Specialized and sophisticated "Little Giant" Firm granted by the Ministry of Industry and Information Technology
Enterprise Technology Centre of Shaanxi Province
Xi'an Post-doctoral Innovation Base

We can offer you:

- High/low voltage soft starters
- High/low voltage frequency converters
- High/low voltage power regulators
- High/low voltage power quality devices

- Industrial power
- Smart heat/smart water utilities
- PLC automatic system integration
- High and low voltage electrical equipment

And solutions for industrial automation systems!!

Xi'an Xichi Electric Co., Ltd.

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It is subject to the latest physical product if the size and parameters of the product change.

XiCHi
Stock code：831081

MaxWell高压变频器

MaxWell High Voltage Variable Frequency Drive

Voltage class：3.3KV-10KV

Power range：185KW-10MW

Xi'an•China

CONTENTS

公司简介
COMPANY PROFILE

Xi'an Xichi Electric Co., Ltd., stock code 831081, is a company specializing in the development, manufacture and sales of power electronics and providing industrial automation system solutions. The company has been awarded the honorary titles including Specialized and sophisticated "Little Giant" firm granted by the Ministry of Industry and Information Technology, Enterprise Technology Centre of Shaanxi Province, Manufacturing Demonstration Enterprise of Shaanxi Province, Technology Innovation Demonstration Enterprise of Xi'an, Xi'an Post-doctoral Innovation Base and High-tech enterprise.

1 Main products

High/low voltage soft starters, high/low voltage frequency conversion devices, high/low voltage power conditioning devices, high/low voltage power quality devices, smart water utilities, smart heat utilities, industrial power supplies, PLC automatic system integration, high and low voltage electrical equipment and industrial automation system solutions!

2 Corporate certification

IS09001 management system, IS014000 environmental management system, OHSAS18000 occupational health management system, IS010012 measurement management system, China CCC and EU CE, safety standardization certificate, enterprise credit rating AAA certificate, technical trade license, construction safety production license, weapons and equipment quality management system certificate.

3 Product application

Electric power, non-ferrous metallurgy, HVAC industry, petroleum and coal chemical industry, municipal engineering, rail transportation, thermal power generation, water conservancy facilities, paper making machinery, scientific research and education, medical and health care, building materials and construction, energy and other industries.

荣誉证书 Certificate of Honour

MaxWell high-voltage frequency converter

General loads

Blower

Pump

Compressor

Belt conveyor

Special loads

Compactors, crushers, extruders, mixers, mills, kilns, etc.

总体概述 General Overview

"MAXWELL H series is a high-voltage frequency converter developed by Xi'an Xichi Electric Co., Ltd. for driving motors. We can provide customers with reliable, high-performance, flexible high-voltage motor drive systems."

Voltage Rating	6KV	10KV
Power range	185KW-0.5MW	200KW-10MW
Power topology	Phase shift transformer + full bridge rectifier + H-bridge inverter	
Output voltage	0-6KV	0-10KV
Output frequency	0-120Hz	
Cooling method	Air cooling	

Application 应用领域

Power industry
- Feedwater pumps
- Primary blower
- Delivery blower
- Exhaust blower
- Mortar pump
- Circulation pump
- Booster pump

HVAC industry
- Compressor
- Circulation pump
- Booster pump
- Lifting pump

New energy
- Water pump
- Compressor
- Blower

Non-ferrous metallurgy
- Blower/slurry pump
- Master liquor pump/induced draft fan
- Seed pump/phosphorus removal pump
- Underflow pumps / Dissolution pump
- Feed pump / dust fan
- Roots fan/ ventilation fan
- Centrifugal feed pump
- Blast furnace blower

Water utilities
- Purification pump
- Clean water pump
- Booster pump
- Sewage pump
- Circulation pump

Petrochemical natural gas
- Water injection pump
- Induced draft fan
- Squeeze pump
- Electric submersible pump
- Main pipeline pump
- Gas compression pump
- Boiler feedwater pump

Building materials and cement
- High temperature fan/kiln tail fan
- Kiln head fan/circulation fan
- Coal mill ventilator/exhaust fan
- Raw mill circulation fan
- Coal mill circulation fan
- Kiln head exhaust fan
- Kiln tail high temperature fan

Rain transport
- Induced draft fan
- Blower
- Pipeline pump

Mining industry
- Main blower
- Drainage pump
- Medium pump
- Crusher
- Mill

Chemical industry
- Boiler blower
- Boiler induced draft fan
- Boiler feed pump
- Condensate pump
- Slag flushing pump
- Mortar pump

产品规格
roduct Specification

MaxWell 6KV series

Product type	Motor power KW	Rated output current A	Weight KG	Dimension (L× W×H) mm
MaxWell-H0185-06	185	23	2030	1850*1770*2350 (A)
MaxWell-H0200-06	200	25	2049	
MaxWell-H0220-06	220	27	2073	
MaxWell-H0250-06	250	31	2109	
MaxWell-H0280-06	280	34	2145	
MaxWell-H0315-06	315	38	2187	
MaxWell-H0355-06	355	43	2236	
MaxWell-H0400-06	400	48	2363	
MaxWell-H0450-06	450	54	2385	
MaxWell-H0500-06	500	60	2410	
MaxWell-H0560-06	560	67	2479	
MaxWell-H0630-06	630	75	2609	
MaxWell-H0710-06	710	85	2664	
MaxWell-H0800-06	800	94	2773	
MaxWell-H0900-06	900	106	2894	
MaxWell-H1000-06	1000	117	3060	
MaxWell-H1120-06	1120	131	3268	
MaxWell-H1250-06	1250	144	3502	
MaxWell-H1400-06	1400	161	3577	

