Thank you for purchasing LS Variable Frequency Drives!

SAFETY INSTRUCTIONS

- Always follow safety instructions to prevent accidents and potential hazards from occurring.
- In this manual, safety messages are classified as follows:

⚠ **WARNING** Improper operation may result in serious personal injury or death.

⚠ **CAUTION** Improper operation may result in slight to medium personal injury or property damage.

- Throughout this manual we use the following two illustrations to make you aware of safety considerations:


Identifies potential hazards under certain conditions. Read the message and follow the instructions carefully.


Identifies shock hazards under certain conditions. Particular attention should be directed because dangerous voltage may be present.

- Keep operating instructions handy for quick reference.
- Read this manual carefully to maximize the performance of SV-iC5 series inverter and ensure its safe use.

⚠ WARNING

- **Do not remove the cover while power is applied or the unit is in operation.** Otherwise, electric shock could occur.

- **Do not run the inverter with the front cover removed.** Otherwise, you may get an electric shock due to high voltage terminals or charged capacitor exposure.

- **Do not remove the cover except for periodic inspections or wiring, even if the input power is not applied.** Otherwise, you may access the charged circuits and get an electric shock.

- **Wiring and periodic inspections should be performed at least 10 minutes after disconnecting the input power and after checking the DC link voltage is discharged with a meter (below DC 30V).** Otherwise, you may get an electric shock.

- **Operate the switches with dry hands.** Otherwise, you may get an electric shock.

- **Do not use the cable when its insulating tube is damaged.**
  Otherwise, you may get an electric shock.

- **Do not subject the cables to scratches, excessive stress, heavy loads or pinching.**
  Otherwise, you may get an electric shock.

⚠CAUTION

- **Install the inverter on a non-flammable surface. Do not place flammable material nearby.**
  Otherwise, fire could occur.

- **Disconnect the input power if the inverter gets damaged.**
  Otherwise, it could result in a secondary accident and fire.

- **After the input power is applied or removed, the inverter will remain hot for a couple of minutes.**
  Otherwise, you may get bodily injuries such as skin-burn or damage.

- **Do not apply power to a damaged inverter or to an inverter with parts missing even if the installation is complete.**
  Otherwise, electric shock could occur.

- **Do not allow lint, paper, wood chips, dust, metallic chips or other foreign matter into the drive.**
  Otherwise, fire or accident could occur.

OPERATING PRECAUTIONS

(1) Handling and installation

- ☐ Handle according to the weight of the product.
- ☐ Do not stack the inverter boxes higher than the number recommended.
- ☐ Install according to instructions specified in this manual.
- ☐ Do not open the cover during delivery.
- ☐ Do not place heavy items on the inverter.
- ☐ Check the inverter mounting orientation is correct.
- ☐ Do not drop the inverter, or subject it to impact.
- ☐ Use the Type 3 grounding method for 200 V Class (Ground impedance: Below 100 ohm).
- ☐ Take protective measures against ESD (Electrostatic Discharge) before touching the PCB for inspection or installation.
- ☐ Use the inverter under the following environmental conditions:

Environment	Surrounding temperature	-10 ~ 50℃ (non-freezing), Ambient 40°C for models SV004iC5-1, SV004iC5-1F, SV008iC5-1, and SV008iC5-1F (UL 508C)
	Relative humidity	90% RH or less (non-condensing)
	Storage temperature	- 20 ~ 65 ℃
	Location	Protected from corrosive gas, combustible gas, oil mist or dust
	Altitude, Vibration	Max. 1,000m above sea level, Max. 5.9m/sec^2 (0.6G) or less

(2) Wiring

- ☐ Do not connect a power factor correction capacitor, surge suppressor, or RFI filter to the output of the inverter.
- ☐ The connection orientation of the output cables U, V, W to the motor will affect the direction of rotation of the motor.
- ☐ Incorrect terminal wiring could result in the equipment damage.
- ☐ Reversing the polarity (+/-) of the terminals could damage the inverter.
- ☐ Only authorized personnel familiar with LS inverter should perform wiring and inspections.
- ☐ Always install the inverter before wiring. Otherwise, you may get an electric shock or have bodily injury.

