



Technology-oriented  
Customer first service

# Special VFD for submersible electric pump Product introduction



**01**

# Company Introduction

Company Profile | Main Products

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Company Profile | Main Products



Our company INVOTRIC focuses on the research and development, production and technical services of electric drive products.

Products are widely used in compressors, textiles, printing, CNC machine tools, fans, water pumps, chemical industry, plastic machinery, woodworking machinery, centrifuges, logistics, mining and other industries.



**01**

**Electric pump medium voltage  
frequency conversion products**

- A, Voltage range: 1300V/2600V**
- B. Current range: 65-105A**
- C, Rectifier structure: 6/12 pulse optional**
- D. Output filtering: sinusoidal filtering**
- E, Scope of application: low cost, energy saving,  
small footprint**

**02**

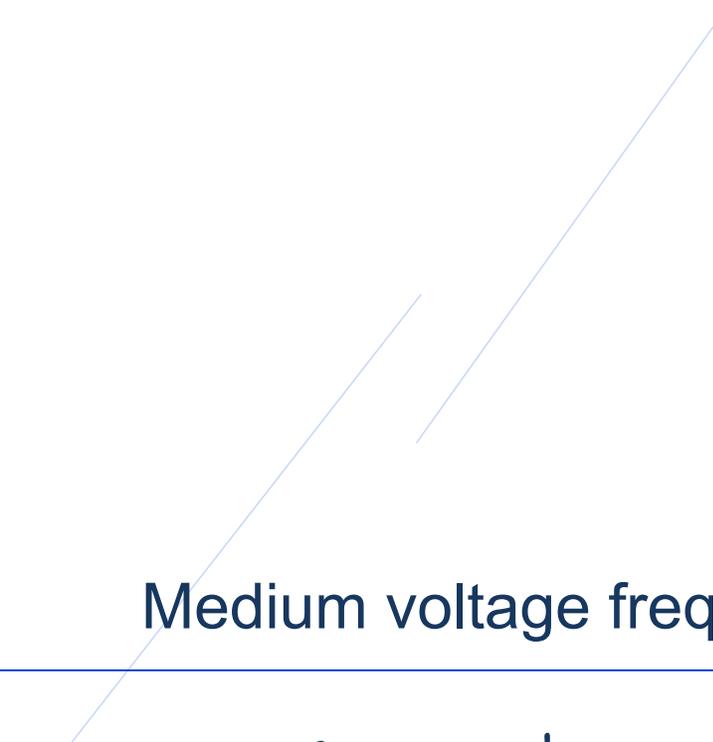
**Electric pump low voltage  
frequency conversion products**

- A, Voltage range: 690V/ 380-480V**
- B. Current range: 160-1600A**
- C, Rectifier structure: 6/12 pulse optional**
- D. Output filtering: integrated sinusoidal filtering**
- E, Application scope: High power, outdoor harsh  
environment**

**03**

**Electric pump multilevel  
frequency conversion products**

- A, Voltage range: 690-5000V**
- B. Current range: 100-250A**
- C. Rectification structure: 18/24/32  
pulse**
- D. Output waveform: sine wave**
- E, scope of application: low harmonic,  
large displacement pump**



# Medium voltage frequency converter for electric pump

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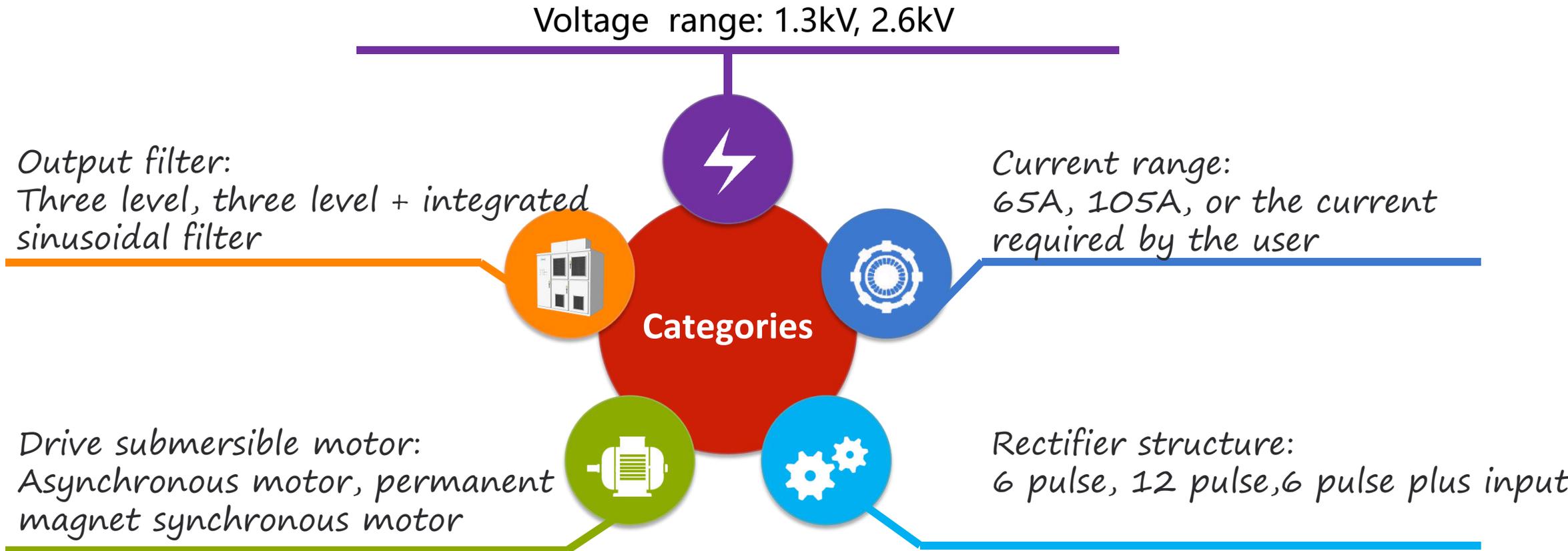
*Specifications | Features & Advantages | Applications*



02

# Medium Voltage VFD Introduction

Specifications | Features & Advantages | Application



# Medium Voltage VFD

## Introduction

## [Specifications](#) | [Features & Advantages](#) | [Applications](#)

### Product model and main parameters

Type	Input voltage range(V)	Rated output current(A)	Output voltage (Without output filter) (V)	Output voltage (with output filter) (V)*	Maximum output capacity (kVA)	Maximum capacity (output filter ) (kVA)
MV-1300-65	700-1300	65	0-1300	0-1270	140	135
MV-1300-105	700-1300	105	0-1300	0-1270	225	218
MV-2600-65	1400-2600	65	0-2600	0-2560	280	273
MV-2600-105	1400-2600	105	0-2600	0-2560	454	440

\* With the output sinewave filter, the filter reactance will have 15-30V voltage drop, the actual voltage drop depends on the unit running current.

