GH Series Medium and High Voltage Inverters

冶炼行业

In the metallurgy industry, GH series frequency inverters are required to drive high-power and large-flow equipment. The stability of GH series frequency inverters is further improved. Typical applications include:

- slurry pumps, induced draft fans, deslagging pumps, ventilation fans, dust extraction fans, centrifugal feed pumps, blast furnace blowers, etc.

石化行业

In the petrochemical industry, GH series frequency inverters can be seamlessly integrated into the station control system without modifying existing motors and wiring, fully competent for new construction/transformation projects. Typical applications include:

- water injection pumps, induced draft fans, extrusion pumps, electric submersible pumps, main pipeline pumps, gas compressors, boiler feed water, etc.

水泥行业

In the concrete industry, Through modular design, GH series frequency inverters simplify installation, debugging, and maintenance in the cement industry. Verified to have more reliable performance, typical applications include:

- raw material mill fans, raw material removal fans, preheater fans, coal fans, mills, rotary kilns, high-temperature fans, etc.

电力行业

In the power industry, Traditional control methods are not only inefficient but also very troublesome to maintain. GH series frequency inverters provide more reliable, precise, and effective direct drive speed regulation control. Typical applications include:

- feed water pumps, primary fans, supply fans, induced draft fans, ash pumps, circulating pumps, booster pumps, condensate pumps, and sewage pumps, etc.

有色行业

In the Non-ferrous metal industry, GH series frequency inverters adopt power unit series multilevel technology to meet the needs of load speed regulation, energy saving, and production process improvement. Typical applications include:

- ID fans, mother liquor pumps, seed pumps, diaphragm pumps, digestion pumps, and material conveying pumps, etc.

煤矿行业

In the coal mining industry, In large conveyor belt applications, precise torque control and automatic load balancing in multi-machine control are critical. The GH series frequency inverters well respond to such needs. Typical applications include:

- Belt conveyors (including the mode of multiple motors driving the same belt), mixing/grinding machines, various slag slurry pumps, water pumps, various fans, compressors, etc.

INDUSTRY APPLICATION

Common applications	Electricity: induced draft fan, primary/secondary fan, circulating water pump, feed water pump, condensate pump, slurry circulating pump, vertical coal mill
	Oil, gas and chemical industry: electric submersible pumps, water injection pumps, oil transfer pumps, pipeline compressors, LNG compressors, air separation compressors, syn gas compressors, ammonia compressors (ice machines)product gas compressors, propylene compressors, carbon dioxide compressor
	Mining: belt conveyors, main fans, gas discharge pumps, mud pumps, crushers, semi-autogenous grinding, ball mills, high-pressure grinding mills
	Cement: raw mill circulating fan, coal mill exhaust fan, cement mill exhaust fan, kiln head exhaust fan, kiln tail high temperature fan kiln tail exhaust fan, running cooling fan, coal mill, roller press
	Metallurgy: dust removal fans, sintering main exhaust fans, blast furnace blowers, circulating water pumps, phosphorus removal pumps, slag washing pumps, air separation compressors, mills, stamping machines, two-way energy recovery compressors
	Municipal: water intake pump, water supply pump, primary water pump, secondary clean water pump, desalination pump, booster pump, irrigation pump
	Waste-to-energy: various types of ordinary fans and water pumps
The main function	Low voltage ride through, self-start after power failure recovery(within 20s),unit bypass function, on-the-fly start function, synchronous switching function, control power supply redundancy design (optional), power unit redundancy design(N+1,optional)), fan redundancy(optional) and other functions customized according to customer needs, mill-specific control function modules
MV VFD Supporting equipment	Excitation inrush current suppression cabinet, one-to-one manual bypass cabinet, one-to-two manual bypass cabinet, one-to-one automatic bypass cabinet, one-to-two automatic bypass cabinet, one-to-one synchronous switching cabinet, output reactor cabinet, Isolation cabinet

INTERNAL STRUCTURE

Power Unit

Each phase is composed of 3 to 9 units to form a 4N+1 stepped PWM wave. The three phases are connected in a Y configuration, directly outputting 3 to 11 kV.

Air Cooling

Adopting internationally renowned brand centrifugal fans in the industry, which feature large air volume, sufficient margin, long service life, and high stability. These fans ensure the heat dissipation requirements of the high-voltage frequency converter and improve the product's stability.

