

HV510 Series

High-Performance Inverter

Product Overview

The HV510 series inverters (the "HV510") are our new generation of high performance vector inverters. They adopt new high-performance open and closed-loop vector control technology and support asynchronous motor and permanent magnet synchronous motor drive control. Their excellent quality, powerful performance, and high power density design enhance the products' ease of use, reliability, environmental adaptability, functional diversity and application flexibility in industrial scenarios. Their design criteria have been improved and their space minimized, comprehensively upgrading the user experience.

Description

HV510 - A0 4 T 00075 B

Inverter series name:
HV510: hopeVert Series
High-Performance Inverter

Circuit topology and cooling method:
A0: Two-quadrant; Air-cooling

Voltage level:
4: 380 V

Number of phases:
T: Three

Power rating:
00075: Heavy load 7.5 kW, light load 11 kW
00150: Heavy load 15 kW, light load 18.5 kW

Brake unit information:
B: Built-in brake unit
Blank: No built-in brake unit

Typical Application

The HV510 can be widely used in the drives of various kinds of automated production equipment in the fields of metallurgy, lifting, petroleum, machine tools, plastics, metal products, papermaking, textile, printing, and packaging.



Metallurgy



Machine Tools



Lifting Equipment



Petroleum



Papermaking



Technical Specifications

Basic Functions

Input voltage	380V (-15%) - 480V (+10%)/three phases
Input power supply frequency	(50Hz/60Hz) ±5%
Input voltage imbalance	≤ 3%
Output voltage	0 V to input voltage
Output frequency	0 Hz-1,500Hz
Motor type	Asynchronous motor, permanent magnet synchronous motor
Control mode	V/F, OLVC (open-loop vector control), CLVC (closed-loop vector control)
Speed range	1:100 for V/F; 1:200 for OLVC; 1:1000 for CLVC
Startup torque	VF: 100% (0.5Hz); OLVC: 150% (0.25Hz); CLVC: 200% (0Hz)
Torque precision	±5% (OLVC, above 5Hz), ±3% (CLVC)
Torque ripple	≤ ±5% under vector control
Speed stabilizing precision	OLVC: 0.2%; CLVC: 0.01%
Torque response	≤ 5 ms under vector control
Acceleration and deceleration time	0.0s-3200.0s; 0.0min-3200.0 min
Torque boost	0.0%-30.0%
Overload capacity	Heavy load application: 150% for 1min/5min, 200% for 3 s/5min Light load application: 110% for 1min/5min, 150% for 10 s/5min
V/F curves	Straight-line type, multi-point type, V/F half separation mode, V/F complete separation mode
Input frequency resolution	Digital setting : 0.01Hz ; analog setting : maximum frequency ×0.025%
Acceleration and deceleration curves	Straight-line and S-curve acceleration and deceleration modes with four types of acceleration and deceleration time and one type of emergency stop deceleration time
Jog control	In some applications, the inverter can run briefly at low speed to test the condition of the equipment
Torque control	Torque control supported during vector control
Simple PLC and multi-segment speed	16-segment speed operation via control terminals
Built-in PID	Easy implementation of closed-loop process control systems
Virtual IO	8 groups of virtual VDI/VDO, 3 groups of AI as DI, enabling simple logic control
Overvoltage and overcurrent stall control	Automatic limitation of current and voltage during operation to prevent frequent tripping due to overcurrent or overvoltage
DC braking	Startup DC braking and shutdown DC braking
Pre-excitation	When the inverter starts up, pre-excitation of the motor establishes a magnetic field inside the motor that can effectively improve the torque characteristics of the motor during startup
Overexcitation	This can effectively inhibit the rise of bus voltage during deceleration to avoid frequent overvoltage alerts, and enable quick stop upon power failure
Speed tracking	Speed tracking is supported for both asynchronous and synchronous motors and for both vector control and V/F control
Protection functions	Overvoltage suppression, undervoltage suppression, V/F overcurrent suppression, short to ground, phase loss, detection of excessive speed deviation, overvoltage, overcurrent, undervoltage, overload, over-heating, startup, bus undervoltage, bus overvoltage, etc

