

## AC310 High Performance Vector Frequency Inverter



# AC310 series High-performance inverter

Veichi Electric Co.,Ltd. Since its establishment, it has always focused on the field of electrical transmission and industrial control. It is a high-tech enterprise engaged in the research and development, production and sales of industrial automation products. And won the honorary titles of Jiangsu Provincial Enterprise Technology Center, Jiangsu Private Technology Enterprise, and "Competitive Brand in the Field of Motion Control". After years of independent R&D and innovation, the company has developed a series of patented technologies with independent intellectual property rights. As of December 31, 2020, a total of 103 patents have been granted, including 18 invention patents.

The company has R&D and production bases in Suzhou and Shenzhen, and has established a wholly-owned subsidiary in India. At present, the company's business covers many countries and regions, providing global customers with competitive, safe and reliable products and services.

The company's product range is rich, including frequency converters from 0.4kW to 1,200kW, servo systems from 50W to 200kW, motion controllers, PLCs and HMIs. Products are widely used in lifting, mining equipment, rail transit, machine tools, compressors, plastics, photovoltaic pumping, building materials, robots/manipulators, printing and packaging, textile and chemical fiber, metallurgy, municipal administration, petroleum, chemical and other industries.

The company has established 13 service outlets in China and developed 122 contracted channel dealers. The distribution channels cover 31 provinces and cities across the country and Hong Kong, Macao and Taiwan regions, forming a wide-ranging and efficient distribution and service network to provide customers with high-quality products and efficient Service.

As of December 2020, Flextronics has more than 900 employees, of which more than 200 are specialized in R&D, accounting for 25% of the total number of employees. The company is committed to creating a positive working atmosphere and providing employees with a diversified development platform, Let every member be professional, precise and dedicated, and form a solid business community with every member, and win the future together.

In the future, Flextronics will continue to adhere to the business philosophy of "market demand-oriented, technological innovation-driven", to expand and strengthen core businesses such as inverters, servo systems and motion controllers, and intelligent Internet of Things, and always insist on providing Good products, good services, through our own efforts, to promote the development of electric drive and industrial control fields, make contributions within our capacity.



Simple in type  
good at heart

Inherit the good platform technology of Flextronics;  
The industry's leading vector technology;  
Synchronous / asynchronous simultaneous drive;  
Integrate multi-industry applications, optimize selection;



Make it simple

Simple wiring, European-style terminals, saving wiring time, cut costs;  
Adopt the domestic general parameter arrangement, optimize the panel buttons, Simple to use;  
Simple debugging, dedicated upper software, minimize debugging;  
Time and difficulty ;



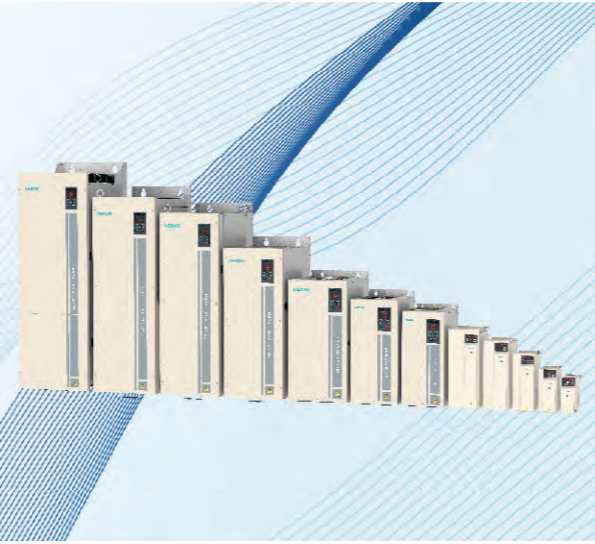
Thinner, design and  
aesthetics integrated

"Book Machine" in the Inverter ;  
Book-style narrow body design, reducing volume by up to 60% ;  
Up and down straight-through heat dissipation, multiple inverters can be installed side by side device, greatly reducing the volume of the electrical cabinet ;