# Medium Voltage VFD

Introduction

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## Cabinet Dimension ( **Integrated output filter** )

Type	Input voltage range(V)	Rated output current(A)	width (mm)	Depth (mm)	Height (mm)	Weight (kg)
MV-1300-65	700-1300	65	900	700	2050	235
MV-1300-105	700-1300	105	900	700	2050	270
MV-2600-65	1400-2600	65	900	700	2050	300
MV-2600-105	1400-2600	105	900	700	2050	335

## Cabinet Dimension(Without output filter)

Type	Input voltage range(V)	Rated output current(A)	width (mm)	Depth (mm)	Height (mm)	Weight (kg)
MV-1300-65	700-1300	65	700	500	1400	155
MV-1300-105	700-1300	105	700	500	1400	168
MV-2600-65	1400-2600	65	900	800	1900	220
MV-2600-105	1400-2600	105	900	800	1900	235

# Medium Voltage VFD

## Introduction

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## Main Technical Parameters

**Input power supply voltage range:** three-phase 1300VAC (+ 5%-15%), 2600VAC (+ 5%-15%)

**Output overload capacity:** (150% x rated current), 1 minute

**Output frequency range:** 0-80Hz

**Control mode:** Forced V/F

**Starting mode:** Smooth starting, synchronous starting, torque boost, swing starting, maximum torque starting

**Frequency set:** Constant frequency, constant current, pump inlet pressure, external analog quantity

**Mode selection:** Manual/automatic switch

**Fault record:** Records and stores fault types and related information in the last one year

**Protection level:** IP20

**Cooling method:** Forced air cooling



# Medium Voltage VFD

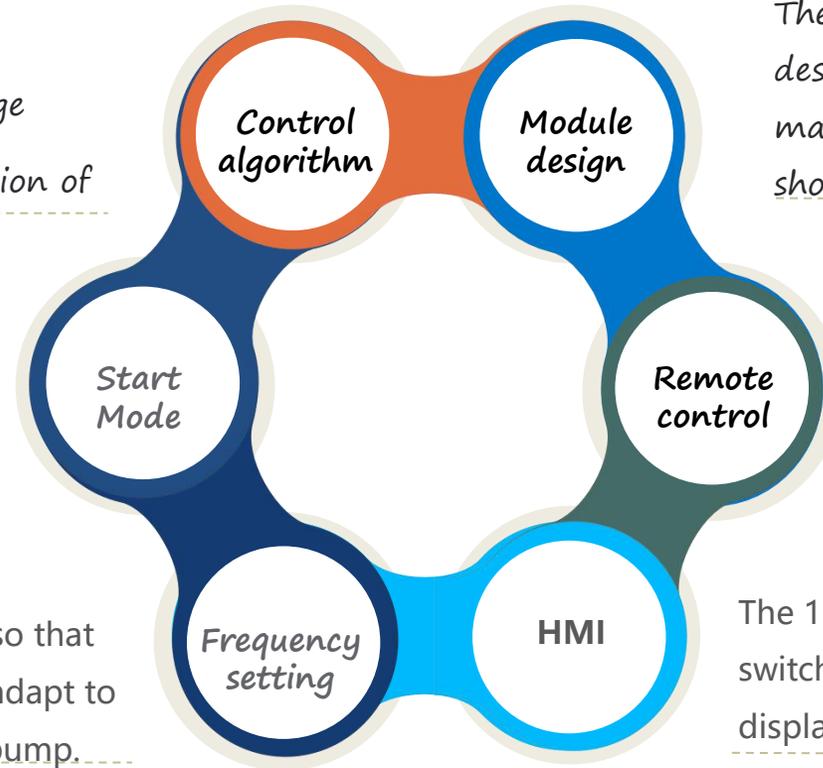
## Introduction

## Specifications | Features & Advantages | Applications

The optimized three-level SVPWM control algorithm is adopted, and the output voltage waveform is quasi-sine wave, which is very suitable for long cable transmission application of electric submersible pump.

Five optional starting modes are provided to solve the starting difficulties of the electric submersible pump when it meets sand jam, heavy oil, scale formation and so on.

Support a variety of frequency setting mode, so that the frequency conversion system can flexibly adapt to different applications of electric submersible pump.



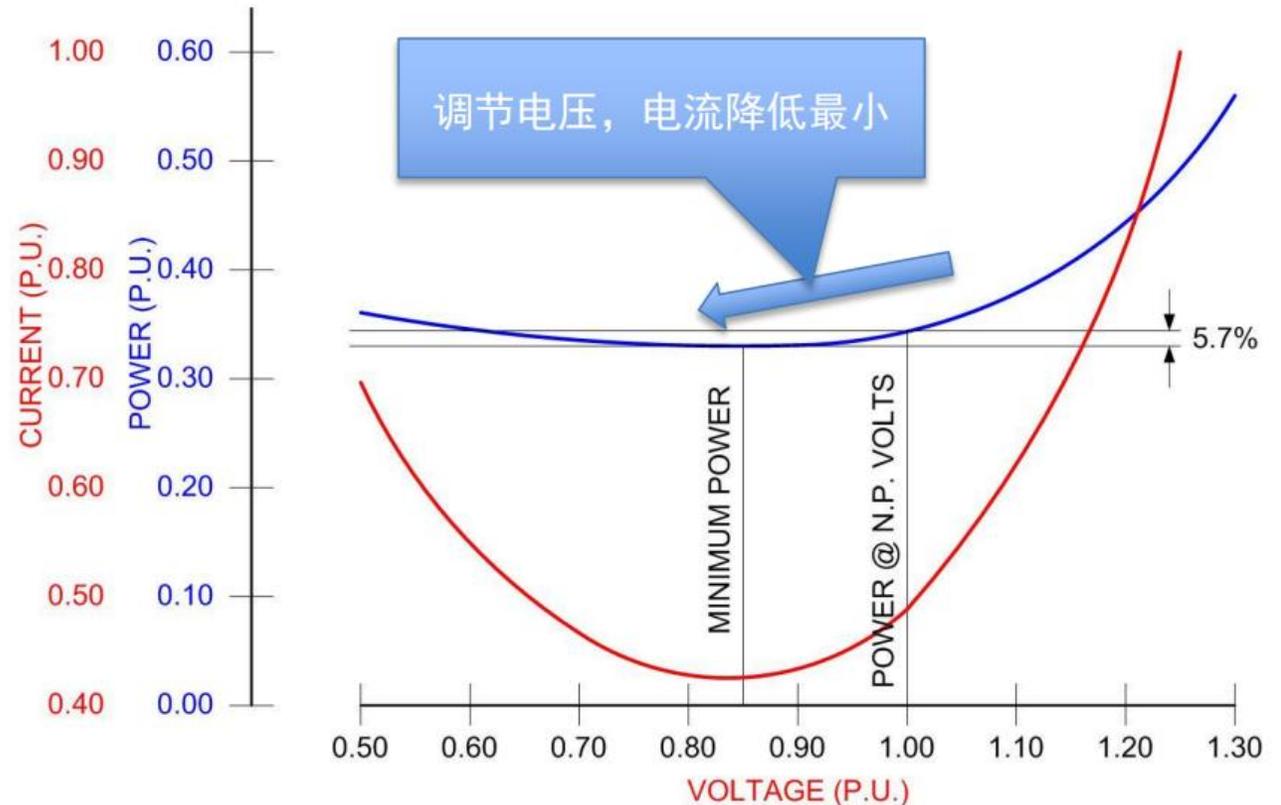
The interior adopts the drawer type modular design, which is convenient for on-site maintenance and replacement of parts, it also shortens the downtime and covers small floor space.

