

HD8000 Series

Medium-Voltage Engineering Variable Frequency Drive System

Product Overview

The HD8000 is a high-power drive system. This system supports single-drive inverters and common DC bus multi-drive inverters. A single inverter can deliver a maximum power of 102 MVA and up to eight inverters can be connected in parallel. The modular hardware and engineering software design enables the variable frequency drive system to handle various complex drive scenarios. The HD8000 uses pressure-contact integrated gate-commutated thyristors IGCT and Diode, and features high reliability, high power density, and small footprint. The system can be equipped with two-quadrant and four-quadrant rectification products. The system adopts liquid cooling for heat dissipation, provides a protection rating of IP54 or higher, and exhibits strong environmental adaptability.

- ◆ **Flexible design:** Single-drive or common bus multi-drive configuration, providing two-quadrant or four-quadrant functions.
- ◆ **Modular design:** Tailored for diverse application scenarios and supporting modular maintenance.
- ◆ **Reliability design:** Ensuring environmental adaptability, load adaptability, and grid adaptability
- ◆ **Comprehensive rectifier units:** Supporting multi-pulse basic rectifier units and PWM rectifier units
- ◆ **Voltage levels:** 1.65 kV, 2.4 kV, 3.3 kV, 4.16 kV, 6.6 kV, 10 kV, 13.8 kV, 19.8 kV
- ◆ **Maximum power:** 102 MVA (single inverter)
- ◆ **Motors supported:** Asynchronous induction motor, permanent magnet synchronous motor, electric excitation synchronous motor, doubly-fed induction motor
- ◆ **Control modes:** V/F, closed-loop vector control (CLVC), open-loop vector control (OLVC)

- ◆ **Cooling modes:** Liquid cooling

Description

HD8000 - 3 M - 1P10 - 1A10 - 1A12 - X - B...

Series Name:

HD8000: hopeDrive
series medium-voltage
engineering inverter

Output Voltage Level:

1: 1.65 kV 2: 2.4 kV
3: 3.3 kV 4: 4.16 kV 6: 6.6 kV
A: 10 kV B: 13.8 kV C: 19.8 kV

System Type:

S: Single inverter
M: Multi-drive common bus system
R: Parallel type Q: Inverter skid unit

Rectifier Type:

D: Two-quadrant (12-pulse) T: Two-quadrant (18-pulse)
F: Two-quadrant (24-pulse) S: Two-quadrant (36-pulse)
P: Four-quadrant
1P10: One 10 MVA four-quadrant rectifier
2P12: Two 12 MVA four-quadrant rectifiers
1D10: One 10 MVA two-quadrant 12-pulse rectifier
2F10: Two 10 MVA two-quadrant 24-pulse rectifiers

Inverter Unit Type:

A: Induction motor S: Electric excitation synchronous motor
P: Permanent magnet synchronous motor
F: AC excitation motor for the rotor (doubly-fed motor)
1A08: One 8 MVA inverter unit for induction motor
1A10: One 10 MVA inverter unit for induction motor.....
1S08: One 8 MVA inverter unit for synchronous motor
1S10: One 10 MVA inverter unit for synchronous motor.....
2A14: Two 14 MVA inverter units for induction motor
2S14: Two 14 MVA inverter units for synchronous motor.....

Inverter Unit Type for the Second Motor (Omitted for Single-Drive Systems)

Inverter Unit Type for Other Motors (Omitted for Single-Drive Systems)

Special Notes:

F: Includes the input filter cabinet B: Includes the braking unit
L: Includes the output reactor I: Includes insulation detection

Typical Application

The HD8000 can be widely used in the drives of various kinds of automated production equipment in the fields of metallurgy, petroleum, petrochemical, LNG, oil and gas, rail transit, machine tools, plastics and metal products, etc.