Control System

Intelligent controller based on high-speed ARM, DSP and FPGA;

Flux closed-loop vector control technology and optimized stacked-wave PWM control technology to achieve high-quality sine voltage and current output.

Human-Machine Interface (HMI)

Adopts touch screens from well-known brands, featuring novel interfaces and rich ports, which facilitates on-site expansion and connection with user systems.

Bypass Cabinet / Wiring Cabinet

Innovatively, the bypass cabinet is designed in an integrated manner. On the basis of not changing the installation dimensions of the product, it can be built-in with a one-drag-one manual bypass cabinet or a one-drag-one automatic bypass cabinet.

Transformer Cabinet

The transformer cabinet and power unit cabinet adopt a front-back arrangement scheme. Through advanced thermal design, while ensuring sufficient heat dissipation, the on-site installation space is reduced, thereby reducing the infrastructure costs for customers.

INTERNAL STRUCTURE

Power Unit

The brand-new design of power units makes the product more lightweight and aesthetically pleasing.

The innovative semi-sealed structural design makes it more adaptable to the environment and more reliable. The self-healing film capacitor without service life limitation will not short-circuit even if broken down by overvoltage.

Modular Design

The units adopt modular design, allowing arbitrary interchangeability, and are convenient for disassembly and assembly.

Multi-pulse rectification mode

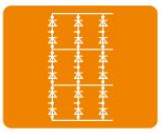
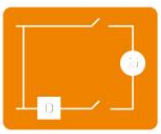
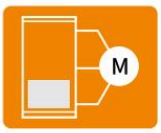
The input side adopts a multi-pulse rectification mode composed of a phase-shifting transformer, which greatly improves the current waveform on the grid side, enhances the input power factor, and reduces the harmonic pollution of the equipment to the power grid.

Improved short-circuit protection technology

The short-circuit protection technology for the secondary side of the phase-shifting transformer avoids accidents such as fires and equipment damage caused by short circuits on the secondary side of the transformer, reduces customer losses, and prevents the expansion of failures.

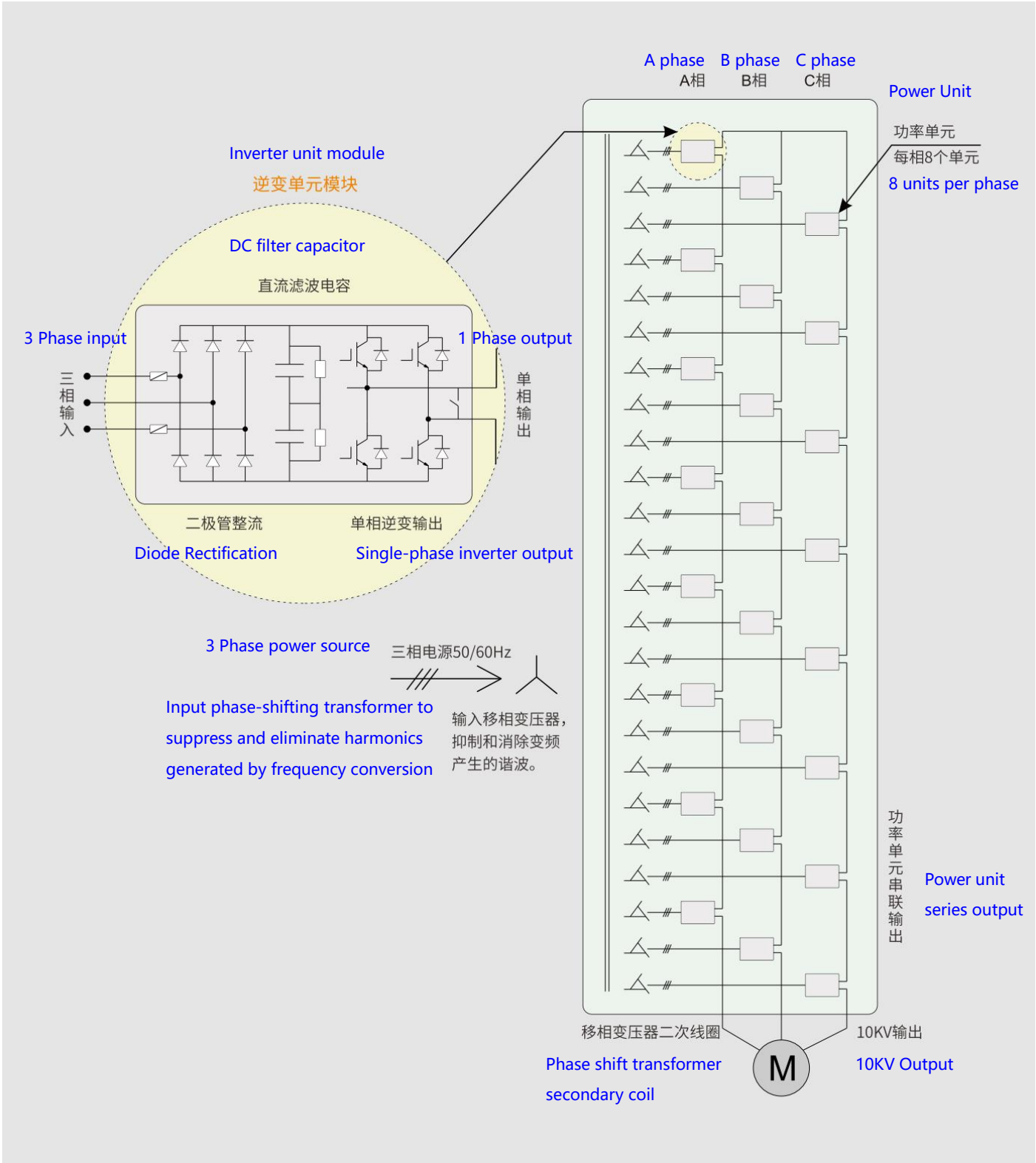
- Timely: Capable of promptly detecting short-circuit information within the transformer's withstand time and initiating protective measures to ensure equipment safety.
- Comprehensive: Considers all aspects including the number of short-circuited phases and short-circuit locations, providing effective protection across various operating conditions.
- Flexible: No additional equipment required, offering greater flexibility and reliability.

