000	Retries Op	en se	EXIT	NEL
nice	Control Alarm&Warning Configu Module	aration	Maintenance						2019/	5/9 11:3
F		Battery S	itatus					PCS	Device Status	
Communication Error			BMS Fan Error			Start	Up Voltage Over Limit		AC Phase R Over Voltage	
Ш	Over Temp. Alarm	•	BMS Contactor	Status Error		Batte	ry Input Revert Fault		AC Phase S Over Voltage	
Ш	Under Temp. Alarm 🔹 Over Temp. Warning 🔹		BMS Ground Fault			EPO Fault			AC Phase T Over Voltage	
						Remo	ste EPO Fault	•	AC Phase R Under Voltage	
Under Temp. Warning		•	8MS Other Ala			AC D	isconnector Fault	0	AC Phase S Under Voltage	
Ш	Charge Over Current Alarm		EMS Other Wa	ming		DC D	isconnector Fault	0	AC Phase T Under Voltage	
Ш	Discharge Over Current Alarm		Battery Available Check Error		SPD	SPD Fault		AC Over Frequency	•	
Ш	Charge Over Current Warning					Heat	er Fault		AC Under Frequency	•
Ш	Discharge Over Current Warning	•	0			Fan L	ock Fault	۲	AC Phase Sequence Error	
	Under Temp, Varning Charge Over Current Alarm Discharge Over Current Maring Charge Over Current Warning Discharge Over Current Warning Vohage Imbalance Warning		1	LLEAR FAULT		Aux	lower Fault		Synchronize Fail Fault(PLL)	
Ш	Current Imbalance Warning					Door	Open Fault	0	AC Phase R Over Load Light	
Ш	Over Voltage Alarm		8M5 CA	N/RS485 Loss faul		Ambi	ent OTP		AC Phase S Over Load Light	
1	Under Voltage Alarm		PCS CAN	é Loss		Ambi	ent UTP		AC Phase T Over Load Light	
П	Over Voltage Warning		PCS Sys	tem Soft-Start Faul	t 🖗	DSP	R\$485 Loss		AC Phase R Over Load Heavy	
1	Under Voltage Warning		System	Restart Fault		EEPR	OM Fault		AC Phase S Over Load Heavy	
	8MS Contactor Error		LC RS48	5 Loss		HME	RS485 Loss	0	AC Phase T Over Load Heavy	

Figure 33. Battery Alarm & Warning

c. Power Module Alarm & Warning

Carlal Do	et Mode Baudicate	Ston bits	Davity How control	Claure 10	Timeout Batries	Onen			
COMIS		1.0	None None	1	1000 1	open	-	EXIT	A DELTA
		[e] 1.0	a nore			Close			Smatter, Greenes, Topethers
Winder Stand fair Stand fair				2019/5/9 11:37:14					
Device	Module								
	AC Phase R Over Current Fault		EPO Fault		Ambient Over Temperature				
	AC Phase S Over Current Fault		AC Fuse Fail		Ambient Under Temperature				
	AC Phase T Over Current Fault		Axillary Power		Heat Sink OT				
	DC Bus (DC+ to DC-) Under Voltage Fault		AC Pre-Load Contactor Fault	•	IGBT OT				
	DC Bux (DC+ to DC-) Over Voltage Fault		AC Main Contactor Fault		NTC Fall				
	DC Bus Voltage IDC+ to neutral point!		IGBT Short Fault		MCU 485 Loss				
	DC Bus Voltage IDC+ to reutral pointi Over Voltage Fault		Sink Over Temp		Reserved	-0			
	DC Bus Voltage IDC- to result al point Under Voltage Fault		MCU Fail		CAN Loss				
	DC But Voltage (DC- to neutral point) Over Voltage Fault		Fan1 Locked		ADC Calibration Fault				
	DC Bus Pre-Load Fail		Fan2 Locked		EEPROM Fault				
	DC Side Soft-Start Fail		AC Hardware OCP		RAM Self-Test Fault				
	DC Fuse blown		DC Hardware OVP		Anti-islanding				
	DC Discharge Over Current Fault		DC Hardware OCP	•	Phase Open / AC connection Los	1 0			
	DC Charge Over Current Fault		Reserved		Grid Recovering Fault				
	Battery Bank Under Voltage Fault		AC-Software-OCP		Internal Choke Current Imbalanc				
	Battery Bank Over Voltage Fault		Inductance L1 over temperature		Reserved				

Figure 34. PCS Power Module Alarm & Warning

5. Parameters Configuration.

The PCS device parameter configuration consists of two parts:

- PCS system parameters
- Grid code parameters



erial Port Mode Baud rate Stop bits Parity Flo OM15 C RTU 330400 11.0 None No A DELTA 1 1000 EXIT 2019/5/9 11:39:24 n Control Alarm&Warning Configuration Maintenance nters Grid code Configuration Lower/Upper Limit 750 DC Input Voltage Lower Limit (V Setting OC Input Voltage Upper Limit (V) Refresh Reactive Power Mode Configuration Rating Param vel (%) 19 e Limit (H: AC Input Run Mode Line-Line Volts Current (A) Thate Adaptio Active/Reactive Grid Code System Time Setting DC Input Year Month Day Hour Minute
00 - 00 - 01 00 1 08 Setting urrent (A)

The parameters can only be configured (read or write) while the PCS is in "OFF" state.

