ZWAYN
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PV-02A1501250S1

Energy storage system combiner cabinet datasheet

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修订记录

No	Version	Revise date	Revise content	Revised /Created by	Note
1	A0	2022.05.27	Initial version		
2	A1	2022.11.11	Update Chapter 1 Architecture Diagram, Chapter 3 Partial Standards, Chapter 6 Dimensional Diagram, Rendering, and Chapter 8 Naming Rules		
3	A2	2023.11.04	1. Unified - Some terminology, adding 2500A current level models 2. Update Chapter 4.1 Electrical schematic and Chapter 6.3 Indicator light calibration		
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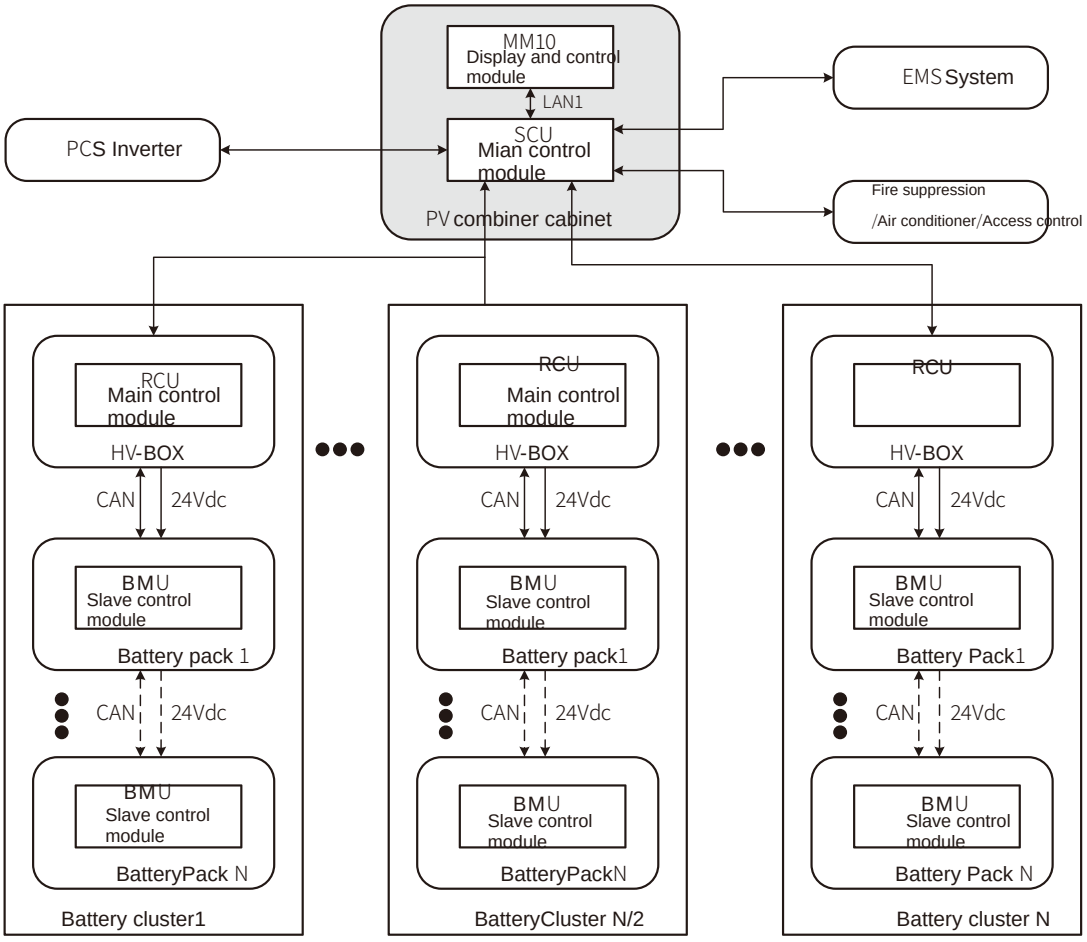
Content

1.Overview

To further enhance product market competitiveness, Dongguan Weineng has launched a large-scale energy storage lithium battery management system, which can adopt a two-level or three-level architecture according to demand, suitable for energy storage fields based on lithium batteries such as lithium iron phosphate, ternary, and lithium titanate. The energy storage lithium battery management system includes a battery slave control management unit (BMU or slave control module), a battery cluster master control management unit (RCU or master control module), a system master control management unit (SCU or master control module), and a system display management unit (MM10 or display control module).

The combiner cabinet is a control cabinet that connects the battery cluster with the PCS energy storage inverter, EMS system, and dynamic environment monitoring equipment (fire/air conditioning/access control). It is equipped with a large storage system battery stack circuit breaker (electrically operated), UPS power supply, large storage control module, large storage display and control module, emergency stop switch, etc., to achieve charging and discharging control, protection, and data communication functions for the lithium battery storage stack.



Architecture diagram of large storage system

2.Product characteristics

1. Support 220VAC power input to supply power to the internal UPS of the busbar cabinet;
2. UPS supplies power to the switch mode power supply (220VAC), which is converted by the switch mode power supply to supply power to the main control module and display control module (24VDC is recommended);
3. Support the power supply to the high-voltage box (if any), with a power supply voltage of 220VAC, indirectly supplying power to the main control module (recommended 24VDC);

4. Support communication with PCS inverters, EMS systems, dynamic environment monitoring equipment, etc;
5. Support the opening and closing control and status monitoring of circuit breakers, and display the status through indicator lights;
6. Summarize real-time data information of the entire system, support battery stack status data processing, and achieve management and control of battery charging and discharging after completion of processing;
7. Support emergency stop control function. In case of emergency, press the emergency stop switch button on the outside of the cabinet to stop the operation of the entire energy storage system;
8. Support the LED status indication of the busbar cabinet, including four status indicator lights: operation, fault, communication, and insulation;
9. The SCU main control module installed in the combiner cabinet has isolated LAN, CAN, RS485, RS232, TF card, and USB interfaces, enabling communication, data storage, and protection with the RCU main control module, MM10 display and control module, PCS inverter, EMS system, and dynamic environment monitoring equipment. It can also store internal data, operation data, and power-off data, and support program upgrades and data exports;
10. The MM10 display and control module installed in the combiner cabinet has isolated LAN, microO USB, USB, TF card interfaces, and a 10.1-inch display screen, enabling communication with the SCU control module and data display of the entire battery system;
11. Equipped with alarms and protections for overvoltage, undervoltage, differential voltage, overcurrent, undercurrent, over temperature, under temperature, temperature difference, short circuit, insulation, relay diagnosis, etc. of batteries (individual cells, modules, clusters, stacks);
12. The product complies with the EU ROHS Directive, lEC/EN/UL 62368, and lEC/EN/UL 60730 requirements.

3. Normative reference documents

3.1 National standards

GB/T 2423.17-2008 Environmental Testing for Electrical and Electronic Products Part 2: Test Methods Test KA: Salt Spray GB/T 2423.22-2012 Environmental Testing Part 2: Test Methods Test N: Temperature Change
GB/T 17626.2-2018 Electromagnetic Compatibility Testing and Measurement Techniques - Electrostatic Discharge Immunity Test
GB/T 17626.3-2016 Electromagnetic Compatibility Testing and Measurement Techniques - Radio Frequency Electromagnetic Field Radiation Immunity Test - GB/T 17626.4-2018 Electromagnetic Compatibility Testing and Measurement Techniques - Electric Fast Pulse Group Immunity Test
GB/T 17626.5-2019 Electromagnetic Compatibility Testing and Measurement Techniques - Surge (Impulse) Immunity Test
GB/T 17626.6-2017 Electromagnetic Compatibility Testing and Measurement Techniques - Immunity to Conducted Disturbances Induced by Radio Frequency Fields GB/T 17626.8-2006 Electromagnetic Compatibility Testing and Measurement Techniques - Power Frequency Magnetic Field Immunity Test
GB/T 17626.11-2008 Electromagnetic Compatibility Testing and Measurement Techniques - Voltage Dips, Short Interruptions, and Voltage Variations - Immunity Test - GB/T 17626.12-2013 Electromagnetic Compatibility Testing and Measurement Techniques - Ringing Wave Immunity Test
GB 19517-2009 National Electrical Equipment Safety Technical Specification
GB 21966-2008 Safety requirements for lithium primary batteries and batteries during transportation
GB 2894-2008 Safety Signs and Guidelines for their Use
GB 51048-2014 Design Specification for Electrochemical Energy Storage Power Stations
GB/T 2423.1-2008 Environmental Testing for Electrical and Electronic Products Part 2: Test Methods Test A: Low Temperature
GB/T 2423.102-2008 Environmental Testing for Electrical and Electronic Products Part 2: Test Methods Test: (Low Temperature, High Temperature) Low Pressure Vibration (Sine) Comprehensive Test
GB/T 2423.2-2008 Environmental Testing for Electrical and Electronic Products Part 2: Test Methods Test B: High Temperature GB/T 2423.3-2016 Environmental Testing Part 2: Test Methods Test Cabs: Constant Damp Heat Test
GB/T 2423.4-2008 Environmental Testing for Electrical and Electronic Products Part 2: Test Methods Test Db Alternating Damp Heat (12h+12h Cycle) GB /T 2423.5-2019 Environmental Testing Part 2: Test Methods Test Ea and Guidelines: Impact
GB/T 2423.7-2018 Environmental Testing Part 2: Test Methods Test Ec: Impact caused by rough operation (mainly used for equipment type samples) GB/T 2423.10-2019 Environmental Testing Part 2: Test Methods Test Fc: Vibration (sinusoidal)
GB/T 34131-2017 Technical Specification for Lithium ion Battery Management System for Electrochemical Energy Storage Power Stations GB/T 36276-2018 Lithium ion Batteries for Power Storage

GB/T 36548-2018 Test Specification for Electrochemical Energy Storage Systems Connected to the Power Grid
GB/T 13384-2008 General Technical Conditions for Packaging of Mechanical and Electrical Products
GB/T 191-2008 Packaging, Storage and Transportation Standards

3.2 Industry standards

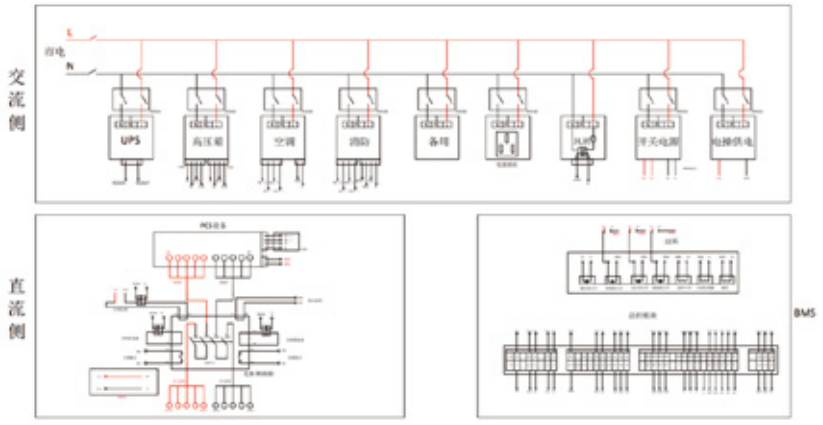
QGDW 1884-2013 Technical Specification for Energy Storage Battery Pack and Management System T/CNESA 1002-2019 Evaluation Specification for Electrochemical Energy Storage System
NB/T 31016-2011 Technical Conditions for Battery Energy Storage Power Control System
NB/T 42091-2016 Technical Specification for Lithium ion Batteries for Electrochemical Energy Storage Power Stations DL/T 5429-2009 Technical Specification for Power System Design

3.3 International standards

EN 50081, EN 50082, IEC 60730, IEC 61000, IEC 61508, IEC 62040, IEC 62619, IEC 62477-2018, UL 1973, UL 60950, UL 9540

4、 Functional description and technical indicators

4.1 Standard electrical schematic diagram



4.2 Constituent elements

No	Name	Qty	Techinical parameter	Recommend brand
1	Circuit breaker (electrically operated)	1	1500V/1250A	Beijing People
2	Surge protector	2	AC standard voltage Un230V/400V (50/60Hz)/ nominal discharge current 20KA/protection voltage ≤ 1.75KV/response time ≤ 25ns	DEHN
			DC ≤ 1500V/nominal current 20KA/protection voltage UP<4.5KV/ Response time ≤ 25ns	
3	Pv fuses	4	1500Vdc/160A	Sinofuse
4	UPS power supply	1	3KV/220Vac	Santak
5	Emergency stop switch	1	220Vac/10A	Aozun Electric

6	Local remote switch	1	6-380V/10A	Aozun Electric
7	LED status indicator light	4	Insulation/Communication/Fault/Operation	ABB
8	AC circuit breaker	16	3P/AC400V/63A	ABB
			1P/AC230V/32A	
			2P/AC400V/20A	
9	Relay	6	24Vdc	ABB
10	Switching Mode Power Supply	1	220Vac/24Vdc/240W	Guangdong Mornsun
11	Main control module	1	0~1500Vdc	Dongguan ZWAYN
12	Display and control module	1	10.1inch display screen	Donguan ZWAYN

4.3 Common Selection

No	Common selection	Specific model
1	Voltage level 1000v/current level 630A/with SCU-01K4CN main control	PV-02A100630S1
2	Voltage level 1500v/current level 1250A/with SCU-01K4CN main control	PV-02A1501250S1
3	Voltage level 1500v/current level 2500A/with SCU-01K4CN main control	PV-01A1502500S1

4.4 基本功能与技术参数

Category	Project	Description	Technical parameter
Environment condition	Working power supply	Normal working voltage	Rated voltage: 100-240vac
			Maximum voltage: 90-264vac
	work environment	Working temperature	Working temperature: -15~+40. C
		Storage temperature	Storage temperature: -40~+125. C
		Relative humidity	Relative humidity: 5-95% RH
		Atmospheric pressure	Atmospheric pressure: 80-110kPa
		Altitude	Altitude: 0-4000m
Basic functions	Circuit breaker (electric operation) control	Closing/Opening/Tripping	High side output voltage range: 9-32vdc
			High side output rated power: 43.8W
			High side output instantaneous power: 72W
	Circuit breaker (electric operation) detection	Closing feedback and opening feedback	High voltage range: 9-32vdc
			Low voltage range:<0.5vdc
	AC power supply	Air conditioning power supply	Output voltage: 9-32vdc Nominal output voltage/ current: 24vdc/1A
		Fire Suppression supply	

		Video power supply	
	Dynamic Loop Communication	Air conditioning, fire suppression, UPS communication	RS485 communication: air conditioning, fire protection
			RS232 communication: UPS power supply
	Power supply output	1way, supplying power to switch mode power supply, EMC protection	Output voltage range: 220vac
			Output power: 9W
Communication	LAN communication	3-way isolated LAN for communication with display and control, PCS equipment	Communication speed: 10M/100M
			Electrical isolation: 3000vdc
	CAN communication	3-way isolated CAN, communicating with the main control and auxiliary modules	Communication speed: 250kbs
			Electrical isolation: 2500vdc
	RS485 communication	4-way isolated RS485, communicating with auxiliary modules	Communication speed: 9600bps
			Electrical isolation: 2500vdc
	RS232 communication	1 isolated RS232, communicating with UPS power supply	Communication speed: 9600bps
			Electrical isolation: 2500vdc
Self check function	Module self check	A comprehensive self check function has been set up to detect voltage, temperature, communication, clock, memory and other components after power on, ensuring the normal operation of the module itself	No
Parameters can be set	Personalized settings	According to customer requirements and battery characteristics, parameter settings can be made through the upper computer/display control interface	No

5.Test items

5.1 Basic performance and functional indicators testing

No	Experimental description	Testing content	Specification model
1	Circuit breaker (electric operation) control	The circuit breaker (electrically operated) control is normal	Meet the specific technical parameter requirements in 4.4
2	Circuit breaker (electric operation) detection	Circuit breaker (electric operation) detection is normal UPS power supply detection is normal	
3	UPS power supply detection	UPS power supply detection is normal	
4	LED indicator light detection	LED indicator light detection is normal	
5	Emergency stop switch detection	Emergency stop switch detection is normal	
6	Local remote switch detection	Local remote switch detection is normal	
7	Functional testing of the main control module	The main control module's functions, communication, and other tests are normal	
8	Function detection of display and control module	The functions and communication of the display and control module are detected to be normal	

5.2 Electrical load test

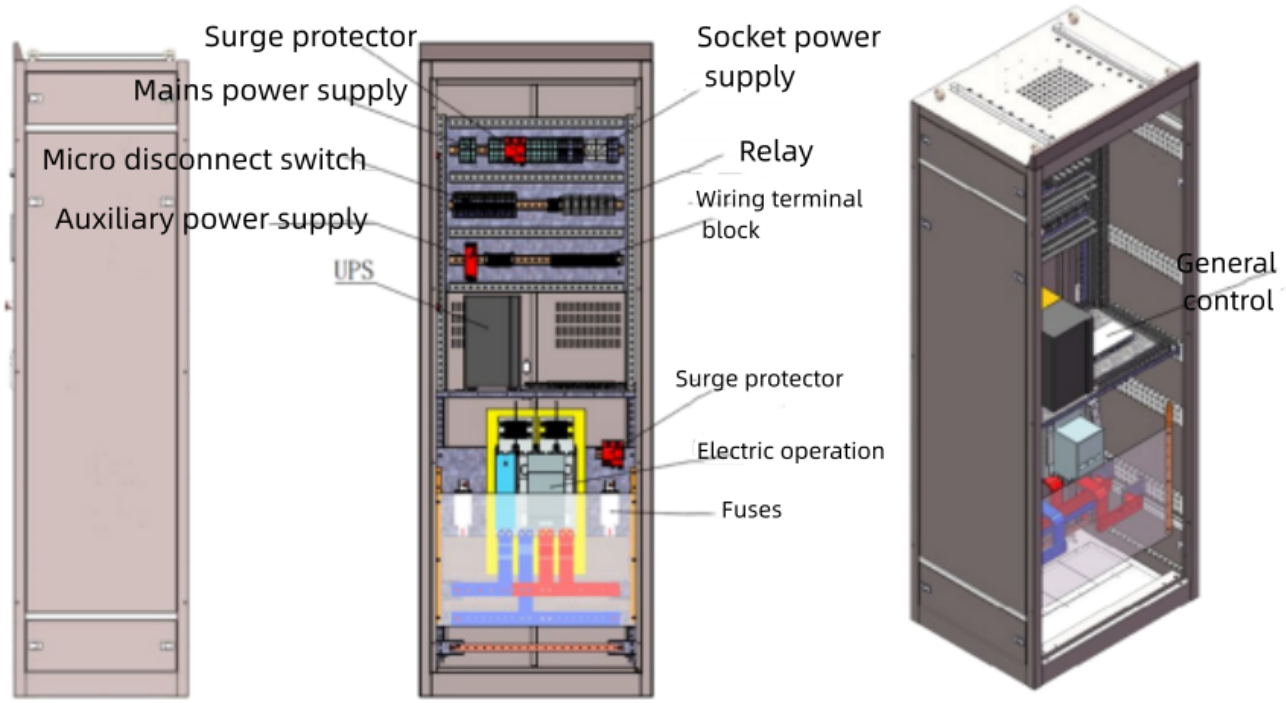
No	Experimental description	Reference standards	Testing requirements
1	Insulation and voltage resistance performance	GB/T 36276-2018-A 4.3；UL 60950 5.2.2	Meet the specific technical parameter requirements in 4.4
2	Impulse voltage test	IEC 62477-1-2012	No breakdown

5.3 Mechanical load test

No	Experimental description	Reference standards	Testing requirements
1	Impact test	GB/T 2423.5-2019	Qualified
2	Vibration test	GB/T 2423.10-2019	Qualified
3	Free fall test	GB/T 2423.7-2018	Qualified

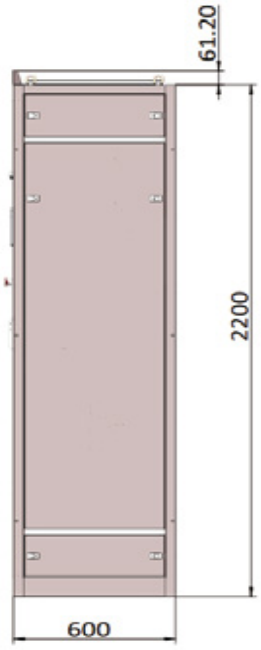
6.Product interfaces and interface definitions

6.1 Internal rendering of the product



Note: The pictures are for reference only, please refer to the actual product for details.

6.2 Product dimension diagram



Note: The size can be customized, please refer to the actual product for details.

6.3 Interface Definition

LED indicator lights 1/2/3/4

Name	Color	Description
Running	●	Running indicator light, long on/long off, long on indicates that the charging and discharging current of the system is greater than 3A
Fault	●	Fault indicator light, long on/long off, long on indicates a fault alarm is generated
Communication	●	Communication indicator light, always on when powered on
Insulation	●	Insulation indicator light, long on/long off, long on indicates insulation alarm

Emergency stop switch

Color	Definition	Description	Note
●	ON	Press the switch, the emergency stop switch will run, and the entire energy storage system will stop running	Do not touch under normal circumstances
	OFF	The switch pops out, and the emergency stop switch loses power.Normally in pop-up state	

Local remote switch

Color	Definition	Description	Note
	Distant	Control is exercised from afar	Default remote execution control
	Local	Control is exercised by local display control	

Note: The model is for reference only

7、 Module application precautions

1.Before powering on the module, it is necessary to confirm whether the power supply input is within the required range;

2. After powering on, do not touch the mains terminals;

3. Based on the total positive and total negative wiring, a fuse (8A) needs to be connected in series on the wiring harness;

4. When plugging and unplugging the terminals of the main positive and negative wire harnesses, attention should be paid to electric shock safety, and it is recommended to wear insulated gloves;

5. CAN communication, RS485, and RS232 communication require the use of twisted pair shielded wire harnesses;

6. In the definition of CAN communication and RS485 communication ports, H-R, L-R, A-R, B-R (such as 1H-R and 1L-R, 1A-R and 1B-R) can be connected to a 120 Ω terminal resistor for communication. If communication requires a 120 Ω terminal resistor, the two wires of 1H-R and 1L-R (or 1A-R and 1B-R) must be short circuited;

7. LAN communication requires the use of standard network cables (Category 5/Category 6);

8.When inserting the TF card, it is necessary to ensure that the spring buckle is fully engaged and pay attention to the direction of the TF card insertion;

9.4 high side DO * H ports should not be directly short circuited to V - to prevent circuit damage;

10. The length of the power harness should not be designed to be too long, and it should not cross with the communication line;

When installing the wiring harness terminals and modules, it is necessary to ensure that the terminals are fully inserted into the module.

8.Product Naming Rules

PV – 01 A 100 6 3 0 S1 – XX–S01

① ② ③ ④ ⑤ ⑥ ⑦

No	Definition	Name		
①	Module code	PV：Combiner box		
②	Product iteration model	01:1 generation product		
③	A/B	A：DC		B：AC
④	Voltage level	100: Voltage level 1000V		150: Voltage level 1500V
⑤	Current level	630: Current 630A	1250: Current 1250A	250: Current 2500A
⑥	General control category	None: Without main control		S1: With SCU-01K4CN main control
⑦	Customized product code	None: Without main control		
		XX: Customer name abbreviation		

Note: Gray represents functions that are not available in standard modules and support customized implementation.

9.Inspection rules

9.1 Inspection classification

Inspection is divided into factory inspection and type inspection.

9.2 Factory inspection

Only after passing the inspection by the quality inspection department can the product leave the factory, and a product quality inspection certificate must be attached; The factory inspection shall at least complete the items specified in the "Factory Inspection Report".

9.3 Type inspection

The product undergoes type inspection according to the following conditions:

1) New product trial production and finalization;
2) After formal production, significant changes in structure, raw materials, and processes may affect product performance;
3) If the product has been discontinued for more than one year, resume production;
4) The requirements proposed in the contract;
5) There is a significant difference between the factory inspection results and the previous type test.

10.Marking, packaging, transportation, and storage

10.1 Markings

1. Product name and trademark;
2. Product model and specifications;
3. Manufacturer's name;
4. Manufacturing date or code.

10.2 Packaging

1. Product name, model, specifications, and quantity;
2. Product standard number;
3. Net and gross weight of each box;
4. Each finished product shall be packed with matching foam.
5. Mark with "anti vibration", "moisture-proof", "handle with care" and other symbols in accordance with GB/T 13384-2008 and GB/T 191-2008 standards.

10.3 Transporation

During transportation, the product should not be subjected to severe vibration or impact, and should not be placed upside down. There should be dedicated packaging boxes and protective measures.

10.4 Storage

The product should be placed in a warehouse that meets temperature and humidity standards, has good air circulation, and is free of corrosive and explosive gases.

ZWAYN

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