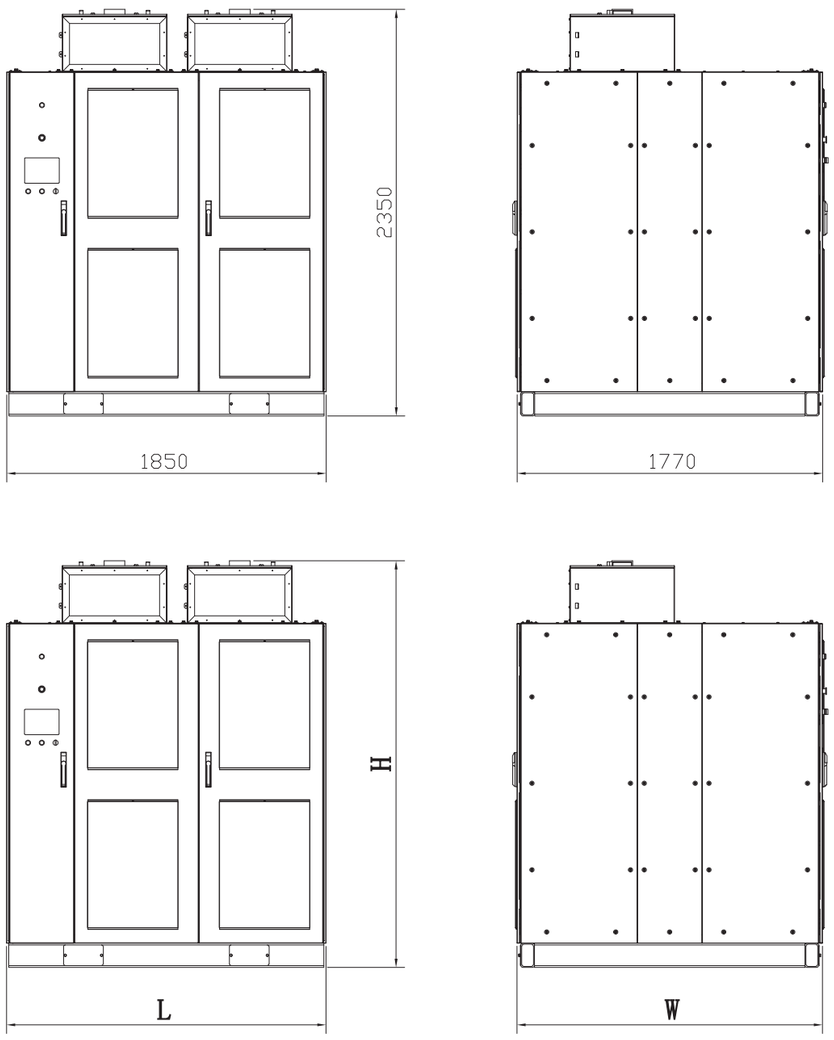
Note: Reference 6kv three-phase asynchronous motor 6kv/50Hz, actual selection needs to be determined according to motor current

MaxWell 10KV series

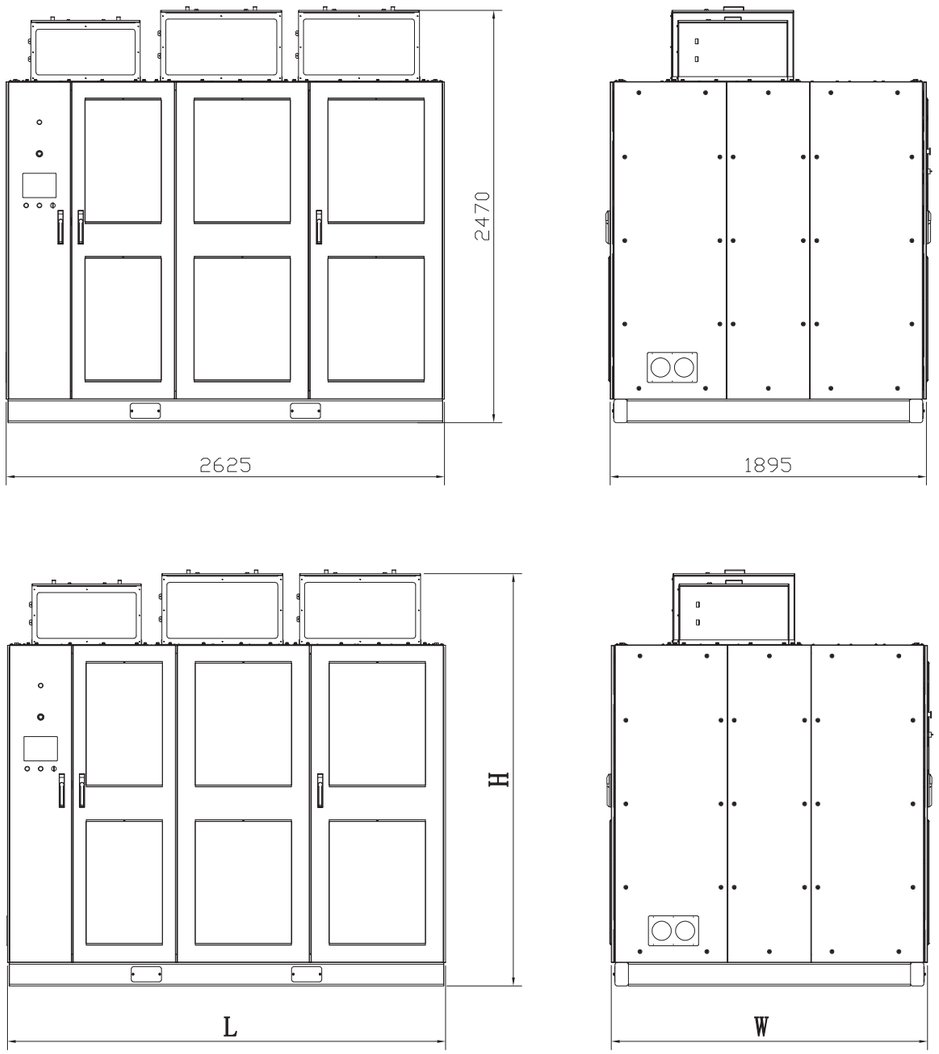
Product type	Motor power KW	Rated output current A	Weight KG	Dimension (L× W×H) mm
MaxWell-H0220-10	220	17	2163	1850*1770*2350 (A)
MaxWell-H0250-10	250	19	2202	
MaxWell-H0280-10	280	21	2241	
MaxWell-H0315-10	315	24	2286	
MaxWell-H0355-10	355	26	2338	
MaxWell-H0400-10	400	29	2475	
MaxWell-H0450-10	450	33	2505	
MaxWell-H0500-10	500	36	2526	
MaxWell-H0560-10	560	40	2600	
MaxWell-H0630-10	630	45	2740	
MaxWell-H0710-10	710	51	2799	
MaxWell-H0800-10	800	56	2916	
MaxWell-H0900-10	900	63	3046	
MaxWell-H1000-10	1000	70	3225	
MaxWell-H1120-10	1120	79	3848	
MaxWell-H1250-10	1250	87	4100	2625*1895*2470 (B)
MaxWell-H1400-10	1400	97	4180	
MaxWell-H1600-10	1600	110	4610	
MaxWell-H1800-10	1800	124	4990	
MaxWell-H2000-10	2000	138	5180	
MaxWell-H2250-10	2250	154	5573	

