

MODEL:

600 INVERTER

OPERATION MANUAL

New Version



SUITABLE MODEL : SINGLE PHASE 200V CLASS
THREE PHASE 200V/400V CLASS

PREFACE

Thank you for your purchase of LS600 IGBT space vector inverter.

The main features of LS600 inverter are beautiful appearance, handy, perspicuous interior construction, complete function, simply operation, and noiseless. In order to sufficient bring into fully play its function, please refer to this operation manual before using.

This inverter uses advanced IGBT silent design combining with vast technology over the years to complete the IGBT space vector inverter for industry use.

Expect you will be satisfy with our LS600 and advise us for your further requirements at all times.

SAFETY SUMMARY

- To prevent any injury of member or damage of equipment, please follow the descriptions in this manual before using or operating this machine.
- Read this manual detailed before installation or operation. Call us for solutions if any question presents.
- Put the manual near the equipment or machine for convenient to consult.

SAFETY SYMBOLS



CAUTION



WARNING, DANGER



INHIBIT

SYMBOL DESCRIPTION



CAUTION

Describes a procedure which, if not performed correctly, could result in damage to data, equipment, or systems.



WARNING

Describes a potential hazard that could result in injury or death ; or a procedure which, if not performed correctly, could result in injury or death.



INHIBIT

Describes an action which, if disobey the regulation, could result in injury or death to members, or damage to equipment.

- The operators mentioned in this manual include:maintenance technical personnel, installation technical personnel, and practiced operators
- Please refer to the descriptions in P. 60 ~ P. 64 of this manual, or document file "TCF NO: INV-1-1998 DATE: FEB. 2, 1998" to see the standards of EMC and EMI that satisfy CE-conformity. The document has two copies; one is for our company and the other is for SGS United Kingdom Ltd.

PRECAUTION

1. Operate the inverter by professional technical personnel, which is familiar with the parameter setting, installation, and wiring assembly of the inverter, to avoid creating any danger accident.
2. Fix the inverter on the flat wall using the screw specified on P. 8 ~ P. 10 with appropriate shielding, to avoid the damage causing by unpredictable strike when operating.
3. Be sure to ground the ground terminals (⊕) of the inverter and the motor.
4. Install an appropriate magnetic-contacted breaker in the power side of every inverter.
5. The DC voltage of the main circuit of the inverter is higher than 650VDC (400V class) or 325VDC (200V class). Do not touch the interior circuit of the inverter to avoid the danger of electric shock.
6. Cut the power supply off and confirm that the charge indicator is off, and then be sure there is not any DC voltage measured by multimeter between terminals P and N before maintenance and examination.
7. Do not touch the terminals of the inverter because there is still high DC voltage inside the inverter even when the operation switch is off.
8. Confirm the safety of the motor or the machine system before setting the output frequency more than 60 Hz.
9. Turn off the power supply of the inverter if do not use it for a long time.
10. Do not turn on/off the inverter by throwing in or cutting off the power supply.

3 CONTENTS

1	Safety summary	P. 2
2	Precaution	P. 3
3	Contents	P. 4, P. 5
4	1. Initial confirmation mode of Ls600	P. 6
	1-1 Nameplate description	P. 6
	1-2 Type designation	P. 7
5	2. Installation method	P. 7
	2-1 Installation site	P. 7
	2-2 Installation direction and space	P. 8
	2-3 Terminal cover fixing/removing and terminal position	P. 9
	2-4 Inverter cover fixing/removing of 7.5HP class or above ...	P. 10
	2-5 Inverter cover fixing/removing of 50HP class or above ...	P. 11
6	3. Wiring method	P. 12
	3-1 Single phase main circuit wiring	P. 12
	3-2 Three phase main circuit wiring	P. 12
	3-3 Three phase main circuit wiring	P. 12
	3-4 Attention matters for wiring	P. 14
	3-5 Wiring gauge application list of main circuit and control circuit	P. 15
	3-6 Attention matters for wiring of control circuit	P. 16
	3-7 Wiring of main circuit and control circuit	P. 17
7	4. Description of control terminal and DIP switch J1	P. 20
	4-1 Position of control terminal and DIP switch J1	P. 20
	4-2 Description of control terminal wiring	P. 20
	4-3 Wiring specification and method of control terminal	P. 21
	4-4 Description of control terminal	P. 22
	4-5 Attention to the following prompts	P. 23
	4-6 Description of DIP switch J1	P. 24
	4-7 Step description	P. 25~P. 27
	4-8 Construction of DIP switch circuit	P. 27

8	5. Operation	P. 28
	5-1 Important point checking before revolution	P. 28
	5-2 Operation panel explanation	P. 29
	5-3 Pre-revolution setting	P. 29
	5-4 Testing revolution	P. 29
9	6. Parameter setting method	P. 30
	6-1 Parameter setting steps and descriptions	P. 30~P. 50
10	7. Protection function	P. 51
	7-1 Fault display	P. 51~P. 52
11	8. General breakdown examination method	P. 53
12	9. Maintenance and examination	P. 54
	9-1 Attention matters of maintenance and examination	P. 54
	9-2 Inspection items	P. 54
	9-3 Insulation testing	P. 55
13	10. Synchronous running wiring connection method	P. 55
	10-1 Synchronous running of DC 0~5V signal	P. 55
	10-2 Synchronous running of DC 0~10V signal	P. 55
14	11. Choosing of braking resistance and braking unit ..	P. 56
15	12. Appendage specification	P. 57
	12-1 Water-and dust-tight type side cover	P. 57
	12-2 Keypad auxiliary box	P. 58
	12-3 Extended line	P. 59
16	13. Function table	P. 59~P. 60
17	14. CE-conformity declaration	P. 61~P. 64
18	15. Installation condition	P. 63
19	16. Testing Specification	P. 64
20	17. Technical rationale	P. 64



CAUTION

Please check the specifications after unpacking. If incorrect voltage source is applied, it could result in the damage of the inverter or injury of members.

1. Initial confirmation mode of LS600

Please use following methods for checking immediately after receipt of our LS600 inverter:

- Does its specification same as your order?
- Does it occur any damage during transportation?

If you have any question, please contact with our company or our distributor immediately.

There is a nameplate in right side of every inverter for user to distinguish the specifications such as input/output voltage, serial number, etc. Inspection for the specification that your order.

1-1 Nameplate for three phase inverter

Model	→	MODE : LS600-2001
Input specification	→	INPUT : AC 3PH 200-240V 50/60Hz
Output specification	→	OUTPUT : AC 0-240V 1.7KVA 4.5A
Manufacturing serial number	→	SER NO : LCA 000001

Type designation:

LS600-2001

Inverter Model

Voltage class 2 = 200-240V
4 = 380-460V

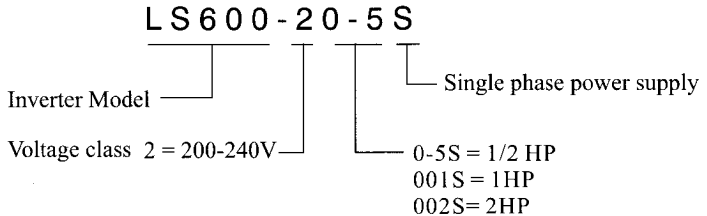
Maximum output capacity

0-5 = 1/2HP	020 = 20HP
001 = 1HP	025 = 25HP
002 = 2HP	030 = 30HP
003 = 3HP	040 = 40HP
005 = 5HP	050 = 50HP
007 = 7.5HP	060 = 60HP
010 = 10HP	075 = 75HP
015 = 15HP	100 = 100HP

1-2. Nameplate for single phase inverter

Model	→	MODE : LS600-20-5S
Input specification	→	INPUT : AC 1PH 200-240V 50/60Hz
Output specification	→	OUTPUT : AC 0-240V 1.2KVA 3.0A
Manufacturing serial number	→	SER NO : LCA 000001

Type designation: (MODEL)



CAUTION

Do not install the inverter in the following environments. It could result in damage of the equipment and even conflagration in the bad environments.

2. Installation method

2-1 Installation site



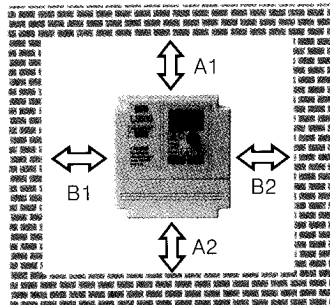
INHIBIT

Please keep away following site:

- Sunshiny site
- With erosive vapor, liquid site
- With dust, iron powder site
- Surrounding temperature less than -10 degree C or higher than 40 degree C site
- With electric magnetic interfere site
- Vibration site
- With wind/rain, water drop, humidity site
- Above sea level 1000M site

2-2 Installation direction and space

1. This is a hanging on wall type inverter, please use M4 screw to vertically fix inverter on wall or circuit wiring board.
2. Please install according to following diagram to keep proper cooling space at inverter surrounding as revolving inverter will cause thermal.
3. Remove the side covers on both sides of the inverter for ventilating when ambient temperature is more than 40 degree C.
4. Refer to the following diagram and the descriptions in item (5) for all 600 series inverter.
5. Suggestion to install the inverter in circuit wiring board with cooling fan device below 40 degree C surrounding temperature. (Refer to the right diagram.)
6. If the inverter installs extra braking resistor, it may cause instant high temperature. Please strictly select site to install the braking resistor, or install a fan for cooling.



The minimum installation distance between the inverter and the wall (Refer to the above diagram.)

	A1	A2	B1	B2
LS600-20-5, 2001, 2002, 2003, 2005 LS600-20-5S, 2001S, 2002S, LS600-4001, 4002, 4003, 4005	More than 10 cm	More than 10 cm	More than 5 cm	More than 5 cm
LS600-2007, 2010, 2015, LS600-4007,4010, 4015,	More than 20 cm	More than 20 cm	More than 10 cm	More than 10 cm
LS600-2020, 2025, 4020, 4030	More than 30 cm	More than 30 cm	More than 15 cm	More than 15 cm
LS600-2030, 2040, 4040, 4050	More than 40 cm	More than 40 cm	More than 20 cm	More than 20 cm
LS600-2050, 2060, 2075 LS600-4060, 4075	More than 50 cm	More than 50 cm	More than 30 cm	More than 30 cm



WARNING

Failure to observe the demands above can result in overheating of the inverter and damage of the equipment.

7. The installation site should be well ventilated and far away from inflammable materials.
8. Suggestion to install the inverter in circuit wiring board with cooling fan device below 40 degree C surrounding temperature.
9. If the inverter installs extra braking resistor, it may cause instant high temperature. Please strictly select site to install the braking resistor.

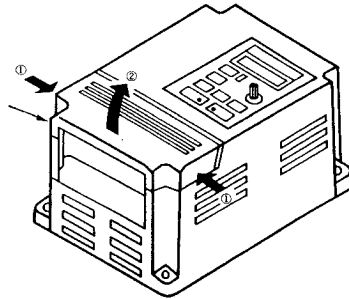
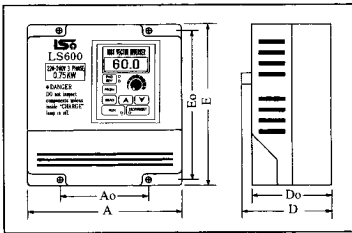
2-3 Terminal cover fixing/removing and terminal position

1. The following is specification for 0.5HP ~ 5HP inverters (single phase or three phase). For removing, grasp the terminal cover at ① on both sides and then lift in the direction of ②. Or aim the screwdriver at the button of one side and push it inward to open the cover.

For fixing, reverse the method.

2. Refer to the description in chapter 3 to see the connection position of power supply terminals.

3. Dimensions in mm



CAUTION

Use M4 screws to fix the inverters.

(UNIT : m/m)

Size		Area	A	A0	E	ED	D	D0	Net weight (kg)	Gross weight (kg)	Measurment	Fix screw
Model												
LS600-20-5	LS600-2001	146	128	150	138	160	153	Approx weight		0.3	M4	
LS600-2002	LS600-4001							1.8	2.0			
LS600-4002	LS600-20-5S							2.6	3.0	0.4	M4	
LS600-2001S, LS600-2002S,												
LS600-2003	LS600-2005	146	128	200	188	160	153	2.6	3.0	0.4	M4	
LS600-4003	LS600-4005											

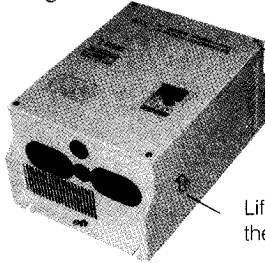
2-4 Cover fixing/removing of inverters more than 7.5 HP

1. The specifications are suitable for the following ranges.

200V ~ 240V, LS600-2007 ~ LS600-2050

380V ~ 460V, LS600-4007 ~ LS600-4050

For removing, turn the screws counterclockwise using type 107 cross-screwdriver. And turn the screws clockwise for fixing.

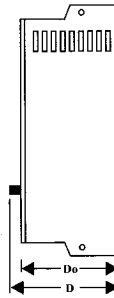
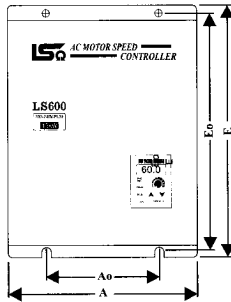


Cross type, M4 screw

Lift the cover after loosening the 4 screws

2. Refer to the description in chapter 3, items 3-2, 3-3 to see the connection position of power supply terminals.

3. Dimensions in mm



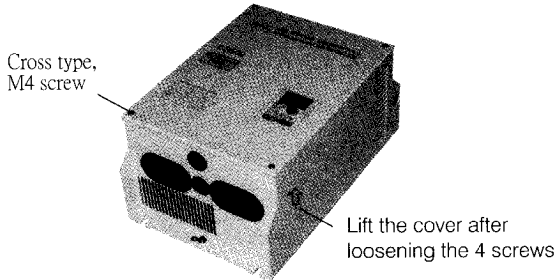
CAUTION

Use M6 screws to fix the inverters.