Metallurgy



Petroleum and Petrochemical



Test-Bed



Offshore Wind Power



Rail Transit



Mine Hoisting



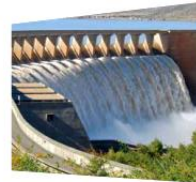
Ship Propulsion



LNG



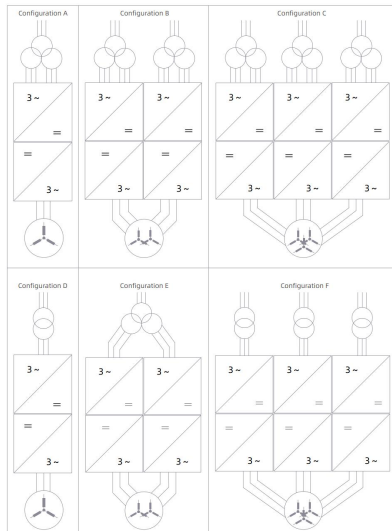
Electric Drive Fracturing Equipment for Oil and Gas



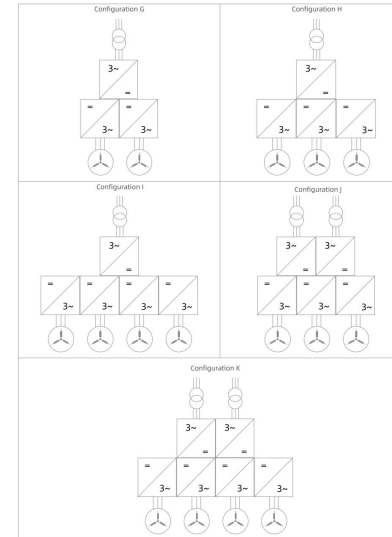
Pumped Storage

System Configuration Examples

➤ Single-Drive/Parallel System Configuration Examples



➤ Multi-Drive System Configuration Examples



Features of HD8000 Series Engineering Inverters

■ Internationally Leading Technologies

- The HD8000 series products passed the appraisal of China Machinery Industry Federation.
- A High-Power IGCT AC-DC-AC Variable Frequency Speed Regulating Device" and "Key Technologies and Applications of Variable Frequency Speed Regulating System" passed the scientific and technological achievement appraisal and the result is internationally advanced, with some technologies appraised as internationally leading.

■ Reliable Engineering Design

- Precise mechanical design to enhance seismic resistance.
- Use of fully controlled IGCTs for extraordinary performance and reliability in the power system.
- Use of double-sided pressure-contact power devices to ensure higher reliability and power density.
- High-altitude design: No need for derating within the altitude of 2,000 m.
- Redundancy and error tolerance design for key components, reducing the system

breakdown probability.

- IP54 protection design and C4-M corrosion resistance design, enabling the system to have strong environmental adaptability.
- First-class fault protection system, providing sound protection for the system
- Robust monitoring system for real-time monitoring of internal data, waveforms, and other information.
- Grid adaptability design, enabling the system to adapt to grid unbalance, grid harmonics, grid frequency flickering, transient grid voltage drops, and high/low voltage ride through.



■ Cutting-Edge Core Protection Strategies in the Industry

- IGCT fault pre-judgment and bridge arm shoot-through protection technologies.
- Real-time detection of instantaneous current at the AC end, preventing shutdown caused by heavy current.

■ Flexible and Diverse Design

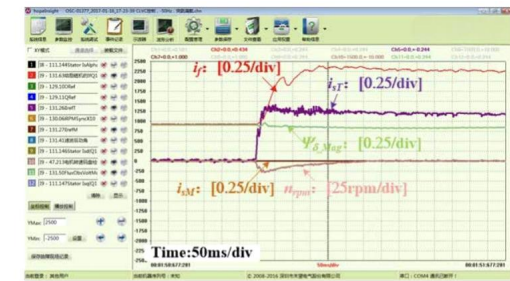
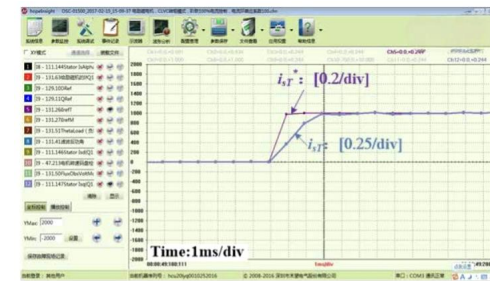
- Flexible system configuration design tailored for specific applications.
- Single-motor drive configuration: Typically used for scenarios using large-capacity single-winding motor drive systems, supporting parallel connection of multiple systems.
- Multi-motor drive configuration: Typically used for scenarios using common DC bus multi-drive systems.

