


# ES Series

## High-performance Vector Low-voltage Frequency Converter



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## EXCELLENT & SMART

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**CUMARK**

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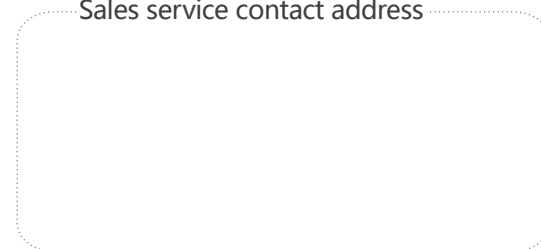
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# ES Series Frequency Converter

*Excellent & Efficient*

*Intelligence Drives the Future*

Cumark elaborately produces ES series high-performance vector frequency converters, based on many years of experience accumulation in electric drive R&D and various industrial automation applications, in combination with internationally first-class drive technologies.

ES series products can meet industrial control demands from different fields under severe environments with their high performance, rich functions and perfect structures, and provide all-round competitive advantages including excellent quality, friendly human-machine interface, and convenient services.





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Intelligent  
fault diagnosis

Intelligent LCD  
Control Keyboard

Intelligent temperature  
monitoring

Intelligent setting of  
industry applications  
parameters

Intelligent V/F  
curve setting



## Company Profile



Shenzhen Cumark New Technology Co., Ltd. was established on March 19, 2001. Its stock code is 831251. We focus on energy management and R&D, production and sales of industry automation products. Relying on excellent power, electronics and automation control technologies and many years of accumulated industry application experience, we provide industrial users with complete high-efficient and reliable automation and energy management solutions.

Our main products include high-voltage frequency converters, low-voltage frequency converters, explosion-proof frequency converters and active filters.




We mainly serve three fields of equipment manufacturing, energy-saving and environment protection and new energy. Our products are widely applied in lifting, machine tools, metal products, power cables, plastics,

printing & packing, textiles & chemical fibers, building materials, metallurgy, coal mines, municipal administration and automobile industries. We are a national high-tech enterprise professionalized in the R&D of power, electronics and automation control technologies. At present, we own industrial automation technologies with proprietary intellectual property rights and master various core technologies including high-performance vector (closed-loop, open-loop) frequency converter technologies, PLC technologies, and explosion-proof frequency converter technologies. Up to December 31, 2014, we have had certificates of 24 patents and 42 various technical qualifications or honors. We have an R&D team with many members, rich experience and advanced technologies, which specialized in the core platform technology research, application technology research, and product development.

## Service Outlets



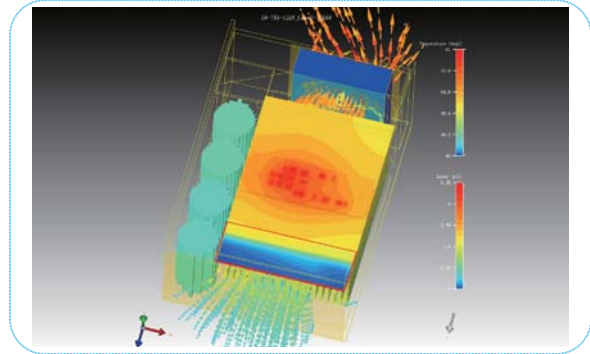
## List of ESSeries Frequency Converters

Type	Performance	Target market	Series	Appearance
High performance vector	<ol style="list-style-type: none"> <li>1) Excellent performance;</li> <li>2) Rich functions;</li> <li>3) High reliability;</li> <li>4) Comprehensive and systematic protection functions;</li> <li>5) Intelligent LCD keyboard included in standard configuration;</li> <li>6) Built-in various industry application standard macros;</li> <li>7) Simple servo function.</li> </ol>	Hoisting and lifting Digitally controlled machine tools ; Forging machine tools Roots blower Food machinery Textiles Dyeing and finishing Plastic machine HVAC, Petroleum Chemical engineering Medical, etc.	ES850 220 V 0.4-2.2 KW 380 V 0.75-560 KW 690 V 4-1250 KW	
Economic and general	<ol style="list-style-type: none"> <li>1) High reliability;</li> <li>2) High usability;</li> <li>3) Compatible with permanent magnet synchronous motor drive and three-phase asynchronous motor drive;</li> <li>4) Intelligent LCD keyboard included in standard configuration;</li> <li>5) Modular compact structure design</li> </ol>	Ceramic equipment Dyeing and finishing equipment Centrifuge Textiles Fans Pumps, etc.	ES580 220 V 0.4-2.2 KW 380 V 0.75-560 KW 690 V 15-1250 KW	
Compact and simple	<ol style="list-style-type: none"> <li>1) Small size and compact;</li> <li>2) Easy commissioning, optional intelligent LCD keyboard;</li> <li>3) Built-in RS485/CANopen communication included in standard configuration;</li> <li>4) High-performance PID function;</li> <li>5) Built-in encoder interface, supporting speed closed-loop control</li> </ol>	Small water pumps, Food packing, Food processing Wood working and engraving ; Air blower, etc.	ES350 220 V 0.4-2.2 KW 380 V 0.75-4 KW	

# High Reliability/ES Series Frequency Converter

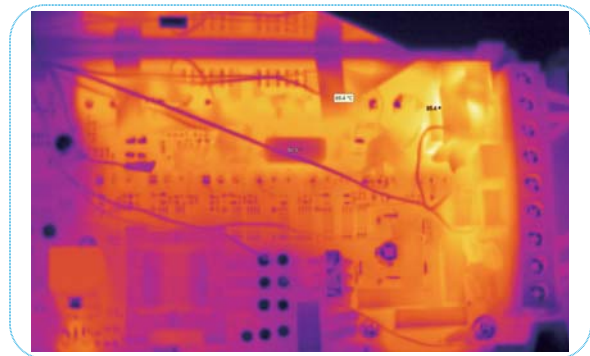
## Innovative Thermal Design Philosophy and Professional Thermal Simulation Analysis

- The innovative thermal design philosophy and first-class efficient thermal simulation software bring about the innovative and unique design, which provides this product with a comprehensive and systematic heat dissipation structure and solution.
- Advanced heat test and verification technologies like thermal imaging efficiently and completely check theoretical results of the thermal design, and further guarantee thermal reliability of the product system.



## Rigorous Temperature Rise Test on the Whole Converter

- Rigorous testing procedures for full load and overload verification as well as strict temperature rise acceptance standards for key components are adopted to enable the product to operate reliably under extreme overload conditions for a long time.
- High temperature aging testing with 120% load at 50°C, which is the first in China.
- All products shall pass the loaded high temperature aging test before delivery, which can effectively prevent scattered components from being invalid, and guarantee product quality.



## Spraying Process of Conformal Coatings

- Multiple high-quality conformal coatings are sprayed to enhance the product's good applicability to the environment.
- The automatic spraying process of conformal coatings is adopted to effectively ensure uniform coating thickness of the circuit board and consistency of batched products.



Note: The automatic spraying process of conformal coatings

## High Protection Grade

- Especially applied in cables, machine tools, ceramics and textiles industries where the site environments are severe, humid or dusty. The innovative and tightly closed structure design can effectively reduce influence of such environments.
- The protection class can reach IP41(0.4-22KW).



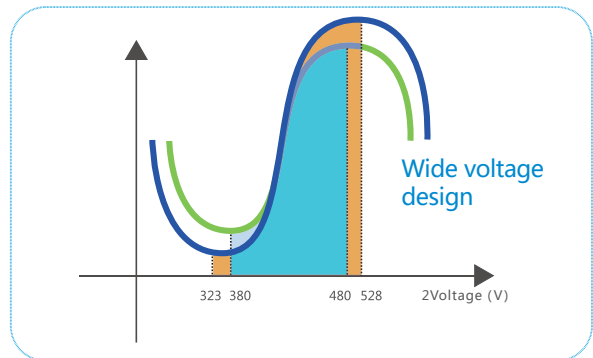
## High Anti-interference Capability

- In a standard configuration, the optimally designed built-in DC reactor (15KW and above) can effectively reduce interference from higher harmonic and foreign conduction radiation and strengthen the power grid adaptability.
- In a standard configuration, the built-in input C3 filter is equipped to reduce electromagnetic interference and guarantee steady operation of the device.
- Simple and friendly EMC cut-off point structure designs convenient for grounding and weakens electromagnetic interference.