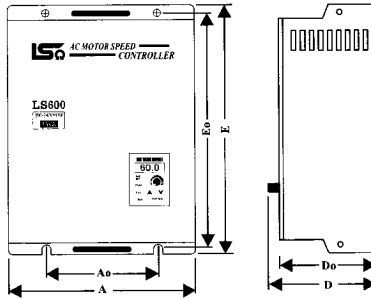
Size Model	Area	Area		Height		Depth		Net weight (Kg)	Gross weight (Kg)	Measu- rement	Fix screw
		A	A0	E	E0	D	D0				
LS600-2007	LS600-2010	245	194	370	352	172	175	11.0	13.0	1.3	M6
LS600-2015	LS600-4007										
LS600-4010	LS600-4015										
LS600-2020	LS600-2025	273	215	523	500	188	175	17.0	20.0	2.0	M6
LS600-4020	LS600-4025										
LS600-4030											
LS600-2030	LS600-2040	290	239	560	535	215	203	21.0	25.0	2.7	M6
LS600-2050	LS600-4040										
LS600-4050											

2-5 Cover fixing/removing of inverters more than 50 HP

- The specifications are suitable for the following ranges.
 200V ~ 240V, LS600-2060 ~ LS600-2075
 380V ~ 460V, LS600-4060 ~ LS600-4075
 For removing, turn the screws counterclockwise using type 107 cross-screwdriver. And turn the screws clockwise for fixing.



- Refer to the description in chapter 3, items 3-2, 3-3 to see the connection position of power supply terminals.
- Dimensions in mm



Size Model	Area	A		E		D		Net weight (Kg)	Gross weight (Kg)	Measurement	Fix screw
		A	Ao	E	Eo	D	Do				
LS600-2060	LS600-2075	354	236	670	645	285	273	42	47	5.0	M6
LS600-4060	LS600-4075										

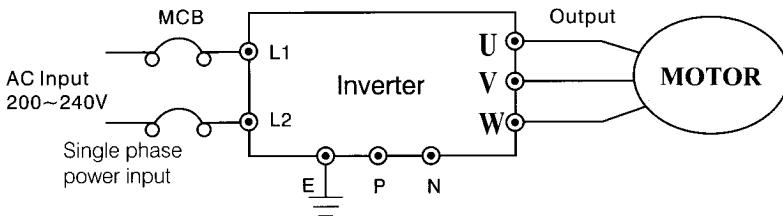


The input power supply terminals (R, S, T) can not connect oppositely to the motor output terminals (U, V, W). Failure to observe the demands could result in the explosion of the inverter, lead to a fire, injury or death to members, and damage to equipment.

3. Wiring method

3-1 Single phase main circuit wiring diagram

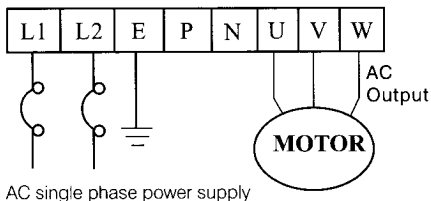
(LS600-20-5S, LS600-2001S, LS600-2002S)



CAUTION

1. The single-phase series provide only DC power supply terminals P, N but not the braking units.
2. Ground the inverters to prevent the danger of lightning struck and electrical shock.
3. Only 200V~240V, 1/2 HP, 1 HP and 2 HP inverters produced for single phase series.

3-1-1 Terminal wiring diagram for single phase inverter

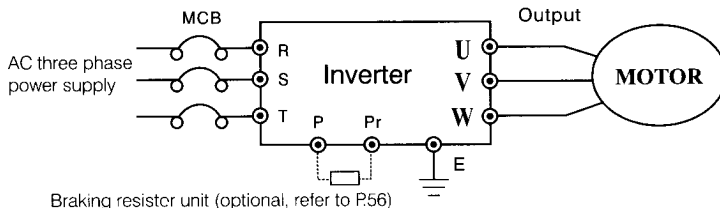


AC single phase power supply

Symbol	Description
L1, L2	220V power supply terminals
E	Grounding terminal
P, N	DC power supply 310VDC, can connect to a braking unit
U, V, W	Output terminals connect to 220V three phase Motor

3-2 Three phase main circuit wiring diagram

(LS600-20-5, LS600-2001, LS600-2002, LS600-2003, LS600-2005, LS600-2007, LS600-2010, LS600-4001, LS600-4002, LS600-4003, LS600-4005, LS600-4007, LS600-4010)



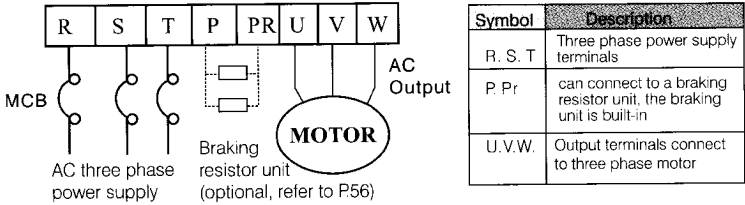
Braking resistor unit (optional, refer to P.56)



CAUTION

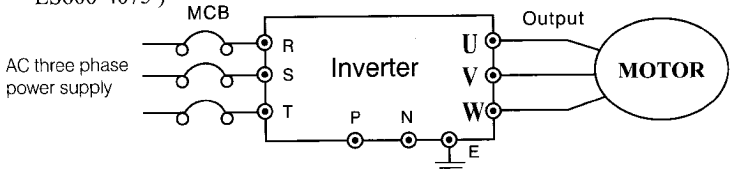
1. The braking circuits of 200V and 400V three-phase series that more than 15 HP are not built-in. Refer to P. 56 for choosing the correct resistance and wattage.
2. Ground the inverters to prevent the danger of lightning struck and electrical shock.

3-2-1 Terminal wiring diagram for three phase inverter



3-3 Three phase main circuit wiring diagram

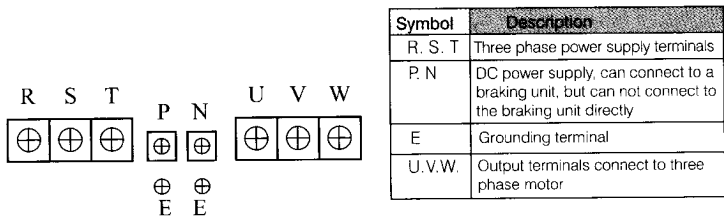
(LS600-2015, LS600-2020, LS600-2025, LS600-2030, LS600-2040, LS600-2050, LS600-2060, LS600-2075, LS600-4015, LS600-4020, LS600-4025, LS600-4030, LS600-4040, LS600-4050, LS600-4060, LS600-4075)



CAUTION

1. The braking circuits of 200V and 400V three-phase series that more than 15 HP are not built-in. Refer to P. 56 for choosing the correct resistance and wattage.
2. Ground the inverters to prevent the danger of lightning struck and electrical shock.

3-3-1 Terminal wiring diagram for three phase inverter



3-4 Attention matters for wiring



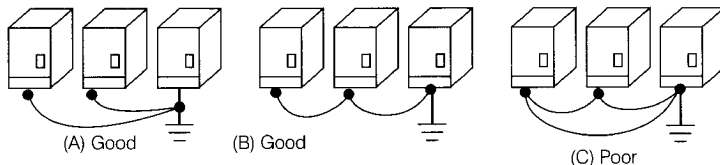
Refer to P. 61 ~ P. 64 to see the wiring specifications that CE confirmed.

1. Main circuit wiring

1. The electric power input terminals R, S, T and output terminals U, V, W (Connected to the motor) can not be wrong connected absolutely. Otherwise, it will occur the strictly damage of the inverter.
2. It can not use the components of LC, RC noise filter and power capacitor at output terminals of the inverter.
3. The main circuit wiring of the inverter must keep away from the signal wire of other control equipment such as PLC to avoid any bad interference.

2. Ground connection

1. Please use third kind grounding (below 10Ω) method to ground the grounding terminal \oplus .
2. Absolutely avoid sharing and using ground pole and ground connection of the welder and power machine, and keep away from drive wiring of big power equipment.
3. Ground connection of multiple inverters as the following diagram.



3. Breaker of main circuit wiring magnetic contactor

It needs at least to install a magnetic contact breaker or magnetic contact protection circuit between input terminals R, S, T of the AC main circuit power supply and Ls600.

- * Please adjust the sensitive current of fault motion prevention more than 200 mA and the motion time more than 0.1 sec when using electric leakage breaker.

4. Surge absorber

Please shunt wire peripheral equipments of the inverter; such as coils of magnetic contactor, relay, and magnetic valve, with absorbers to prevent noise interference. Please refer to the following table for surge absorber usage.

Voltage	Use object	Specification of surge absorber
220V	Large capacity coil except for relay	AC250V 0.5uf200 Ω
	Controlling relay	AC250V 0.1uf100 Ω
380V	-Ditto-	AC500V 0.5uf220 Ω

3-5 Main circuit and control circuit wire gauge application list



- Verify that the input power supply voltage must be the same as the specification of the inverter before wiring.
- Choose the terminal screws and wires according to the electrical statute. Then screw the screws tightly.
- The wiring of the input power supply terminals does not influence the phase sequence. But the phase sequence of the output terminals U, V, W will influence the rotational direction of the motor. Interchange any two phases of the wiring for alteration.



- Proceed the wiring procedure after cutting the power source off to guarantee the operation safety.
- Install extra magnetic contacted breaker at the input side of the power supply to prevent the bomb out of the inverter or the rise of a fire.
- Ground the inverters to prevent the danger of electrical shock or a fire.

Table (1)

Contents	Specification	20-5	2001	2002	2003	2005	2007	2010	2015	2020	2025	2030	2040	2050	2060	2075
Capacity Kw/HP-200V		0.4/0.5	0.75/1	1.5/2	2.2/3	3.7/5	5.5/7.5	7.5/10	11/15	15/20	18.5/25	22/30	30/40	37/50	45/60	55/75
Rated current of three phase MCB(A)		5	10	15	20	30	50	60	75	125	150	175	225	250	300	400
Wire gauge of electrical wiring (mm ²)		2.0			3.5		5.5	8.0	14	22	22	38	60	80	100	150
Main circuit screw size		M4					M5		M6			M8		M10		
Wire gauge of control circuit (mm ²)		0.128~0.5(26~20AWG)														
Fix of control line		Plug-in (Refer to P.21for description)														

Table (2)

Contents	Specification	4001	4002	4003	4005	4007	4010	4015	4020	4025	4030	4040	4050	4060	4075	
Capacity Kw/HP-400V		0.75/1	1.5/2	2.2/3	3.7/5	5.5/7.5	7.5/10	11/15	15/20	18.5/25	22/30	30/40	37/50	45/60	55/75	
Rated current of three phase MCB(A)		5	10	15	20	30		50	60	100		125	150	175	200	
Wire gauge of electrical wiring (mm ²)		2.0				3.5		5.5	14		22		38		50	
Main circuit screw size		M4				M5		M6			M8		M10			
Wire gauge of control circuit (mm ²)		0.128~0.5(26~20AWG)														
Fix of control line		Plug-in (Refer to P.21for description)														

Table (3)

Contents	Specification	20-5S	2001S	2002S	2003S
Capacity Kw/HP-200V		0.4/0.5	0.75/1.0	1.5/2.0	2.2/3.0
Rated current of three phase MCB(A)		10	15	25	30
Wire gauge of electrical wiring (mm ²)		2.0		3.5	
Main circuit screw size		M4			
Wire gauge of control circuit (mm ²)		0.128~0.5(26~20AWG)			
Fix of control line		Plug-in (Refer to P.21for description)			

- ※
 Table (1) is for 200-240V class three phase power supply.
 Table (2) is for 380-460V class three phase power supply.
 Table (3) is for 200-240V class single phase power supply.

3-6 Attention matters of control circuit wiring

1. The control signal wire must separate with the power wiring to prevent fault motion.
2. The analog signal for frequency setting must use separating twist wire with well grounding.
3. The length of control signal wire must less than 10 meters.



CAUTION

The warning relay does not provide the power failure keeping function. If it needs to make breakdown detection, please extra install programmable controller with power failure keeping function at exterior.

4. Wiring diagram for open collector output terminals

Figure A: Wiring for DC power supply

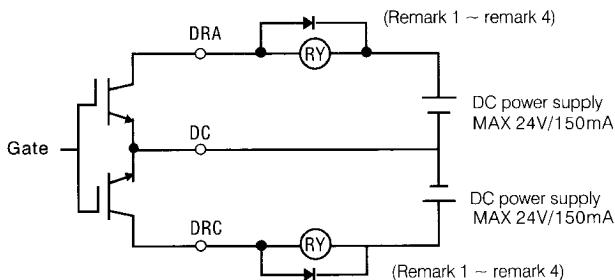
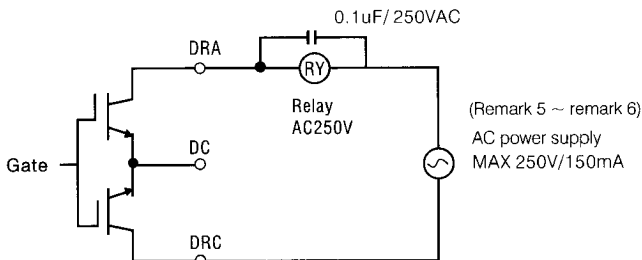


Figure B: Wiring for AC power supply



Remark 1. It needs to extra install a surge absorbing diode between the coil terminals of relay in figure A.

Remark 2. The maximum current of driving relay is 150 mA.

Remark 3. The maximum voltage for driving in figure A is DC 24V and the maximum voltage for driving in figure B is AC 250V.