It provides RS485 communication interface and supports standard MODBUS-RTU protocol. The VFD can be connected to the remote monitoring system in the background through wired or wireless mode to monitor and control the operation of the electric submersible pump remotely in real time

The 10-inch industrial touch screen supports real-time switching of Chinese and English display, integrates the display and storage function of electric pump downhole sensor data, provides USB download interface, customer can use a USB disk to download and store various historical operation data, provides customized interface development.

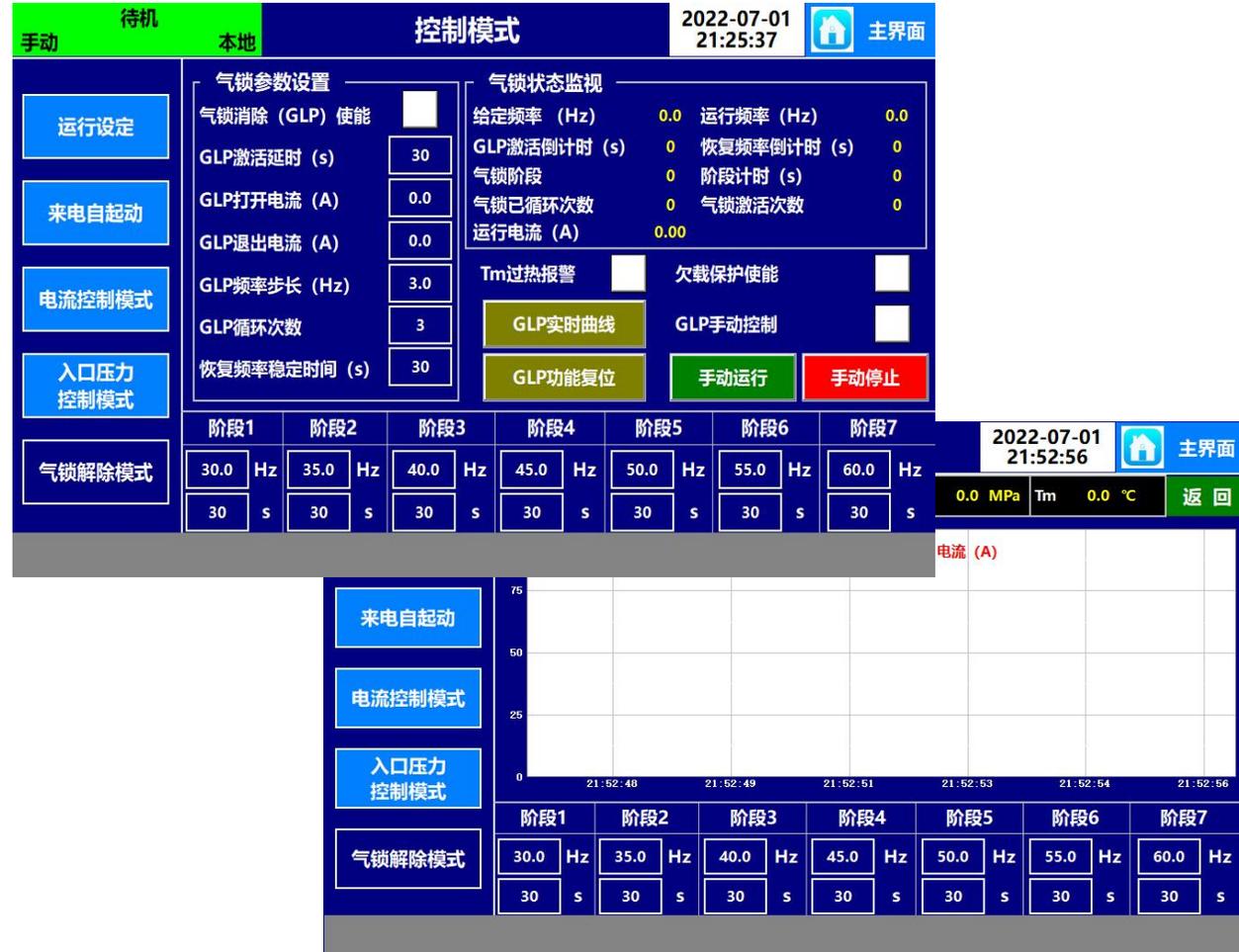
### Energy saving optimization control algorithm

According to the energy-saving requirements of submersion electric pump, a unique energy-saving control function of frequency converter output voltage self-optimization is developed. The algorithm controls frequency converter to automatically optimize the volt-per-hertz voltage frequency ratio of specific operating frequency, so as to find the most efficient configuration with the lowest power consumption. By maintaining a constant frequency, the frequency converter can increase/decrease the output voltage and minimize the energy consumption of the electric submersible pump.



### Gas Lock Algorithm

When the electric pump unit is frequently "Gas locked" in a high gas content well, it can switch to GLP (Gas Lock Protection) mode to try to restore the unit to normal operation. Gas lock release supports automatic and manual control mode. In previous projects in Indonesia, ZJITEK products successfully relieved the "gas lock" shutdown problem faced by five Wells with high gas content.



