

CP0208-01# Test Report

Product name	500kW/552kWh	Date	Dec/29/2023
Gateway No.	999000002381	Container No.	HSCU231026-4

File change log		
Releases date	Editor	Description of the changes
2022.10.31	Kuan Li	File creation
2023.08.02	Kuan Li	File modification of the V02 version
2023.09.25	Huikang Deng	File modification of the V03 version

Item	Testing	Result
1	Inspect the appearance of the container	
1-1	Inspect paint & dents & deformation	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
1-2	Inspect grounding points	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
1-3	Inspect door locks	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
2	Inspect the wiring of the BESS	
2-1	Inspect the cable connections (PCS+, PCS-, B+, B-) of the HVUs	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
2-2	Inspect the terminal connections (P1, P2, P3) of the HVUs	
2-3	Inspect the Ethernet connection (LAN1) of the HVUs	
2-4	Resistance detection of the battery cluster terminal ($60 \pm 5 \Omega$)	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
2-5	Resistance detection of the battery cluster terminal ($120 \pm 5 \Omega$)	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
2-6	Inspect the connections of the PCSs	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
2-7	Check the connection of the fire fan before power on	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
2-8	CO / H2 sensor wiring confirmation	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
3	Insulation test	
3-1	Insulation resistance test of transformer inlet end (Measurement $\geq 1M \Omega$)	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
3-2	Insulation resistance test of transformer inlet end and outlet end (Measurement $\geq 1M \Omega$)	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
3-3	Insulation resistance test of PCS AC inlet end (Measurement $\geq 1M \Omega$)	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
3-4	Insulation resistance test of PCS DC inlet end (Measurement $\geq 1M \Omega$)	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
4	Secondary power supply confirmation and equipment power transmission inspection	

4-1	Close the QF2K circuit breaker	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
4-2	Close the FU1 (lightning protection device) circuit breaker	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
4-3	Confirm the MW SDR-120-24 input / output voltage	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
4-4	Confirm that all devices in the control cabinet are activated	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
4-5	Close the air conditioning circuit breaker and confirm the air conditioning voltage	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
4-6	Close the QFCF (box lighting) circuit breaker	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed

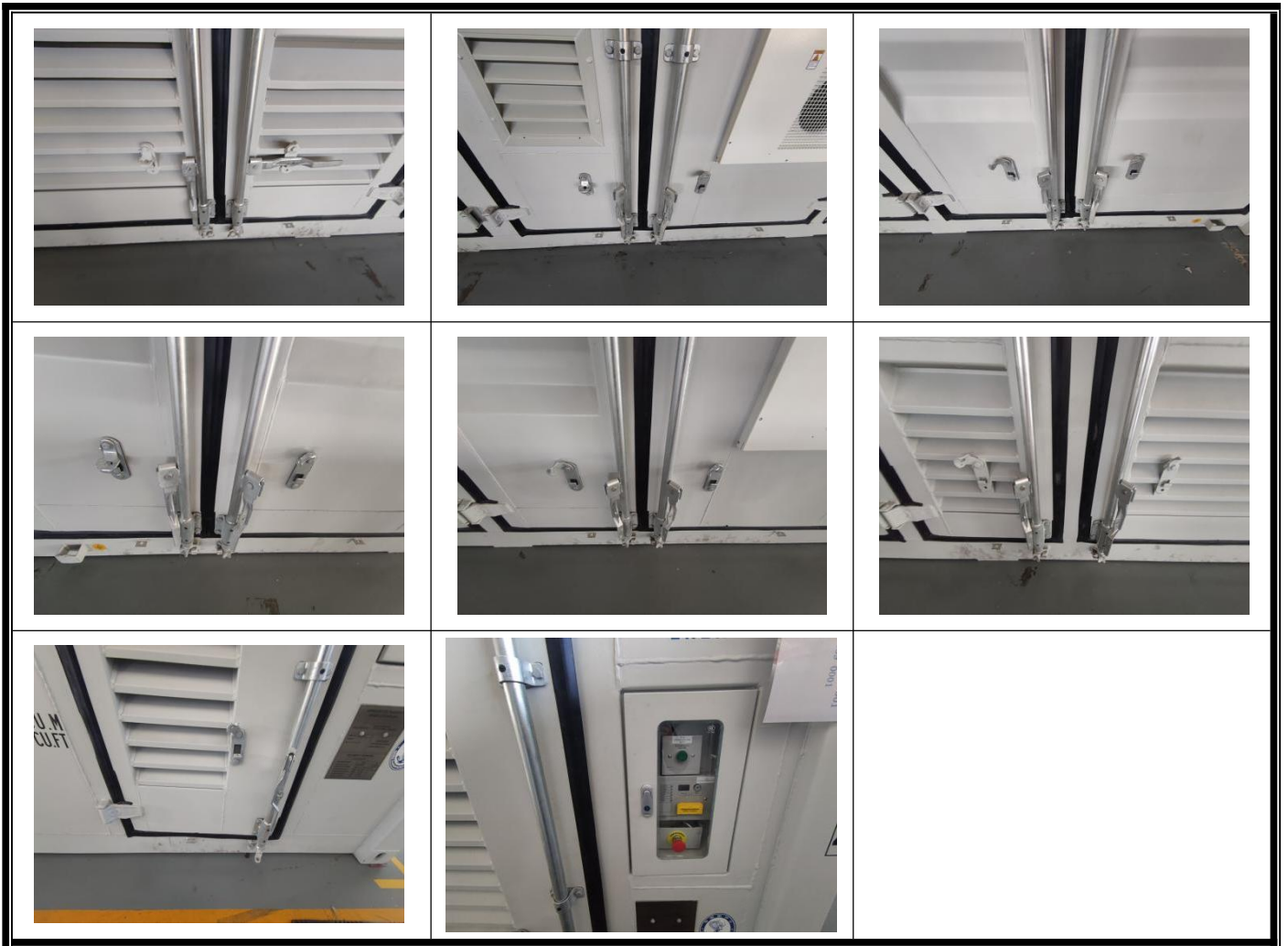
5	Communication inspection and equipment upgrade	
5-1	Insulation version upgrade	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
5-2	The BMU version upgrade	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
5-3	The CMU version upgrade	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
5-4	Check battery module communication cable connection (COMM terminal)	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
5-5	Check the high voltage connection of the battery module	
5-6	AC power supply of HVUs	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
5-7	DC power supply of HVUs	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
5-8	Insulation board sampling bus voltage calibration	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
5-9	Set the CMU's watch	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
5-10	Black start function test	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
6	Safety regulations test	
6-1	Ground continuity test (Measurement $\leq 100\text{m}\Omega$)	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
6-2	Battery String insulation resistance test (Measurement $\geq 1\text{M}\Omega$)	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
6-3	Dielectric withstand test (Leakage current $\leq 3\text{mA}$)	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed

7	HMI information confirmation	
7-1	Enter the account and password through the HMI system login interface	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
7-2	Check all parameters through the BMS parameter page of the HMI	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
7-3	Confirm the Q1 AC circuit breaker status of PCS through HMI	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
7-4	Gradually confirm the PCS DC circuit breaker QD 1~8 status through HMI	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
7-5	Gradually confirm the disconnecting switch QS61~68 status of HVUs through HMI	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
7-6	Close contactors (KM+, KM-) on the control page of HMI	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
7-7	Confirm the status of all contactors	
7-8	Confirm the current events through HMI	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
7-9	Confirm the history events through HMI	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
7-10	Confirm the self-inspection events through HMI	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
8	Environment control system test	
8-1	Check humidity & temperature	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
8-2	Switch the mode to manual on the ES page of HMI	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
8-3	Start/stop PACK fans manually	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
8-4	Start/stop the fire smoke exhaust fan manually	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
8-5	Start/stop air conditioner manually	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
8-6	Set the temperature value of the air conditioner to observe the refrigeration operation	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
8-7	Set the temperature value of the air conditioner to observe the heating operation	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
9	Emergency stop and water flooding test	

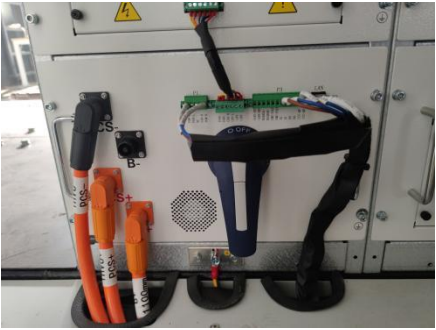





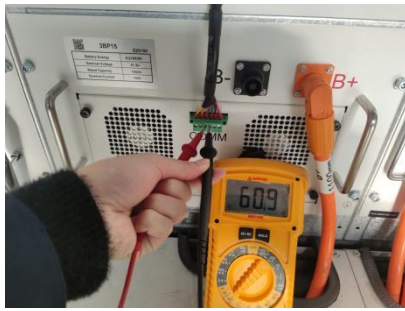

9-1	Emergency stop test	☼Passed <input type="checkbox"/> Failed
9-2	Water flooding test	☼Passed <input type="checkbox"/> Failed
10	Fire test	
10-1	Confirm terminal resistance of the fire control box	☼Passed <input type="checkbox"/> Failed
10-2	Main/backup power supply switching test	☼Passed <input type="checkbox"/> Failed
10-3	Fire protection signal fault test	☼Passed <input type="checkbox"/> Failed
10-4	Fire alarm trigger test	☼Passed <input type="checkbox"/> Failed
10-5	Fire extinguishing interlock control test in Container inner	☼Passed <input type="checkbox"/> Failed
10-6	Fire extinguishing interlock control test out of Container door	☼Passed <input type="checkbox"/> Failed
10-7	Fire fan linkage test (automatic environment control)	☼Passed <input type="checkbox"/> Failed
10-8	Smoke sensor test in PCS room	☼Passed <input type="checkbox"/> Failed
10-9	The CO / H2 sensor alarm test	☼Passed <input type="checkbox"/> Failed
10-10	Fire reset test	☼Passed <input type="checkbox"/> Failed
10-11	Confirm that the hydrogen sensor / carbon monoxide sensor displays normal	☼Passed <input type="checkbox"/> Failed
11	Primary power supply confirmation and equipment power transmission inspection	
11-1	Confirm the voltage of the bus cabinet	☼Passed <input type="checkbox"/> Failed
11-2	QF2K circuit breaker voltage test	☼Passed <input type="checkbox"/> Failed
11-3	Close FU1 (surge protector) switch	☼Passed <input type="checkbox"/> Failed
11-4	MW SDR-120-24 input / output voltage test	☼Passed <input type="checkbox"/> Failed
11-5	The HVDC power supply module voltage test	☼Passed <input type="checkbox"/> Failed
11-6	PCS fault trip test	☼Passed <input type="checkbox"/> Failed
12	Confirm the status of ESS	
12-1	Confirm values of all AC & DC of PCSs	☼Passed <input type="checkbox"/> Failed



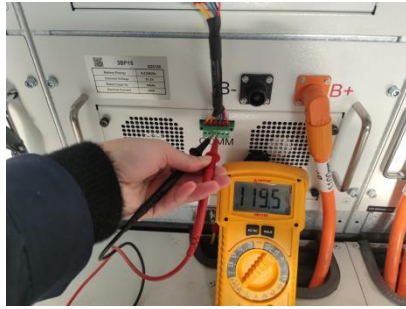

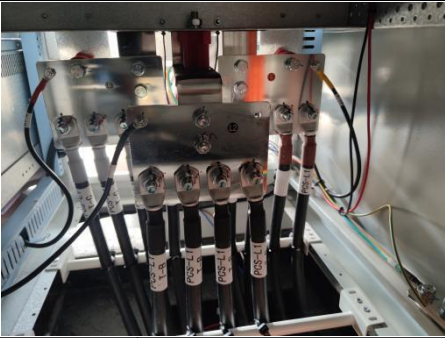

12-2	Confirm the status of ESS over HMI	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
12-3	Check the BMS information on the HMI status page	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
12-4	Check parameters & version	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
13	Protection test	
13-1	The protection test of the communication fault	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
13-2	The protection test of the cell over-voltage	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
13-3	The protection test of the cell under-voltage	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
13-4	The protection test of the battery string over-voltage	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
13-5	The protection test of the battery string under-voltage	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
13-6	The protection test of the battery string over-current	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
13-7	The protection test of insulation	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
14	High power test	
14-1	Full power charge/discharge of each branch for 15min test	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
14-2	Cell balancing function test	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
14-3	Transformer heat-dispersing fan test	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
14-4	PCS heat-dispersing fan test	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
15	Efficiency test	
15-1	Battery capacity test	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
16	Test conclusion	
17	Equipment information register	
Remarks :		
Manager: <u> Kuan Li </u> Tester: <u> FuHua Luo </u>		

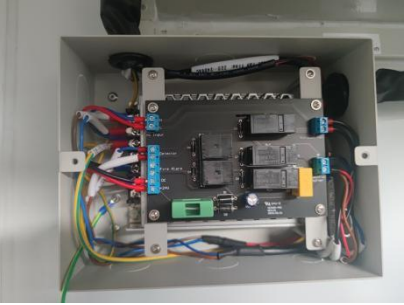



1. Inspect the appearance of the container			
Item	Testing	Details	Result
1-1	Inspect paint & dents & deformation	Inspect for the ESS exterior Inspect for rust or deformation Inspect for dents or damage	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
			
			
1-2	Inspect grounding points	Inspect for the grounding point Inspect for rust Inspect for deformation	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
			
			
1-3	Inspect door locks	Inspect door locks Inspect fire/EPO covers	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed





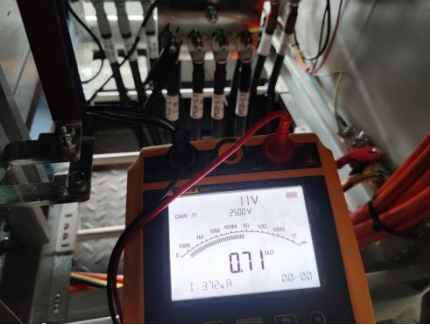
2. Inspect the wiring of the BESS			
Item	Testing	Details	Result
2-1	Inspect the cable connections (PCS+, PCS-, B+, B-) of the HVUs	<p>Inspect the cable connections of the pack.</p> <p>Connect the final B+ and B- of the PACKs to the B+ and B- of the HVU</p> <p>Verify that the cables are securely fastened into the terminals</p>	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
2-2	Inspect the terminal connections (P1, P2, P3) of the HVUs	<p>Inspect the wirings of the pack terminals (P1, P2, P3)</p> <p>Check if the wiring corresponds to the appropriate terminals</p> <p>Look for any loose or detached</p>	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed

		wiring connections	
2-3	Inspect the Ethernet connection (LAN1) of the HVUs	Check if the LAN1 cable of the HVUs is properly connected	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
		 	
			
2-4	Resistance detection of the battery cluster terminal ($60 \pm 5 \Omega$)	Measure whether the resistance value between the panel CANH and CANL in the last pack of each cluster battery is $60 \Omega \pm 5 \Omega$	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
		 	
			

<p>2-5</p>	<p>Resistance detection of the battery cluster terminal ($120 \pm 5 \Omega$)</p>	<p>Remove the communication line between No.14 and No.15 PACK, and measure the CANH and CANL of No.15 PACK with the multimeter resistance gear, showing the resistance value of $120 \pm 5 \Omega$</p>	<p><input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed</p>
			