Figure 35. PCS System Parameters Configuration

The configuration steps are as follows:

Step 1: Confirm that the PCS is in the "OFF" state, which can be achieved by clicking the **PCS OFF** button on the **System control** page.

Step2: When the PCS is in the "OFF" state, the **Refresh** button in the **Configuration** page will be activated.

Step3: Click the **Refresh** button to read the current configuration parameter value. After modifying one or more parameters, click the **Setting** button to complete the parameter reconfiguration.

Step4: To ensure the parameter configuration is successful, wait for 2s, then click the **Refresh** button to confirm again.

a. System Parameters

It mainly includes the PCS device rated operating parameters, running mode settings, threshold settings, etc., as shown in the Figure 35.

b. Grid code parameters

The PCS device adjusts the necessary operating parameters, running mode settings, threshold settings, etc. according to the difference of the application area and following the local power grid regulations, as Figure 36.



Figure 36. Grid Code Parameters Configuration



6. Maintenance

As Figure 37, it mainly reads the PCS serial number, the firmware version number and the PCS fault log, and stores log information. The Fault log can only be read when the PCS is in the "OFF" state.

t15 •	RTU	Baud rate	Stop bits	Parity Flow control Slave ID Timeout Retries None None 1 1000 1	Close	EXIT AL
n Control	Alarm&Wan	ning Configur	ation Main	enance		2019/5/9 11:
Index	Date	Time	Fault Code	Fault Description	Device Name	Version
1	2010/05/00	10.45.40	30	HALL BEARS Loss	PCC.HMLFW.V	ler Toono
2	2019/05/09	10-46-36	33	DSP RS485 Loss	1.02-1000-11-1	en la
3	2019/05/09	10.46:35	31	Ambient UTP	PCS-MCU-FW-	Ver 1.1.7.4
4	2019/05/09	10:46:35	28	Reserved		
5	2019/05/09	10:46:35	9	Synchronize (PLL) Fault	PCS-DSP-FW-V	ler 0.0.0.0
6	2019/05/09	10:46:34	4F	Door Open Fault		protection of the local division of the loca
7	2019/05/09	10:46:33	7	AC Under Frequency	PCS-Device-SN	WACT17061
8	2019/05/09	10:46:33	5	AC Phase T Under Voltage		
9	2019/05/09	10:46:33	4	AC Phase S Under Voltage		
10	2019/05/09	10:46:33	3	AC Phase R Under Voltage		
11	2019/05/09	10:46:32	47	Fan Lock Fault		
12	2019/05/09	10,46:32	44	SPD1 Fault		
13	2019/05/09	10:46:32	43	DC Disconnector Fault		
14	2019/05/09	10:46:32	42	AC Disconnector Fault		
15	2019/03/07	13:53:28	39	HMI R\$485 Loss		
16	2019/03/07	13:53:23	11	DSP R5485 Loss		
17	2019/03/07	13:53:22	31	Ambient UTP		
1.8	2019/03/07	13:53:22	28	Reserved		
19	2019/03/07	13:53:22	9	Synchronize (PLL) Fault		
20	2019/03/07	13:53:21	4F	Door Open Fault		
21	2019/03/07	13:53:20	7	AC Under Frequency		
22	2019/03/07	13:53:20	5	AC Phase T Under Voltage		
	2019/03/07	13:53:20	4	AC Phase S Under Voltage		
23		12.62.30		And the second sec		

Figure 37. PCS Maintenance Information

Steps are as follows:

Step1: Confirm that the PCS is in the "OFF" state, the **Load Log** button is bright color, otherwise it is gray.

Step2: Click the Load Log button, a message dialog will pop up, please click OK, as Figure 38.

0		×
Note:		
Do not	switch to other interf	aces
during	the loading of the fau	ult log. This
process	takes about 1 minut	te. Please
	ant	

Figure 38. Reminder Dialog

Step 3: Wait patiently for the fault log information to be loaded. When finished, a message dialog will pop up, click **OK** to end the reading action, as Figure 39.

0	\times
Fault log loading o	ompleted!
确定	

Figure 39. Load Completion Message Box



Note:

The reading of fault log information can be canceled by clicking **Cancel** button.



Save the data as follows:

Step 1: In any area of the table, right-click and the following dialog box will pop up, as Figure 40.



Figure 40. Save Fault Log Information

Step 2: Select **Export data to Excel** from the **Export** option and click the left mouse button. The Microsoft Excel application will open automatically and the data will be stored in the temporary file, as Figure 41.