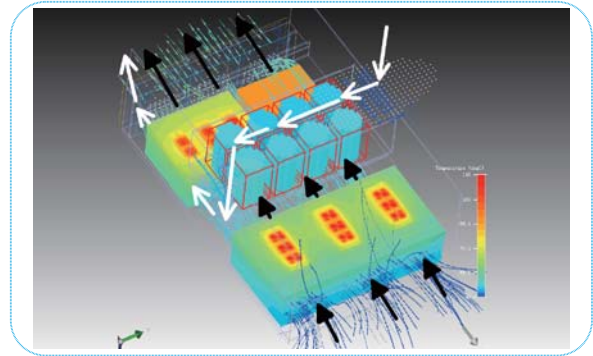
## Wide Voltage Range Design

- Rated voltage: single phase 220V; three-phase 220V/380V/690V
- Voltage frequency: 50-60Hz $\pm$ 5Hz
- Allowable voltage fluctuation: -30% to +15%



## Innovative and Independent Air Duct Design

- The design can effectively prevent dust and other foreign matters from entering the inside of the frequency converter, thereby avoiding faults caused by electric short circuits and damaged components.
- Electronic components are separated from the main cooling system by the poor conductor or wind screen, to avoid component failures due to too high temperature caused by heat radiation from the main-power radiator.



## Selection and Design of Key Components

- Strict component selection testing procedures are adopted. All power components such as the rectifier bridge, IGBT and electrolytic capacitor use mainstream products of the first-class manufacturers. Performance and reliability of key components are guaranteed from selection to manufacturing.
- Large allowance and derating design ensures reliability of key components.

## CE Certification Compliance

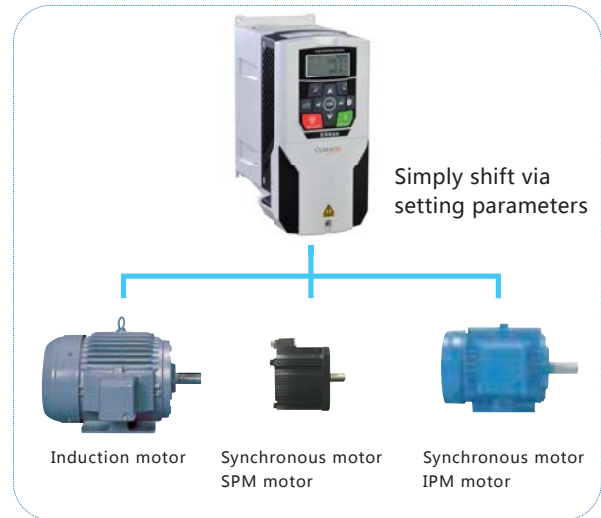
- The ES series products meet relevant requirements of European CE directives.



# Excellent Performance /ESSeries Frequency Converter

## Comprehensive Motor Drive Technology

- Support drive control of all motors (three-phase asynchronous, permanent magnet synchronous).
- Support the speed and torque control modes.
- The frequency converter equipped with the synchronous motor delivers good energy-saving effects.



## Accurate and Comprehensive Auto-turning Function

- The frequency converter can accomplish motor parameter auto-turning accurately, it will be more convenient to operate & commissioning and offers higher control precision and response speed.
- The comprehensive and rich Auto-turning functions cover various motor Auto-turning and mechanical Auto-turning functions.

Motor Comprehensive Auto-turning	
Rotary Auto-turning	Mostly suitable in applications of high starting torque, high speed and high control precision.
Stop Auto-turning	Mostly suitable in applications of commissioning when the motor and handling machines are connected.
Auto-turning of inter-line resistance	Change the length of the motor cables, or effectively improve the control precision when the motor capacity is different from the frequency converter capacity.
Energy-saving Auto-turning	Maintain the optimal efficiency for the motor all the time through self-learning when used in whatever conditions.

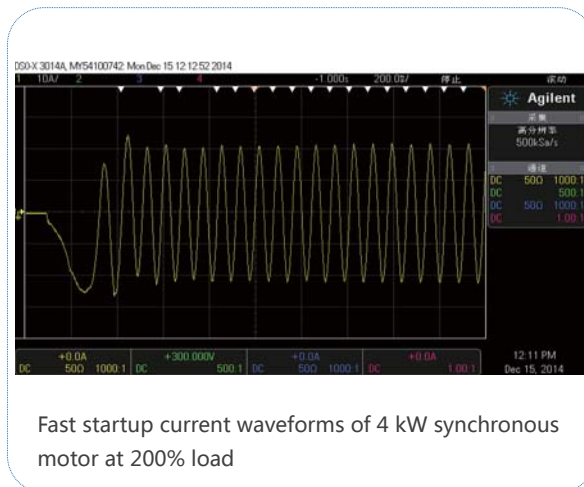
Mechanical Auto-turning	
Inertia Auto-turning	Make the Kinetic Energy Back-up (KEB) function, deceleration time, optimal function, and feed forward function achieve best application performance.
ASF* automatic gain * : Automatic Speed Regulator	Carry out ASR gain Auto-turning according to the preset

## Built-in Servo Function

- The built-in servo positioning is adopted for the device. When the PG vector control is available, the device supports control over positions including zero servo, principal axis orientation (4 orientation positions), simple carry control (8 carryovers setting) and pulse train position.
- It can be used in most servo application field.

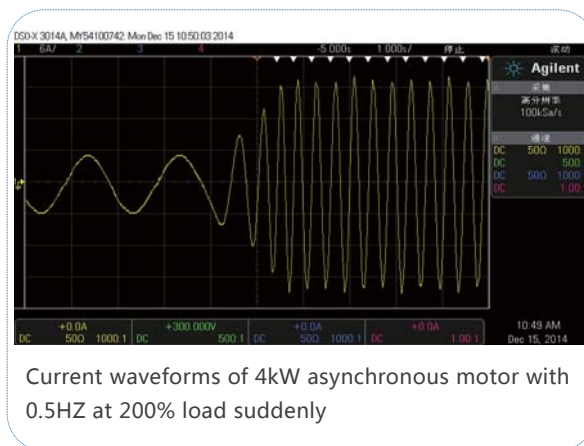
## Large Startup Torque

- Synchronous motor  
Open-loop vector : 0.5Hz/200%  
Close-loop vector : 0Hz/200%
- Asynchronous motor  
Open-loop vector : 0.25Hz/200%  
Close-loop vector : 0Hz/200%



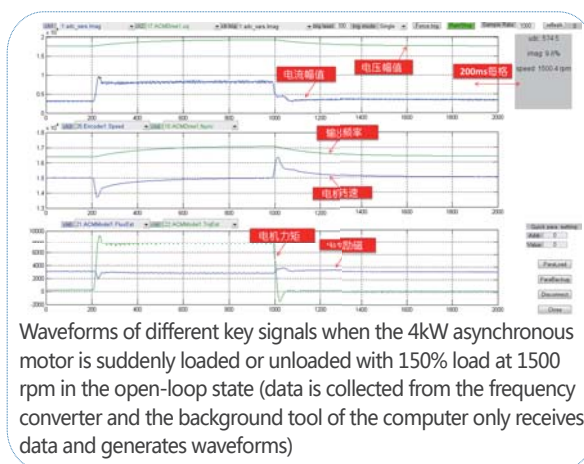
## Fast Torque Response, Low Torque Pulse

- Torque response open-loop vector : <20ms
- Torque response close-loop vector : <5ms
- The device can run steadily with load at a ultra-low speed of 0.01Hz. The low torque pulse ensures stable running.