Note: Reference 10kv three-phase asynchronous motor 10kv/50Hz, actual selection needs to be determined according to motor current

D外形尺寸
imensions



Dimensional drawing A



Dimensional drawing B

Product Features

1. Input current harmonics

Multi-pulse rectification using transformer phase shift technology, 30 pulses for 6kv systems and 48 pulses for 10kv systems.
Meets IEEE519-2014 standard.
Input filterless.

2. Input power factor

The input transformer phase shift technology combined with cascade modules provide the reactive power required by the motor with an input power factor of up to 0.96. After the motor has passed through the high voltage inverter, no reactive power compensation equipment is required.

3. Output voltage waveform

Module-cascaded technology, H-bridge inverter, module output superimposed to form multilevel, output perfect sine wave to ensure the motor work in better condition. It is adaptable to new and old motor.

4. Overall efficiency

Efficiency up to 97%, better electromagnetic design for phase shifting transformers to reduce losses, and IGBT uses international first-tier brand.

5. Grid adaptability

Output voltage fluctuation range -15%-+15%, frequency fluctuation -10%-+10%. Within the fluctuation range it ensures the output rated voltage by output injection harmonic control. It can work with the minimum voltage -45%. When the grid momentarily loses power, the high voltage frequency converter will enter the momentary power loss non-stop function to maintain the motor working, and if the grid is recovered before the system energy storage is depleted, the system will continue to work.

6. Lightning protection

The mains input, output, control power input and communication signals are protected against lightning.

7. Modular design

The control system, electrical system, power module, fan system and detecting unit adopt modular design, being highly reliable, easy to maintain and easy to operation.

8. All-in-one design

10KV 1-2MW, one design for the structure size in the power section, 10KV 1-2.25MW, 10KV 200KW-1 MW and 6KV 185KW-0.8MW. Small in size and space saving.

9. Low voltage soft-start function

The phase shifting transformer is switched to the grid on the high voltage side after the transformer has output a normal voltage by means of a low voltage soft start. The soft start ensures that the phase shifting transformer is switched to the grid without inrush current.

10. Control power

The power supply of the control system adopts a modular design and a dual redundant power supply, with one from low voltage and one from high voltage. The core memory chip inside the control system is powered by a super capacitor to ensure the operation of data storage when the system is powered down.

11. Multiple motor control options

Depending on the motor applications, VF control, vector control and direct torque control (DTC) are available to suit various motor loads.

12. Fault protection

Motor overcurrent protection, output overload protection, input overvoltage and overcurrent protection, phase shifting transformer overheat protection, communication fault protection, power unit fault, output short circuit protection, IGBT overcurrent protection, operation gate open protection, etc.

13. Rich user interfaces

It has interfaces for RS485, analogue input, analogue output, digital input, digital output, encoder input, power control, power output, high voltage circuit breaker control and detection, emergency stop, etc. to meet a wide range of applications.

14. Power module design

Independent duct design, adaptable to various industrial applications. Interference-free fibre optic control signals. Module control adopts DSP digital control.

15. Master control system

DSP+FPGA architecture is used to complete motor algorithms, logic control, fault handling, SVPWM regulation, communication, signal processing and other functions to perform motor control accurately, quickly and reliably.

16. Interference-free switching technology

High-voltage frequency converter can achieve synchronous motor or asynchronous motor soft start, with motor starting from 0HZ and gradually running to the grid frequency of 50HZ. Then the motor switches from the frequency conversion state to the industrial frequency grid, with the switching process smooth and there is no impact current on the motor so as to ensure the safe operation of the motor.