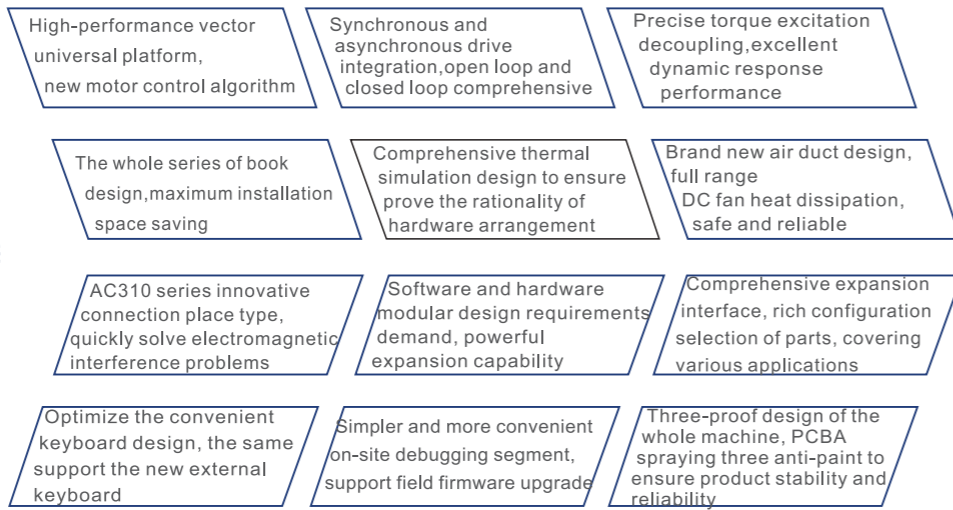


# AC310 series High-performance inverter

The AC310 series inverter is a high-performance vector inverter that is a continuation of the AC300 hardware structure design concept by Flextronics, retains the characteristics of the new generation of Flextronics products, and breaks through innovation in functional performance. It not only adopts the international leading field-oriented vector control technology, but also enriches the control methods of various forms of load such as voltage-frequency separation EPS power supply on the basis of compatible asynchronous and synchronous motor control. Under the premise of ensuring product high performance and high reliability, rationally layout parts, maintain product book-style narrow body design, pay attention to product ease of use and industry-specific design, and better solve customers' product selection Troubles. It is equipped with abundant expansion ports and a variety of expansion accessories to achieve the characteristics of high performance, high reliability, high power density and high applicability.



## Product features



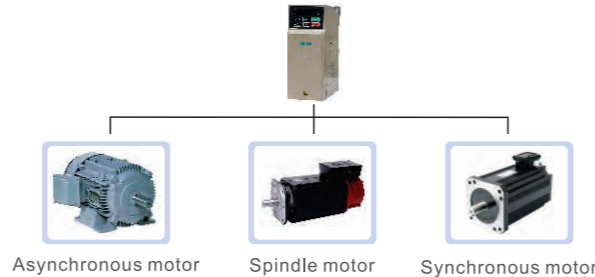
### General specification

AC 310 series		
Power level	Simplex 220V 50/60Hz	0.75-220kW
	Three phase 220V 50/60Hz	0.75-220kW
	Three phase 380V 50/60Hz	0.75-1200kW
Input	Allow voltage fluctuation	Voltage : 320V~480V Voltage imbalance rate:<3%
	Allow frequency fluctuation	Frequency: ±5%
	Distortion rate	IEC61800-2
Output	The output voltage	0-Input voltage, error is less than 5%
	Output frequency range	0-600Hz
	Overload capacity	150%Rated current 1min 180%Rated current 10s 200%Rated current 0.5s

### Performance features

#### Support multiple types of motors/loads

Compared with other inverters that can only drive corresponding motors, AC310 series inverters are customer diversity, can drive ordinary three-phase asynchronous motors, variable frequency motors, AC servo motors, permanent magnet synchronous motors, high-speed synchronous motors, spindle motors, synchronous reluctance motors, torque motors, Linear motors, etc.

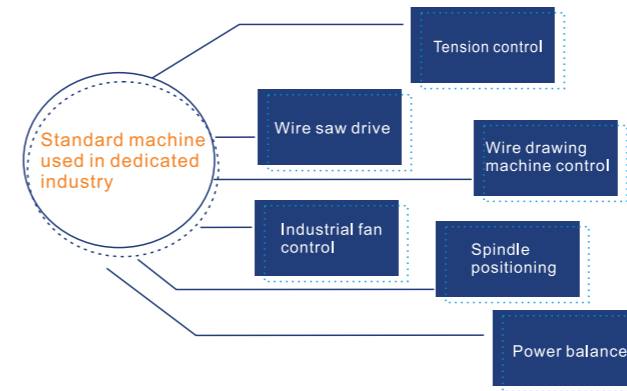


### Control mode selection

Control mode	Speed control	Torque control	Position control	Applicable motor
VF mode	●			Asynchronous motor
Voltage frequency separation	●			Torque motor, EPS power supply, series resonance
High performance vector without PG	●	●		Asynchronous, permanent magnet synchronous
With PG high performance vector	●	●	●	Asynchronous, permanent magnet synchronous, synchronous reluctance

### Standard machine "special" use, function in one

AC310 continues the innovative mechanism of the 300 series, retains the original product features, and is committed to solving the troubles of customer selection and improving market competitiveness. It has industry expansion functions. It can expand and increase parameters according to the actual use industry, and integrates multiple industry parameters. So as to realize the "special" use of the standard machine and the integration of functions.



### Actively respond to industry4.0

With the continuous reform of intelligent production, centralized control of products becomes more common. AC310 products can support communication with different types of DCS systems and PLC systems, and can support direct communication between various types of touch screens and AC310. MODBUS-RTU communication is standard and compatible options. Equipped with support for PROFIBUS-DP, CANOPEN, PROFINET communication protocols.