4 31年	5 - C - 开始 振入	四面布用 公	式数据审问	htemp 1 1201 101201 Acrobat Q 15/061818									12 A 12	共正
	* E 3	< ~ fi												
	A	в	с	DE	F	G	н	1	J	к	L	M	N	
	1	2019/5/9	10:46:40	39 HMI RS485 Loss										
	2	2019/5/9	10:46:36	33 DSP RS485 Loss										
	3	2019/5/9	10:46:35	31 Ambient UTP										
	4	2019/5/9	10:46:35	2B Reserved										
	5	2019/5/9	10:46:35	9 Synchronize (PLL) Fault										
	6	2019/5/9	10:46:34	4F Door Open Fault										
	7	2019/5/9	10:46:33	7 AC Under Frequency										
	8	2019/5/9	10:46:33	5 AC Phase T Under Voltage										
	9	2019/5/9	10:46:33	4 AC Phase S Under Voltage										
	10	2019/5/9	10:46:33	3 AC Phase R Under Voltage										
	11	2019/5/9	10:46:32	47 Fan Lock Fault										
	12	2019/5/9	10:46:32	44 SPD1 Fault										
	13	2019/5/9	10:46:32	43 DC Disconnector Fault										
	14	2019/5/9	10:46:32	42 AC Disconnector Fault	2									
	15	2019/3/7	13:53:28	39 HMI RS485 Loss										
	16	2019/3/7	13:53:23	33 DSP RS485 Loss										
	17	2019/3/7	13:53:22	31 Ambient UTP										
	18	2019/3/7	13:53:22	2B Reserved										
	19	2019/3/7	13:53:22	9 Synchronize (PLL) Fault										
	20	2019/3/7	13:53:21	4F Door Open Fault										
	21	2019/3/7	13:53:20	7 AC Under Frequency										
	22	2019/3/7	13:53:20	5 AC Phase T Under Voltage										
	23	2019/3/7	13:53:20	4 AC Phase S Under Voltage										
	24	2019/3/7	13:53:20	3 AC Phase R Under Voltage										
	25	2019/3/7	13:53:19	47 Fan Lock Fault										
	26	2019/3/7	13:53:19	44 SPD1 Fault										
	27	2019/3/7	13:53:19	43 DC Disconnector Fault										
	28	2019/3/7	13:53:19	42 AC Disconnector Fault										
	29	2019/3/6	9:55:06	39 HMI R5485 Loss										
		2010/2/2	0.00	00 DCD DC40C 1 ++++			and of a							
	wtempora	ry_//1349	۲				1.1							

Figure 41. Temporary Data File

Step 3: Save the file as *.xlsx or another file format. Task completion.



Configurable Parameters

The PCS device is VDE-AR-N4105 and AS/NZS 4777.2 certified. There are several parameters configurable for the VDE-AR-N4105 and AS/NZS 4777.2 functions as shown in the following tables, and users can configure these parameters through communication with the PCS HMI Tool. Grid code AS4777.2 and default value of related parameters are set as factory default.

System Parameters Configuration

The part mainly descripts configurable system parameters of PCS device.

Running Mode

Definition	Description	Unit	Min	Max	Default
Run Mode			1	1	
Run Mode	0: PCS Run with Grid-tie mode 1: PCS Run with Grid off/ Standalone mode	NA	0	1	0
Phase Adaptive	Auto adaptive grid phase sequence. 0: Disable 1: Enable	NA	0	1	0
Active/Reactive Priority	Setting priority of active power / reactive power. 0: Reactive first 1: Active first	NA	0	1	0
Grid Code	Grid code type setting: 0-4: Reserved 5: VDE4105 6 JAP(TBD) 7: AS4777.2 8: NZS4777.2	NA	5	8	7
Available Minimum of PCS	Setting the minimum of PCSs available in master-slave parallel system	NA	1	8	1
Reactive Power Mod	e Configuration				
Reactive Power Mode	 Reactive Power Mode Selection. 0: SPF (Specified Power Factor) 1: Power Set (Demand response) 2: PFP (cos φ (P) curve) 3: Volt-Var Other: NA 	NA	0	4	1

Table 7: PCS Run Mode Parameters Configuration



Power Demand

Definition	Description	Unit	Min	Max	Default
Active Power	Setting active power demand of the system. Positive means PCS sources active power to the grid. Negative power means PCS sinks active power from the grid. The definition of active power in this document is the same unless otherwise specified.	kW	-100	100	0
Reactive Power	Setting reactive power demand of the system. Positive means PCS sources reactive power to the grid. Negative means PCS sinks reactive power from the grid.	kVar	-100	100	0
DRM Reactive Power	Reactive power demand of DRM3 and DRM7. (AS/ NZS4777.2 Only) The direction of reactive power is defined the same as the parameter above.	kVar	-60	60	0

Table 8: PCS Power Demand Configuration



Note:

Before the function is enabled, the "Reactive Power Mode" must be set to "Power Set".

Reconnection Function

Table 9: PCS Reconnection Parameters Configuration

Definition	Description	Unit	Min	Max	AS	VDE	NZS
Auto Reconnection Enable	Auto Restart/Reconnect function enable. 0: Disable 1: Enable	NA	0	1	1	1	1
Voltage Recovery Lower Limit	Lower limit of voltage recovery.	V	280	400	355.1	340	342.9
Voltage Recovery Upper Limit	Upper limit of voltage recovery.	V	400	460	438.2	440	438.2



Definition	Description	Unit	Min	Max	AS	VDE	NZS
Time Duration Checking Volt. Recover	Time duration for checking if voltage is recovered in normal range.	s	30	300	60	60	60
Frequency Recovery Lower Limit	Lower limit of frequency recovered to normal operational range.	Hz	45	50	47.5	47.5	47.5
Frequency Recovery Upper Limit	Upper limit of frequency recovered to normal operational range.	Hz	50	55	50.15	50.05	50.15
Time Duration Checking Freq. Recovery	Time duration for checking if frequency is recovered in normal operational range.	S	30	300	60	60	60

