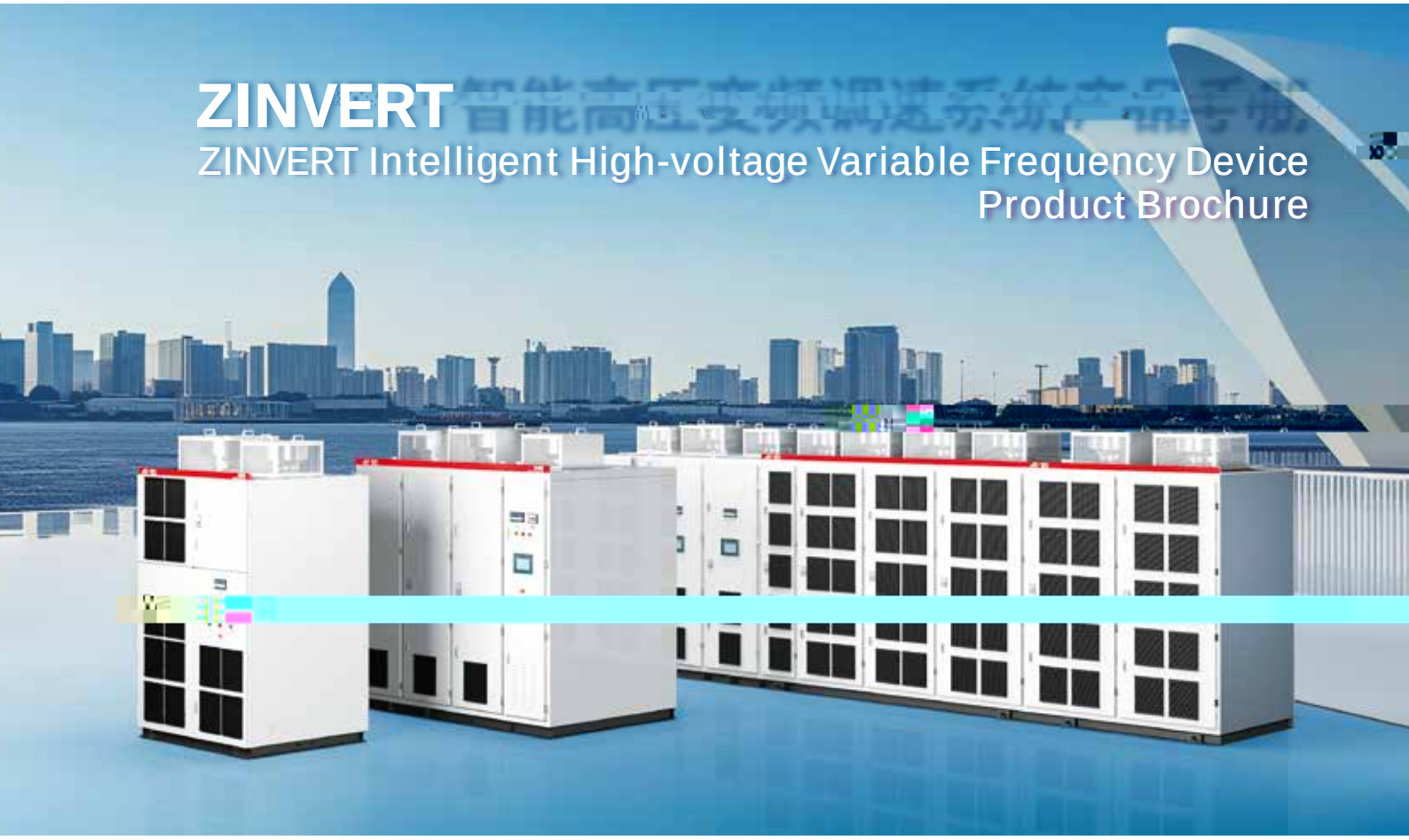
智光电气
Zhiguang Electric



ZINVERT

ZINVERT Intelligent High-voltage Variable Frequency Device Product Brochure

广州智光电气技术有限公司
Guangzhou Zhiguang Electric Technology Co., Ltd.

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PCS (SVG) / UPS

Guangzhou Zhiguang Electric Technology Co., Ltd. is a core member enterprise of Guangzhou Zhiguang Electric Co., Ltd. specializing in the research of flexible power technology in the strategic development direction of integrated energy technology and services.

Since its establishment, the company has been focusing on the research of electrical control equipment technology with high-power power electronics as the core technology, and has carried out technological research and industrial application in the fields of smart grid, distributed microgrid, energy storage, motor control and energy conservation, power quality control, advanced power supply technology, etc. The main products include neutral point grounding devices for distribution networks, high-voltage variable frequency speed regulation devices, energy storage PCS systems, static var generators (SVG), port shore power systems, high/low-voltage power quality management, and large industrial intelligent UPS, etc.

Enterprise Vision

“ ”

An Expert in Technological Innovation of High-power Electronics.