### Excellent control performance

Control mode	Speed control range	Starting torque	Applicable motor
High performance vector without PG	1:200	150%	Permanent magnet synchronous motor
High performance vector without PG	1:100	150%	Asynchronous motor
With PG high performance vector	1:1000	200%	Asynchronous, permanent magnet synchronous motor

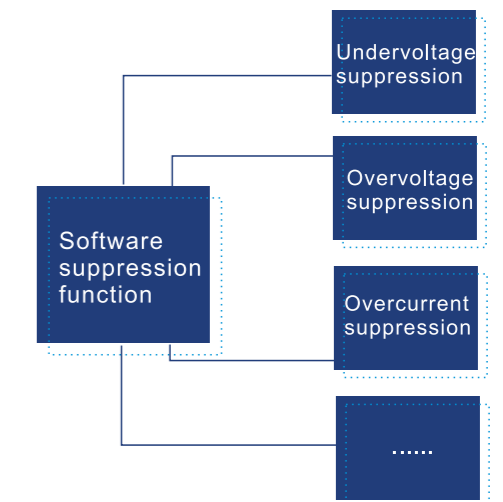
Closed-loop torque response <10ms, steady speed accuracy 0.02%, speed ripple 0.2%  
Open-loop torque response <20ms, stable speed accuracy 0.2% (synchronous), 0.5% (asynchronous)  
The highest vector output frequency is 600Hz, and the lowest carrier frequency is 1KHz

### Voltage frequency separation, professional drive

The comprehensive and abundant dedicated function algorithms for voltage-frequency separation can effectively drive torque motors and realize steady-state control of EPS power supplies. At the same time, it is widely used in a variety of withstand voltage test equipment in power applications.



### Software suppression function

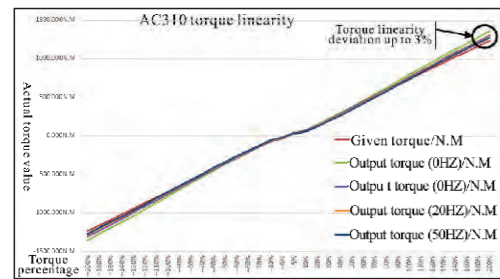


### High starting torque characteristics

Low frequency torque is large. In the closed-loop vector mode, 200% rated torque can be output at 0.0Hz, It can run stably with load at ultra-low speed of 0.01Hz. Powerful low-torque output, which can effectively Ensure the stability and smooth start-up.

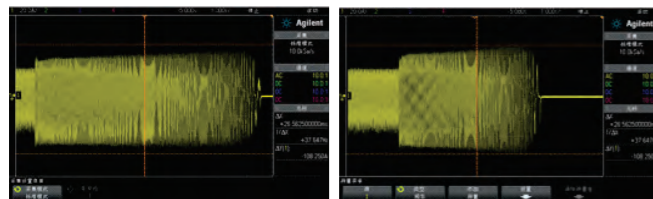


In torque control mode, the torque output is stable. The linearity deviation is within 3%, which greatly guarantees The stable operation of the equipment.



### Overexcitation braking function

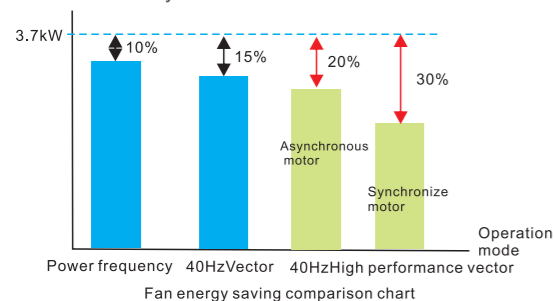
In the case of partial inertia shutdown, the braking resistor can be used without increasing the braking resistance, and the over-excitation braking function can be used realize fast braking and improve product ease of use. Over-excitation braking function effectively suppresses deceleration the DC bus voltage rises during the process to avoid inverter over-voltage faults, while achieving rapid braking, quickly stop after a power outage.



Overexcitation braking function is invalid Overexcitation braking function is effective

### Excellent energy saving function

The use of a new generation of energy-saving control technology can realize the efficient operation of induction motors;the load current reduces the excitation current, and the load condition is automatically adjusted to save energy; maximize the machine efficiency; reduce motor loss and reduce energy loss. 30% of the asynchronous machine adoptsthe vector the synchronous machine is driven by the mass mode, and the energy efficiency can be increased by more than 10%.



### Motor parameter self-learning

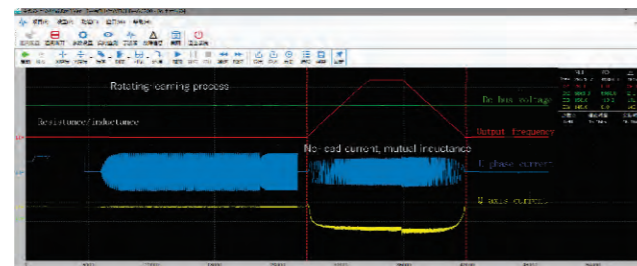
Whether in the self-learning of rotating or stationary motors, the motor parameters can be accurately obtained, and the debugging method convenient and simple to operate, providing higher control accuracy and response speed.