			
<p>2-6</p>	<p>Inspect the connections of the PCSs</p>	<p>Confirm that wire position correct. Confirm wiring fasten.</p>	<p><input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed</p>
			
<p>2-7</p>	<p>Check the connection of the fire fan before power on</p>	<p>Verify that the signal harness and power supply harness positions are wired correctly</p>	<p><input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed</p>

				
2-8	CO / H2 sensor wiring confirmation	Verify that the sensor power cord and signal wiring harness are correctly wired	☞ Passed <input type="checkbox"/> Failed	
				

3. Insulation test				
Item	Testing	Details		Result
3-1	Insulation resistance test of transformer inlet end (Measurement $\geq 1M \Omega$)	Using an insulation resistance tester, set DC 2500V and 1 minute		☞ Passed <input type="checkbox"/> Failed
		Insulation resistance		
transformer inlet end to the casing		7.7G Ω		
				

3-2	Insulation resistance test of transformer inlet end and outlet end (Measurement $\geq 1M \Omega$)	Using an insulation resistance tester, set DC 2500V and 1 minute	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
transformer inlet end and outlet end		Insulation resistance 9.7G Ω	
			
3-3	Insulation resistance test of PCS AC inlet end (Measurement $\geq 1M \Omega$)	Using an insulation resistance tester, set DC 2500V and 1 minute Perform insulation testing on each string of PCS on the AC side to the casing	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
PCS AC three phase to the casing		Insulation resistance 710M Ω	
			
3-4	Insulation resistance test of PCS DC inlet end	Using an insulation resistance tester, set DC 2500V and 1 min Perform insulation testing on each string of PCS on the DC side	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed

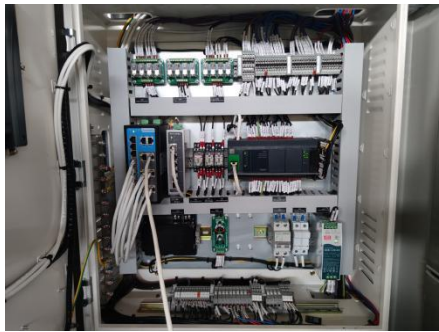


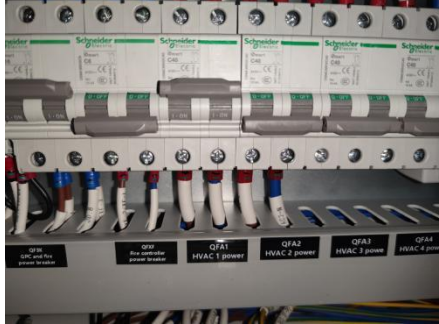

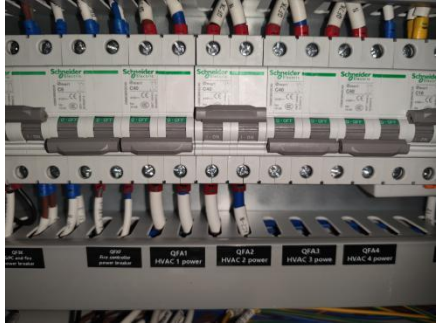

	(Measurement \geq 1M Ω)		to the casing				
	Insulation resistance		Insulation resistance		Insulation resistance		Insulation resistance
1#PCS + to the casing	840M Ω	2#PCS + to the casing	960M Ω	3#PCS + to the casing	1050M Ω	4#PCS + to the casing	1090M Ω
1#PCS - to the casing	940M Ω	2#PCS - to the casing	1040M Ω	3#PCS - to the casing	1110M Ω	4#PCS - to the casing	1150M Ω

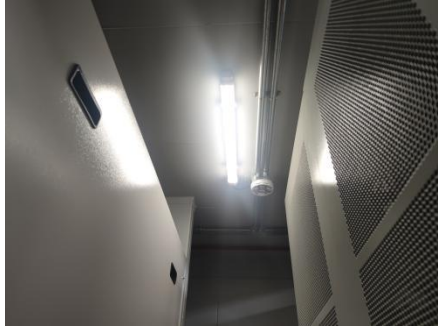
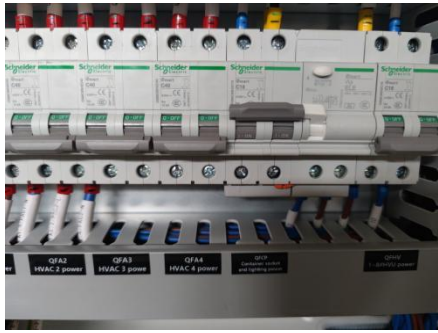


4. Secondary power supply confirmation and equipment power transmission inspection

Item	Testing	Details	Result
4-1	Close the QF2K circuit breaker	Measure 3-phase AC: AC400V Measure AC to neutral: AC220V	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed

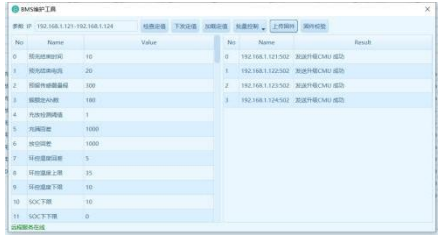



			
			
<p>4-2</p>	<p>Close the FU1 (lightning protection device) circuit breaker</p>	<p>Confirm that the QFSPD circuit breaker is closed.</p>	<p><input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed</p>
			
<p>4-3</p>	<p>Confirm the MW SDR-120-24 input / output voltage</p>	<p>Input voltage: AC220V Output voltage: DC25.5V</p>	<p><input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed</p>
			
<p>4-4</p>	<p>Confirm that all devices in the control cabinet are activated</p>	<p>Check if the MW SDR-120-24 is illuminated and operational Ensure the following devices</p>	<p><input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed</p>

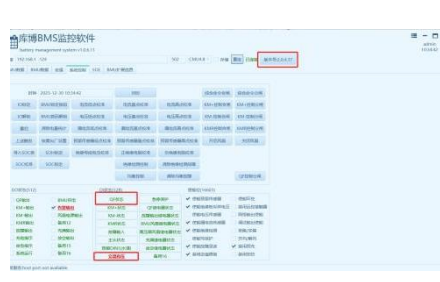
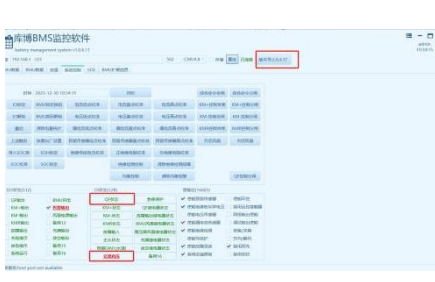
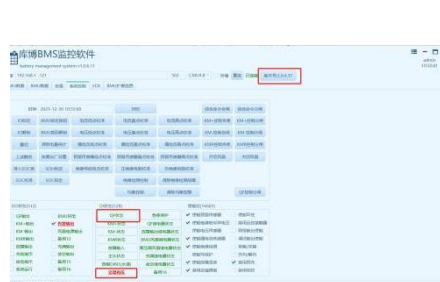
		<p>are powered on:</p> <ol style="list-style-type: none"> 1.GPC HMI 2.RTU 3.Industrial switch 4.Network switch 	
			
<p>4-5</p>	<p>Close the air conditioning circuit breaker and confirm the air conditioning voltage</p>	<p>Confirm that the QFA1~4 circuit breaker is closed.</p> <p>Confirm that the air conditioning 1#~4# operates</p>	<p>⚙️ Passed <input type="checkbox"/> Failed</p>
			
			
<p>4-6</p>	<p>Close the QFCF (box lighting) circuit breaker</p>	<p>Confirm that the QFCF circuit breaker is closed.</p> <p>Confirm that the light can turn on and turn off in the container.</p>	<p>⚙️ Passed <input type="checkbox"/> Failed</p>



5. Communication inspection and equipment upgrade

Item	Testing	Details	Result
5-1	Insulation version upgrade	Upgrade it to a unified version and confirm that all cluster versions are consistent.	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
5-2	The BMU version upgrade	Upgrade it to a unified version and confirm that all cluster versions are consistent.	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
5-3	The CMU version upgrade	Upgrade it to a unified version and confirm that all cluster versions are consistent.	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed

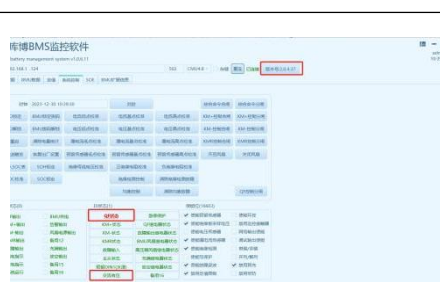
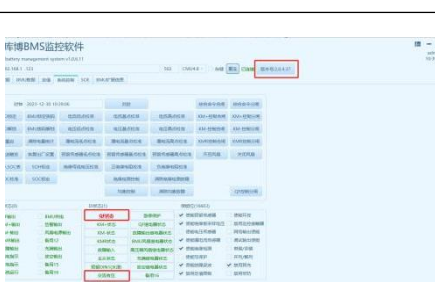
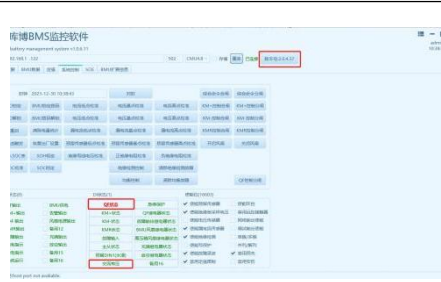
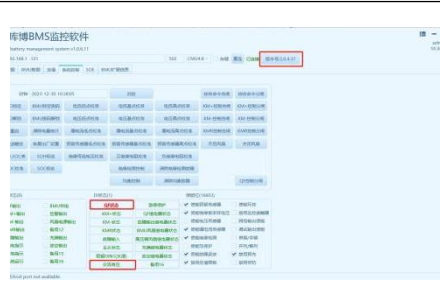
			
<p>5-4</p>	<p>Check battery module communication cable connection (COMM terminal)</p>	<p>Check the communication wire of battery module (COMM terminal).</p> <p>Whether the wiring is corresponding to the terminal.</p> <p>Whether there is a string.</p> <p>Whether the wiring is loose.</p>	<p>☀ Passed <input type="checkbox"/> Failed</p>
<p>5-5</p>	<p>Check the high voltage connection of the battery module</p>	<p>Check the high voltage connection of the battery module</p> <p>Whether there is a string</p> <p>Whether the joint is loose</p> <p>Whether the string wiring is excessively bent</p>	<p>☀ Passed <input type="checkbox"/> Failed</p>
			
<p>5-6</p>	<p>AC power supply of HVUs</p>	<p>During the AC power supply, disconnect the high voltage box circuit breaker and confirm that the AC power supply is normal in the upper monitor.</p>	<p>1BC: ☀ Passed <input type="checkbox"/> Failed</p> <p>2BC: ☀ Passed <input type="checkbox"/> Failed</p> <p>3BC: ☀ Passed <input type="checkbox"/> Failed</p> <p>4BC: ☀ Passed <input type="checkbox"/> Failed</p>



5-7 DC power supply of HVUs

Direct current power supply, disconnect AC power, close the high voltage box circuit breaker one by one, then screenshot.

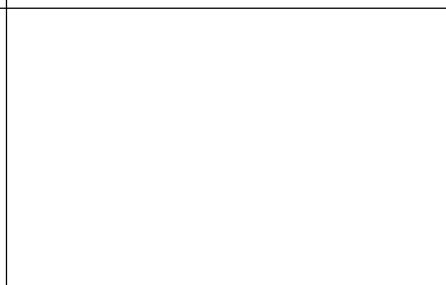
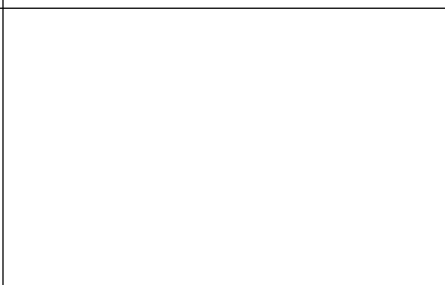
1BC: Passed Failed
 2BC: Passed Failed
 3BC: Passed Failed
 4BC: Passed Failed



5-8 Insulation board sampling bus voltage calibration

Correct the sampling voltage of the battery cluster insulation plate through the CMU upper monitor.

1BC: Passed Failed
 2BC: Passed Failed
 3BC: Passed Failed
 4BC: Passed Failed

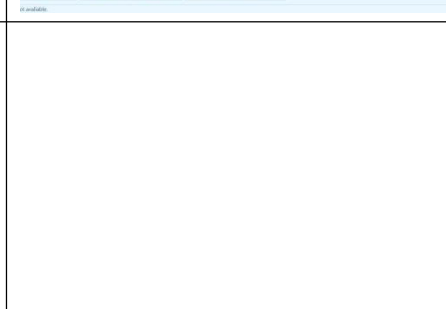
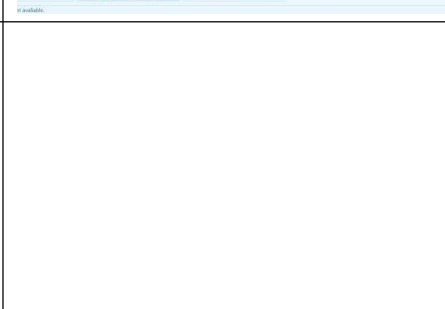
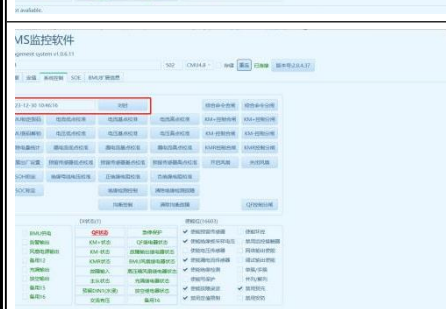


5-9

Set the CMU's watch

Time calibration is performed through the CMU upper monitor.

1BC: Passed Failed
 2BC: Passed Failed
 3BC: Passed Failed
 4BC: Passed Failed



5-10

Black start function test

Without AC input power, start the control box through the black start button

Passed Failed

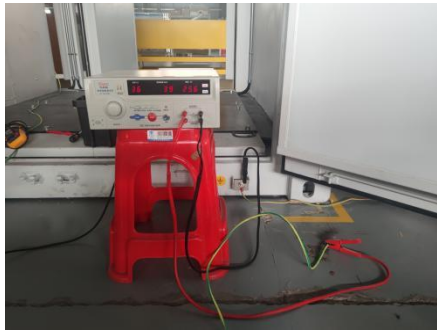


6. Safety regulations test

Item	Testing	Details	Result
6-1	Ground continuity test (Measurement $\leq 100m \Omega$)	Use a ground resistance tester to output a 25A current and measure the resistance between the far end of the rack and the container ground point Measure the resistance between the GPC ground wire and the ground busbar of the container	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed

	Resistance
Far end of the rack to the ground busbar	39m Ω
GPC ground wire to ground busbar	8m Ω





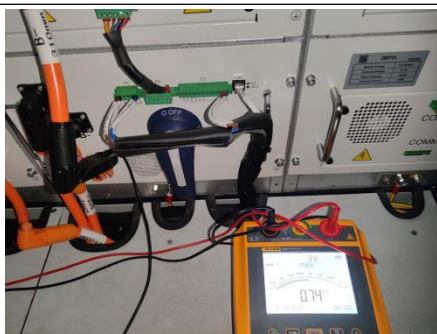
6-2

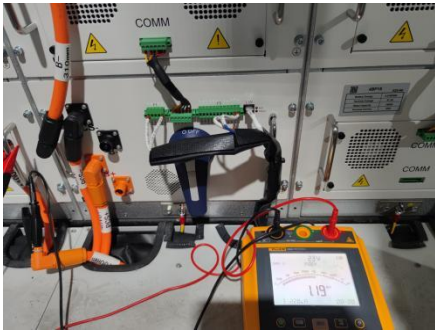
Battery String insulation resistance test (Measurement $\geq 1M \Omega$)

Using an insulation resistance tester, set DC 2500V and 1 minute.
 Perform the withstand voltage test on the total positive of each string and the casing.
 Perform the withstand voltage test on the total negative of each string and the casing.