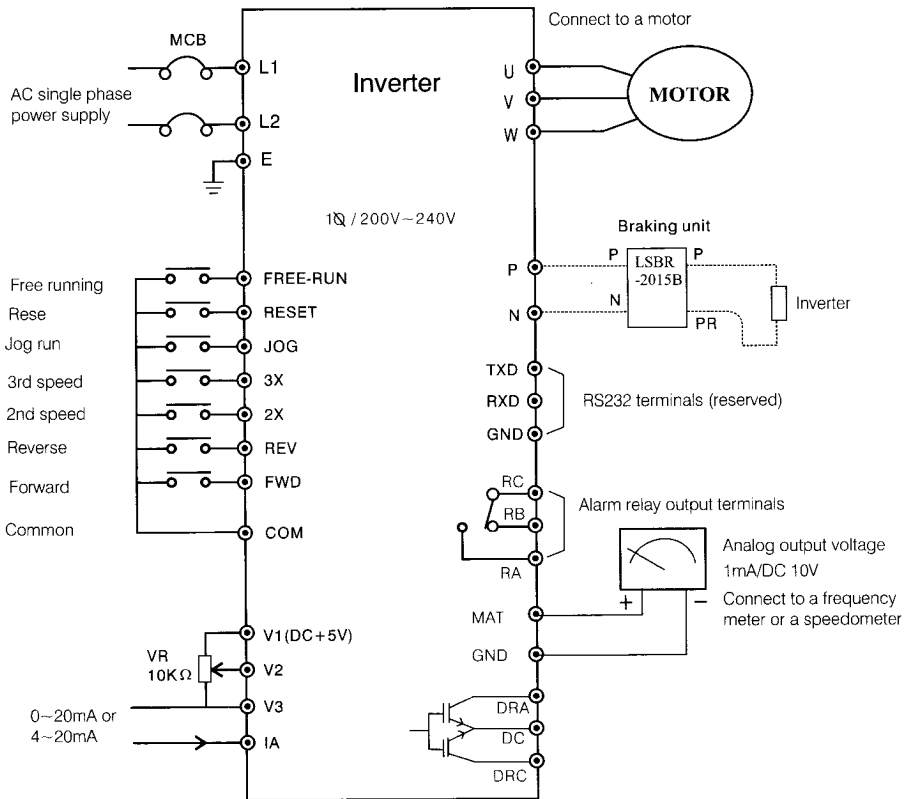
Remark 4. Terminals DRC, DRA in figure A are for positive connection input, and terminal DC is for negative connection input.

Remark 5. The maximum power supply in figure B is AC 250V/150 mA without the limitation of polarity.

Remark 6. Shunt a surge absorbing capacitor (0.1uF/250VAC) between both sides of the AC relay coil.

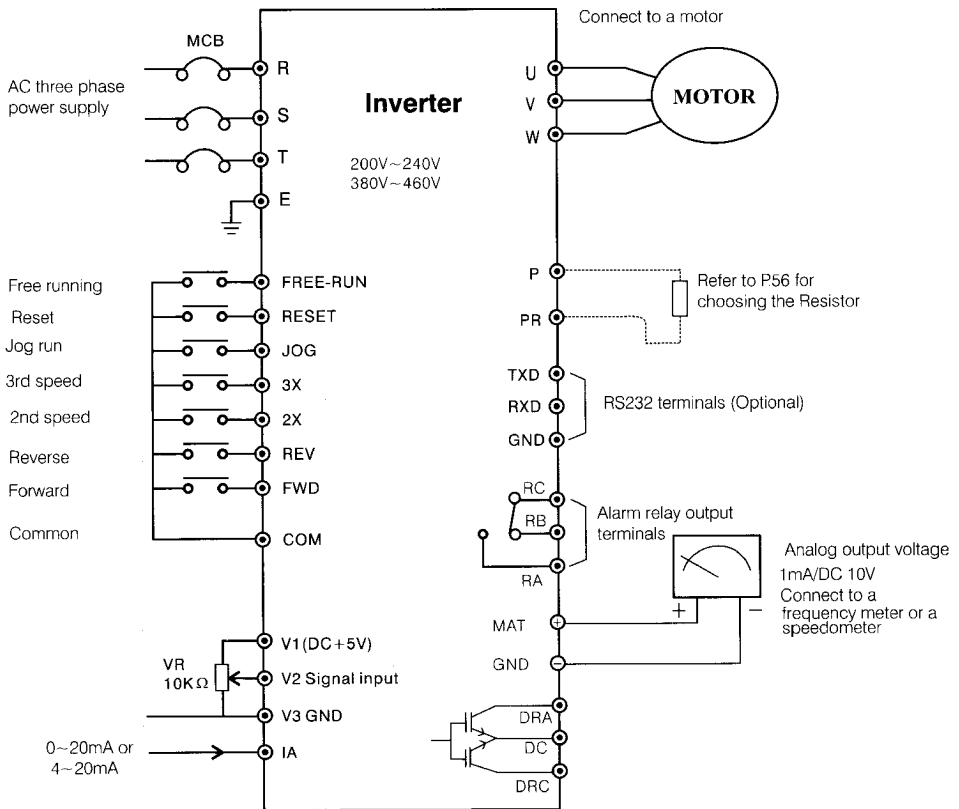
3-7 Wiring diagram of main circuit and control circuit

3-7-1 Wiring diagram of single phase main circuit and control circuit (suitable for single phase AC source)

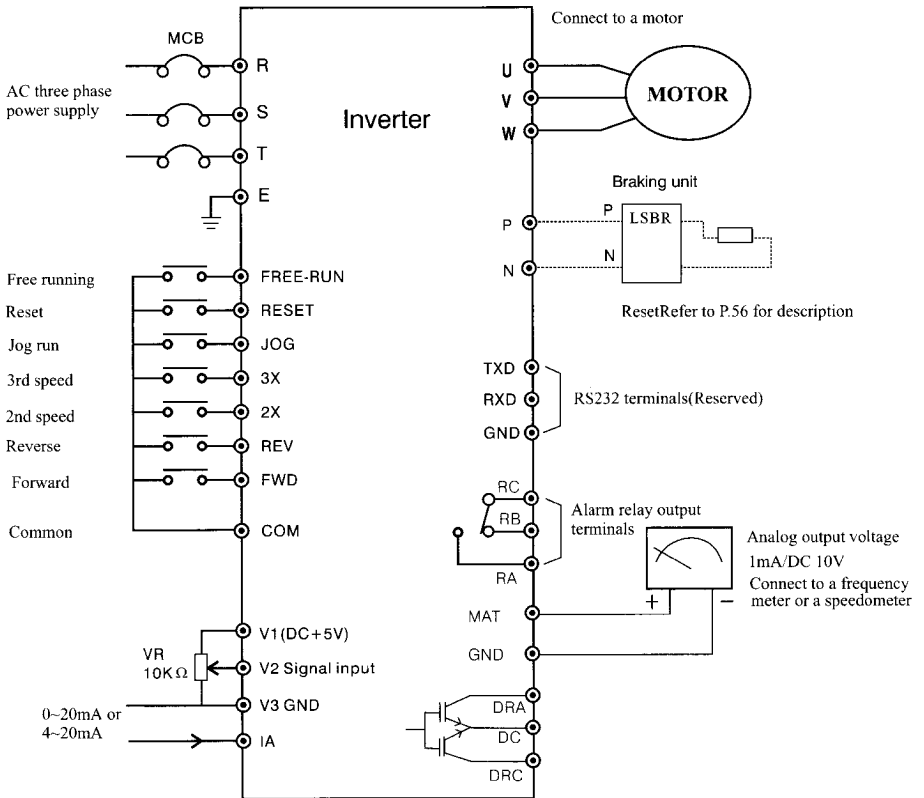


3-7-2 Wiring diagram of three phase main circuit and control circuit Suitable for the following models :

LS600-20-5, LS600-2001, LS600-2002, LS600-2003,
LS600-2005, LS600-2007, LS600-2010, LS600-4001,
LS600-4002, LS600-4003, LS600-4005, LS600-4007,
LS600-4010

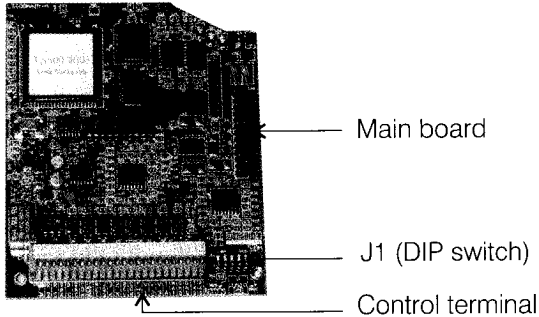


3-7-3 Wiring diagram of three phase main circuit and control circuit
 Suitable for the following models : LS600-2015, LS600-4015
 or above

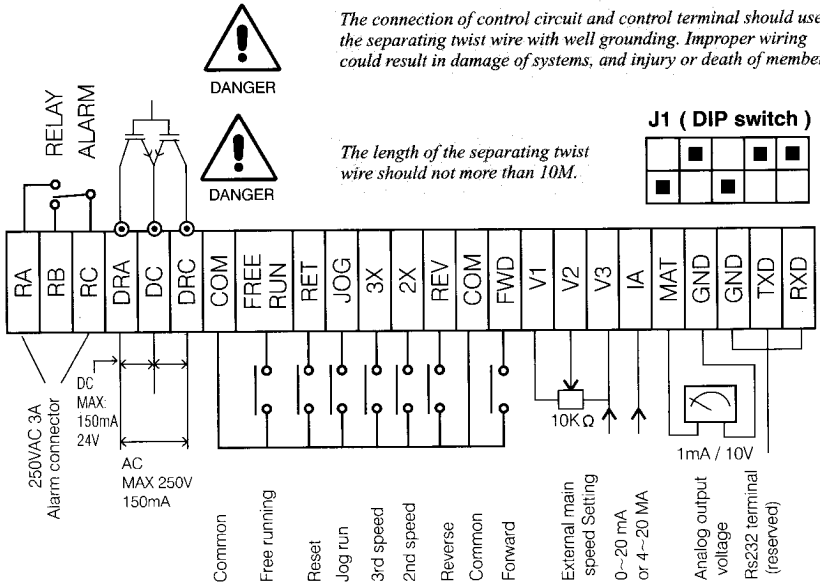


4 Description of control terminal and DIP switch J1

4-1 Position of control terminal and DIP switch J1

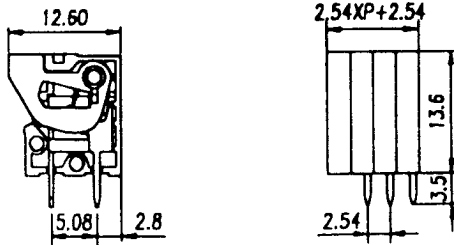


4-2 Description of control terminal wiring

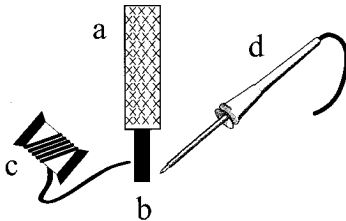


4-3 Specification and method of control terminal wiring

1. Internal construction of terminal

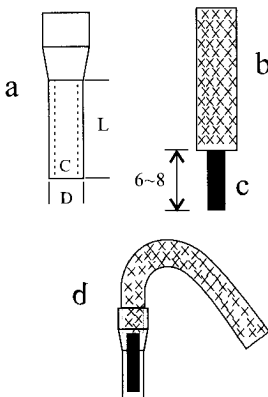


2. Peel 10mm ~ 12mm off the line, and weld it with tin



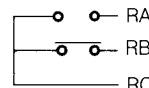
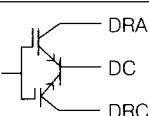
- a. Use electrical signal wire of 20-26 wire gauge with 150V/2A rating
- b. Peel 10mm ~ 12mm off the line, and weld it with tin
- c. Use 0.8mm welding rod
- d. Use 40W welding iron

3. With needle terminal



- a. Needle terminal
L: 10mm length
D: 1.3mm external diameter
C: 1.0mm internal diameter
- b. Electrical signal wire
150V/2A rating
26-20 wire gauge
(0.128 mm²~0.5 mm²)
- c. 6~8 mm peel off

4-4 Description of control circuit terminal

Symbol	Terminal name	Description		
Control circuit input terminal	V1	Power supply terminal used for frequency setting	DC +5V power supply connect with potentiometer pin #3	
	V2	Input terminal used for frequency Setting	DC 0~5V signal input terminal, connect with potentiometer pin #2	
	V3	Ground terminal used for frequency setting	Ground terminal used for frequency setting, connect with potentiometer pin #1	
	TXD	RS232 output terminal	RS232 signal output terminal	Reserved
	RXD	RS232 input terminal	RS232 signal input terminal	
	GND	RS232 ground terminal	RS232 signal ground terminal	
	FWD	Forward instruction terminal	Short circuit between FWD-COM , inverter will forward running	
	REV	Reverse instruction terminal	Short circuit between REV-COM, inverter will reverse running	
	FREE RUN	Free-run stop terminal	Short circuit between FREE-RUN and COM, inverter will stop outputting immediately, motor will stop by inertia	
	JOG	Jogging operation terminal	Short circuit between JOG-COM, motor will make jogging running, the frequency is variable	
	COM	Common ground terminal	Common ground for input and control signals, same as interface 12V	
	2X	2nd speed terminal	Short circuit between 2X-COM, motor will running with 2nd speed	
	3X	3rd speed terminal	Short circuit between 3X-COM, motor will running with 3rd speed	
	RESET	Reset signal terminal	Short circuit between RESET-COM, protection status will release	
	IA	Electric current signal terminal	Input 0~20mA or 4~20mA current signal to terminal V3	
Control circuit output terminal	MAT	Analog signal output	0~10V, 1mA analog output	
	GND	Analog ground		
	RA	Alarm relay output terminal	 <p>Relay acts when inverter trips Alarm relay capacity: 250V/3A For normal: RA-RC open, RB-RC closed For fault: RA-RC closed, RB-RC open</p>	
	RB			
	RC			
	DRA		 <p>Crystal output. Inverter acts when frequency setting more than 1 Hz, and the output terminals are closed. Inverter stops when frequency setting less than 1 Hz, and the output terminals are open. Rating between DRA-DRC is AC 250V/150mA. Rating between DRA-DC and DRC-DC are DC 24V/150mA.</p>	
	DC			
DRC				



*The control terminals have the characteristics of dead end.
Connect to signals with any voltage source could result in the damage
of the inverter.*

4-5 Prompts

V1, V2, V3

Correctly connect to a 10 K Ω potentiometer. The wrong connection of terminals V1 and V3 will reverse the speed adjustment. Both terminals V3 and GND are ground of +5V.

TXD, RXD, GND

Reserved RS232 signal input terminals.

FWD-COM

Terminals for clockwise operation. (Change any two phase of terminals U, V, W if inverted.) Dead end that can not connect to any voltage source.

REV-COM

Terminals for counterclockwise operation. (Change any two phase of terminals U, V, W if inverted.) Dead end that can not connect to any voltage source.

