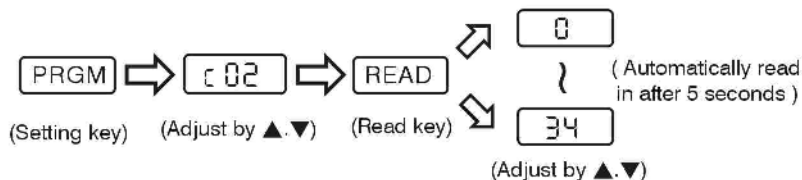




Attend the following statements when setting  $\text{C01}=0, 1, 2, 3, 4$  and 5.

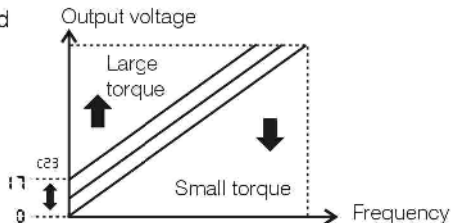
- (1) The function setting must apply the adjustment of DIP switch J1. Refer to P24~P27 for descriptions.
- (2) The keypad means the control box for inverter operation. It includes the keys for monitor parameter setting and the potentiometer (B10K $\Omega$ /16 $\Phi$  or 24 $\Phi$ ).
- (3) The control terminals mean the main board terminals connecting to exterior control signals. Refer to P20 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



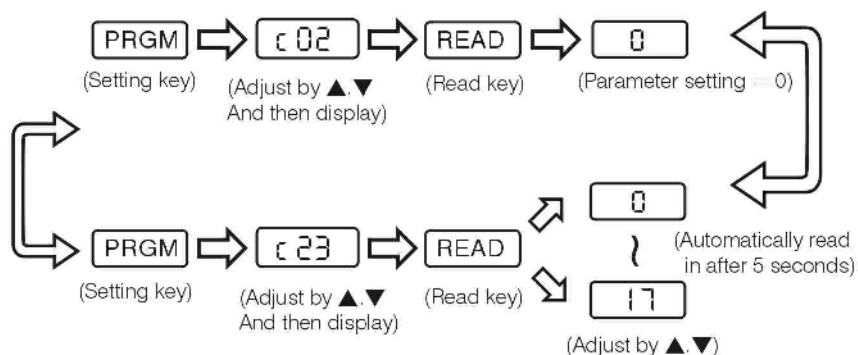
$\text{C02}=0$  : The function can adjust the torque value according the automatic torque compensation mode at low frequency. It does not need to set the parameter in general. It can slightly raise the setting value of  $\text{C23}$  to assist the torque function when motor torque is not sufficient and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

\* Only both  $\text{C02}$  and  $\text{C23}$  be set simultaneously is valid.



## 9 PARAMETER SETTING METHOD

### Operation flow diagram of C02 and C23



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.



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

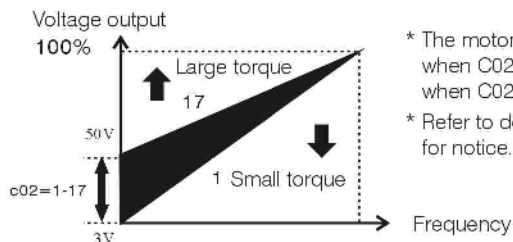


The parameter setting must be done by professional personnel. It is better to set the torque value equals 3Hz, which is sufficient for motor starting up.



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.



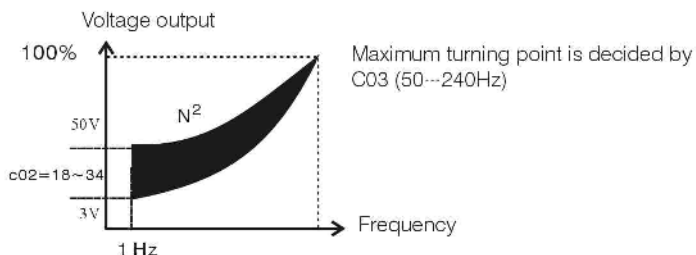
\* The motor torque is minimum when C02=1 and maximum when C02=17.

\* Refer to descriptions in C02=0 for notice.

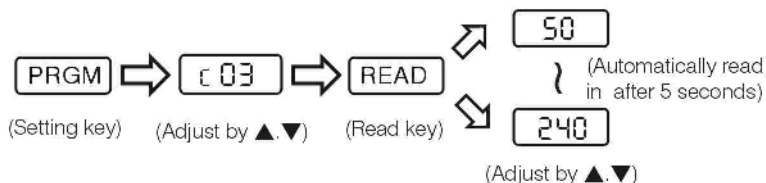


- (1) Choose the parameter  $C02=1-17$  when no sufficient torque can be obtained by choosing the voltage vector automatic compensation mode of  $C02=0$ .
- (2) The voltage vector automatic compensation mode of  $C02=0$  is invalid when choosing  $C02=1-17$ .
- (3) The parameter setting offers the most 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.

