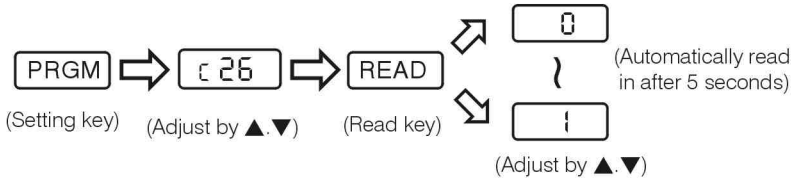


c26 Multiple speed revolution setting



c26 : The multiple speed revolution range is separated into 0~120Hz and 121~240Hz.

c26=0 : Output frequency range: 0~120Hz.

c26=1 : Output frequency range: 0~240Hz.

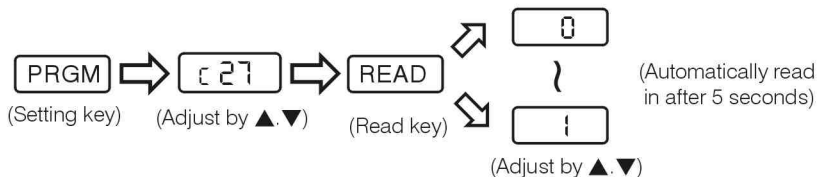
- (1) Cautiously choose the motor specification when multiple speed operation. Suggestion to choose motor specified for inverter when the operating frequency is more than 121Hz.
- (2) Refer to descriptions on C16 and C4 for parameter setting.
C16: Upper limitation setting
C4: Main speed setting



CAUTION

Use specified motor for high-speed revolution. Notice the vibration support capacity of bearing machine structure and whether the ground is strong.

c27 Functional parameter setting



c27 : The function can lock part of the parameters. Refer to P.59~P.60 for descriptions. It can not read out the parameter contents and the monitor displays E 1 1 when choosing the lock mode (C27=1). Reset C27=0 to release the lock function.

c27=0 : All parameters can be changed.

c27=1 : Partial parameters can not be changed.



CAUTION

Prevent the wrong setting operated by personnel that is not familiar to the machine or is not professional. Suggestion to lock the inverter by setting C27=1 after completely setting the parameters to prevent arbitrary parameter change.

9 PARAMETER SETTING METHOD

c28	Reserved
c29	Reserved
c30	Carrier wave frequency setting

c30 : The carrier wave frequency means the switching time on IGBT module. Its range is 3kHz~15kHz.

High carrier wave frequency : Low noise, large IGBT losing, high fin temperature and the torque will decrease.

Low carrier wave frequency : High noise, small IGBT losing, low fin temperature and the torque will increase.

※ Set C00=4 for C30 setting.

c30=1 : The carrier wave frequency is 3kHz and is suitable for 75Hp~100Hp motors.

c30=2 : The carrier wave frequency is 6kHz and is suitable for 50Hp~60Hp motors.

c30=3 : The carrier wave frequency is 8kHz and is suitable for 30Hp~40Hp motors.

c30=4 : The carrier wave frequency is 10kHz and is suitable for 15Hp~25Hp motors.

c30=5 : The carrier wave frequency is 12kHz and is suitable for 7.5Hp~10Hp motors.


c30=6 : The carrier wave frequency is 15kHz and is suitable for 0.5Hp~5Hp motors.



INHIBIT

*Use the initial setting value in factory and do not change it arbitrarily.
Change it with the agreement of our professional technical personnel if necessary.
Or it could result in the damage of inverter and injury of member.*

7 Protection function

The inverter stops immediately when the protection function of the inverter is acting and then the monitor displays the fault reason by English word or numeric. Press the  key to restart the inverter, or cut off the power supply and restart the inverter after the charge indicator is off (about 5~10 seconds).