FREE RUN-COM

Inverter will stop outputting immediately after having the two terminals shorted, and the motor will free run to stop. The motor reverts to original speed operation after opening the terminals for a while. (The time it reverts depends on the accelerating time length of main speed.) Dead end that can not connect to any voltage source.

JOG-COM

Discontinuous jog operation. Dead end that can not connect to any voltage source.

2X, 3X-COM

Exterior 2nd and 3rd speed terminals. Well preset the parameters for normal operation. Dead end that can not connect to any voltage source.

RESET-COM

Reset terminal for releasing the protection status. Do not reset the inverter when high speed operating. Dead-end that can not connect to any voltage source.

IA-V3 (GND)

Electrical current input terminal. C01=1, 3 for 0~20mA input and C01=4, 5 for 4~20mA input. The first switch of J1 must set to ON and the others to OFF.

MAT-GND

0~10VDC/1mA analog output terminal. Can connect to a tachometer or a frequency meter.



WARNING

MAT-GND are terminals for output only and can not connect to any input signal. Connect to any input signal could result in burn of main board, a fire, damage of equipment and injury of member.

RA, RB, RC

Alarm relay output terminals. The maximum voltage rating is AC 250V and the maximum current rating is 3A. RC-RA terminals are normally open and RC-RB terminals are normally closed. RC is common ground terminal.

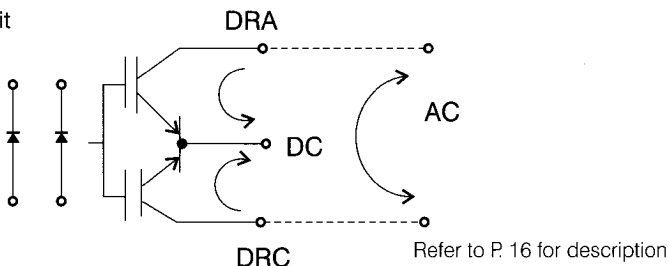
DRA, DC, DRC

Crystal open collector output terminals. Closed when frequency setting more than 1Hz and open when frequency setting less than 1Hz.

(1) Characteristics table

Symbol	Over 1Hz	Under 1Hz	Capacity	Polarity
DRA-DRC	Closed	Open	AC250V/150MA	-
DRA-DC	Closed	Open	DC24V/150MA	DRA for positive input DC for negative input
DRC-DC	Closed	Open	DC24V/150MA	DRC for positive input DC for negative input

(2) Circuit



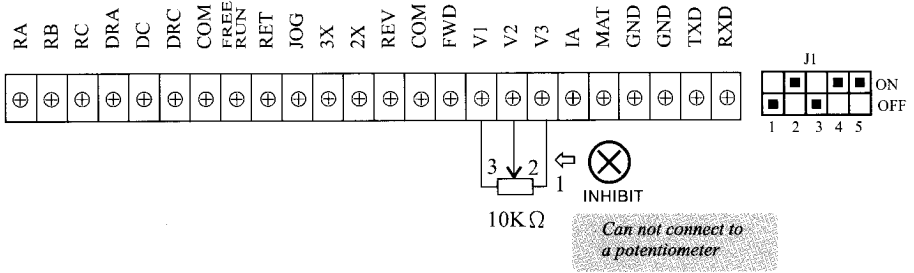
4-6 Description of DIP switch J1

J1	Signal	Description	Step										
<table border="1"> <tr><td>■</td><td>■</td><td>■</td><td>■</td><td>ON</td></tr> <tr><td>■</td><td>■</td><td>■</td><td>■</td><td>OFF</td></tr> </table>	■	■	■	■	ON	■	■	■	■	OFF	DC 0~5V Potentiometer on board, factory Preset	Preset standard mode in factory. Take voltage source from inverter itself and tune the speed from potentiometer in keypad.	A
■	■	■	■	ON									
■	■	■	■	OFF									
<table border="1"> <tr><td>■</td><td>■</td><td>■</td><td>■</td><td>ON</td></tr> <tr><td>■</td><td>■</td><td>■</td><td>■</td><td>OFF</td></tr> </table>	■	■	■	■	ON	■	■	■	■	OFF	DC 0~5V Exterior potentiometer	Control terminals V1, V2, V3 separately connect to pins #3, #2, #1 of exterior potentiometer, and set C01=1, 3.	B
■	■	■	■	ON									
■	■	■	■	OFF									
<table border="1"> <tr><td>■</td><td>■</td><td>■</td><td>■</td><td>ON</td></tr> <tr><td>■</td><td>■</td><td>■</td><td>■</td><td>OFF</td></tr> </table>	■	■	■	■	ON	■	■	■	■	OFF	DC 0~5V Exterior signal	Take voltage source from PC or PLC transformer. Connect terminal V2 to positive part, terminal V3 to negative part, and set C01=1, 3.	C
■	■	■	■	ON									
■	■	■	■	OFF									
<table border="1"> <tr><td>■</td><td>■</td><td>■</td><td>■</td><td>ON</td></tr> <tr><td>■</td><td>■</td><td>■</td><td>■</td><td>OFF</td></tr> </table>	■	■	■	■	ON	■	■	■	■	OFF	DC 0~10V Exterior potentiometer and voltage Source	0~10V exterior voltage source. Connect positive part to terminal V1 and potentiometer pin #3, negative part to terminal V3 and potentiometer pin #1, signal input part to terminal V2 and potentiometer pin #2, and set C01=1, 3.	D
■	■	■	■	ON									
■	■	■	■	OFF									
<table border="1"> <tr><td>■</td><td>■</td><td>■</td><td>■</td><td>ON</td></tr> <tr><td>■</td><td>■</td><td>■</td><td>■</td><td>OFF</td></tr> </table>	■	■	■	■	ON	■	■	■	■	OFF	DC 0~10V Exterior signal	Take voltage source from PC or PLC transformer. Connect terminal V2 to positive part, terminal V3 to negative part, and set C01=1, 3.	E
■	■	■	■	ON									
■	■	■	■	OFF									
<table border="1"> <tr><td>■</td><td>■</td><td>■</td><td>■</td><td>ON</td></tr> <tr><td>■</td><td>■</td><td>■</td><td>■</td><td>OFF</td></tr> </table>	■	■	■	■	ON	■	■	■	■	OFF	0~20mA Current signal	0~10mA current source. The analog signal control has changed to current signal control. Set C01=1, 3.	F
■	■	■	■	ON									
■	■	■	■	OFF									
<table border="1"> <tr><td>■</td><td>■</td><td>■</td><td>■</td><td>ON</td></tr> <tr><td>■</td><td>■</td><td>■</td><td>■</td><td>OFF</td></tr> </table>	■	■	■	■	ON	■	■	■	■	OFF	4~20mA Current signal	4~20mA current source. Set C01=4, 5.	G
■	■	■	■	ON									
■	■	■	■	OFF									

4-7 Step description

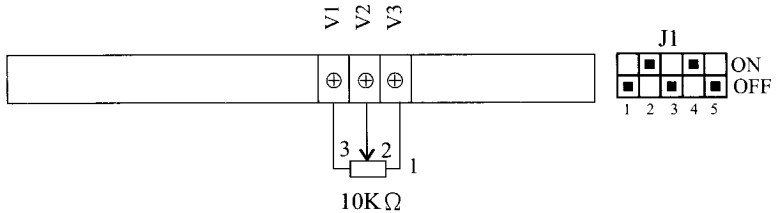
STEP A

1. Use interior DC 0~5V voltage of the inverter.
2. Set DIP switch-J1 pins #1, #3 off (downward) and pins #2, #4, #5 on (upward).
3. Set C01=0, 1, 2, 3, 4 or 5.
 Remark C01=4: Keypad + analog signal control
 C01=5: Control terminal + analog signal control
4. Position diagram



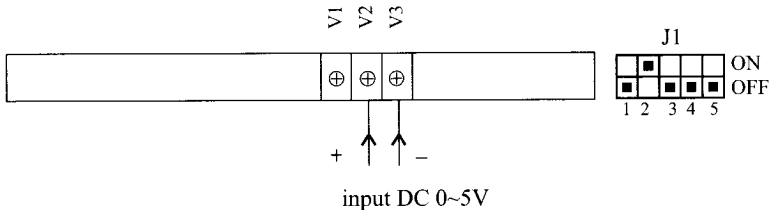
STEP B.

1. Connect to an exterior potentiometer.
(Use interior DC 0~5V voltage of the inverter.)
2. Set DIP switch-J1 pins #1, #3, #5 off and pins #2, #4 on.
3. Set C01=1 or 3.
4. Position diagram



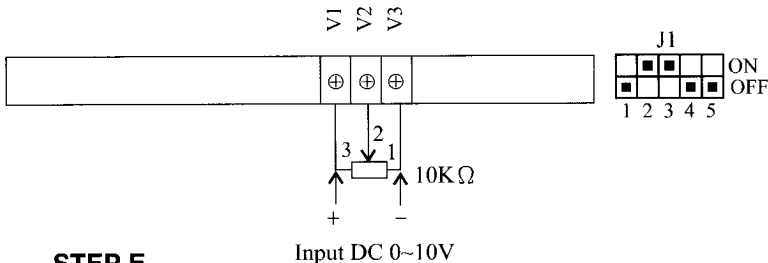
STEP C.

1. Connect to DC 0~5V exterior voltage source.
2. Set DIP switch-J1 pins #1, #3, #4, #5 off and pin #2 on.
3. Set C01=1 or 3.
4. Position diagram



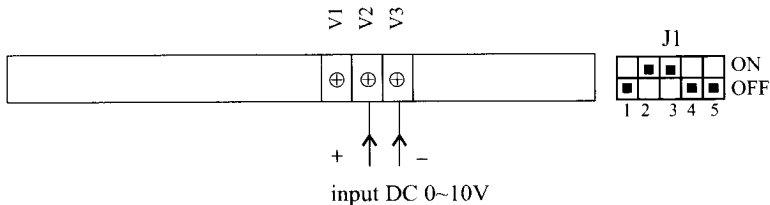
STEP D.

1. Connect to DC 0~10V voltage source by an exterior potentiometer.
2. Set DIP switch-J1 pins #1, #4, #5 off and pins #2, #3 on.
3. Set C01=1 or 3.
4. Position diagram



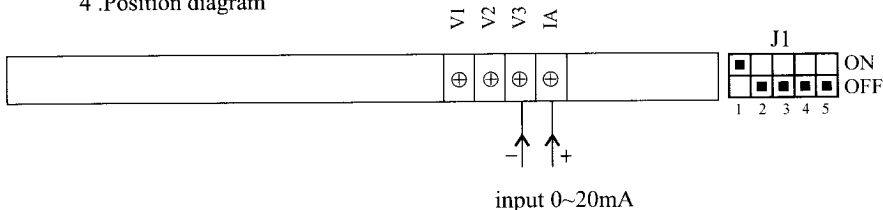
STEP E.

1. Connect to DC 0~10V exterior voltage source.
2. Set DIP switch-J1 pins #1, #4, #5 off and pins #2, #3 on.
3. Set C01=1 or 3.
4. Position diagram

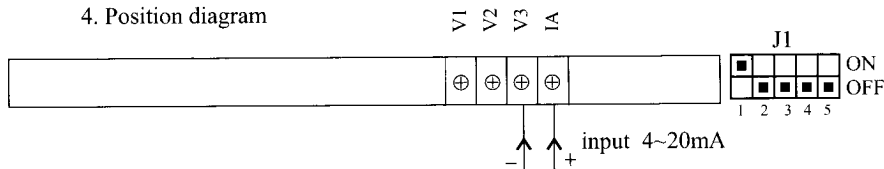


STEP F.

1. Connect to 0~20mA exterior current source.
2. Set DIP switch-J1 pins #2, #3, #4, #5 off and pin #1 on.
3. Set C01=1 or 3.
4. Position diagram

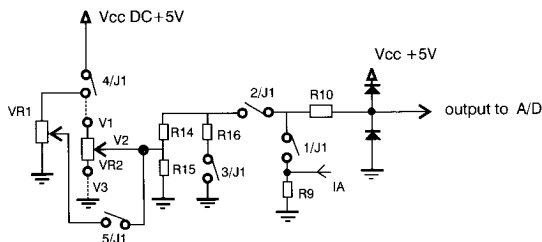
**STEP G.**

1. Connect to 4~20mA exterior current source.
2. Set DIP switch-J1 pins #2, #3, #4, #5 off and pin #1 on.
3. Set C01=4 or 5.
4. Position diagram

**4-8 Construction of DIP switch circuit**

(1) Refer to P.24 ~ P.27 descriptions to set parameter C01=1, 2, 3, 4 or 5.

(2) Circuit



VR1: Potentiometer B10K Ω /16 Φ on control box.

VR2: Exterior potentiometer connect to control terminals V1, V2, V3.

Refer to P.24 ~ P.27 for setting.

Connect to 0~20mA exterior current source when C01=1, 3. Set DIP switch-J1 pins #2, #3, #4, #5 off and pin #1 on.

Connect to 4~20mA exterior current source when C01=4, 5. Set DIP switch-J1 pins #2, #3, #4, #5 off and pin #1 on.

5 Operation



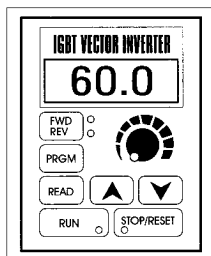
Observe the safety specifications mentioned in above sections before operation.

5-1 Important point checking before revolution

When you complete wiring, please check follows again before revolution.

1. Is wiring corrective? Be sure that electric power must input from terminals L1, L2 for single phase and terminals R, S, T for three phase.
2. Verify that motor is normal and without problems of lock and creepage.
3. Does it make any short circuit due to improper wiring?
4. Do terminal screws tightly lock?
5. Is there any phenomenon of wire gap or short circuit between output sides of inverter and exterior control circuit?
6. The electric line connects inverter and motor should less than 12M.

5-2 Operation panel explanation



Keep panel dry and prevent water infiltration. Water infiltration could result in the stall of the inverter, the damage of machine and injury of member.



Press the key lightly to prevent the damage of its elasticity.