Table 9: PCS Reconnection Parameters Configuration (Continued)

Sleep & Awake Function

Table 10: PCS Sleep & Awake Parameters Configuration

Definition	Description	Unit	Min	Max	Default
Sleep/Awake Action	Command for asking system turn to sleep or awake mode: 1: Sleep; 2: Awake; Other: No action	NA	0	2	0
Sleep Mode Selection	Enable and enter Auto and/or Schedule sleep mode, or disable sleep mode. 0: Disable. 1: Enable Auto; 2: Enable Schedule; 3: Both Auto and Schedule are enabled. Note: Before Schedule mode is enabled, the following registers should be set in advance.	NA	0	3	0



Definition	Description	Unit	Min	Max	Default
	hours	NA	0	23	2
	minutes	NA	0	59	0
Time Set 1	Action: 0: No action 1: Sleep 2: Awake If this schedule is same as last time point, no action to system.	NA	0	2	1
	hours	NA	0	23	5
	minutes	NA	0	59	30
Time Set 2	Action: 0: No action 1: Sleep 2: Awake If this schedule is same as last time point, no action to system.	NA	0	2	2
	hours	NA	0	23	15
	minutes	NA	0	59	0
Time Set 3	Action: 0: No action 1: Sleep 2: Awake If this schedule is same as last time point, no action to system.	NA	0	2	2
	hours	NA	0	23	20
	minutes	NA	0	59	0
Time Set 4	Action: 0: No action 1: Sleep 2: Awake If this schedule is same as last time point, no action to system.	NA	0	2	2

Table 10: PCS Sleep & Awake Parameters Configuration (Continued)



Battery Configuration

Definition	Description	Unit	Min	Max	Default
Battery Supplier	0: DELTA-ESD-CAN 1: LGC-CAN 2: SAMSUNG-SDI-RS485 3: DELTA-ESD-RS485 Other: Reserved	NA	0	8	1
Battery Fault Check Enable	Battery fault check switch: 0: Disable (Default) 1: Enable	NA	0	1	0
SoC Warning Upper Limit	Setting upper limit for battery pack SoC warning. When SoC is greater than this setting value, a "Battery SoC High Warning" is reported. If Battery SOC High Warning is reported. The system do not allow to charge the battery.	%	50	100	90
SoC Fault Upper Limit	Setting upper limit for battery pack SoC fault. When SoC is greater than this setting value, a "Battery SoC High Fault" is reported.	%	50	100	95
SoC Warning Lower Limit	Setting lower limit for battery pack SoC warning. When SoC is less than this setting value, a "Battery SoC Low Warning" is reported. If Battery SOC Low Warning is reported. The system do not allow to discharge the battery.	%	2	50	10
SoC Fault Lower Limit	Setting lower limit for battery pack SoC fault. When SoC is less than this setting value, a "Battery SoC Low Fault" is reported.	%	2	50	5

Table 11: Battery Parameters Configuration



System Time Setting

Definition	Description	Unit	Min	Max	Default
System Time	Year	NA 0		99	0
	Month	NA	NA 0		0
	Day	NA	0	31	1
	Hour	NA	0	23	0
	Minute	NA	0	59	8

Table 12: PCS Device System Time Setting

Grid Code Parameters Configuration

The PCS supports operating in compliance with several grid code rules, such as VDE-AR-N4105 and AS/NZS 4777.2. There are several parameters configurable for the grid code functions as shown in the following tables.

Anti-Islanding Protection Function

Table 13: Anti-islanding Protection Parameters Configuration

Definition	Description	Unit	Min	Max	Default
Islanding Detection	Setting if islanding detecting function is enabled or not. 0: Disable. 1: Enable.	NA	0	1	0

Voltage Protection Setting

Table 14: Voltage Protection Parameters Configuration

Definition	Description	Unit	Min	Max	AS	VDE	NZS
Over Voltage Level 2 (OVL2)	Over Voltage Trip Point Level 2 Settings: Configure this voltage value according to grid code.	V	400	480	459	460	459
Trip time for OVL2	Over Voltage Trip Time Level 2. Configure this time value according to grid code.	S	0.1	300	0.2	0.2	0.2
Over Voltage Level 1 (OVL1)	Over Voltage Trip Point Level 1. Configure this time value according to grid code.	V	400	480	450.3	440	450.3



Definition	Description	Unit	Min	Max	AS	VDE	NZS
Trip time for OVL1	Over Voltage Trip Time Level 1. Configure this time value according to grid code.	S	0.1	300	1.5	0.2	1.5
Under Voltage level 1(UVL1)	Under Voltage Trip Point Level 1. Configure this voltage value according to grid code.	V	280	400	311.7	320	311.7
Trip time for UVL1	Under Voltage Trip Time Level 1. Configure this time value according to grid code.	s	0.1	300	1.5	0.2	1.5

Table 14: Voltage Protection Parameters Configuration (Continued)



Note:

All the voltage protective limits of AS/NZS are secured against change.