Passed Failed

	Insulation resistance		Insulation resistance	
1BC+ to string	1200 M Ω	3BC+ to string	1130M Ω	
1BC- to string	820 M Ω	3BC- to string	770 M Ω	
2BC+ to string	1090 M Ω	4BC+ to string	1190 M Ω	
2BC- to string	740 M Ω	4BC- to string	790 M Ω	





6-3

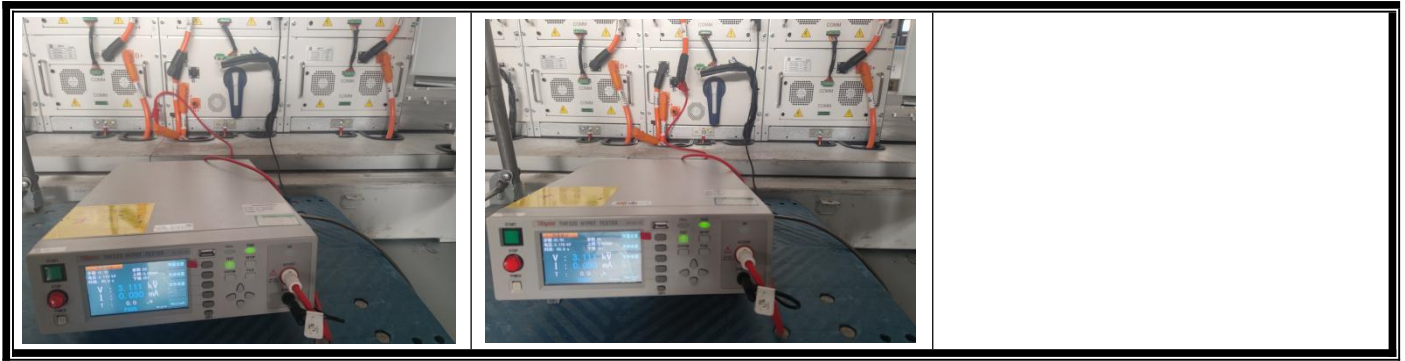
Dielectric withstand test
(Leakage current \leq 3mA)





Using an insulation withstand voltage tester, set DC 3110V and leakage current to 3mA with 1 min
Perform the withstand voltage test on the total positive of each string and the casing.
Perform the withstand voltage test on the total negative of each string and the casing

Passed Failed

	Leakage current		Leakage current
1BC+ to shell	0.030mA	3BC+ to shell	0.030mA
1BC- to shell	0.030mA	3BC- to shell	0.030mA
2BC+ to shell	0.030mA	4BC+ to shell	0.030mA
2BC- to shell	0.030mA	4BC- to shell	0.030mA





7. HMI information confirmation			
Item	Testing	Details	Result
7-1	Enter the account and password through the HMI system login interface	<p>Account: Admin (no need to enter)</p> <p>Password: 111111 (default)</p> <p>Automatically login when the correct password is entered.</p> 	<p><input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed</p>
7-2	Check all parameters through the BMS parameter page of the HMI	<p>Confirm that the parameters are correct and keep all the parameters consistent</p>   	<p><input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed</p>

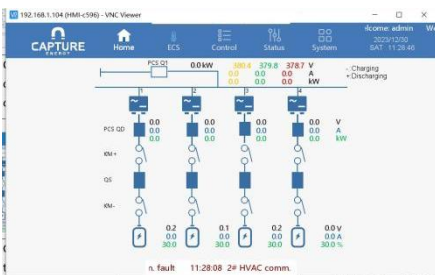
Name	Parameters	Name	Parameters
Upper limit of cluster pole temp.	50.0 °C	Alarm value for upper limit of cell voltage	3.5500 V
Ultimate upper limit of cluster pole temp.	60.0 °C	Protection value for ultimate upper limit of cell voltage	3.6500 V
Upper limit of pack pole temp.	50.0 °C	Alarm value for lower limit of cell voltage	2.8000 V
Ultimate upper limit of pack pole temp.	60.0 °C	Protection value for ultimate lower limit of cell voltage	2.6000 V
Upper limit of module temp.	45.0 °C	Alarm value for upper limit of the battery cluster voltage	852.0 V
Ultimate upper limit of module temp.	55.0 °C	Protection value for ultimate upper of battery cluster voltage	876.0 V
Lower limit of module temp.	5.0 °C	Alarm value for lower limit of the battery cluster voltage	672.0 V
Ultimate lower limit of module temp.	-5.0 °C	Protection value for ultimate lower of battery cluster voltage	624.0 V
Short-circuit current limit	140 %	Alarm of upper limit for charging/discharging current	115 %
Charging & discharging limit current	179.8 A	Protection of upper limit for charging/discharging current	125 %
Insulation-resistance protection value	20 kΩ	Protection value for leakage current	40.8 mA

7-3

Confirm the Q1 AC circuit breaker status of PCS through HMI

Close the PCS AC circuit breaker Q1 and confirm the status of Q1 on the HMI

Passed Failed

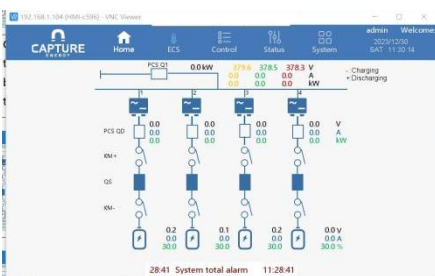
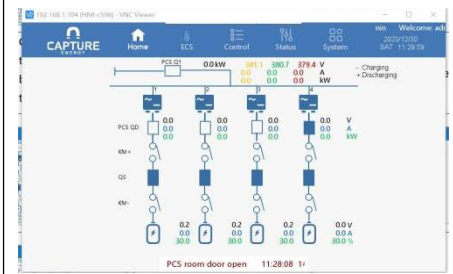
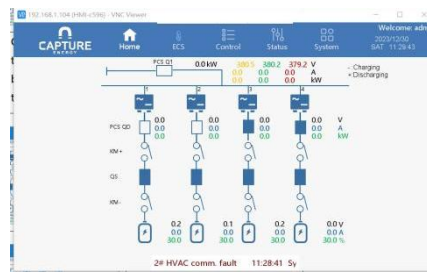
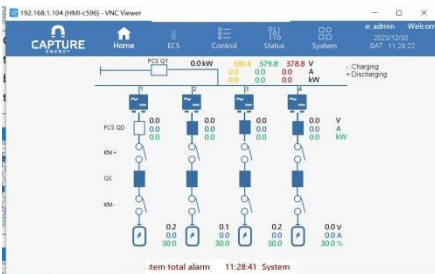


7-4

Gradually confirm the PCS DC circuit breaker QD1~8 status through HMI

Close the PCS DC circuit breaker sequentially and confirm the corresponding PCS DC circuit breaker is closed on HMI

Passed Failed



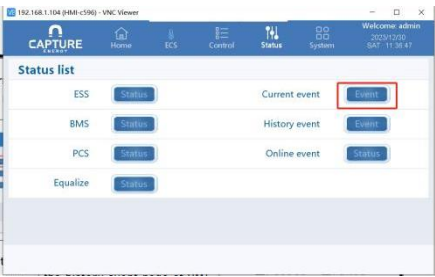
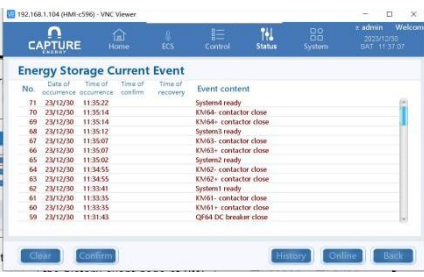
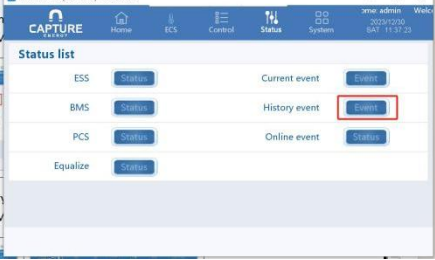
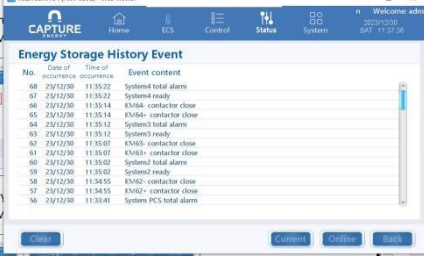
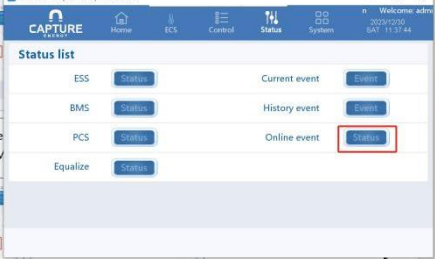
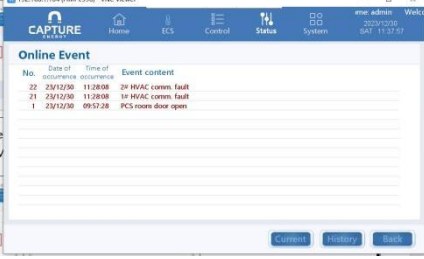
7-5

Gradually confirm the disconnecting switch QS61~64 status of HVUs through HMI


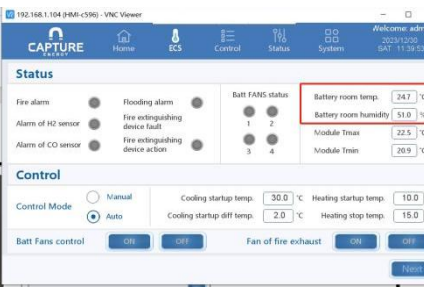
Close the HVU circuit breaker in turn and confirm that the corresponding HVU circuit breaker is closed on the HMI

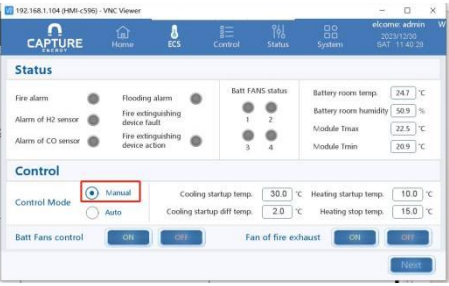






Passed Failed









<p>7-6</p>	<p>Close contactors (KM+, KM-) on the control page of HMI</p>	<p>Close KM on for each circuit at the contactor control page of HMI</p>	<p><input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed</p>
<p>7-7</p>	<p>Confirm the status of all contactors</p>	<p>The status of KM+ and KM- for each circuit is in series</p>	<p><input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed</p>
<p>7-8</p>	<p>Confirm the current events through HMI</p>	<p>Confirm the information over the current event page of HMI</p>	<p><input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed</p>

		
7-9	Confirm the history events through HMI	Confirm the information over the history event page of HMI <input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
		
7-10	Confirm the online events through HMI	Confirm the information over the online event page of HMI <input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
		

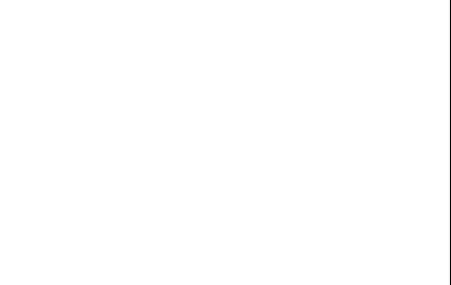
8. Environment control system test

Item	Testing	Details	Result
8-1	Check humidity & temperature	Verify if the temperature and humidity readings on the meter match the values displayed on HMI	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
			

<p>8-2</p>	<p>Switch the mode to manual on the ES page of HMI</p>	<p>Confirm the environmental control is on manual mode</p> 	<p>⚙️ Passed <input type="checkbox"/> Failed</p>
<p>8-3</p>	<p>Start/stop PACK fans manually</p>	<p>Manually start/stop the pack fan Verify operation of the pack fan</p>	<p>⚙️ Passed <input type="checkbox"/> Failed</p>
			
<p>8-4</p>	<p>Start/stop the fire smoke exhaust fan manually</p>	<p>Manually start/stop the fire smoke exhaust fan Verify operation of the fire smoke exhaust fan</p>	<p>⚙️ Passed <input type="checkbox"/> Failed</p>
			
			

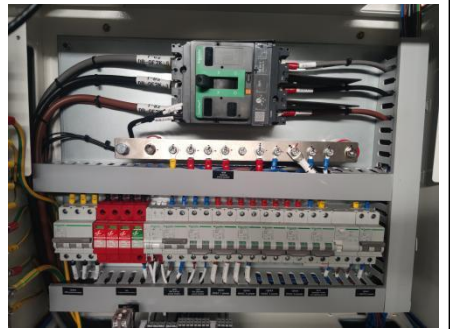
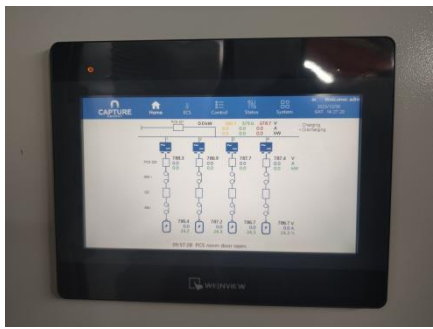
8-5	Start/stop air conditioner manually	Manually start/stop HVAC1#~2# Verify the operation of HVAC1#~2#	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
			
			
8-6	Set the temperature value of the air conditioner to observe the refrigeration operation	Set the temperature values for HVAC1#~2# Observe the temperature and operation of HVAC1#~2#	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
			
			

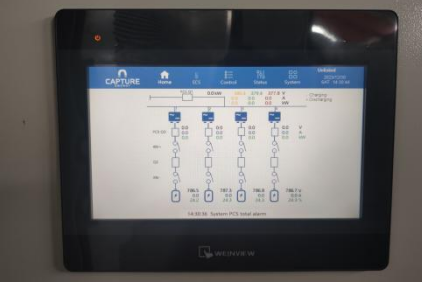
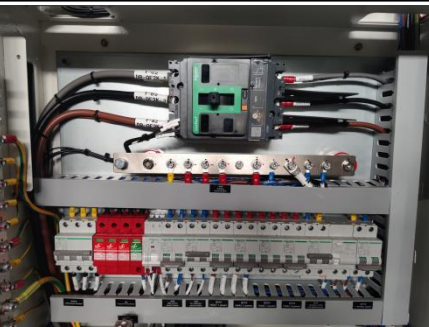