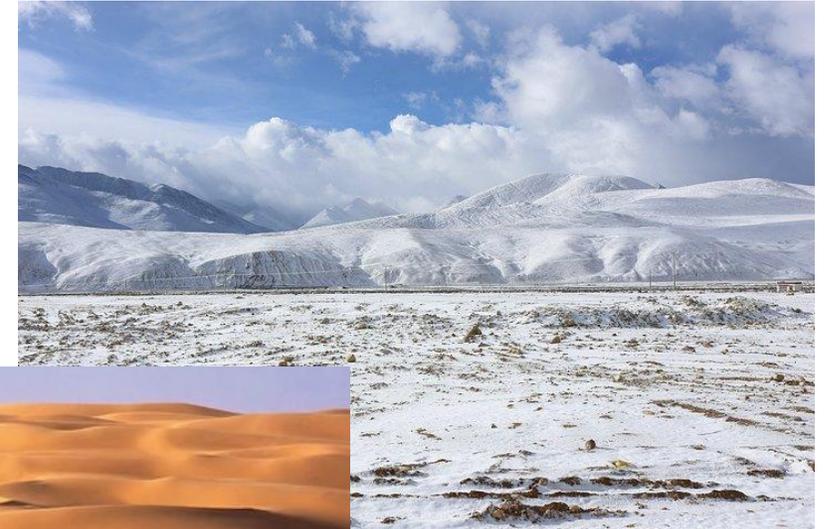
# Medium Voltage VFD

## Introduction

Specifications | Features & Advantages | Applications

### Environment Adaptiveness

- It can operate reliably in the range of  $-40^{\circ}\text{C}\sim+50^{\circ}\text{C}$  ambient temperature for a long time.
- The capacitor of the main loop adopts the film capacitor, which has a longer life than the electrolytic capacitor, and the resistance to low temperature can reach  $-40^{\circ}\text{C}$ .
- Adopt independent cooling duct and high power axial fan imported from Germany, so that the product can work stably at the ambient temperature of  $+50^{\circ}\text{C}$ .
- IP class: IP31 or IP54.



# Medium Voltage VFD

## Introduction

Specifications | Features & Advantages | Applications

### Integrated and extensible capability

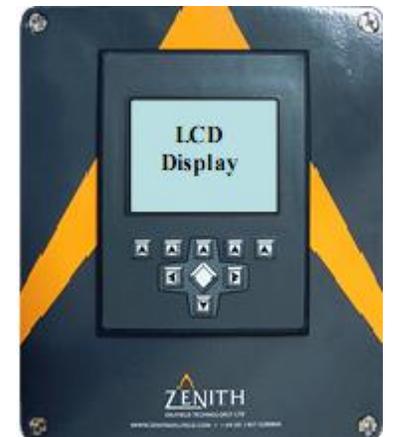
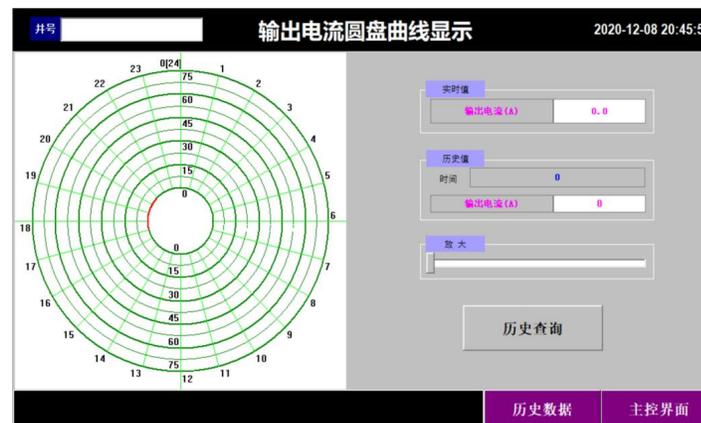
- Integrated pump downhole sensor for data display and storage, support Schlumberger, ZENITH, TRIOL and other pump sensor series.
- Support internal integrated output sine wave filter.
- Support input harmonic filter.
- Extendable input parameter measuring module.
- The electronic circular current card is provided, and the shape of the current card can be viewed directly on the touch screen.



UNICONN



COMM.Card



# Medium Voltage VFD

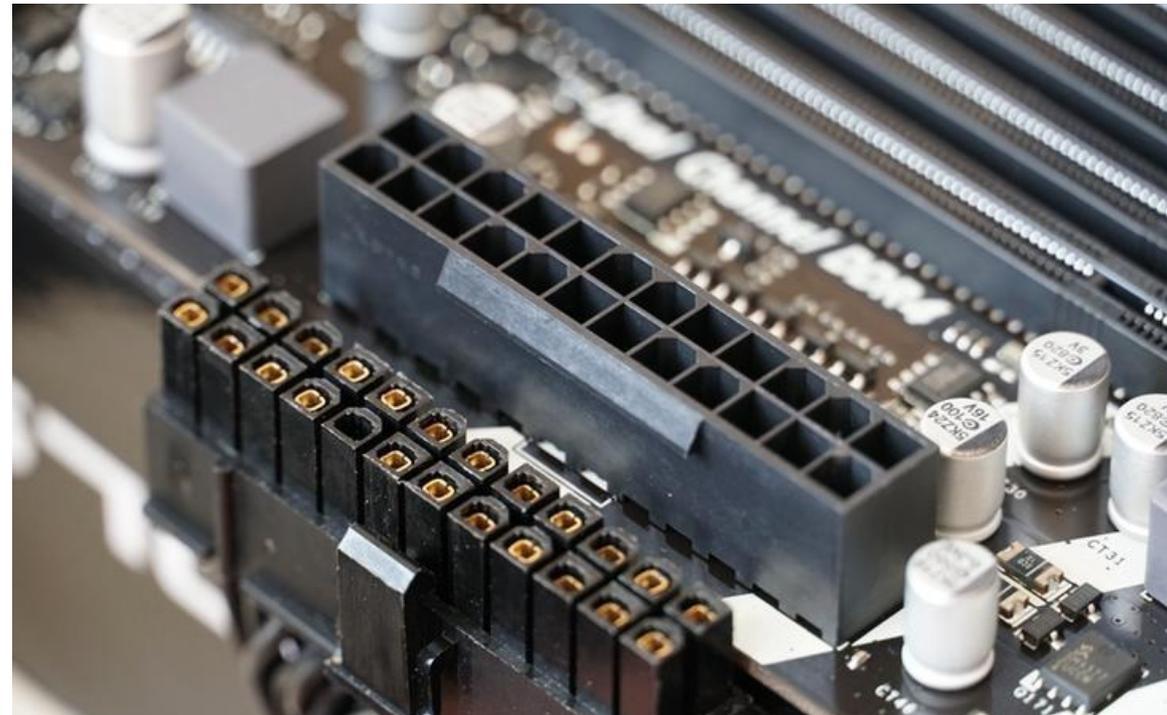
## Introduction

*Specifications | Features & Advantages |*

*Applications*

### User Interface QTY

- 2 ways of AI
- 2 ways of AO
- 4 ways of DI
- 4 ways of DO
- 2 ways of RS485 interface
- Special input interfaces are provided for wellhead pressure protection switch, downhole sensor protection switch and power supply transformer protection switch.



# Medium Voltage VFD Introduction

*Specifications | Features & Advantages | Applications*

## Typical Application Cases of Domestic Market



**Daqing Oilfield**

The first set of 1300V/65A variable frequency prototype was put into production in June 2016 and is still in operation. So far, Invotric has put 72 sets of medium-voltage converters of this specification into production in Daqing oilfield.