FEATURES

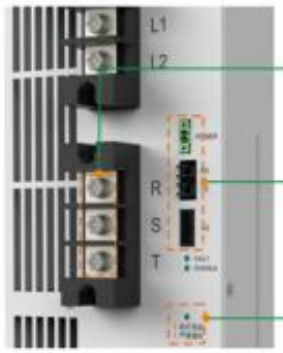
	Design features	User Benefits
	High reliability, adopting 1700V high-voltage IGBT (Insulated Gate Bipolar Transistor) from well-known brands.	Ensure highly reliable operation with an average time between failures (MTBF) of 12 years.
	The main circuit uses long-life self-healing metal film capacitors to replace traditional electrolytic capacitors that need to be replaced regularly.	Low maintenance and operation costs, requiring no maintenance or replacement throughout the full life cycle of the frequency converter.
	The overall system efficiency reaches up to 97.5% (design value).	Especially in the field of flow control applications, the energy-saving effect is quite remarkable.
	Diode rectification ensures that the power factor reaches more than 95% within the speed regulation range.	No power factor compensation capacitors need to be set.
	Multi-level PWM control mode makes the output waveform very similar to a sine wave (11 levels for 6kV frequency conversion, and □ levels for 10kV frequency conversion).	The waveform close to a perfect sine wave allows the motor to operate without derating, and the motor has no additional harmonic heating.
	Adopting multi-pulse rectification and phase-shifting transformers: 3.3kV class: 18 pulses; 6.0kV class: 30 pulses; 10kV class: 48 pulses.	No harmonic filter is required, meeting the high-order harmonic current output limit standards specified in IEEE-519 (1992) and GB14549-1993.
	Even if the power supply voltage drops instantaneously or there is a power outage within 300 milliseconds, the frequency converter can maintain output and continue to operate.	For important loads, it provides safe protection.
	The synchronous switching function enables smooth and ripple-free switching to the power frequency bypass.	One frequency converter can control multiple motors. When switching the power supply of the motor from variable frequency to power frequency bypass, there is no impact on the power grid and the motor, and it can be used for the soft start of extra-large power motors without disturbance.
	Perfect control ensures short acceleration time and excellent dynamic response.	It can meet the requirements of high-precision control. For variable torque loads, it has the protection functions of preventing overcurrent during acceleration and overvoltage during deceleration.
	The frequency converter features an integrated design with a built-in input dry-type isolation transformer.	It provides better protection for the motor, simplifies installation, and has low installation costs.
	Directly drive ordinary high-voltage motors. It can be adapted to standard synchronous/asynchronous motors and other special motors.	No transformer is required, saving costs and energy, while also reducing the requirements for installation sites.