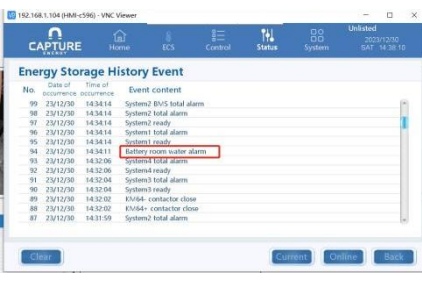
8-7	Set the temperature value of the air conditioner to observe the heating operation	Set the temperature values for HVAC1#~2# Observe the temperature and operation of HVAC1#~2#	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
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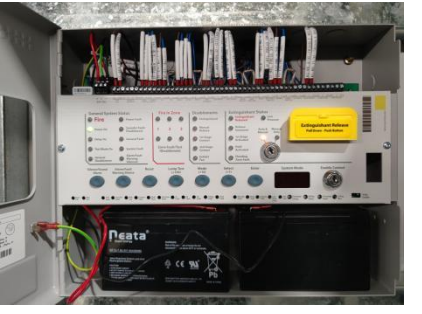


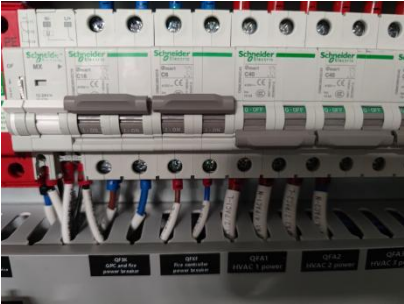
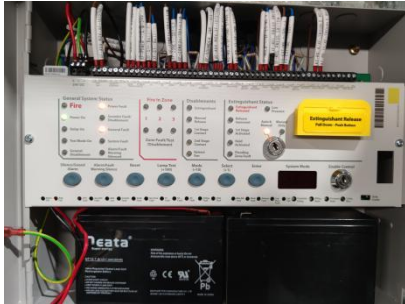
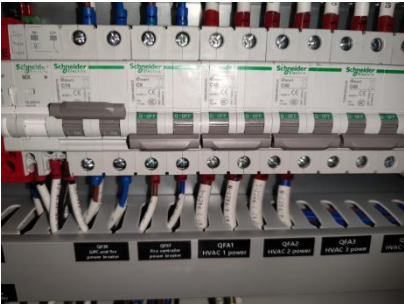



9. Emergency stop and water flooding test

Item	Testing	Details	Result
9-1	Emergency stop test	Press the emergency stop on the control cabinet door Observe the system shutdown condition after the emergency stop	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed



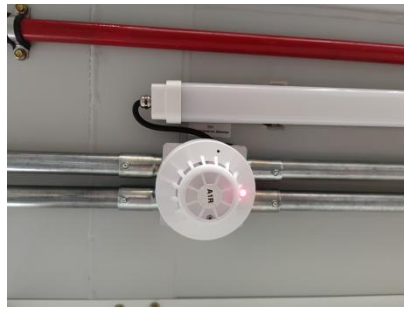
			
<p>9-2</p>	<p>Water flooding test</p>	<p>Verified the protective measures by simulated flooding and then checked with historical fault records on the HMI.</p>	<p>⚙️ Passed <input type="checkbox"/> Failed</p>
			
			






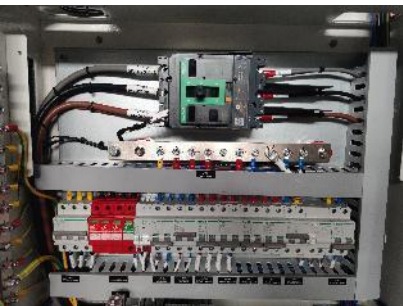




<p>10. Fire test</p>			
Item	Testing	Details	Result
<p>10-1</p>	<p>Confirm terminal resistance of the fire control box</p>	<p>Confirm whether there is any excess resistance. Five resistors should be retained.</p>	<p>⚙️ Passed <input type="checkbox"/> Failed</p>
			

<p>10-2</p>	<p>Main/backup power supply switching test</p>	<p>While main/backup power supply is working</p> <ol style="list-style-type: none"> 1. Turn off the main power supply and Confirm whether the controller running continually. 2. Turn off the backup power supply and Confirm whether the controller running continually. 	<p>Main Power Supply: <input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed Backup Power Supply: <input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed</p>
			
			
<p>10-3</p>	<p>Fire protection signal fault test</p>	<p>Remove the signal wire of the fire detector Check if the controller registers the fault</p>	<p><input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed</p>
			
<p>10-4</p>	<p>Fire alarm trigger test</p>	<p>Simulate fire detection triggering (Temperature & smoke sensor test) Inspect fire-related alarms</p>	<p><input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed</p>

status

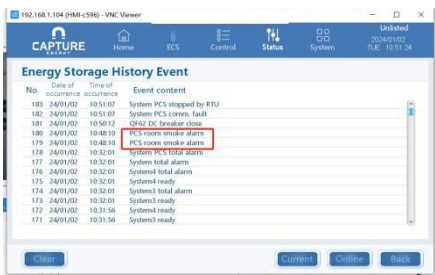
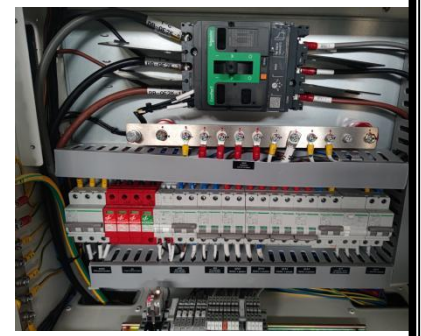
1. Controller panel
2. Buzzer
3. Air discharge indicator light
4. External control box
5. Horn strobe alarm



			
<p>10-5</p>	<p>Fire extinguishing interlock control test in container inner</p>	<p>Run alarm by the start/stop button of the fire controller in container inner. Verify the countdown of alarm and the action of the solenoid valve</p>	<p><input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed</p>
			
			
			
<p>10-6</p>	<p>Fire extinguishing interlock control test out of Container door</p>	<p>Run alarm by the start/stop button of the fire controller out of container door. Verify the countdown of alarm and the action of the solenoid</p>	<p><input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed</p>

		valve	
			
			
			
10-7	Fire fan linkage test (automatic environment control)	<p>Set the environment control system running mode to automatic mode, and then make the hydrogen sensor and CO sensor in low concentration alarm test, fire exhaust fan running and shutter open. Then simulate the fire alarm state through the start / stop button of the fire control system, and then observe whether the fire exhaust fan and the shutter are automatically closed</p>	<p>⚙️ Passed <input type="checkbox"/> Failed</p>

			
			
			
			
			
10-8	Smoke sensor test in PCS room	Simulated triggering of smoke sensor in PCS room, and then the contactor and QF2K are disconnected	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed



10-9

The CO / H2 sensor alarm test

Use the remote control to simulate the sensor being in a low / high concentration alarm state.

Observe the running condition of the exhaust fan.

Passed Failed





10-10

Fire reset test

Put the thimble in the original state

Passed Failed



10-11

Confirm that the hydrogen sensor / carbon monoxide sensor displays normal

Check the gas detection type on the sensor display is consistent with the device detection type and confirm that the gas concentration value is normal.

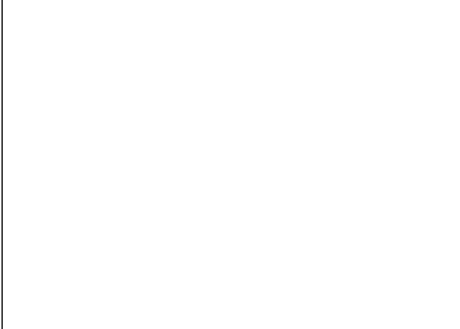
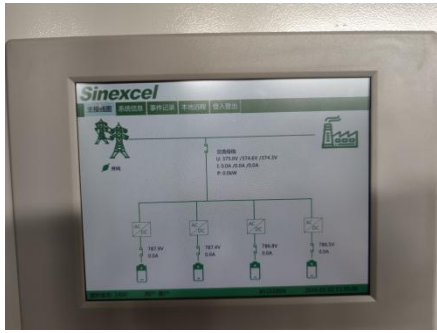
Passed Failed



11. Primary power supply confirmation and equipment power transmission inspection

Item	Testing	Details	Result
11-1	Check the transformer incoming line end voltage	Measure 3-phase AC : AC690V Measure AC to neutral: AC400V	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
11-2	QF2K circuit breaker voltage test	Measure 3-phase AC : AC400V Measure AC to neutral: AC220V	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed

11-3	Close FU1 (surge protector) switch	Verify that the QFSPD circuit breaker is closed.	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed		
					
		11-4	MW SDR-120-24 input / output voltage test	Measure SDR-120-24 Input voltage: AC220V Output voltage: DC25.5V	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
					
11-5	The HVDC power supply module voltage test	Input voltage: 715-840 V DC Output voltage: 24V DC	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed		
					
11-6	PCS fault trip test	Simulate a remote EPO fault on the PCS and observe if all the PCS AC and DC switches trip	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed		



12 . Confirm the status of ESS

Item	Testing	Details	Result
12-1	Confirm values of all AC & DC of PCSs	After the PCS AC/DC circuit breaker is closed, check the AC/DC voltage of the corresponding PCS on the HMI touch screen.	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
			Branch 1: <input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed Branch 2: <input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed Branch 3: <input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed Branch 4: <input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed Branch 5: <input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed Branch 6: <input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed Branch 7: <input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed Branch 8: <input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
12-2	Confirm the status of ESS over HMI	Check whether the ESS status is normal over HMI.	



12-3

Check the BMS information on the HMI status page

Confirm the numerical information on the BMS status page

Passed Failed



12-4

Check parameters & version

Check parameters & version, including PCS\CMU\BMU\INR\HMI\PLC.

Passed Failed



13. Protection test

Item

Testing

Details

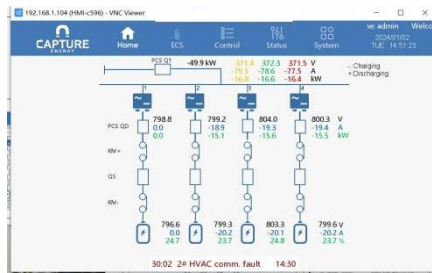
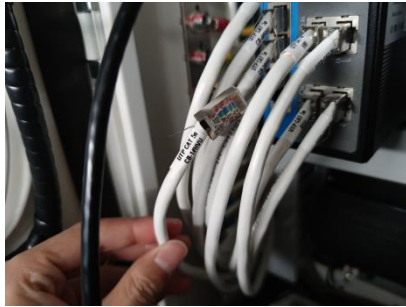
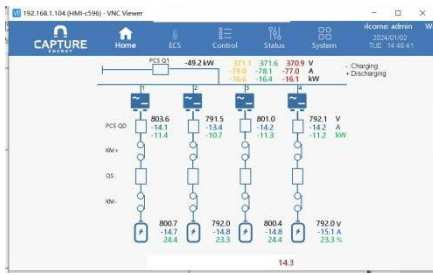
Result

13-1

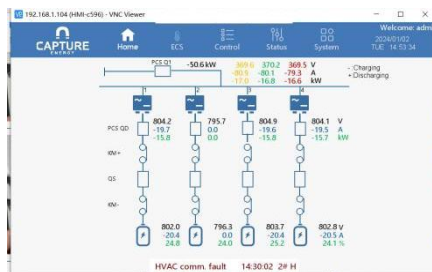
The protection test of the communication fault

Disconnect the RTU and BMS network cables separately and observe the response of system.

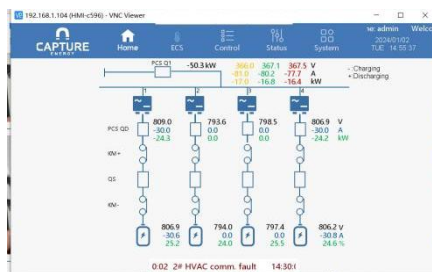
Passed Failed



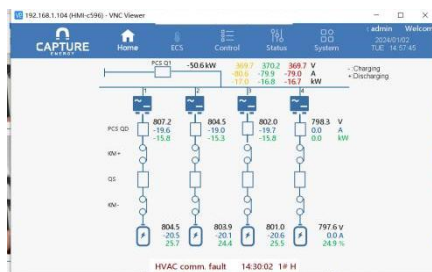
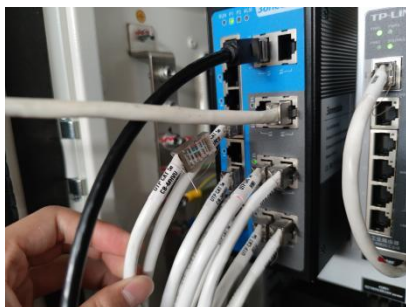
No.	Date of occurrence	Time of occurrence	Time of confirm	Time of recovery	Event content
30	24/01/2024	14:51:04			System ready
29	24/01/2024	14:50:48	14:51:04	14:51:04	IBC BVS comm. fault
28	24/01/2024	14:50:48	14:51:04	14:51:04	System BVS comm. fault
27	24/01/2024	14:50:48	14:51:04	14:51:04	System2 BVS comm. fault
26	24/01/2024	14:45:32	14:47:31		System charging
25	24/01/2024	14:45:32			System ready
24	24/01/2024	14:45:32			System3 ready
23	24/01/2024	14:45:32			System1 ready
22	24/01/2024	14:45:32		14:50:48	System ready
21	24/01/2024	14:45:47		14:45:50	System PCS total alarm
20	24/01/2024	14:45:47		14:45:50	System total alarm
19	24/01/2024	14:45:47		14:45:52	System2 total alarm
18	24/01/2024	14:45:47		14:45:52	System3 total alarm



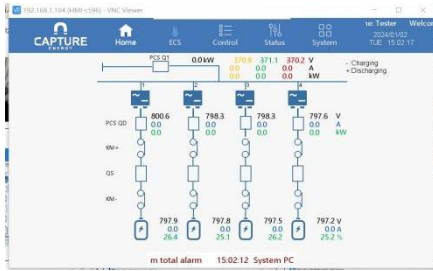
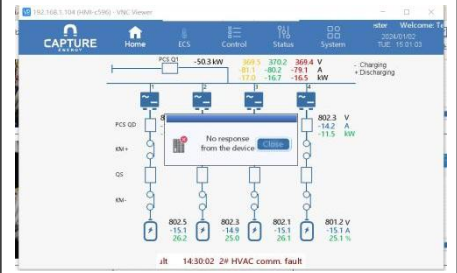
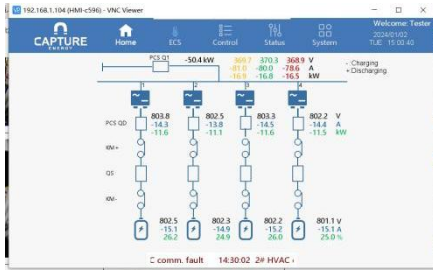
No.	Date of occurrence	Time of occurrence	Time of confirm	Time of recovery	Event content
34	24/01/2024	14:53:30			System2 ready
33	24/01/2024	14:53:09	14:53:32	14:53:32	IBC BVS comm. fault
32	24/01/2024	14:53:09	14:53:32	14:53:32	System BVS comm. fault
31	24/01/2024	14:53:09	14:53:32	14:53:32	System3 BVS comm. fault
30	24/01/2024	14:51:04			System1 ready
29	24/01/2024	14:50:48	14:51:04	14:51:04	IBC BVS comm. fault
28	24/01/2024	14:50:48	14:51:04	14:51:04	System BVS comm. fault
27	24/01/2024	14:50:48	14:51:04	14:51:04	System2 BVS comm. fault
26	24/01/2024	14:45:32	14:47:31		System charging
25	24/01/2024	14:45:32			System ready
24	24/01/2024	14:45:32			System3 ready
23	24/01/2024	14:45:32		14:53:09	System2 ready
22	24/01/2024	14:45:30		14:50:48	System1 ready