## Wide Speed Range, High Steady-speed Precision

- Speed range :  
Open-loop vector : 1 : 200  
Close-loop vector : 1 : 3000
- Steady-speed precision :  
Open-loop vector : 10% rated slip  
Close-loop vector :  $\pm 0.01\%$



## High Overload Capacity

- Run steadily at 120% rated load
- Run for 60s at 150% rated load
- Run for 10 seconds at 180% rated load



# Rich and Easy Functions /ES Series Frequency Converter

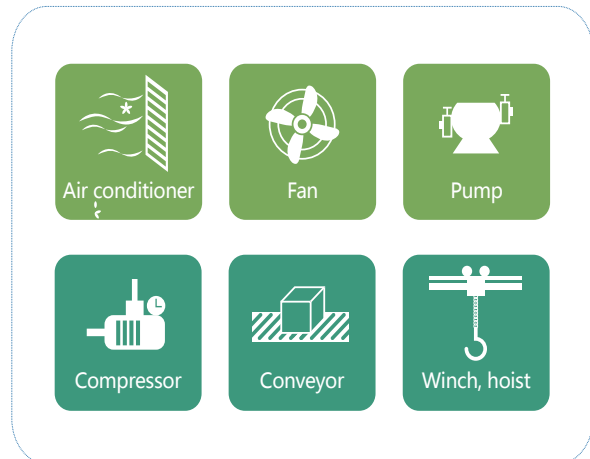
## Chinese LCD Smart Keyboard Adopted in Standard Configuration

- Large-text and multi-function Chinese or English LCD display for faster and more accurate parameter settings.
- Detailed status display for monitoring and setting.
- Detailed diagnosis information. Status information and waves of key nodes, fault records, and diagnosis information can be viewed for fault query and maintenance.
- Automatically setting of optimum parameter values. With the usage selection function, users need to only select the mechanical function. Then, the device automatically sets parameters to optimum values, thereby eliminating tedious parameter setting and shortening trial run time.
- Storage of application parameters of up to 4 user groups, which is convenient for fast process switching.
- Reliable built-in parameter backup & duplicating function
- Built-in parameter change logging function



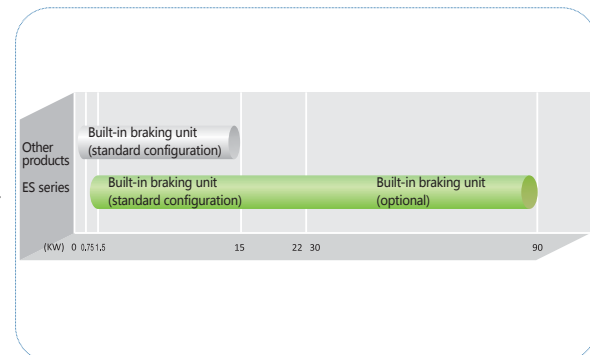
## Rich Application Macros

- Various built-in typical mechanical applications such as fans, water pumps, cables and unwinding and rewinding unit.
- Automatic setting of optimum parameter values.
- With the usage selection function, users need to only select the mechanical function. Then, the device automatically sets parameters to optimum values, thereby eliminating tedious parameter setting and shortening trial run time.



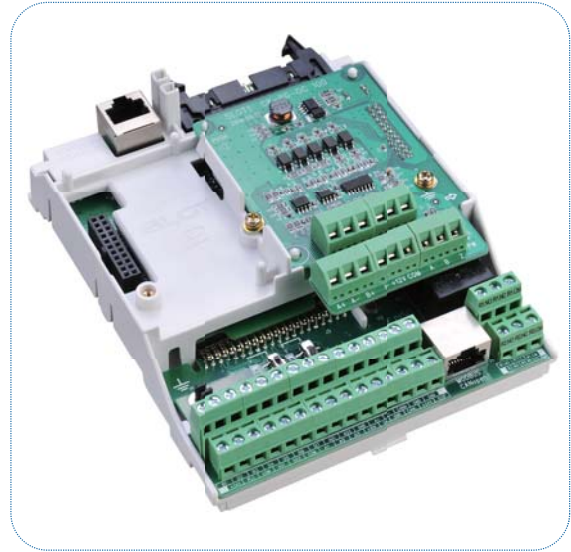
## Reliable Braking Function

- Over-excitation braking function achieves emergency braking even without brake resistor.
- The built-in braking unit is optional for the device with power of 30-90KW. The built-in braking unit is included in the standard configuration of the device with power of 22 KW and below,
- The use of a brake resistor achieves better braking effects, saves electric installation space, and lowers electric costs for users.



## Rich Extension Functions

- Include the RS-422/485CANopen telecommunication function in standard configuration.
- Support 4 kinds of field bus communication protocols (Modbus-RTU、PROFIBUS-DP、DeviceNet、CANopen)
- Support various PG cards.
- Support collector open encoder, differential output encoder, rotary-transformer-type encoder, and sin-cos encoder.
- Support I/O extension.  
\* For F0 series, the LCD keyboard is optional



## Rich I/O Interfaces

### ■ Type of Terminals Qty Characteristics

Boolean input	7	Maximum input frequency:1kHz, compatible with NPN and PNP input types
High-speed pulse input	1	Maximum input frequency: 50kHz, compatible with NPN and PNP input types
Analog input	3	0~10V, 0~20mA, -10V to +10V
Boolean output	2	Maximum output frequency: 1kHz
High-speed pulse output	1	Maximum output frequency: 50kHz
Analog output	2	0~10V, 0~20mA
Relay output	2	3A/250VAC,1A/30VDC, normally open+normally close

Note: the interfaces above are for F1 and later models. For F0 series, the quantity of some function interfaces is lower. See the technical datasheet or standard wiring diagram for details.

## Systematic and Comprehensive Protection Functions

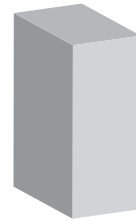
- Frequency converter protection function: short circuit protection, overcurrent protection, overvoltage protection, under-voltage protection, input & output phase loss protection, overload protection and overheat protection.
- Motor protection function: overload protection and motor temperature protection.
- Brake circuit protection function: brake transistor overload protection, brake transistor straight-through protection, and brake resistor protection



# Compact Modular Design/ES Series Frequency Converter

## Compact Structure Design

- The smaller size helps save installation space, facilitate electric layout, and is more suitable to be used in combination with the synchronous motor.
- The standard configurations uses a built-in DC reactor (15 KW and above), which helps reduce electrical installation space eliminates potential safety risks in using an external DC reactor.
- For low-power models, the rear metal plate design can effectively prevent the installation environment like oily environment from influencing the frequency converter, and guarantee secure installation.
- For medium-/high-power models, the window/cover of the rear radiator can be periodically cleaned, which is convenient for routine maintenance and cleaning of the frequency converter and saves maintenance time and costs.
- Some medium-/high-power models can be installed laterally as a blade, greatly facilitating suite design and manufacturing of professional systems.
- Minimum dimensions : 122mmx276mmx172mm (high performance)  
82mm x 176mm x 131 mm (micro transmission )



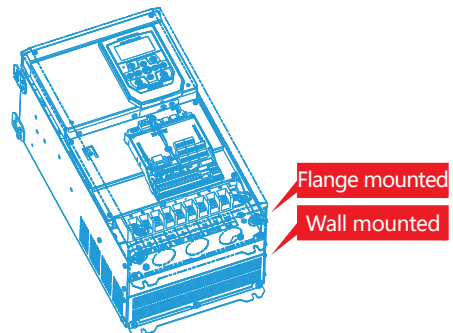
ES Series VS General model

The area is reduced by about 30 %

The volume is reduced by about 45 %

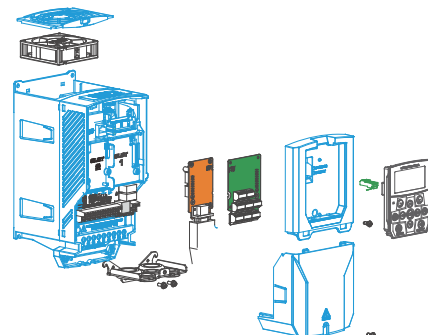
## Various Mounting Modes

- 1.5-90 kW: wall-mounted, flange (run-through wall) mounted
- 110-400kW: wall-mounted, floor-mounted
- 450-560kW: floor-mounted



## Modular Design

- Detachable terminal block, easy for maintenance.
- The main control unit, various PG cards and communication cards adopt the modular structure design. The joints of function modules are carefully designed and easy for universal application.
- Detachable fans, easy for cleaning and replacement.
- Hot pluggable LCD keyboard.