Enterprise Mission

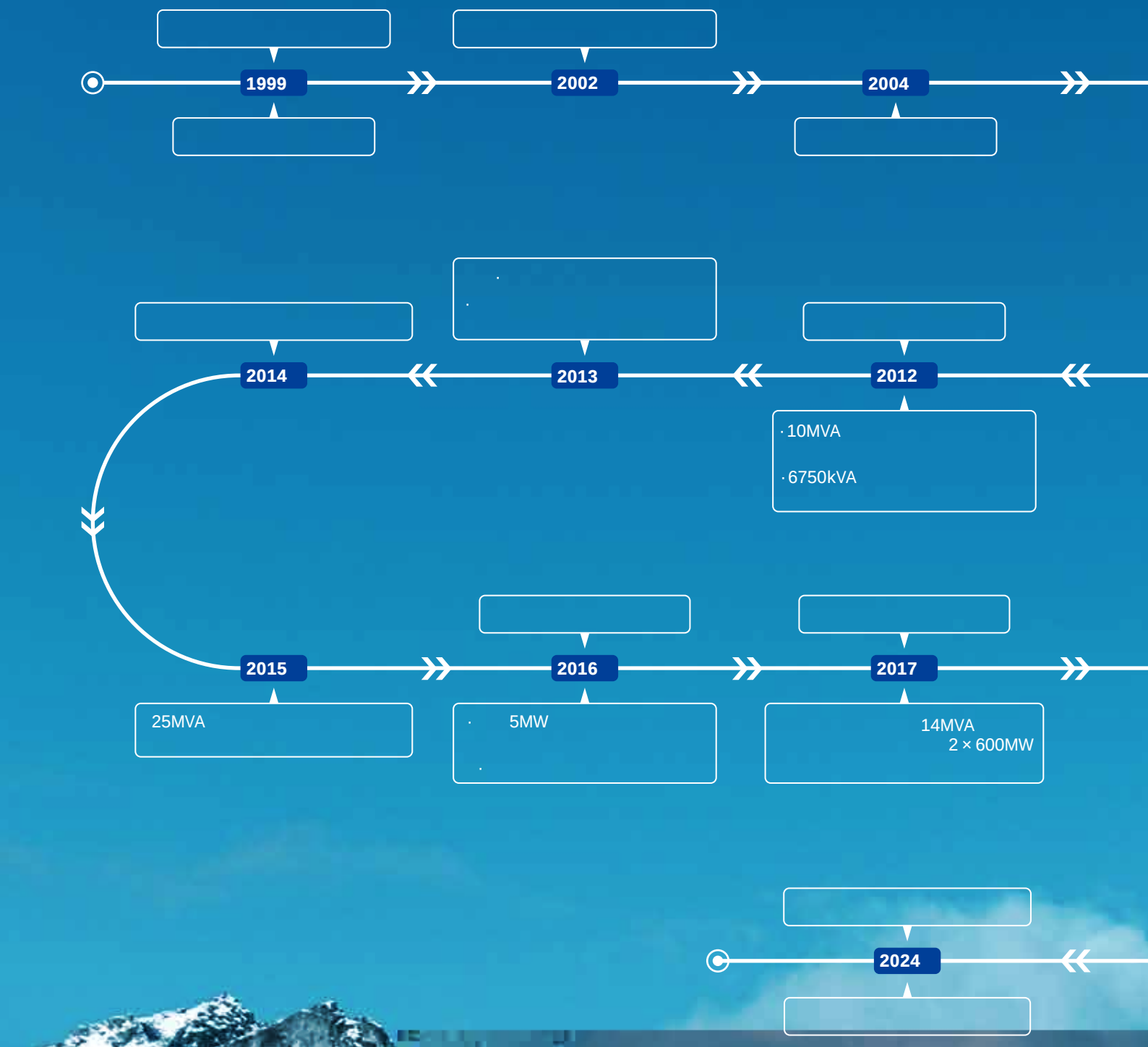
“ ”

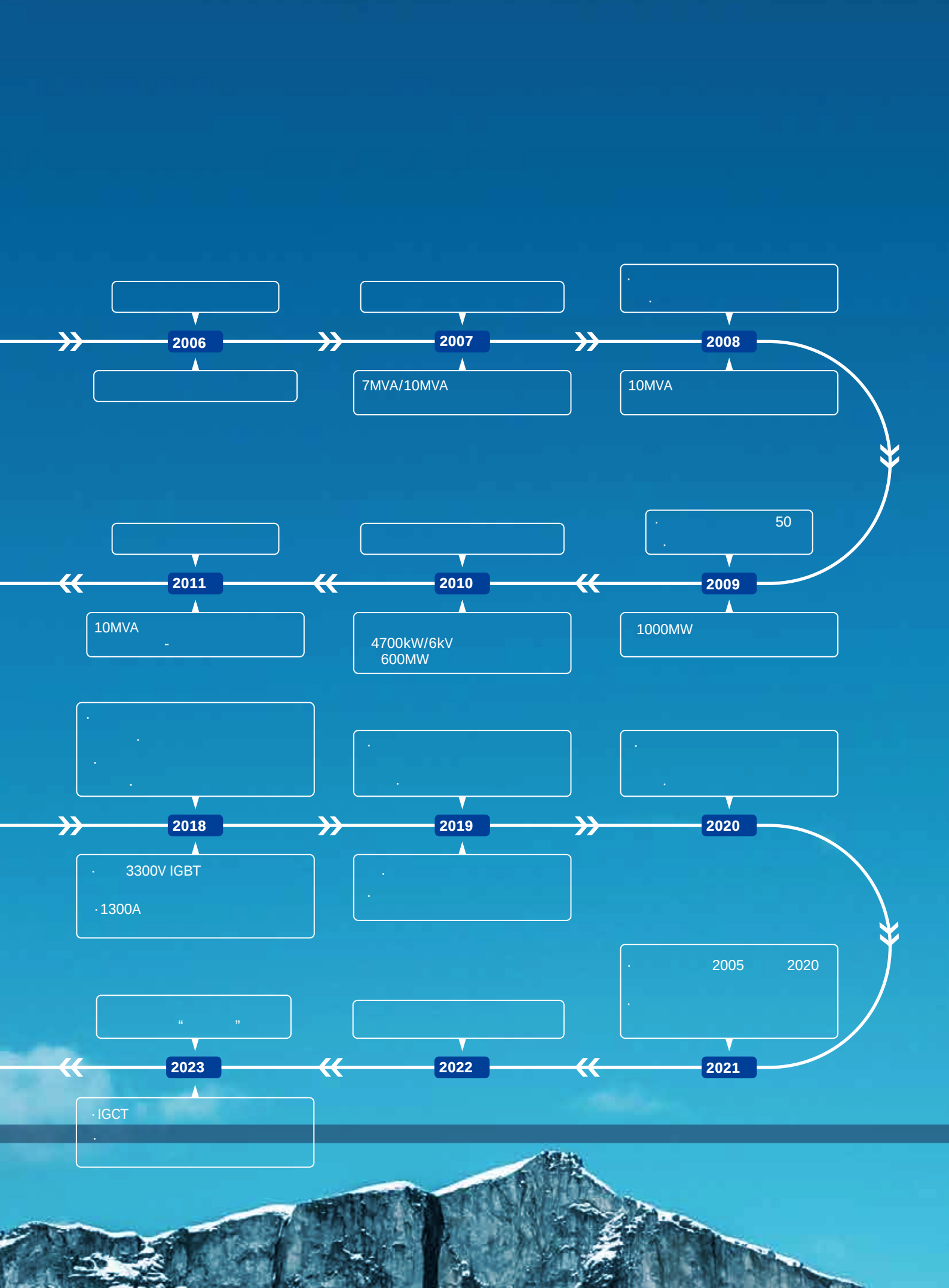
To Help Customers Use Energy Safely, E ciently and Comfortably.