#### Spin self-learning

The load must be disengaged for learning, and it is suitable for occasions with high control accuracy requirements.

#### Completely static self-learning

The powerful motor self-learning algorithm can obtain the motor parameters when the motor is stationary, and the effect is comparable to rotating self-learning.



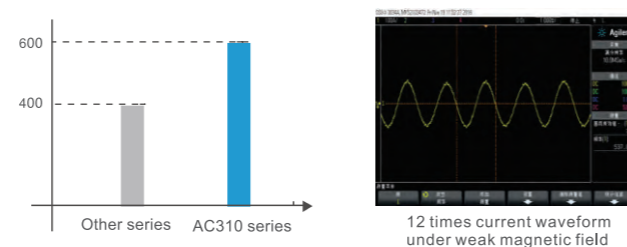
Spin self-learning



Static self-learning

### Stable high-speed field weakening control

The new field weakening control algorithm and the high-bandwidth current vector control algorithm achieve a stable high fast field weakening operation, up to 12 times of field weakening high precision output.



Other series: The maximum output frequency under vector control is 320/400Hz ; AC 310 series: The highest output frequency under vector control is 600Hz.

### Other software functions

Support software online upgrade

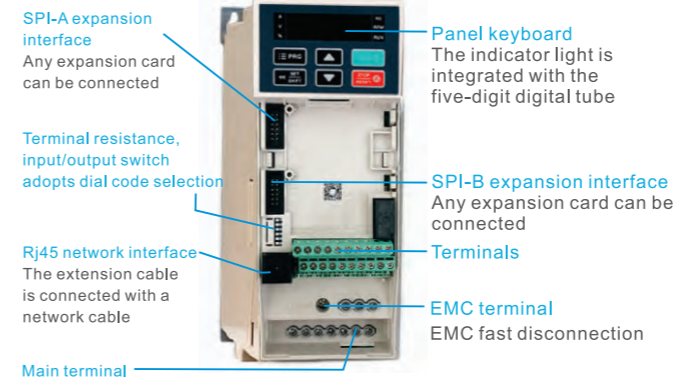
Random carrier capability

Powerful PC software

### Structural hardware characteristics

#### Simple internal layout, convenient wiring operation

The whole series adopts narrow-body design and strictly controls the structural size. The main model includes most of the common is suitable for application, various expansion interfaces and wiring terminals are distributed in an orderly manner, and the wiring operation is convenient.



#### Number of standard terminals

Serial number	Unit circuit	Quantity	Remarks
1	Normal X input	5	Bidirectional input
2	Normal Y output	1	Open collector output
3	Relay output	1	Normally open/normally closed
4	10V power output	1	50mA
	24V power output	1	100mA
5	Voltage/current analog input	2	V/A support free switching
6	Analog output(optional)	1	0-10V output
		1	0-20mA output
		1	0-100kHz pulse output
7	Rs485 communication	1	ModBus-RTU
8	Low speed pulse input	1	X5 terminal:0-5kHz input

#### New book structure

The whole series of AC310 series frequency converters adopts a narrow book design, and the volume is reduced.60%. It is the "book-based machine" in the real inverter.

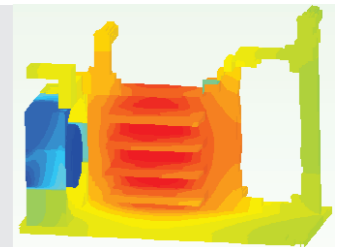


### New structure design



Electronic device and radiator duct isolation design, in which capacitance, MOS tube and relay to strengthen protection, machine a closed design is adopted on both sides of the device. Mention high environmental resistance of the machine.

Wide tooth surface heat dissipation and high wind speed design. Ensure that the full power range of the inverter enough to use at high temperature without derating.



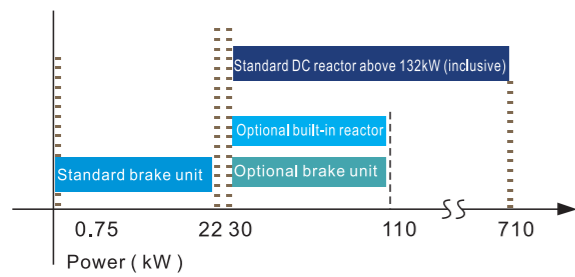
### Optimized structure design

Book-style narrow body design, rational use of space, greatly saving customers' main cabinet space and main cabinet cost.

#### 380V 2.2kW example



## Braking unit and reactor configuration



- 0.75~22kW Standard brake unit
- 30~110kW Optional built-in brake unit
- 45kW—110kW Optional built-in DC reactor
- Standard DC reactor for 132kW (inclusive) and above (standard input reactor for 630-710kW)

## Port feature dial code selection

Port characteristics are convenient to choose dialing codes. You can quickly select input and output characteristics with a common screwdriver.