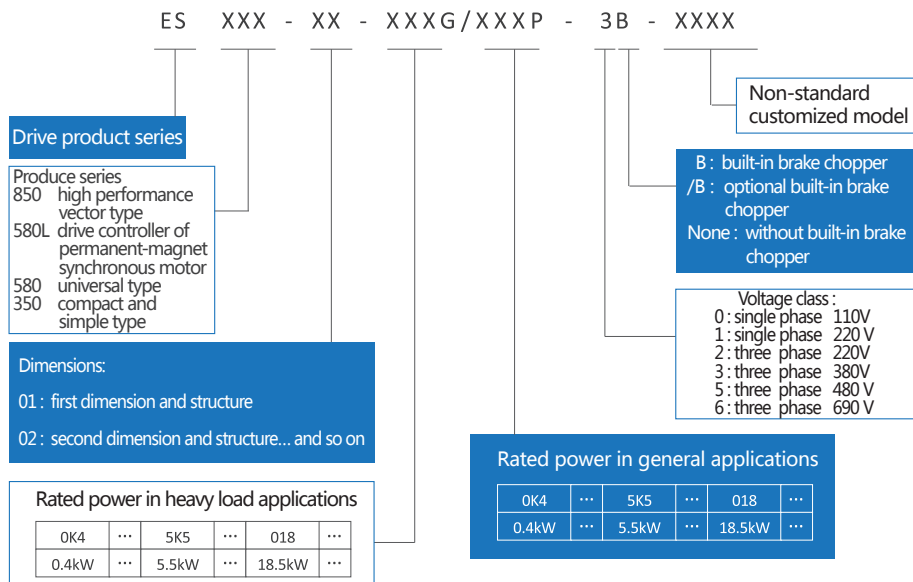


# Smart Drive /ESSeries Frequency Converter

## UniqueSmartDrive

- Intelligent LCD control keyboard: The friendly human-machine interface displays key parameters relevant to running of the frequency converter and motor in real time.
- Intelligent fault diagnosis: It records extreme operation conditions of the frequency converter, including the maximum current, voltage and maximum temperature, which are easy for fault locating and exception analysis. It also records device load conditions for customers, which are convenient for customers to optimize electric drive schemes.
- Intelligent temperature monitoring: It detects the temperature at key points inside the machine and intelligently controls the temperature of the whole machine by using adaptive algorithms.
- Intelligent V/F curve setting: It automatically match the most excellent performance parameters based on motor parameters, requiring no manual setting.
- Intelligent parameter setting for industry applications: Users only need to select an industry application, and the device automatically matches optimum parameters, eliminating tedious parameter setting.

## NamingRules





# ESSeries Frequency Converter

## Technical Data

	Item	Specification and Technical Data
Main power connection	Input voltage U1	220...240V; 380...500V; 660V...690V; 220V/380V/660V±20%; signal/three-phase power
	Input frequency f1	50...60Hz ±5Hz
	Output voltage U2	0...U1 (V)(The maximum output voltage equals the input power voltage.)
	Output frequency f2	0-1000Hz (V/Fcontrol); 0-500Hz(vector control)
	Carrier frequency	2-12 KHz (The device can intelligently and automatically make optimal adjustment according to load characteristics and drive temperature.)
	Input voltage unbalance degree	Maximum: ±3% of rated inter-phase input voltage
	Efficiency	≈ 98% (when operating at rated power)
Basic functions	Maximum frequency	0-500Hz(vector control) 0-1000Hz (V/Fcontrol)
	Input frequency resolution	Digital setting: 1RPM Analog setting: 0.025% of maximum RPM
	Control mode	Open-loop V/F control Open-loop vector control (SVC)/close-loop vector control (FOC)
	Startup torque	200% @ 0.25Hz@ OpenLoop(open-loop control) 200% @0Hz@ CloseLoop(close-loop control)
	Speed range	1 : 200 @ OpenLoop(open-loop control) 1 : 3000 @ CloseLoop(close-loop control)
	Steady-speed precision	±0.5% @ OpenLoop(open-loop control) ±0.01% @ CloseLoop(close-loop control)
	Overload capacity	Heavy load application: 60sat 150% rated current @40°C. The time depends on the drive temperature under other conditions. Light load application:60sat 110% rated current @40°C. The time depends on the drivetemperature under other conditions.
	Torque boost	Automatic torque boost. Manual torque boost 0.1%-30%
	V/Fcurve	Intelligent adaptive
	V/Fseparation	Two methods : full separation, half separation
	Acceleration and deceleration curves	straight-line or S-curve acceleration and deceleration mode Two acceleration time values. The acceleration and deceleration time range : 0.0s-650.00s
	Simple PLCfunction	Achieve operationof up-to-16-stages speed(via built-in PLC or control terminals)
	Built-in PID	Conveniently achieve the process control close-loop control system
	Automatic voltage regulation (AVR)	When the grid voltage changes, the device automatically maintainsconstant output voltage.
Enhancements	Overvoltage and overcurrent stall control	The current and voltage are automatically limited during running to avoid jump faults due to frequent overcurrent and overvoltage
	Fast current limiting	Overcurrent faults are minimized to guarantee normal operation of the frequency converter.
	Torque limiting and control	The torque is automatically limited operating (to avoid frequent overcurrent jumping fault due to too large torque).
	Protection function	Output shortcircuit protection, input & output phase loss protection, overcurrent protection, overvoltage protection, undervoltage protection, overheat protection, overload protection, brake chopper overload protection, brake chopper shortcircuit protection, brake resistor overload protection
	Non-stop during transient interruption	Keep the frequency converteroperating in a short time (by reducing feedback energy compensation voltageat the moment of power outage). The duration depends on the mechanical inertia of the load at that time.
	Timing control	Timing control function. The time range and precision is 0.0-6500.0(min).
	Switching multiple motors	Support switching among four groups of motor parameters.
	Bus communication	The standard configuration uses the built-in Modbus/CANopen communication, which can be extended to Profibus-DP bus communication.
Intelligent temperature control	Full cover system temperature testing, intelligent real-time IGBT chip temperature monitoring, and intelligent and optimized adjustment of the carrier and current based on drive temperature changes	
Type of encoders supported	Support differential encoders, collector open encoders, UVW encoders, rotary transformer encoders and Sin-Cos Encoders	

## Technical Data

Item	Specification and Technical Data	
I/O Input Output Interface	Command input mode	Control keyboard input, control terminal input, bus communication input, which can be switched mutually.
	Speed reference mode	Digital giving, analog voltage (current) giving, pulse giving, bus communication giving and PID giving, which are mutually switched.
	Input terminal (input)	The followings are included in standard configuration : 6 (F0) / 7 (F1 and above) digital input terminals, where, DI6 (F0) DI7 (F1 and above)supports the maximum of 50 kHz high-speed pulse input. 2 (F0) /3 (F1 and above) analog input terminals (where, at least 2 supports 0-10Vvoltage input or 0-20 mAvoltage input) The followings are extended as cards : 5 digital input terminals 2 analog input terminals, supporting input of -10V to+10V voltage
	Output terminal (output)	The followings are included in standard configuration: 1 high-speed pulse output terminal (supporting 0-50 kHz square signal output ) 1 (F0) /2 (F1 and above) digital output terminals 1 (F0) /2 (F1 and above) relay output terminals 1 (F0) /2 (F1 and above) analog output terminals (supporting0-10V voltage output or 0- 20mA voltage output) The followings are extended as cards: 3 digital output terminals 3 relay output terminals 3 analog output terminals, supporting 0-10V voltage output or 0-20mA voltage output
Display and control	Man-machine interface	5-bit 8-shape digital tube (F0) , intelligent sealed LCD control keyboard (F1 and above)
	Parameters duplicating	Rapidly duplicating parameters via the LCD control keyboard
Application environment	Application site	Indoor, free of direct sunshine, dusts, corrosive gases, flammable gases, oil mist, water vapor, drip or salts
	Altitude	At 0-1000m ; When the altitude is 1000-4000m, the capacity is reduced by 1% as the altitude rises by 100m. (consult professionals for more accurate values)
	Operation ambient temperature	-10°C to+40°C (when the ambient temperature is 40°C-55°C, the driveis automatically derated to achieve self-protection)
	Relative humidity	Less than 95%RH. No droplets condensed (condensation)
	Sinusoidal vibration	(IEC 60068- 2/ - 6.TestFc) Max.0.1mm (5 to 13.2Hz) ; max.7m/S <sup>2</sup> (13.2 to 100 Hz) sinusoidal vibration (F0-F7) Max.0.1mm (10 to 57Hz) ; max.10m/S <sup>2</sup> (57 to 150 Hz) sinusoidal vibration (F8-F9)
	Impact	Not allowed (during operation); maximum 100m/S <sup>2</sup> , 11ms (during storage and transportation with packing)
	Free fall (Max.)	Not allowed (during operation); with packing : 100cm @F0-2,76cm @F0-4,46cm @F5-7,15cm @F8-9
Storage & transportation temperature	-40°C to+70°C (-40 to+158°F)	
Protection grade	IP20 (ULopen type), full closed design for small- and medium-power models. Top/Left and right sides can reach IP41 (the medium cavity with air vents on two sides for some F0** models)	
Cooling mode	Forced air cooling of the interior fan. The air flows from bottom to top. Air-cooled radiator.	
Application standard	IEC 61800-3 (2004), IEC 61800-5-1 (2007) ; GB12668 (see the nameplate for details).	