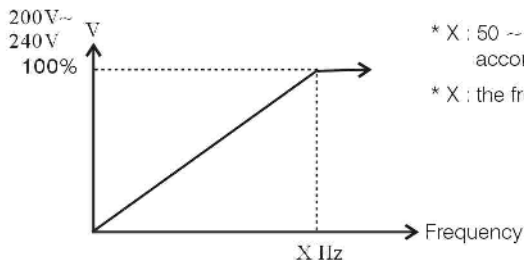


### $C03$ V/F turning point selection (Basic frequency)



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

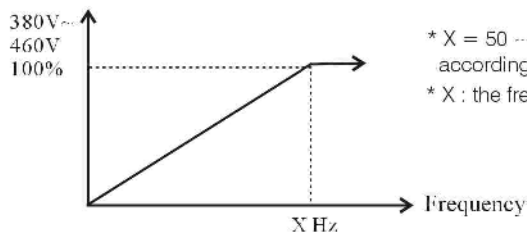
(1) 200V ~ 240V curve graph



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

## 9 PARAMETER SETTING METHOD

(2) 380V ~ 460V curve graph

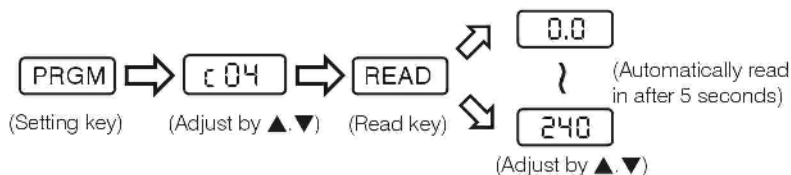


- \* X = 50 ~ 240Hz selects voltage according to motor characteristics.
- \* X : the frequency code



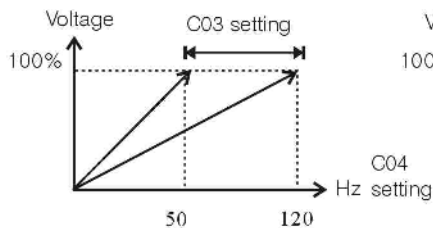
- (3) Set X more than the motor operation frequency 50/60Hz to prevent heat up of motor.
- (4) Set V/F curve tuning point according to the motor rated frequency. For example, C03 should be equal to or more than 50Hz if the motor rated frequency is 50Hz.

### ε04 Main speed frequency setting

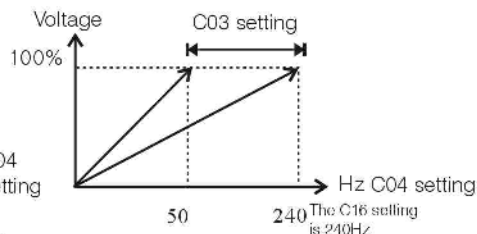


ε04 : Main speed setting. Exactly adjust accelerating/decelerating range by ▲, ▼ and speed range by potentiometer.

- (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.

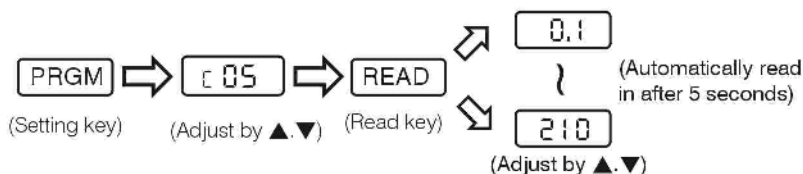


- ※ Set curve diagram of 1~120Hz
- ※ Set C03 for tuning point
- ※ Set C04 for main speed

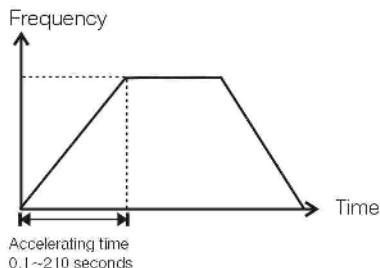


- ※ Set curve diagram of 1~240Hz
- ※ Set C03 for tuning point
- ※ Set C04 for main speed and C16 to release the upper limitation function.

### ┌05 Main speed frequency accelerating time setting

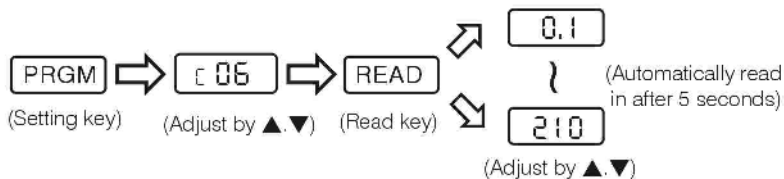


┌05 : Accelerating time means the time that increases the frequency from 1Hz to 60Hz. The calculating unit for frequency more than 61Hz is calculated by the time integral. The maximum value is 210 seconds and the step time is 0.1 second.



