



LSE DRIVE

# ES600 MODEL

## SPACE VECTOR CONTROLLER

LONG SHENQ ELECTRONIC CO., LTD.



## About Long Shenq

Long Shenq Electronic co., Ltd., founded in 1985, located in New Teipei City, Taiwan . For many years, we produce AC motor vector inverters, permanent magnet servo drivers, controller units and peripheral equipment . We sell these products all over the world with good quality and at reasonable price . In 2002, we passed and we were recognized by the international quality standard certification ISO9001:2000(new version is 2015), increasing products quality and customer trust .

The ES600 series voltage vector inverter is a comprehensive upgrade based on the LS600 series. It is specifically designed to enhance equipment operating stability, extend service life, and simplify user operation. Utilizing advanced voltage vector control technology, it precisely adjusts output voltage and frequency according to load demands, improving motor efficiency and reducing energy consumption.

Application Fields: Industrial automation equipment (such as conveyors and printing machines), elevator doors, smart sliding doors, rolling shutters, fan and pump control, as well as textile, plastic, and food processing equipment.



## Feature description

1. Built-in special PWM two-phase modulation.
2. Space vector : voltage space vector control, automatic current compensation, low output loss and high energy saving effect.
3. Unique overload capacity: 150%/60 seconds
4. High performance, low noise IGBT module
5. Output frequency 0.1 Hz ~ 480.0Hz
6. AVR automatic voltage regulator output
7. Automatic compensable torque current
8. Serial communication interface RS-485 (baud rate 115200)
9. 2 mode Operational control / Frequency command source switches
10. V/F curve, N square decreasing curve
11. 8 groups of acceleration and deceleration time options, 8 speeds can be preset
12. 2 groups of users' setting parameter memory
13. 2 groups of output Do and Relay can be edited for positive and negative logic functions
14. 4 groups of virtual digital output/input
15. 4 groups frequency/current/Ai1/Ai2 upper and lower limit comparison

# ES600 SPECIFICATION

## Control Characteristics

Operation method	6 digit number of LED digit display operation. 32-bit DSP-MCU, sine wave SVPWM control mode, using high-performance low-noise IGBT.
control mode	Special PWM two-phase modulation, V/F space vector control
Max. output frequency	0.01~480.0Hz
Frequency accuracy (temperature change)	Digital instruction : $\pm 0.1\%$ ( $-10^{\circ}\text{C}\sim+40^{\circ}\text{C}$ ) Analog instruction : $\pm 0.1\%$ , ( $25^{\circ}\text{C} \pm 10^{\circ}\text{C}$ )
Frequency command resolution	Digital command : 0.1Hz, Analog command : 0.03Hz ( 11bit/60Hz )
Frequency output resolution	Digital instruction : $\pm 0.1\text{Hz}$ ; Analog instruction : $\pm 0.5\%$
Acceleration / deceleration time	0.01 ~ 3000.0( seconds), 8-stage individual & independent setup of acceleration /deceleration time duration.
V/F curve	Automatic torque compensation.
Control functions	5-channel digital manipulator cycle display, n square decrement curve, digital output positive and negative logic control, editable digital function terminal, parameter memory read and store control, low frequency automatic torque current compensation, DC brake at start/stop, stall prevention action control, MODBUS RS-485 communication, 4 groups of fault history
Signal for frequency setup	4 groups of analog commands : 0~5V, 0~10V, 4~20mA, 0~20mA.
Torgue for braking	About 20%, up to 125% with brake controller.