(3) Trial run

- ☐ Check all parameters prior to operation. Changing parameter values might be required depending on the load.
- ☐ Always apply permissible range of voltage to the each terminal as indicated in this manual. Otherwise, it could lead to inverter damage.

(4) Operation precautions

- ☐ When the Auto restart function is selected, stay away from the equipment as a motor will restart suddenly after a fault stop.
- ☐ The Stop key on the keypad is valid only when the appropriate function setting has been made. Prepare an emergency stop switch separately.
- ☐ If a fault reset is made with the reference signal present, a sudden start will occur. Check that the reference signal is turned off in advance. Otherwise an accident could occur.
- ☐ Do not modify or alter anything inside the inverter.
- ☐ Motor might not be protected by electronic thermal function of inverter.
- ☐ Do not use a magnetic contactor on the inverter input for frequent starting/stopping of the inverter.
- ☐ Use a noise filter to reduce the effect of electromagnetic interference. Otherwise nearby electronic equipment may be affected.

- ☐ In case of input voltage unbalance, install AC reactor. Power Factor capacitors and generators may become overheated and damaged due to potential high frequency noise transmitted from inverter.
- ☐ Before operating unit and prior to user programming, reset user parameters to default settings.
- ☐ Inverter can easily be set to high-speed operations. Verify capability of motor or machinery prior to operating unit.
- ☐ Stopping torque is not produced when using the DC-Break function. Install separate equipment when stopping torque is needed.

(5) Fault prevention precautions

- ☐ Provide a safety backup such as an emergency brake which will prevent the machine and equipment from hazardous conditions if the inverter fails.

(6) Maintenance, inspection and parts replacement

- ☐ Do not conduct a megger (insulation resistance) test on the control circuit of the inverter.
- ☐ Refer to Chapter 8. Troubleshooting and Maintenance (parts replacement).

(7) Disposal

- ☐ Handle the inverter as an industrial waste when disposing of it.

(8) General instructions

- ☐ Many of the diagrams and drawings in this instruction manual show the inverter without a circuit breaker, a cover or partially open. Never run the inverter like this. Always place the cover with circuit breakers and follow this instruction manual when operating the inverter.

Important User Information

- The purpose of this manual is to provide the user with the necessary information to install, program, start up and maintain the SV-iC5 series inverter.
- To assure successful installation and operation, the material presented must be thoroughly read and understood before proceeding.
- This manual contains.

Chapter	Title	Description
1	Basic Information and Precautions	Provides general information and precautions for safe and optimum use of the SV-iC5 series inverter.
2	Installation	Provides instructions on how to install the SV-iC5 inverter.
3	Wiring	Provides instructions on how to wire the SV-iC5 inverter.
4	Basic Configuration	Describes how to connect the optional peripheral devices to the inverter.
5	Programming Keypad	Illustrates keypad features and display.
6	Basic Operation	Provides instructions for quick start of the inverter.
7	Function List	Outlines the parameter information of the SV-iC5 such as description, type, units, factory defaults, minimum/maximum setting.
8	Troubleshooting and Maintenance	Defines the various inverter faults and the appropriate action to take as well as general troubleshooting information.
9	Specifications	Gives information on Input/Output rating, control type and more details of the SV-iC5 inverter.

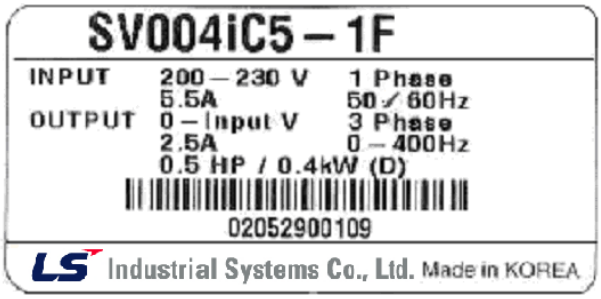
Table of Contents

1. Basic Information and Precautions

1.1 Important Precautions

Unpacking and inspection

- Inspect the inverter for any damage that may have occurred during shipping. To verify the inverter unit is the correct one for the application you need, check the inverter type, output ratings on the nameplate and the inverter is intact.



