

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 \oplus 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.

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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:

LS 600 - 2001

Inverter Model

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

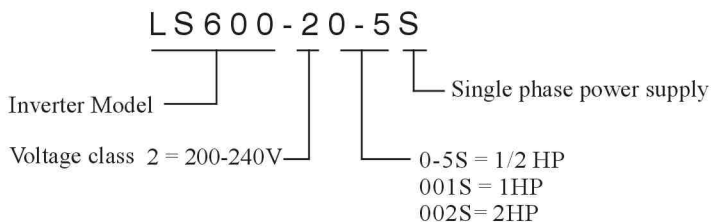
Maximum output capacity

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)



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

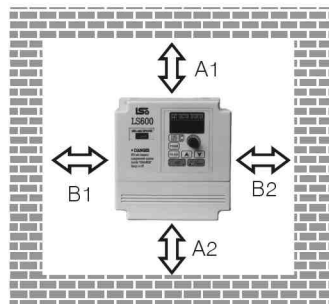


Please keep away following site:

- 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



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

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

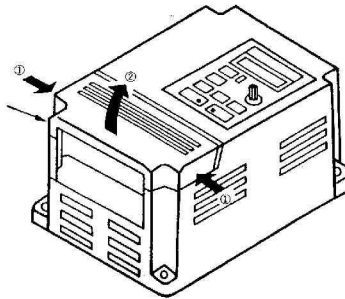
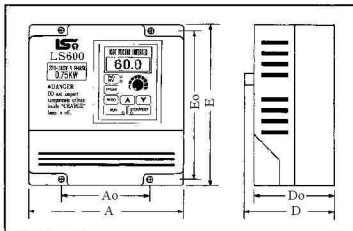
2-3 Terminal cover fixing/removing and terminal position

- 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.

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

- Dimensions in mm



CAUTION

Use M4 screws to fix the inverters.

(UNIT : m/m)

Size \ Area		A	A0	E	E0	D	D0	Net weight (kg)	Gross weight (kg)	Measu- re-ment	Fix screw
Model								Approx weight		0.3	M4
LS600-20-5	LS600-2001	146	128	150	138	160	153				
LS600-2002	LS600-4001										
LS600-4002	LS600-20-5S										
LS600-2001S, LS600-2002S,								1.8	2.0		
LS600-2003	LS600-2005	146	128	200	188	160	153	2.6	3.0	0.4	M4
LS600-4003	LS600-4005										

5 INSTALLATION METHOD

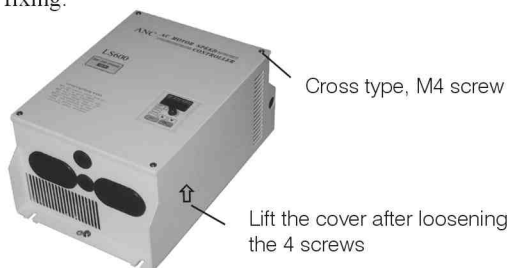
2-4 Cover fixing/removing of inverters more than 7.5 HP

1. The specifications are suitable for the following ranges.

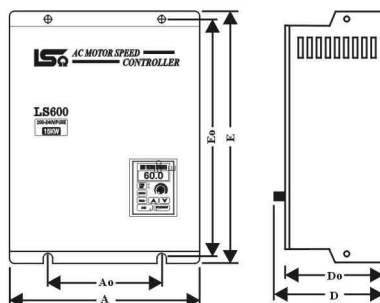
200V ~ 240V, LS600-2007 ~ LS600-2050

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

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



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



Use M6 screws to fix the inverters.

Size / Area		A	Ao	E	Eo	D	Do	Net weight (Kg)	Gross weight (Kg)	Measurement	Fix screw
Model											
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

1. The specifications are suitable for the following ranges.

200V ~ 240V, LS600-2060 ~ LS600-2075

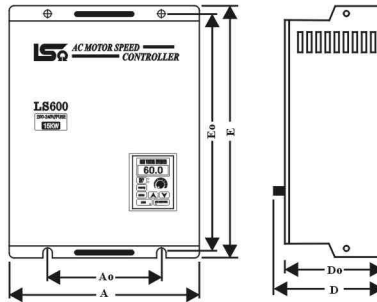
380V ~ 460V, LS600-4060 ~ LS600-4075

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



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



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



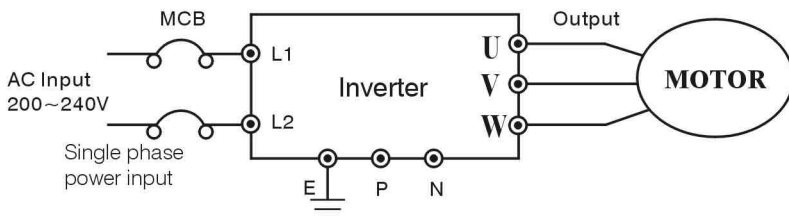
INHIBIT

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

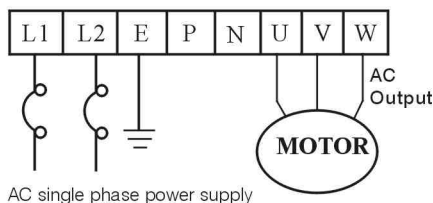
(LS600-20-5S, LS600-2001S, LS600-2002S)



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.