Frequency Protection Setting

Table 15: Frequency Protection Parameters Configuration

Definition	Description	Unit	Min	Max	AS	VDE	NZS
Over Frequency Point 1(OF1)	Over Frequency Trip Point Level 1. Configure this frequency value according to grid code.	Hz	50	55	52	51.5	52
Trip Time for OF1	Over frequency level 1 trip time. Configure this time value according to grid code.	s	0.1	1000	0.2	0.2	0.2
Under Frequency Point 1(UF1)	Under Frequency Trip Point Level 1.Configure this frequency value according to grid code.	Hz	45	50	47	47.5	45
Trip Time for UF1	Under frequency level 1 trip time. Configure this time value according to grid code.	S	0. 1	1000	1	0.2	1



Note:

All the frequency protective limits of AS/NZS are secured against change.



Ramp Rate Function

Definition	Description	Unit	Min	Max	AS	VDE	NZS
Normal Ramp	Rate Setting			•			
Normal Ramp Rate Enable	Setting Normal Ramp Rate function enable or disable: 0: Disable 1: Enable	NA	0	1	0	1	0
Normal Ramp Rate	Normal Ramp Rate. Unit %Prated/s.	%Prate/s	0	200	0.28	100	0.28
Soft-Start Ramp Rate Setting							
Soft-Start Ramp Rate Enable	Disable or Enable Soft Start ramp rate function 0: Disable 1: Enable	NA	0	1	1	1	1
Soft-Start Ramp Rate	Setting Soft Start ramp Rate. Unit %Prated/s.	%Prate/s	0	200	0.28	100	0.28

Table 16: Ramp Rate Parameters Configuration

Volt-Var Function

Table 17: Volt-Var Parameters Configuration	Table 17	Volt-Var	Parameters	Configuration
---	----------	----------	------------	---------------

Definition	Description	Unit	Min	Max	AS	VDE	NZS
Volt-Var Function Enable	Volt -Vars function setting: 0: Disable; 1: Enable; Note: (1) Before the function is enabled, the "Reactive Power Mode" must be set to "Volt-Var". (2)It will be activated when input power is greater than the value "Enter Level"	NA	0	1	0	0	0
Q1, Cap. High		%	0	100	30	50	30
Curve Point 1	V1, Voltage min	V	320	400	358.5	360	358.5
Curvo Doint 2	Q2, Cap. Low	%	0	100	0	0	0
Curve Fornt 2	V2, Voltage Low	V	320	400	381	380	381
Curve Point 3	Q3, Ind. Low	%	-100	0	0	0	0
Curve Point 3	V3, Voltage Normal	V	400	480	433	420	422.6



Definition	Description	Unit	Min	Max	AS	VDE	NZS
Curve Point 4	Q4, Ind. Max	%	-100	0	-30	-50	-30
	V4, Voltage High	V	400	480	459	440	441.7

Table 17: Volt-Var Parameters Configuration (Continued)

Volt-Watt Function

Table 18: Volt-Watt Parameters Configuration

Definition	Description	Unit	Min	Max	AS	VDE	NZS
Volt-Watt Function Enable	Volt-Watt Function enable: 0: Disable 1: Enable	NA	0	1	1	0	1
Over Voltage Start Point	Setting V-Watt Function voltage start point.	V	400	480	433	420	422.6
Power Decreasing Slope for Over Voltage	Decreasing Power rate if Voltage above V_START.	%Prate/ 1%Vrate	0	100	12.27	8	12.27
Power Lower Limit	Setting output power lower limit for V-Watt function.	%	-100	100	20	20	20
Under Voltage Start Point	Volt-Watt function in voltage drop side. (AS/ NZS 4777.2 only) When voltage of AC side is lower than this value, input power from the gird will be decreased.	V	320	400	380	NA	380
Power Decreasing Slope for Under Voltage	The decreasing power rate when voltage goes down. (AS/NZS 4777.2 and charge mode only)	%Prate/ 1%Vrate.	0	100	17.77	NA	17.77



Freq-Watt Function

When a grid frequency disturbance results in an increase in grid frequency, the PCS will reduce the output power level to the grid. When AS or NZS is selected, the PCS will reduce the input power level from the grid when a grid frequency decrease represents.

Definition	Description	Unit	Min	Max	AS	VDE	NZS
Freq-Watt Function Enable	Freq-Watt Function enable. 0: Freq-Watt function is disabled 1: Freq-Watt function is enabled	NA	0	1	1	0	1
Start Point for Over Frequency	Freq-Watt function start point.	Hz	50	55	50.25	50.2	50.25
Power decreasing Slope for Over Frequency	Decreasing power rate if frequency above start frequency.	%Prate/ Hz	0	200	57	40	57
Power Lower Limit	Output power lower limit for Freq-Watt function.	%	-100	100	0	20	0
Start Point for Under Frequency	Freq-Watt function in frequency drop side. Output power to the grid increases when frequency is lower than this value. (for VDE4105) Input power from the grid decreases when frequency is lower than this value. (for AS/ NZS4777.2 and charge mode)	Hz	45	50	49.75	49.8	49.75
Power Slope for Under Frequency	Slope Increase rate of output power to the grid. (for VDE4105) Decrease rate of input power from the gird. (for AS/NZS4777.2 and charge mode)		0	2000	133	0	133