PRINCIPLE STRUCTURE

The main circuit of the GH series is composed of an input transformer and several single-phase PWM frequency conversion units. For 6kV, 5 frequency conversion units per phase can generate an 11-level output voltage. For 10kV, 8 frequency conversion units per phase can generate a 17-level output voltage. The pre-charging circuit can reduce the capacitor charging current and transformer magnetizing inrush current when applying high voltage, reduce the impact on the power grid, protect the frequency converter, and extend the service life of the frequency converter.



FEATURES



- Using high-voltage fence-type power terminal blocks makes wiring more convenient and safer.
- Reasonable layout on the power unit panel.
- The communication between the unit and the control part adopts optical fiber.
- Rich interfaces for easy on-site maintenance and debugging.
- Power unit live warning makes on-site maintenance safer and more reassuring.

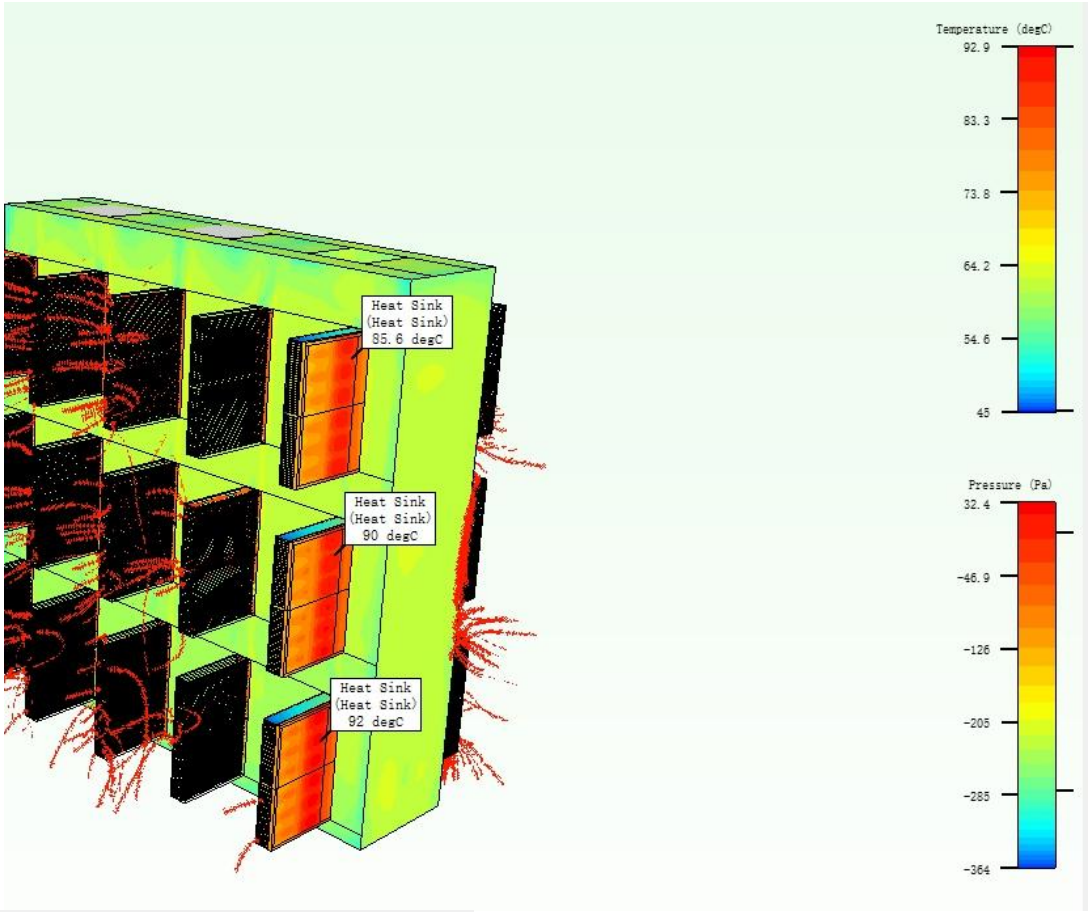
- High-voltage-resistant IGBT snubber capacitors absorb voltage spikes to ensure smoother IGBT voltage.
- Adopting advanced Insulated Gate Bipolar Transistors (IGBTs) with low power consumption and high efficiency.
- IGBT upper and lower bridge drive connector.
- Using first-line domestic modular power supplies ensures higher reliability and smoother voltage.
- RST detection connector.
- The filter capacitor can stabilize and maintain the DC voltage.
- Specially designed long-life metal film capacitors dedicated to power electronics.