7-1 Fault display

Fault display	Abnormal reason explanation	Examination matters	Solution method
E+	Wrong operation	Refer to manual for operating	Operate according to correct method
	C27=1 for parameter lock	Check parameter C27	Set C27=0 to release parameter lock
OC0	Overcurrent when standstill (belong to noise disturbance)	Seek noise source such as electromagnetic wave, ultrasonic	Well inhibit noise by extra installing a filter and grounding or change installation environment
	Current sensor fault	Return inverter to us for reparation if displays OC0 after throwing in 3 times	Change current sensor by technical personnel
OC1	Overcurrent when acceleration (200% of rated current)	Is inverter in rapid accelerating state?	Extend acceleration time
OC2	Overcurrent when fix speed operation (200% of rated current)	Is load variation too drastic?	Reduce load variation
OC3	Overcurrent when deceleration (200% of rated current)	Is inverter in rapid decelerating state?	Extend deceleration time
OL1	Overload when acceleration (150% of rated current)	Is acceleration time too short or load too heavy?	Extend acceleration time or reduce load condition
OL2	Overload when fix speed operation (150% of rated current)	Is load variation too large?	Reduce load condition Measure output current of inverter by current probe
OU0	Overvoltage when standstill DC voltage more than 400V (AC 220V spec.) or 800V (AC 380V spec.)	Confirm input source voltage AC 200 ~ 240V (220V class) AC 380 ~ 460V (380V class)	Improve electric power situation
OU1	Overvoltage when acceleration	Is input voltage correct?	Improve electric power situation and reduce input voltage
	Electric leakage caused by improper insulation of motor	Measure insulation of motor by megger or measure case using 10 k Ω gear of multimeter	Change motor or rewind motor coil

Fault display	Abnormal reason explanation	Examination matters	Solution method
OU2	Overvoltage when fix speed operation AC220V voltage more than 270V (DC 400V spec.) or AC 380V voltage more than 470V (DC 800V spec.)	Is input voltage correct?	Improve electric power situation and reduce input voltage
OU3	Overvoltage when deceleration	Does rapid deceleration make too large regenerated current and then high voltage?	Extend deceleration time or extra install braking resistor or braking unit.
	Input voltage is too high, DC voltage is more than 400V (AC200V spec.) or 800V (AC380V spec.)	Is input voltage correct?	Improve electric power situation and reduce input voltage
OFF	Insufficient input voltage instantaneously stops electric power DC voltage is less than 200V (AC200V spec.) or 400V (AC380V spec.)	Test electric power voltage	improve electric power situation
EF	Simultaneous forward and reverse rotation commands	Check control circuit	Modify control circuit, close only one FWD-COM, REV-COM terminals at one time
FR	Exterior free running stop command input (inverter continuous rotation when command released)	Check control circuit	Open FREE-RUN – COM terminals if not used
OH	Heat sink overheating (More than 80°C)	Is cooling fan normal?	Replace cooling fan
		Surrounding temperature too high or bad ventilation	Change installation environment
- O -	No forward/reverse command signal from exterior terminal	Check control circuit	Close one of FWD-COM and REV-COM terminals
		Is CO1=2, 3 or 5?	Change CO1=0, 1 or 4
b-E	Stop when motor is braking	Is C18=1?	Set C18=0 to release braking function if not necessary

8 General breakdown examination method

(It can not process the following examination by without professional technology works, otherwise do not take responsibility)