- Type of the inverter

SV	004		iC5	-	1		F	
	Motor rating		Series Name		Input		EMI Filter option	
LS Inverter	004	0.4 [kW]	Single phase standard inverter (200V)	-	1	Single phase	F	Built-in Filter
	008	0.75 [kW]					-	N/A
	015	1.5 [kW]						
	022	2.2 [kW]						

- Accessories

If you have found any discrepancy, damage, etc., contact your sales representative.

Preparations of instruments and parts required for operation

Instruments and parts to be prepared depend on how the inverter is operated. Prepare equipment and parts as necessary.

Installation

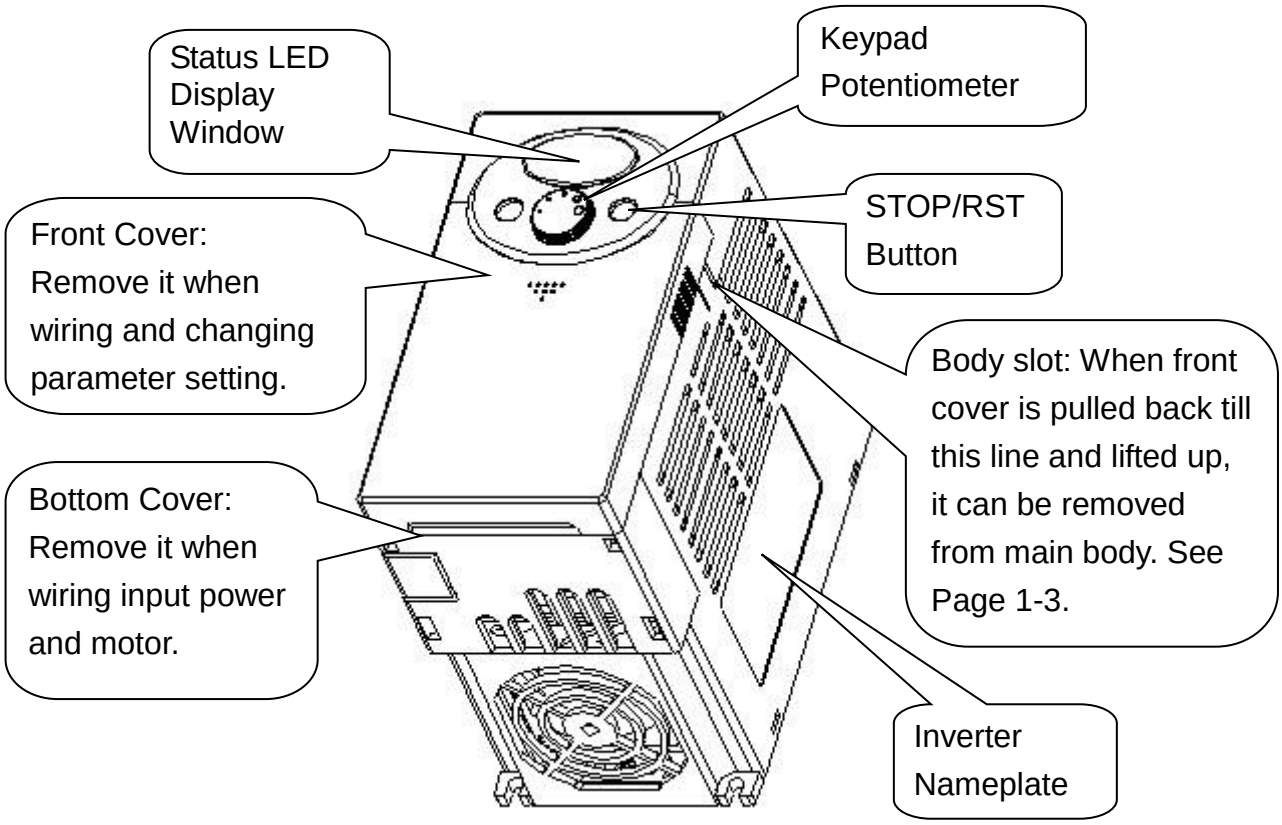
To operate the inverter with high performance for a long time, install the inverter in a proper place in the correct direction and with proper clearances (Refer to 2. Installation, P 2-1).