Table 19: Freq-watt Parameters Configuration



Specified Power Factor Function (SPF)

Definition	Description	Unit	Min	Max	AS	VDE	NZS
SPF Function Enable	Specified Power Factor function configuration. 0: Disable 1: Enable Note: (1) Before the function is enabled, the "Reactive Power Mode" must be set to "SPF". (2)It will be activated when input power is greater than the value "Enter Level".	NA	0	1	0	0	0
SPF Mode	Mode Priority Setting: 0: FPF (Fixed Power Factor) 1: PFAP (Power Factor Mode & Active Power Priority)	NA	0	1	0	0	0
Entry Power Level	Entry level for active power in Volt-Var, SPF, PFP mode. If the absolute value of active power is higher than this level, those functions (Volt-Vars, SPF, PFAP) would be activated.	%Prate	0	100	20	20	20
Exit Power Level	Exit level for active power in Volt-Vars, SPF, PFP mode. If the absolute value of active power is lower than this level, Those functions would be disabled. Note: This setting should be lower than the value "Entry level".	%Prate	0	100	19	19	19
Power Factor Target	The target power factor for SPF mode. It will be activated when input power is greater than the value "Enter level".	NA	-1.00	1.00	1.00	1.00	1.00

Table 20: SPF Parameters Configuration





Note:

Leading power factor means PCS sources reactive power to the grid, and power factor is defined to be positive. Lagging power factor means PCS sinks reactive power from the grid and power factor is defined to be negative. The definition of power factor in this document is the same unless otherwise specified.

Power Factor / Active Power Characteristic Curve (PFP)

Definition	Description	Unit	Min	Max	AS	VDE	NZS
Curve Point 1	Power point 1	%Prate	0	100	50	50	50
	PF point 1	NA	-1.00	1.00	1.00	1.00	1.00
Curve Point 2	Power point 2	%Prate	0	100	100	100	100
	PF point 2	NA	-1.00	1.00	-0.90	-0.90	-0.90

Table 21: Power Factor / Active Power Characteristic Curve (PFP)



Note:

Before the function is enabled, the "Reactive Power Mode" must be set to "PFP".



Appendix

Event Log Fault Definition

While the PCS detects a system error occurring, it will show the fault event name on its HMI screen at the front door, and users can also access the error code by communicating with the PCS via its protocol. The PCS system error codes consisting of DSP and MCU faults are listed in the tables below:

Fault Word Definition





Fault Classification	Primary Code	Secondary Code	Fault Name (HMI Tool)	Fault Code (LCD Screen)
		0	AC Phase R Over Voltage	AC OVP R
		1	AC Phase S Over Voltage	AC OVP S
		2	AC Phase T Over Voltage	AC OVP T
		3	AC Phase R Under Voltage	AC UVP R
		4	AC Phase S Under Voltage	AC UVP S
		5	AC Phase T Under Voltage	AC UVP T
	0	6	AC Over Frequency	AC OVER FREQ
		7	AC Under Frequency	AC UNDER FREQ
		8	AC Phase Sequence Error	PHASE SEQ ERR
		9	Synchronize Fault (PLL)	PHASE LOCK ERR
		А	NA	
		В	NA	
		С	NA	
		D	NA	
		E	NA	
		F	Start Up Voltage Over Limit	GRID FAULT - SA

Table 22: Event Log Fault Code List



Table 22: Event Log Fault Code List (Continued)

Fault Classification	Primary Code	Secondary Code	Fault Name (HMI Tool)	Fault Code (LCD Screen)
		0	Battery Over Voltage Fault	BAT OVER VOLT
		1	Battery Under Voltage Fault	BAT UNDER VOLT
		2	Battery Input Revert	BAT POLE ERROR
		3	NA	
		4	Battery SoC Low Fault	BAT SOCL FAULT
		5	Battery SoC High Fault	BAT SOCH FAULT
		6	Battery SoC Low Warning	BAT SOCL WARN
		7	Battery SoC High Warning	BAT SOCH WARN
MCU Batt Fault	1	8	Battery BMS Fault	BAT FAULT
		9	Battery Charge Power Over Limit Value Fault*	
		А	Battery Discharge Power Over Limit Value Fault*	
		В	NA	
		С	NA	
		D	NA	
		E	NA	
		F	NA	
MCU Sys Fault	2	Reserved		
		0	Ambient OTP	AMBIENT OTP
		1	Ambient UTP	AMBIENT UTP
		2	DRM0	DRM0
		3	DSP RS485 Loss	PM 485 Loss
		4	Slaver Under Fault State Fault*	
		5	NA	
		6	EEPROM Fault	EEPROM FAIL
MCU Other	3	7	NA	
Fault	5	8	NA	
		9	HMI RS485 Loss	HMI COM LOSS
		А	BMS CAN/RS485 Loss Fault	BMS COM LOSS
		В	PCS CAN Loss	SYS CAN LOSS
		С	PCS System Soft-Start Fault	SYS SOFTST FAIL
		D	System Restart Fault	SYS REST FAULT
		E	LC RS485 Loss	EMS_485_LOSS
		F	4-20mA Data Fault*	



Table 22: Event Log Fault Code List (Continued)