SITUATION	REASON	SOLUTION METHOD
Motor can not rotate	Does power supply connect to terminals R, S and T?	<ul style="list-style-type: none"> • Turn on electric-power. • Turn off power and start again.
	Is wiring corrective?	<ul style="list-style-type: none"> • Check electric circuit
	Does output terminals U, V, W, with voltage output?	<ul style="list-style-type: none"> • Confirm electric power. • Operate according revolution proceedings
	Does motor rotational shaft locked?	<ul style="list-style-type: none"> • Reduce motor load. • Replace new motor • Check machine structure
	Does protective function work?	<ul style="list-style-type: none"> • Confirm indicator display
	Is setting of operation keyboard corrective?	<ul style="list-style-type: none"> • Re-confirmation
Inverter trips when motor is starting	Starting rotation torque is insufficient	<ul style="list-style-type: none"> • Change torque compensated parameter value.
	Acceleration time is too short, which can not comply with GD ² of regenerated energy.	<ul style="list-style-type: none"> • Extend acceleration time
	Starting frequency is too low.	<ul style="list-style-type: none"> • Enhance starting frequency
	Start motor when motor is free running.	<ul style="list-style-type: none"> • Set restart function when free running (cd22=1, 2 or 3)
	Does protective function work?	<ul style="list-style-type: none"> • Confirm indicator display
	Is setting of operation keyboard corrective? Or electric leakage by improper insulation of motor.	<ul style="list-style-type: none"> • Re-confirmation • Restart after replacing motor or unweaving output lines. Inverter faults if displays OC again. Motor faults if not displays OC.
Inverter trips when deceleration	Displays OU when deceleration (protection function of overvoltage acts) Too large GD ² of load that motor drove. Interior auxiliary braking circuit of inverter unable to absorb regenerated energy of motor when rapid deceleration. # Overvoltage protective function acts when regenerated energy is over 400V (200-240V spec.) Or 800V (380-460V spec.).	<ul style="list-style-type: none"> • Extend deceleration time • Install exterior DC braking resistor for motor less than 10HP • Install braking unit and braking resistor for motor more than 15HP
Inverter trips when standstill	Displays OFF when revolution	<ul style="list-style-type: none"> • Check power supply capacity • Check connections of electromagnetic breaker and no-fuse breaker
	Displays OU when revolution	<ul style="list-style-type: none"> • Install exterior DC braking resistor • Restart after unweaving output lines. Inverter faults if displays OU1 again. Electric leakage of inverter if motor does not display Ou1 and need to be replaced.

9 Maintenance and examination

Please make sure to process maintenance and examination to keep your LS600 inverter in normal situation for long.

9-1 Attention matters of maintenance and examination



- * First verify current situation of the electric power switch by operator. In order to confirm the processing safety, hang the identification label on switch and strictly prohibit anyone closing the electric power switch.
- * In short time after cutting off the electric power, DC high voltage is still existing on the large capacity capacitor of interior rectification circuit. Verify that the [charge] indicator is off before processing the basic board examination.

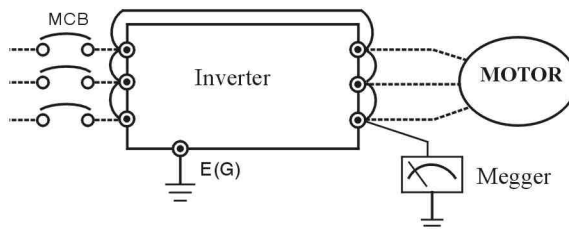
9-2 Inspection items

- * Does motor revolve as your expected operation?
- * Is cooling system normal? Does it occur any situation of abnormal overheating?
- * Is installation environment normal? Does it satisfy comments on the manual?
- * Does it occur any abnormal noise or vibration situation during operation?

9-3 Insulation testing



- * Do not directly test insulated resistivity between terminals of inverter by megger. There is DC high voltage that could result in damage of inverter.
- * The insulated test between terminals and case of inverter can be done by megger. The testing object is the main circuit and the following diagram shows the wiring method of testing. Please pay attentions that do not test the control circuit.



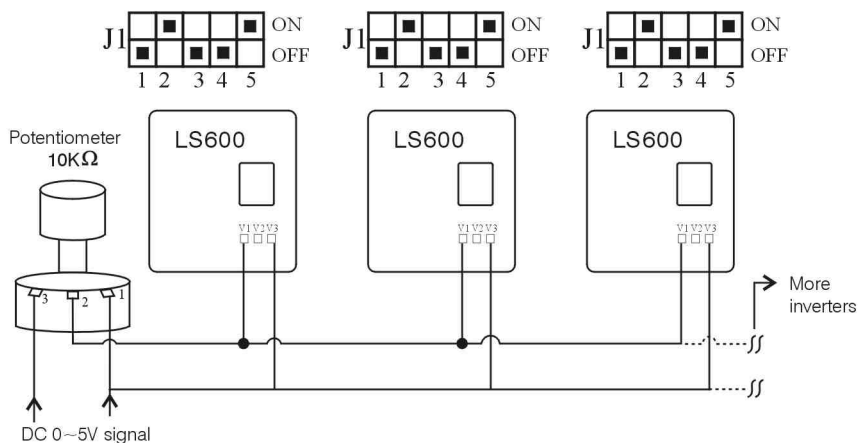
Remark 1: The parts of dashed lines indicate that be wired or not wired.