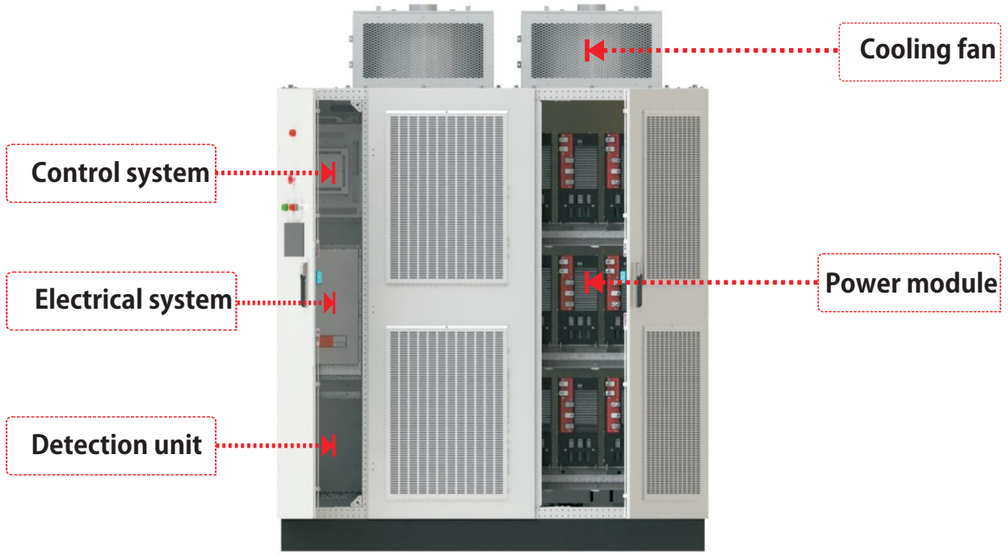
17. Easy maintenance

With a modular design, each part is a separate module, and it only needs to handle the corresponding module during maintenance, allowing the ventilation dust screen to be replaced or cleaned under normal operation.

18. Highly adaptable to the environment

Protection class IP30; pollution class II. It meets start-up at -15℃ and can work at a maximum temperature of 55℃;
Storage and transport temperature -40℃to +70℃;
The complete machine passes the Class III road transport test;
Power module, control system, detection unit, electrical system and other modules pass the 0.6m drop test and vibration test.

工作原理
Principle Of Operation

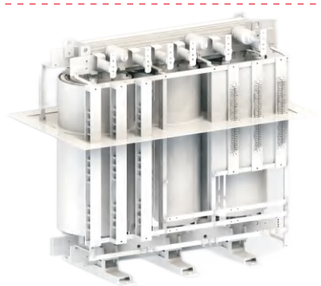


The high voltage frequency converter mainly consists of phase shifting transformer, power module, control system, electrical system, detection unit, heat dissipation fan, etc. The output of each phase of the power module is cascaded to achieve 6KV or 10KV high voltage output. The power modules are cascaded to form multi-levels to effectively reduce output voltage harmonics and provide high quality drive energy for the motor.

Phase shifting transformer

The primary high voltage input is converted into the multiple secondary voltages required by each power module, while phase shifting and electrical isolation of the primary and secondary voltages is achieved, reducing harmonics in the primary high voltage input.

The primary side of the transformer winding adopts star connection and the secondary side adopts extended triangle connection. There is a fixed phase difference between windings, which forms a multi-pulse rectification method. The harmonic currents of windings on the secondary side of the transformer offset each other and are not reflected to the primary side, suppressing the high voltage input current harmonics and eliminating the harmonic pollution of the high voltage frequency converter to the grid.



Power module

The input voltage is the secondary winding voltage of the phase-shifting transformer. After three-phase full-wave rectification, AC is converted to DC, and DC is inverted to AC through H-bridge.

Multiple power module outputs are cascaded to form the high voltage frequency converter output. The individual power module outputs are equal-amplitude PWM voltage waveforms, with a defined phase shift between power unit outputs, and the cascade forms a stepped PWM waveform at the high voltage frequency converter output, similar to a sine wave, which greatly reduces the high harmonics at the high voltage frequency converter output.

Control system

The user-side information and internal signals are processed to control the inverter output of each power module to obtain an AC output with adjustable voltage amplitude and frequency for variable speed control of the motor.

Electrical system

The low voltage side input provides power and control for the various parts of the high voltage frequency converter and enables the normal operation of the high voltage frequency converter.

Detection unit

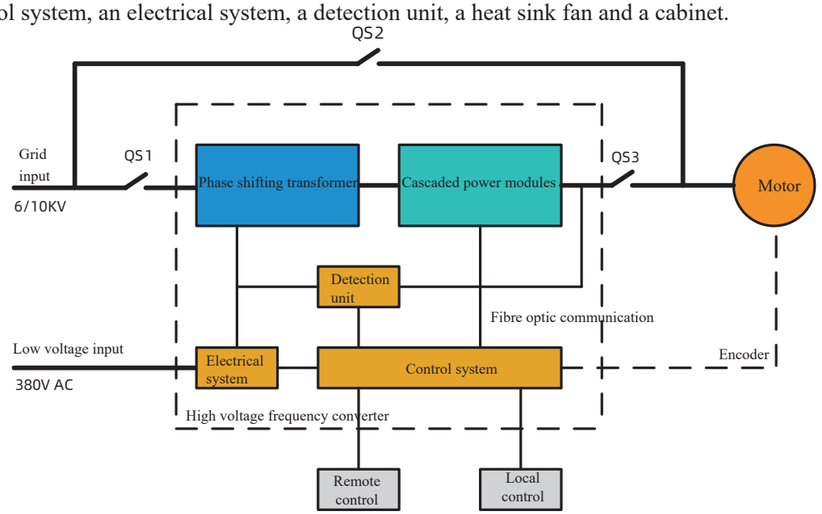
Enables high-voltage to low-voltage signal detection, providing controllable signals for control units and electrical systems.

Cooling fan

The fan carries away the heat generated by the phase shifting transformer and power module through the air ducts, controlling the temperature of the phase shifting transformer and power module within the specified limits.