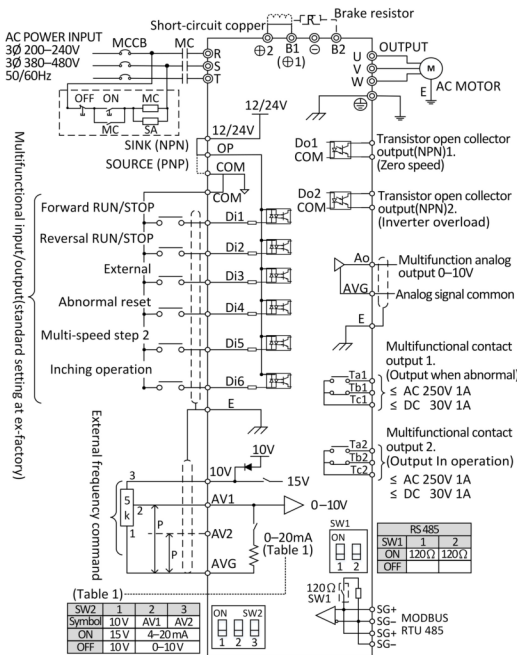
## Protection functions

Operation method	Inverter rated current - heavy duty (HD): 150 % / 1 minute
Motor overload (OL)	Electronic overload curve protection (motor rated current)
Instantaneous overcurrent (OC)	When over 200% / < 1 sec rated current drive trip, motor stops
Automatic restart after instantaneous power failure	Power off for more than 15 ms, the inverter stop immediately. Otherwise, continue working within 15ms.
Over Voltage (OL)	DC voltage in main circuit ( OU ) : $V_{dc} > 410\text{V}$ (220V) / $820\text{V}$ (460V)
Low Voltage (LU)	DC voltage in main circuit ( LU ) : $V_{dc} < 190\text{V}$ (220V) / $380\text{V}$ (460V)
Over-heat (OH)	protected by thermo-switch, include heating sink and charge Resistor.
Stall protection	To protect the device from stall during acceleration/deceleration and operation.
Grounding protection	Electronic circuit protection.

## Environment specifications

Ambient temperature	$-10^{\circ}\text{C}\sim+50^{\circ}\text{C}$ (open type), no freezing
Storage temperature	$-20^{\circ}\text{C}\sim+60^{\circ}\text{C}$
Humidity	Below 90%RH (no condensation condition)
Vibration	20HZ 1G, 20 ~ 50HZ, 0.2G

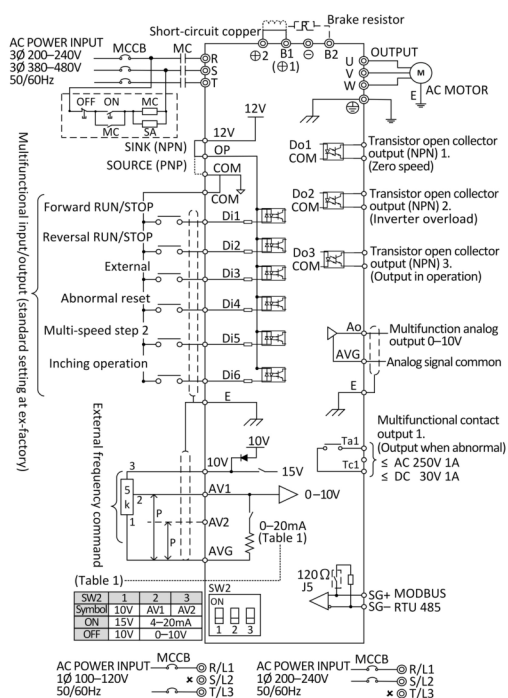
# Standard type control terminal circuit wiring diagram



Terminal Mark	Terminal Designatin	Description	
Multi-function Input Terminals	DI1	Forward command	When Di1-COM is connected (ON), it is forward rotation, and when it is open (OFF), it is stopped.
	DI2	Reverse instruction	When Di2-COM is connected (ON), it is reverse rotation, and when it is open (OFF), it is stopped.
	DI3	Input when external abnormality	When the external abnormal signal is ON, the inverter will trip and stop.
	DI4	Failure reset	Di4 failure release, reset the drive.
	DI5	Multi-speed command 2	Multi-stage speed commands 1 and 2, with binary 2 bit, can perform four-stage speed control.
	DI6	Inching(Jogging) operation	Execute Inching(Jogging) frequency with ON.
PNP	COM	Input common terminal	+24 V output power supply reference ground.
	COM	Input common terminal	+24 V output power supply reference ground.
	OP	Digital input common terminal	Digital input common terminal.
NPN	24V	Power output terminal	Power output 24 V/200 mA.
	10V	Power supply for frequency setting	+10 V/+15 V power supply, current: 30 mA / 50 mA. (SW2 pin 1 for optional setting)
	AVG	Analog signal common terminal	The common terminal of analog power, input and output signals.
Analog frequency setup	AV1	Analog voltage frequency command	DC 0V~10V / 4mA~20mA input. (SW2 pin2 optional setting).
	AV2	Analog current frequency instructions	DC 0V~10V / 4mA~20mA input. (SW2 pin3 optional setting).
Multi-function Output Terminals	DO1	Detected in zero speed	It is ON in the stop state or below the zero speed level.
	DO2	Detected in Forward	It is ON in the Forward state
	TA1	Output when abnormal	Contact capacity: AC 250 V/1 A, DC 30 V/1 A *When abnormal, Ta1-Tc1 is ON. *When abnormal, Tb1-Tc1 is OFF. When the abnormal protection function of the inverter is activated, it will output with 1a and 1b contacts.
	TA2	When in operation	Contact capacity: AC 250 V/1 A, DC 30 V/1 A *During operation, Ta2-Tc2 is ON. *During operation, Tb2-Tc2 is OFF. The inverter output starting frequency is above the set value, and output with 2a-2b contact action.
	TB1	When in operation	Contact capacity: AC 250 V/1 A, DC 30 V/1 A *During operation, Ta2-Tc2 is ON. *During operation, Tb2-Tc2 is OFF. The inverter output starting frequency is above the set value, and output with 2a-2b contact action.
	TC1	When in operation	Contact capacity: AC 250 V/1 A, DC 30 V/1 A *During operation, Ta2-Tc2 is ON. *During operation, Tb2-Tc2 is OFF. The inverter output starting frequency is above the set value, and output with 2a-2b contact action.
Modbus	AO	Reference output frequency	Analog signal output 0 V-10 V.
	AVG	Analog signal common terminal	The common terminal of analog power, input and output signals.
	SG+	Serial Communication	RS485 serial communication port : Positive input.
	SG-	Serial Communication	RS485 serial communication port : Negative terminal input
	E	Shield isolation ground terminal	Covered isolation wire, connection selection ground wire dedicated.