No.	Date of occurrence	Time of occurrence	Time of confirm	Time of recovery	Event content
38	24/01/2024	14:55:29			System2 ready
37	24/01/2024	14:54:56	14:55:29	14:55:29	IBC BVS comm. fault
36	24/01/2024	14:54:56	14:55:29	14:55:29	System BVS comm. fault
35	24/01/2024	14:54:56	14:55:29	14:55:29	System3 BVS comm. fault
34	24/01/2024	14:53:32			System1 ready
33	24/01/2024	14:53:09	14:53:32	14:53:32	IBC BVS comm. fault
32	24/01/2024	14:53:09	14:53:32	14:53:32	System BVS comm. fault
31	24/01/2024	14:53:09	14:53:32	14:53:32	System2 BVS comm. fault
30	24/01/2024	14:51:04			System1 ready
29	24/01/2024	14:50:48	14:51:04	14:51:04	IBC BVS comm. fault
28	24/01/2024	14:50:48	14:51:04	14:51:04	System BVS comm. fault
27	24/01/2024	14:50:48	14:51:04	14:51:04	System2 BVS comm. fault
26	24/01/2024	14:47:31			System charging



No.	Date of occurrence	Time of occurrence	Time of confirm	Time of recovery	Event content
42	24/01/2024	14:57:42			System1 ready
41	24/01/2024	14:57:18	14:57:42	14:57:42	IBC BVS comm. fault
40	24/01/2024	14:57:18	14:57:42	14:57:42	System BVS comm. fault
39	24/01/2024	14:57:18	14:57:42	14:57:42	System3 BVS comm. fault
38	24/01/2024	14:55:29			System2 ready
37	24/01/2024	14:54:56	14:55:29	14:55:29	IBC BVS comm. fault
36	24/01/2024	14:54:56	14:55:29	14:55:29	System BVS comm. fault
35	24/01/2024	14:54:56	14:55:29	14:55:29	System3 BVS comm. fault
34	24/01/2024	14:53:32			System1 ready
33	24/01/2024	14:53:09	14:53:32	14:53:32	IBC BVS comm. fault
32	24/01/2024	14:53:09	14:53:32	14:53:32	System BVS comm. fault
31	24/01/2024	14:53:09	14:53:32	14:53:32	System2 BVS comm. fault
30	24/01/2024	14:51:04			System1 ready



Energy Storage Current Event

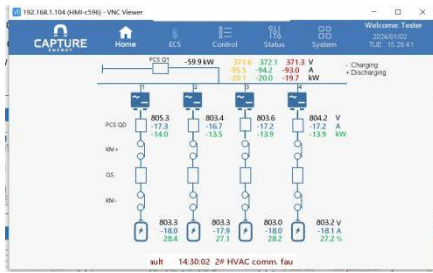
No.	Date of occurrence	Time of occurrence	Time of confirm	Time of recovery	Event content
52	24/01/02	15:02:19			System ready
51	24/01/02	15:02:19			System3 ready
50	24/01/02	15:02:19			System2 ready
49	24/01/02	15:02:19			System1 ready
48	24/01/02	15:02:12	15:02:19		System PCS total alarm
47	24/01/02	15:02:12	15:02:19		System total alarm
46	24/01/02	15:02:12	15:02:19		System3 total alarm
45	24/01/02	15:02:12	15:02:19		System2 total alarm
44	24/01/02	15:02:12	15:02:19		System1 total alarm
43	24/01/02	15:02:12	15:02:19		System ready
42	24/01/02	14:57:42	15:02:11		System BVS comm. fault
41	24/01/02	14:57:42	14:57:42		4BC BVS comm. fault
40	24/01/02	14:57:18	14:57:42		System BVS comm. fault

13-2

The protection test of the cell over-voltage

Adjust the over-voltage protection parameters for the cells.
Confirm the triggering of the protection mechanism.

Passed Failed



Parameters

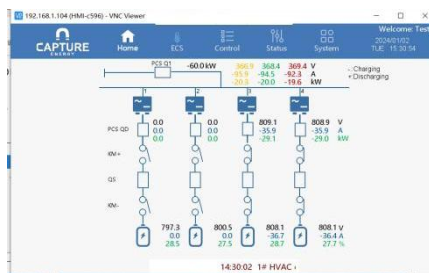
Name	Parameters	Name	Parameters
Upper limit of cluster pole temp.	50.0 °C	Alarm value for upper limit of cell voltage	3.5500 V
Ultimate upper limit of cluster pole temp.	60.0 °C	Protection value for ultimate upper limit of cell voltage	3.5000 V
Upper limit of pack pole temp.	50.0 °C	Alarm value for lower limit of cell voltage	2.8000 V
Ultimate upper limit of pack pole temp.	60.0 °C	Protection value for ultimate lower limit of cell voltage	2.6000 V
Upper limit of module temp.	45.0 °C	Alarm value for upper limit of the battery cluster voltage	852.0 V
Ultimate upper limit of module temp.	55.0 °C	Protection value for ultimate upper of battery cluster voltage	876.0 V
Lower limit of module temp.	5.0 °C	Alarm value for lower limit of the battery cluster voltage	872.0 V
Ultimate lower limit of module temp.	-5.0 °C	Protection value for ultimate lower of battery cluster voltage	824.0 V
Short circuit current limit	145.0 A	Alarm of upper limit for charging/discharging current	115.0 %
Charging & discharging rated current	175.0 A	Protection of upper limit for charging/discharging current	125.0 %
Insulation resistance protection value	20 MΩ	Protection value for leakage current	40.0 mA

Energy Storage Current Event

No.	Date of occurrence	Time of occurrence	Time of confirm	Time of recovery	Event content
73	24/01/02	15:29:46			EV01 - contactor open
72	24/01/02	15:29:46			EV02 - contactor open
71	24/01/02	15:29:44			System1 charge full
70	24/01/02	15:29:44		15:29:51	System1 BVS total alarm
69	24/01/02	15:29:44		15:29:51	System1 total alarm
68	24/01/02	15:29:44		15:29:51	IBC Cell overvoltage alarm
67	24/01/02	15:29:44		15:29:51	IBC HV Overvoltage protection
66	24/01/02	15:29:44		15:29:51	System charging
65	24/01/02	15:29:54			System2 ready
64	24/01/02	15:29:54			System2 charge full
63	24/01/02	15:29:52		15:29:44	System1 ready
62	24/01/02	15:29:52		15:29:44	System1 charge full
61	24/01/02	15:29:47		15:29:52	System PCS total alarm

Parameters

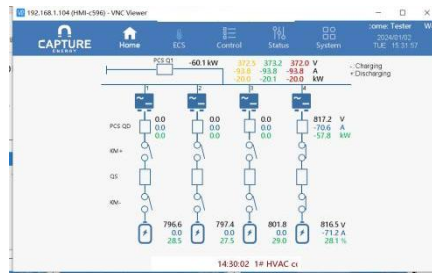
Name	Parameters	Name	Parameters
Upper limit of cluster pole temp.	50.0 °C	Alarm value for upper limit of cell voltage	3.5500 V
Ultimate upper limit of cluster pole temp.	60.0 °C	Protection value for ultimate upper limit of cell voltage	3.5000 V
Upper limit of pack pole temp.	50.0 °C	Alarm value for lower limit of cell voltage	2.8000 V
Ultimate upper limit of pack pole temp.	60.0 °C	Protection value for ultimate lower limit of cell voltage	2.6000 V
Upper limit of module temp.	45.0 °C	Alarm value for upper limit of the battery cluster voltage	852.0 V
Ultimate upper limit of module temp.	55.0 °C	Protection value for ultimate upper of battery cluster voltage	876.0 V
Lower limit of module temp.	5.0 °C	Alarm value for lower limit of the battery cluster voltage	872.0 V
Ultimate lower limit of module temp.	-5.0 °C	Protection value for ultimate lower of battery cluster voltage	824.0 V
Short circuit current limit	145.0 A	Alarm of upper limit for charging/discharging current	115.0 %
Charging & discharging rated current	175.0 A	Protection of upper limit for charging/discharging current	125.0 %
Insulation resistance protection value	20 MΩ	Protection value for leakage current	40.0 mA



Energy Storage Current Event

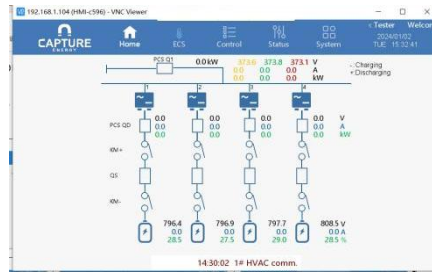
No.	Date of occurrence	Time of occurrence	Time of confirm	Time of recovery	Event content
81	24/01/02	15:30:45			System2 total alarm
80	24/01/02	15:30:38			EV02 - contactor open
79	24/01/02	15:30:38			EV01 - contactor open
78	24/01/02	15:30:38			System2 charge full
77	24/01/02	15:30:38		15:30:42	System2 BVS total alarm
76	24/01/02	15:30:38		15:30:42	System2 total alarm
75	24/01/02	15:30:37		15:30:42	IBC Cell overvoltage alarm
74	24/01/02	15:30:37		15:30:42	IBC HV Overvoltage protection
73	24/01/02	15:29:46			EV01 - contactor open
72	24/01/02	15:29:46			EV02 - contactor open
71	24/01/02	15:29:44			System1 charge full
70	24/01/02	15:29:44		15:29:51	System1 BVS total alarm
69	24/01/02	15:29:44		15:29:51	System1 total alarm

Name	Parameters	Name	Parameters
Upper limit of cluster pole temp.	50.0 °C	Alarm value for upper limit of cell voltage	3.5500 V
Ultimate upper limit of cluster pole temp.	60.0 °C	Protection value for ultimate upper limit of cell voltage	3.3000 V
Upper limit of pack pole temp.	50.0 °C	Alarm value for lower limit of cell voltage	2.8000 V
Ultimate upper limit of pack pole temp.	60.0 °C	Protection value for ultimate lower limit of cell voltage	2.6000 V
Upper limit of module temp.	45.0 °C	Alarm value for upper limit of the battery cluster voltage	852.6 V
Ultimate upper limit of module temp.	55.0 °C	Protection value for ultimate upper of battery cluster voltage	876.0 V
Lower limit of module temp.	-5.0 °C	Alarm value for lower limit of the battery cluster voltage	822.0 V
Ultimate lower limit of module temp.	-5.0 °C	Protection value for ultimate lower of battery cluster voltage	824.0 V
Short circuit current limit	145 %	Alarm of upper limit for charging/discharging current	115 %
Charging & discharging wind current	175.0 A	Protection of upper limit for charging/discharging current	125 %
Insulation resistance protection value	20 kΩ	Protection value for leakage current	40.0 mA



No.	Date of occurrence	Time of occurrence	Time of confirm	Time of recovery	Event content
87	24/01/02	15:31:44			EN03- contactor open
88	24/01/02	15:31:42			EN03- contactor open
86	24/01/02	15:31:42			System3 charge full
85	24/01/02	15:31:42	15:31:46	15:31:46	System2 BVS total alarm
84	24/01/02	15:31:42			System3 total alarm
83	24/01/02	15:31:41	15:31:46	15:31:46	IBC Cell overvoltage alarm
82	24/01/02	15:31:41	15:31:46	15:31:46	IBC HVJ Overvoltage protection
81	24/01/02	15:30:45			System2 total alarm
80	24/01/02	15:30:38			EN02- contactor open
79	24/01/02	15:30:38			EN02- contactor open
78	24/01/02	15:30:38			System2 charge full
77	24/01/02	15:30:38	15:30:42	15:30:42	System2 BVS total alarm
76	24/01/02	15:30:38	15:30:42	15:30:42	System2 total alarm

Name	Parameters	Name	Parameters
Upper limit of cluster pole temp.	50.0 °C	Alarm value for upper limit of cell voltage	3.5500 V
Ultimate upper limit of cluster pole temp.	60.0 °C	Protection value for ultimate upper limit of cell voltage	3.3000 V
Upper limit of pack pole temp.	50.0 °C	Alarm value for lower limit of cell voltage	2.8000 V
Ultimate upper limit of pack pole temp.	60.0 °C	Protection value for ultimate lower limit of cell voltage	2.6000 V
Upper limit of module temp.	45.0 °C	Alarm value for upper limit of the battery cluster voltage	852.6 V
Ultimate upper limit of module temp.	55.0 °C	Protection value for ultimate upper of battery cluster voltage	876.0 V
Lower limit of module temp.	-5.0 °C	Alarm value for lower limit of the battery cluster voltage	822.0 V
Ultimate lower limit of module temp.	-5.0 °C	Protection value for ultimate lower of battery cluster voltage	824.0 V
Short circuit current limit	145 %	Alarm of upper limit for charging/discharging current	115 %
Charging & discharging wind current	175.0 A	Protection of upper limit for charging/discharging current	125 %
Insulation resistance protection value	20 kΩ	Protection value for leakage current	40.0 mA



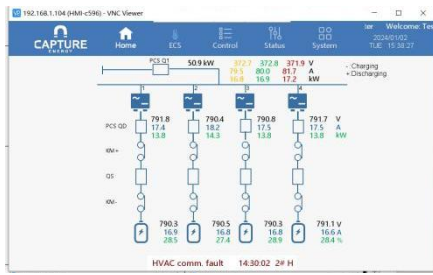
No.	Date of occurrence	Time of occurrence	Time of confirm	Time of recovery	Event content
97	24/01/02	15:32:30			System PCS total alarm
96	24/01/02	15:32:30			System total alarm
95	24/01/02	15:32:29	15:32:34	15:32:34	IBC Cell overvoltage alarm
94	24/01/02	15:32:29	15:32:34	15:32:34	IBC HVJ Overvoltage protection
93	24/01/02	15:32:28			EN04- contactor open
92	24/01/02	15:32:28			EN04- contactor open
91	24/01/02	15:32:28			System2 charge full
90	24/01/02	15:32:28	15:32:35	15:32:35	System2 BVS total alarm
89	24/01/02	15:32:28			System2 total alarm
88	24/01/02	15:31:44			EN02- contactor open
87	24/01/02	15:31:44			EN02- contactor open
86	24/01/02	15:31:42			System3 charge full
85	24/01/02	15:31:42	15:31:46	15:31:46	System3 BVS total alarm