Fault Classification	Primary Code	Secondary Code	Fault Name (HMI Tool)	Fault Code (LCD Screen)
		0	EPO Fault	EPO BUTTON
		1	Remote EPO Fault	REMOTE EPO
		2 AC Disconnector Fault		AC BREAKER
		3	DC Disconnector Fault	DC BREAKER
		4	SPD1 Fault	SPD FAULT
		5	Heat Fault	HEAT EXCHG FAIL
		6	NA	
MCU Hardware	1	7	Fan Lock Fault	FAN LOCK
Fault	-	8	NA	
		9	Aux Power Fault	AUX POWER 12V
		А	NA	
		В	NA	
		С	NA	
		D	NA	
		E	NA	
		F	Door Open Fault	FRONT DOOR OPEN
		0	AC Phase R Over Voltage	AC OVP R
		1	AC Phase S Over Voltage	AC OVP S
		2	AC Phase T Over Voltage	AC OVP T
		3	AC Phase R Under Voltage	AC UVP R
		4	AC Phase S Under Voltage	AC UVP S
		5	AC Phase T Under Voltage	AC UVP T
		6	AC Over Frequency	AC OVER FREQ
DSP Vac Fault	5	7	AC Under Frequency	AC UNDER FREQ
	Ŭ	8	AC Phase Sequence Error	PHASE SEQ ERR
		9	Synchronize Fault (PLL)	PLL LOST
		А	AC Phase R Over Load Light	OVER LOAD L1R
		В	AC Phase S Over Load Light	OVER LOAD L1S
		С	AC Phase T Over Load Light	OVER LOAD L1T
		D	AC Phase R Over Load Heavy	OVER LOAD L2R
		E	AC Phase S Over Load Heavy	OVER LOAD L2S
		F	AC Phase T Over Load Heavy	OVER LOAD L2T



Table 22: Event Log Fault Code L	ist (Continued)
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Fault Classification	Primary Code	Secondary Code	Fault Name (HMI Tool)	Fault Code (LCD Screen)
		0	AC Phase R Over Current Fault (RMS)	AC OVER CUR R
		1	AC Phase S Over Current Fault (RMS)	AC OVER CUR S
		2	AC Phase T Over Current Fault (RMS)	AC OVER CUR T
	6	3	DC Bus (DC+ to DC-) Under Voltage Fault	DC BUS UVP
		4	DC Bus (DC+ to DC-) Over Voltage Fault	DC BUS OVP
		5	DC Bus Voltage (DC+ to Neutral Point) Under Voltage Fault	DC BUS UVP-P
DSP Conv Fault		6	DC Bus Voltage (DC+ to Neutral Point) Over Voltage Fault	DC BUS OVP-P
		7	DC Bus Voltage (DC- to Neutral Point) Under Voltage Fault	DC BUS UVP-N
		8	DC Bus Voltage (DC- to Neutral Point) Over Voltage Fault	DC BUS OVP-N
		9	DC Bus Pre-Load Fail	DC PRE-ISSUE
		A	DC Side Soft-Start Fail	SOFT START FAIL
		В	DC Fuse Blown	DC FUSE BLOWN
		С	DC Discharge Over Current Fault	DC CHARGE OCP
		D	DC Charge Over Current Fault	DC DISCHG OCP
		E	Battery Bank Under Voltage Fault	BATT UVP
		F	Battery Bank Over Voltage Fault	BATT OVP



Table 22: Event Log Fault Code List (Continued)

Fault Classification	Primary Code	Secondary Code	Fault Name (HMI Tool)	Fault Code (LCD Screen)
		0	EPO Fault	EPO BUTTON
		1	AC Fuse Fail	AC FUSE BLOWN
		2	Axillary Power	AUX POWER ERROR
		3	AC Pre-Load Contactor Fault	AC PRE-RELAY
		4	AC Main Contactor Fault	AC MAIN RELAY
		5	IGBT Short Fault	IGBT SHORT
		6	Sink Over Temp	HEAT SINK OTP
Hardware	7	7	MCU Fail	
Fault	1	8	Fan1 Locked	FAN1 LOCKED
		9	Fan2 Locked	FAN2 LOCKED
		А	AC Hardware OCP	AC HARDWARE OCP
		В	DC Hardware OVP	DC HARDWARE OVP
		С	DC Hardware OCP	DC HARDWARE OCP
		D	NA	
		E	AC-Software-OCP	AC FW_OCP
		F	Inductance L1 Over Temperature	L1 OTP
	8	0	Ambient Over Temperature	AMB OVER TEMP
		1	Ambient Under Temperature	AMB UNDER TEMP
		2	Heat Sink Over Temperature	HEAT SINK OTP
		3	IGBT Over Temperature	IGBT OTP
		4	NTC Fail	NTC FAULT
		5	MCU 485 Loss	RS485 COM LOSS
		6	Grid Voltage Over Battery Voltage Fault*	
DSP Other		7	CAN Loss	CAN COM LOSS
Fault		8	ADC Calibration Fault	ADC CALIB ERROR
		9	EEPROM Fault	EEPROM ISSUE
		A	RAM Self-Test Fault	RAM TEST FAIL
		В	Anti-islanding	ISLANDING
		С	Phase Open/AC Connection Lost	AC OPEN PHASE
		D	Grid Recovering Fault	SYS RESTORING
		E	Internal Choke Current Imbalance	L1 Curr Unb
		F	DCI Fault*	



Note: The '*' means that fault code is only used for internal use.