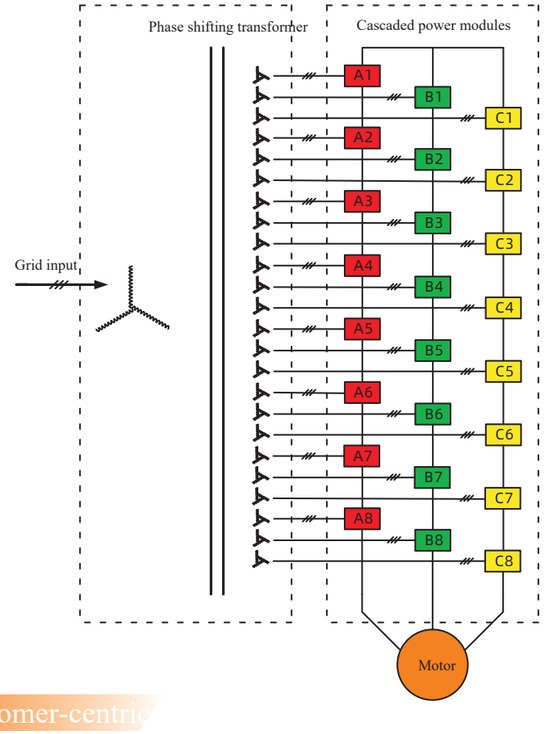
1. System composition

The high voltage frequency converter consists of a phase shifting transformer, a power module, a control system, an electrical system, a detection unit, a heat sink fan and a cabinet.



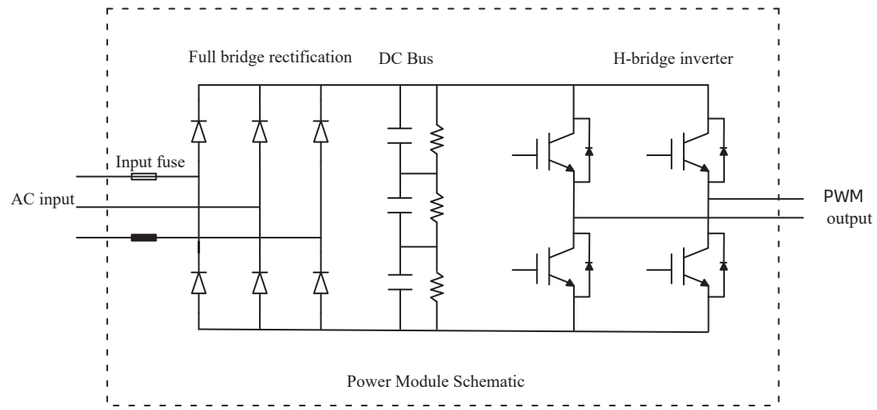
2. Power topology

Phase shifting transformer+ power module



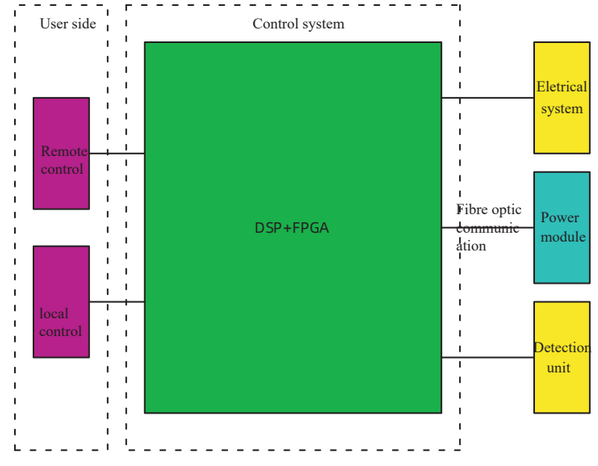
3. Power unit

The power unit converts AC to DC via full-bridge rectification and the H-bridge inverts the PWM output. The core component IGBT adopts Infineon or Fuji control chip TI.



4. Control system

The control system uses a DSP+FPGA solution, with the DSP carrying out the motor control algorithms and logic control and the FPGA mainly completing the PWM control of the module.



5. Electrical system and detection unit

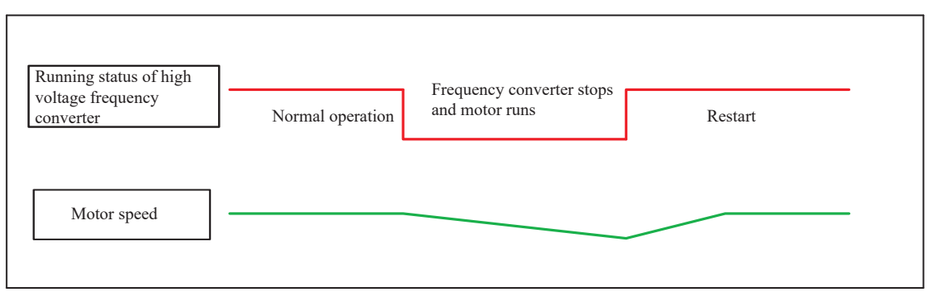
Electrical system: low voltage side input and supply power to the power supply section.

Detection unit: detect the signals on the high and low voltage side and convert them into the signals required by the control system by means of regulation.

运行功能
Operating Functions

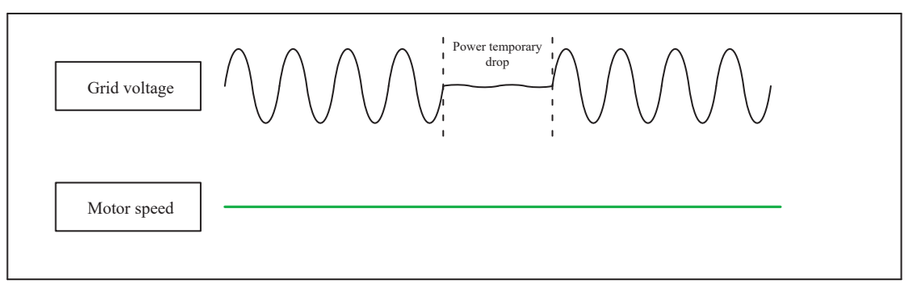
1. Automatic speed tracking start

When the high voltage inverter is started, if the motor is found to be still running, the high voltage frequency converter will automatically detect the running status of the motor and the frequency converter will start at the current speed. The motor will not be over-current during the starting process and it will be driven to work at the set speed.