Remark 2: The parts of solid lines must have wiring.

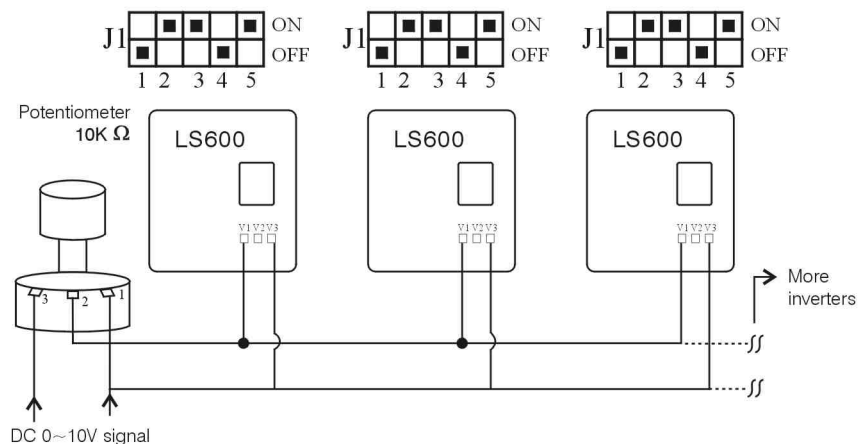
10 Synchronous running wiring connection method

- (1) Externally supply the DC 0~5V or DC 0~10V signal to control the inverter.
- (2) Set C01=1 or 3.
- (3) The main speed setting must be done by exterior potentiometer and the individual speed setting must be done by interior potentiometer of the inverter.
- (4) The wiring of synchronous running must cooperate with the settings of DIP switch J1 and control terminals V1, V2, V3 and C01.

10-1 Synchronous running of DC 0~5V signal



10-2 Synchronous running of DC 0~10V signal



11 Choosing of braking resistance and braking unit

- (1) The braking units of 200V~240V 0.4kW~7.5kW class and 380V~460V 0.75kW~7.5kW class inverters are built-in. It only needs to extra install resistors. Refer to following table for descriptions.
- (2) The braking units of inverters more than 11kW are not built-in. It can choose braking unit of our company for installation. Refer to following table for descriptions.
- (3) The surrounding of braking resistor may cause high temperature after continuous discharge. Install the braking resistor by keeping sufficient spaces away from devices, which are weak against heat. The installation site should be well ventilation or install a fan for cooling.