Wiring

Connect the power supply, motor and operation signals (control signals) to the terminal block. Note that incorrect connection may damage the inverter and peripheral devices (Refer to 3. Wiring, P 3-1.).

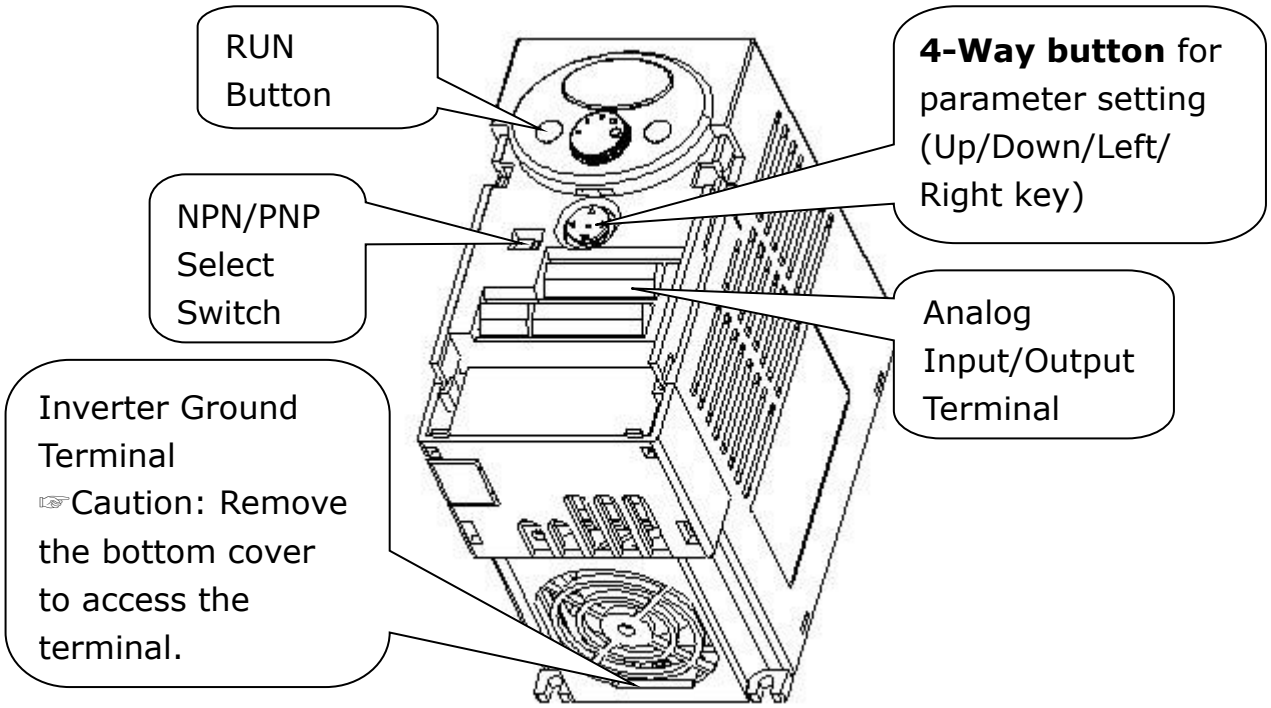
1.2 Product Details

1.2.1 Appearance



1.2.2 View without the front cover

Refer to Page 1-3 for front cover removal.