FWD/REV	Forward/reverse key
▲ ▼	Function selection key ▲:Increase key ▼:Decrease key
PRGM	Programmable key
READ	Read key
RUN	Inverter starting key
STOP/RESET	Stop/reset key (Reset when inverter fault)

The read key of 600 series is not established. It will be automatically read-in after 5 seconds.

5-3 Pre-revolution setting

LS600 model inverter setting has completed before shipment. It adjusts speed by a potentiometer and operates forward, reverse, start and stop actions by keyboard. If it needs to change parameter value, it can free to change by professional personnel.



DANGER

Only authorized personnel should be permitted to perform the parameter setting to prevent damage of machine and injury of member.

5-4. Testing revolution

1. Turn on the electric power switch after verifying the installation of MCB and magnetic breakers, then the indicator will display 0.0.



WARNING

Confirm the turning direction of motor before revolution. Wrong turning direction could result in the damage of machine transmission and injury of member.

2. The run indicator will flash after pressing the **[RUN]** key. Turn right the variable resistor knob until the monitor display is more than 1Hz, then the operation indicator stops flashing, the stop indicator goes out and the motor starts to run.
3. Confirm the turning direction of motor. It can change by directly pressing the **[FWD/REV]** key (or change wiring of terminals U, V, W) if reversed direction. The **[FWD/REV]** indicator will light for forward revolution and the **[FWD/REV]** indicator will light for reversed revolution.



CAUTION

*The forward/reverse function setting by the **[FWD/REV]** key is not retainable. The inverter will return to forward revolution mode after restarting the power supply. Set C21 for memory if necessary.*

4. Press **[STOP/RESET]** key, motor stop running. **[STOP/RESET]** Indicating lamp light, **[RUN]** indicating lamp off.



WARNING

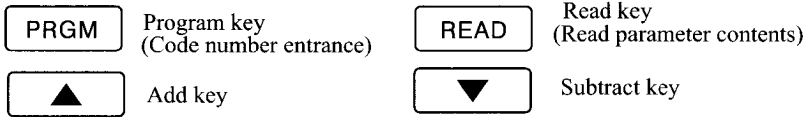
Do not turn on/off the inverter by throw in or cut off the power supply. Failure to observe the warning could result in the damage of inverter, the reduction of inverter life, a fire or the loss of effects.

- ① Turn the variable resistor knob until the monitor displays 0.0, then the run indicator flashes and the stop indicator keeps on. The run indicator goes off and the stop indicator keeps on after stop key pressed.
- ② The stop indicator will flash after pressing the **[STOP/RESET]** key. The run indicator keeps on and the frequency decreases. When monitor display is less than 1Hz, the run indicator goes off, the

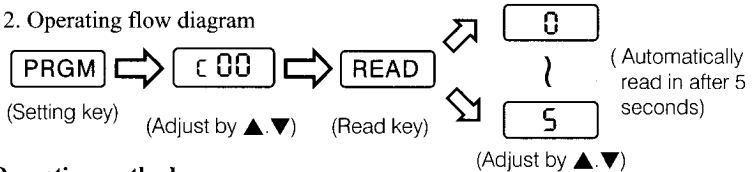
6 Parameter setting method

6-1 Parameter setting steps and descriptions







1. The parameter setting of 600 series is easy. Notice the following descriptions



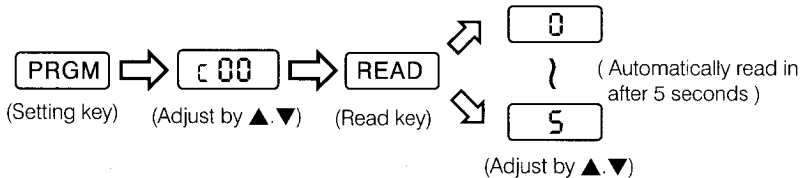
2. Operating flow diagram













Operating method:

The monitor displays 0.0 after the power is on. The monitor displays C00 after pressing the  key. The code number can be changed by increase key  and decrease key . Choose the desired parameter and press the  key, then choose the desired value by increase key  and decrease key .

Monitor display content selection

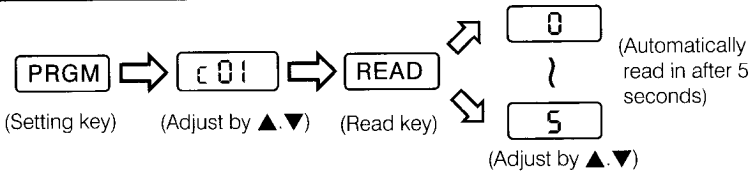


-  : Frequency (Hz) display, maximum for 240Hz. The display resolution is 0.5Hz for normal revolution and 0.1Hz for accelerating/decelerating time more than 20 seconds.
-  : 2-pole motor revolution speed rpm(1:10) display, maximum for 999
-  : 4-pole motor revolution speed rpm(1:10) display, maximum for 999
-  : 6-pole motor revolution speed rpm(1:10) display, maximum for 999
-  :  unlock,  is for carrier wave setting.
-  : The monitor display will immediately flash once per Second when the frequency decreases to zero (on the status of stop) after pressing the  key. And the frequency will immediately increase from 0Hz to the setting value after pressing the  key.



Set the carrier wave according to the initial factory value and do not change it arbitrarily. The improper setting could in the abnormal heat of inverter thus the damage of inverter.

c01 Control mode selection



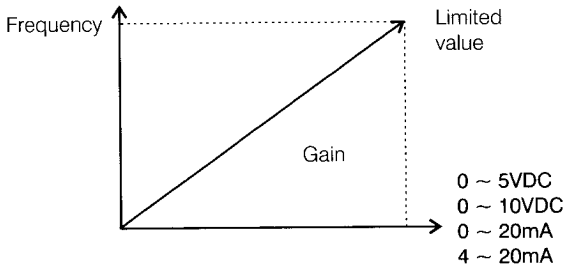
- c01=0 : Speed mode operation controlled by keyboard.
Acceleration or deceleration adjust by ▲, ▼
- c01=1 : Controlled by keyboard and analogy signal.
Key board : Set speed by keyboard.
Analog signal : Refer to P.24~P.27 for descriptions
 1. Potentiometer operation on control panel (Interior 0~5VDC)
 2. Exterior potentiometer operation (Interior 0~5VDC or exterior 0~10VDC)
 3. Exterior signal operation (Exterior 0~5VDC or exterior 0~10VDC)
 4. 0~20mA current signal operation



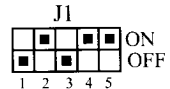
The mode selection function must apply the adjustment of DIP switch J1. The improper setting could result in the reduction of the inverter life.

Gain graph

Relative curved graph of analog signal instruction (0~5VDC, 0~10VDC, 0~20mA, 4~20mA) complying with output frequency.



DIP Switch



Remark: Refer to P.24~P.27 for descriptions.

$\text{C01}=2$: (1) Set control terminals FWD, REV and COM for the control of run/stop operations. And adjust acceleration or deceleration by ▲, ▼ on keypad.

- (2) The monitor displaying -0- indicates that the revolution direction is not confirmed and the inverter can not start up. Close the FWD-COM or REV-COM terminals, and then adjust acceleration or deceleration by ▲, ▼. At this time, the monitor displays 0.0.

** Any connector on control terminal has its own function. Refer to the descriptions on every section (P.22 for example).*

$\text{C01}=3$: Controlled by control terminal and analog signal

- (1) The monitor displaying -0- indicates that the revolution direction is not confirmed and the inverter can not start up. Close the FWD-COM or REV-COM terminals, and then input analog signals for operation. At this time, the monitor displays 0.0.
- (2) 0~5VDC, 0~10VDC and 0~20mA analog signal input applied with the adjustment of DIP switch J1. Refer to P.24 for descriptions.

$\text{C01}=4$: Controlled by keypad and analog signal

- (1) keyboard: Progress speed setting from keyboard.
- (2) Refer to P.24~P.27 for analog signal setting.
- (2-1) Potentiometer operation on control panel (Interior 0~5VDC of inverter)
- (2-2) Exterior potentiometer operation (Interior 0~5VDC of inverter, exterior 0~5VDC or exterior 0~10VDC)
- (2-3) Exterior signal operation (Exterior 0~5VDC or exterior 0~10VDC)
- (2-4) 4~20mA current signal operation



CAUTION

*The function setting must apply the adjustment of DIP switch J1.
The improper setting could result in the reduction of the inverter life.*

$\text{C01}=5$: Controlled by control terminal and analog signal

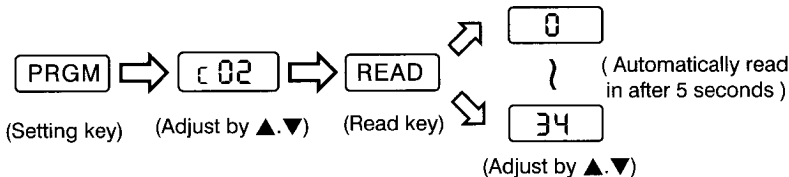
- (1) Refer to item (2) of $\text{C01}=2$ and item (1) of $\text{C01}=3$ for control terminal operation.
- (2) Refer to item (2) of $\text{C01}=4$ for analog signal control.



Attend the following statements when setting $\text{C01}=0, 1, 2, 3, 4$ and 5 .

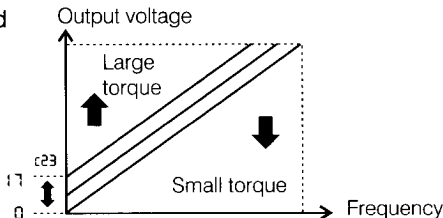
- (1) The function setting must apply the adjustment of DIP switch J1. Refer to P.24~P.27 for descriptions.
- (2) The keypad means the control box for inverter operation. It includes the keys for monitor parameter setting and the potentiometer (B10K Ω /16 Φ or 24 Φ).
- (3) The control terminals mean the main board terminals connecting to exterior control signals. Refer to P.20 for descriptions.
- (4) The control terminal functions can be set when $\text{C01}=2, 3$ or 5 . Reset the parameter when the FWD-COM and REV-COM terminals are open and the monitor displays -0-.
- (5) 0~20mA current signal input for $\text{C01}=1$ or 3 .
4~20mA current signal input for $\text{C01}=4$ or 5 .

C02 V/F torque characteristic curve selection

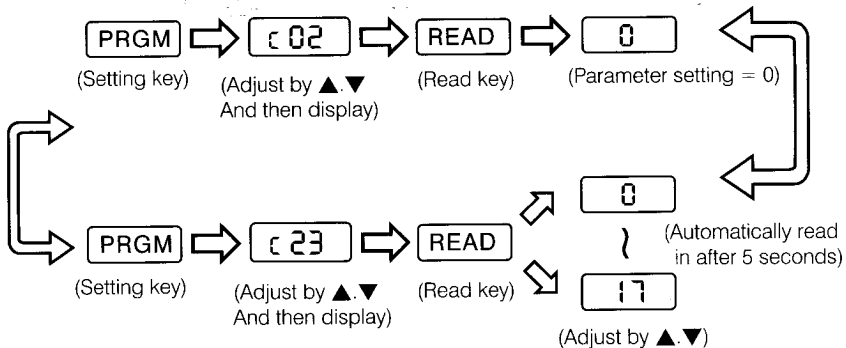


$\text{C02}=0$: The function can adjust the torque value according the automatic torque compensation mode at low frequency. It does not need to set the parameter in general. It can slightly raise the setting value of C23 to assist the torque function when motor torque is not sufficient and under the primary consideration of inverter to motor rated current.

* Only both C02 and C23 be set simultaneously is valid.



Operation flow diagram of C02 and C23



DANGER

The current will increase when the parameter value is too high at automatic compensation mode. Revolution in low speed over long hours could result in heat up or burn out of inverter, or a fire.



CAUTION

Extra install a cooling fan to prevent overheating of motor for revolution in low speed over long hours.



CAUTION

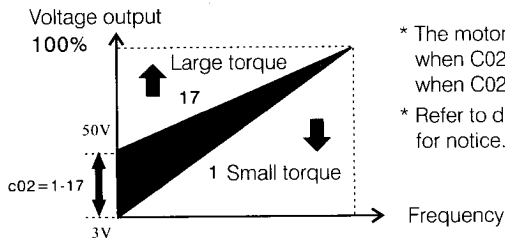
The parameter setting must be done by professional personnel. It is better to set the torque value equals 3Hz, which is sufficient for motor starting up.



CAUTION

The initial factory value is C23=3. The selective values of C23 are 0~17 under the mode of C02=0

The curve is straight line for C02=1~17. It does not offer the function of automatic torque compensation under normal V/F torque control mode.



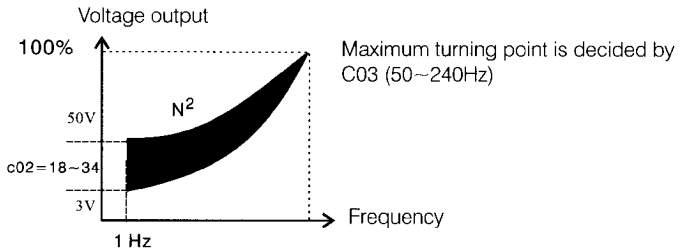
* The motor torque is minimum when C02=1 and maximum when C02=17.

* Refer to descriptions in C02=0 for notice.

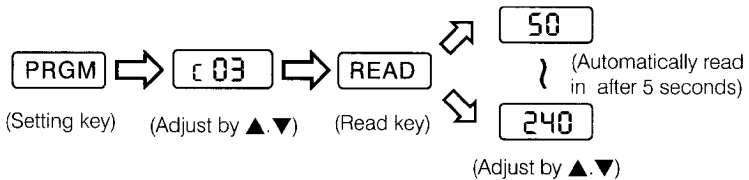


- (1) Choose the parameter $C02=1-17$ when no sufficient torque can be obtained by choosing the voltage vector automatic compensation mode of $C02=0$.
- (2) The voltage vector automatic compensation mode of $C02=0$ is invalid when choosing $C02=1-17$.
- (3) The parameter setting offers the most wide revolution range for normally using and is suitable for traditional machine.
- (4) Slightly tuning the curves 1-17 to prevent the heat up of motor.

$C02=18-34$: N^2 increasing parabolic curve. It has the effect of energy saving and suitable for transmission of fan, hydraulic pump and liquid machine; or load of large torque.