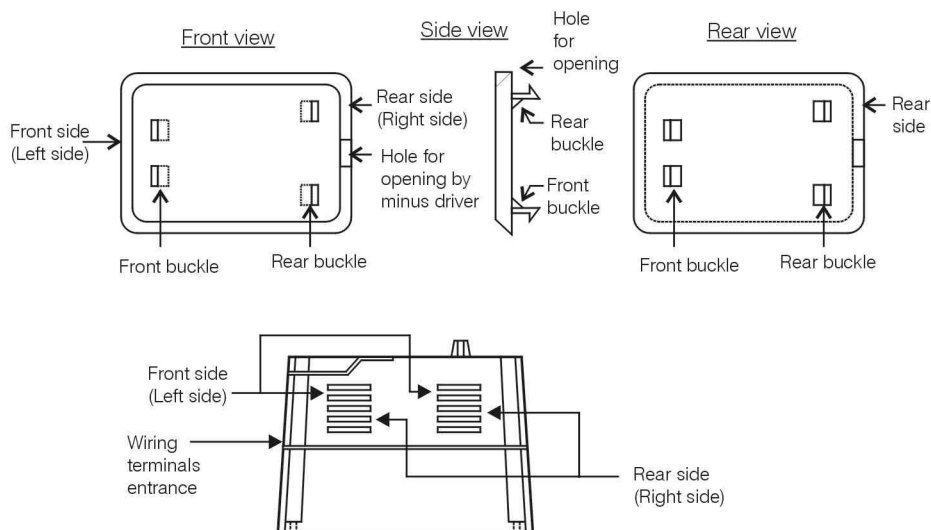
INVERTER									Specification
Voltage	Model	Capacity	Minimum resistivity	Minimum wattage	Quantity	Braking torque	Circuit		Exterior braking unit
							Inside	Outside	
200V	LS600-20-5	0.4	150	120	1	225	○		
	LS600-2001	0.75	150	120	1	130	○		
	LS600-2002	1.50	100	200	1	130	○		
	LS600-2003	2.20	60	250	1	120	○		
	LS600-2005	3.70	40	300	1	120	○		
	LS600-2007	5.50	25	1000	1	150	○		
	LS600-2010	7.50	20	2000	1	150	○		
	LS600-2015	11.00	13.6	2400	1	125		○	LSBR-2015B
	LS600-2020	15.00	10.0	3000	1	125		○	LSBR-2015B
	LS600-2025	18.50	8.0	4800	1	125		○	LSBR-2022B
	LS600-2030	22.00	6.8	4800	1	125		○	LSBR-2022B
	LS600-2040	30.00	10	3000	2	125		○	LSBR-2015B
	LS600-2050	37.00	10	3000	2	100		○	LSBR-2015B
	LS600-2060	45.00	6.8	4800	2	120		○	LSBR-2022B
LS600-2075	55.00	6.8	4800	2	100		○	LSBR-2022B	
400V	LS600-4001	0.75	300	200	1	200	○		
	LS600-4002	1.50	300	200	1	200	○		
	LS600-4003	2.20	150	300	1	130	○		
	LS600-4005	3.70	100	500	1	130	○		
	LS600-4007	5.50	80	800	1	150	○		
	LS600-4010	7.50	60	1000	1	150	○		
	LS600-4015	11.00	50	1040	1	135		○	
	LS600-4020	15.00	40	1560	1	125		○	LSBR-4015B
	LS600-4025	18.50	32	4800	1	125		○	LSBR-4030B
	LS600-4030	22.00	27.2	4800	1	125		○	LSBR-4030B
	LS600-4040	30.00	20	6000	1	125		○	LSBR-4030B
	LS600-4050	37.00	32	4800	2	125		○	LSBR-4015B
	LS600-4060	45.00	20	6000	2	135		○	LSBR-4030B
	LS600-4075	55.00	20	6000	2	135		○	LSBR-4030B

12 Appendage specification

12-1 Water-and dust-tight type side cover



- (1) The side cover has the aided water-and dust tight functions but has not the absolute protective function. It is correct to choose the proper installation site.
- (2) The cooling efficiency will reduce after installing the side cover. The surrounding temperature of installation site should not more than 40 degree C.
- (3) Diagram of side cover

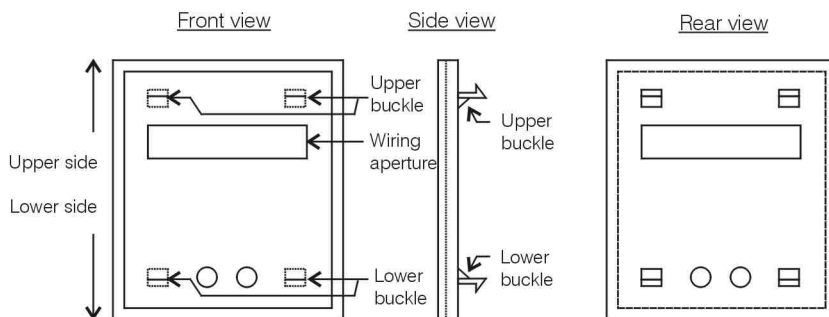


- Installation step: (1) Confirm front and rear sides. The distance between two buckles of front side is shorter than the ones of rear side. And there are holes on the rear side for opening the cover by screwdriver.
- (2) Aim the front side of the side cover at the front side of the inverter and press it slightly to install, and then press the rear side slightly.
- Disassembly step: Pry up the hole of rear side using the minus screwdriver to open the side cover.