# ESSeries Frequency Converter

## Selection of ES850 Products

### 220V rated voltage

Model Code	Rated Value		General Load Application		Heavy Load Application		Noise Level	Heat Radiation	Air Volume	Dimension
	I <sub>N</sub> (A)	I <sub>max</sub> (A)	I <sub>Ld</sub> (A)	P <sub>Ld</sub> (kW)	I <sub>Hd</sub> (A)	P <sub>Hd</sub> (kW)				
ES850-01-0K4G/0K7P-1B <sup>1)</sup>	4.8	6	4.5	0.75	2.5	0.37	45	40	53	F1
ES850-01-0K7G/1K5P-1B <sup>1)</sup>	7.5	10	7	1.5	4.5	0.75	45	94	53	
ES850-01-1K5G/2K2P-1B <sup>1)</sup>	11	15	10	2.2	7	1.5	45	172	53	
ES850-01-2K2G-1B <sup>1)</sup>	15	20	-	-	10	2.2	45	232	53	

### 380V rated voltage

Model Code	Rated Value		General Load Application		Heavy Load Application		Noise Level	Heat Radiation	Air Volume	Dimension
	I <sub>N</sub> (A)	I <sub>max</sub> (A)	I <sub>Ld</sub> (A)	P <sub>Ld</sub> (kW)	I <sub>Hd</sub> (A)	P <sub>Hd</sub> (kW)				
ES850-01-0K7G/1K5P-3B	5.2	7	5	1.5	2.5	0.75	45	40	53	F1
ES850-01-1K5G/2K2P-3B	6.3	9	6	2.2	4.2	1.5	45	76	53	
ES850-01-2K2G/4K0P-3B	10.5	15	9.8	4	5.6	2.2	45	97	53	
ES850-01-4K0G/5K5P-3B	14	20	13.5	5.5	10.5	4	45	172	53	
ES850-01-5K5G/7K5P-3B	18.2	25	17.5	7.5	14.5	5.5	45	210	53	F2
ES850-02-7K5G/011P-3B	26	36	25	11	17.6	7.5	45	325	55	
ES850-02-011G-3B	28	35	26	15	25	11	45	420	55	F3
ES850-03-015G/018P-3B	41	57	38.6	18.5	35	15	57	550	145	
ES850-03-018G/022P-3B	48	67	46	22	41	18.5	57	660	145	
ES850-03-022G/030P-3B	63.5	89	61	30	48	22	57	890	145	F4
ES850-04-030G/037P-3/B	78	109	75	37	66	30	60	1114	290	
ES850-04-037G/045P-3/B	95	133	91	45	79	37	60	1140	290	
ES850-04-045G/055P-3/B	120	168	115	55	94	45	60	1200	290	F5
ES850-05-055G/075P-3/B	162	227	155	75	116	55	60	1440	350	
ES850-05-075G/090P-3/B	185	222	178	90	160	75	60	1940	350	
ES850-05-090G/110P-3/B	225	270	215	110	179	90	67	2200	570	F6
ES850-06-110G/132P-3	272	326	261	132	215	110	68	3300	685	
ES850-06-132G/160P-3	320	384	310	160	259	132	68	3850	685	
ES850-07-160G/200P-3	375	450	360	200	314	160	68	4100	720	F7
ES850-07-200G/220P-3	450	540	430	220	387	200	68	4600	720	
ES850-07-220G/250P-3	487	584	470	250	427	220	68	5100	720	
ES850-08-250G/280P-3	546	628	525	280	481	250	68	5782	1200	F8
ES850-08-280G/315P-3	624	718	600	315	550	280	68	6252	1200	
ES850-08-315G/355P-3	686	789	660	355	616	315	68	7866	1200	
ES850-09-355G/400P-3	760	874	730	400	671	355	68	9100	1300	F9
ES850-09-400G/450P-3	865	995	830	450	759	400	68	9900	1300	
ES850-09-450G/500P-3	950	1093	920	500	850	450	68	10500	1680	
ES850-09-500G/560P-3	1100	1265	1080	560	950	500	68	11500	1680	F9
ES850-09-560G/630P-3	1200	1380	1150	630	1060	560	68	12600	1680	

### 660V/690V rated voltage

Model Code	Rated Value		General Load Application		Heavy Load Application		Noise Level	Heat Radiation	Air Volume	Dimension
	I <sub>N</sub> (A)	I <sub>max</sub> (A)	I <sub>Ld</sub> (A)	P <sub>Ld</sub> (kW)	I <sub>Hd</sub> (A)	P <sub>Hd</sub> (kW)				
ES850-04-015G/018P-6	22	44	21	18.5	18	15	57	550	290	F4
ES850-04-018G/022P-6	26	54	25	22	22	18.5	57	660	290	
ES850-04-022G/030P-6	35	64	33	30	27	22	57	890	290	
ES850-04-030G/037P-6	44	70	41	37	35	30	60	1114	290	
ES850-04-037G/045P-6	49	71	48	45	45	37	60	1140	290	
ES850-04-045G/055P-6	61	104	58	55	52	45	60	1200	290	
ES850-04-055G/075P-6	80	124	80	75	65	55	60	1440	290	
ES850-05-075G/090P-6	98	168	93	90	86	75	60	1940	350	F5
ES850-05-090G/110P-6	119	198	113	110	100	90	67	2200	350	
ES850-05-110G/132P-6	142	200	142	132	121	110	68	3300	350	
ES850-05-132G/160P-6	175	220	165	160	150	132	68	3850	350	F6
ES850-06-160G/200P-6	220	240	215	200	175	160	68	4100	720	
ES850-06-200G/220P-6	271	320	245	220	220	200	68	4600	720	
ES850-06-220G/250P-6	290	350	265	250	250	220	68	5100	720	F7
ES850-07-250G/280P-6	300	360	295	280	270	250	68	5782	1000	
ES850-07-280G/315P-6	330	360	325	315	300	280	68	6252	1000	
ES850-07-315G/355P-6	370	480	360	355	330	315	68	7866	1000	

## Selection of ES580 Products

### 220V rated voltage

Model Code	Rated Value		General Load Application		Heavy Load Application		Noise Level	Heat Radiation	Air Volume	Dimension
	I <sub>n</sub> (A)	I <sub>max</sub> (A)	I <sub>Ld</sub> (A)	P <sub>Ld</sub> (kW)	I <sub>Hd</sub> (A)	P <sub>Hd</sub> (kW)		W	m <sup>3</sup> /h	
ES580-01-0K4G/0K7P-1B <sup>1)</sup>	4.8	6	4.5	0.75	2.5	0.37	45	40	53	F1
ES580-01-0K7G/1K5P-1B <sup>1)</sup>	7.5	10	7	1.5	4.5	0.75	45	94	53	
ES580-01-1K5G/2K2P-1B <sup>1)</sup>	11	15	10	2.2	7	1.5	45	172	53	
ES580-01-2K2G-1B <sup>1)</sup>	15	20	-	-	10	2.2	45	232	53	