■ Excellent Control Performance

- Four-quadrant operation capability, supporting energy feedback during motor driving and braking.
- Supporting various types of motors (including induction motors, permanent magnet

synchronous motors, and electric excitation synchronous motors)

- Fast dynamic torque response, meeting system requirements for suppressing mechanical resonance.
- Torsional vibration suppression: Eliminating or significantly reducing torque vibration by enhancing the damping force of the shafting with load observers.
- Segmented synchronous modulation of motors, meeting requirements for wider speed regulating range of rolling mills and hoists.
- Selective harmonic elimination pulse width modulation (SHEPWM), effectively mitigating motor heating and noise issues.



■ Modular Design for Easy Maintenance

- Intelligent fault diagnosis system for fast fault locating.
- Modular design for key components, facilitating easy maintenance and enhancing system reliability.
- Easy maintenance, with only 15 minutes required for phase module assembly/disassembly.

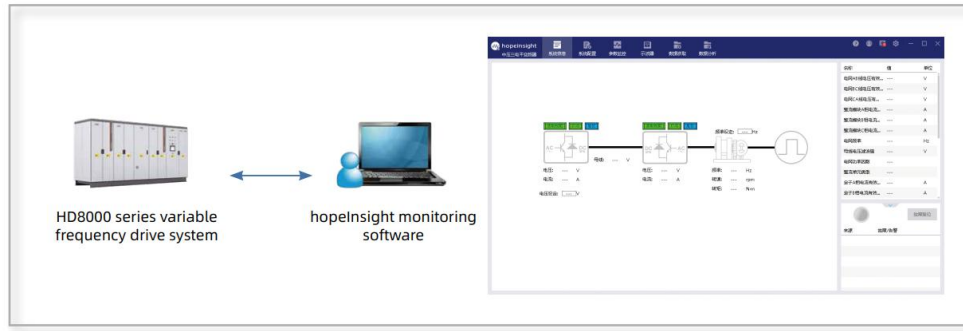
■ Customizable Communication Protocols

- Supporting customizable communication protocols through optional modules
- Compatible with various industrial buses, such as Profibus-DP, CANopen, Profinet IO, Modbus RTU, Modbus TCP, EtherCAT, Ethernet/IP, achieving interconnectivity of industrial devices.

■ hopelnsight Background Rapid Commissioning Software

hopelnsight is a rapid commissioning tool for drive systems. It can be connected to the PC backend through optical fibers. The software offers a wide range of commissioning

functions, including batch parameter setting, fault data downloading and waveform analysis, 12-channel high-speed oscilloscope, and editing. The working diagram is as follows:



(Working Diagram of hopsight Monitoring Software)

▼ The UI is displayed in Chinese by default and English is supported. The user-friendly UI is convenient for operations.

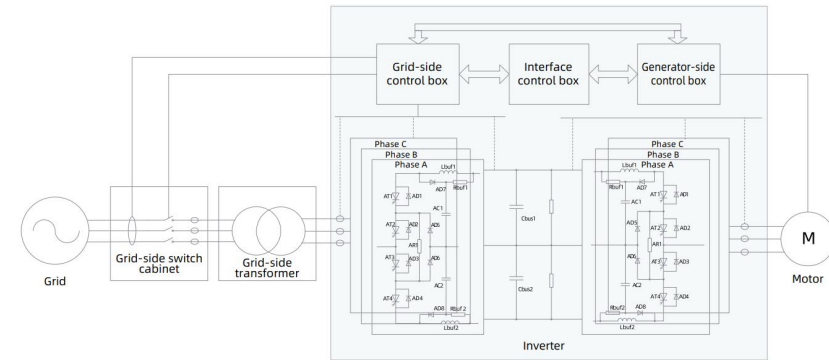


▼ The robust fault waveform recording function plus detailed event logging greatly facilitates fault diagnosis.