※ The side cover is free. Ask our company or service department for product if necessary.

12-2 Keypad auxiliary box

- (1) The sizes of the auxiliary box and the keypad operation box are the same.
- (2) There will be a rectangle hole after moving the operation box away from the inverter. Suggestion to install the auxiliary box to avoid incursion of dust and worms.
- (3) Size of auxiliary box



- Installation step : (1) Confirm that the sizes of the auxiliary box and the inverter operation box are the same.
- (2) Aim the lower buckles at the lower edge of the inverter and then press the upper buckles slightly to clasp the auxiliary box.

12-3 Extended line

- (1) An extended line is the transmission cable that connects the operation box and inverter main board.
- (2) Please order the extended line according to the following standard lengths that our company manufactures.
0.5M, 1.0M, 1.5M, 2.0M, 3.0M, 4.0M, 5.0M, 6.0M, 10M, 15M, 20M.

13 Function table

Code number	Function	Parameter setting	Factory preset	Remarks	
0	Display contents selection	0 : frequency display 1 : 2-pole rotation speed display (1/10) 2 : 4-pole rotation speed display (1/10) 3 : 6-pole rotation speed display (1/10) 4 : c30 unlock 5 : frequency display when STOP	0	* The parameter can not be changed under running	
1	Exterior/interior control selection	0 : keyboard control 1 : keyboard and analog signal control 2 : keyboard and control terminal 3 : control terminal and analog signal 4 : keyboard and exterior 4~20mA signal 5 : control terminal and exterior 4~20mA signal	1		*
2	V/F output characteristic curve selection	0 : automatic torque compensation 1-17 : straight lines 18-34 : curved lines	0		*
3	Turning point selection (base frequency)	50 ~210Hz	60Hz		*
4	Main speed frequency setting	0 ~210Hz	60Hz		
5	Main speed acceleration time setting	0.1~210sec	5sec	5-120 sec every time more or less 1 sec.	
6	Main speed deceleration time setting	0.1~210sec	5sec		
7	2nd speed frequency setting	0-240Hz	0Hz		
8	2nd speed acceleration time setting	0.1~210sec	5sec		
9	2nd speed deceleration time setting	0.1~210sec	5sec		
10	3rd speed frequency setting	0-240Hz	0Hz		
11	3rd speed acceleration time setting	0.1~210sec	5sec		
12	3rd speed deceleration time setting	0.1~210sec	5sec		
13	Jog speed frequency setting	0-240Hz	5Hz		
14	Jog speed acceleration time setting	0.1-210 sec	0.1sec		
15	Jog speed deceleration time setting	0.1-210 sec	0.1sec		

Code number	Function	Parameter setting	Factory preset	Remarks	
16	Upper limited frequency setting	0-240 Hz	60Hz		
17	Lower limited frequency setting	0-240 Hz	0Hz		
18	DC Braking selection	0: ineffective 1: effective	0		*
19	DC Braking energy setting	1 -30	5		*
20	DC Braking time setting	0.1 -10sec	3sec		
21	Forward/reverse selection setting	0: for forward/reverse running 1: only for forward running 2: only for reverse running	0		*
22	Automatic speed tracking mode (Stall prevention setting)	0: ineffective 1: only effective in acceleration 2: only effective in deceleration 3: effective in acceleration/ deceleration	0		
23	Automatic torque compensation	0 -17 Voltage vector mode compensation	3		*
24	Escape time computation of overcurrent (150%)	0.1-20sec	10sec		*
25	Recover the original factory setting	0: no change 1: recover original setting	0		*
26	Multiple speed running setting	0 : 0-120Hz 1 : 0-240Hz	0		*
27	Functional parameter lock	0: unlocked 1: locked	0		
28	Reserved				
29	Reserved				
30	Carrier wave setting	1 : 3KHz (75Hp~100Hp) 2 : 6KHz (50Hp~60Hp) 3 : 8KHz (30Hp~40Hp) 4 : 10KHz (15Hp~20Hp) 5 : 12KHz (7.5Hp~10Hp) 6 : 15KHz (1/2Hp~5Hp)	3K 6K 8K 10K 12K 15K		