13-3

The protection test of the cell under-voltage

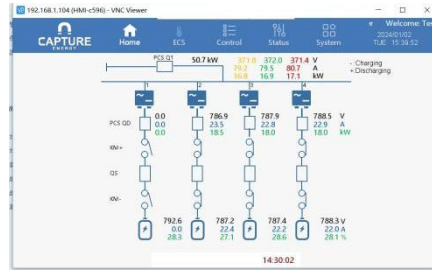
Adjust the under-voltage protection parameters for the cells
Confirm the triggering of the protection mechanism

Passed Failed



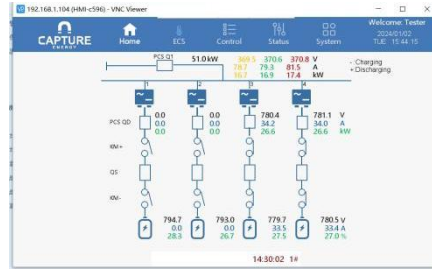
No.	Date of occurrence	Time of occurrence	Time of confirm	Time of recovery	Event content
118	24/01/02	15:39:36			EN01- contactor open
117	24/01/02	15:39:36			EN01- contactor open
116	24/01/02	15:39:36	15:39:40	15:39:40	IBC Cell undervoltage alarm
115	24/01/02	15:39:36	15:39:40	15:39:40	IBC HVJ Undervoltage protection
114	24/01/02	15:39:34			System1 discharge empty
113	24/01/02	15:39:34	15:39:40	15:39:40	System2 BVS total alarm
112	24/01/02	15:39:34			System1 total alarm
111	24/01/02	15:37:58			System discharging
110	24/01/02	15:37:28	15:37:33	15:37:33	System charging
109	24/01/02	15:36:40			System ready
108	24/01/02	15:35:25			System ready
107	24/01/02	15:35:23			EN04- contactor close
106	24/01/02	15:35:23			EN04- contactor close

Name	Parameters	Name	Parameters
Upper limit of cluster pole temp.	50.0 °C	Alarm value for upper limit of cell voltage	3.5500 V
Ultimate upper limit of cluster pole temp.	60.0 °C	Protection value for ultimate upper limit of cell voltage	3.3000 V
Upper limit of pack pole temp.	50.0 °C	Alarm value for lower limit of cell voltage	2.8000 V
Ultimate upper limit of pack pole temp.	60.0 °C	Protection value for ultimate lower limit of cell voltage	2.6000 V
Upper limit of module temp.	45.0 °C	Alarm value for upper limit of the battery cluster voltage	852.6 V
Ultimate upper limit of module temp.	55.0 °C	Protection value for ultimate upper of battery cluster voltage	876.0 V
Lower limit of module temp.	-5.0 °C	Alarm value for lower limit of the battery cluster voltage	822.0 V
Ultimate lower limit of module temp.	-5.0 °C	Protection value for ultimate lower of battery cluster voltage	824.0 V
Short circuit current limit	145 %	Alarm of upper limit for charging/discharging current	115 %
Charging & discharging wind current	175.0 A	Protection of upper limit for charging/discharging current	125 %
Insulation resistance protection value	20 kΩ	Protection value for leakage current	40.0 mA

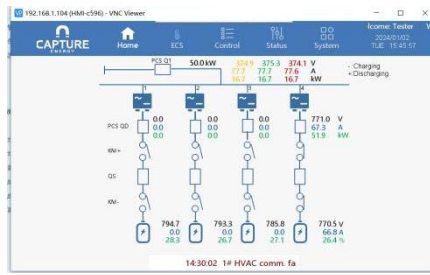


No.	Date of occurrence	Time of occurrence	Time of confirm	Time of recovery	Event content
126	24/01/02	15:42:17			System2 total alarm
125	24/01/02	15:42:12			EN01- contactor open
124	24/01/02	15:42:12			EN01- contactor open
123	24/01/02	15:42:09			IBC Cell undervoltage alarm
122	24/01/02	15:42:09	15:42:14	15:42:14	IBC HVJ Undervoltage protection
121	24/01/02	15:42:08	15:42:12	15:42:12	System2 discharge empty
120	24/01/02	15:42:08	15:42:14	15:42:14	System2 BVS total alarm
119	24/01/02	15:42:08	15:42:14	15:42:14	System2 total alarm
118	24/01/02	15:39:36			EN01- contactor open
117	24/01/02	15:39:36			EN01- contactor open
116	24/01/02	15:39:36	15:39:40	15:39:40	IBC Cell undervoltage alarm
115	24/01/02	15:39:36	15:39:40	15:39:40	IBC HVJ Undervoltage protection
114	24/01/02	15:39:34	15:39:40	15:39:40	System1 discharge empty

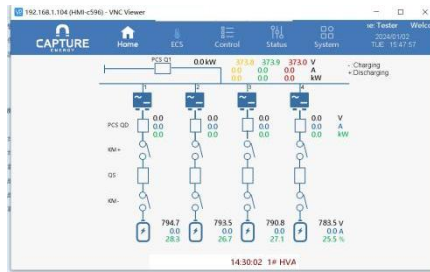
Name	Parameters	Name	Parameters
Upper limit of cluster pole temp.	50.0 °C	Alarm value for upper limit of cell voltage	3.5500 V
Ultimate upper limit of cluster pole temp.	60.0 °C	Protection value for ultimate upper limit of cell voltage	3.3000 V
Upper limit of pack pole temp.	50.0 °C	Alarm value for lower limit of cell voltage	2.8000 V
Ultimate upper limit of pack pole temp.	60.0 °C	Protection value for ultimate lower limit of cell voltage	2.6000 V
Upper limit of module temp.	45.0 °C	Alarm value for upper limit of the battery cluster voltage	852.6 V
Ultimate upper limit of module temp.	55.0 °C	Protection value for ultimate upper of battery cluster voltage	876.0 V
Lower limit of module temp.	-5.0 °C	Alarm value for lower limit of the battery cluster voltage	822.0 V
Ultimate lower limit of module temp.	-5.0 °C	Protection value for ultimate lower of battery cluster voltage	824.0 V
Short circuit current limit	145 %	Alarm of upper limit for charging/discharging current	115 %
Charging & discharging wind current	175.0 A	Protection of upper limit for charging/discharging current	125 %
Insulation resistance protection value	20 kΩ	Protection value for leakage current	40.0 mA



No.	Date of occurrence	Time of occurrence	Time of confirm	Time of recovery	Event content
126	24/01/02	15:42:17			System2 total alarm
125	24/01/02	15:42:12			EN01- contactor open
124	24/01/02	15:42:12			EN01- contactor open
123	24/01/02	15:42:09			IBC Cell undervoltage alarm
122	24/01/02	15:42:09	15:42:14	15:42:14	IBC HVJ Undervoltage protection
121	24/01/02	15:42:08	15:42:12	15:42:12	System2 discharge empty
120	24/01/02	15:42:08	15:42:14	15:42:14	System2 BVS total alarm
119	24/01/02	15:42:08	15:42:14	15:42:14	System2 total alarm
118	24/01/02	15:39:36			EN01- contactor open
117	24/01/02	15:39:36			EN01- contactor open
116	24/01/02	15:39:36	15:39:40	15:39:40	IBC Cell undervoltage alarm
115	24/01/02	15:39:36	15:39:40	15:39:40	IBC HVJ Undervoltage protection
114	24/01/02	15:39:34	15:39:40	15:39:40	System1 discharge empty



No.	Date of occurrence	Time of occurrence	Time of confirm	Time of recovery	Event content
129	24/01/20	15:45:38	15:45:38	15:45:40	EN153 - contactor open
130	24/01/20	15:45:38	15:45:38	15:45:40	EN154 - contactor open
131	24/01/20	15:45:38	15:45:38	15:45:40	System3 discharge empty
132	24/01/20	15:45:35	15:45:35	15:45:40	System3 BVS total alarm
129	24/01/20	15:45:35	15:45:35	15:45:40	System3 total alarm
128	24/01/20	15:45:34	15:45:34	15:45:42	IBC Cell undervoltage alarm
127	24/01/20	15:45:34	15:45:34	15:45:42	IBC HV/LV Undervoltage protection
126	24/01/20	15:42:17	15:42:17	15:42:20	System2 total alarm
125	24/01/20	15:42:12	15:42:12	15:42:15	EN152 - contactor open
124	24/01/20	15:42:12	15:42:12	15:42:15	EN151 - contactor open
123	24/01/20	15:42:09	15:42:14	15:42:14	IBC Cell undervoltage alarm
122	24/01/20	15:42:09	15:42:14	15:42:14	IBC HV/LV Undervoltage protection
121	24/01/20	15:42:08	15:42:22	15:42:22	System2 discharge empty



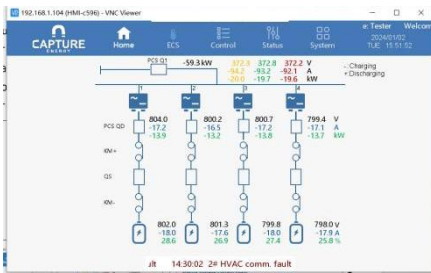
No.	Date of occurrence	Time of occurrence	Time of confirm	Time of recovery	Event content
140	24/01/20	15:47:23	15:47:23	15:47:25	System PCS total alarm
141	24/01/20	15:47:23	15:47:23	15:47:25	EN146 - contactor open
142	24/01/20	15:47:21	15:47:21	15:47:25	System1 BVS total alarm
139	24/01/20	15:47:21	15:47:21	15:47:25	EN145 - contactor open
138	24/01/20	15:47:20	15:47:20	15:47:25	IBC Cell undervoltage alarm
137	24/01/20	15:47:20	15:47:20	15:47:25	IBC HV/LV Undervoltage protection
136	24/01/20	15:47:19	15:47:19	15:47:23	System4 discharge empty
135	24/01/20	15:47:19	15:47:19	15:47:23	System4 total alarm
134	24/01/20	15:47:19	15:47:19	15:47:23	System4 BVS total alarm
133	24/01/20	15:45:38	15:45:38	15:45:40	EN153 - contactor open
132	24/01/20	15:45:38	15:45:38	15:45:40	EN154 - contactor open
131	24/01/20	15:45:35	15:45:35	15:45:40	System3 discharge empty
130	24/01/20	15:45:35	15:45:40	15:45:40	System3 BVS total alarm

13-4

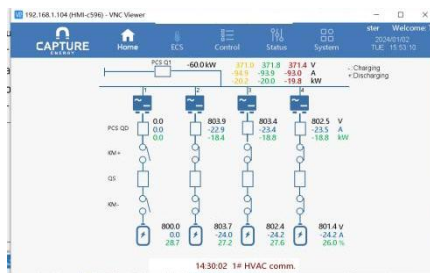
The protection test of the battery string over-voltage

Adjust the over-voltage protection parameters for the battery pack.
Confirm the triggering of the protection mechanism.

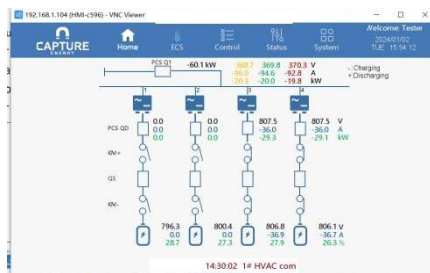
⚙ Passed Failed



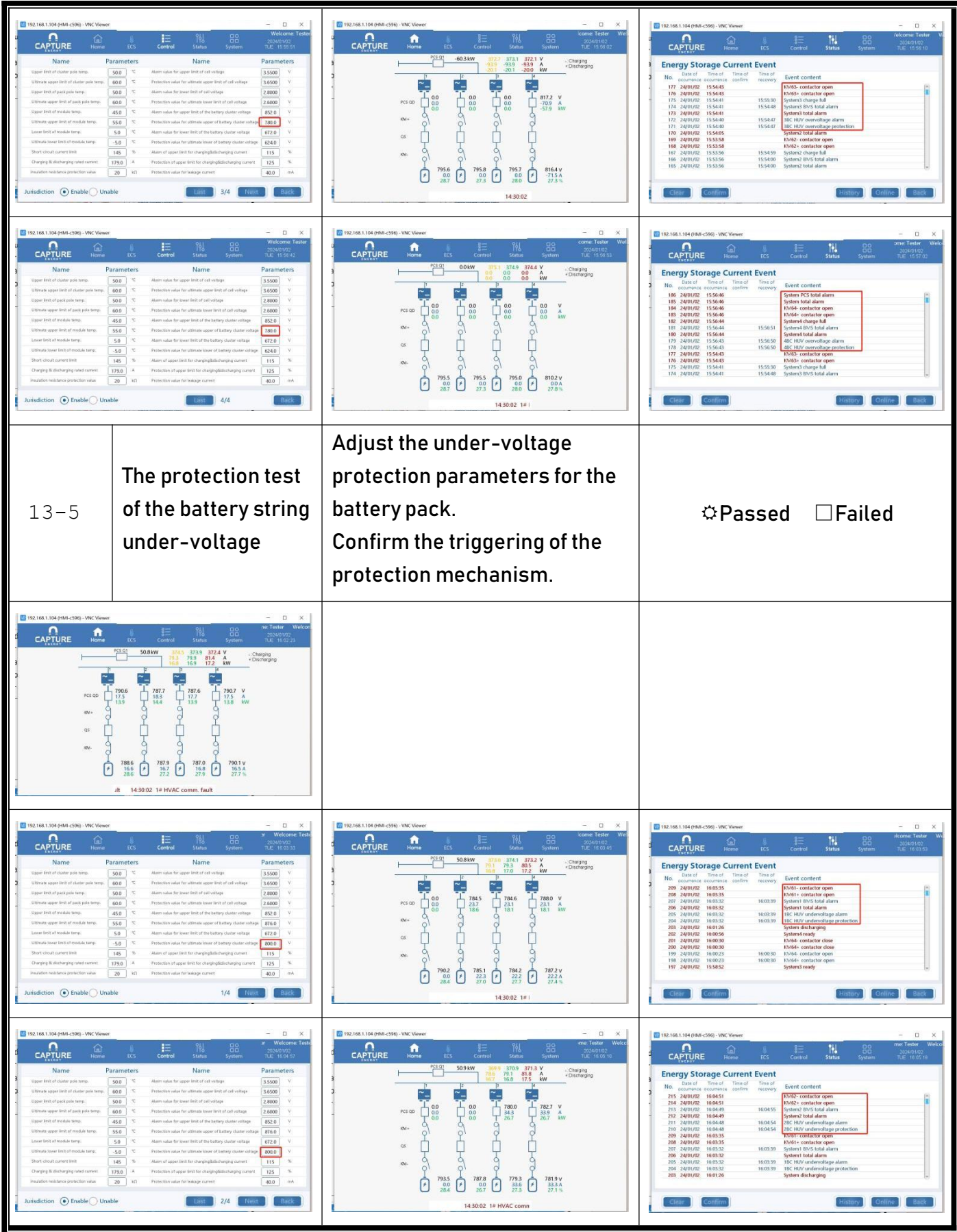
No.	Date of occurrence	Time of occurrence	Time of confirm	Time of recovery	Event content
140	24/01/20	15:52:59	15:52:59	15:53:01	EN161 - contactor open
141	24/01/20	15:52:59	15:52:59	15:53:01	EN162 - contactor open
142	24/01/20	15:52:56	15:52:56	15:53:01	System1 charge full
139	24/01/20	15:52:56	15:52:56	15:53:01	System1 BVS total alarm
138	24/01/20	15:52:56	15:52:56	15:53:01	System1 total alarm
137	24/01/20	15:52:56	15:52:56	15:53:01	IBC HV/LV Undervoltage alarm
136	24/01/20	15:52:56	15:52:56	15:53:01	IBC HV/LV Undervoltage protection
135	24/01/20	15:50:15	15:50:15	15:50:15	System charging
134	24/01/20	15:49:31	15:49:31	15:49:31	System ready
133	24/01/20	15:49:29	15:49:29	15:49:29	EN163 - contactor close
132	24/01/20	15:49:24	15:49:24	15:49:24	EN164 - contactor close
131	24/01/20	15:49:24	15:49:24	15:49:24	System ready