Establishment Time: 2002	Registered Capital: 200 million yuan	Wholly-owned subsidiary of Zhiguang Electric Co., Ltd.	More than 300 patents and honorary qualifications

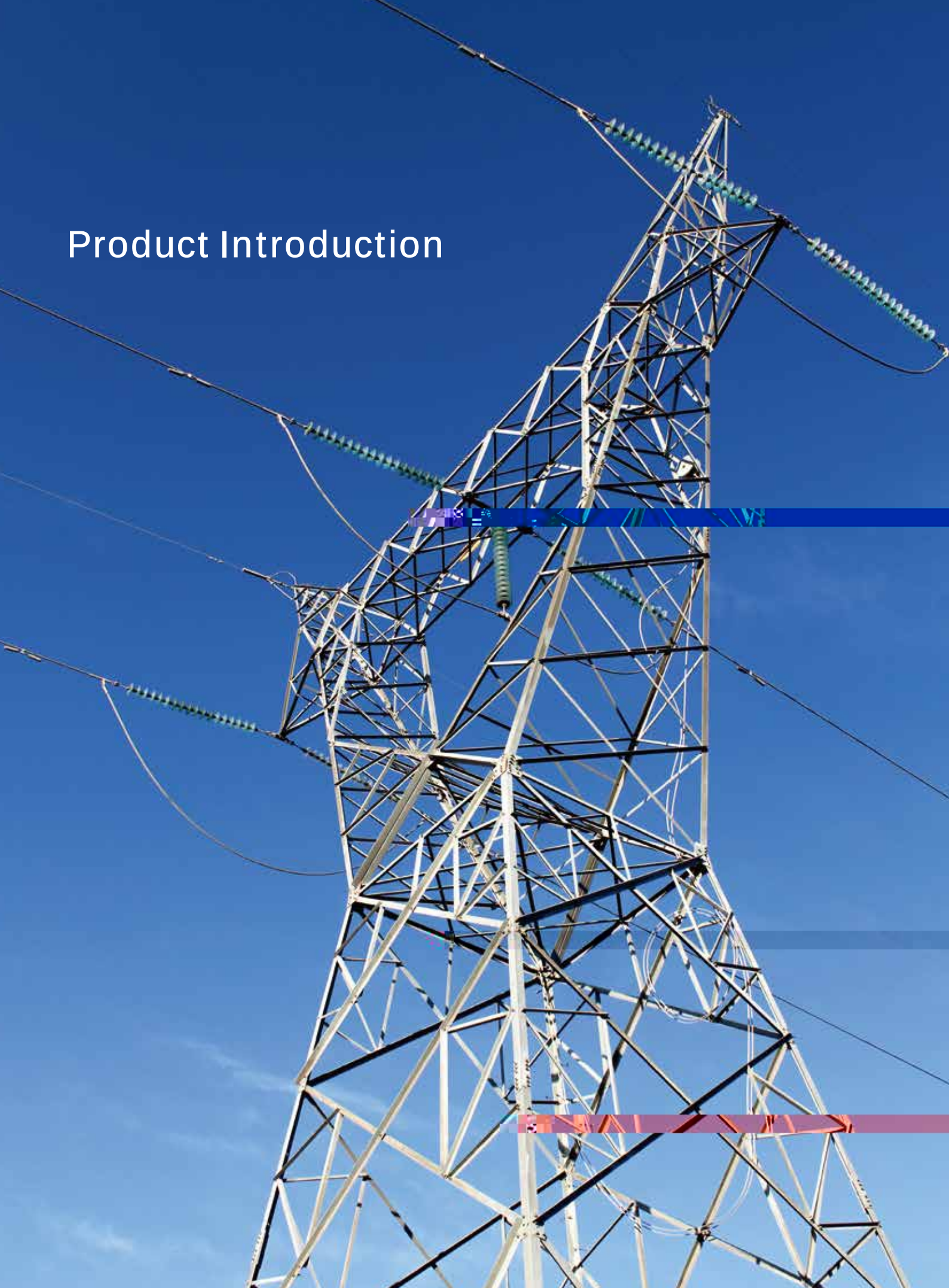
1.1

Development History of Enterprises and Products




2006
2007
7MVA/10MVA
2008
10MVA
2009
50
1000MW
2010
4700kW/6kV
600MW
2011
10MVA
-
2018
3300V IGBT
1300A
2019
2020
2005
2020
2021
2022
2023
IGCT

Product Introduction



2.1 ZINVERT

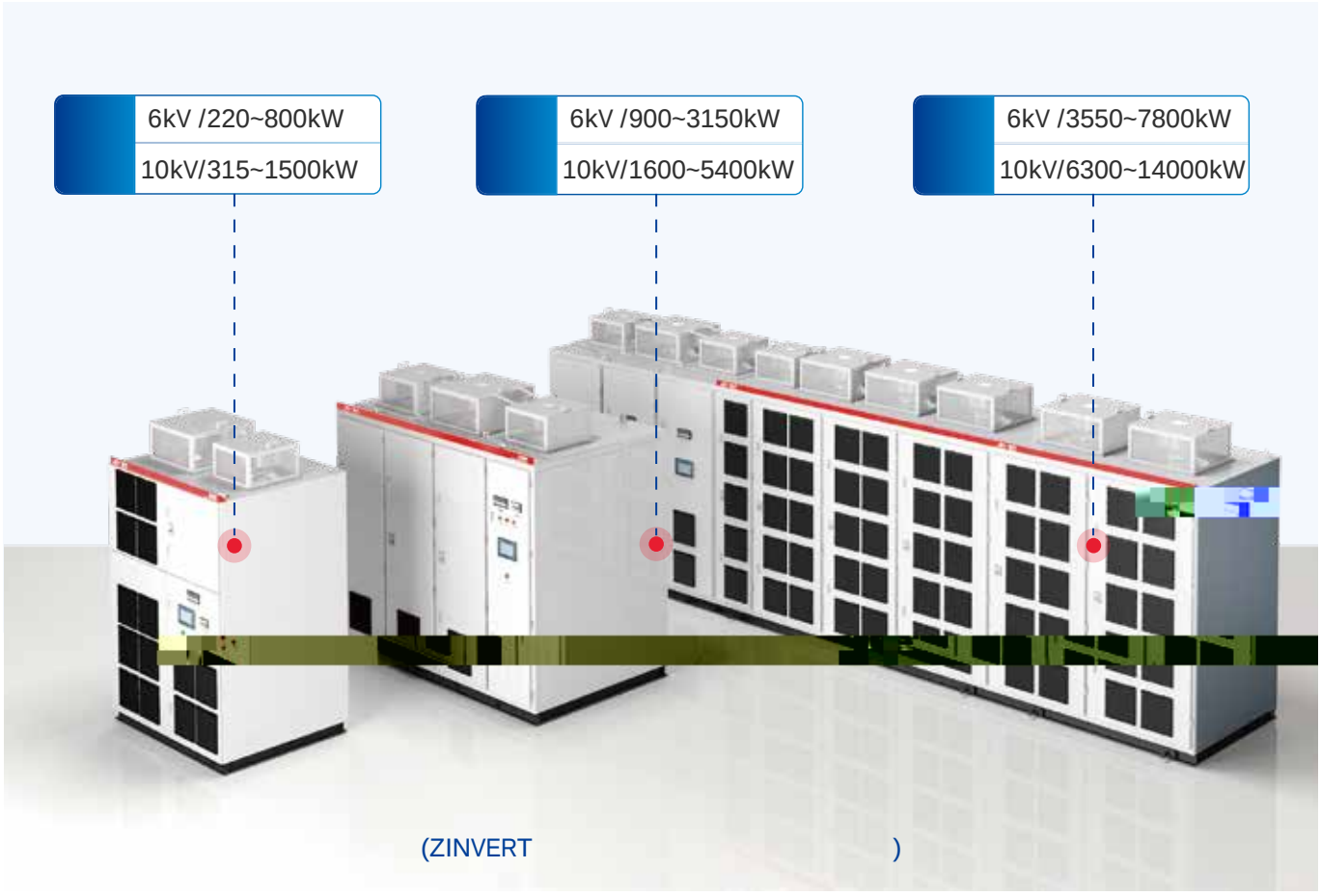
ZINVERT Intelligent High-voltage Variable Frequency Device(HVFD Introduction