14 CE-conformity declaration**1. Products satisfied CE-conformity**

LS600-20-5, LS600-2001, LS600-2002 , LS600-2003,
LS600-2005, LS600-4001, LS600-4002, LS600-4003,
LS600-4005

2. Conformed institution

SGS United Kingdom Ltd

Address: South Industrial Estate

Bow burn

CO.Durham

DH65AD United Kingdom

Tel: +44(0)1913772000

Fax: +44(0)1913772020

3. All CE-conformity satisfied the standards describe in the document.

TCF No: INV-1-1998

Date : Feb.2.1998

The document has two copies, one is for our company and the other is for SGS United Kingdom Ltd.

4. Certificate of compliance

SGS SGS United Kingdom Ltd.
EMC Services

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Dunstable
United Kingdom
Telephone: +44 (0) 1525 377 2000
Fax: +44 (0) 1525 377 2001
E-mail: sgs@sgs.com

Client: Long Sheng Electronic Co., Ltd.
Address: 3rd Floor, No 68 Wu Chuan, 7th Road, Wu Ku Industrial Dist., Wu Ku Shiang Taipei Hsin, Taiwan, R.O.C.

Certificate of Compliance

Product: IGBT Space Vector Inverter
Brand Name: Long Sheng Electronics Co., Ltd.
Model: LS600-20-5, LS600-2001, LS600-2002, LS600-2003, LS600-2005, LS600-4001, LS600-4002, LS600-4003, LS600-4005.
Description: This products are IGBT space vector inverters. It has a various features including a silent design high precision, smooth current and small size.
Issue date: 14th May 1998 SGS serial number: DUR 20451
Technical Construction File (TCF) reference number: INV-1-1998
Technical Construction File Date: 2nd Feb 1998
Conclusion: Based on a review of the above Technical Construction it is the opinion of SGS EMC Services that the product shall be judged to comply with the requirements of the EMC Directive 89/336/EEC as amended by 92/31/EEC, 93/68/EEC.

WARNING: This certificate is only valid for the equipment detailed in this Technical Construction File. The attention of the customer is drawn to the fact that the product is not to be used for any other purpose than that for which it was designed. The product is not to be used for any other purpose than that for which it was designed. The product is not to be used for any other purpose than that for which it was designed. The product is not to be used for any other purpose than that for which it was designed.

Authorised Signatory

John S Whitley
General Manager
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Registered in England No. 101995 Registered Office: 100 Broad Street, London EC2M 2JN, United Kingdom

5. Technical construction file assessment report

SGS SGS United Kingdom Ltd.
Technical Services

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Technical Construction File Assessment Report

(As detailed in SI 1992 No.2372 Regulation 54)
Report Number DUR 20451
Issue Date 14/05/98
Page 1 of 3

TECHNICAL CONSTRUCTION FILE ASSESSMENT REPORT

TCF Reference: INV-1-1998
Manufacturer: Long Sheng Electronics Co., Ltd.
Address: 3rd Floor, NO 68, Wu Chuan 7th Road Wu Ku Industrial Dist., Wu Ku Shiang Taipei Hsin, Taiwan, R.O.C.
Brand Name: Long Sheng Electronics Co., Ltd.
Product: Inverter IAC motor speed controller)
Model: LS600-20-5, LS600-2001, LS600-2002, LS600-2003, LS600-2005, LS600-4001, LS600-4002, LS600-4003, LS600-4005.
Description of: The products are IGBT space vector inverters. It has a various features including a silent design high precision, smooth current and small size.
Equipment:
Responsible Person: Mr Hsieh Wen-Ko
Telephone: 00 886-2-2994032
Fax: 00 886-2-2994161
Operating Environment: Industrial

Member of the SGS Group (Société Générale de Surveillance)

6. Analysis of technical construction file

Technical Construction File Assessment Report

(As detailed in SI 1992 No.2372 Regulation 54)
Report Number DUR 20451
Issue Date 14/05/98
Page 2 of 3

External Photographs: Photographs of the product can be found in the product literature and test reports found in the TCF.