\*AV1 and AV2 need to configure P-046 and P-050.  
 \*The terminal symbol is +10V. When SW2 PIN1 switches to ON, the contact's output is 15V, and OFF is 10V.

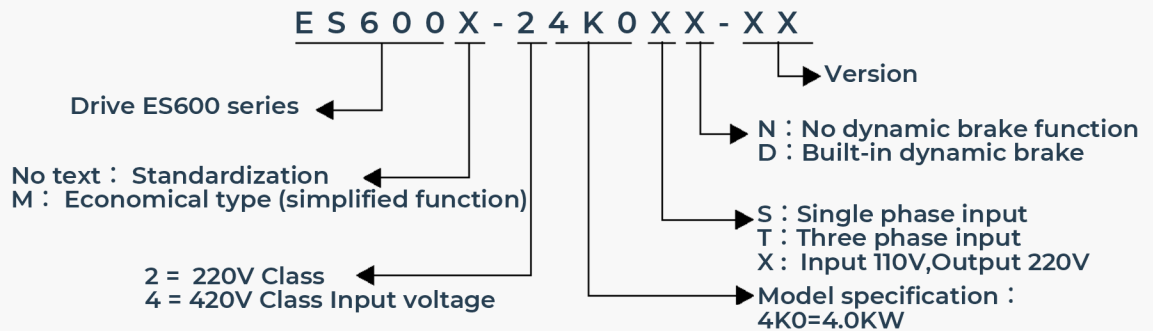
# M-type control terminal circuit wiring diagram (miniaturization)



Terminal Mark	Terminal Designatin	Description	
Multi-function Input Terminals	DI1	Forward command	When Di1-COM is connected (ON), it is forward rotation, and when it is open (OFF), it is stopped.
	DI2	Reverse instruction	When Di2-COM is connected (ON), it is reverse rotation, and when it is open (OFF), it is stopped.
	DI3	Input when external fault	When the external abnormal signal is ON, the inverter will trip and stop.
	DI4	Fault reset	Use the control terminal ON (closed) to release the locked status when the fault protection circuit operates.
	DI5	Multi-speed command 2	Multi-stage speed commands 1 and 2, with binary 2 bit, can perform four-stage speed control.
	DI6	Inching(Jogging) operation	Execute Inching(Jogging) frequency with ON.
PNP	COM	Input common terminal	+12 V output power supply reference ground.
	COM	Input common terminal	+12 V output power supply reference ground.
	OP	Digital input common terminal	Digital input common terminal.
NPN	12V	Power output terminal	Power output 12 V/200 mA.
	10V	Power supply for frequency setting	+10 V/+15 V power supply, current: 30 mA / 50 mA. (SW2 pin 1 for optional setting)
	AVG	Analog signal common terminal	The common terminal of analog power, input and output signals.
Analog frequency setup	AV1	Analog voltage frequency command	DC 0V~10V / 4mA~20mA input. (SW2 pin2 optional setting).
	AV2	Analog current frequency instructions	DC 0V~10V / 4mA~20mA input. (SW2 pin3 optional setting).
Multi-function Output Terminals	DO1	Detected in zero speed	It is ON in the stop state or below the zero speed level.
	DO2	Detected in Forward	It is ON in the Forward state
	DO3	In operation	The inverter state is in the standby mode or in operation.
	TA1	Fault output	Contact capacity: AC 250 V/1 A, DC 30 V/1 A *When abnormal, Ta1-Tc1 is OFF. When the fault protection function of the inverter is activated, it will output with 1a-1c contact action.
	TB1	Fault output	Contact capacity: AC 250 V/1 A, DC 30 V/1 A *When abnormal, Ta1-Tc1 is OFF. When the fault protection function of the inverter is activated, it will output with 1a-1c contact action.
	TC1	Fault output	Contact capacity: AC 250 V/1 A, DC 30 V/1 A *When abnormal, Ta1-Tc1 is OFF. When the fault protection function of the inverter is activated, it will output with 1a-1c contact action.
Modbus	AO	Reference output frequency	Analog signal output 0 V-10V.
	AVG	Analog signal common terminal	The common terminal of analog power, input and output signals.
	SG+	Serial Communication	RS485 serial communication port : Positive input.
	SG-	Serial Communication	RS485 serial communication port : Negative terminal input

\*AV1 and AV2 need to configure P-046 and P-050.  
 \*The terminal symbol is +10V. When SW2 PIN1 switches to ON, the contact's output is 15V, and OFF is 10V.