No.	Date of occurrence	Time of occurrence	Time of confirm	Time of recovery	Event content
162	24/01/20	15:52:59	15:52:59	15:53:01	EN161 - contactor open
161	24/01/20	15:52:59	15:52:59	15:53:01	EN162 - contactor open
160	24/01/20	15:52:56	15:52:56	15:53:01	System1 charge full
159	24/01/20	15:52:56	15:52:56	15:53:01	System1 BVS total alarm
158	24/01/20	15:52:56	15:52:56	15:53:01	System1 total alarm
157	24/01/20	15:52:56	15:52:56	15:53:01	IBC HV/LV Undervoltage alarm
156	24/01/20	15:52:56	15:52:56	15:53:01	IBC HV/LV Undervoltage protection
155	24/01/20	15:50:15	15:50:15	15:50:15	System charging
154	24/01/20	15:49:31	15:49:31	15:49:31	System ready
153	24/01/20	15:49:29	15:49:29	15:49:29	EN163 - contactor close
152	24/01/20	15:49:24	15:49:24	15:49:24	EN164 - contactor close
151	24/01/20	15:49:24	15:49:24	15:49:24	System ready



No.	Date of occurrence	Time of occurrence	Time of confirm	Time of recovery	Event content
170	24/01/20	15:54:05	15:54:05	15:54:05	System2 total alarm
169	24/01/20	15:53:58	15:53:58	15:54:00	EN162 - contactor open
168	24/01/20	15:53:58	15:53:58	15:54:00	EN161 - contactor open
167	24/01/20	15:53:56	15:53:56	15:54:00	System2 charge full
166	24/01/20	15:53:56	15:53:56	15:54:00	System2 BVS total alarm
165	24/01/20	15:53:56	15:53:56	15:54:00	System2 total alarm
164	24/01/20	15:53:55	15:53:55	15:54:00	IBC HV/LV overvoltage alarm
163	24/01/20	15:53:55	15:53:55	15:54:00	IBC HV/LV overvoltage protection
162	24/01/20	15:52:59	15:52:59	15:53:01	EN161 - contactor open
161	24/01/20	15:52:59	15:52:59	15:53:01	EN162 - contactor open
160	24/01/20	15:52:56	15:52:56	15:53:01	System1 charge full
159	24/01/20	15:52:56	15:52:56	15:53:01	System1 BVS total alarm
158	24/01/20	15:52:56	15:52:56	15:53:01	System1 total alarm

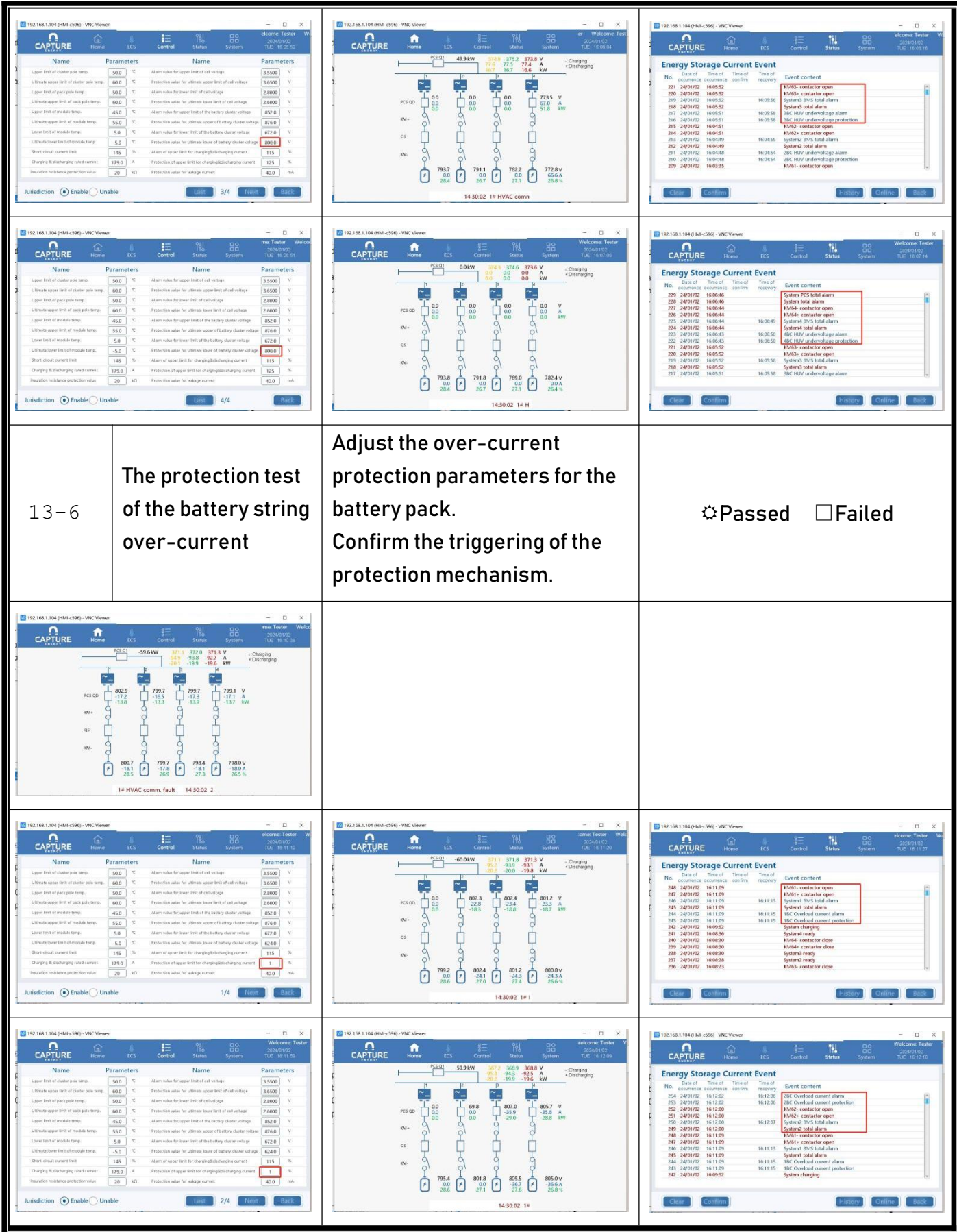


13-5

The protection test of the battery string under-voltage

Adjust the under-voltage protection parameters for the battery pack.
Confirm the triggering of the protection mechanism.

Passed Failed



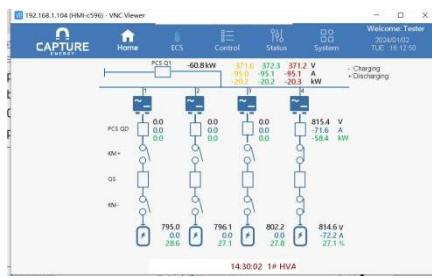
13-6

The protection test of the battery string over-current

Adjust the over-current protection parameters for the battery pack.
Confirm the triggering of the protection mechanism.

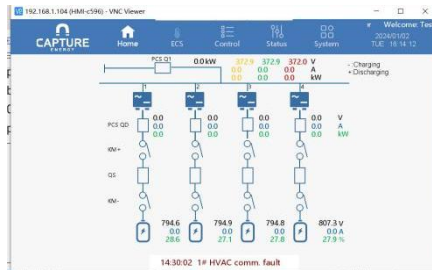
⚙️ Passed Failed

Name	Parameters	Name	Parameters
Upper limit of cluster pole temp.	50.0 °C	Alarm value for upper limit of cell voltage	3.5500 V
Ultimate upper limit of cluster pole temp.	60.0 °C	Protection value for ultimate upper limit of cell voltage	3.6500 V
Upper limit of pack pole temp.	50.0 °C	Alarm value for lower limit of cell voltage	2.8000 V
Ultimate upper limit of pack pole temp.	60.0 °C	Protection value for ultimate lower limit of cell voltage	2.9000 V
Upper limit of module temp.	45.0 °C	Alarm value for upper limit of the battery cluster voltage	851.0 V
Ultimate upper limit of module temp.	55.0 °C	Protection value for ultimate upper of battery cluster voltage	876.0 V
Lower limit of module temp.	5.0 °C	Alarm value for lower limit of the battery cluster voltage	822.0 V
Ultimate lower limit of module temp.	-5.0 °C	Protection value for ultimate lower limit of battery cluster voltage	824.0 V
Short-circuit current limit	145 %	Alarm of upper limit for charging/discharging current	115 %
Charging & discharging total current	1750 A	Protection of upper limit for charging/discharging current	1 %
Insulation resistance protection value	20 Ω	Protection value for leakage current	400 mA



No.	Date of occurrence	Time of occurrence	Time of confirm	Time of recovery	Event content
266	24/01/02	16:12:41			INV3- contactor open
259	24/01/02	16:12:41			INV3- contactor open
254	24/01/02	16:12:41	16:12:45		System3 EVIS total alarm
257	24/01/02	16:12:41	16:12:47		System3 total alarm
256	24/01/02	16:12:40	16:12:47		IBC Overload current alarm
255	24/01/02	16:12:40	16:12:47		IBC Overload current protection
254	24/01/02	16:12:02	16:12:06		IBC Overload current alarm
252	24/01/02	16:12:00	16:12:06		IBC Overload current protection
251	24/01/02	16:12:00			INV3- contactor open
250	24/01/02	16:12:00	16:12:07		System3 EVIS total alarm
249	24/01/02	16:12:00	16:12:07		System3 total alarm
248	24/01/02	16:11:59			INV3- contactor open

Name	Parameters	Name	Parameters
Upper limit of cluster pole temp.	50.0 °C	Alarm value for upper limit of cell voltage	3.5500 V
Ultimate upper limit of cluster pole temp.	60.0 °C	Protection value for ultimate upper limit of cell voltage	3.6500 V
Upper limit of pack pole temp.	50.0 °C	Alarm value for lower limit of cell voltage	2.8000 V
Ultimate upper limit of pack pole temp.	60.0 °C	Protection value for ultimate lower limit of cell voltage	2.9000 V
Upper limit of module temp.	45.0 °C	Alarm value for upper limit of the battery cluster voltage	851.0 V
Ultimate upper limit of module temp.	55.0 °C	Protection value for ultimate upper of battery cluster voltage	876.0 V
Lower limit of module temp.	5.0 °C	Alarm value for lower limit of the battery cluster voltage	822.0 V
Ultimate lower limit of module temp.	-5.0 °C	Protection value for ultimate lower limit of battery cluster voltage	824.0 V
Short-circuit current limit	145 %	Alarm of upper limit for charging/discharging current	115 %
Charging & discharging total current	1750 A	Protection of upper limit for charging/discharging current	1 %
Insulation resistance protection value	20 Ω	Protection value for leakage current	400 mA



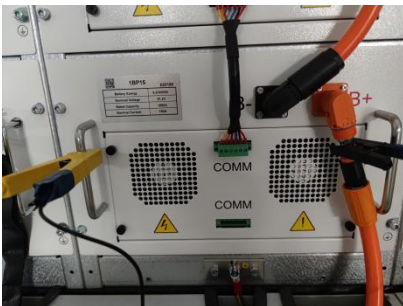
No.	Date of occurrence	Time of occurrence	Time of confirm	Time of recovery	Event content
266	24/01/02	16:14:00			System3 PCS total alarm
267	24/01/02	16:14:00			System3 total alarm
266	24/01/02	16:14:00			INV4- contactor open
265	24/01/02	16:14:00			INV4- contactor open
264	24/01/02	16:13:58	16:14:03		IBC Overload current alarm
263	24/01/02	16:13:58	16:14:03		IBC Overload current protection
262	24/01/02	16:13:57	16:14:04		System3 EVIS total alarm
261	24/01/02	16:13:57			System3 total alarm
260	24/01/02	16:12:41			INV3- contactor open
259	24/01/02	16:12:41			INV3- contactor open
254	24/01/02	16:12:41	16:12:45		System3 EVIS total alarm
257	24/01/02	16:12:41	16:12:45		System3 total alarm
256	24/01/02	16:12:40	16:12:47		IBC Overload current alarm

13-7

The protection test of insulation

Connect a 15kΩ resistor between the B+ pole of pack/HVU and enclosure.
Verify the triggering of the protection mechanism

Passed Failed



No.	Date of occurrence	Time of occurrence	Time of confirm	Time of recovery	Event content
16	24/01/03	11:50:04			IBC BUS insulation protection
15	24/01/03	11:50:02			System1 EVIS total alarm
14	24/01/03	11:50:02			System1 total alarm
13	24/01/03	11:24:18	11:33:43		System1 EVIS total alarm
12	24/01/03	11:24:18	11:33:43		System1 total alarm
11	24/01/03	11:23:27	11:24:15		System1 EVIS total alarm
10	24/01/03	11:23:27	11:24:15		System1 total alarm
9	24/01/03	10:58:44	11:23:22		GN4 DC breaker close
8	24/01/03	10:58:44	11:23:22		System1 EVIS total alarm
7	24/01/03	10:58:44	11:23:22		System1 total alarm
6	24/01/03	10:58:45			System3 PCS stopped by RTU
5	24/01/03	10:58:39	10:58:39		IBC EVIS comm. fault
4	24/01/03	10:58:45	10:58:39		System3 EVIS comm. fault

No.	Date of occurrence	Time of occurrence	Time of confirm	Time of recovery	Event content
310	24/01/02	16:46:58			System3 EVIS total alarm
309	24/01/02	16:46:57			IBC BUS insulation protection
308	24/01/02	16:24:48			System3 PCS total alarm
307	24/01/02	16:24:45			INV4- contactor open
306	24/01/02	16:24:45			INV4- contactor open
305	24/01/02	16:24:45	16:25:29		IBC HVU pole high temperature alarm
304	24/01/02	16:24:45	16:25:29		IBC HVU pole high temperature protection
303	24/01/02	16:24:45	16:25:08		System3 EVIS total alarm
302	24/01/02	16:24:45	16:25:28		System3 total alarm
301	24/01/02	16:24:45			System3 EVIS total alarm
300	24/01/02	16:24:45			System3 total alarm
299	24/01/02	16:23:28			INV3- contactor open
298	24/01/02	16:23:28			INV3- contactor open