Customization Functions

Restart upon power failure	The inverter resumes operation automatically when power is restored after failure
Master-slave control	Master-slave synchronous control between two or more motors
Position lock	Zero-speed hovering can be achieved under CLVC mode
Brake control	Motor brake control during inverter start and stop
Parameter copy	Backup and recovery of local user parameters With the help of a removable keypad, parameters can be copied between different inverters
Parameters and key lock	Locking of parameters and some/all keys
Keypad UP/DOWN	The keypad UP/DOWN key can be configured to modify parameters
Keypad priority	Commands can be entered using the built-in keypad or an external keypad
Restart after fault auto reset	The inverter can be set to restart automatically after fault auto reset
Stop speed detection	Two stop speed detection modes are supported: detection based on the speed setting value and detection based on the speed feedback value
Braking usage	Both braking and braking pipe protection through pipe on-off frequency setting
Energy-saving operation	When the motor runs at light load/no load, reducing the output voltage (motor flux) can reduce wear and tear on the motor, and the noise generated by the motor
Timing control	Timing control function allows for a time range of 0-65,000 s/m/h and supports 3 different unit settings
Fixed length control	Control with given length
Hibernation and wakeup	Used to enable hibernation and wakeup in water supply applications
Fan control	Three fan control modes are supported: always working, working automatically and working during inverter running
Overmodulation	Used to increase the inverter output voltage
Random PWM	Used to mitigate motor noise
Multi-motor switchover	Switchover between 2 motors through motor parameter switchover
Multiple encoder types supported	Incremental, resolver
Encoder running in redundancy mode	Automatic switching to OLVC mode in event of encoder failure under CLVC mode
Statistics	Current running time, current power-on time, accumulative running time, accumulative power-on time, accumulative fan running time
User-defined parameters	Parameters can be viewed and changed through the user-defined menu mode and non-continuous address continuously read and written
Background debugging software	hopeinsight: Supports inverter parameter operation and virtual oscilloscope function. The virtual oscilloscope can perform graphical monitoring of the internal state of the inverter, which, coupled with extensive background monitoring functionality, facilitates on-site data acquisition and debugging
Fault recording	Record of fault waveform for parameters of 100 channels to facilitate on-site problem location and analysis Recording duration: 100ms before to 100ms after the fault; Sampling rate: up to 3kHz
Various communication modes	Modbus RTU (standard); Profibus-DP, CANopen, Profinet IO, Modbus TCP/IP, EtherCAT, EtherNet/IP (optional)
Various optional accessories	Removable LED/LCD keypad, encoder card, communication card, I/O terminal expansion card, etc

■ Environmental Conditions

Altitude	≤ 1000 m: no need for derating 1000-3000 m: current derating by 1% per 100 m increased
Ambient temperature	-25°C to +40°C (allowed to run at 40°C to 55°C with derating)
Humidity	15%-95% with no condensation
Vibration	3M3, IEC60721-3-3
Storage temperature	-40°C to +70°C
Place of use	Indoors with no direct sunlight, flammable, corrosive gases or liquids, or conductive particles etc.
Installation	Wall-mounted
Protection rating	IP20
Cooling method	Air-cooling

Features of HV510

■ Reliable structural design

- Innovative independent air duct design improves the product's heat dissipation performance and environmental adaptability
- Compact type design minimizes the installation space in the cabinet.

■ Professional thermal design

- Efficient and accurate thermal simulation platform software is adopted to ensure the thermal reliability of the machine
- Advanced thermal testing together with verification techniques and devices effectively verify the theoretical results of the thermal design.

■ Rigorous temperature rise test

- A stringent full-load and overload verification test program is adopted for temperature rise testing on the machine.
- High-temperature load aging test for the product before leaving the factory effectively prevents and intercepts component failures.

■ Effective anti-interference design

- Built-in C3 filter can effectively suppress high-frequency harmonics generated by the inverter.
- EMC filter ungrounded design effectively reduces leakage current to ground.

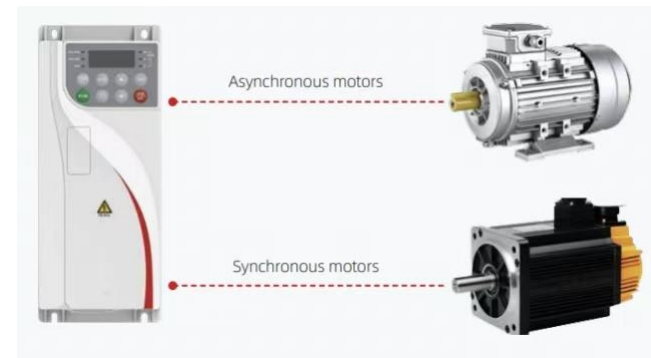
■ Comprehensive protection functions

- The entire series supports multiple protections against overvoltage, undervoltage, overcurrent, phase loss, overspeed, locked-motor, overload, motor temperature, short circuit to ground, etc.
- Based on the severity of the type of fault, the inverter can be set to report alarm, shut down or continue running, which makes daily maintenance more convenient.