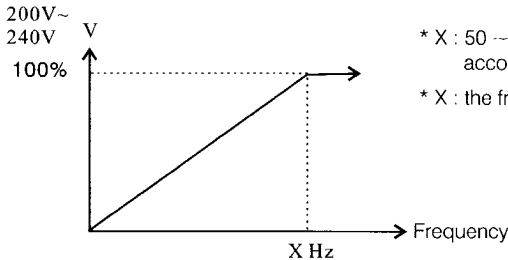


C03 V/F turning point selection (Basic frequency)



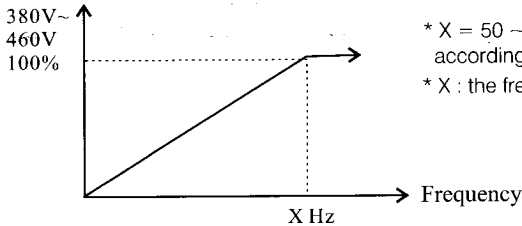
C03 : 100% voltage output decided by 50Hz ~ 240Hz output frequency.

(1) 200V ~ 240V curve graph



- * X : 50 ~ 240Hz selects voltage according to motor characteristics.
- * X : the frequency code

(2) 380V ~ 460V: curve graph

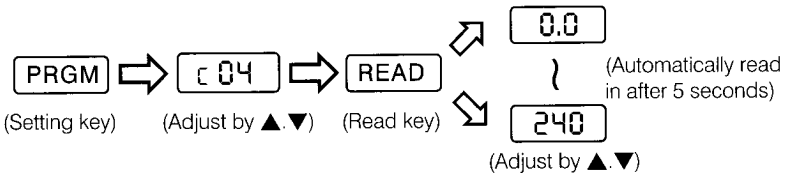


* X = 50 ~ 240Hz selects voltage according to motor characteristics.
* X : the frequency code



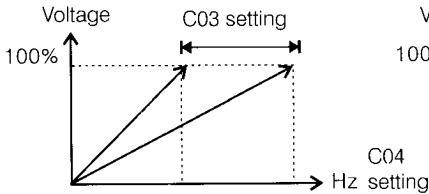
- (3) Set X more than the motor operation frequency 50/60Hz to prevent heat up of motor.
- (4) Set V/F curve tuning point according to the motor rated frequency. For example, C03 should be equal to or more than 50Hz if the motor rated frequency is 50Hz.

C04 Main speed frequency setting

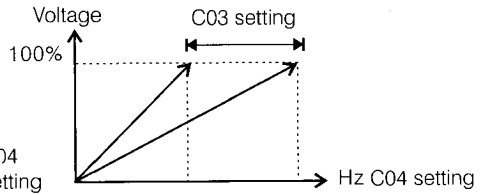


C04 : Main speed setting. Exactly adjust accelerating/decelerating range by ▲, ▼ and speed range by potentiometer.

- (1) The frequency setting range for C26=0 is 1.0Hz~120Hz. The frequency setting range for C26=1 is 1.0Hz ~ 240Hz and, at this mode, change the upper limitation of C16 to 240Hz.
- (2) Refer to descriptions in C01 for operation mode.

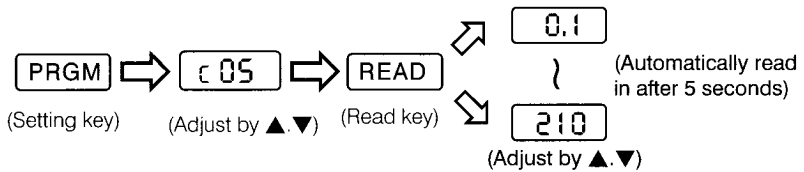


- ※ Set curve diagram of 1~120Hz
- ※ Set C03 for tuning point
- ※ Set C04 for main speed

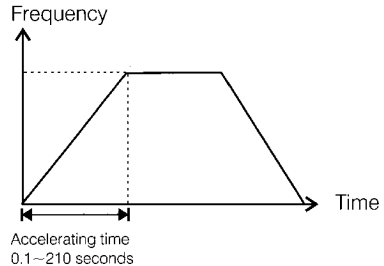


- ※ Set curve diagram of 1~240Hz
- ※ Set C03 for tuning point
- ※ Set C04 for main speed and C16 to release the upper limitation function.

05 Main speed frequency accelerating time setting

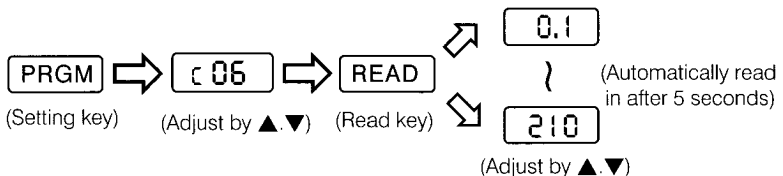


05 : Accelerating time means the time that increases the frequency from 1Hz to 60Hz. The calculating unit for frequency more than 61Hz is calculated by the time integral. The maximum value is 210 seconds and the step time is 0.1 second.



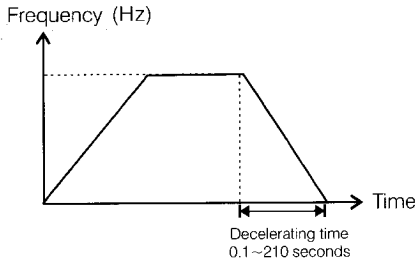
- (1) The less accelerating time could result in the large I^2t generated by current, and then causes overheating that tripping the inverter. Properly increase the accelerating time is helpful for the life of motor and machine.
- (2) The accelerating time setting value of Ls600 series is 5 seconds for less than 5Hp and 10 seconds for more than 7.5 Hp. It can be changed if necessary.
- (3) The accelerating time can be changed when operating.

06 Main speed frequency decelerating time setting



06 : Decelerating time means the time that decreases the frequency from 60Hz to 0Hz. The less decelerating time could result in the large GD^2 generated by regenerative voltage, and then causes the over voltage protection. Properly increase the accelerating time is helpful for the life of motor and machine. The calculating unit for frequency more than 61Hz is calculated by the time integral. The step time is 0.1 second.

9 PARAMETER SETTING METHOD

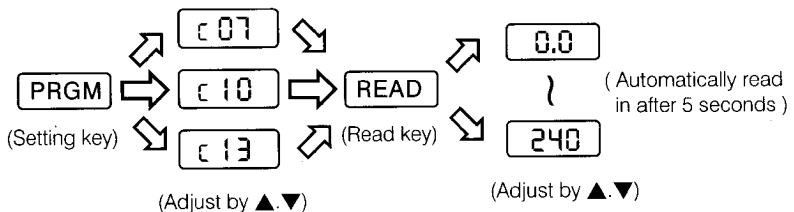


- (1) The machines with large torque load that could generate large GD^2 , such as hydraulic pump, fan, hydroextractor, turnplate and punch, must properly increase their decelerating time settings.
- (2) The decelerating time setting value of Ls600 series is 5 seconds for less than 5Hp and 10 seconds for more than 7.5 Hp. It can be changed if necessary.
- (3) The decelerating time can be changed when operating.

c07 Second speed frequency setting

c10 Third speed frequency setting

c13 Jogging speed frequency setting



c07, c10, c13 : 2nd (2X) speed, 3rd (3X) speed and jogging (JOG) speed revolution
 If it needs to apply 2nd speed, 3rd speed, or jogging speed revolution when motor is running, it can close the exterior terminals between 2X-COM, 3X-COM or JOG-COM. Set C01=1, 2, 3, 4 or 5 after completely setting the frequency value of **c07**, **c10**, and **c13**.

(1)The accelerating/decelerating time of 2X, 3X and JOG speed must completely preset. Refer to c05, c06 for the descriptions of setting method.

- c08 :2X accelerating time setting, the range is 0.1 second to 210 seconds.
- c09 :2X decelerating time setting, the range is 0.1 second to 210 seconds.
- c11 :3X accelerating time setting, the range is 0.1 second to 210 seconds.
- c12 :3X decelerating time setting, the range is 0.1 second to 210 seconds.
- c14 :JOG accelerating time setting, the range is 0.1 second to 210 seconds.
- c15 :JOG decelerating time setting, the range is 0.1 second to 210 seconds.

(2)The functions mentioned above can use control terminals complying with exterior selection switch or non-voltage connector to control the inverter for multi-speed revolution or jogging running.

(3)The frequency value must use interior setting and its range is 1~240Hz. (Set C26=1 and the upper limitation frequency of C16 is 240Hz.)

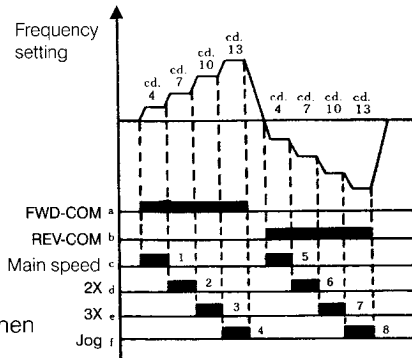
(4)Multi-speed revolution timing diagram

Description for C01=1, 2, 3, 4 or 5:

- a.Close FWD-COM terminals for forward revolution.
- b.Close REV-COM terminals for reverse revolution.
- c.C04 setting for main speed revolution.
- d.C07 setting for 2nd speed revolution.
- e.C10 setting for 3rd speed revolution.
- f.C13 setting for jogging speed revolution.

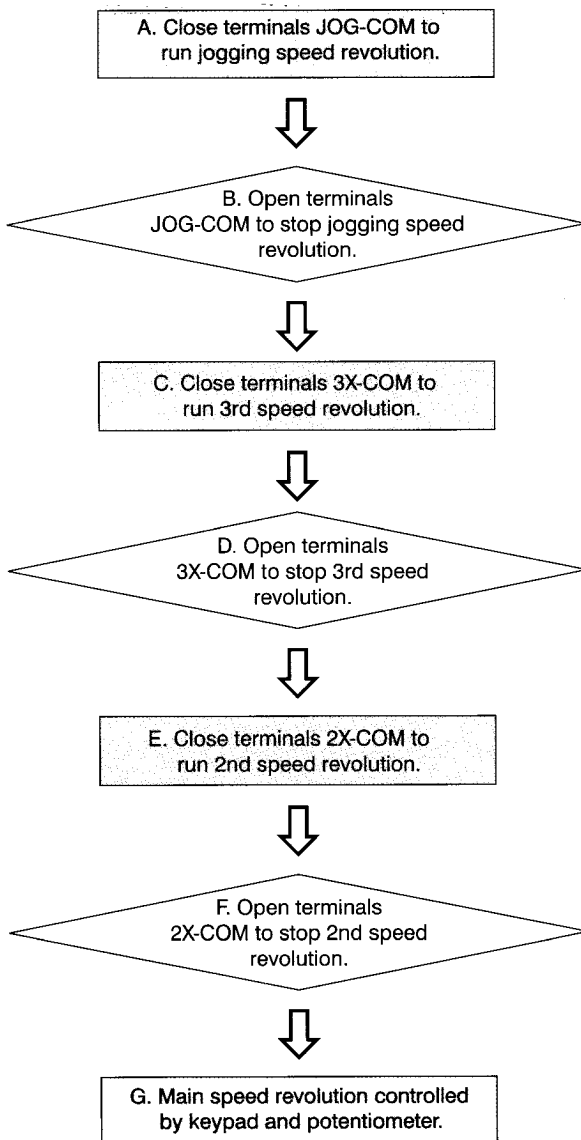


(5) The inverter can not operate when both the FWD-COM and REV-COM terminals are closed. Only one closing action is valid at one time.

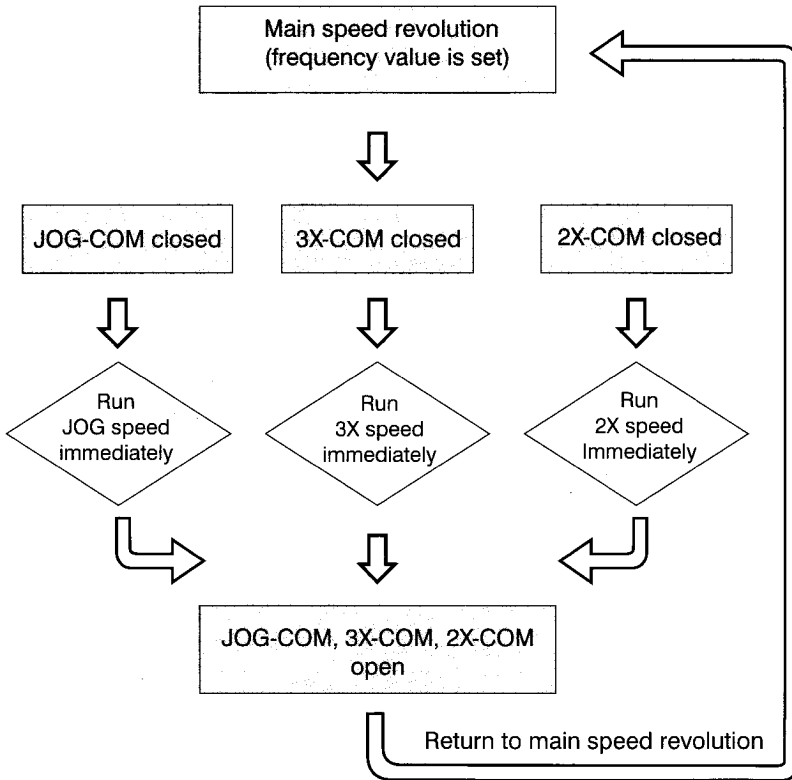


(6) Priority for speed selection when C01=1, 2, 3, 4 or 5.
 JOG → 3X → 2X → MAIN Speed

(6) - 1 Steps of first kind

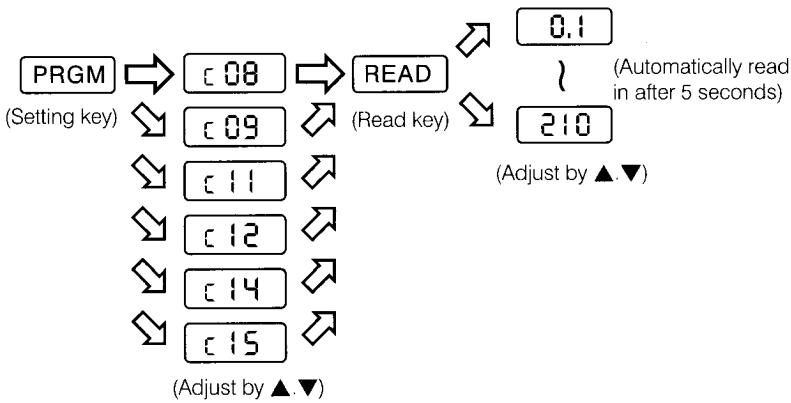


(6) - 2 Steps of second kind



- Remark: (1) It runs JOG-COM speed when all JOG-COM, 3X-COM and 2X-COM are closed. It runs 3X-COM speed when JOG-COM is open. It runs 2X-COM speed when 3X-COM is open.
- (2) Wiring on connectors of control terminal and take non-voltage connector as switch.