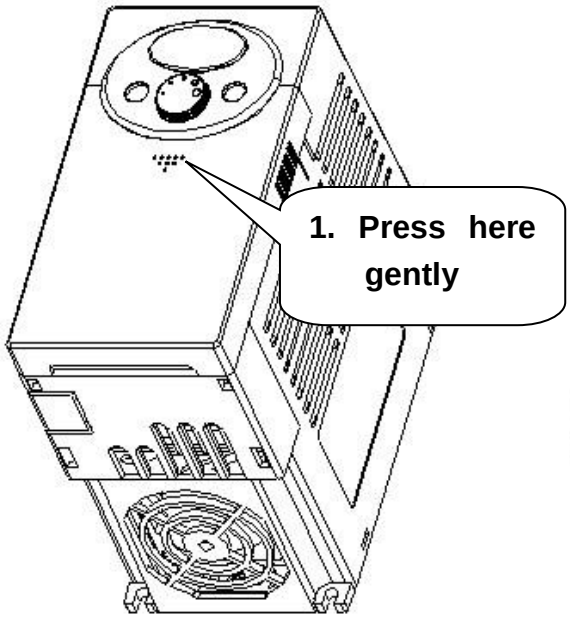


1.3 Removal and Reinstallation

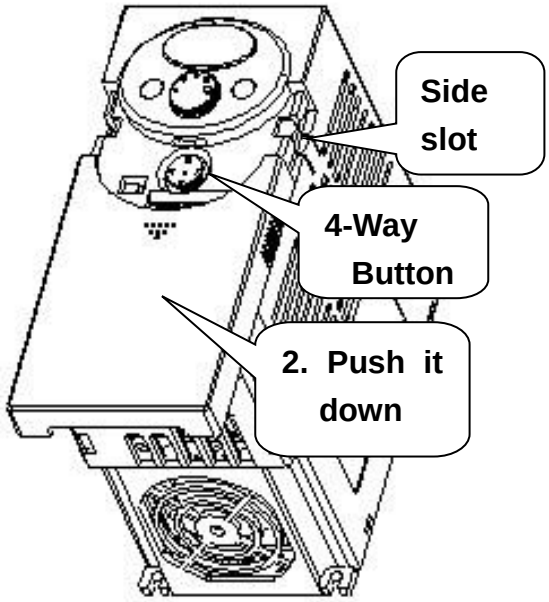
1.3.1 Removal of the front cover

◆ To change parameter setting: Press the pattern with a finger slightly as 1) and push it downward as 2). Then 4-way button will appear. Use this button for parameter setting and changing the value.

1)

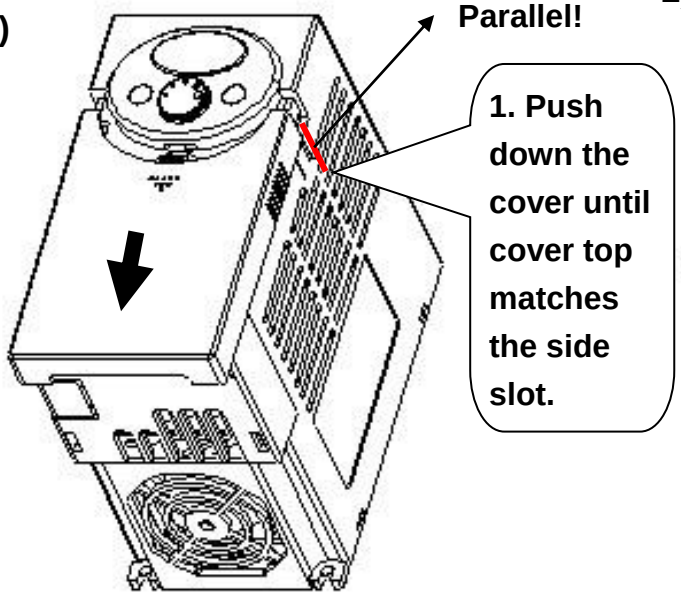


2)