Fault Word Example

For Example: LOG1 fault word is 0x007B, primary code '7' means "Hardware Fault", then you can get "DC Hardware OVP" from fault classification "Hardware Fault" according to secondary code 'B'. Corresponding to the fault information on the PCS LCD Screen is "DC HARDWARE OVP".

Human Machine Interface Display

Keypad Button & Home Panel



Figure 43. Keypad Button & Home Panel

Table 23: Keypad Button & Home Panel

No.	Item	Description
1	ON	On (The button is disable)
2	OFF	Off (The button is disable)
3	STANDBY	Standby state
4	RUN	Run state
5	FAULT	Fault state
6	Demand	Configured for demand mode
7	Standby	Standby state
8	100kW	Power conditioning system 100kW
9	Ratings	Ratings
10	Alarm	Alarm
11	Battery	Battery
12	Info	Information
13	V	Voltage
14	А	Ampere
15	kW/Var	Kilowatt/Variants
16	State Enter Running	State enter running
17	State Enter Standby	State enter standby



Table 23: Keypad Button & Home Panel (Continued)

No.	Item	Description
18	А	Grid phase 1: L1
19	В	Grid phase 2: L2
20	С	Grid phase 3: L3

Ratings Panel



Figure 44. Ratings Panel

Table 24: Ratings Panel

No.	Item	Description
1	Ratings	Ratings
2	HOME	Return to home page
3	AC L-L VOLT (V)	AC line-line voltage (V)
4	FREQUENCY (Hz)	Frequency (Hz)
5	AC CURRENT (A)	AC Current (A)
6	VDC IN LOW (V)	VDC in low (V)
7	VDC IN HIGH(V)	VDC in high (V)
8	DC CURRENT (A)	DC current (A)
9	AC POWER (kW)	AC power (kW)



Alarm Panel



Figure 45. Alarm Panel

Table 25: Alarm Panel

No.	Item	Description
1	Alarm	Waring & fault
2	HOME	Return to home page
3	BMS COM LOSS	BMS communication loss

BATT INFO Panel



Figure 46. BATT INFO Panel Page 1

Table 26: BATT INFO Panel Page 1

No.	Item	Description
1	BATT INFO	Battery information
2	HOME	Return to home page
3	NEXT	Next page
4	State	State
5	PwrOff	Power off



No.	Item	Description
6	V	Voltage
7	1	Current
8	V	Volt
9	A	Ampere
10	Р	Power
11	kW	Kilowatt
12	SoC	State of charge
13	%	Percentage
14	SoH	State of health
15	Temp	Temperature
16	٦°	Celsius
17	MC_N	Main contactor -
18	MC_P	Main contactor +
19	PC	Pre-charge contactor
20	AllClsd	All closed
21	AllOpen	All open
22	LGC	LG chemical
23	LossCOMM	Communication loss
24	BMS	Battery management system

Table 26: BATT INFO Panel Page 1 (Continued)



Figure 47. BATT INFO Panel Page 2

Table 27: BATT INFO Panel Page 2

No.	Item	Description
1	RACK1, RACK2, RACK3	Battery rack
2	ST	Status



No.	Item	Description
3	Initial	Initial
4	Open	Open
5	Close	Close
6	MC+	Main contactor +
7	MC-	Main contactor -
8	PC	Pre-charge contactor
9	V	Voltage
10	1	Current
11	SoC	State of charge
12	PM+	Power discharge limitation
13	PM-	Power charge limitation

Table 27: BATT INFO Panel Page 2 (Continued)



Figure 48. BATT INFO Panel Page 3

Table 28: BATT INFO Panel Page 3

No.	Item	Description
1	Max Cell Volt	Maximum cell voltage
2	Min Cell Volt	Minimum cell voltage
3	Max Cell Temp	Maximum cell temperature
4	Min Cell Temp	Minimum cell temperature
5	V	Voltage
6	٥°	Celsius





Figure 49. BATT INFO Panel Page 4

Table 29: BATT INFO Panel Page 4

No.	Item	Description
1	AIRC	Air conditioning
2	DOOR	Door
3	SPD	Surge protection device
4	HEAR	Heat exchanger
5	Falt	Fault
6	OPEN	Open
7	Ext Batt Cab absent	External battery cabinet absent
8	Fault	No fault
9	Norm	Normal



Info Panel



Figure 50. Info Panel Page 1

Table 30: Info Panel Page 1

No.	ltem	Description
1	Info	Information
2	HOME	Return to home page
3	HW	Hardware
4	FW	Firmware
5	DVT version	Design verification test version
6	M/P/H	MCU/DSP/HMI
7	Designed by	Designed by
8	NEXT	Next page





Figure 51. Info Panel Page 2

Table 31: Info Panel Page 2

No.	Item	Description
1	HOME	Return to home page
2	BACK	Return last page
3	UP	Increase the value
4	DN	Decrease the value
5	LCD CONTRAST RADIO ADJ	LCD contrast ratio adjustment
6	SET VALUE	Set value