**Hunan Anhua hot spring bath well**

Twelve sets of 12-pulse rectifier 1300V/65A converters are used in Anwar Hot Spring project. Since the project is powered by a local 380V civil grid, the use of frequency converters can prevent harmonics from interfering with the grid.



**Xing Jian oil field**

A total of 17 sets of 2600V/65A VFD have been applied in the Xing Jian oil field. Some oil Wells in Xinjiang are powered by gas generators and have deep electric submersible pumps. The input side adopts harmonic filter to suppress grid interference, and the output is equipped with sinusoidal filter to protect the long cable and motor.

# Medium Voltage VFD Introduction

Specifications | Features & Advantages | Applications

## Typical Application Cases of Overseas Market



### Indonesia

Seven sets of integrated skid bodies and 18 sets of VFD have been put into use for Indonesian offshore platform. In order to save space, the integrated skid structure is adopted, and each skid body is fixed with 2-3 VFD cabinets with integrated output filters.



### Chad Oilfield of Africa

One hundred and one sets of 6-pulse 1300V/65A VFD have been put into use for the African Savanna project. The frequency converter is fixed in the pry body with air conditioning, and equipped with input/output filter cabinet.



### Shengli Oilfield

Two sets of 2600V/105A VFD have been used in electric pump Wells of Shengli Oil Field offshore platform. According to user requirements, the VFD with constant frequency switching function and output sine wave built in.

*Low voltage frequency converter for  
electric pumps*

Specifications | Features & Advantages | Applications



02

# Low Voltage VFD Introduction

Specifications | Features & Advantages | Applications

# 4

Series 4

# 3

Application  
Environment

Product Series	Description	Definitions
HP	IP56(NEMA4X), -20°C... + 60 °C; 6/12/18/24 pulse rectification; Suitable for outdoor <b>tropical desert</b>	High Protection
PS	IP56(NEMA4X), -20°C... + 60 °C; Phase shifting transformer; Suitable for <b>outdoor land integral skid structure</b>	PST (Phase-shifting transformer)
LH	IP56(NEMA4X), Stainless steel cabinet, - 20 °C... + 60 °C; 6-pulse rectifier + input filter; Suitable for <b>offshore platforms</b>	Low Harmonic
RS	IP20(NEMA3R), -20°C...+50°C,6/12 pulse rectifier, input harmonic filter optional; Suitable <b>for indoor use</b>	Regular Series

# Low Voltage VFD Introduction

[Specifications](#) | [Features & Advantages](#) | [Applications](#)

Max capacity of per-unit :  
**1200kVA**  
Max capacity of dual-unit:  
**2250kVA**

## Main Parameters of HP Series Products



Rated output current (A)	Rated capacity (kVA)	Full load output capacity with output filter (kVA)	Dimension series	W (mm)	D (mm)	H (mm)	Weight (kg)
160	133	120	No.1	1350	1262	2000	495
250	208	185					544
400	333	300					600
630	524	470	No.2	1690	1262	2000	768
800	665	600					837
1000	831	745					980
1200	998	900	No.3	2134	1262	2178	1366
1400	1164	1050					1454
1600	1330	1200					1562

## Main Technical Specifications

Input voltage: three-phase 380VAC (+ 15%-15%), 480VAC (+ 15%-15%)

Output overload capacity: (150% x rated current), 1 minute, (interval of 5 minutes)

Output frequency: 1.5-80Hz (asynchronous motor control mode)

Control mode: programmable V/f

Starting mode: smooth starting, synchronous starting, torque lifting, swing starting, impact starting

Frequency setting: manual setting, constant current, pump inlet pressure, gas lock release

Mode selection: Manual/automatic switch

Fault record: Records and stores fault types and related information in the last one year

Protection level: IP20, IP56

Cooling method: forced air cooling



# Low Voltage VFD

## Introduction

[Specifications](#) | [Features & Advantages](#) | [Applications](#)

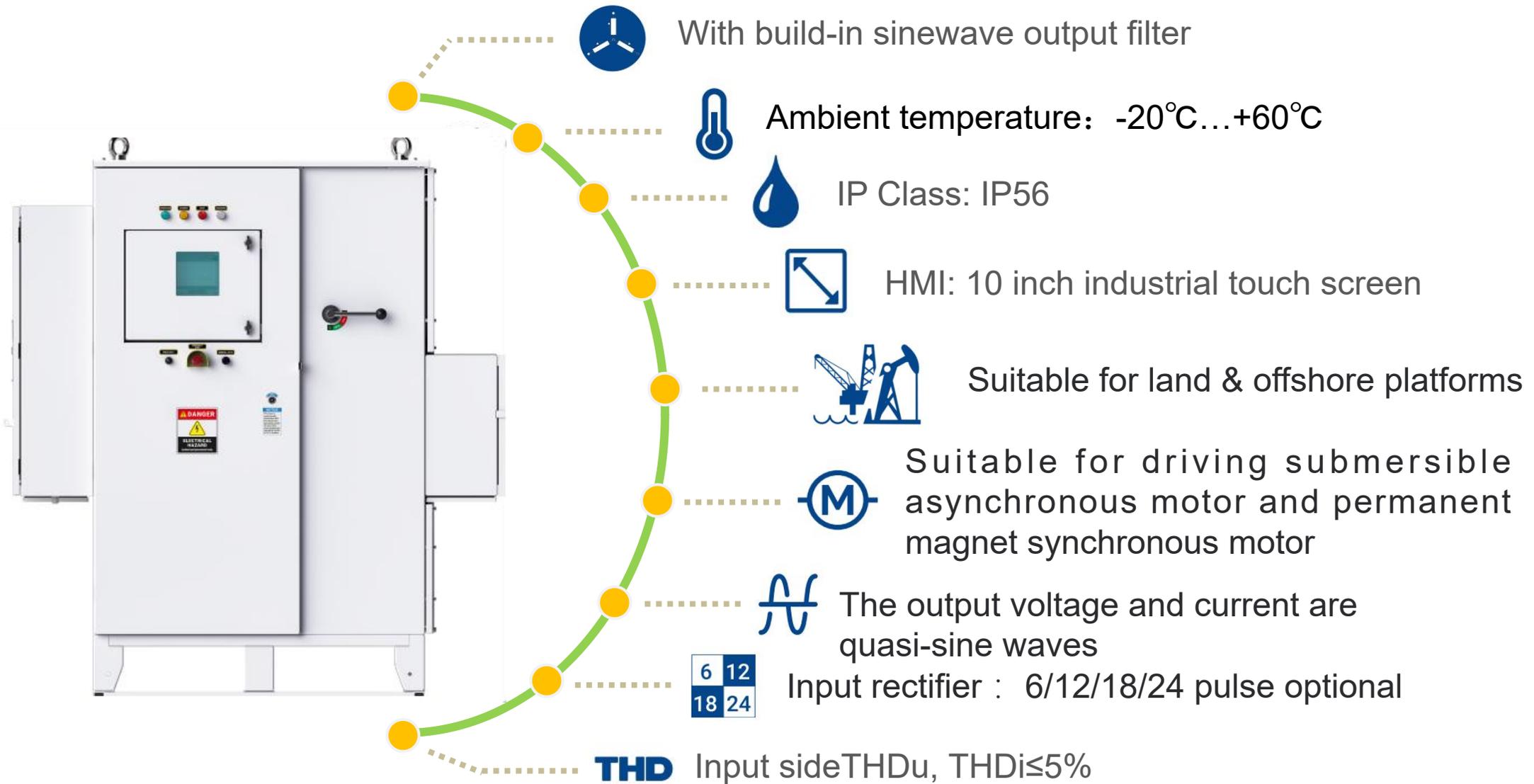
### Major Component Brands and Manufacturers