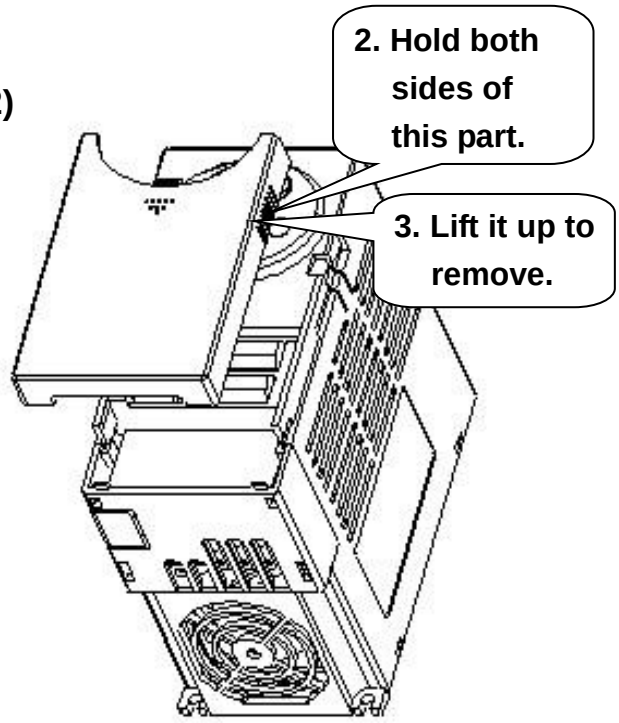


◆ Removal for wiring: The method is the same as shown in 1. Hold both sides of the cover and lift upward to completely remove from the main body.

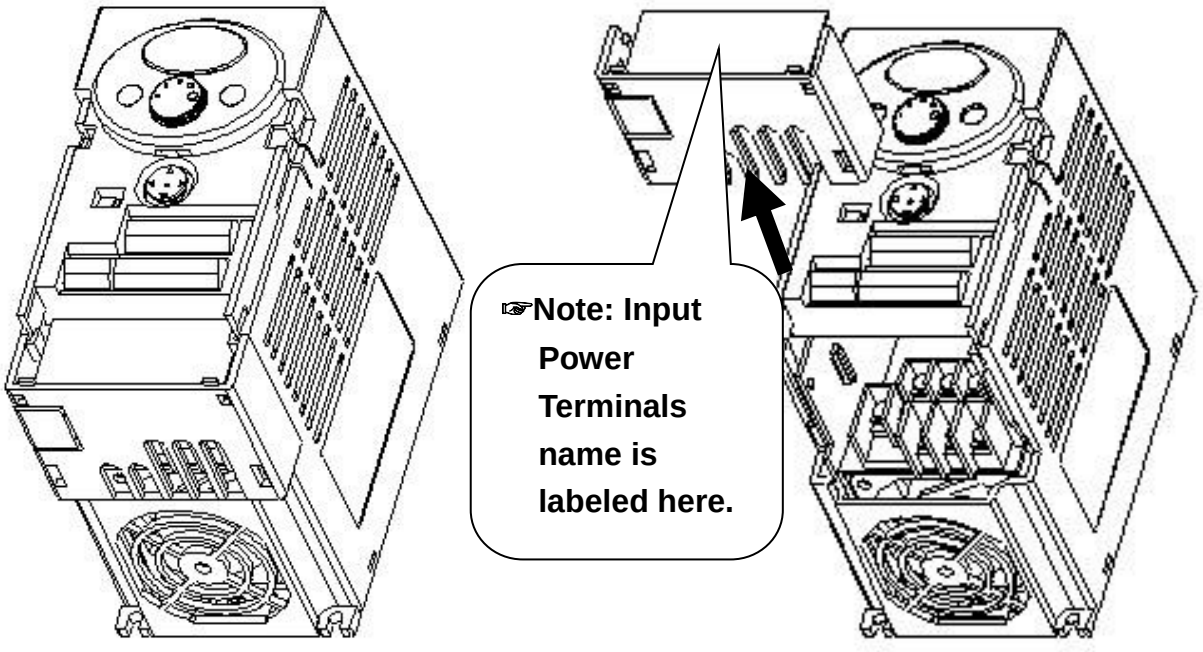
1)



2)