ZINVERT 10kV 6kV

-

HVFD through the phase shifting transformer on the input 10kV or 6kV voltage after phase shifting step-down, by the power unit rectifier inverter and superposition of each phase after the output, to achieve the real high-high frequency conversion speed control.

- High power density all-in-one cabinet type, chassis type power unit, suitable for single person maintenance operation;
- Advanced speed tracking algorithm, real-time monitoring of unit operation and maintenance, to ensure rapid start-up in full working conditions;
- Optimised system-wide logic control strategy, which ensures fast restart after high voltage loss;
- ;
  Rigorous thermal analysis design, which not only ensures heat dissipation but also greatly reduces installation space and infrastructure costs.
- H ;
  Adopting multi-stage H-bridge power unit box cascade to realise the perfect waveform output of high voltage, it can directly drag ordinary asynchronous motor without boosting.
- IEC
  Without adding any filter, and the harmonic index meets the most severe requirements of IEC and national standard on grid harmonics.



(ZINVERT)

2.2 ZINVERT

HVFD Eight Advantages

Superior high and low voltage ride-through technology

65 115 Ue 60s

It does not shut down in the range of 65% to 115% Ue fluctuation of the grid-side voltage, and within 60s of the grid-side voltage dropout, it starts by itself without shock and drags the motor to the state before the power dropout.

“ STT ”

Direct starting of rotating loads with proprietary "STT" technology

“ STT ”

Adopting the original "STT" algorithm, it ensures that the motor can be started without stopping at any speed within the speed range, and can be started directly without impact, which has been verified by the test of the national organisations.

“ SCP ”

High-voltage output sudden short-circuit "SCP" protection technology

“ SPC ” Adopting the patented "SPC" protection technology with multiple short-circuit protection functions, it can e ectively protect the safety of the motor and the system.

Separate power supply technology for transformers with high short-circuit insulation impedance

Low-voltage debugging mode enables convenient debugging and easy problem troubleshooting, shortens the debugging cycle, and improves reliability.

Adaptive acceleration and deceleration adjustment

Improve the short-circuit resistance of the transformer, guarantee the stability of the power supply of the unit, reduce the losses generated by daily operation, and save energy and increase e ciency.

Unique cooling structure adapts to air-cooled and water-cooled flexible design

Adopting special structural design, high heat dissipation e ciency, small system volume, low requirements for temperature, humidity, dust, gas and other environmental requirements, air-cooled, water-cooled to meet the needs of customers in multiple scenarios.

Low power sensitivity and high operational stability

Adopt three-way power supply circuit design, low sensitivity to power supply. Adopt software and hardware multiple anti-interference technology to ensure the stability of system operation.

The whole machine is self-developed and produced to ensure quality and cost competitiveness.

Based on Zhiguang's many years of high-power electronics technology and patented technology, self-developed and produced of power units, phase-shifting transformers, control systems and other core components, to ensure product quality and cost advantages.

2.3
Main performance indicators

voltage	2.3kV 3kV 3.3kV 6kV 6.6kV 10kV	
output	overload capacity	130%In 1min/10 min 180%In 130% In 1 min/10 min; 180% In immediate protection;
	voltage	0~Un Carrier phase-shifted superimposed waveform
	frequency	0~50Hz/60Hz
	THD	<2% rating
input	phases frequency	three-phase 50/60 ± 5%Hz
	voltage range	rating /-15%~35% reduced rate
	power factor	>0.96 20% Greater than 20% load
control	Startup frequency	0.1 10Hz
	/ Input/Output Interface	/ 16 1 5 Standard: 16 digital inputs/outputs each; 1 analogue input, 5 outputs
	communication interface	RS232 RS485 RJ45
	Signal isolation	opto-isolation
	accuracy	0.1% ± 2% Frequency stability accuracy 0.1%; voltage accuracy ± 2%
	e ciency	>97% rated >96% 20% >20% rated
	torque increase	0~10%Un configurable
	acceleration and deceleration times	0 3000s configurable
	Instant power-down and restart	0.1 30s) Restart mode optional, waiting time 0.1 30s (settable)
	PLC Built-in PLC calibration	PID / Manual/automatic adjustment of PID parameters
display	Touch-sensitive human-machine interface	Real-time data, device status, parameter settings
protective function	IGBT Over-current, short-circuit, grounding, over-voltage, under-voltage, overload, overheating, motor overload, phase loss, IGBT breakdown or short-circuit, unit fault, high and low voltage ride-through, etc.	
failover	System bypass, unit bypass	
noise	<75dB all	
environment	location	5000m 1200 1200-5000 Indoor: up to 5000m above sea level (standard 1200m above sea level, customised for 1200-5000m) Outdoor: prefabricated cabin No corrosive, explosive gas, dust, no direct sunlight.
	/ temperature/humidity	-5~+45 20~95% Temperature: -5 to +45°C; Humidity: 20 to 95%, no condensation
	vibration	10~150HZ 0.5g
	storage	-20~70
cooling method	Forced air, water and evaporative cooling	

2.4 Business Models

2.4.1 Application Scenarios

Thermal power generation: induced draft fan, supply fan, dust-absorbing fan, booster fan, compressor, condensate pump, feed water pump, make-up water pump, grey slurry pump, and so on.