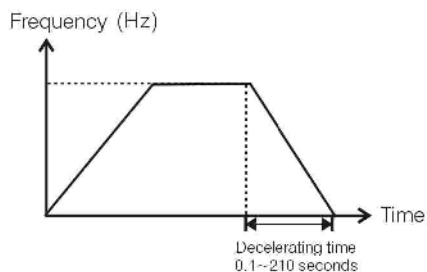
- (1) The less accelerating time could result in the large  $I^2t$  generated by current, and then causes overheating that tripping the inverter. Properly increase the accelerating time is helpful for the life of motor and machine.
- (2) The accelerating time setting value of Ls600 series is 5 seconds 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

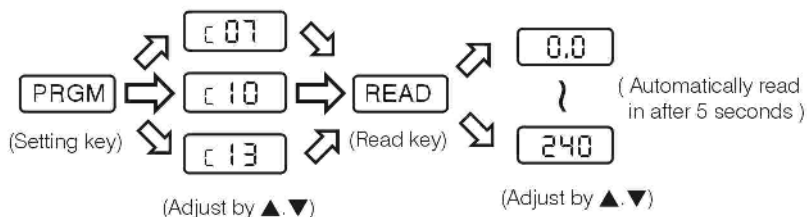


- (1) The machines with large torque load that could generate large  $GD^2$ , such as hydraulic pump, fan, hydroextractor, tumpalte and punch, must properly increase their decelerating time settings.
- (2) The decelerating time setting value of Ls600 series is 5 seconds for less than 5Hp and 10 seconds 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.)

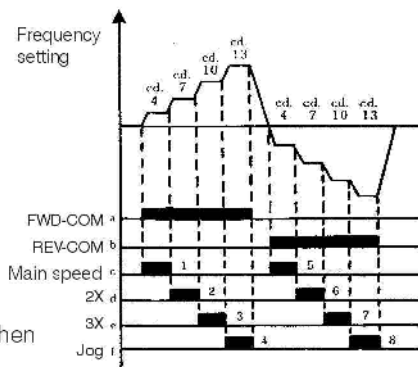
(4)Multi-speed revolution timing diagram

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.

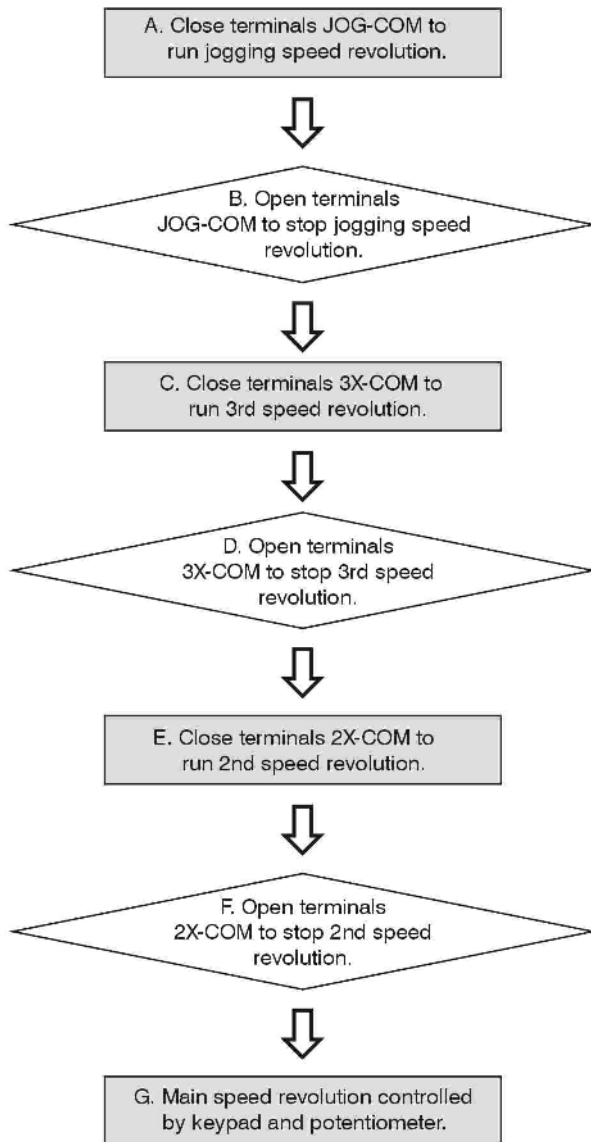


(5) The inverter can not operate when both the FWD-COM and REV-COM terminals are closed. Only one closing action is valid at one time.