Name	Brand	Country
IGBT	INFINEON MITSUBISHI	Germany Japan
Rectifier diode	SEMIKRON TECHSEM	Germany Taiwan, China
BUS Capacitors	EPCOS	Germany
DSP&FPGA	Texas Instruments (Texas Instruments) STMicroelectronics	USA Switzerland
Fan	EBM-PAPST	Germany
Optical fiber and Interface	AVAGO	USA
Breaker	Schneider Electric, CHNT	France China

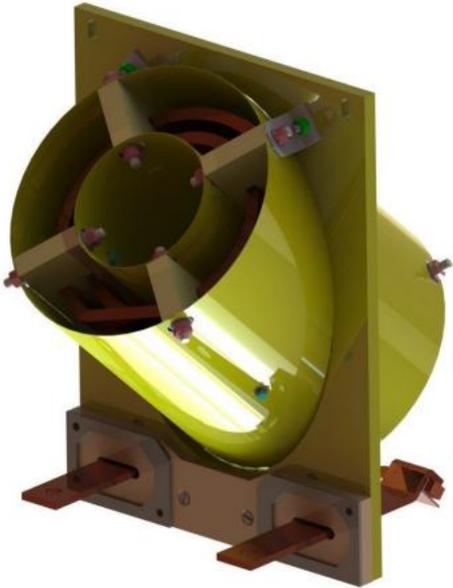


# Low Voltage VFD Introduction

Specifications | Features & Advantages | Applications



## With build-in sinewave output filter



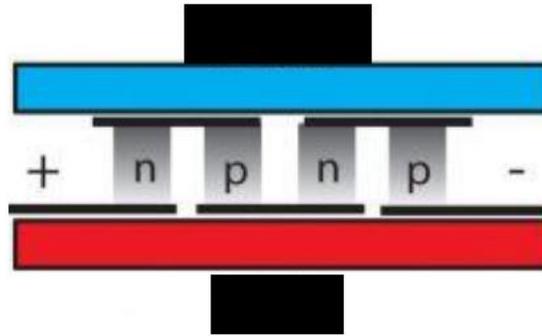
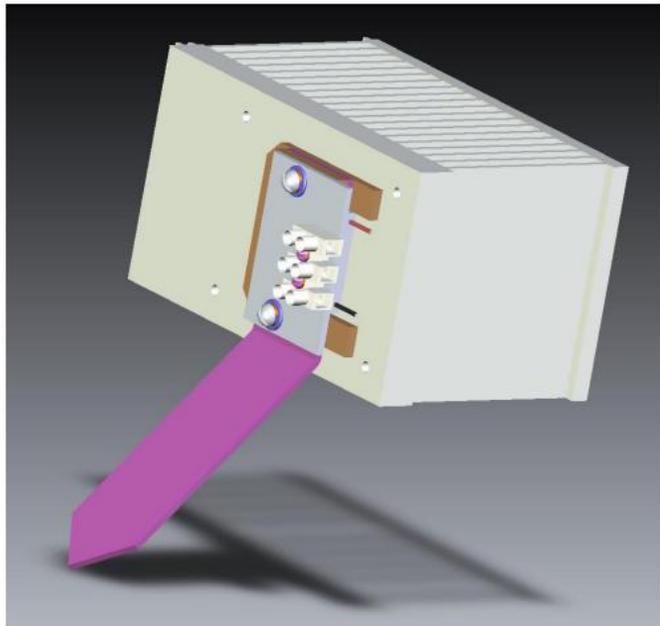
The built-in sinewave filter is specially designed for the application of electric submerged pump. The filter is integrated at the bottom of the converter. The hot air generated by the heat dissipation of the main circuit is forced by the fan to blow through the reactor, and the hot air is forced out through the middle hollow while cooling the reactor. Make the voltage and current waveform applied to the pump load close to the standard sine wave:

- Eliminate the overvoltage phenomenon on the long cable of the output side of the converter.
- Effectively reduce the deterioration of insulation of boost transformer, submersible cable and submersible motor on the output side of converter
- Reduce the noise of booster transformer and suppress the bearing current of submersible motor

# Low Voltage VFD Introduction

Specifications | Features & Advantages | Applications

## *Cabinet humidity control unit*



A humidity control unit is installed on both sides of the bottom plate of the cabinet. The unit is composed of P-type and N-type semiconductors in series. The principle is based on the thermoelectric effect, in which the metal contact points appear to absorb heat on one side and release heat on the other. This effect can be amplified by using semiconductor materials.

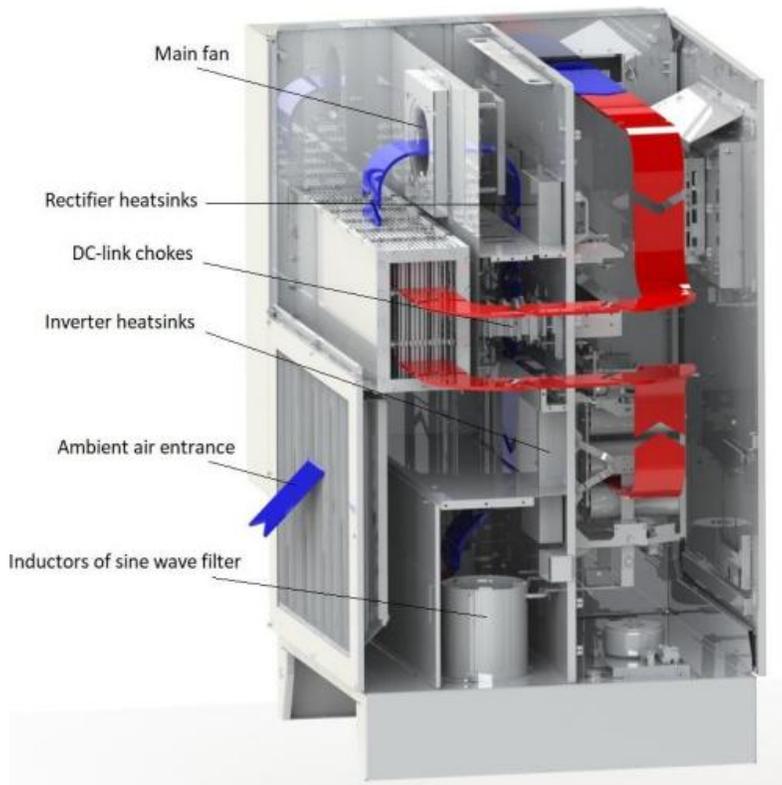
The hot and humid moisture existing in the internal space of the frequency converter cabinet accumulates when it meets the cooling part of the control unit and flows to the lower part of the frequency converter. At the same time, the heat generated by the control unit is taken away by the cooling fan of the cabinet. Humidity control unit can be very effective to prevent moisture accumulation on the surface of electrical parts, prevent parts insulation decline, especially in the morning and evening temperature difference is large environment.