### 380V rated voltage

Model Code	Rated Value		General Load Application		Heavy Load Application		Noise Level	Heat Radiation	Air Volume	Dimension
	I <sub>n</sub> (A)	I <sub>max</sub> (A)	I <sub>Ld</sub> (A)	P <sub>Ld</sub> (kW)	I <sub>Hd</sub> (A)	P <sub>Hd</sub> (kW)	dBA	W	m <sup>3</sup> /h	
ES580-01-0K7G/1K5P-3B	5.2	7	5	1.5	2.5	0.75	45	40	53	F1
ES580-01-1K5G/2K2P-3B	6.3	9	6	2.2	4.2	1.5	45	76	53	
ES580-01-2K2G/4K0P-3B	10.5	15	9.8	4	5.6	2.2	45	97	53	
ES580-01-4K0G/5K5P-3B	14	20	13.5	5.5	10.5	4	45	172	53	
ES580-01-5K5G/7K5P-3B	18.2	25	17.5	7.5	14.5	5.5	45	210	53	F2
ES580-02-7K5G/011P-3B	26	36	25	11	17.6	7.5	45	325	55	
ES580-02-011G-3B	28	35	26	15	25	11	45	420	55	F3
ES580-03-015G/018P-3B	41	57	38.6	18.5	35	15	57	550	145	
ES580-03-018G/022P-3B	48	67	46	22	41	18.5	57	660	145	
ES580-03-022G/030P-3B	63.5	89	61	30	48	22	57	890	145	F4
ES580-04-030G/037P-3/B	78	109	75	37	66	30	60	1114	290	
ES580-04-037G/045P-3/B	95	133	91	45	79	37	60	1140	290	
ES580-04-045G/055P-3/B	120	168	115	55	94	45	60	1200	290	F5
ES580-05-055G/075P-3/B	162	227	155	75	116	55	60	1440	350	
ES580-05-075G/090P-3/B	185	222	178	90	160	75	60	1940	350	
ES580-05-090G/110P-3/B	225	270	215	110	179	90	67	2200	570	F6
ES580-06-110G/132P-3	272	326	261	132	215	110	68	3300	685	
ES580-06-132G/160P-3	320	384	310	160	259	132	68	3850	685	F7
ES580-07-160G/200P-3	375	450	360	200	314	160	68	4100	720	
ES580-07-200G/220P-3	450	540	430	220	387	200	68	4600	720	
ES580-07-220G/250P-3	487	584	470	250	427	220	68	5100	720	F8
ES580-08-250G/280P-3	546	628	525	280	481	250	68	5782	1200	
ES580-08-280G/315P-3	624	718	600	315	550	280	68	6252	1200	
ES580-08-315G/355P-3	686	789	660	355	616	315	68	7866	1200	F9
ES580-09-355G/400P-3	760	874	730	400	671	355	68	9100	1300	
ES580-09-400G/450P-3	865	995	830	450	759	400	68	9900	1300	
ES580-09-450G/500P-3	950	1093	920	500	850	450	68	10500	1680	F9
ES580-09-500G/560P-3	1100	1265	1080	560	950	500	68	11500	1680	
ES580-09-560G/630P-3	1200	1380	1150	630	1060	560	68	12600	1680	

### 660V/690V rated voltage

Model Code	Rated Value		General Load Application		Heavy Load Application		Noise Level	Heat Radiation	Air Volume	Dimension
	I <sub>n</sub> (A)	I <sub>max</sub> (A)	I <sub>Ld</sub> (A)	P <sub>Ld</sub> (kW)	I <sub>Hd</sub> (A)	P <sub>Hd</sub> (kW)	dBA	W	m <sup>3</sup> /h	
ES580-04-015G/018P-6	22	44	21	18.5	18	15	57	550	290	F4
ES580-04-018G/022P-6	26	54	25	22	22	18.5	57	660	290	
ES580-04-022G/030P-6	35	64	33	30	27	22	57	890	290	
ES580-04-030G/037P-6	44	70	41	37	35	30	60	1114	290	
ES580-04-037G/045P-6	49	71	48	45	45	37	60	1140	290	
ES580-04-045G/055P-6	61	104	58	55	52	45	60	1200	290	
ES580-04-055G/075P-6	80	124	80	75	65	55	60	1440	290	F5
ES580-05-075G/090P-6	98	168	93	90	86	75	60	1940	350	
ES580-05-090G/110P-6	119	198	113	110	100	90	67	2200	350	
ES580-05-110G/132P-6	142	200	142	132	121	110	68	3300	350	F6
ES580-05-132G/160P-6	175	220	165	160	150	132	68	3850	350	
ES580-06-160G/200P-6	220	240	215	200	175	160	68	4100	720	
ES580-06-200G/220P-6	271	320	245	220	220	200	68	4600	720	F7
ES580-06-220G/250P-6	290	350	265	250	250	220	68	5100	720	
ES580-07-250G/280P-6	300	360	295	280	270	250	68	5782	1000	
ES580-07-280G/315P-6	330	360	325	315	300	280	68	6252	1000	F7
ES580-07-315G/355P-6	370	480	360	355	330	315	68	7866	1000	

# ES Series Frequency Converter

## 660V/690V rated voltage

Model Code	Rated Value		General Load Application		Heavy Load Application		Noise Level	Heat Radiation	Air Volume	Dimension
	I <sub>N</sub> (A)	I <sub>max</sub> (A)	I <sub>Ld</sub> (A)	P <sub>Ld</sub> (kW)	I <sub>Hd</sub> (A)	P <sub>Hd</sub> (kW)	dBA	W	m <sup>3</sup> /h	
ES580-08-355G/400P-6	430	520	420	400	385	355	68	9100	1300	F8 <sup>2)</sup>
ES580-08-400G/450P-6	470	655	455	450	430	400	68	9900	1300	
ES580-08-450G/500P-6	522	700	505	500	470	450	68	10500	1300	
ES580-08-500G/560P-6	590	800	571	560	555	500	68	11500	1300	
ES580-08-560G/630P-6	721	820	710	630	600	560	68	12600	1300	
ES580-09-630G/800P-6	900	1350	880	800	680	630	68	16000	1680	F9 <sup>2)</sup>
ES580-09-800G/1100P-6	1160	1750	1115	1100	900	800	68	20000	1680	F10 <sup>4)</sup>
ES580-09-1100G/1250P-6	1250	2000	1250	1250	1114	1100	68	26000	1680	
ES580-09-1250G/1400P-6	1350	2200	1400	1400	1250	1250	68	32000	1680	

## Selection of ES350 Products

### 220V rated voltage

Model Code	Rated Value		General Load Application		Heavy Load Application		Noise Level	Heat Radiation	Air Volume	Dimension
	I <sub>N</sub> (A)	I <sub>max</sub> (A)	I <sub>Ld</sub> (A)	P <sub>Ld</sub> (kW)	I <sub>Hd</sub> (A)	P <sub>Hd</sub> (kW)	dBA	W	m <sup>3</sup> /h	
ES350-F0-0K4G/0K7P-1B	4.8	6	4.5	0.75	2.5	0.37	40	40	25	F0 <sup>3)</sup>
ES350-F0-0K7G/1K5P-1B	7.5	10	7	1.5	4.5	0.75	40	65	25	
ES350-F0-1K5G/2K2P-1B	9	11.5	8.5	2.2	7	1.5	40	80	25	
ES350-F0-2K2G-1B	10	12	-	-	9	2.2	40	92	25	

### 380V rated voltage

Model Code	Rated Value		General Load Application		Heavy Load Application		Noise Level	Heat Radiation	Air Volume	Dimension
	I <sub>N</sub> (A)	I <sub>max</sub> (A)	I <sub>Ld</sub> (A)	P <sub>Ld</sub> (kW)	I <sub>Hd</sub> (A)	P <sub>Hd</sub> (kW)	dBA	W	m <sup>3</sup> /h	
ES350-F0-0K7G/1K5P-3B	5.2	6	5	1.5	2.5	0.75	40	40	25	F0 <sup>3)</sup>
ES350-F0-1K5G/2K2P-3B	6.3	7.5	6	2.2	4	1.5	40	76	25	
ES350-F0-2K2G/4K0P-3B	9.5	11	9	4	5	2.2	40	97	25	
ES350-F0-4K0G-3B	10	12	-	-	8	4	40	125	25	F0 <sup>**3)</sup>

G- constant torque load application, P-square torque load application, - indicate that the item is not supported. Rated value

I<sub>N</sub> Continuous and available rated current without load at 40°C

I<sub>MAX</sub> Maximum output current. Ten seconds are allowable at startup. Under other circumstances, the time depends on temperature

General load application:

I<sub>LD</sub> Continuous rated output current of P converter s at ≤ 40°C. The overload current value is allowed to reach 120%

of I<sub>LD</sub> in 1 minute out of every five minutes. The time depends on the drive temperature under other circumstances.