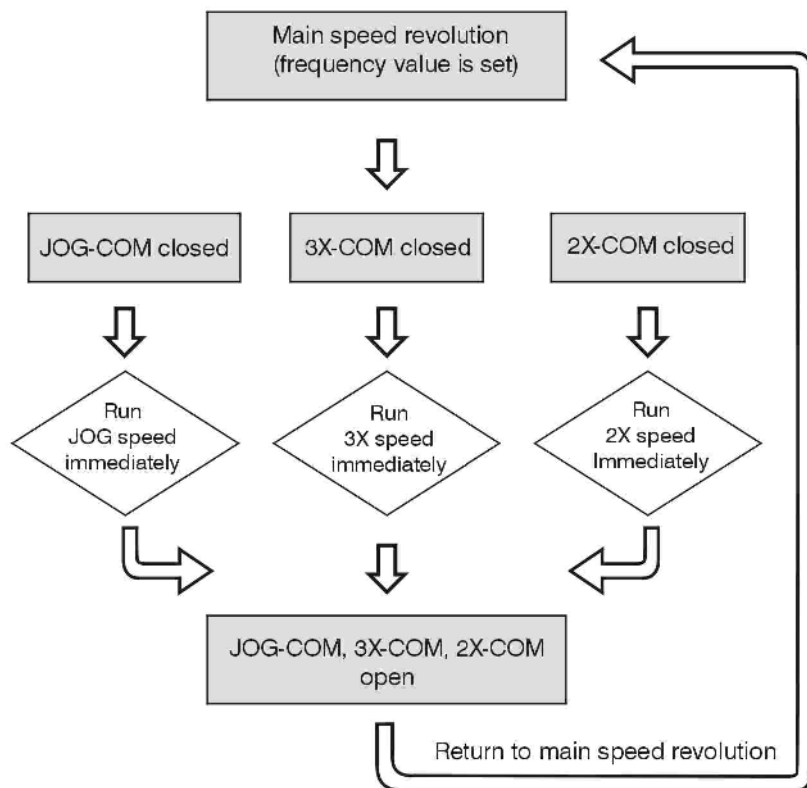
(6) Priority for speed selection when  
 C01 =1, 2, 3, 4 or 5.  
 JOG →3X →2X →MAIN Speed

(6) - 1 Steps of first kind





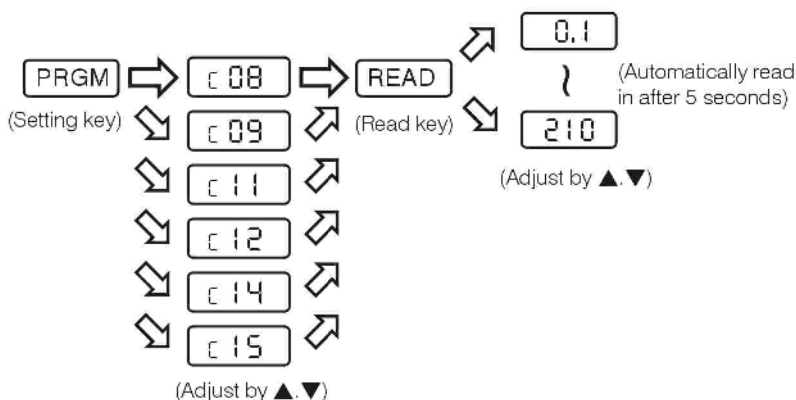
## (6) - 2 Steps of second kind



- 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.

## 9 PARAMETER SETTING METHOD

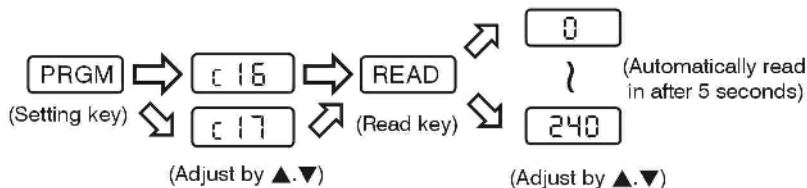
<b>c08</b>	Second speed accelerating time setting
<b>c09</b>	Second speed decelerating time setting
<b>c11</b>	Third speed accelerating time setting
<b>c12</b>	Third speed decelerating time setting
<b>c14</b>	Jogging speed accelerating time setting
<b>c15</b>	Jogging speed decelerating time setting



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.

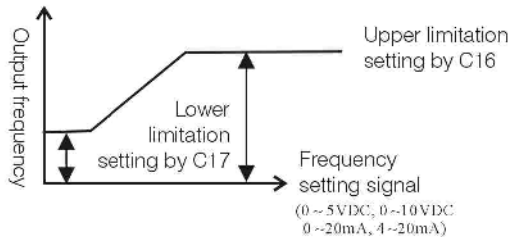
<b>c16</b>	Frequency upper limitation setting
<b>c17</b>	Frequency lower limitation setting



**c16** : Frequency upper limitation setting

**c17** : Frequency lower limitation setting

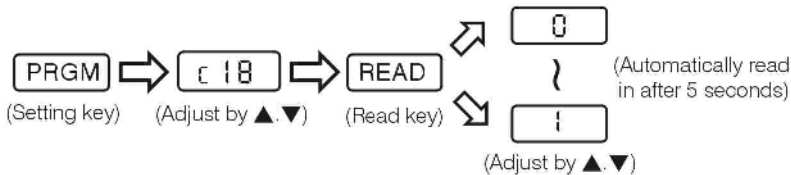
- (1) The frequency setting range of upper/lower limitation is 0--240Hz.
- (2) The upper limitation must be more than the lower limitation.
- (3) Frequency speed adjustment range is between upper limitation and lower limitation.
- (4) The main speed frequency setting must be equal to or less than the 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.*

## **c18** Braking selection



**c18** : Offers the function of enforced braking to prevent the motor free running when the output frequency is less than 0Hz.