# Low Voltage VFD

## Introduction

Specifications | Features & Advantages | Applications

### *Unique Heat Dissipation Structure (patented)*



The heat dissipation of power devices and control parts in the cabinet adopts channel isolation design. It is more conducive to the stable operation of VSD control system. The blue arrow on the left represents the external cooling air duct, and the red arrow represents the hot air duct in the control area. The hot air is forced by the cooling fan into the aluminum tube radiator at the rear of the converter for cooling, and then recirculated into the control area.

The heat dissipation structure has been applied for invention patent.

# Low Voltage VFD Introduction

Specifications | Features & Advantages | Applications

## Typical Application Cases of Overseas Market



### Halfaya oil field of Iraq

Six sets of IP56 outdoor products are used in Iraq desert environment. The converter is integrated with other equipment in the outdoor pry body without special air conditioning room. It adopts 12-pulse structure and the rated current is up to 1600A.



### *Misan oil field of Iraq*

Eighteen sets of VFD have been applied in the Iraq desert environment, according to user requirements, RS conventional series products designed with protection grade IP20 and input filter installed in the air conditioning room and the rated current up to 1000A.



### Offshore platform of Indonesia

A total of 24 sets VFD have been put into use in the electric submersible pump offshore in Indonesia. In order to prevent salt spray corrosion from affecting the use of frequency converter, it adopts high protection grade with outdoor stainless steel structure, the maximum rated current up to 1000A.

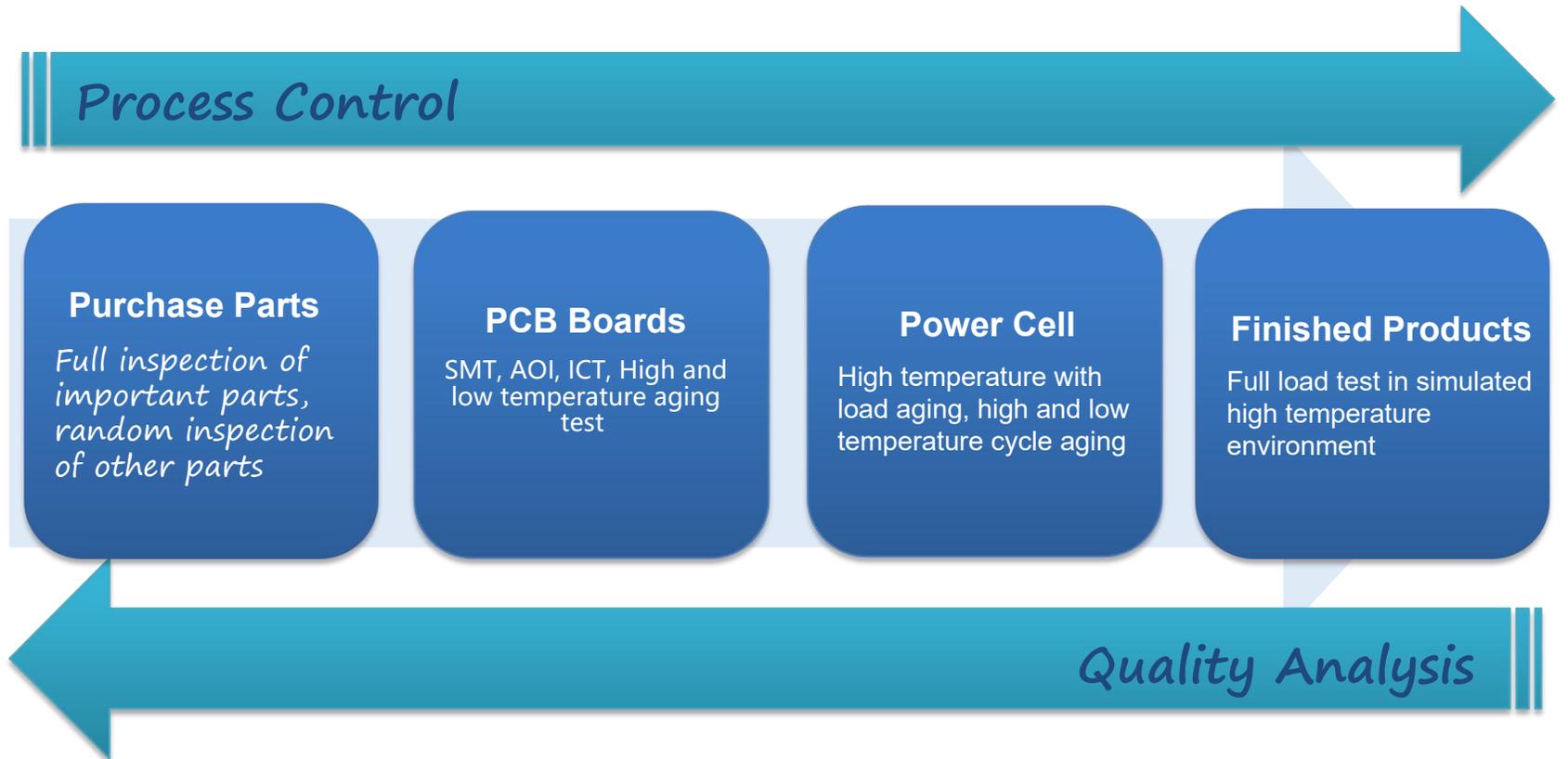


03

# Quality control and service

| Quality control | Service |

# A Strict Process Control



## B Complete Testing Means

### Component Testing

- IGBT module tester, capacitance tester, capacitance leakage test device

### Process Inspection

- Aging, EMI testing, integrated process detection platform

### Inspection of Finished Product

- Multifunctional simulation test system, power quality analyzer, simulation load test device



PCB Test



Power cell  
Assembling



PCB Board  
Burning



Final test

### Reliable Parts Supply Chain

ZJITEK has been committed to optimizing the production process while strictly implementing product quality control. In the production process, we adhere to 5S management, and implement PDCA to continuously optimize product quality and service quality.