Excellent Performance of HV510

■ Advanced motor drive technology

- Supports both asynchronous and synchronous motors to achieve high-performance current vector control
- Supports switchover between two groups of motor parameters
- Supports speed and torque mode control of motors



■ Extensive auto-tuning function

- Accurate auto-tuning ability of motor parameters: improves motor control accuracy and response speed.
- Comprehensive auto-tuning modes: support motor auto-tuning needs in different scenarios.

■ Complete braking function

- Supports DC braking at startup/stop
- Supports overexcitation function which can effectively suppress the rise of bus voltage

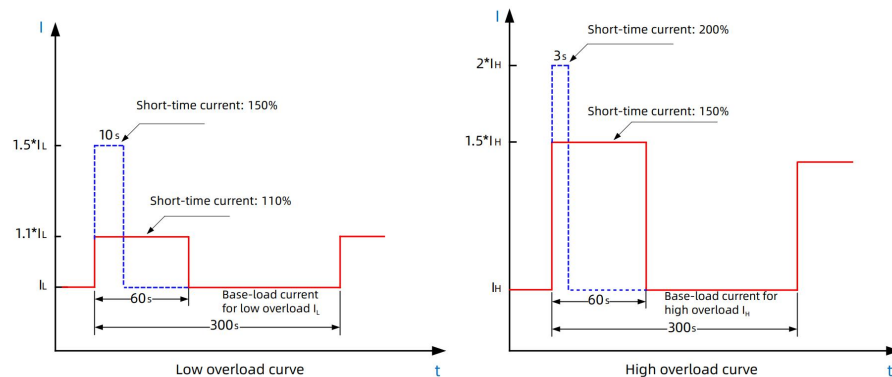
during deceleration, thereby avoiding frequent overvoltage faults

-The entire series can be configured with a built-in brake unit, saving installation space and electrical costs.

Powerful overload capacity

-Low overload: 110% of I_L for 60s or 150% of I_L for 10s in a duty cycle.

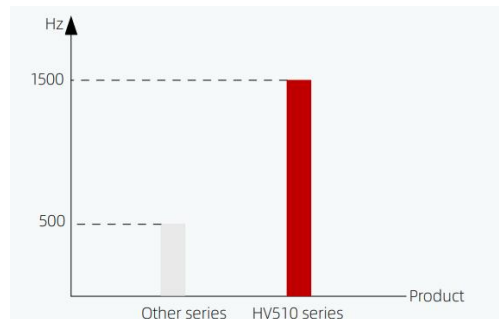
-High overload: 150% of I_H for 60s or 200% of I_H for 3s in a duty cycle.



Extensive Functionality of HV510

High frequency output

-Output up to 1,500 Hz, suitable for high-frequency, high-speed motors.



Diversified expansion functions

- Communication card: supports major communication protocols, including Profibus-DP,

Profinet IO, CANopen, Modbus TCP/IP, Ethercat, and EtherNet/IP

- Encoder card: supports the wiring of the incremental encoder and resolver
- I/O terminal card: provides more terminal functions
- 110 kW or below inverters are configured with a built-in LED keypad as standard, which cannot be removed and used externally. If external use is needed, an optional LED keypad can be configured. The keypad can be installed on the cabinet when combined with the mounting base.
- 132 kW or above inverters are configured with a removable LED keypad (mounting base excluded) as standard. To install it on the cabinet, a mounting base should be selected. Inverters of all power ranges support optional configuration of a removable LCD keypad.

Note: The optional I/O terminal expansion card and the communication expansion card share the same expansion card slot, and cannot be installed and used at the same time.