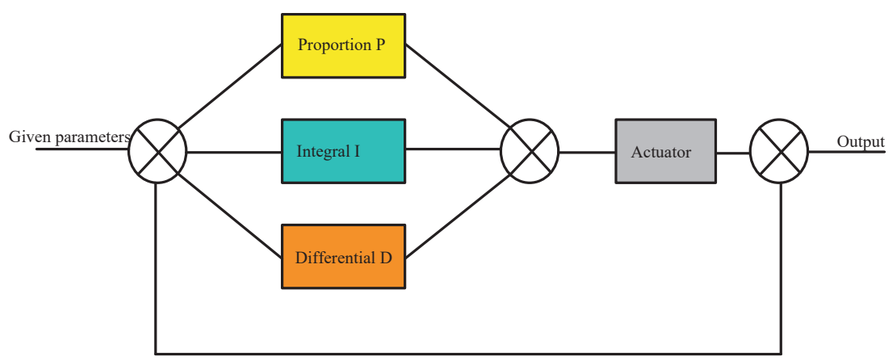
2. No shutdown during momentary power failure

In the event of an alarm such as a power failure or undervoltage on the high voltage frequency converter, the output of the high voltage frequency converter continues to track the motor speed, maintaining the motor at its original speed for the duration of the power failure.



3. PID controller

A PID controller is reserved for the high voltage frequency converter. PID parameters can be set for flow control, pressure control, temperature control, etc. The output of the PID can be used as the frequency of the frequency converter.



4. Multi-speed control

The operating frequency can be selected according to the configuration of the multi-speed frequency terminals, with four terminals allowing for setting of sixteen-speed frequency.

5. Special functions

Motor braking: select the motor DC braking or excitation braking mode according to the application;
Torque boosting: during motor acceleration and deceleration and steady-state operation, this function can be set enabled according to operational needs. Under the premise that the output of the frequency converter is not overcurrent, the output torque of the motor is increased to improve the dynamic performance of the system.
Frequency hopping function: the frequency converter can avoid the operation at certain frequency bands according to the site operation needs;
PLC function: the output of the frequency converter can change the operating frequency band according to the command received, and the acceleration and deceleration rate when switching between the frequency bands can be set;
S-curve acceleration and deceleration: according to the needs of the process, the acceleration and deceleration curve of the output of the high-voltage frequency converter can be changed according to the S-curve set by the user.

技术参数
echnical Parameters

Power input	
Input voltage	Voltage class 6KV or 10KV, output rated power is output when voltage fluctuation range is within -10%~+10%. Output power is derated within -45%~-10%.
Input frequency	50Hz，frequency fluctuation range -10%~+10%
Input current harmonic	THDI≤4%, meeting international standard IEEE 519-2014 and national standard GB/T 14549-93 power quality standard
Input power factor	Up to 0.96

Power output	
Output voltage range	0~6KV or 0~10KV
Output frequency	0-120Hz
System efficiency	Up to 97%
Output overload	Work for a long time with the load less than 105%, and inverse time protection enables within 110% ~ 160%.
Output current harmonic	THDI≤4%, meeting international standard IEEE 519-2014 and national standard GB/T 14549-93 power quality standard