Cement manufacturing: kiln head exhaust fan, kiln tail exhaust fan, high-temperature fan, main dust-absorbing fan, cooler dust-absorbing fan, cooler exhaust fan, preheating tower fan, sorter fan, etc.

Metallurgy: main extractor fan, blast furnace blower, dust removal fan, slurry pump, descaling pump, centrifugal feed pump, elevator, semi-automatic mill, etc.

Mines: Main ventilation fans, pressurised fans, extractor fans, air compressors, pumps, belt conveyors, mills, etc.

Municipalities: sewage pumps, clean water pumps, purification pumps, biological crude treatment tower pumps, oxygen delivery blowers, etc.

Papermaking: pulper, grinder, pulveriser, papermaking machine, rewinder, etc.

Petrochemical: induced draft fan, gas compressor, water injection pump, submersible oil pump, main pipeline pressurised pump, boiler feed pump, brine pump, mixer, squeezer, etc.

Others: Synchronous belt drive mechanical devices, mine hoist, wind turbine, energy return laboratory, drag control, wind tunnel, rubber, military and other industries.

6kV　　6kV HVFD Selection Table

			(m ſ˜ tion Table						
220		30							

33	4500	Zinvert-A6H5600/06	540	9200	10800	2910	1586	13776	15276
34		Zinvert-A5H5600/06		9200	10800	2910	1586	13317	14817
35	5000	Zinvert-A6H6300/06	600	9400	10800	2910	1586	15438	16938
36		Zinvert-A5H6300/06		9400	10800	2910	1586	14979	16479
37	5600	Zinvert-A6H7000/06	720	9400	11000	2910	1586	15438	16938
38		Zinvert-A5H7000/06		9400	10800	2910	1586	14979	16479
39	6300	Zinvert-A6H8000/06	800	11000	12600	2910	1586	20850	22350
40		Zinvert-A5H8000/06		11000	12600	2910	1586	20250	21750
41	7100	Zinvert-A6H9000/06	900	11000	12600	2910	1586	21650	23150
42	7800	Zinvert-A6H10000/06	1050	13000	14600	2910	1586	23950	25450

▸ 3kV 3kV HVFD Selection Table

NO.	Motor Capacity (kW)	Inverter Model	A Rated output current	Total Length		Height (mm)	Total Depth (mm)	kg Total Weight	
				Manual	Automatic			Manual	Automatic
1	250	Zinvert-A3H315/03	60	2600	3200	2675	1586	2010	2310
2	315	Zinvert-A3H400/03	75	2950	3550	2675	1586	2262	2562
3	355	Zinvert-A3H450/03	105	2950	3550	2675	1586	2502	2802
4	400	Zinvert-A3H500/03	105	2950	3550	2675	1586	2563	2863
5	450	Zinvert-A3H560/03	105	2950	3550	2675	1586	2643	2943
6	500	Zinvert-A3H630/03	120	2950	3550	2675	1586	2713	3013
7	560	Zinvert-A3H700/03	150	2950	3550	2675	1586	2844	3144
8	630	Zinvert-A3H800/03	150	2950	3550	2675	1586	2935	3235
9	710	Zinvert-A3H900/03	180	2950	3550	2675	1586	3035	3335
10	800	Zinvert-A3H1000/03	210	2950	3550	2675	1586	3255	3555
11	900	Zinvert-A3H1150/03	245	2950	3550	2675	1586	3591	3891
12	1000	Zinvert-A3H1250/03	245	2950	3550	2675	1586	3841	4141
13	1120	Zinvert-A4H1400/03	270	4800	5400	2675	1200	4386	4686
14	1250	Zinvert-A4H1550/03	300	4800	5400	2675	1200	4586	4886
15	1400	Zinvert-A4H1800/03	360	4800	5400	2675	1200	4999	5299
16	1600	Zinvert-A4H2000/03	400	4800	5400	2675	1200	5598	5898
17	1800	Zinvert-A4H2250/03	480	6680	7280	2675	1586	6898	7198
18	2000	Zinvert-A4H2500/03	480	6680	7280	2675	1586	7198	7498
19	2250	Zinvert-A4H2800/03	540	7200	7800	2710	1586	7623	7632
20	2500	Zinvert-A4H3150/03	600	7200	7800	2710	1586	8123	8177
21	2800	Zinvert-A4H3500/03	720	7200	7800	2710	1586	8323	8623
22	3150	Zinvert-A4H4000/03	800	7200	7800	2710	1586	8623	8923

▸ Ultra-large capacity HVFD Selection Table

NO.	Transformer Capacity (kVA)	Inverter Model	A Rated unit current output	Unit configuration
1	20000	Zinvert-S4H20000/10F	1150	ZINVU-1150/45F-175D-C1
2	25000	Zinvert-S4H25000/10F	1450	ZINVU-1450/45F-175D-C1
3	30000	Zinvert-S4H30000/10F	1750	ZINVU-1750/45F-175D-C1
4	40000	Zinvert-S4H40000/10F	2300	ZINVU-2300/45F-175D-C1
5	50000	Zinvert-S4H50000/10F	2900	ZINVU-2900/45F-175D-C1
6	60000	Zinvert-S4H60000/10F	3500	ZINVU-3500/45F-175D-C1
7	12000	Zinvert-S2H12000/06F	1150	ZINVU-1150/45F-175D-C1
8	15000	Zinvert-S2H15000/06F	1450	ZINVU-1450/45F-175D-C1
9	18200	Zinvert-S2H18200/06F	1750	ZINVU-1750/45F-175D-C1
10	24000	Zinvert-S2H24000/06F	2300	ZINVU-2300/45F-175D-C1
11	30000	Zinvert-S2H30000/06F	2900	ZINVU-2900/45F-175D-C1
12	36400	Zinvert-S2H36400/06F	3500	ZINVU-3500/45F-175D-C1
13	6000	Zinvert-S1H6000/03F	1150	ZINVU-1150/45F-175D-C1
14	7500	Zinvert-S1H7500/03F	1450	ZINVU-1450/45F-175D-C1
15	9000	Zinvert-S1H9000/03F	1750	ZINVU-1750/45F-175D-C1
16	12000	Zinvert-S1H12000/03F	2300	ZINVU-2300/45F-175D-C1
17	15000	Zinvert-S1H15000/03F	2900	ZINVU-2900/45F-175D-C1
18	18000	Zinvert-S1H18000/03F	3500	ZINVU-3500/45F-175D-C1