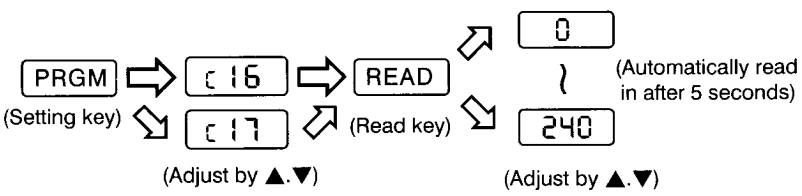
- c08** Second speed accelerating time setting
- c09** Second speed decelerating time setting
- c11** Third speed accelerating time setting
- c12** Third speed decelerating time setting
- c14** Jogging speed accelerating time setting
- c15** Jogging speed decelerating time setting



c08, c09, c11, c12, c14, c15 :

Refer to descriptions on C05 and C06 for parameters setting and changing. The accelerating/decelerating time can be changed when operating.

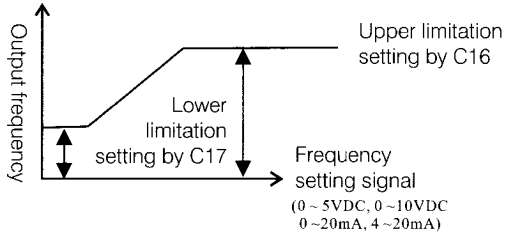
- c16** Frequency upper limitation setting
- c17** Frequency lower limitation setting



Ⓛ16 : Frequency upper limitation setting

Ⓛ17 : Frequency lower limitation setting

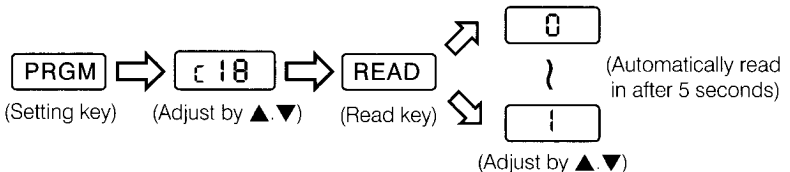
- (1) The frequency setting range of upper/lower limitation is 0~240Hz.
- (2) The upper limitation must be more than the lower limitation.
- (3) Frequency speed adjustment range is between upper limitation and lower limitation.
- (4) The main speed frequency setting must be equal to or less than the frequency upper limitation.
- (5) The frequency raises to the lower limitation value after pressing the **[RUN•]** key when the frequency setting is less than the lower limitation. When the frequency is higher than the lower limitation during operation, the inverter operates with actual frequency value.
- (6) Upper/lower limitation diagram



DANGER

The function setting must be performed by professional personnel. The improper upper/lower limitation setting could result in the damage of equipment and injury of member.

Ⓛ18 Braking selection



Ⓛ18 : Offers the function of enforced braking to prevent the motor free running when the output frequency is less than 0Hz.

Ⓛ18=0 : Without DC braking function.

Ⓛ18=1 : With DC braking function. The DC dynamic braking acts immediately when the frequency is reduced to 0Hz, and the monitor displays b f E . The RUN indicator keeps on when the DC dynamic braking is running. The RUN indicator goes out and the STOP indicator turns on when the DC dynamic braking stops.

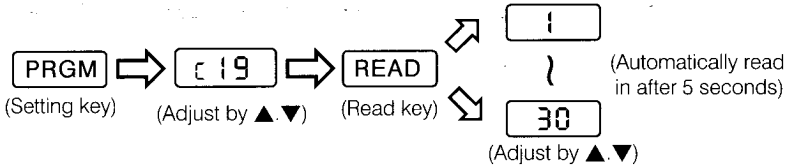


CAUTION

The motor will cause DC overcurrent when quick DC braking. The braking energy setting of C19 is very important and suggestion to perform the setting by professional personnel.

9 PARAMETER SETTING METHOD

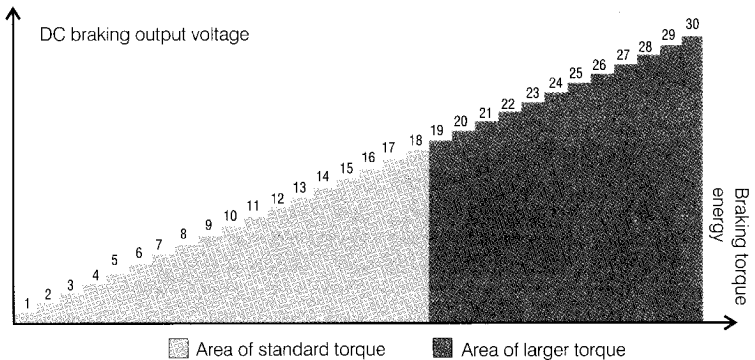
c19 Braking energy setting



c19 : Decides the motor torque energy in braking.

c19=1 : With weak braking energy.

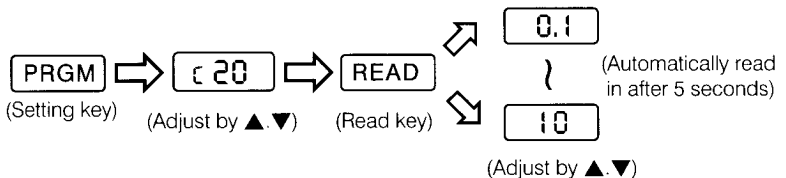
c19=30 : With strong braking energy.



- (1) The above diagram shows the relationship of DC output voltage and braking torque energy. It shows that the higher DC output voltage could result in the larger braking torque.
- (2) Suggestion to set the baking torque less than C19=18. The principle of setting standard is that the motor will not free run and keep standstill under 0Hz.
- (3) The big setting energy of C19 and frequent braking could result in the heating of motor, burn out of coil and even a fire.
- (4) The braking energy is correlated with the braking time and is set by C20.

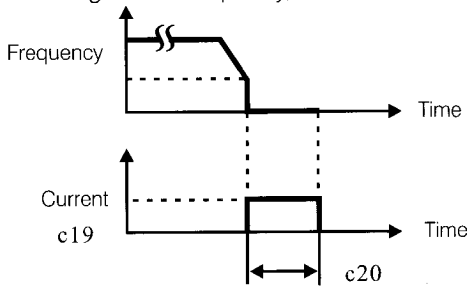


c20 Braking time setting

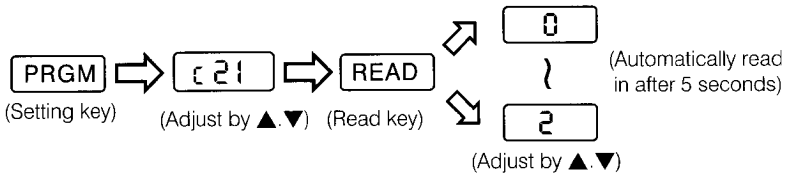


c20 : The lasting time of the braking torque energy after tuning is 0.1~10 seconds.

- (1) The DC dynamic braking time setting range is 0.1~10 seconds.
- (2) The monitor displays **b t E** and the RUN indicator keeps on when the DC dynamic braking acts. The RUN indicator goes out and the STOP indicator turns on when the DC dynamic braking stops.
- (3) The braking time setting is according to the criterion that could keep motor standstill.
- (4) The output frequency reduced to 0Hz when inverter stops and it starts the DC braking action. It can fix the motor bearing to prevent motor slide in the braking time. And it loses the function after the end of the braking time.
- (5) Relation diagrams of frequency, current and braking time.



c21 Forward/reverse revolution setting



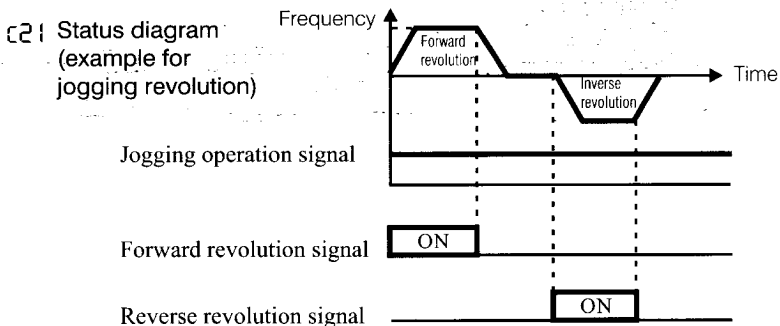
c21 : Decides the turning direction of motor. Set c21 for bi-directional, forward and reverse revolution.

c21=0 : It can make forward and reverse revolutions.

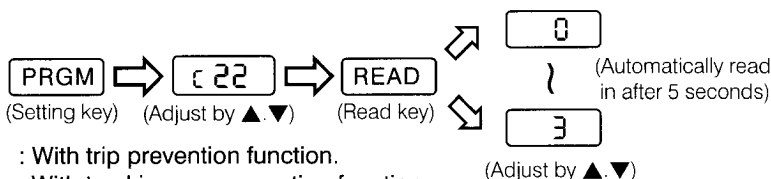
c21=1 : It can only make forward revolution and the forward (FWD) indicator is on. Change any two input terminals of motor to change the motor polarity. It is invalid to change the input terminals of the power supply.

c21=2 : It can only make reverse revolution and the reverse (REV) indicator is on. Change any two input terminals of motor to change the motor polarity. It is invalid to change the input terminals of the power supply.

9 PARAMETER SETTING METHOD



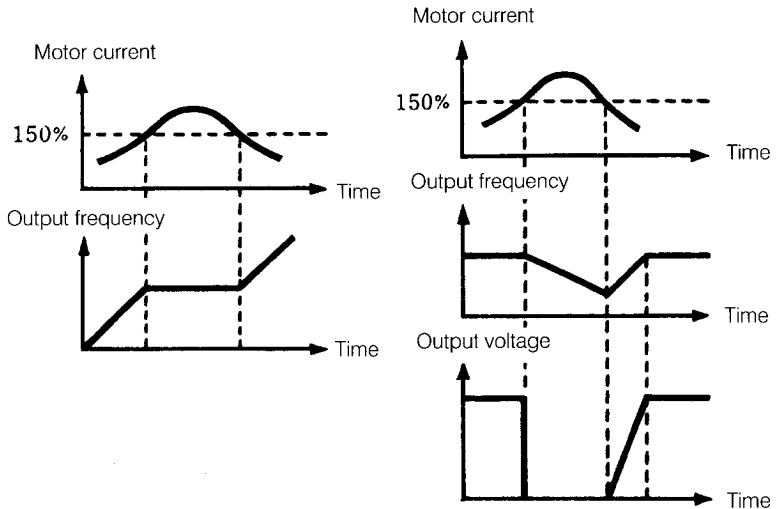
C22 Stall prevention for overcurrent and overvoltage



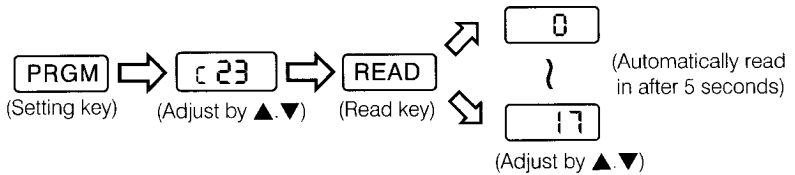
- C22 : With trip prevention function.
 With tracking compensation function.
 With automatic speed search function.
- C22=0 : Without stall prevention function of overcurrent and overvoltage. It does change the accelerating and decelerating time.
- C22=1 : The accelerating time will be changed when output current of inverter is more than 150% of rated current and DC side voltage of inverter reaches DC350V (AC200~AC240 series) or DC650V (AC380~460 series) when accelerating. The output frequency of inverter never increases or the inverter stops to prevent trip causing by overcurrent and overvoltage. It restores the accelerating function after under the protection level.
- C22=2 : The decelerating time will be changed when output current of inverter is more than 150% of rated current and DC side voltage of inverter reaches DC350V (AC200~AC240 series) or DC650V (AC380~460 series) when decelerating. The output frequency of inverter never increases or the inverter stops to prevent trip causing by overcurrent and overvoltage. It restores the decelerating function after under the protection level.
- C22=3 : It has the functions in C22=1 and C22=2 when accelerating and decelerating. It has the function of automatic speed search and tracking. It shows that the inverter will automatically tune the output frequency according the load variation status to prevent the trip of motor.

1. Stall prevention when accelerating

2. Stall prevention when operating



C23 Automatic torque compensation energy setting



C23 : The C23 function setting is of the voltage vector mode. It has the function of automatic torque compensation energy that increases the torque compensation capability. It is valid only when **C20**. Refer to

C02=0 on P.33~P.34 for descriptions.

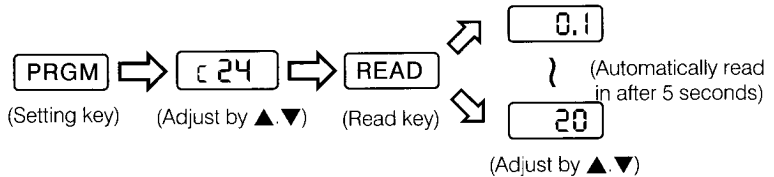
C23=1 : The compensation energy is small.

C23=17 : The compensation energy is largest.

* Refer to **C02=0** on P.33~P.34 for descriptions.