Uniquely Identified Pages
The pages of the TCF are not uniquely identified. SGS EMC Services will retain a copy at SGS for file reference.

ANALYSIS OF TECHNICAL CONSTRUCTION FILE

Technical Description of Apparatus

Drawings: Two block diagrams of the equipment can be found in section 2 of the TCF. They refer to the two different supply ranges available for these products. The circuit diagrams of the different models can also be found in section 2 of the TCF. They have reference numbers, issue dates and revision number.

Parts List: A parts list can be found in section 2 of the TCF.

Cables: The block diagram indicates there are 3 cables. A cable to the filter and then from the filter to the inverter. A cable also connects the inverter to a motor.

Product Variants: There are nine model variants included in this TCF. The main differences between the models include the input voltage and motor power. A table showing the variations in the model can be found in section 1 of the TCF.

Installation: The installation procedure is detailed in the instruction manual.

Operating Principles: This is explained in the instruction manual found in the TCF.

7. Technical rationale and test data

Technical Construction File Assessment Report


(As detailed in SI 1992 No.2372 Regulation 54)
Report Number DUR 20451
Issue Date 14/05/98
Page 3 of 3

Technical Rationale and Test Data

The manufacturer has identified the operating environment as industrial and divided the nine models into two groups by input voltage. The highest rated model in the two groups have been chosen as the worst case and tested. These two models have been tested to EN 5508-2 (1994) for emissions and EN 55082-2 (1995) for immunity by an SGS approved laboratory. Test reports for both emissions and immunity can be found in the TCF showing compliance with these standards.

Conclusion

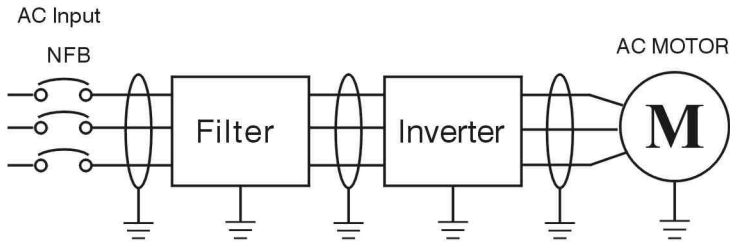
It is the opinion of SGS EMC Services that the product shall be judged to comply with the requirements of the EMC directive 89/336/EEC, as amended by directives 92/31/EEC and 93/68/EEC.


John S Whitley
General Manager
SGS EMC Services

15 Installation condition

(Extracted from document
TCF NO: INV-1-1998, P. 20)

(1) Wiring diagram



* Refer to the user manual for detailed circuits and operation method.

- (2) Use shielded electric wires for wiring of no-fuse breaker and filter. Well ground the electric network. Ground the green electric wire of 2.0~3.0 mm diameter of the electric cable. The standard wiring length is less than 10 meters.
- (3) The standard wiring length between filter and inverter is 1 meter.
- (4) The standard wiring length between inverter and AC motor is 3 meters.
- (5) Use shielded electric wires for wiring circuits of filter, inverter and AC motor. Well ground the electric network.
- (6) The installation of filter must use following specifications.

Model	Manufacture nation	Manufactory	Filter
LS600-20-5, LS600-2001 LS600-2002,	England	<u>Roxburgh</u>	MIF-310
LS600-2003, LS600-2005 LS600-4001, LS600-4002 LS600-4003, LS600-4005	England	<u>Roxburgh</u>	MIF-316