**c18=0** : Without DC braking function.

**c18=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.

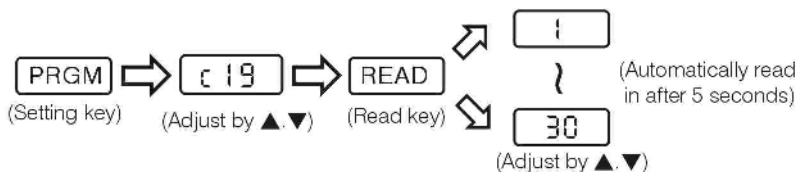


CAUTION

*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

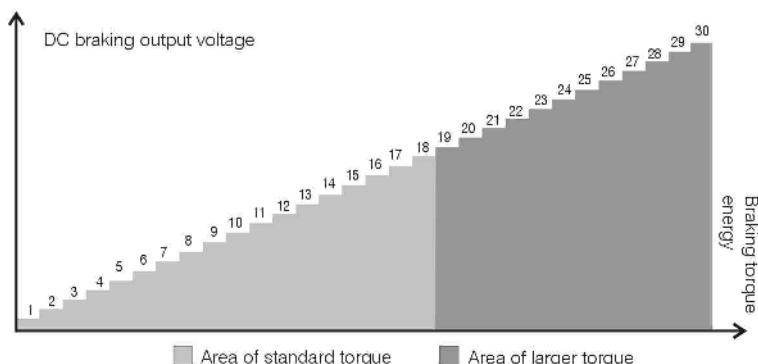
### c19 Braking energy setting



c19 : Decides the motor torque energy in braking.

c19=1 : With weak braking energy.

c19=30 : With strong braking energy.

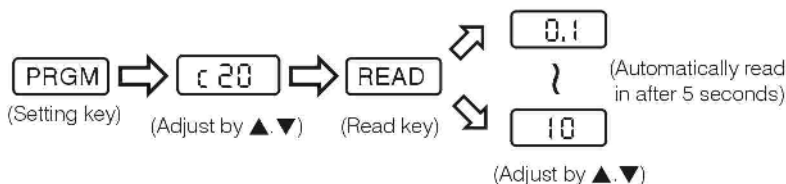


- (1) The above diagram shows the relationship of DC output voltage and braking torque energy. It shows that the higher DC output voltage could result in the larger braking torque.
- (2) Suggestion to set the baking torque less than C19=18. The principle of setting standard is that the motor will not 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.



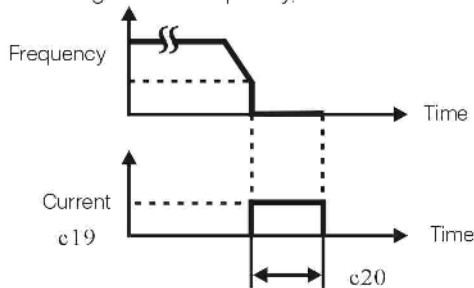
DANGER

### c20 Braking time setting

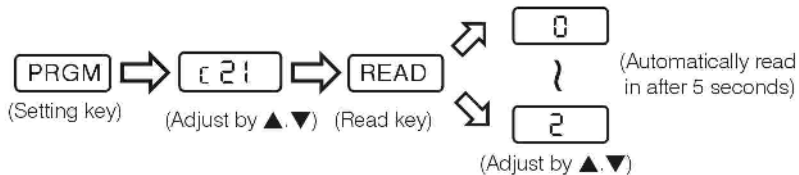


**c20** : The lasting time of the braking torque energy after tuning is 0.1~10 seconds.

- (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



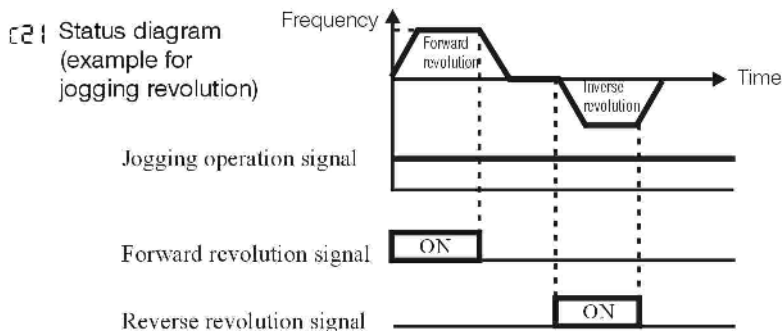
**c21** : Decides the turning direction of motor. Set **c21** for bi-directional, forward and reverse revolution.

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

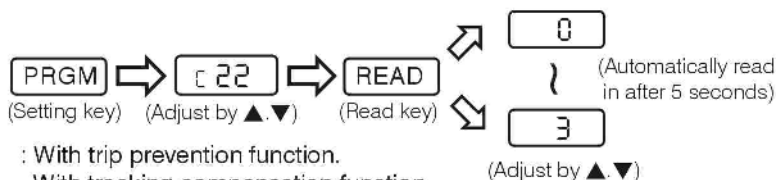
**c21 = 1** : It can only make forward revolution and the forward (FWD) indicator is on. Change any two input terminals of motor to change the motor polarity. It is invalid to change the input terminals of the power supply.

**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



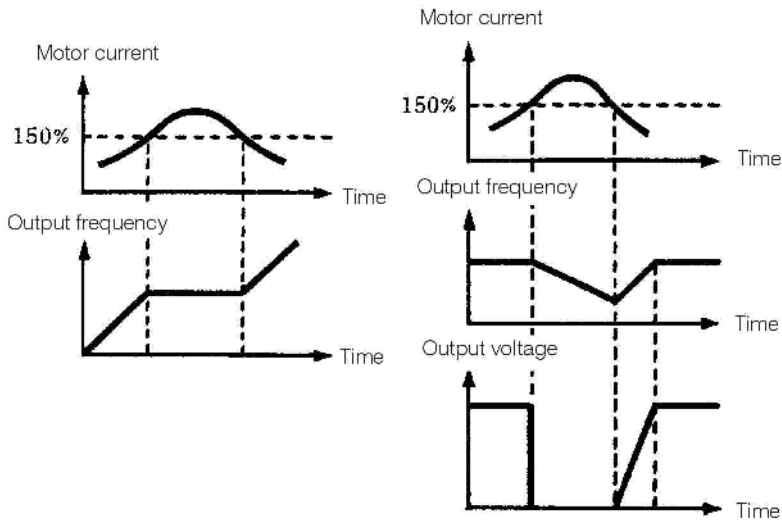
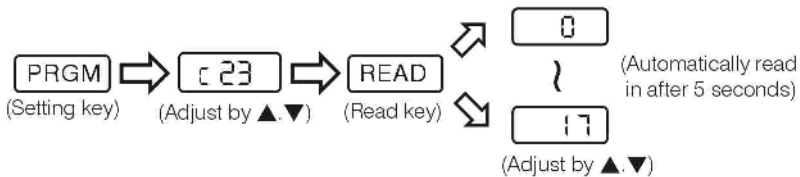
### **C22** Stall prevention for overcurrent and overvoltage



- 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.

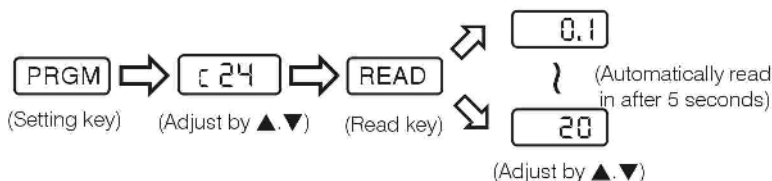
**C23=1** : The compensation energy is small.

**C23=17** : The compensation energy is largest.

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

## 9 PARAMETER SETTING METHOD

### Ⓒ24 150% overcurrent trip time setting



Ⓒ24 : 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.

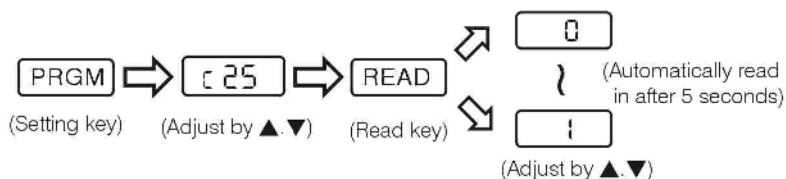
OL1: Overload when accelerating.

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.

### Ⓒ25 Recovery setting value at exportation factory



Ⓒ25 : Choose Ⓒ25=1 to recovery the initial setting value in factory. The Ⓒ25 value restores to 0 and all other interior parameters restore to the initial setting value in factory after action.



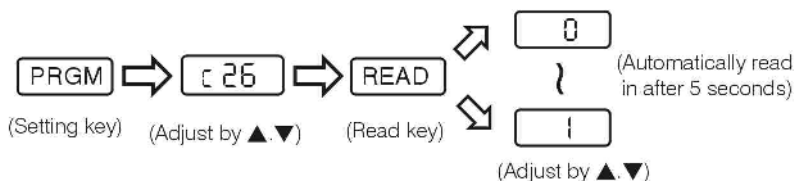
CAUTION

(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.

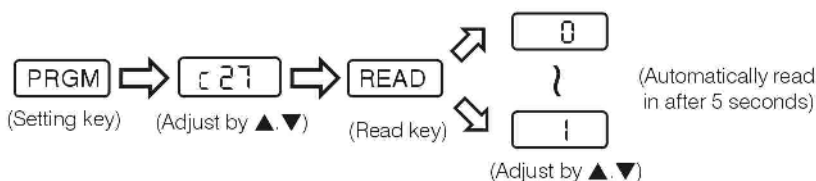
- (1) Cautiously choose the motor specification when multiple speed operation. Suggestion to choose motor specified for inverter when the operating frequency is more than 121Hz.
- (2) Refer to descriptions on C16 and C4 for parameter setting.  
C16: Upper limitation setting  
C4: Main speed setting



CAUTION

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

## C27 Functional parameter setting



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

C27=0 : All parameters can be changed.

C27=1 : Partial parameters can not be changed.