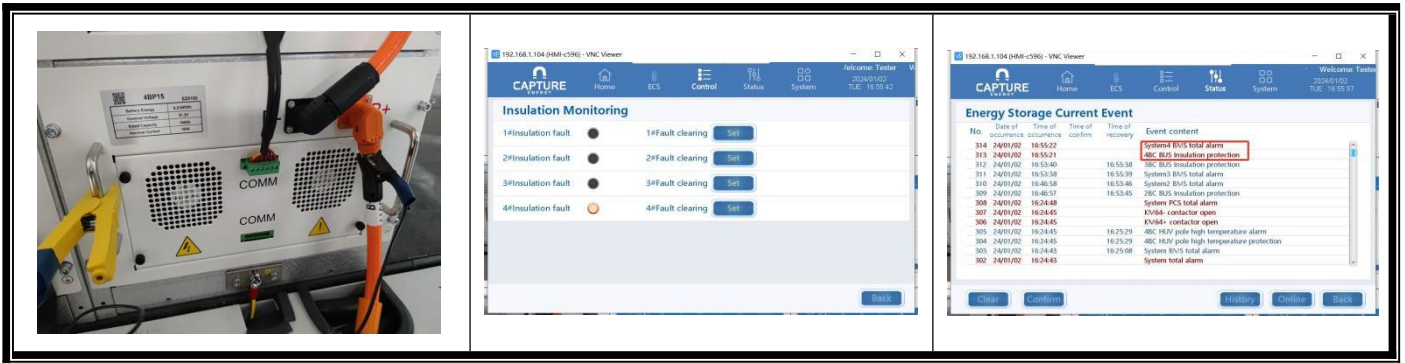
No.	Date of occurrence	Time of occurrence	Time of confirm	Time of recovery	Event content
310	24/01/02	16:46:58			System3 EVIS total alarm
309	24/01/02	16:46:57			IBC BUS insulation protection
308	24/01/02	16:24:48			System3 PCS total alarm
307	24/01/02	16:24:45			INV4- contactor open
306	24/01/02	16:24:45			INV4- contactor open
305	24/01/02	16:24:45	16:25:29		IBC HVU pole high temperature alarm
304	24/01/02	16:24:45	16:25:29		IBC HVU pole high temperature protection
303	24/01/02	16:24:45	16:25:08		System3 EVIS total alarm
302	24/01/02	16:24:45	16:25:28		System3 total alarm
301	24/01/02	16:24:45			System3 EVIS total alarm
300	24/01/02	16:24:45			System3 total alarm
299	24/01/02	16:23:28			INV3- contactor open
298	24/01/02	16:23:28			INV3- contactor open

No.	Date of occurrence	Time of occurrence	Time of confirm	Time of recovery	Event content
312	24/01/02	16:53:40			IBC BUS insulation protection
311	24/01/02	16:53:38			System3 EVIS total alarm
310	24/01/02	16:46:58	16:53:46		System3 EVIS total alarm
309	24/01/02	16:46:57	16:53:46		IBC BUS insulation protection
308	24/01/02	16:24:48	16:25:08		System3 PCS total alarm
307	24/01/02	16:24:45	16:25:08		System3 EVIS total alarm
306	24/01/02	16:24:45	16:25:29		INV4- contactor open
305	24/01/02	16:24:45	16:25:29		IBC HVU pole high temperature alarm
304	24/01/02	16:24:45	16:25:29		IBC HVU pole high temperature protection
303	24/01/02	16:24:45	16:25:08		System3 EVIS total alarm
302	24/01/02	16:24:45	16:25:28		System3 total alarm
301	24/01/02	16:24:45			System3 EVIS total alarm
300	24/01/02	16:24:45			System3 total alarm



No.	Date of occurrence	Time of occurrence	Time of confirm	Time of recovery	Event content
312	24/01/02	16:53:40			IBC BUS insulation protection
311	24/01/02	16:53:38			System3 EVIS total alarm
310	24/01/02	16:46:58	16:53:46		System3 EVIS total alarm
309	24/01/02	16:46:57	16:53:46		IBC BUS insulation protection
308	24/01/02	16:24:48	16:25:08		System3 PCS total alarm
307	24/01/02	16:24:45	16:25:08		System3 EVIS total alarm
306	24/01/02	16:24:45	16:25:29		INV4- contactor open
305	24/01/02	16:24:45	16:25:29		IBC HVU pole high temperature alarm
304	24/01/02	16:24:45	16:25:29		IBC HVU pole high temperature protection
303	24/01/02	16:24:45	16:25:08		System3 EVIS total alarm
302	24/01/02	16:24:45	16:25:28		System3 total alarm
301	24/01/02	16:24:45			System3 EVIS total alarm
300	24/01/02	16:24:45			System3 total alarm

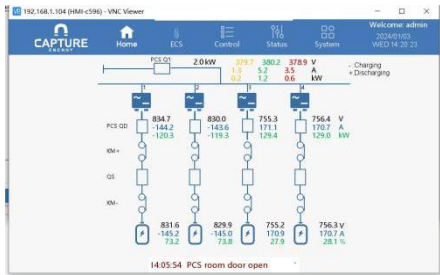
No.	Date of occurrence	Time of occurrence	Time of confirm	Time of recovery	Event content
312	24/01/02	16:53:40			IBC BUS insulation protection
311	24/01/02	16:53:38			System3 EVIS total alarm
310	24/01/02	16:46:58	16:53:46		System3 EVIS total alarm
309	24/01/02	16:46:57	16:53:46		IBC BUS insulation protection
308	24/01/02	16:24:48	16:25:08		System3 PCS total alarm
307	24/01/02	16:24:45	16:25:08		System3 EVIS total alarm
306	24/01/02	16:24:45	16:25:29		INV4- contactor open
305	24/01/02	16:24:45	16:25:29		IBC HVU pole high temperature alarm
304	24/01/02	16:24:45	16:25:29		IBC HVU pole high temperature protection
303	24/01/02	16:24:45	16:25:08		System3 EVIS total alarm
302	24/01/02	16:24:45	16:25:28		System3 total alarm
301	24/01/02	16:24:45			System3 EVIS total alarm
300	24/01/02	16:24:45			System3 total alarm



14. High power test

Item	Testing	Details	Result
14-1	Full power charge/discharge of each branch for 15min test	Full power (125kW) charge/discharge for 15min test for each branch of each PCS.	<p>Full load discharge</p> <p>PCS1: <input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed</p> <p>PCS2: <input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed</p> <p>PCS3: <input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed</p> <p>PCS4: <input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed</p> <p>PCS5: <input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed</p> <p>PCS6: <input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed</p> <p>PCS7: <input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed</p> <p>PCS8: <input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed</p> <p>Charge at full power</p> <p>PCS1: <input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed</p> <p>PCS2: <input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed</p> <p>PCS3: <input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed</p> <p>PCS4: <input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed</p> <p>PCS5: <input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed</p> <p>PCS6: <input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed</p> <p>PCS7: <input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed</p> <p>PCS8: <input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed</p>

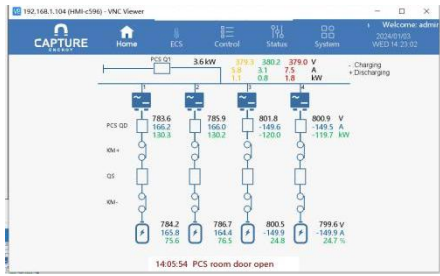




192.168.1.104 (HMI-c596) - VNC Viewer

BMS Status

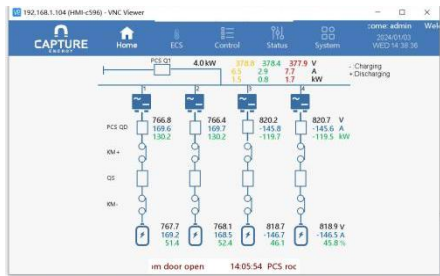
Cluster	Max. voltage of single cluster	No.	Min. voltage of single unit	No.	BMS Comm.	BMU Comm.
1	3.4754 v	207	3.4532 v	56	●	●
2	3.4678 v	224	3.4453 v	72	●	●
3	3.1639 v	56	3.1488 v	239	●	●
4	3.1721 v	104	3.1484 v	231	●	●



192.168.1.104 (HMI-c596) - VNC Viewer

BMS Status

Cluster	Max. voltage of single cluster	No.	Min. voltage of single unit	No.	BMS Comm.	BMU Comm.
1	3.2770 v	152	3.2594 v	1	●	●
2	3.2823 v	72	3.2665 v	208	●	●
3	3.3487 v	49	3.3366 v	168	●	●
4	3.3424 v	205	3.3279 v	72	●	●



192.168.1.104 (HMI-c596) - VNC Viewer

BMS Status

Cluster	Max. voltage of single cluster	No.	Min. voltage of single unit	No.	BMS Comm.	BMU Comm.
1	3.2118 v	122	3.1896 v	215	●	●
2	3.2132 v	128	3.1966 v	215	●	●
3	3.4256 v	231	3.4038 v	168	●	●
4	3.4222 v	231	3.4014 v	164	●	●



14-2

Cell balancing function test

Check that the balancing function is normal

⚙️ Passed Failed

192.168.1.104 (HMI-c596) - VNC Viewer

BP	Status	Voltage(V)	Current(A)	BP	Status	Voltage(V)	Current(A)
1	●	25.129	1.936	13	●	25.118	0.000
2	●	25.191	2.023	14	●	25.132	2.011
3	●	25.145	1.946	15	●	25.080	0.000
4	●	25.303	0.000				
5	●	25.090	-1.971				
6	●	25.156	0.000				
7	●	25.040	0.000				
8	●	25.140	-1.949				
9	●	25.201	-1.981				
10	●	25.192	0.000				
11	●	25.258	-2.010				
12	●	25.097	0.000				

Current number of charging equalization channels: 3, Current number of discharging equalization channels: 3, 1/4, [None], [Back]

192.168.1.104 (HMI-c596) - VNC Viewer

BP	Status	Voltage(V)	Current(A)	BP	Status	Voltage(V)	Current(A)
1	●	25.000	2.021	13	●	24.787	2.044
2	●	24.978	2.043	14	●	24.730	0.000
3	●	24.919	-2.106	15	●	24.762	1.931
4	●	25.016	0.000				
5	●	25.145	-1.979				
6	●	25.053	-1.994				
7	●	24.925	0.000				
8	●	24.973	-1.959				
9	●	24.988	-2.038				
10	●	24.797	0.000				
11	●	24.731	2.037				
12	●	24.767	0.000				

Current number of charging equalization channels: 5, Current number of discharging equalization channels: 5, [None], 2/4, [None], [Back]

192.168.1.104 (HMI-c596) - VNC Viewer

BP	Status	Voltage(V)	Current(A)	BP	Status	Voltage(V)	Current(A)
1	●	24.608	2.043	13	●	24.651	2.040
2	●	24.704	1.940	14	●	24.780	2.013
3	●	24.633	-2.027	15	●	24.592	0.000
4	●	24.774	2.057				
5	●	24.709	0.000				
6	●	24.961	0.000				
7	●	24.617	-2.031				
8	●	24.738	-2.095				
9	●	24.624	-2.035				
10	●	24.798	-1.976				
11	●	24.802	0.000				
12	●	24.740	0.000				

Current number of charging equalization channels: 4, Current number of discharging equalization channels: 4, [None], 3/4, [None], [Back]

192.168.1.104 (HMI-c596) - VNC Viewer

BP	Status	Voltage(V)	Current(A)	BP	Status	Voltage(V)	Current(A)
1	●	25.056	1.949	13	●	25.134	2.041
2	●	25.370	0.000	14	●	25.214	2.004
3	●	25.191	-2.001	15	●	25.044	0.000
4	●	25.037	1.974				
5	●	25.090	-1.967				
6	●	25.098	1.952				
7	●	25.234	-2.058				
8	●	25.086	0.000				
9	●	24.956	-1.962				
10	●	24.924	-1.973				
11	●	25.150	0.000				
12	●	25.186	0.000				

Current number of charging equalization channels: 5, Current number of discharging equalization channels: 5, [None], 4/4, [None], [Back]

192.168.1.104 (HMI-c596) - VNC Viewer



BP	Status	Voltage(V)	Current(A)	BP	Status	Voltage(V)	Current(A)
1	●	25.000	2.021	13	●	24.787	2.044
2	●	24.978	2.043	14	●	24.730	0.000
3	●	24.919	-2.106	15	●	24.762	1.931
4	●	25.016	0.000				
5	●	25.145	-1.979				
6	●	25.053	-1.994				
7	●	24.925	0.000				
8	●	24.973	-1.959				
9	●	24.988	-2.038				
10	●	24.797	0.000				
11	●	24.731	2.037				
12	●	24.767	0.000				

Current number of charging equalization channels: 5, Current number of discharging equalization channels: 5, [None], 2/4, [None], [Back]

192.168.1.104 (HMI-c596) - VNC Viewer

BP	Status	Voltage(V)	Current(A)	BP	Status	Voltage(V)	Current(A)
1	●	24.608	2.043	13	●	24.651	2.040
2	●	24.704	1.940	14	●	24.780	2.013
3	●	24.633	-2.027	15	●	24.592	0.000
4	●	24.774	2.057				
5	●	24.709	0.000				
6	●	24.961	0.000				
7	●	24.617	-2.031				
8	●	24.738	-2.095				
9	●	24.624	-2.035				
10	●	24.798	-1.976				
11	●	24.802	0.000				
12	●	24.740	0.000				

Current number of charging equalization channels: 4, Current number of discharging equalization channels: 4, [None], 3/4, [None], [Back]

14-3	Transformer heat-dispersing fan test	Confirm that the Transformer heat-dispersing fan can start normally.	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
			
14-4	PCS heat-dispersing fan test	Confirm that the PCS heat-dispersing fan can start normally.	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
			

15. Efficiency test	
15-1 Test content	<ol style="list-style-type: none"> 1. ESS discharge to the cut-off protection state, then wait for 30 minutes, and then charge to the charge cut-off state at full power (set full power according to the field situation). Record the quantity of electric charge W1 of the whole process from the starting charging to the end of charging. 2. After ESS full-charged and static for 30 minutes, ESS discharging to cut-off discharge state at full power (set full power according to the field situation). Record the quantity of electric discharge W2 of the whole process from the starting discharging to the end of discharging. 3. Calculate the ESS system efficiency based on the charging and discharge data. ESS efficiency calculation formula: $N = W2/W1 * 100\%$.

Test data	Charging		pcs	cmu	Discharging		pcs	cmu	
	Quantity of electric charge W1 (kWh)	Branch 1	534	124.2	Quantity of electric discharge W2 (kWh)	Branch 1	440	108.2	
		Branch 2		130.1		Branch 2		116.1	
		Branch 3		130.2		Branch 3		115.0	
		Branch 4		130.1		Branch 4		113.6	
		Total quantity of electric charge		514.6		Total quantity of electric discharge		452.9	
	Charge-discharge cycle efficiency of ESS:								
	Charge-discharge cycle efficiency			pcs	cmu				
	N=W2/ W1*100%		Branch 1	82.4%	87.1%				
			Branch 2		89.2%				
Branch 3			88.3%						
Branch 4			87.3%						
Total cycle efficiency			88.0%						
16. Test conclusion									
16-1	Test conclusion		<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed						