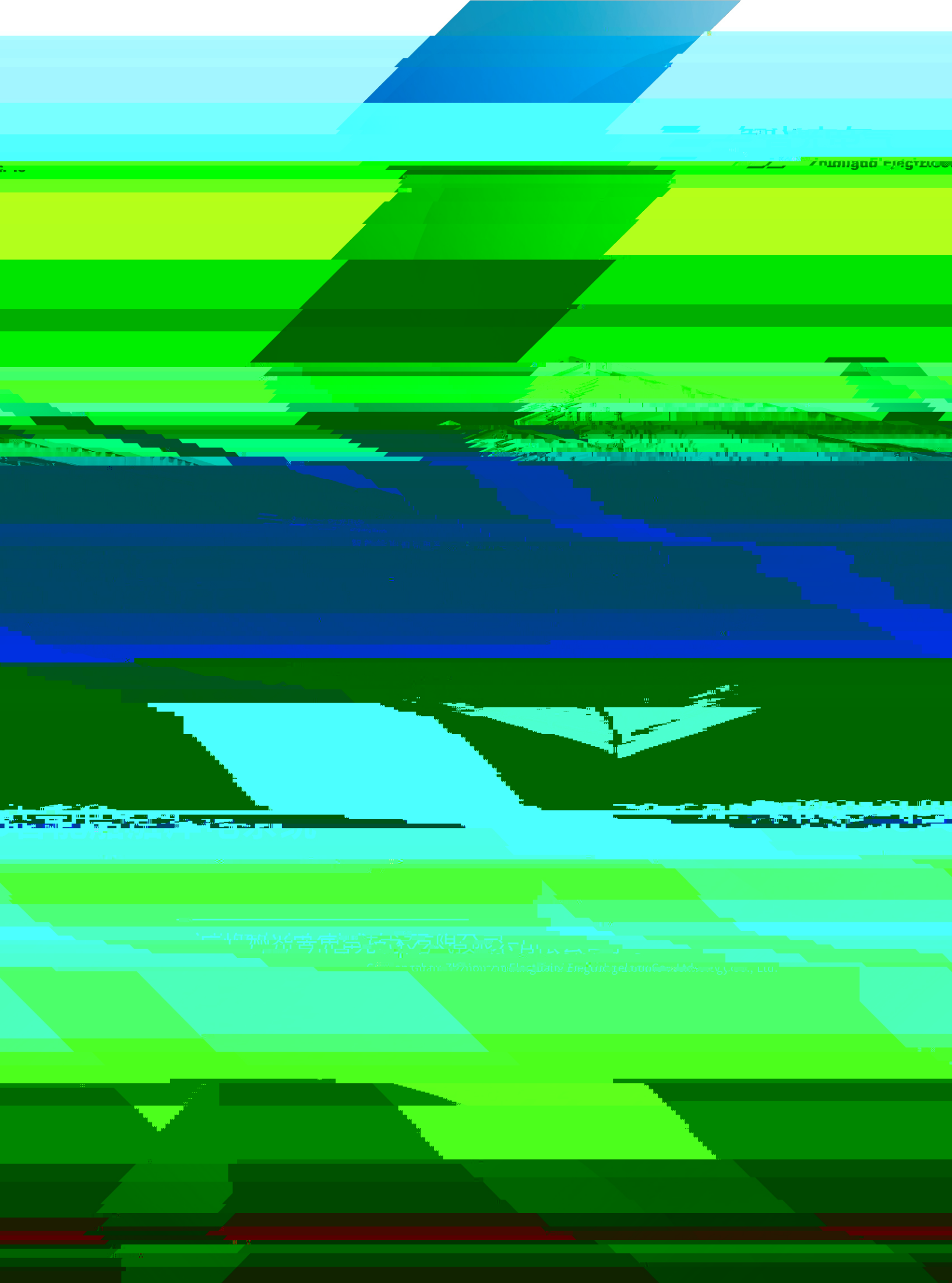


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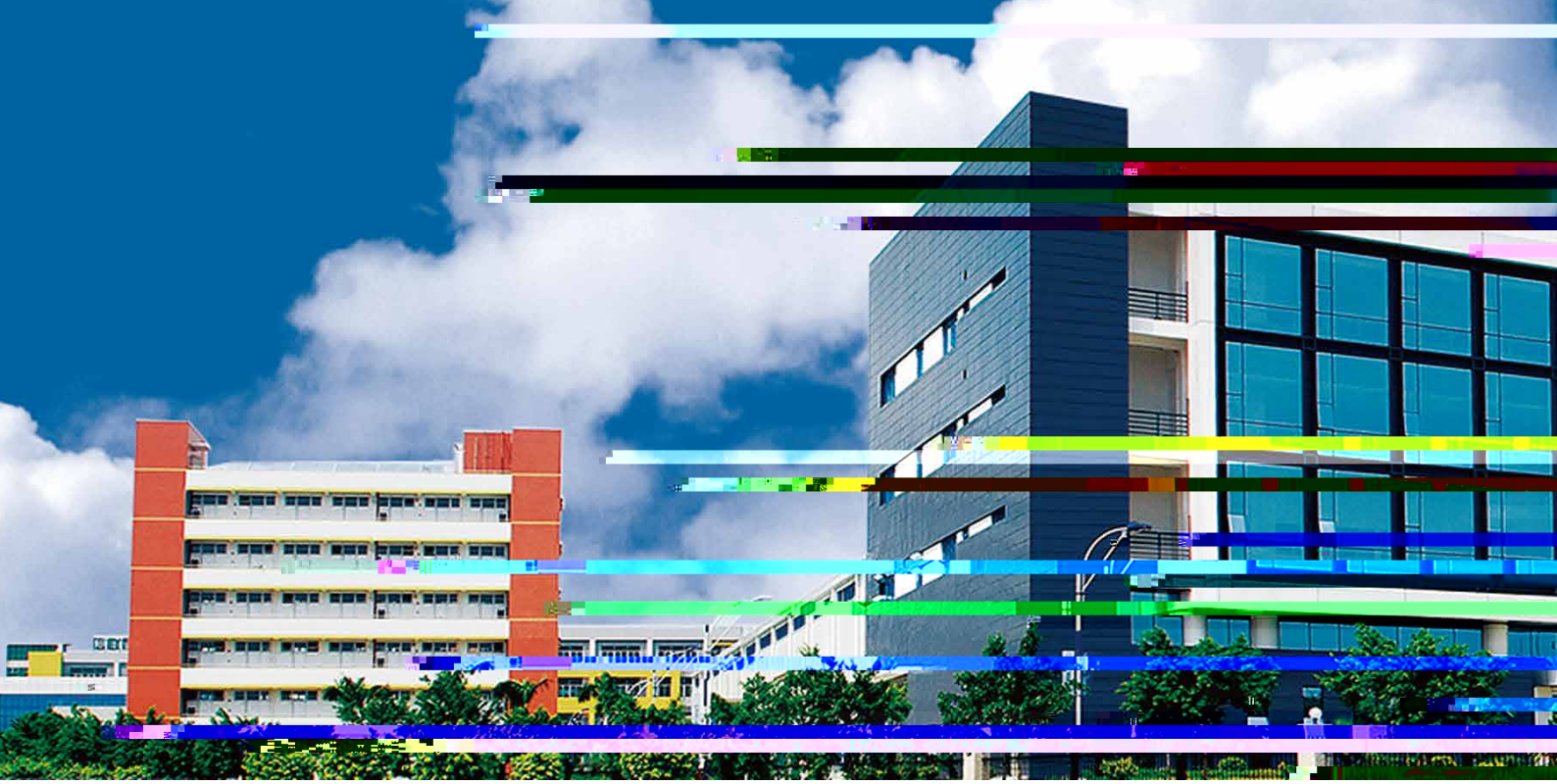
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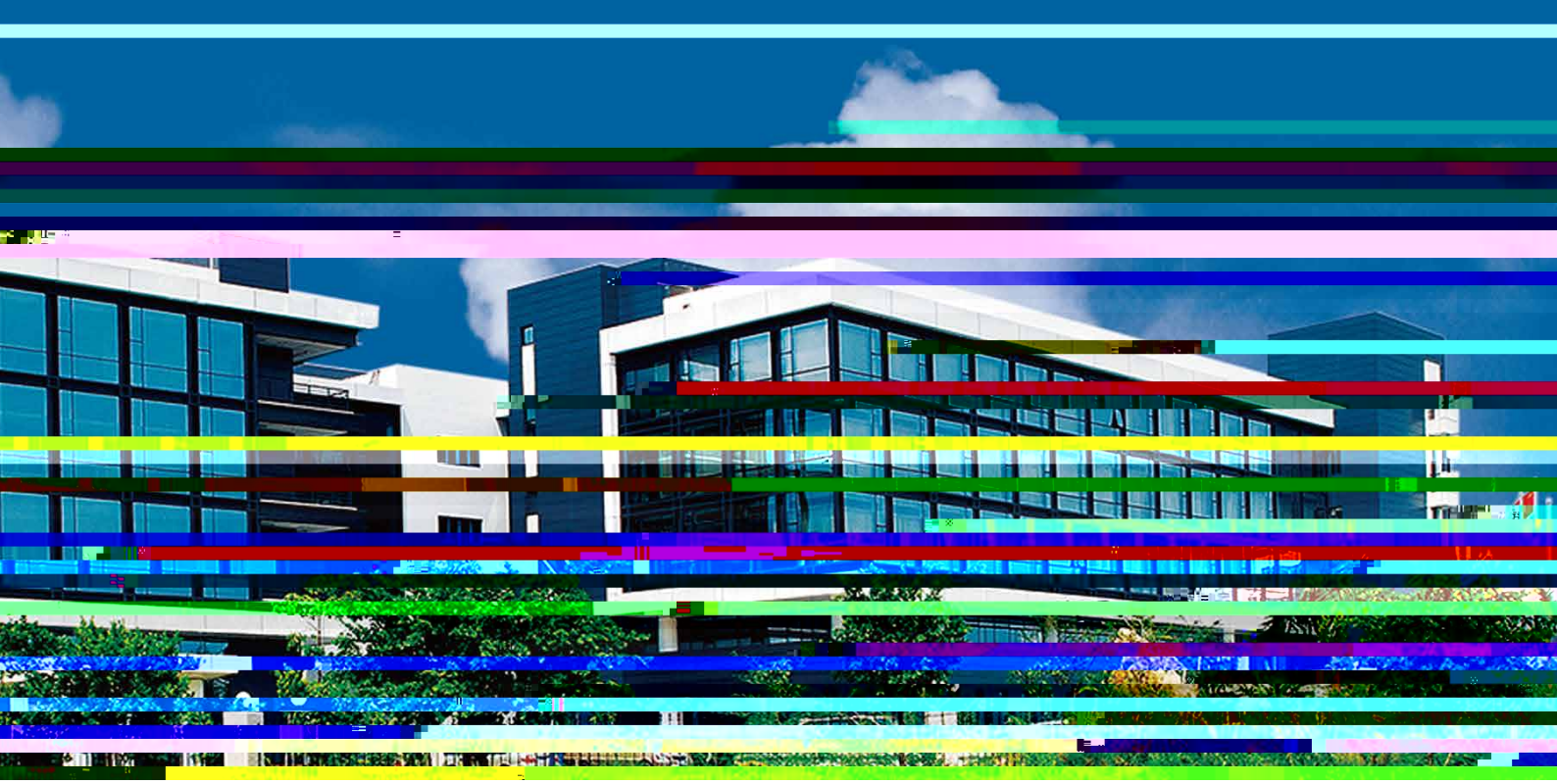
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Guangzhou Zhiguang Electric Technology Co., Ltd., established in 2002 with a registered capital of 200 million yuan, is a wholly-owned subsidiary of Guangzhou Zhiguang

XE+QNQ

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2.1
The Introduction of Each Subsystem

2.1.1
High and Low Voltage Power Distribution Subsystem

The power distribution system at the input side of the system is designed according to the specifications of the conventional power distribution equipment, and the power distribution system at the output side is designed according to the specifications of the shore power equipment. Both sets of the power distribution subsystems can be equipped with monitoring, metering, and communications-related equipment and interfaces to facilitate monitoring and metering of power supply and equipment operation.

2.1.2
Variable Frequency Voltage Regulator Subsystem

The core equipment is a high-voltage variable frequency power supply, and its functional characteristics are as follows:

NO.1

Low harmonics without filter device

3%

400V/440V 6.6kV/6kV 11kV

NO.2

One-click Switching of Frequency and Voltage

NO.3

Reverse Power Processing and Protection

2.1.3
Transformer and Power Grid Isolation Subsystem

D,yn11 50/60Hz 60Hz

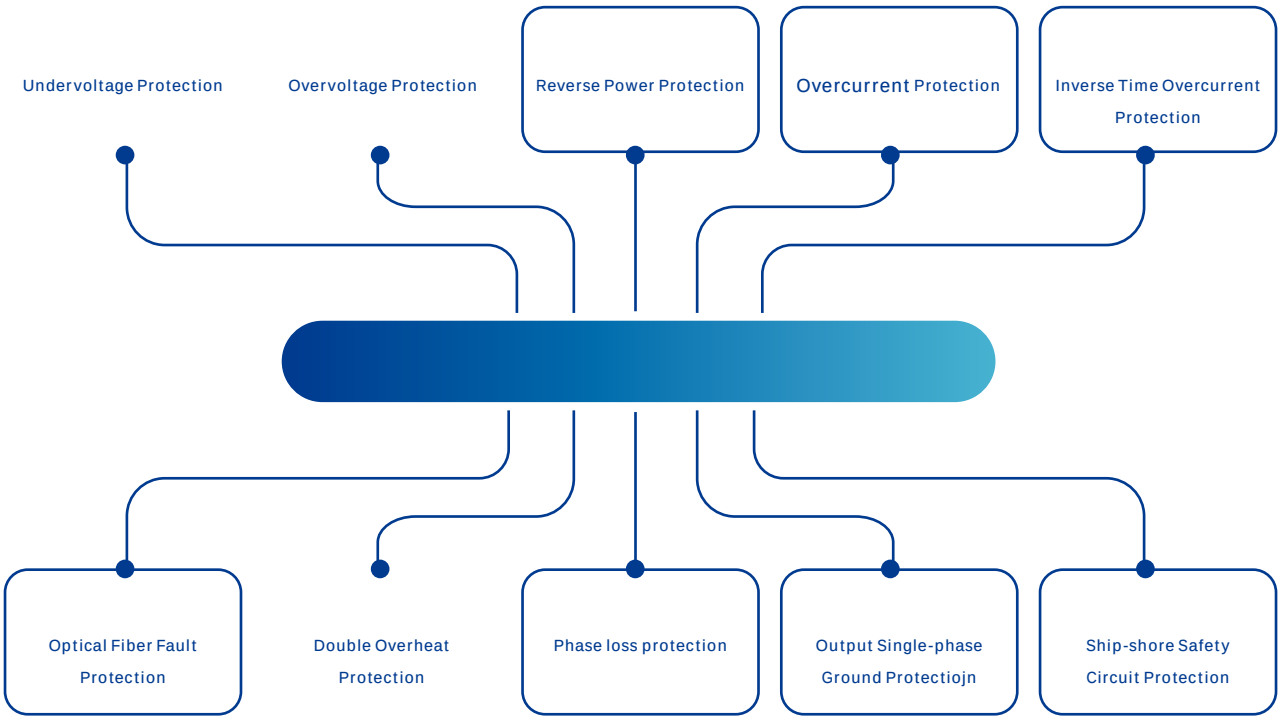
The isolation transformer adopts the D,yn11 connection design, 50/ 60Hz dual-frequency working mode, the rated voltage is set according to the 60Hz electrical system, and the system output voltage switching function at di erent frequencies is achieved by setting the output voltage value of the variable frequency power supply.

2.1.4
Neutral Point Grounding Safely Subsystem

Zhiguang Electric is the drafting unit of domestic neutral grounding equipment industry standard, and is also the main manufacturer of neutral grounding equipment for domestic medium voltage grid. The neutral point of isolation transformer adopts resistance grounding and zero sequence protection in the output switchgear, limiting the fault current when the ship side is grounded during the shore power supply process and providing safety protection for the equipment and personnel on board.

2.1.5
Electrical Integrated Protection Subsystem

The electrical comprehensive protection subsystem is provided with a mechanical lock key for the grounding switch and a key exchange box for the dock socket box socket key to ensure that the dock socket cable plug can only be plugged and unplugged when there is no voltage at the socket and the grounding switch of the output switch cabinet is closed.



3% IEC80005-1

The power quality optimization subsystem uses multi-pulse, phase-shift rectification technology, and the output voltage harmonics are less than 3% when no filtering device is configured, which meets the requirements of the IEC80005-1 standard for shore power system harmonics. For occasions bw# requ bwwg/a } ψ k Ã e ᵘ fi] v ɜ ב , wer s an be analyz

2.1.7
Data Integrated Monitoring Subsystem

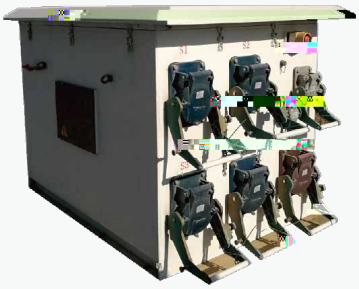
The data comprehensive monitoring subsystem not only monitors each device, but also communicates with the terminal monitoring system, which is convenient for the operator to grasp the operation status of the device. The monitoring system should record the output voltage and current data (including the necessary waveforms) during power supply, so that when the power supply is abnormally interrupted, the state of the fault can be traced back and the cause of the fault can be analyzed.

A large number of power electronic components inside the system are sensitive to the operating temperature, so the ambient temperature of the system operation must be monitored and controlled in real time.Unique and e cient heat dissipation schemes are adopted in multiple design links.

The system adop ʒ ɒ airobon-apte ɒ desige o3 the poweu t { shoero3 the ad { h # the È ad { è

Power electronic devices are arranged in parallel and evenly on the surface of the radiator to avoid the problem of short heat dissipation in the series arrangement. According to the di erence in the power conversion, air-cooled or pure water-cooled heat dissipation schemes can be used.

Zhiguang ' s many years of experience in the design and engineering of high-power device cooling can provide heat dissipation design and operation and maintenance programs adapted to the actual needs of di erent on-site working conditions.



Special Dock Socket Box for Cruise



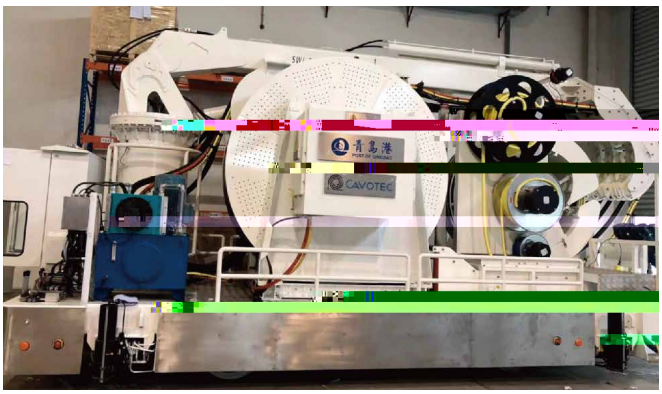
Special Dock Socket Box for Container Ship

-

The ship-shore connection subsystem mainly includes two parts: dock socket box and cable management system (required for some types of ship). The dock socket box is installed at the front of the dock, and the ship-shore electrical circuit is established by plugging in cables to shorten the connection time. The dock socket box maintenance door is provided with a travel switch and an interlock corresponding output switch to provide interlock protection for the maintenance work.

The cable management system that integrates power transmission, intelligent control, safety and reliability and other functions. The hydraulically coupled drive unit drives the cable turntable to realize intelligent cable retraction and ensure that the retraction tension is always lower than the cable's maximum bearing capacity and the safe use of shore power cables. In addition, the cable turntable has a limit action, which outputs an emergency cut-o shore power signal to avoid the live cable being pulled o .





Special Cable Management System for Cruise

2.2
Technical Parameters

msrnsr

Glnsr

Continued

	Signal isolation	opto-isolation
	Control signal transmission	Fiber Optic Transmission, Code Conversion
	Display, Metering	/ Output: frequency, voltage, current, active power, reactive power, power factor, three-phase unbalance, active plating, reactive power degree; fault/alarm and its record; parameter setting
	Running Operations	Panel keys, remote switch command control
	Frequency setting	Panel setting, remote current analog control
	Operation status output	Fault and alarm contact outputs
d_gjmtcp	Unit Bypass Function	
	D protective measure	Electrical five prevention, lockout
q_dcrw npmrcargml	75dB 80dB Electromagnetic noise less than 75dB, total noise less than 80dB	
		1000m Indoors, at an altitude of less than 1000m (high altitude needs to be customized), no corrosive, explosive gases, dust, and no direct sunlight.
		5 +45 Humidity 20 95% non-condensing
		10 150Hz 0.5g
		-20~70
Clajmqspc npmrcargml aj_qq	IP20 indoor IP55 outdoor	



ZG-SPS (STT)

ZG-SPS Intelligent Shore Power System adopts the phase tracking technology of power supply at output end (STT proprietary technology), which can track the status of power supply at output end at any time, and the function of automatic adjustment of phase sequence, which can accept the phase adjustment instruction from the ship to adjust the output phase sequence automatically;
Or analyze the voltage of the ship's power grid by detecting the output end, calculate the phase sequence of the ship's power system, adjust the phase sequence of the shore power according to the phase sequence of the ship's power, and automatically adjust the output phase sequence. One of the phase sequence detection and adjustment programs is selected for implementation during on-site construction.

85% 115%Un

65% 85%Un

65%Un “ ”

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85% 115%Q ÷] ᴰ ח shiamEno®cu¸ p ȳ p -si í o anf® ᴰ ɣ ᴀ ᵀ ɣ. ż ח Æ t
65% 85%Q ÷] # ɔ א ᵠ ɣ ı cempso я v ǯ ȳ я я ᵐ א ᵀ ᴰ ǯ l я

Seamless Ship-to-shore Switching Technology

ZG-SPS

ZG-SPS can adapt to the automatic synchronization function in ship-side operating mode and shore-side operating mode to achieve rapid synchronization and seamless power switching between ship-side generators and shore-side power supply.



2.4
System Installation Form

ZG-SPS

The ZG-SPS intelligent high-voltage shore power system is available for both indoor installation and outdoor container installation.

2.4.1
ndoor Installation

The indoor installation is suitable for sites with large spaces. The system is installed in the onshore power supply room or terminal front substation, and there is plenty of space for on-site maintenance and operation, but the equipment can ' t be moved.

2.4.2
Outdoor Container Installation

The outdoor container installation method is suitable for occasions where the site is limited and is not suitable for the construction of permanent power distribution rooms. The system covers a relatively small area.

3.1

Qingdao Cruise Terminal Intelligent High-voltage Shore Power System

3000 3.6

Project highlights Large stand-alone capacity without parallel connections. The shore power project is expected to replace 30 million kilowatt-hours of electricity a year, reduce CO2 emissions by 36,000 tons, and achieve zero emissions for cruise ships docking in Qingdao.



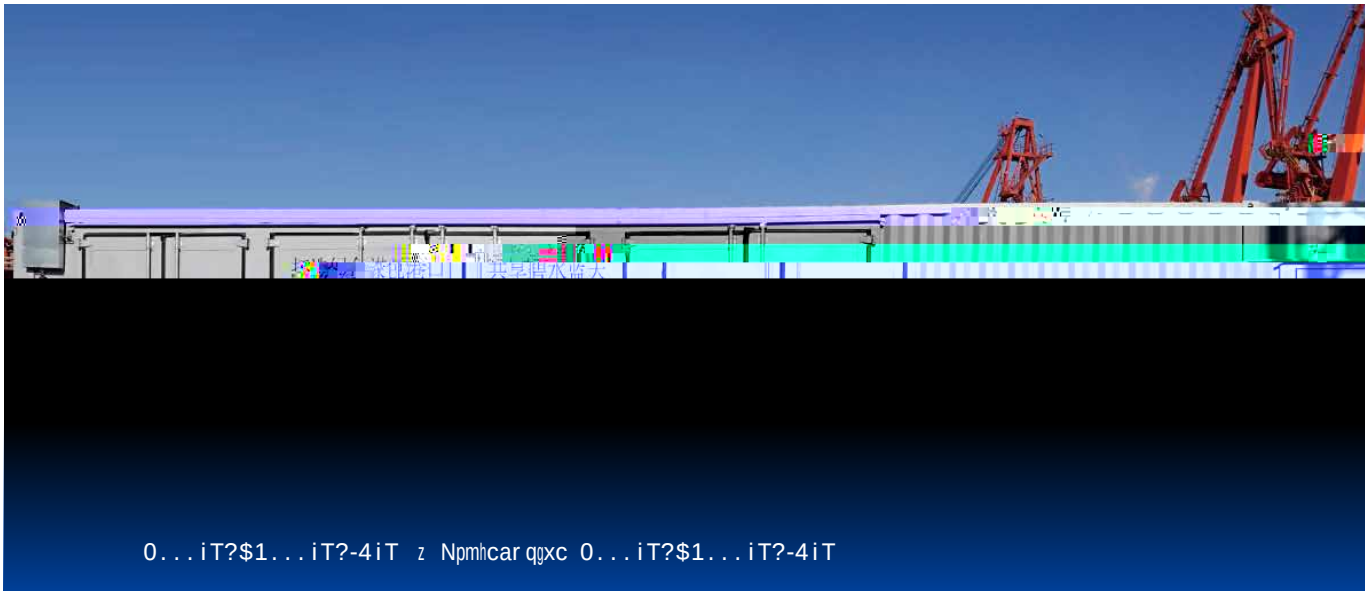
3.2

Liaoning Yingkou Port Intelligent High-voltage Shore Power System

19 2000KVA 3000KVA 4000KVA

50Hz 60Hz

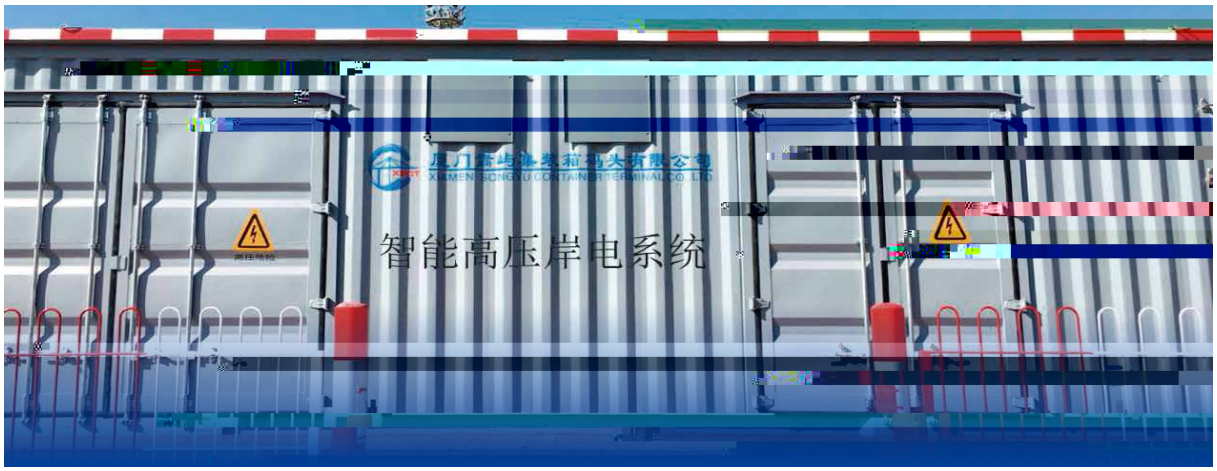
Project highlights Yingkou Port currently has 19 sets of Zhiguang shore power installations with capacities of 2,000KVA, 3,000KVA and 4,000KVA respectively, and all berths can be connected to high voltage shore power. The shore power system can provide two types of power supply, 50Hz and 60Hz, to meet the needs of various ships' power consumption.



5000kVA 3 20

60Hz/50Hz

Project highlights Installation of one set each of 2000kVA and 3000kVA.The operating vessels connected to this shore power system use a 6kV high-voltage embarkation mode. The ship is equipped with a step-down transformer, the ship's grid voltage is low voltage 400V, and the output power of the ship-side generator is 360kW when connected to the grid.





Extensive Practical Experience in Power Supply with Connected Ships

200 10000TEU

According to incomplete statistics, there are currently more than 200 Chinese and foreign ships connected to our shore power supply system. Among them, there are many large container ships above 10000TEU, as well as bulk cargo and ro-ro passenger ships, cruises, details are as follows:

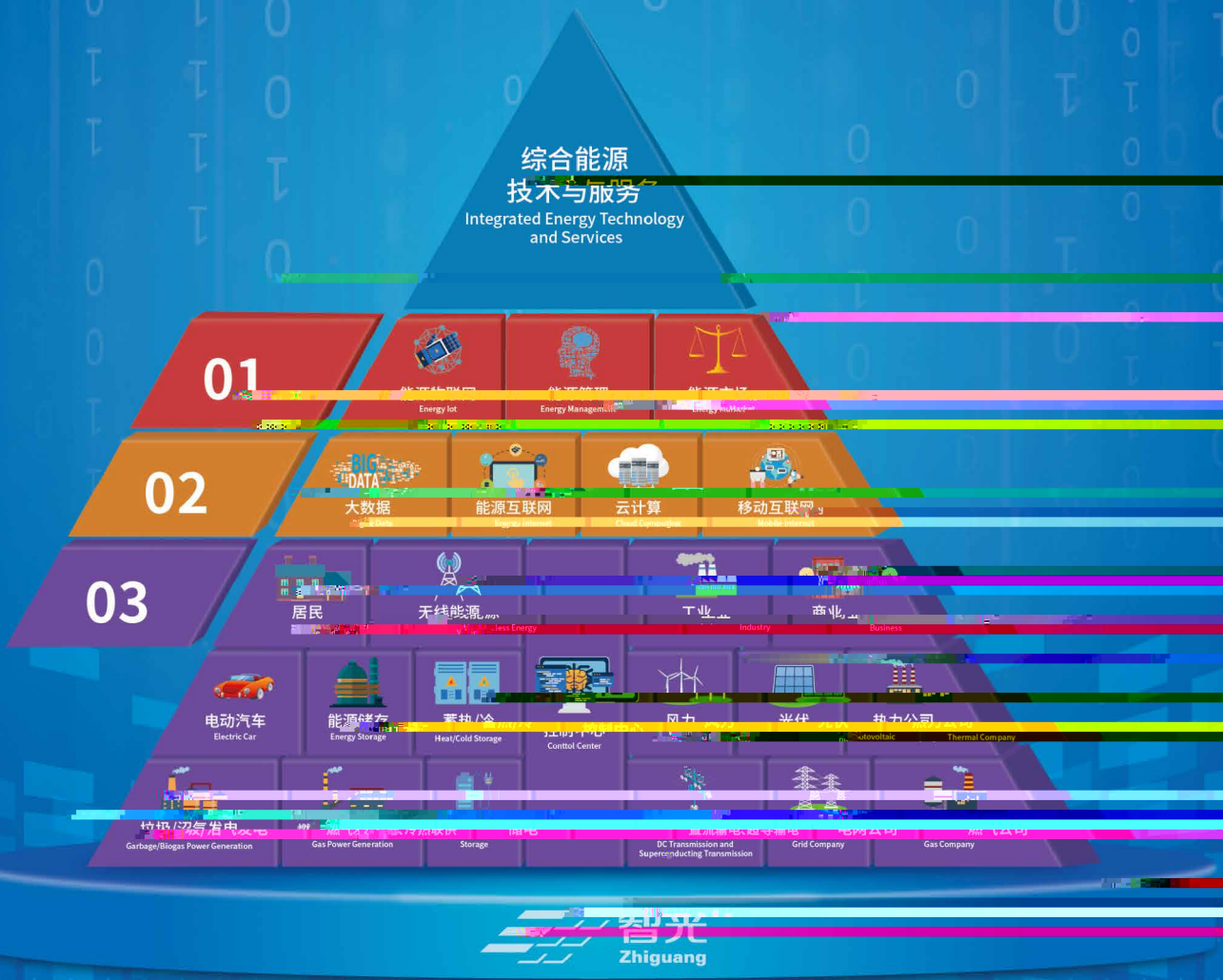
ZG-SPS

Various types of ships (parts) successfully connected to ZG-SPS

Kmbcj		Kmbcj	
COSCO Shipping France	13386TEU	COSCO Shenhua Round 801	
COSCO Shipping Netherlands	13386TEU		8000TEU
COSCO Constellation Sagittarius	20000TEU		4600TEU
COSCO Constellation Grand Virgo	20000TEU		8452TEU
Maersk Edinburgh	13000TEU		4636TEU
Maersk Ensenada	13000TEU	98	1868TEU
Maersk Gudi	13000TEU		5000TEU
Maersk Essen	13000TEU		3300TEU
MSC DANIELA	14000TEU		19000TEU
Yingkou Port Lilac Passenger Ship	normal power supply with ship		3300TEU

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Zhiguang·Integrated Energy Technology & Service Provider



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