3.2 Typical Performance

NO.	Contract	Device Model	Motor power	load	Industry	runtime
1	100MW	Zinvert-S9H18000/10	15000			2025
2	100MW	Zinvert-S9H18000/10	15000			2025
3	LNG	Zinvert-A9H16500/10	13200			2025
4	LNG	Zinvert-R8H13200/10	13200			2025
5	LNG	Zinvert-A9H16250/10Y	13000			2024
6	LNG	Zinvert-R8H13000/10Y	13000			2024
7		Zinvert-R8H11000/10Y	11000			2023
8		ZGMVS-10/14000	10600			2024
9		ZGMVS-10/14000	10600			2024
10		Zinvert-R8H5600/10Y	10500			2022
11		Zinvert-R8H8700/10Y	8700			2023
12		Zinvert-A8H11250/10Y	8500			2024
13		Zinvert-S10H12500/10Y	8000			2022
14		Zinvert-A8H10000/10	7600			2024
15		ZGMVS-10/8900	7200			2022
16		Zinvert-A8H8900/10Y	7100			2025
17		Zinvert-A8H8900/10Y	6900			2022
18		Zinvert-A8H7800/10	6300			2024
19	3#	Zinvert-A6H7800/06Y	6300			2014
20	#3	Zinvert-A6H6900/06Y	6000			2016
21	SJ15000	Zinvert-S8H6750/10Y	5800			2019
22		Zinvert-A6H7000/06Y	5600			2015
23	4#	Zinvert-A6H6900/06Y	5500	/		2015
24		Zinvert-A6H6300/06Y	5200			2019
25		Zinvert-A9H7000/10Y	5000			2019
26	3#	Zinvert-A8H5600/10Y	4300			2020
27		Zinvert-R8H5000/10Y	3400			2022
28		Zinvert-A8H3150/10Y	2500			2020
29		Zinvert-A8H1250/10B	800			2016
30		Zinvert-A8H450/10B	355			2017
			20000			

3.2.1 Special load

NO.	Project Name	Device Model	Motor power	(/) Classification of inverter application loads(Other fan/pump loads)	Industry	Year
1		Zinvert-A8H1800/10B	1400			2015
2		Zinvert-A8H4500/10Y	6300			2016
3		Zinvert-A8H1500/10B	1250			2017
4		Zinvert-A8H2000/10Y	1600			2018
5		TRQ-1250	1250			2018
6		Zinvert-A8H2500/10Y	1600			2018
7		Zinvert-A8H6300/10Y	5000			2018
8		Zinvert-A8H6300/10Y	5000			2019
9		Zinvert-A6H500/10B	320			2019
10		Zinvert-A5H900/06B	710			2019
11		Zinvert-A6H560/06B	400			2019
12		Zinvert-A9H5600/10Y	4500			2020
13		Zinvert-S6H6300/06Y	4850			2020
14		Zinvert-A9H4000/10Y	2600			2020
15		Zinvert-A5H1150/06B	710			2020
16	1#	Zinvert-A8H1800/10B	3550			2020
17		Zinvert-R8H800/10B	630			2021
18		Zinvert-A5H3500/06Y	2500			2021
19		Zinvert-A9H1150/10B	710			2022
20		Zinvert-A8H4500/10Y	3550			2022
21		Zinvert-S9H4500/10Y	2100			2023
22		Zinvert-A8H5000/10Y	3550			2023

3.3 Typical Applications

LNG

Zinvert-R8H11000/10Y

LNG

LNG

LNG

LNG

Project Name: Inverter Project for the Natural Gas Storage and Peak Regulation of Jingbian by Yanchang Petroleum and the Supporting LNG Configuration

Product Specification: Zinvert-R8H11000/10Y

Project Highlights: The working conditions of natural gas storage and peak regulation as well as LNG production are complex and changeable, and this device endows the system with a powerful adjustment capability. In terms of natural gas storage and peak regulation, it can quickly adjust the operating parameters of the compressor according to the gas consumption peaks and valleys in di erent seasons and at di erent times of the day and night, so as to achieve precise gas storage and e cient gas supply. In the LNG production process, it can timely adjust the motor speed in response to the slight changes in process parameters such as the refrigeration temperature and pressure, ensuring that LNG production is always in the best state and flexibly meeting the diverse demands of the market for natural gas and LNG products.