Dialing diagram	Tag	Select location	Function Description
	RS485	485 terminating resistor	RS485 communication access 120 ohm terminal resistance
	AO-F	AO output frequency	AO interface 0.0~100kHz frequency output
	AO-I	AO output current	AO interface 0~20mA current output or 4~20mA current output
	AO-U	AO output voltage	0~10V voltage output
	AI1	AI1 input-current/voltage	AI1 input 0~20mA or 4~20mA or AI1 input 0~10V
	AI2	AI2 input-current/voltage	AI2 input 0~20mA or 4~20mA or AI2 input 0~10V

## Keyboard operation

A newly designed panel keyboard with superior operability. Built-in keyboard and external keyboard support dual display (control right can be selected through the inverter parameters built-in or external keyboard)

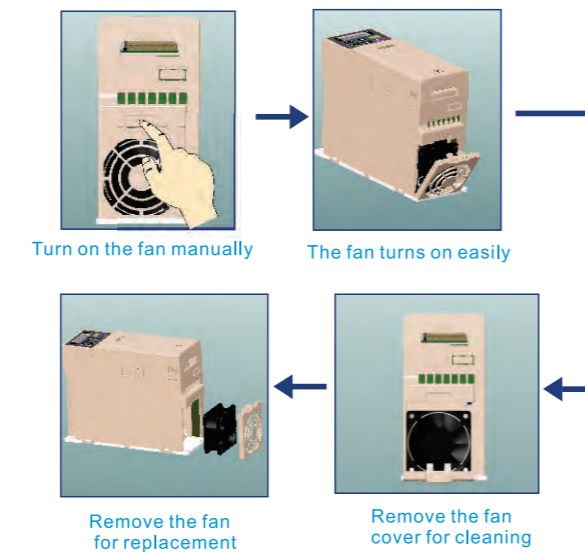


Note: Plastic case below 37KW adopts integrated keyboard, and steel case above 37KW adopts double-row keyboard.

Name	Status	Meaning	
Unit indicator	Hz	Flashing/bright	Frequency unit
	A	Bright	Current unit
	V	Flashing/bright	Voltage unit
	RPM	Bright	Speed unit
	%	Flashing/bright	Percentage unit
Status Indicator	RUN	Bright	The inverter is running forward
	RUN	Flashing	The inverter is running in reverse
	RUN	Turn off	Inverter stop

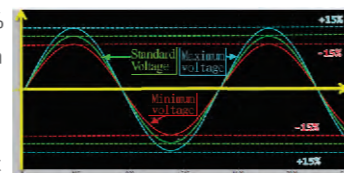
## Fast disassembly and assembly design of the fan

Using innovative fan structure design, under the premise of ensuring the stability and efficiency of the fan, in order to quickly replace and clean the fan without using external tools.



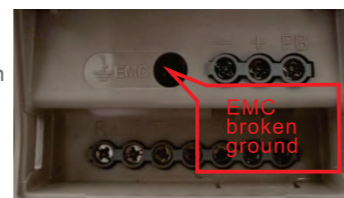
## Wide voltage design

The allowable fluctuation range of input voltage is  $\pm 15\%$  of rated voltage, use time can be protected from voltage fluctuations impact, meet the demanding grid environment territory.



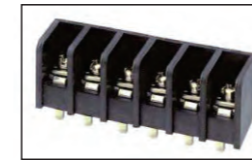
## EMC broken ground design

Adopt innovative EMC break ground design, grounding can be quickly selected through the terminal or intermittently, effectively solve EMC interference.

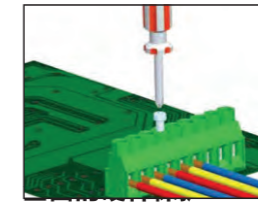


## European terminal block

Use professional European-style terminals that comply with IEC 60998-2-1; UL 1059; UL 486E specifications while ensuring safety and reliability, it saves connection time: stripping → wire sleeve number → screw locking. AC310 frequency converter adopts European-style terminals on the main circuit terminals of low-power machines. Use European style the time of the terminal connecting the main circuit in the cabinet is at least half the time compared to the previous machine. Greatly improve the customer's assembly efficiency.



Stripping → Socket No. → Crimping Nose → Screw Lock

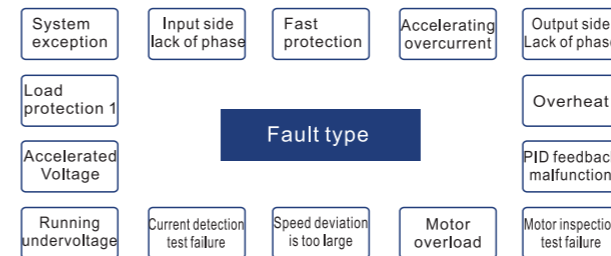


Stripping → Socket No. → Screw Lock

	AC310 model	Wire thread $\phi$ (mm)	Wire cross-sectional area S (mm <sup>2</sup> )	Stripping length L (mm)
Main circuit terminal	0.75kW-2.2kW	0.25-2.5	0.05-5.2	7-8
	4.0kW-5kW	0.5-2.5	0.2-5.2	6-7
	7.5kW-11kW	0.8-4	0.5-13	10-11
Wire stripping diagram				