PG card



PN communication card



I/O terminal expansion card



DP communication card



Removable LED keypad

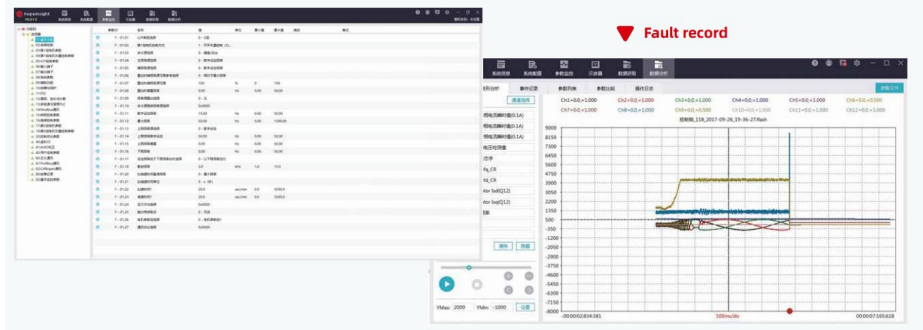


Removable LCD keypad

Background quick debugging software

- Supports inverter event recording and virtual oscilloscope function
- Supports parameter editing and status monitoring, to facilitate debugging and maintenance

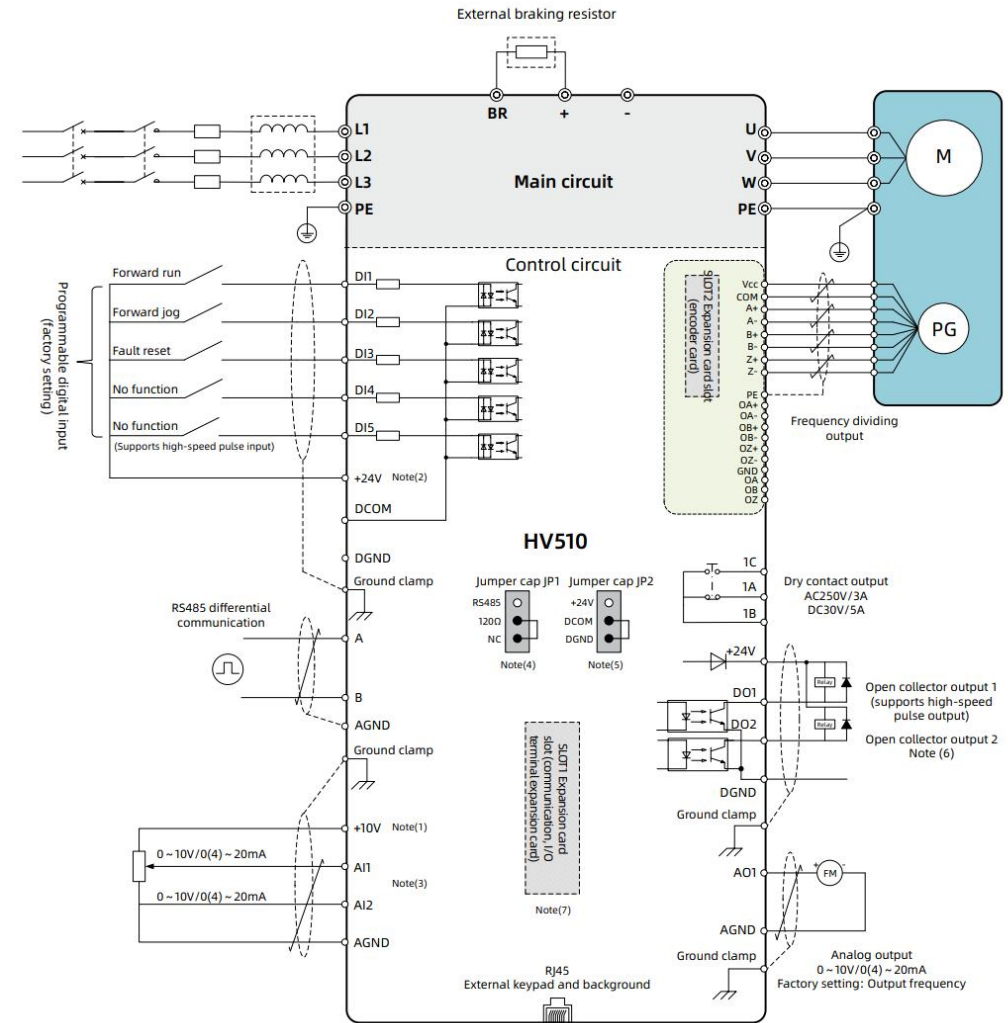
Parameter interface



Special application software functions

- Master-slave control: suitable for master-slave synchronous control between two or more motors.
- Simple PLC: supports cyclic operation of up to 16 segments with fixed time and speed.
- PID: suitable for closed-loop systems for process control such as constant temperature, constant pressure, tension, etc.
- Virtual I/O: easy internal logic control by means of simple settings.
- Restart upon power failure: The inverter resumes operation automatically when power is restored after failure.
- Multi-motor switchover: Two groups of motor parameters can be stored to enable switchover.
- Position lock: Zero-speed hovering can be achieved under CLVC mode.
- The wobble function is applicable to textile and chemical fiber processing equipment, which can improve the quality of spindle winding
- Random PWM depth: mitigates the harsh motor noise
- Encoder running in redundancy: automatic switching to OLVC mode in event of encoder failure under CLVC mode.

Standard Wiring Diagram



Note (1): The maximum output of +10 V port is 25 mA.

Note (2): The maximum current load of +24 V port is 50 mA.

Note (3): Internal resistance of AI1 and AI2 ports (in current mode): 500 Ω

Note (4): The activation ports for RS485 terminal resistance (120 Ω).

Note (5): For terminals DI1-DI5, NPN or PNP transistor signals can be selected as inputs, and the bias voltage can be selected from the inverter's internal power supply (+24 V terminal) or external power supply (DGND terminal).

Note (6): When the digital output terminals drive the relay, a freewheel diode needs to be added with correct polarity at both ends of the relay coil, otherwise, the internal circuit may be damaged. The driving capacity is not more than 50 mA.