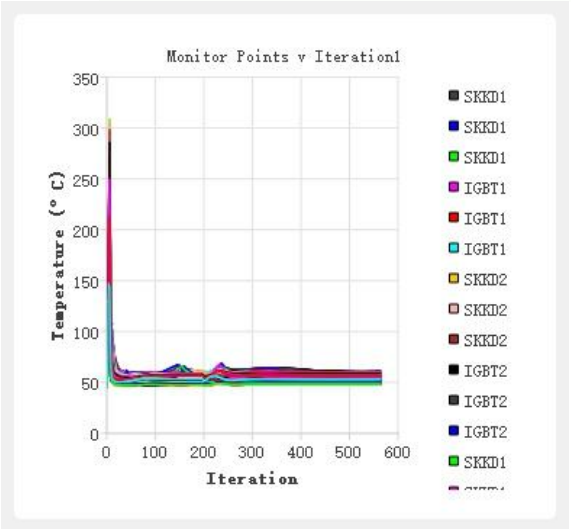
- Unique heat dissipation design transfers heat from the radiator to the cooling air.
- The input fuses are arranged at the three-phase voltage input terminals, featuring excellent protective performance.
- The control board transmits PWM control signals to the gate driver, and the gate driver circuit board directly drives the IGBT.

PRODUCT ADVANTAGES

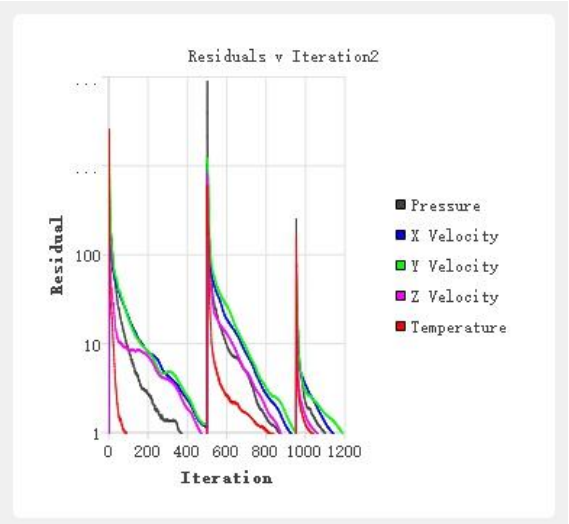
Thermal simulation analysis

Thermal analysis is carried out using the mainstream simulation software FloTHERM to solve for the temperature of the radiator and the flow direction of the air duct.





Simulation convergence curve



Simulation temperature detection

BASIC DATA

Naming rules

GH 100 MD 1250 kVA AA

H-bridge cascade high voltage inverter

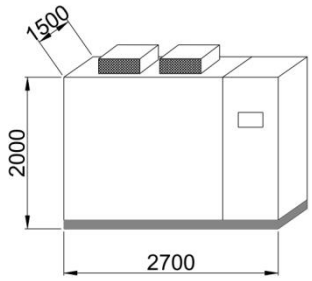
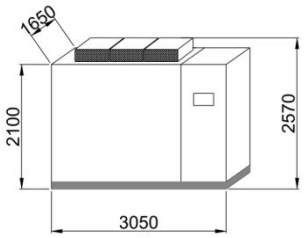
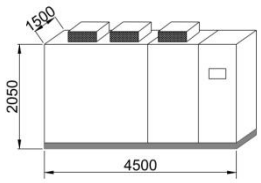
Suffix, no this item can be ignored