HD8000 Typical Solutions

HD8000 Series Three-Level Medium-Voltage Inverters

➤ Solution Topology (Example)

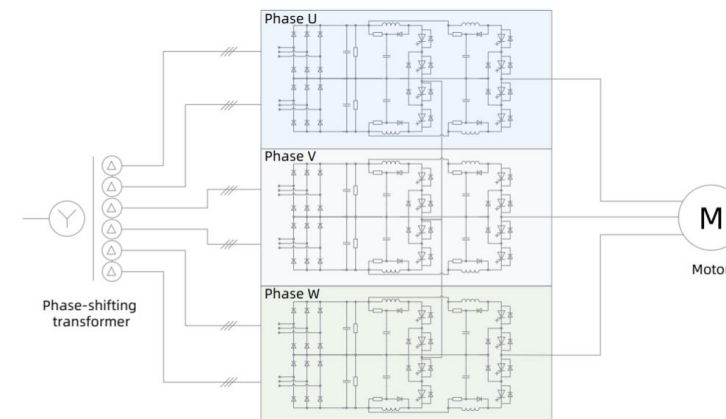


➤ Solution Advantages

- High overall efficiency
- Simple system structure using fewer components, ensuring high reliability
- Large single-inverter capacity, with high power density and small footprint
- Multi-pulse rectifier or PWM rectifier available for the grid side, providing strong flexibility
- Lower impact of grid harmonics.

HD8000 Series Five-Level Medium-Voltage Inverters

➤ Solution Topology (Example)



➤ Solution Advantages

- Simple system structure using fewer components, ensuring high reliability
- High power density and small footprint
- Space vector pulse width modulation (SVPWM) algorithm for five-level system and segmented synchronous modulation algorithm.
- Lower impact of grid harmonics
- Smaller voltage jump at the output and lower voltage harmonic content
- Lower motor port voltage and reduced impact on the insulation of motors and power cables



Technical Specifications of HD8000 Series Products

Basic rectifier	Input frequency	45 Hz ~ 66 Hz
	Fundamental power factor	≥ 95% (based on 12-pulse and above, rated current, and 2% current input reactor)
PWM rectifier	Input frequency	45 Hz ~ 66 Hz
	Power factor	1 (can be set continuously)
	Protection functions	Overload protection, overheating protection, short circuit protection, fault prediction
Inverter	Output voltage	1: 1.65 kV; 2: 2.4 kV; 3: 3.3 kV; 4: 4.16 kV; 6: 6.6 kV; A: 10 kV; B: 13.8 kV; C: 19.8 kV
	Output frequency	0 ~ 110 Hz (higher output frequencies can be customized as required)
	Speed stability	OLVC: 0.2% CLVC: 0.01%
	Speed fluctuation	OLVC: 0.4% CLVC: 0.2%
	Starting torque	OLVC: 150% CLVC: 200%
	Torque control	V/F: Supported OLVC: Supported CLVC: Supported
	Torque accuracy	OLVC: 5% CLVC: 2% (customizable)
	Torque response time	≤ 5 ms
	Speed response time	OLVC: 100 ms CLVC: 100 ms
	Dynamic speed drop equivalent	OLVC: 0.5%*s CLVC: 0.25%*s
System	Efficiency	Two-quadrant: ≥ 99% (excluding the rectifier transformer) Four-quadrant: ≥ 98.5% (excluding the rectifier transformer)
	Temperature	Water inlet temperature ≤ 35°C (external water)
	Altitude	≤ 2000m (derating required for 2000m ~ 4000m)
	IP rating	IP54
	Cooling mode	Liquid cooling
	Corrosion resistance class	C4-M