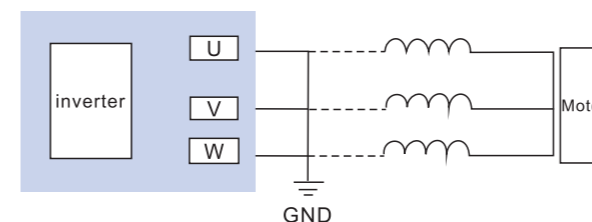
## Protective function

With output short-circuit protection to ground, internal buffer relay protection, fan drive circuit protection, external 24VDC DC short circuit protection, motor overload protection and other hardware protection functions comprehensive protection of the internal and peripheral equipment of the inverter.



## New motor-to-ground short-circuit detection

The inverter starts the ground short-circuit protection test immediately. Once a short-circuit on the motor side is found, the stop the output and protect the motor.



## Expandability

### Super expansion ability

A variety of extended interfaces to meet customized needs. AC310 control board retains two SPI high-speed channel external extension cards, and the control board automatically recognizes the expansion card also contains the expansion card setting parameter group.

### Expansion Card

Expansion card model	Claim
IO Expansion Card	Optional, high-speed pulse, relay
Speed tracking card	Optional, multi-type encoder
PG Card	Optional, multi-type encoder
Speed tracking card	Optional
RT resolver card	Optional
GPRS Card	Optional

### Communication expansion card

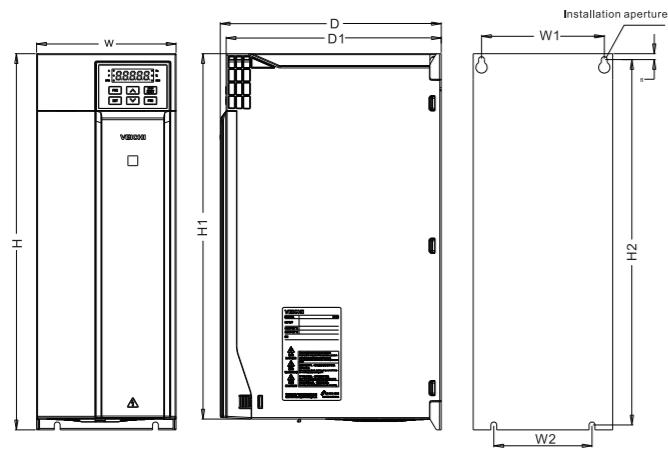


Communication expansion card model	Claim
PROFIBUS-DP card	Optional
CANopen card	Optional
PROFINET card	Optional
.....	

### IO Expansion Card

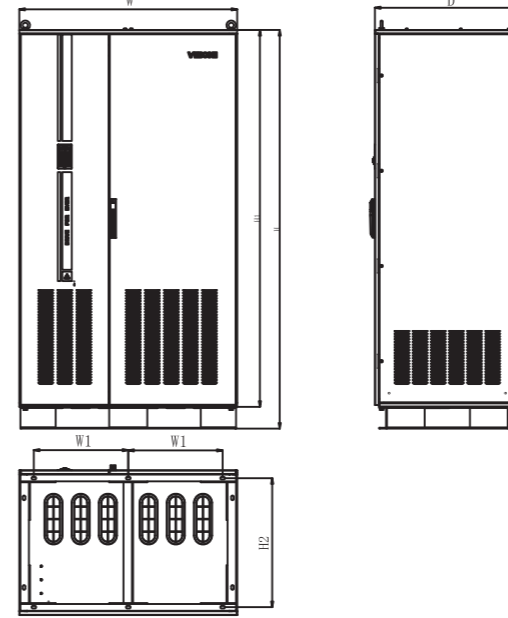
Attributes	Terminal	Description
Input IO	ExpandX6/X7/X8/X10	PLC/COM, Co-negative, Co-positive
High-speed pulse input	X10	0-100KHz
Digital output	Extend Y2	DC24V/50mA
Digital output	Expansion relay TA2/TB2/TAC2	3A/240VAC
Synchronous motor temperature detection	PK+/PK-	Support PT100/PT1000/KTY84, Motor temperature detection
Public	COM/PLC2	External public
Switch	S7	Input terminal polarity selection