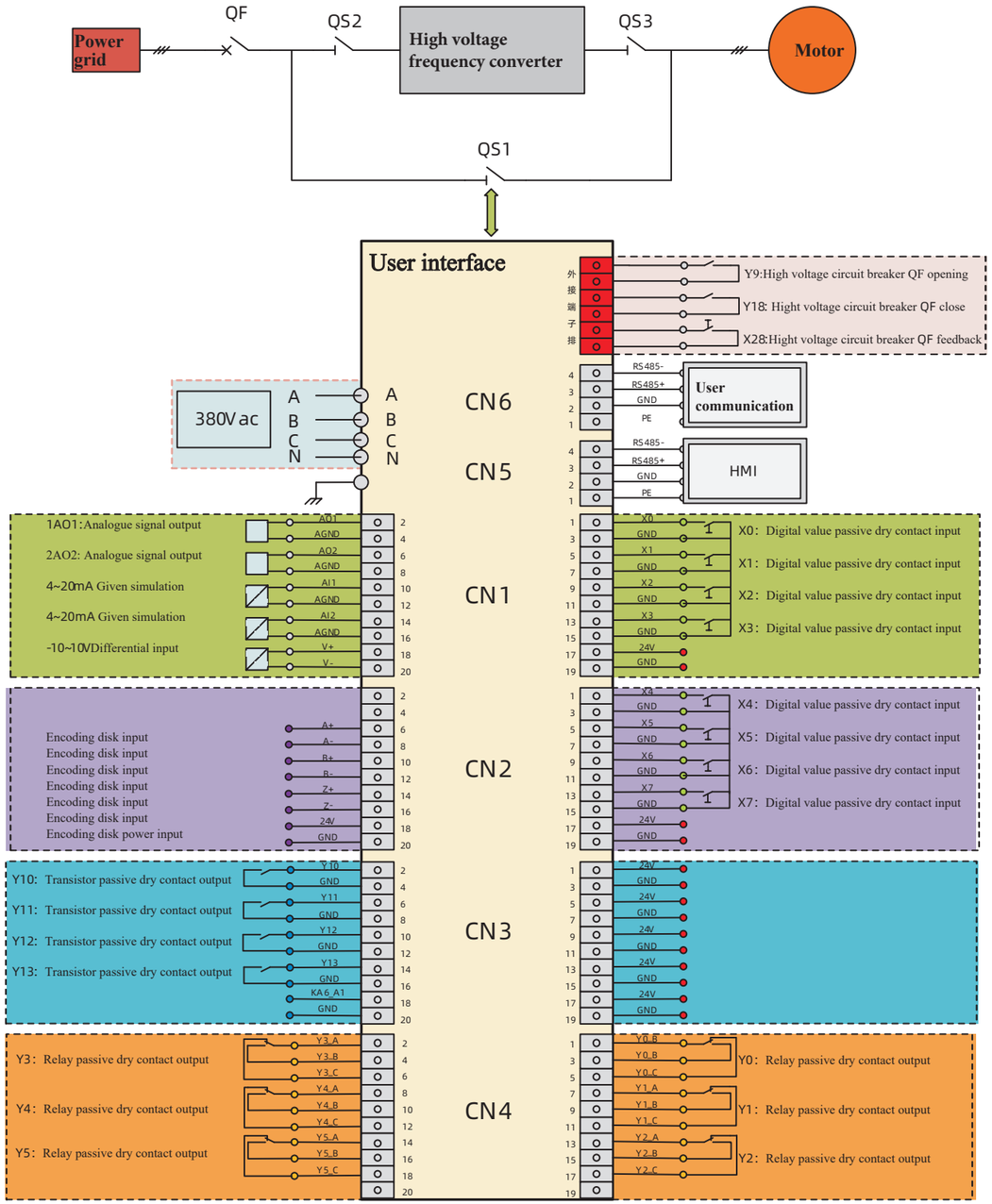
Control mode	
Control mode	V/F, VC control without speed sensor, VC control with speed sensor
Acceleration/ deceleration time	0.1-3600S
Frequency resolution	Digital setting 0.01Hz, analogue setting 0.1 x set maximum frequency
Frequency accuracy	Digital setting ±0.01% max. frequency, analogue setting ±0.2% x set max. frequency
Speed resolution	Digital setting 0.01Hz, analogue setting 0.1 x set maximum frequency
Speed accuracy	±0.5%
Speed fluctuation	±0.3%
Starting torque	Larger than120%
Excitation braking	Braking time 0-600S, starting frequency 0-50Hz, braking current 0-100% of rated current
DC braking	Braking time 1-600S, starting frequency 0-30Hz, braking current 0-150% of rated current
Automatic voltage regulation	When the input voltage varies within -10% to +10%, the output voltage can be kept constant automatically and the rated output voltage fluctuates by no more than ±3%.

Machine parameters	
Cooling method	Air cooling
Protection class	IP30
Insulation class for phase shifting transformers	Class H (180℃)
Local operation mode	Touch screen
Auxiliary power supply	≥20KVA

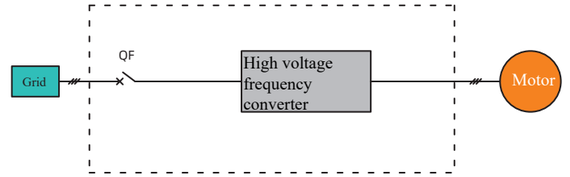
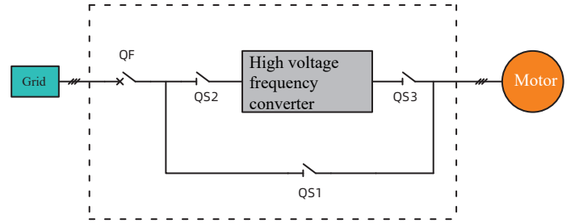
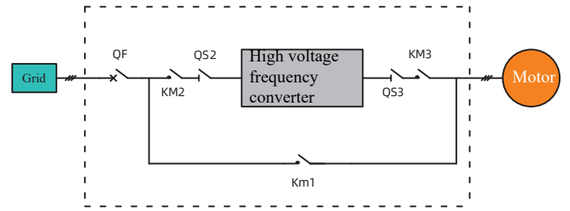
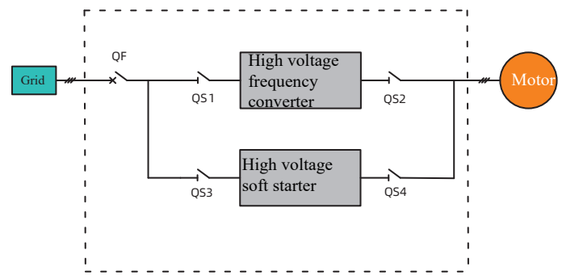
Environmental adaptability	
Ambient operating temperature	0~+40℃ It can start directly at -15°C, and capacity derates for use at 40°C to 55°C
Ambient storage temperature	-40℃~+70℃
Ambient transport temperature	-40℃~+70℃
Relative humidity	5%-95%RH no condensation
Altitude	less than 2000m
Installation site	Indoor
Contamination level	Contamination level 3 and occasional conductive contaminants are allowed

User interface	
Analogue input	3
Analogue output	2
Communication interface	2
High voltage circuit breaker control	1
Code plate interface	1
Relay type dry contact output	6
Transistorised dry contact output	4
Multi-functional terminal input	8
Power supply interface	380V AC

U用户接口
ser Interface



S系统解决方案
ystem Solutions

Working mode	System composition	Working principle
Variable frequency operation		Variable frequency mode：QF close
Operation of manual switching between variable frequency and power frequency		Variable frequency mode: QS2, QS3, QF close Power frequency mode: QS2, QS3 open QF, QS1close
Operation of automatic switching between variable frequency and power frequency		Variable frequency mode:QS2, QS3, QF, KM2, KM3 close Power frequency mode: QS2,QS3, KM2, KM3 open QF、KM1close
Motor runs in dual mode		Variable frequency mode:QS1, QS2, QF close ; QS3, QS4 open Soft start mode: QS3, QS4, QF close ; QS1, QS2 open

Remarks:

1. In operation of manual switchover between variable frequency and power frequency, high voltage frequency converter needs to be shut down during the switchover between variable frequency and power frequency.
2. In operation of automatic switchover between variable frequency and power frequency, high voltage frequency converter automatically complete the switchover between variable frequency and power frequency and does not need to be shut down.