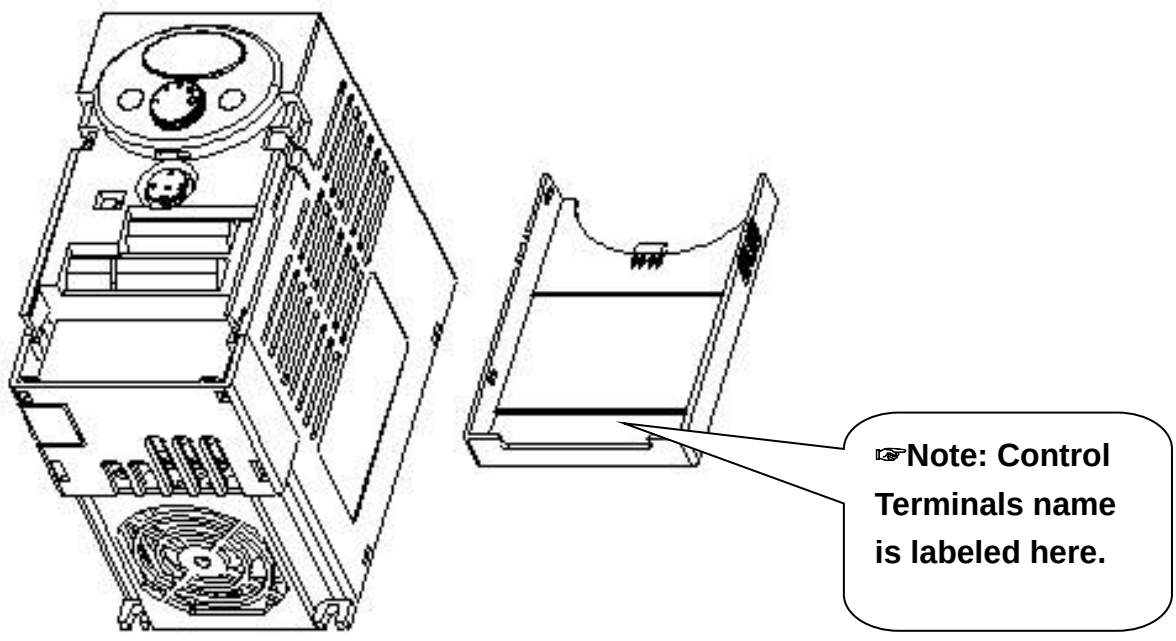


◆ Removal for wiring input power and terminals: After removing the front cover, lift the bottom cover up to disconnect.



◆ To access control terminals: after finishing power terminal wiring, reinstall the bottom cover and then start wiring control terminals.

◆ ☞ Note : Use the recommended size of the cable as indicated in this manual ONLY. Using larger size cable may lead to mis-wiring or damage the insulation.