CAUTION

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

## 9 PARAMETER SETTING METHOD

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<b>c28</b>	Reserved
<b>c29</b>	Reserved
<b>c30</b>	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
Ett	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 $\Omega$ gear of multimeter	Change motor or rewind motor coil

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

## 8 General breakdown examination method

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

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

## 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.

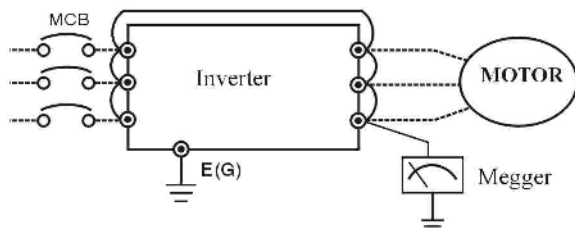
### 9-2 Inspection items

- \* 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.



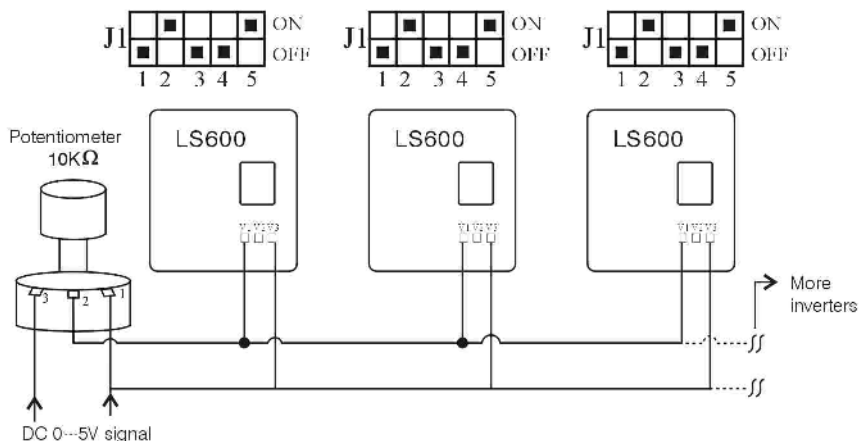
Remark 1: The parts of dashed lines indicate that be wired or not wired.

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

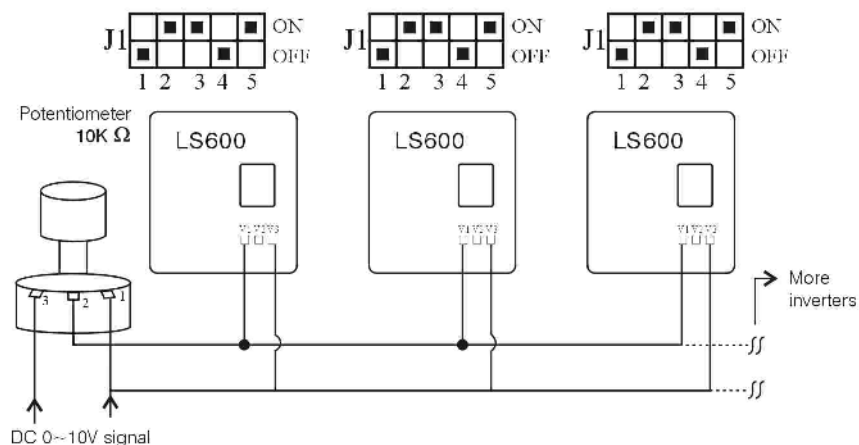
## 10 Synchronous running wiring connection method