Fully automatic SMT production line



Product assembly line



THT Production Line

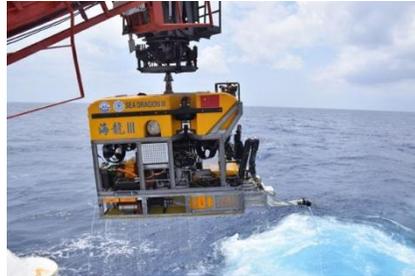


QCC Team

# Quality Control and Service

Quality control | **Service**

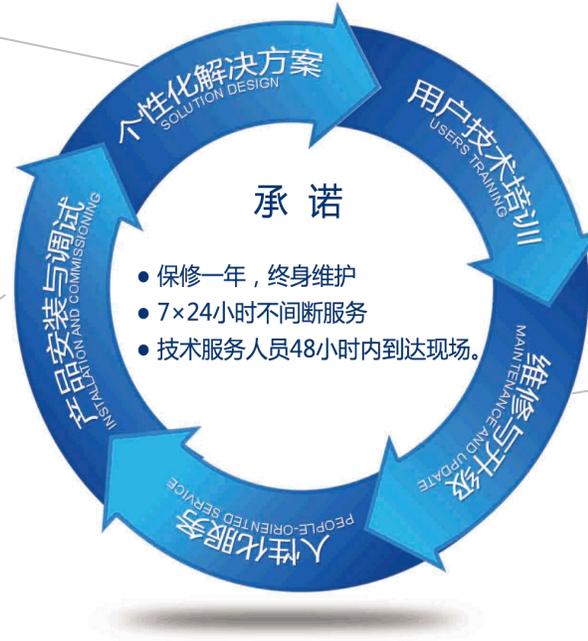
**A** Think what customers think, worry what customers want.



Participate in the construction of electric submersible pump on offshore platform



Xinjiang oilfield after-sales service team



Conduct technical training for customers

Pre-Sale	<ul style="list-style-type: none"> <li>• Field evaluation</li> <li>• User communication</li> <li>• Scheme customization</li> </ul>
Middle-sale	<ul style="list-style-type: none"> <li>• Installation guide</li> <li>• Field debugging</li> <li>• User training</li> </ul>
After-sale	<ul style="list-style-type: none"> <li>• Periodic maintenance</li> <li>• On-site inspection</li> <li>• User training</li> </ul>

# Company Culture

*For the oilfield electric submersible pump to provide cost-effective, reliable surface equipment, and extend to the field of industrial control.*

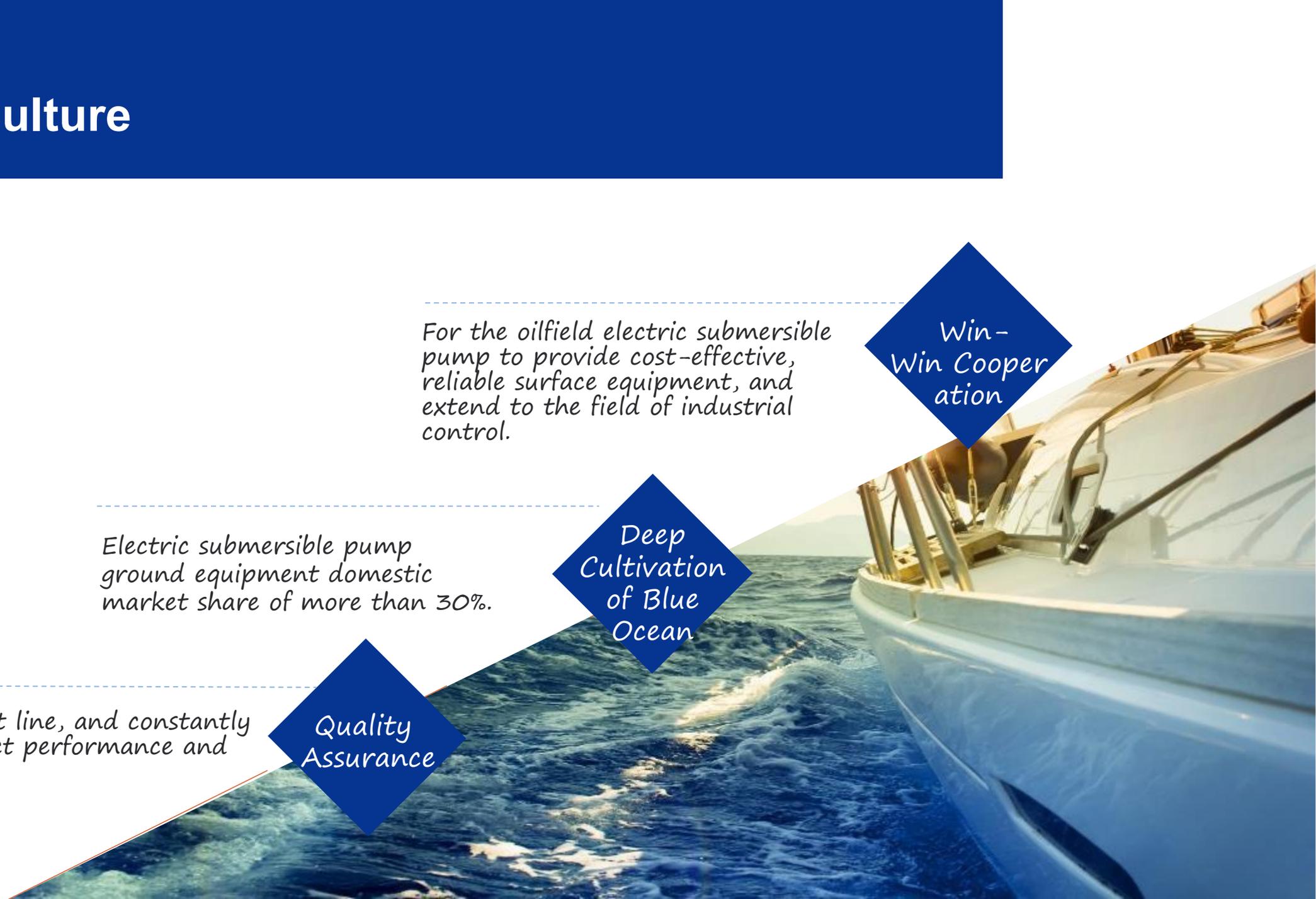
*Win-Win Cooperation*

*Electric submersible pump ground equipment domestic market share of more than 30%.*

*Deep Cultivation of Blue Ocean*

*Expand product line, and constantly improve product performance and service quality.*

*Quality Assurance*



An aerial night view of a city skyline, likely Dubai, featuring a complex highway interchange and numerous skyscrapers illuminated at night. The city extends to the coast where the sea is visible. A semi-transparent blue overlay covers the right side of the image, containing the text.

**Thanks for  
your attention**