1. Load of square torque characteristics

The relationship among motor speed, flow/air volume, head/pressure and power is as follows:

Working status I:

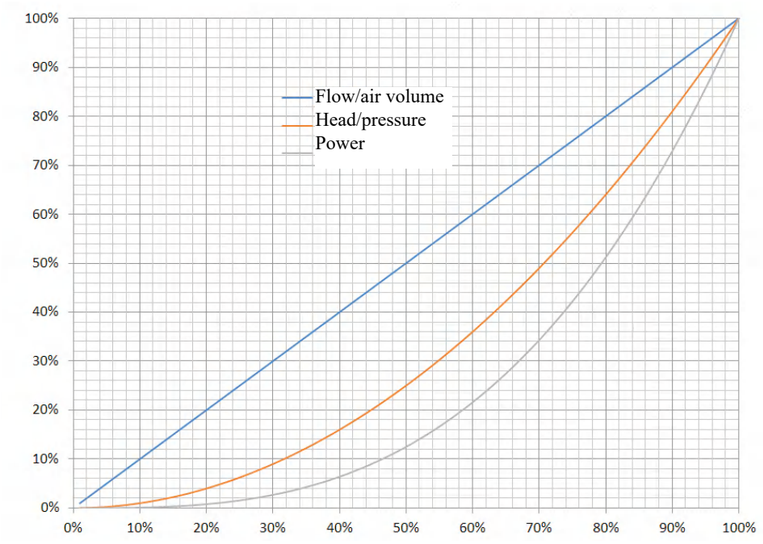
Motor speed (N1), flow/air volume (Q1), head/pressure (H1), power (P1)

Working status II:

Motor speed (N2), flow/air volume (Q2), head/pressure (H2), power (P2)

$$\frac{Q1}{Q2} \propto \left(\frac{N1}{N2}\right)$$
$$\frac{H1}{H2} \propto \left(\frac{N1}{N2}\right)^2$$
$$\frac{P1}{P2} \propto \left(\frac{N1}{N2}\right)^3$$

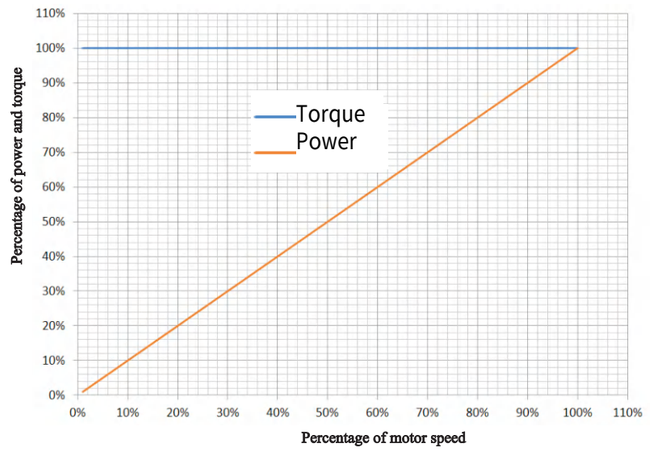
Flow/air volume, head/pressure and power changes are the primary, secondary and tertiary relationships for speed changes respectively. When the motor speed changes, the power will change in a cubic relationship and the power will decrease or increase very significantly.



Type of load: fan, pump

2. Load of constant torque characteristics

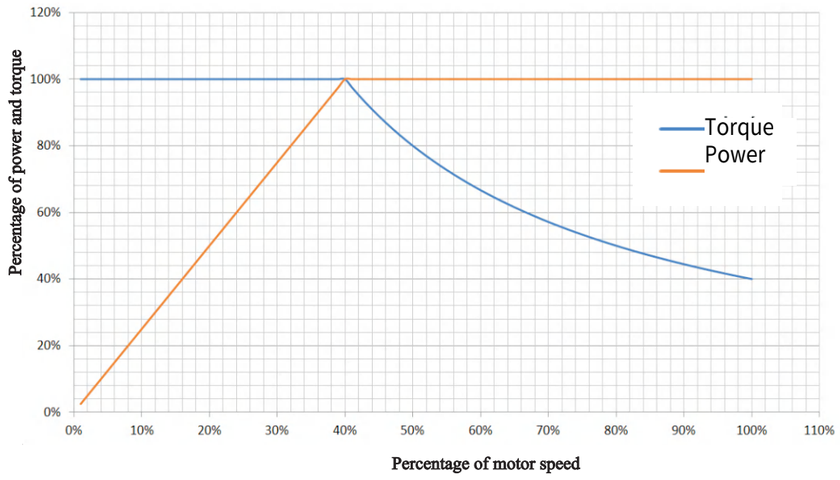
With the load of constant power, the motor output torque remains constant over the motor speed range and the change relationship of torque and power is linear, as shown in the following diagram:



Type of load: belt conveyor, elevator, mixer, compactor, etc.

3. Load of constant power characteristics

With the load of constant power , the motor output torque is constant at a certain speed in the motor speed range. As the speed increases the motor power increases to a certain speed, then the output power of the motor remains constant. The change relationship of torque and power is linear, shown as below:



Type of load: rolling mills, construction vehicles, etc.

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Service network for domestic market 20+

An international business unit has been established for overseas customers to provide a multi-faceted support service.

Memo