- (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

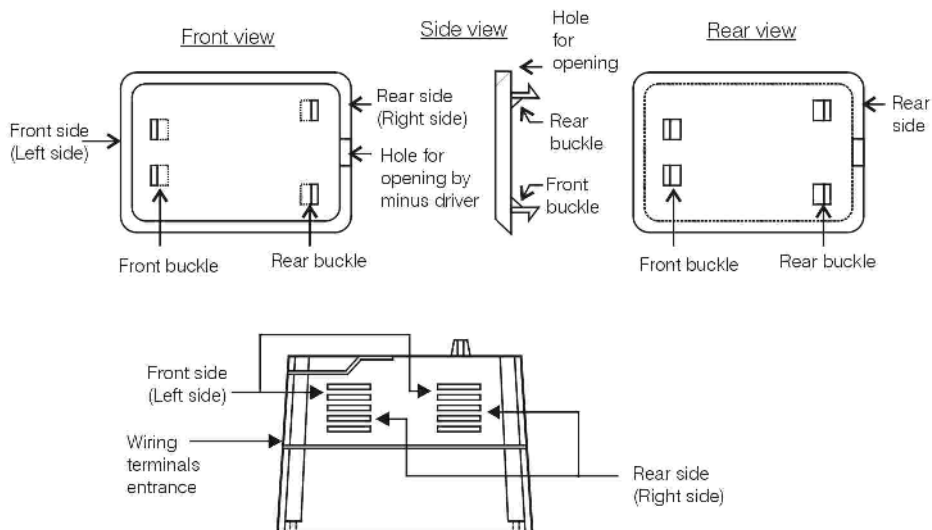


## 12 Appendage specification

### 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

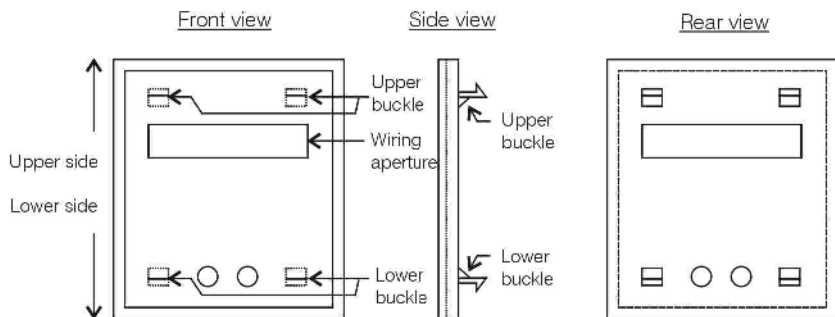


- Installation step: (1) Confirm front and rear sides. The distance between two buckles of front side is shorter than the ones of rear side. And there are holes on the rear side for opening the cover by screwdriver.
- (2) Aim the front side of the side cover at the front side of the inverter and press 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	Main speed acceleration time setting	0.1~210sec	5sec	5-120 sec every time more or less 1 sec.	
6	Main speed deceleration time setting	0.1~210sec	5sec		
7	2nd speed frequency setting	0-240Hz	0Hz		
8	2nd speed acceleration time setting	0.1~210sec	5sec		
9	2nd speed deceleration time setting	0.1~210sec	5sec		
10	3rd speed frequency setting	0-240Hz	0Hz		
11	3rd speed acceleration time setting	0.1~210sec	5sec		
12	3rd speed deceleration time setting	0.1~210sec	5sec		
13	Jog speed frequency setting	0-240Hz	5Hz		
14	Jog speed acceleration time setting	0.1-210 sec	0.1sec		
15	Jog speed deceleration time setting	0.1-210 sec	0.1sec		

# 16 FUNCTION TABLE

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		

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**14 CE-conformity declaration**

## 1. Products satisfied CE-conformity

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

## 2. Conformed institution

SGS United Kingdom Ltd

Address: South Industrial Estate

Bow burn

CO.Durham

DH65AD United Kingdom

Tel: +44(0)1913772000

Fax: +44(0)1913772020

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

TCF No: INV-1-1998

Date : Fed.2.1998

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

4. Certificate of compliance

**SGS** SGS United Kingdom Ltd.  
EMC Services

Client: Long Sheng Electronic Co., Ltd  
Address: 3rd Floor, No 68, Wu Chuan 7th Road, Wu Ku Industrial Estate, 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, L5600-4000, 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: 19th May 1998 SGS serial number: DUR 20451  
Technical Construction File (TCF) reference number: INV-1-1099  
Technical Construction File Date: 2nd Feb 1998

Conclusion: Based on a review of the above Technical Construction File in the opinion of SGS EMC Services the product shall be judged to comply with the requirements of the EMC Directive 89/326/EEC as amended by 92/31/EEC, 93/88/EEC.

Authorized Signatory:   
John S. Wilby  
General Manager

5. Technical construction file assessment report

**SGS** SGS United Kingdom Ltd.  
Technical Services

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

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

**TECHNICAL CONSTRUCTION FILE ASSESSMENT REPORT**

TCF Reference: INV-1-1099  
Manufacturer: Long Sheng Electronics Co., Ltd.  
Address: 3rd Floor, No 68, Wu Chuan 7th Road, Wu Ku Industrial Estate, Wu Ku Shiang Taipei Hsien, 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: The product is an IGBT space vector inverter. It has a variety of features including a silent design, high precision, smooth current and small size.  
Equipment:  
Responsible Person: Mr. Ikuoh Wai-Kai  
Telephone: 00 886 2-2994032  
Fax: 00 886 2-2994161  
Operating Environment: Industrial

6. Analysis of technical construction file

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

**External Photographs:** Photographs of the product can be found in the product file folder and a test report 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 Assessment**

**Drawings:** Two block diagrams of the equipment can be found in section 2 of the TCF. They refer to the two different motor 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 version 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 one from the filter to the inverter. A cable also connects the inverter to a motor.

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

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

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


7. Technical rationale and test data

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

**Technical Rationale and Test Data**

The manufacturer has identified the operating environment an industrial and divided the two models into two groups by input voltage. The highest rated motor in the two groups have been chosen as the worst case and tested. These two models have been tested to EN 50081-2 (1984) for emissions and EN 50082-2 (1996) 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.

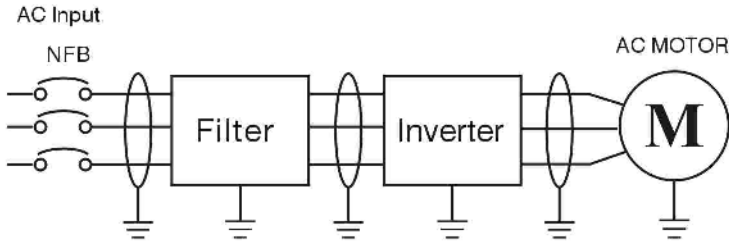
**Conclusion**  
It is the opinion of SGS EMC Services that the product shall be judged to comply with the requirements of the EMC Directive 89/326/EEC, as amended by Directives 92/31/EEC and 93/88/EEC.

  
John S. Wilby  
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 A.M.P.	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.