Mark	Voltage level
60	6kV
100	10kV

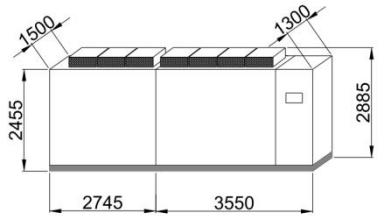
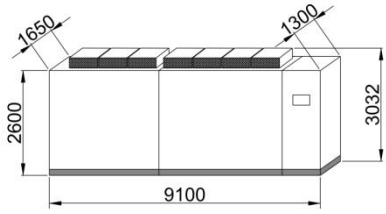
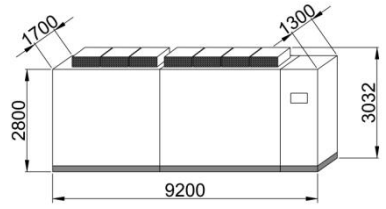
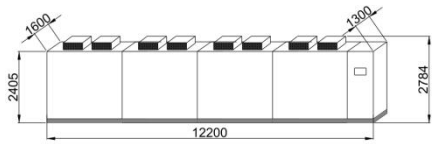
Mark	Power
kVA	Power

Mark	Product series
MD	Two-quadrant inverter
MF	Four-quadrant inverter

Mark	Product series
1250	1250kVA
1400	1400kVA

Dimensional diagram	Model	Applicable motor power (kW)	Nominal capacity (kVA)	Overall size (width × depth × height mm)	Weight (kg)
 Instructions: 280~560kVA: Height is 2386 with 2 fans. 630~800kVA: Height is 2386 with 3 fans. 900~1250kVA: Height is 2470 with 2 fans.	GH100MD280kVA	220	280	2700×1500×2000	2620
	GH100MD315kVA	250	315	2700×1500×2000	2640
	GH100MD355kVA	280	355	2700×1500×2000	2660
	GH100MD400kVA	315	400	2700×1500×2000	2680
	GH100MD450kVA	355	450	2700×1500×2000	2700
	GH100MD500kVA	400	500	2700×1500×2000	2720
	GH100MD560kVA	450	560	2700×1500×2000	2740
	GH100MD630kVA	500	630	2700×1500×2000	2860
	GH100MD710kVA	560	710	2700×1500×2000	2920
	GH100MD800kVA	630	800	2700×1500×2000	3050
	GH100MD900kVA	710	900	2700×1500×2000	3300
	GH100MD1000kVA	800	1000	2700×1500×2000	3470
	GH100MD1120kVA	900	1120	2700×1500×2000	3700
	GH100MD1250kVA	1000	1250	2700×1500×2000	3970
	GH100MD1400kVA	1120	1400	3050×1650×2100	4880
	GH100MD1600kVA	1250	1600	3050×1650×2100	5080
	GH100MD1800kVA	1400	1800	3050×1650×2100	5300
	GH100MD2000kVA	1600	2000	3050×1650×2100	5400
	GH100MD2250kVA	1800	2250	3050×1650×2100	5650
	GH100MD2500kVA	2000	2500	3050×1650×2100	5850
 说明: 2800~3150kVA:Height is 2525 with fans 3500~4500kVA:Height is 2600 with fans	GH100MD2800kVA	2240	2800	4500×1500×2050	7650
	GH100MD3000kVA	2400	3000	4500×1500×2050	7950
	GH100MD3150kVA	2500	3150	4500×1500×2050	7990
	GH100MD3500kVA	2800	3500	4500×1500×2050	8150
	GH100MD3750kVA	3000	3750	4500×1500×2050	8200
	GH100MD4000kVA	3150	4000	4500×1500×2050	8700
	GH100MD4500kVA	3550	4500	4500×1500×2050	8820

BASIC DATA

Dimension drawing	model	Adaptive motor power(kW)	Nominal capacity(kVA)	Machine size(width x depth x height mm)	weight(kg)
	GH100MD5000kVA	4000	5000	6925×1500/1300×2455	11990
	GH100MD5600kVA	4500	5600	6925×1500/1300×2455	12500
	GH100MD6300kVA	5000	6300	6925×1500/1300×2455	13300
	GH100MD7000kVA	5600	7000	6925×1500/1300×2455	13800
	GH100MD8000kVA	6300	8000	9100×1650/1300×2600	18410
	GH100MD9000kVA	7100	9000	9100×1650/1300×2600	19700
	GH100MD10000kVA	8000	10000	9200×1700/1300×2800	20400
	GH100MD11250kVA	9000	11250	9200×1700/1300×2800	22500
	GH100MD12500kVA	10000	12500	12200×1600/1300×2405	27120
	GH100MD13750kVA	11000	13750	12200×1600/1300×2405	28860