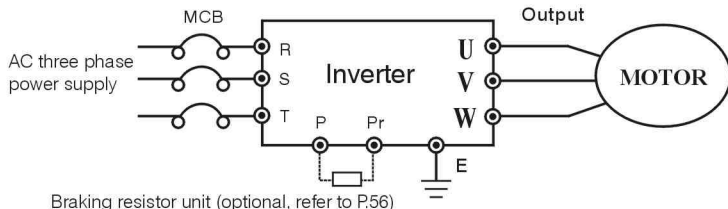
3-1-1 Terminal wiring diagram for single phase inverter



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)



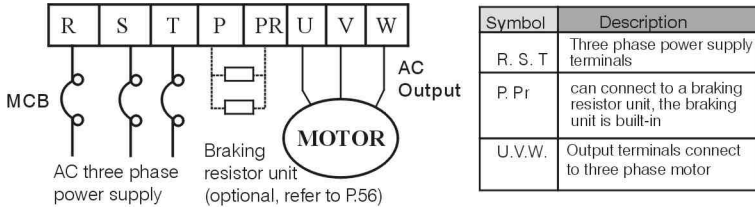
Braking resistor unit (optional, refer to P.56)



CAUTION

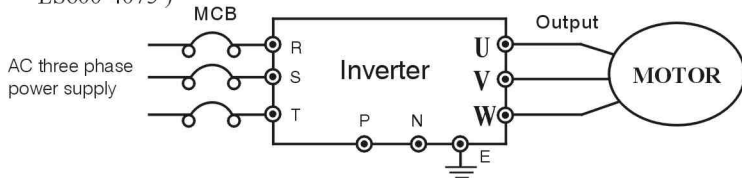
1. The braking circuits of 200V and 400V three-phase series that more than 15 HP are not built-in. Refer to P. 56 for choosing the correct resistance and wattage.
2. Ground the inverters to prevent the danger of lightning struck and electrical shock.

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



3-3 Three phase main circuit wiring diagram

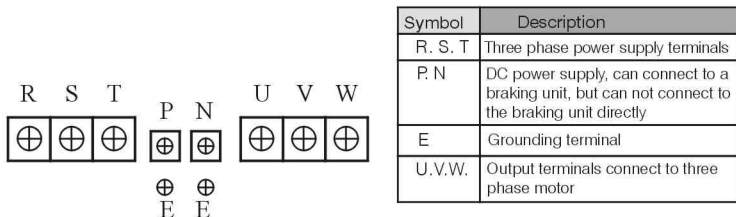
(LS600-2015, LS600-2020, LS600-2025, LS600-2030, LS600-2040, LS600-2050, LS600-2060, LS600-2075, LS600-4015, LS600-4020, LS600-4025, LS600-4030, LS600-4040, LS600-4050, LS600-4060, LS600-4075)



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



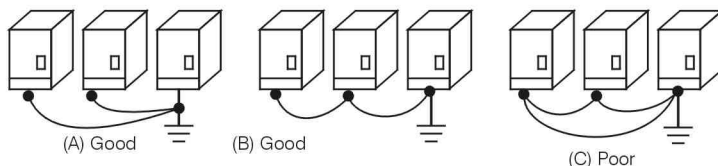
Refer to P. 61 ~ P. 64 to see the wiring specifications that CE confirmed

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 $10\ \Omega$) 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)

Specification	20-5	2001	2002	2003	2005	2007	2010	2015	2020	2025	2030	2040	2050	2060	2075
Contents															
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. 21 for description)														

Table (2)

Contents	Specification														
Capacity Kw/HP-400V	4001 0.75/1	4002 1.5/2	4003 2.2/3	4005 3.7/5	4007 5.5/7.5	4010 7.5/10	4015 11/15	4020 15/20	4025 18.5/25	4030 22/30	4040 30/40	4050 37/50	4060 45/60	4075 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. 21 for 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.



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

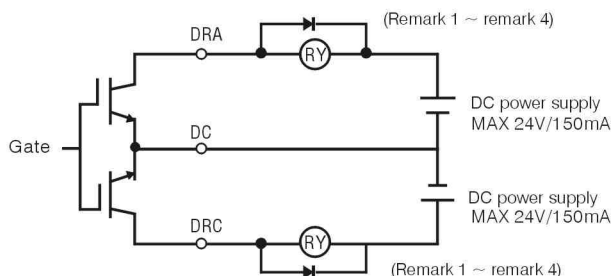
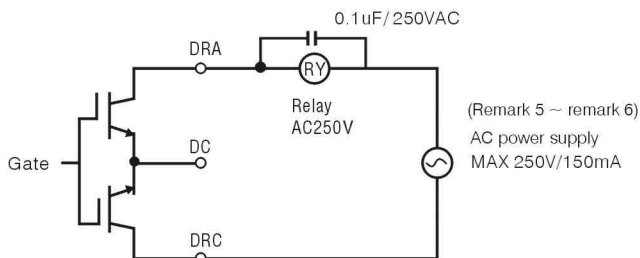


Figure B:Wiring for AC power supply



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.