600MW

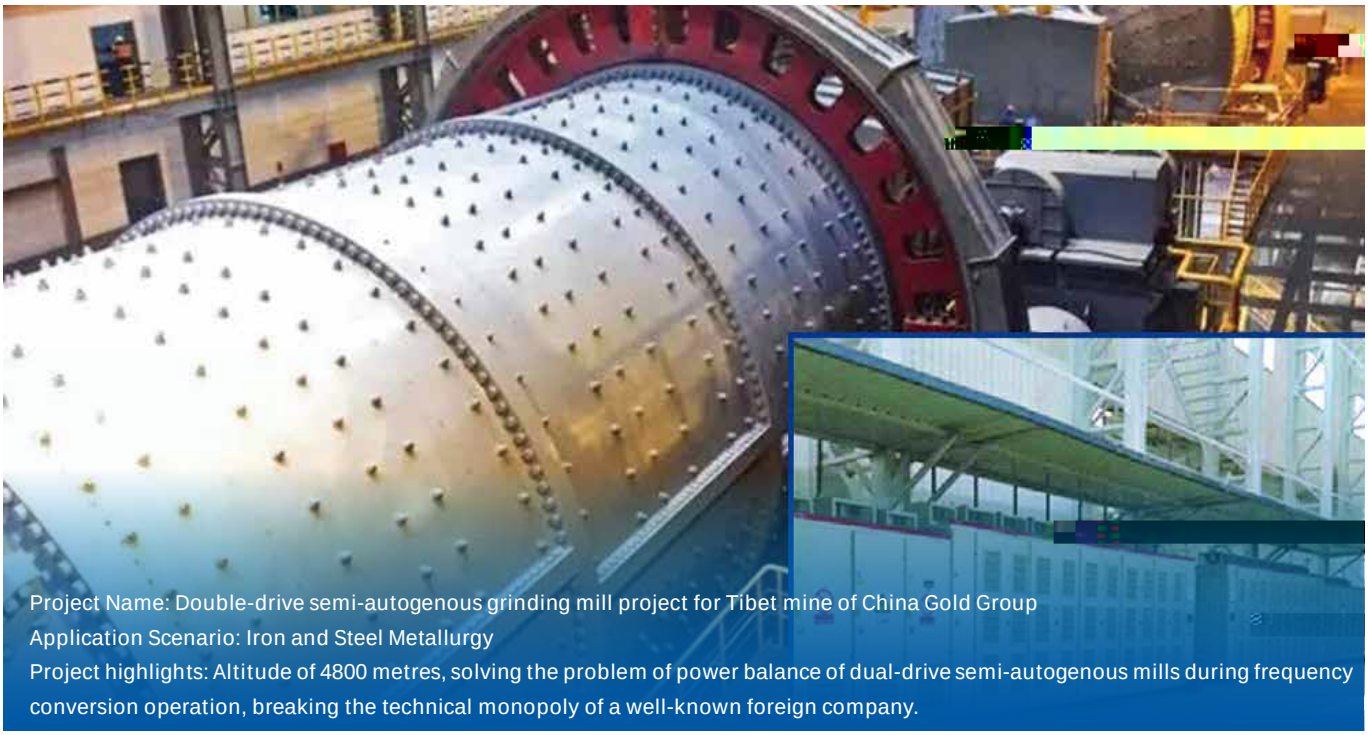
Project name: Datang Group 600MW unit combined induced draft fan frequency conversion transformation project

Application scenario: thermal power generation induced draft fan

Project highlights: After the transformation, the frequency conversion equipment operates stably, has good regulation characteristics, and the energy-saving e ect is obvious.

▸

4800



Project Name: Double-drive semi-autogenous grinding mill project for Tibet mine of China Gold Group
Application Scenario: Iron and Steel Metallurgy
Project highlights: Altitude of 4800 metres, solving the problem of power balance of dual-drive semi-autogenous mills during frequency conversion operation, breaking the technical monopoly of a well-known foreign company.

▸ 600MW

6500h 75% 25% 2000

1%

Project name: Datang Group thermal power plant 600MW unit electric feedwater pump frequency conversion transformation project
Application Scenario: Thermal power generation feedwater pump
Project highlights: Under the premise that the unit runs for 6500h and the average load rate is 75%, the comprehensive power saving rate can be up to 25%, and it is expected that the average annual power saving will be over 20 million kWh, and the comprehensive plant power rate will be reduced by nearly 1%.

▸ “ ”

Project Name:Nation's First! Successful Operation of Zhiguang's "One-to-Nine" High-Voltage Frequency Conversion Project
Application Scenario: Thermal Power Plant Fans
Project Highlights:The successful operation of this project has overcome numerous technical challenges faced by high-voltage frequency converters in a one-to-many configuration, such as motor matching, protection, wiring layout, and length. It not only optimizes the operational e ciency of the fans but also reduces energy consumption and maintenance costs, enhancing the system's stability and safety.

▸

20000kVA 150 250

Project name: Guangxi large-scale paper-making enterprise synchronous motor special converter drive pulp mill project
Application Scenario: Pulp Mill for Paper Making Industry
Project highlights: 20000kVA motor, using Zhiguang high-voltage inverter one-two start-up solution, can achieve an annual output of 1.5 million tons of raw pulp and 2.5 million tons of paper.

▸ 2 × 460MW “ ”

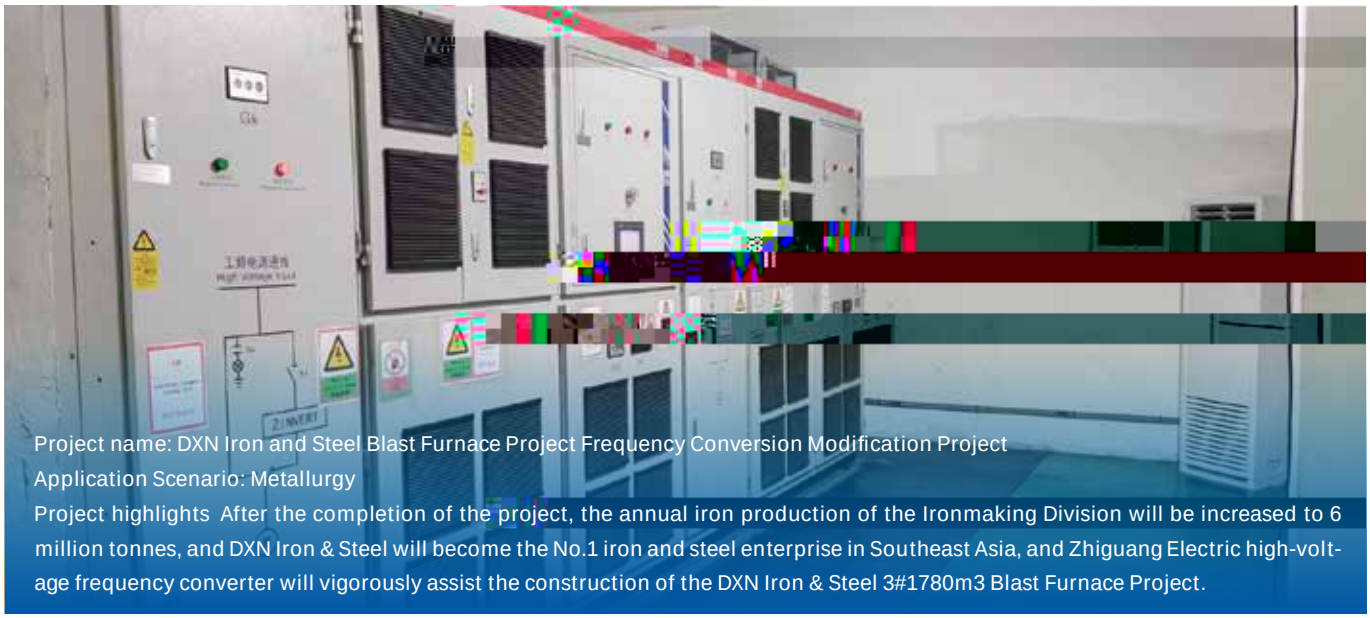
18 42 kWh 548.6 GJ

Project Name: Guangzhou Development Zone 2 × 460MW Gas-to-Coal Cogeneration Project
Application Scenario: Thermal power generation
Project Overview: This project adopts 18 sets of inverter by Zhiguang, with an annual power generation of 4.2 billion kWh after commissioning and an estimated annual heat supply of 5.486 million GJ, providing a stable heat source for many enterprises in Guangzhou Science City and the eastern and western districts of the Economic and Technological Development Zone, as well as Dongguan Mayong and other places.