P<sub>LD</sub> Typical motor power in the light load application.

Heavy load application:

I<sub>Hd</sub> Continuous rated output current of G converters at ≤ 40°C. The overload current value is allowed to reach 150%

of I<sub>Hd</sub> in 1 minute out of every five minutes. The time depends on the drive temperature under other circumstances.

P<sub>Hd</sub> Typical motor power in the heavy load application.

1)=The 220V series models need to be consulted to confirm inventory and supply cycle

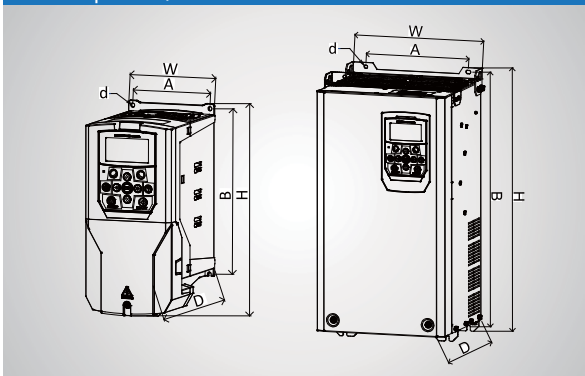
2)=Contains 6 vein or 12 pulse rectifier power circuit, the specific order before please consult our company representative.

3)=\* represent independent closed air duct structure, \*\* represent independent closed air duct with cooling hole structure, - represent this item not supported.

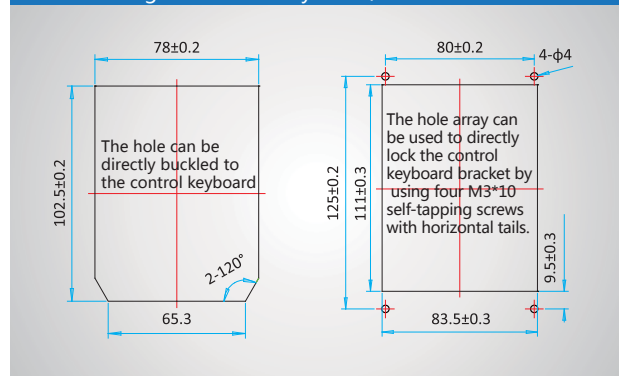
4)=Manufacturers need to consult before ordering

## Installation Dimensions

Dimensions and installation schematic diagram of ES series plastics/sheet metal structure



Shape and dimensions of the opening for directly mounting the control keyboard/bracket to the door













Dimension	Installation Hole Width SpacingA (mm)	Installation Hole Height SpacingB (mm)	Installation Hole Sized (mm)	Appearance Width W (mm)	Appearance HeightH (mm)	Appearance ThicknessD (mm)	Weight (Kg)
F0	65	168	5.0	82	176	131	1.3
F1	110	222	5.5	122	276	172	2.9
F2	140	238	6.0	155	292	172	3.7
F3	150	368	7.0	180	420	216	10.7
F4	200	479	6.5	255	495	221	21
F5	250	650	12.0	355	670	260	61
F6	357/75 <sup>1)</sup>	761	11.0	390	790	278	90
F7	357/115 <sup>1)</sup>	937	11.0	390	1001	295	≈110 <sup>2)</sup>
F8	490/200 <sup>1)</sup>	1280	13.0	537	1305	340	≈190 <sup>2)</sup>
F9	490/240 <sup>1)</sup>	1420	13.0	537	1455	380	≈220 <sup>2)</sup>

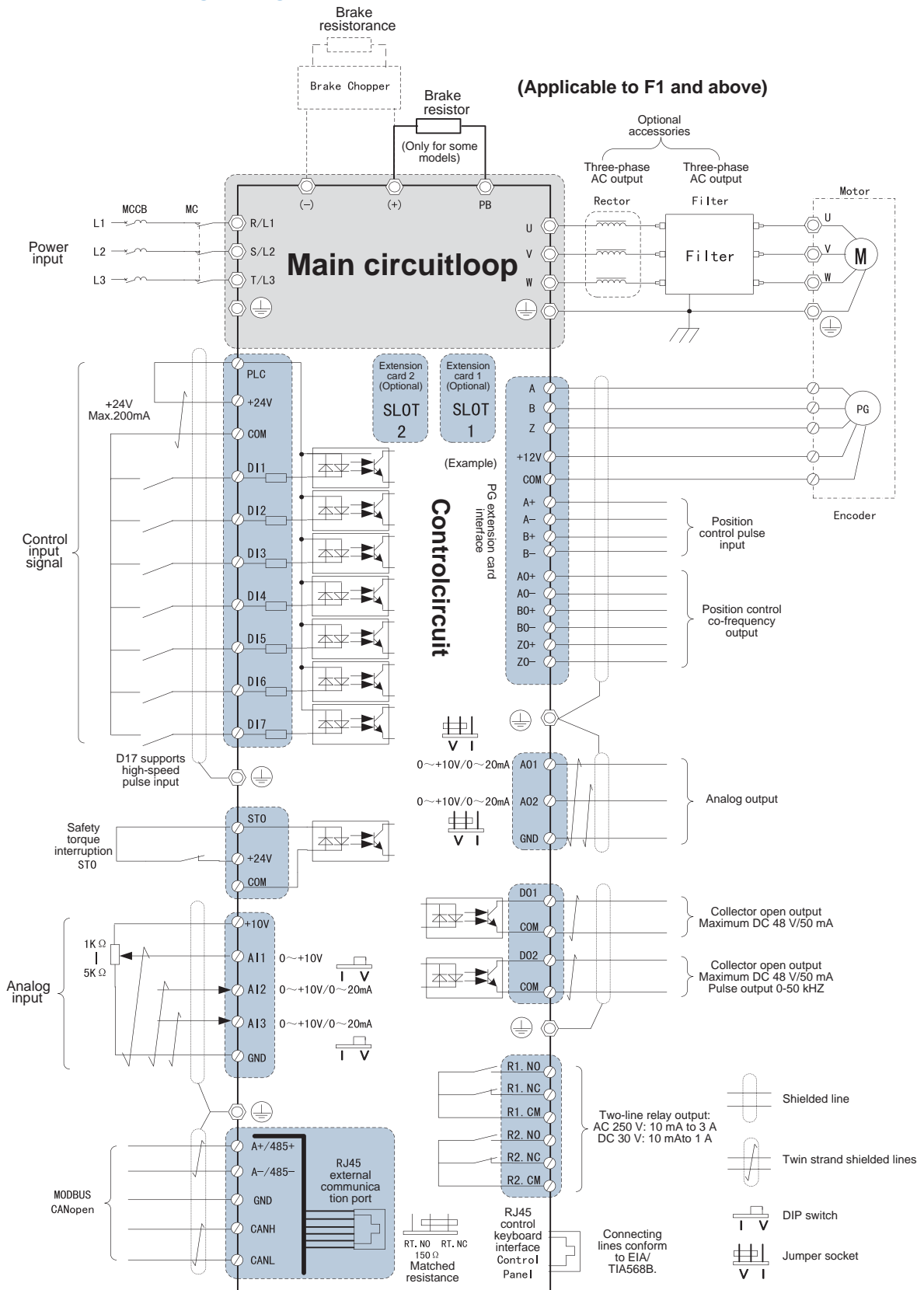
Note: 1) indicates hole spacing for forwarding installation /hole spacing for blade-type lateral installation hole (preferred design scheme);  
2) indicates estimate values or more accurate values, which are to be updated.