- Remarks
- The above dimensions and weights are for reference only. The specific dimensions and weights shall be subject to the technical agreement.
- The input voltage and output voltage of the standard series are consistent.
- The height of the overall dimensions does not include the height of the fans, and the fan height needs to be additionally added by 300mm to 600mm.
- The above overall dimensions and weights refer to the sum of the control cabinet, unit cabinet, and transformer cabinet, excluding the power frequency bypass cabinet part.
- The distance from the front of the equipment to the wall shall not be less than 1500mm, the distance from the back to the wall shall not be less than 1000mm, the distance from the side to the wall shall not be less than 800mm, and the distance from the top to the roof shall not be less than 1000mm.
- The standard overload capacity is 110% for 1 minute, allowing overload for 1 minute every 10 minutes. Overload capacities of 125%, 150%, and 200% can be selected to meet different application needs.
- The applicable motor power may vary due to differences in motor types and structures, and is for reference only.

GH Series Medium and High Voltage Inverters

ELECTRICAL SPECIFICATIONS

Project	Voltage	6kV Series	10kV Series
Input	Input rated voltage	3-phase 50/60Hz, 6kV	3-phase 50/60Hz, 10kV
	Voltage fluctuation range	6kV/10kV±10% full load operation, -10%~35% allows long-term derating operation	
	Frequency range	50Hz±10%	
	Unit input voltage	690V	
	Input power factor	>0.95(20% load or more)	
	Input current harmonics	<2% meets IEEE519-1992 and GBT14549-93	
Output	Output voltage range	0~6kV	0~10kV
	Output capacity range	230~7000kVA	250~12500kVA
	Unit output voltage	690V	
	Output frequency range	0~50Hz max330Hz 120Hz and above factory customized	
	Speed ratio	40:1(Universal Vector)100:1(SVC)200:1(FVC)	
	Speed accuracy	±0.5%(SVC) ±0.2%(FVC)	
	Torque response	>750rad/s	
	Starting torque	0.5HZ/150%(SVC); OHz/180%(FVC)	
Technical Solution		**Unit cascade, AC-DC-AC, high-high mode**	
Control method		General vector, speed sensorless/sensorless control (SVC/FVC)	
Rectification form		Diode three-phase full bridge	
Inverter form		IGBT inverter bridge	
Acceleration and deceleration time		0.1-6500 seconds, >6500 seconds can be customized by the manufacturer	
Start-Stop Control		Local or remote	
Control System		ARM, DSP, FPGA, CPLDSHMI	
Panel Display		Touch screen/LCD optional, Simplified Chinese	
Overload capacity		120% rated current, 1 minute	
Overall efficiency		**>96%**	
Is there a fuse in the frequency converter?		**Power unit input side with fuse**	
Is optical fiber used in the electrical isolation part?		yes	
Is an input filter required?		no	
Is an output filter required?		no	
Is power factor compensation required?		no	
Power unit protection		**Overvoltage, undervoltage, voltage balancing, input phase loss, overcurrent, overtemperature, communication, etc.**	
System protection		Motor overload, output overload, output short circuit, output grounding, input overcurrent, input overvoltage, input unbalance, input grounding, cooling fan fault alarm, door switch Interlock protection, transformer overheat alarm, transformer overheat trip, etc.	
Mean time between failures		50,000 hours	
Communication interface		**CANbus, Modbus, PROFIBUS can be customized according to users**	
Switch input		10-way, half/full width relay dry contact	
Switching output		16-way, relay dry contact	
Analog input		4 channels, 4~20mA or 0~10V	
Analog output		channels, 4~20mA or 0~10V	
Usage Environment		**indoor**	
Ambient temperature		-10℃~+40℃, +40℃~+50℃ derating operation; low T-10℃, preheating is required before starting	
Ambient humidity		5%~95%, no condensation	
Altitude		<1000m, more than 1000m need to reduce the rating, please specify when ordering	
Total equipment noise		**<75dB**	
Cooling method		Forced air cooling	
Protection level		IP30	
Cabinet type		GGD combination type	
Inlet and outlet line		Bottom in and bottom out / top in and top out Special can be customized according to users	
Control power supply		380V±10%AC three-phase four-wire	