# ES600 model instructions



## ES600 type dimension, Specification

	Input Voltage	KW	HP	Amps	Frame	Mode code	Brake Circuit		
							Option	Built-in	
ES600M economical type	110V 1Phase input	0.4	0.5	3.7	1	ES600M-10K4SN-A1	○	×	
		0.75	1	5	1	ES600M-10K7SN-A1	○	×	
	220V 1Phase input	0.4	0.5	3.7	1	ES600M-20K4SN-A1	○	×	
		0.75	1	5	1	ES600M-20K7SN-A1	○	×	
		1.5	2	7.5	1	ES600M-21K5SN-A1	○	×	
		2.2	3	10	1	ES600M-22K2SN-A1	○	×	
	220V 3Phase input	4.0	5	17.5	2	ES600M-24K0SN-A1	○	×	
		0.4	0.5	3.7	1	ES600M-20K4TN-A1	○	×	
		0.75	1	5	1	ES600M-20K7TN-A1	○	×	
		1.5	2	7.5	1	ES600M-21K5TN-A1	○	×	
	380V 3Phase input	2.2	3	10	1	ES600M-22K2TN-A1	○	×	
		4.0	5	17.5	2	ES600M-24K0TD-A1	×	○	
		0.75	1	3.7	2	ES600M-40K7TD-A1	×	○	
		1.5	2	5	2	ES600M-41K5TD-A1	×	○	
	ES600 standard type	220V 3Phase input	2.2	3	7.5	2	ES600M-42K2TD-A1	×	○
4.0			5	10	2	ES600M-44K0TD-A1	×	○	
5.5			7.5	25	4	ES600-25K5TD-A1	×	○	
7.5			10	34	5	ES600-27K5TD-A1	×	○	
11			15	50	5	ES600-2011TD-A1	×	○	
15			20	68	5	ES600-2015TD-A1	×	○	
18.5			25	82	6	ES600-2018TN-B1	○	×	
380V 3Phase input		22	30	100	6	ES600-2022TN-B1	○	×	
		30	40	130	6	ES600-2030TN-B1	○	×	
		37	50	165	7	ES600-2037TN-B1	○	×	
		For above 50HP, please contact us.	45	60	190	7	ES600-2045TN-B1	○	×
		55	75	230	7	ES600-2055TN-B1	○	×	
		0.75	1	3.7	3	ES600-40K7TD-A1	×	○	
		1.5	2	5	3	ES600-41K5TD-A1	×	○	
		2.2	3	7.5	3	ES600-42K2TD-A1	×	○	
380V 3Phase input	4.0	5	10	3,4	ES600-44K0TD-A1	×	○		
	5.5	7.5	15	4	ES600-45K5TD-A1	×	○		
	7.5	10	17.5	4	ES600-47K5TD-A1	×	○		
	11	15	25	5	ES600-4011TD-A1	×	○		
	15	20	38	5	ES600-4015TD-A1	×	○		
	18.5	25	43	5	ES600-4018TD-A1	×	○		
	22	30	50	6	ES600-4022TN-B1	○	×		
	30	40	68	6	ES600-4030TN-B1	○	×		
For above 50HP, please contact us.	37	50	82	6	ES600-4037TN-B1	○	×		
	45	60	100	7	ES600-4045TN-B1	○	×		
	55	75	130	7	ES600-4055TN-B1	○	×		
		75	100	165	7	ES600-4075TN-B1	○	×	

## ■ ES600 DIMENSION

UNIT : m/m



Frame	1	2	3	4	5	6	7
Height	145	169	199	286	335	458	563
Width	83	92	115	129	175	253	345
Depth	138	147	151	176	193	227	276

## ■ Customized project planning and development services

**01**

### Demand Project Planning

Confirm customer needs, product function size, planning and design, and set up a project.

**02**

### Development and Design

Development and design stage:  
Dimension design  
Software design  
Circuit design  
PCB design

**03**

### Test sample

The products are assembled and integrated, and verified by software and hardware integration tests to achieve customer goals.

**04**

### Mass production

The products are mass-produced and verified by customers, and then they can enter the mass production stage

**05**

### After-sales service

If the customer makes necessary modifications to the product, we support the following:  
Product Hardware Modifications  
Product version update



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