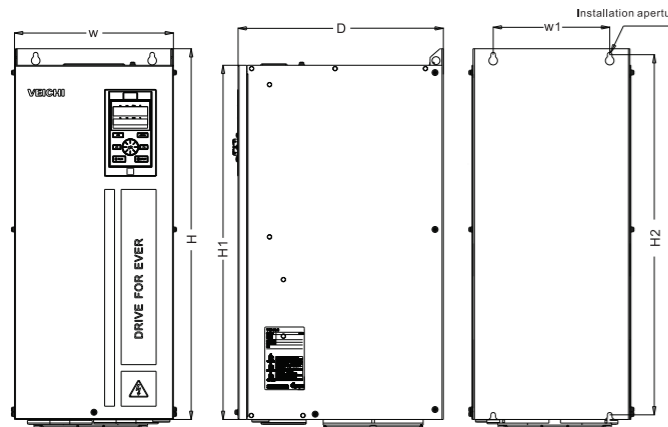
Inverter model	Dimensions ( mm )					Installation size ( mm )				Installation aperture
	W	H	H1	D	D1	W1	W2	H2	B	
AC310-T/S2-7R5G-B	142	383	372	225	219	125	100	372	6	4-M5
AC310-T/S2-011G-B										
AC310-T/S2-015G										
AC310-T2-018G	172	430	/	225	219	150	150	416.5	7.5	4-M5
AC310-T2-022G										
AC310-T3-015G/018P-B										
AC310-T3-018G/022P-B	142	383	372	225	219	125	100	372	6	4-M5
AC310-T3-022G/030P-B										
AC310-T3-030G/037P										
AC310-T3-037G/045P	172	430	/	225	219	150	150	416.5	7.5	4-M5

### Cabinet model

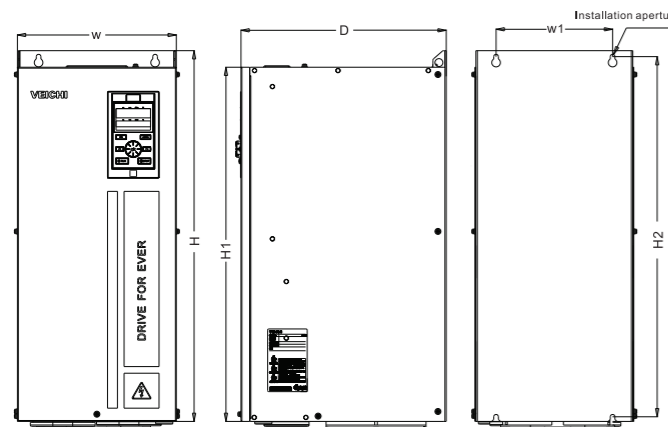


Inverter model	Dimensions(mm)				Installation size(mm)		Installation aperture
	W	H	H1	D	W1	H2	
AC310-T3-630G/710P-L							
AC310-T3-710G/800P-L							
AC310-T3-800G/900P-L	1201	2198	2078	798	520	711	φ 14
AC310-T3-900G/1000P-L							
AC310-T3-1000G/1120P-L							

### Iron case model



Inverter model	Dimensions ( mm )				Installation size ( mm )		Installation aperture
	W	H	H1	D	W1	H2	
AC310-T2-030G							
AC310-T2-037G	240	560	535	310	176	544	4-M6
AC310-T2-045G							
AC310-T2-055G	270	638	580	350	195	615	4-M8
AC310-T3-045G/055P							
AC310-T3-055G/075P	240	560	535	310	176	544	4-M6
AC310-T3-075G/090P							
AC310-T3-090G/110P	270	638	580	350	195	615	4-M8
AC310-T3-110G/132P							
AC310-T3-132G/160P-L	350	738	680	405	220	715	4-M8
AC310-T3-160G/185P-L							
AC310-T3-185G/200P-L							
AC310-T3-200G/220P-L	360	940	850	480	200	910	4-M16
AC310-T3-220G/250P-L							
AC310-T3-250G/280P-L	370	1140	1050	545	200	1110	4-M16
AC310-T3-280G/315P-L							

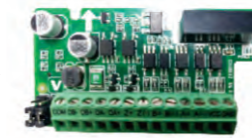


Inverter model	Dimensions ( mm )				Installation size ( mm )		Installation aperture
	W	H	H1	D	W1	H2	
AC310-T3-315G/355P-L							
AC310-T3-355G/400P-L	400	1250	1140	545	240	1213	4-M16
AC310-T3-400G/450P-L							
AC310-T3-450G/500P-L							
AC310-T3-500G/560P-L	460	1400	1293	545	300	1363	4-M16
AC310-T3-560G/630P-L							

### Accessories list

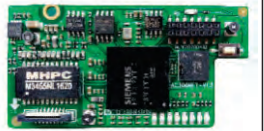
#### AC300PG01

There are 5V and 12V power PG card, support incremental differential output encoder and open collector output encoder.