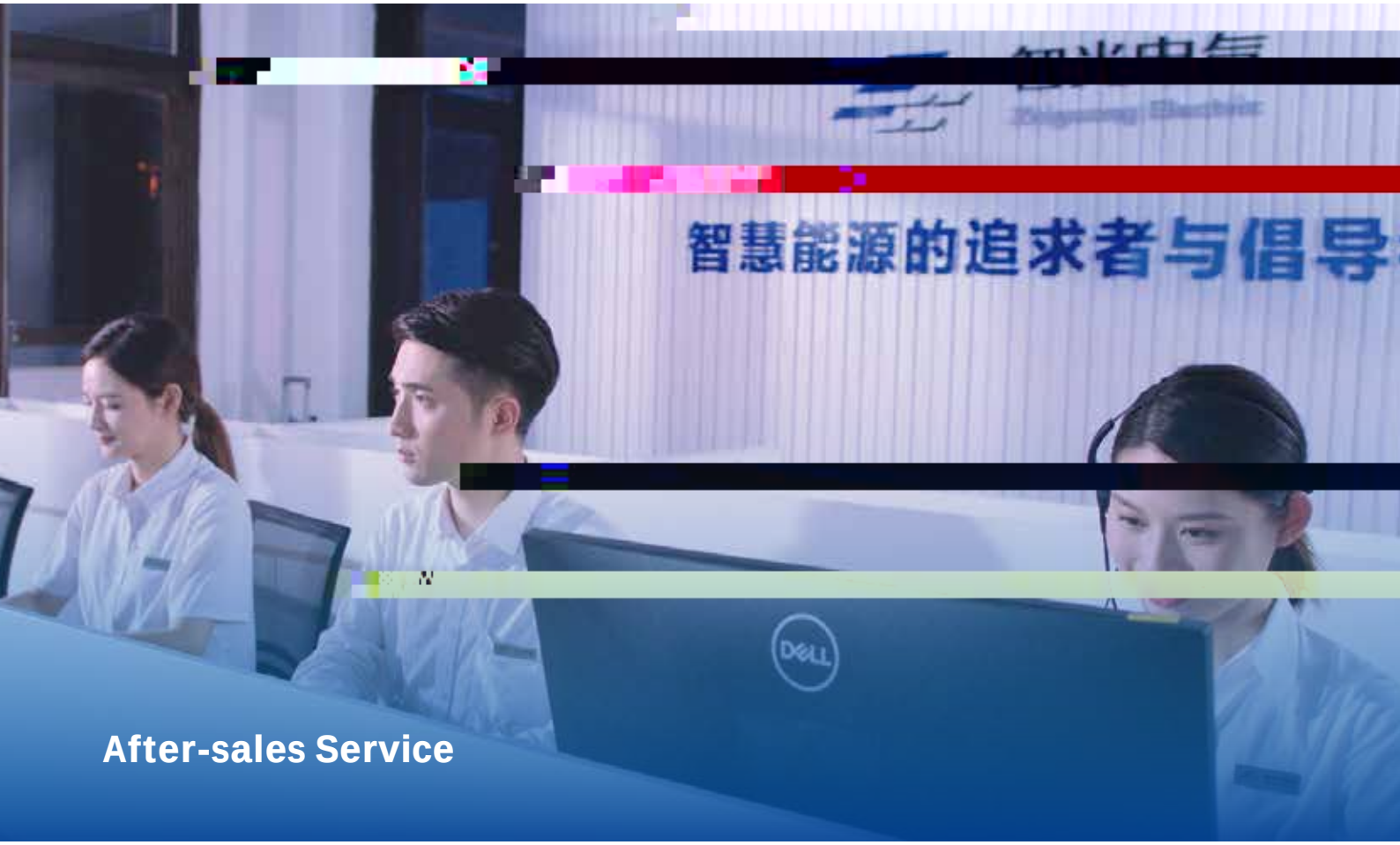
▸

600

3#1780m3



Project name: DXN Iron and Steel Blast Furnace Project Frequency Conversion Modification Project
Application Scenario: Metallurgy
Project highlights After the completion of the project, the annual iron production of the Ironmaking Division will be increased to 6 million tonnes, and DXN Iron & Steel will become the No.1 iron and steel enterprise in Southeast Asia, and Zhiguang Electric high-voltage frequency converter will vigorously assist the construction of the DXN Iron & Steel 3#1780m3 Blast Furnace Project.



After-sales Service

Five-star after-sales service to ensure the stable operation of equipment in various scenarios around the world.

Professional E cient Comprehensive

7大服务中心 Service Center

Zhiguang has established seven major regional service centres with Guangzhou, Beijing, Shanghai, Xi'an, Chongqing, Wuhan and Hangzhou as the core, and on the basis of which it has set up a service network covering all major customer service points and project departments across the country, which can provide faster, more convenient and comprehensive and considerate high-quality services for customers and partners.

2服务范围 Service Scope21 ftA sales Ser vice

Standardised Warranty: pre-commissioning, installation and commissioning, preventive maintenance, spare parts supply, on-site service, optimisation service, intelligent O&M.
Customised services: customised programme design, multiple cooperation models, training services.

2/48服务承诺 Service Commitment

2 48

Respond within 2 hours after receiving the service demand, and personnel arrive at the site within 48 hours.

1 Service Platform

“ ”

"Comprehensive Energy Service Industrial Internet Platform" empowers the core aspects of comprehensive energy service products, such as technology research and development, product manufacturing, system integration, equipment operation and maintenance, energy e ciency improvement, energy trading, etc., with big data, and helps customers realise the transformation and upgrade from factor-driven to data-driven.

002169

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