Note (7): The optional I/O terminal expansion card and the communication expansion card share the same expansion card slot, and cannot be installed and used at the same time.

Product Selection

■ Product Dimensions

Frame	Width (mm)	Height (mm)	Depth (mm)	Mounting Hole Horizontal Spacing M1(mm)	Mounting Hole Horizontal Spacing M2(mm)	Mounting Hole Vertical Spacing H2 (mm)	Mounting Hole DiameterΦ (mm)	Net Weight(kg)
FA	76	232	175.5	55	55	221	5	1.7
FB	95	232	175.5	70	70	221	5	1.8
FC	121.5	272	187	90	90	262	6	3.3
FD	140	377	237	105	105	357	6.5	5.5
FE	240	500	225	160	160	485	7	16
FF	270	615	240	200	200	594	9	24
FG	335	712	255	230	230	688	9	38
F8	300	880	450	160	160	825	9	105
F9	300	980	545	160	160	925	9	122
F10	300	1100	545	160	160	1050	9	156
F11	330	1220	590	110	220	1150	9	209

■ Model Selection

Rated voltage: three phases 380 Vac/50 Hz					
Model	Heavy Load		Light Load		Frame Type
	Rated Power (kW)	Rated output current (A)	Rated power (kW)	Rated output current (A)	
HV510-A04T00007B	0.75	2.5	1.5	4.2	FA
HV510-A04T00015B	1.5	4.2	2.2	5.8	
HV510-A04T00022B	2.2	5.8	4	9.5	
HV510-A04T00040B	4	9.5	5.5	13	FB
HV510-A04T00055B	5.5	13	7.5	17	
HV510-A04T00075B	7.5	17	11	25	FC
HV510-A04T00110B	11	25	15	32	
HV510-A04T00150B	15	32	18.5	38	FD
HV510-A04T00185B	18.5	38	22	46	
HV510-A04T00220B	22	46	-	-	
HV510-A04T00300(B)	30	60	37	75	FE
HV510-A04T00370(B)	37	75	45	91	
HV510-A04T00450(B)	45	91	55	125	FF
HV510-A04T00550(B)	55	125	75	150	
HV510-A04T00750(B)	75	150	90	180	
HV510-A04T00900(B)	90	180	110	210	FG
HV510-A04T01100(B)	110	210	132	250	
HV510-A04T01320(B)	132	256	160	310	F8
HV510-A04T01600(B)	160	312	200	380	
HV510-A04T02000(B)	200	380	220	415	
HV510-A04T02200(B)	220	415	250	471	F9
HV510-A04T02500(B)	250	471	280	510	
HV510-A04T02800(B)	280	510	315	610	
HV510-A04T03150(B)	315	610	355	670	F10
HV510-A04T03550(B)	355	670	400	745	
HV510-A04T04000(B)	400	745	450	820	
HV510-A04T04500(B)	450	820	500	860	F11
HV510-A04T05000(B)	500	860	560	990	
HV510-A04T05600(B)	560	990	630	1100	