9 PARAMETER SETTING METHOD

ε24 150% overcurrent trip time setting



ε24 : The operation is normal that the operating current of the inverter achieves the 100% rated current. It must limit the operation time to prevent the burn out of motor when the operating current of the inverter is more than the 150% rated current.
 The monitor displays OL1, OL2 or OL3 when the inverter current is more than the 150% rated current and the integral accumulated time reaches.

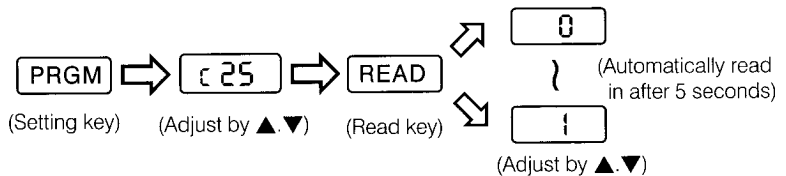
OL1: Overload when accelerating.

OL2: Overload of constant speed.

OL3: Overload when decelerating.

OL (overload): The range of time setting is 0.1~20 seconds and the initial value in factory is 10 seconds.

ε25 Recovery setting value at exportation factory



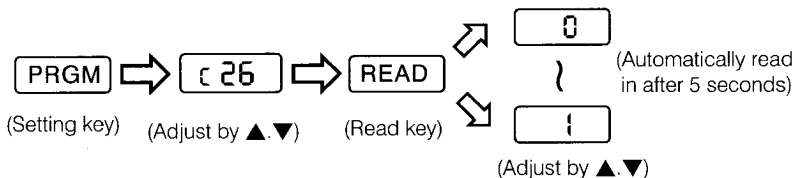
ε25 : Choose ε25=1 to recovery the initial setting value in factory.
 The ε25 value restores to 0 and all other interior parameters restore to the initial setting value in factory after action.



(1) Suggestion to process the function setting after recording the old parameter values. Otherwise, the old parameter values will be clear after restoring the initial setting value in factory.

(2) Process the function setting by professional personnel to prevent wrong operation.

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.

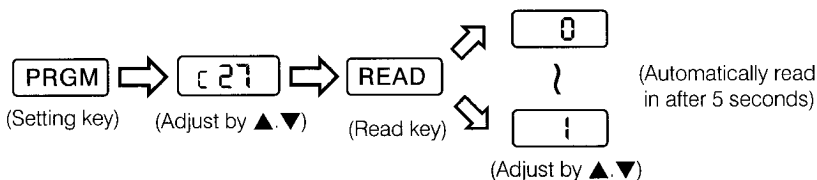
C26=1 : Output frequency range: 0~240Hz.

- (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



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.



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.

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
EH	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 C01=2, 3 or 5?	Change C01=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	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.

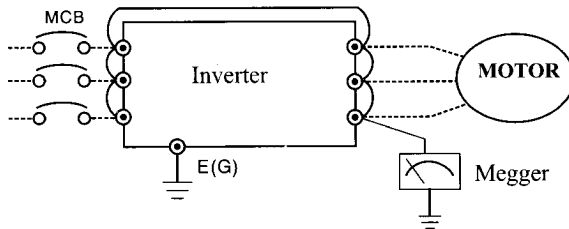
9-2 Inspection items

- * 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.



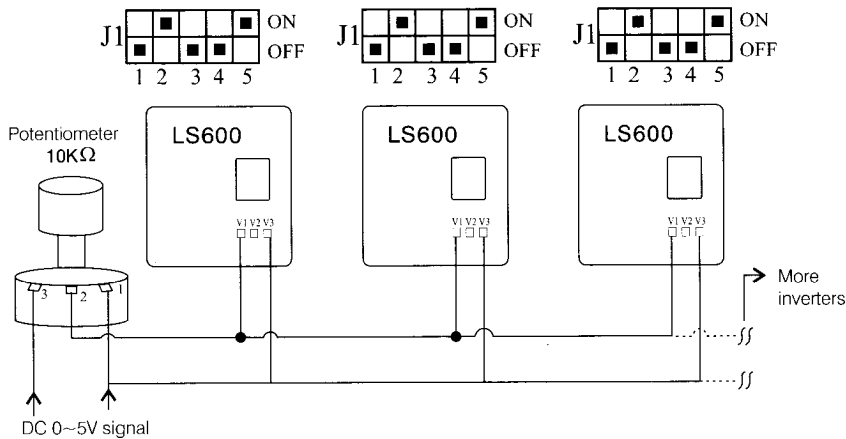
Remark 1: The parts of dashed lines indicate that be wired or not wired.

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

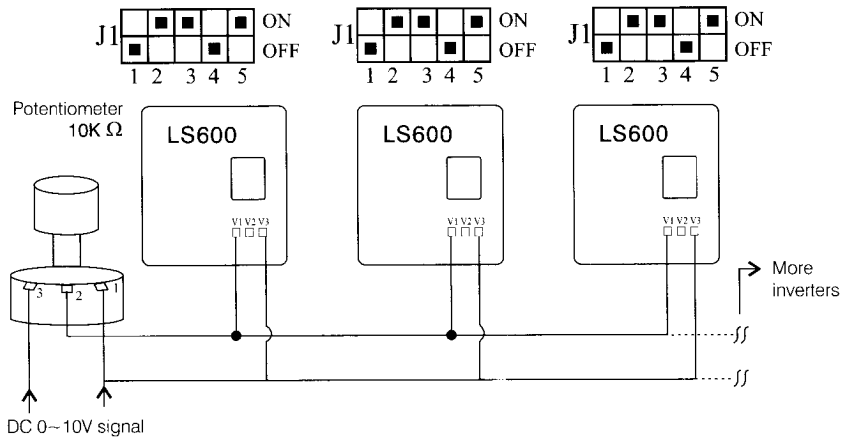
10 Synchronous running wiring connection method

- (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.

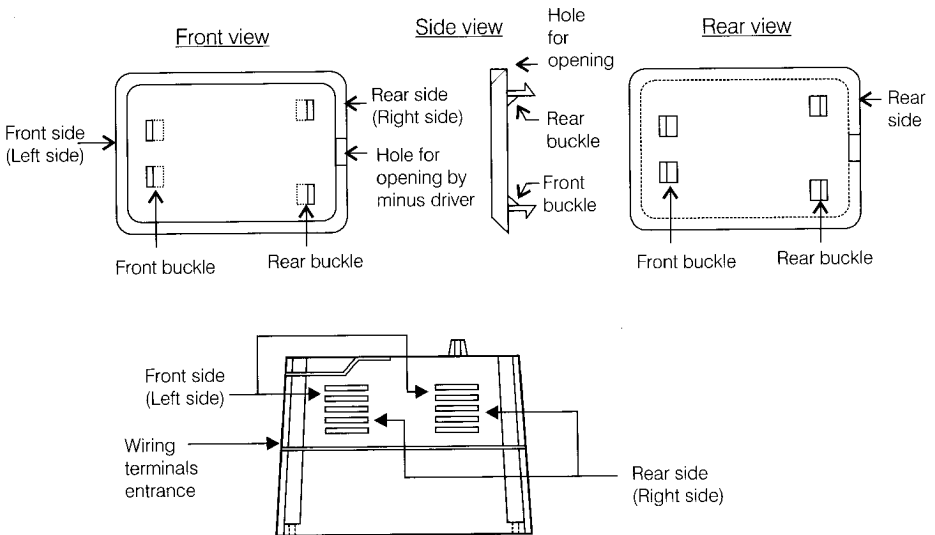
INVERTER								Specification	
Voltage	Model	Capacity	Minimum resistivity	Minimum wattage	Quantity	Braking torque	Circuit		Exterior braking unit
							Inside	Outside	
200V	LS600-20-5	0.4	150	120	1	225	○		
	LS600-2001	0.75	150	120	1	130	○		
	LS600-2002	1.50	100	200	1	130	○		
	LS600-2003	2.20	60	250	1	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		○	LSBR-4015B
	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



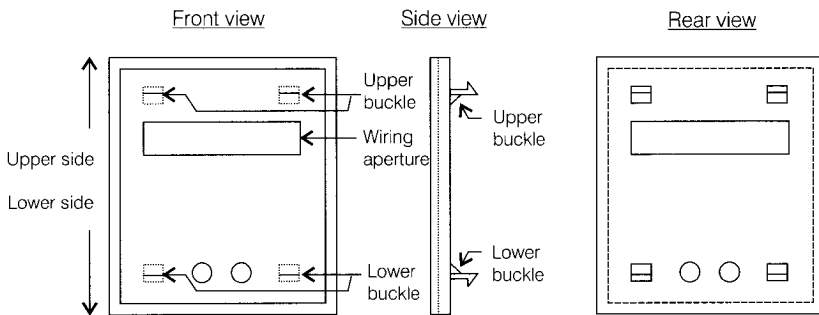
- Installation step: (1) Confirm front and rear sides. The distance between two buckles of front side is shorter than the ones of rear side. And there are holes on the rear side for opening the cover by screwdriver.
- (2) Aim the front side of the side cover at the front side of the inverter and press 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	5-120 sec every time more or less 1 sec.	
5	Main speed acceleration time setting	0.1~210sec	5sec		
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		

4. Certificate of compliance

SGS SGS United Kingdom Ltd.
EMC Services

South Industrial Estate
Barnet
Co. Surrey
CR8 3ND
United Kingdom
Telephone: +44 (0) 181 377 2000
Fax: +44 (0) 181 377 2001
www.sgs-uk.com

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

Certificate of Compliance

Product: IGBT Space Vector Inverter
Brand Name: Long Sheng Electronic Co., Ltd
Model: L5600-20-5, L5600-2001, L5600-2002, L5600-2003, L5600-2005, L5600-4001, L5600-4002, L5600-4003, L5600-4005

Description: This product is an IGBT space vector inverter. It has a variety of features including a silent design, high precision, smooth current and small size.

Issue date: 14th Mar 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 File is the opinion of SGS EMC Services that the product shall be judged to comply with the requirements of the EMC Directive #93/32/EEC as amended by 92/31/EEC, 93/88/EEC.

It is the manufacturer's responsibility to ensure that the equipment described in Technical Construction File is the same as the one described in the above TCF. The manufacturer at the point of purchase should ensure that the product is the same as the one described in the above TCF. The manufacturer should ensure that the product is the same as the one described in the above TCF. The manufacturer should ensure that the product is the same as the one described in the above TCF.

Authorised Signatory

John S Whitley
General Manager
A signed copy of this certificate is retained by SGS EMC Services and may only be reproduced after three to five days with the prior approval of the General Manager.

5. Technical construction file assessment report

SGS SGS United Kingdom Ltd.
Technical Services

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CR8 3ND
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Telephone: +44 (0) 181 377 2000
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Technical Construction File Assessment Report
(As detailed in SI 1992 No. 2372 Regulation 54)
Report Number DUR 20451
Issue Date 14/03/98
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 Hsueh, Taiwan, R. O. C.

Brand Name: Long Sheng Electronics Co. Ltd.

Product: Inverter (AC motor speed controller)

Model: L5600-20-5, L5600-2001, L5600-2002, L5600-2003, L5600-2005, L5600-4001, L5600-4002, L5600-4003, L5600-4005.

Description of Equipment: The products are IGBT space vector inverters. It has a variety of features including a silent design, high precision, smooth current and small size.

Responsible Person: Mr Heah Wan Ko

Telephone: 00 886-2-23942032

Fax: 00 886-2-2394161

Operating Environment: Industrial

Member of the SGS Group (Incorporated in Switzerland)

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 14/03/98
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 the 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 14/03/98
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 50081-2:1994 for emissions and EN 50082-2:1995 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

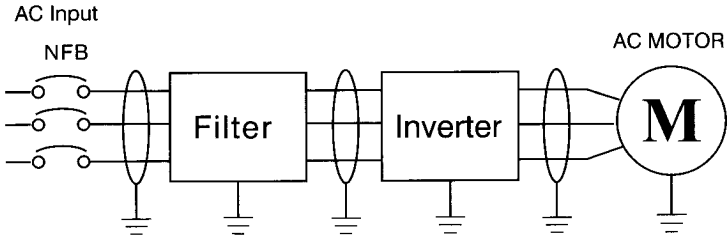
It is the opinion of SGS EMC Services that the product shall be judged to comply with the requirements of the EMC directive 89/338/EEC, as amended by directives 92/31/EEC and 93/88/EEC.


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

16 Testing Specifications

(Extracted from document
TCF NO: INV-1-1998, P. 5)

Voltage	200V (3 Phase)					400V (3 Phase)			
Model	20-5	2001	2002	2003	2005	4001	4002	4003	4005
MAX. Motor (KW)	0.4	0.75	1.5	2.2	3.7	0.75	1.5	2.2	3.7
Nominal Output Capacity	1.2	1.7	2.8	4.2	6.1	2	3.2	4.2	7.0
Nominal Output AMP	3	4.5	7.5	11	16	2.5	4.5	7.0	9.0
MAX. Output Voltage	200V~240V Three phase matched voltage					380V~460V Three phase matched voltage			
Highest Output Frequency	Up to 120Hz by parameter setting or specified up to 240Hz								
Nominal Voltage & Frequency	(3 Phase) 200/208/220V 50Hz 200/208/240V 60Hz					3 Phase 380/400/415/440/460V 50/60Hz			
Allow Voltage Variance	±10%								
Control Principle	PWM sine wave, voltage space vector control								
Range of Frequency Control	0.5~240Hz								
Frequency Precision	Digital Command : 0.1%(-10 -40°C) Analog Command : 0.5% (25°C±10°C)								

17 Technical Rationale

(Extracted from document
TCF NO: INV-1-1998, P. 16)

Technical Rationale

LS600 model inverter has 4 kinds of initial testing specifications for LS600-2002, LS600-2005, LS600-4002, LS600-4005. The result certifying large electric current will occur powerful radiation interference and electric conduction interference. Thus, we decide LS600-2005 and LS600-4005 to be our representative testing models.

The electric circuit of LS600-2005, LS600-2001, LS600-2002, LS600-2003, LS600-2005..etc, specification are same,. But different in capacity. When power HP is great, the capacity of used parts are large.

The electric circuit of LS600-4001, LS600-4002, LS600-4003, LS600-4005 are same. The fixed capacity of inverter is bigger, it needs to select large capacity of spare parts.

To sum up above, LS600-2005 and LS600-4005 are representative testing models.