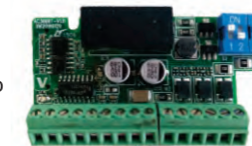
#### AC300 PN card

Support standard profinet



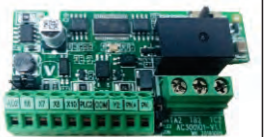
#### AC300RT1

Supports four different ratios of 0.219, 0.286, 0.5, 0.58, the factory default ratio is 0.5



#### AC300IO1

Four digital inputs(X10z supports 50k pulse input), one digital output one analog input and one relay output. Support temperature detection( PT100, PT1000 and KTY84)



#### AC300CAN1

CANopen expansion card



#### KBD10-15

External LED five-digit display and operation keyboard, potentiometer speed control



#### AC300DP01

Profibus communication expansion card



#### KBD300-25

Two-line external five-digit display keyboard, silicone buttons, digital potentiometer



#### AC300-GPRS

Equipment positioning and maintenance, real-time monitoring ,data collection

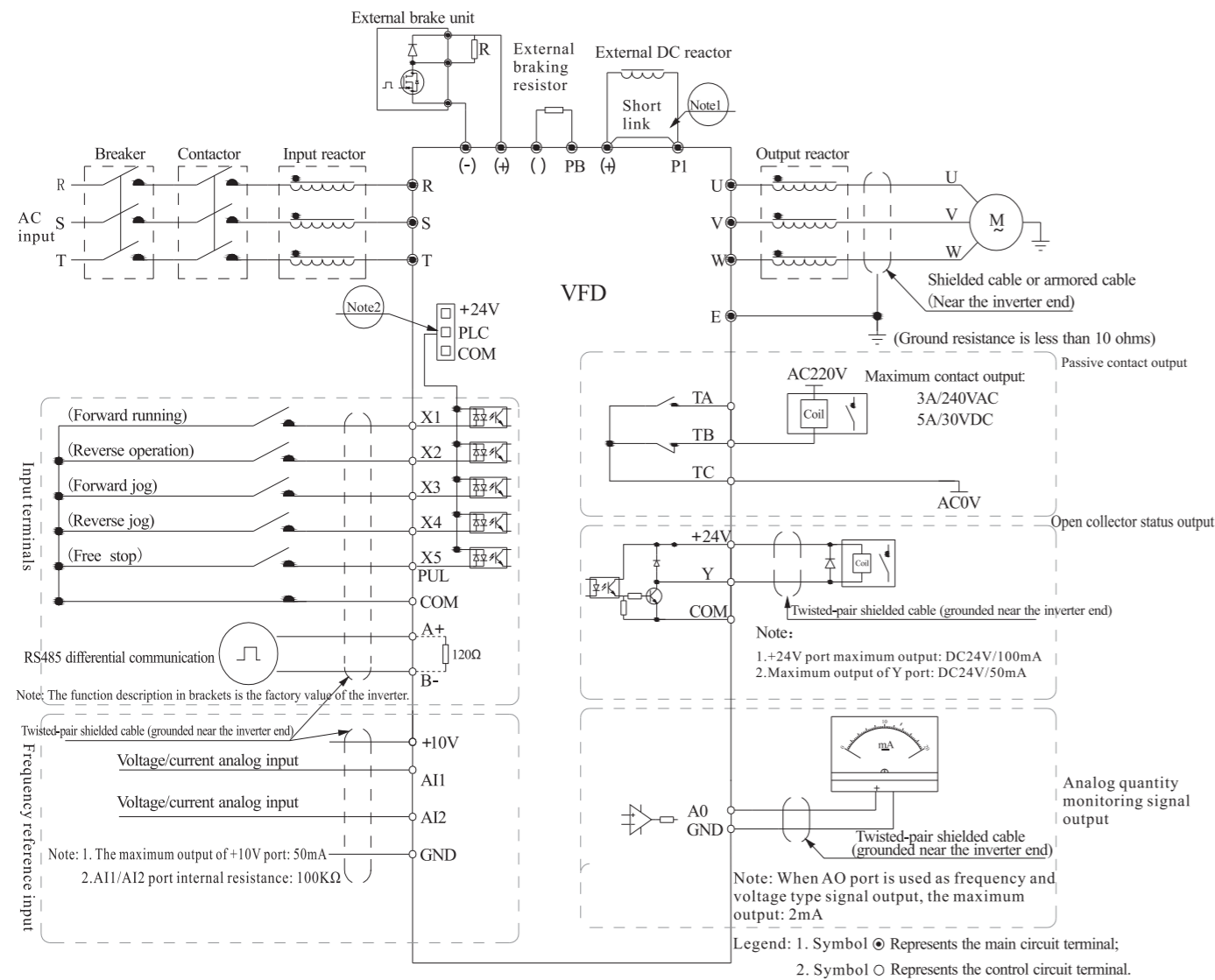


#### KBD300-L1 LCD keyboard

Have a good human-computer interface



# Wiring diagram



- Note:
1. When installing the DC reactor, be sure to remove P1(+) Shorting strip between terminals.
  2. Multi-function input terminals (X1~ X5/PUL) can choose NPN or PNP transistor signal as input, and the bias voltage can choose the inverter internal power supply (+24V terminal), or select the external power supply (PLC terminal). The factory default "+24V" and "PLC" are shorted, and the position of the shorting piece is between RJ45 and the terminal.
  3. The analog monitoring output is dedicated output for indicator meters such as frequency meters, ammeters, and voltmeters, and cannot be used for control operations such as feedback control.
  4. Since there are many types of pulses in actual use, please refer to the detailed description for specific wiring methods.

# Application field