## Optional Accessories

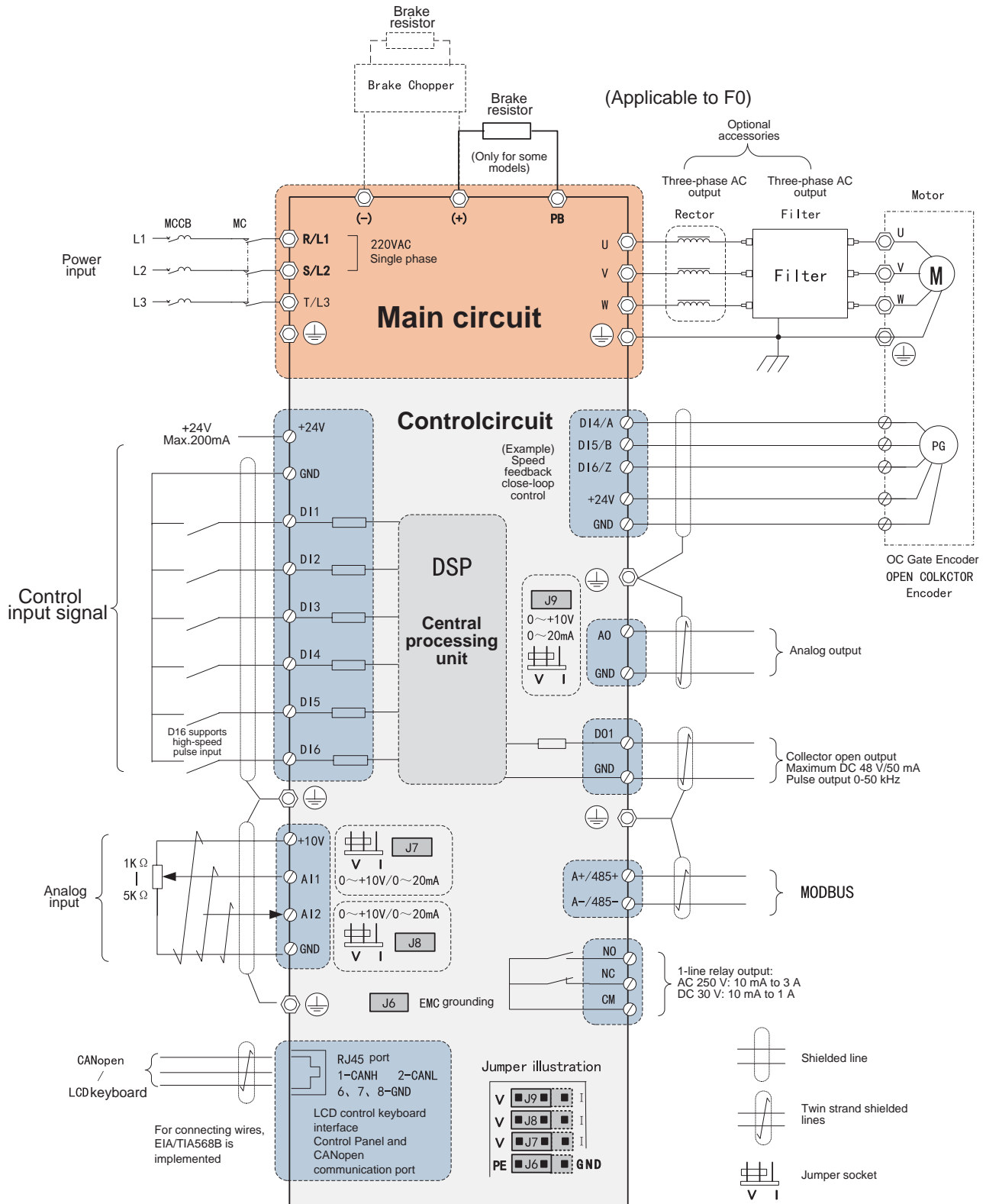
Legend	Model	Accessory and Main Function
	ESX-04-X/X-3B	The built-in braking unit function is optional for F4 series products and is represented with [B] at the end of model.
	ESX-05-X/X-3B	The built-in braking unit function is optional for F5 series products and is represented with [B] at the end of model.
	ES-CM-PD	Profibus-DP communication card, applicable to DB 9-pin interface
	ES-PG-OC	Collector open encoder interface card, adapting to 12V power, with position control pulse input/output
	ES-PG-DF	Differential encoder interface card, adapting to 5V power, with position control pulse input/output
	ES-PG-RT	Rotary transformer encoder interface card, with position control pulse input/output
	ES-PG-SN	Sin-Cos encoder interface card, adapting to 5V power, with position control pulse input/output
	ES-RU-DTC	The voltage capture card of the power grid is connected to the power grid and is used to detect real-time phase voltage and phase of the power grid, so as to achieve VF and WF switching or energy feedback.
	ES-CP-MU	LCD control keyboard, which is included in the standard configuration. It may be omitted in the case of remote control.
	ES-CP-SU	Extended bracket of the control keyboard, which is applicable to installation of the LCD keyboard cabinet door
	ES-SU-F6	Applicable to the floor-mounted installation base for F6 and F7 models
	ES-SU-F8	Applicable to the floor-mounted installation base for F8 and F9 models
	ES-RP-01	Universal high-performance rotary single-turn 5K potentiometer with the rotary knob (universal model: RV24YN 20SB502)
	ES-CB-F0	Incoming box, which is applicable to F0 models, in order to raise the closed protective capability to IP40.

# ESSeries Frequency Converter

## Standard Wiring Diagram 1



# Standard Wiring Diagram 2





## Advantageous Industry Applications

### Lifting Machinery

- ◇ Fast response speed and large startup torque properly alleviate vibrations at startup.
- ◇ Zero-speed clasp brake and zero-speed open brake completely eliminate hook sliding and back flush.
- ◇ Low torque pulse ensures more reliable operation of the device; especially in construction elevators, the device makes taking the elevators more conformable.
- ◇ All-round protection functions (frequency converter, motor, brake unit) and overload torque detection function prevent operations beyond the specification or on a mechanical failure.
- ◇ Compact structure design is adopted and the built-in brake unit (for below 90KW) is optional.
- ◇ The Smart drive function facilitates operations (easy for commissioning and maintenance), and helps save labor costs and time.
- ◇ Intelligent LCD keyboard, real-time monitoring of key information, convenient man-machine interactions are provided.
- ◇ The voltage operation range is wide (-20% to +20%).

### Typical Applications



Bridge crane



Tower crane



Hoist

### Metal and Stone Processing

- ◇ Low frequency and strong torque, steady speed and high precision.
- ◇ The device can decelerate quickly to stop during a power failure to prevent long-time mechanical inertia rotation, which is safer.
- ◇ High overload capacity (3S seconds at 200% rated load), good overvoltage suppression (especially in punching).
- ◇ High protection grade (IP40), closed circuit structure design, thickening process of multiple conformal coatings, good physical environmental adaptability
- ◇ Smartdrive function, which can be used in most servo applications.
- ◇ Smart drive function, which facilitates operations (easy for commissioning and maintenance), and save labor costs and time.
- ◇ Intelligent LCD keyboard, real-time monitoring of key information, convenient man-machine interactions
- ◇ The fluctuation of speed is small when the converter is loaded suddenly.
- ◇ Capable of receiving various signal sources

### Typical Applications



Machine tools



Rotary cutter for the wood processing equipment



Punch of the metal processing equipment

## Cables, Winding

- ◇ Low frequency and strong torque, supporting low-speed startup with empty reel or full reels
- ◇ Fast response speed, steady and fast during startup/stop and acceleration and deceleration
- ◇ High steady-speed precision, constant tension control, steadier pendulum during the whole process
- ◇ High protection grade (IP40), closed circuit structure design, and thickening process of multiple conformal coatings, effectively preventing metal dusts
- ◇ Built-in DC reactor for 15 kW and higher models, which can effectively reduce power higher harmonic and conduction radiation. Other optional accessories are not required to save space and reduce wiring
- ◇ Smartdrive function, avoiding complex commissioning, facilitating maintenance; saving labor costs and time
- ◇ Intelligent LCD keyboard, real-time monitoring of key information, convenient man-machine interactions

### Typical Applications



Coating machine



Straight wire drawing machine

## Fluid Machinery

- ◇ Intelligent commissioning: Intelligent setting of industry application parameters, intelligent V/F curve setting. Complex commissioning by professionals is not required to save labor and time.
- ◇ Compatible with synchronous motors
  - Used with synchronous motor, which can save energy greatly
  - Used with synchronous motor, down sizing and light weight, saving equipment room
- ◇ Built-in reactor for 15 kW and higher models
  - Other optional accessories are not required to save space and reduce wiring; The power higher harmonic and conduction and radiation can be effectively reduced.
- ◇ Good human-machine interface
  - Real-time monitoring of key parameters; real-time and multi-line LCD display
- ◇ Speed search function: Rotations in the free running mode can be searched after power failure and startup, implementing easy start up.
- ◇ Greater energy saving effects, minimum unit power consumption in the case of equivalent torques

### Typical Applications



Air compressor



Fans & pumps