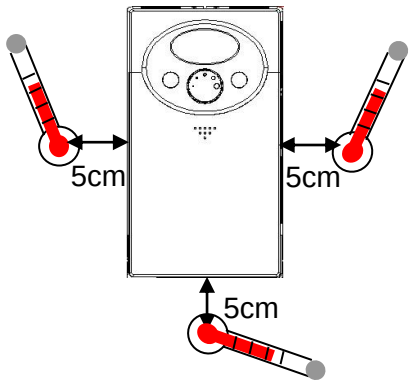


2. Installation

2.1 Installation Precautions

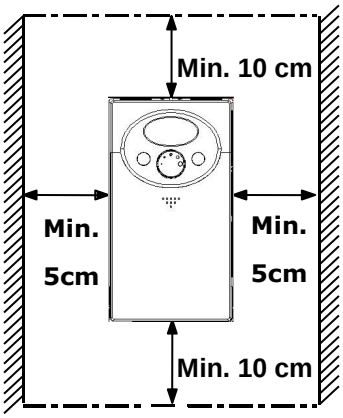
CAUTION

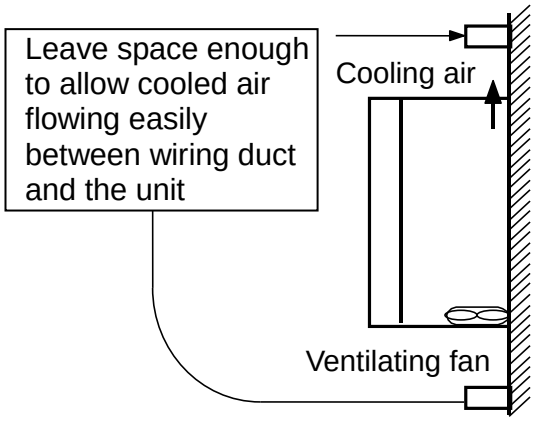
- Handle the inverter with care to prevent damage to the plastic components. Do not hold the inverter by the front cover. It may fall off.
- Install the inverter in a place where it is immune to vibration (5.9 m/s^2 or less). The inverter is under great influence of ambient temperature.
- Install in a location where temperature is within the permissible range (-10~50°C). **Maximum Surrounding Air Temperature is 50°C. Models SV004iC5-1, SV004iC5-1F, SV008iC5-1, and SV008iC5-1F can be used in Ambient 40°C. (UL 508C)**



<Ambient Temp Checking Location>

- The inverter will be very hot during operation. Install it on a non-combustible surface.
- Mount the inverter on a flat, vertical and level surface. Inverter orientation must be vertical (top up) for proper heat dissipation. Also leave sufficient clearances around the inverter.

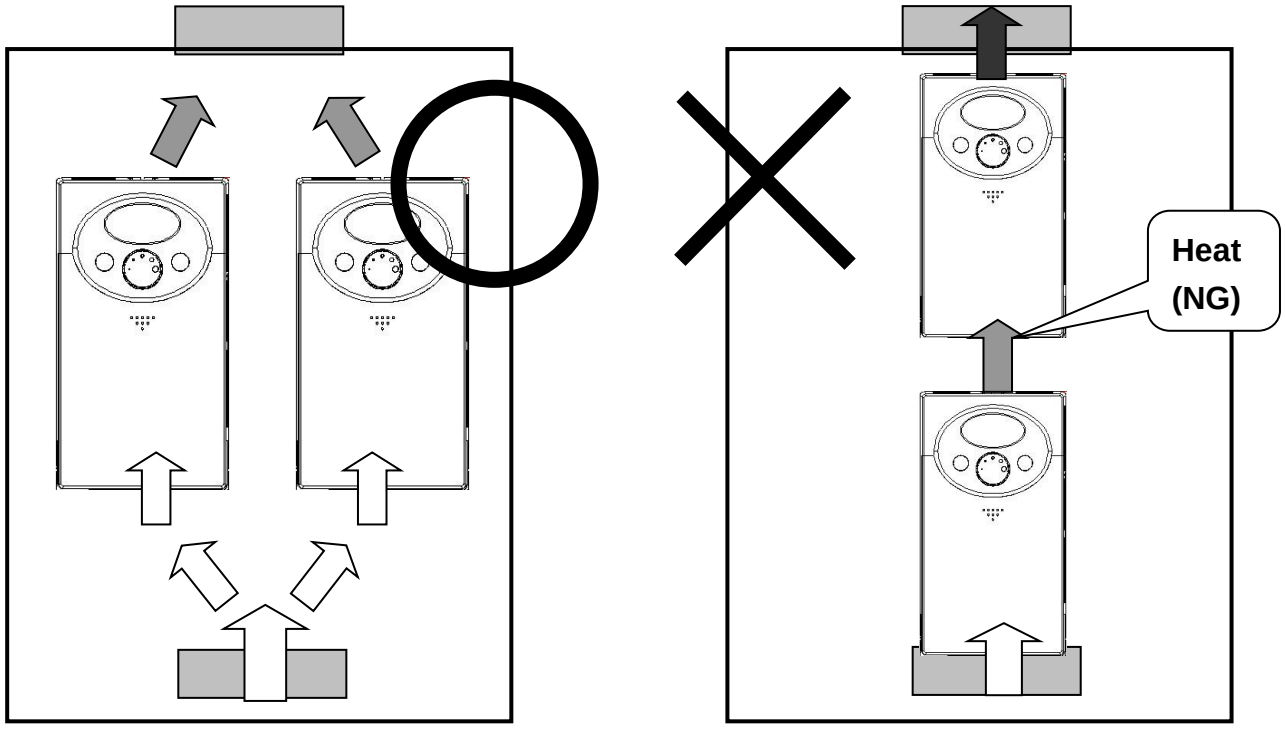




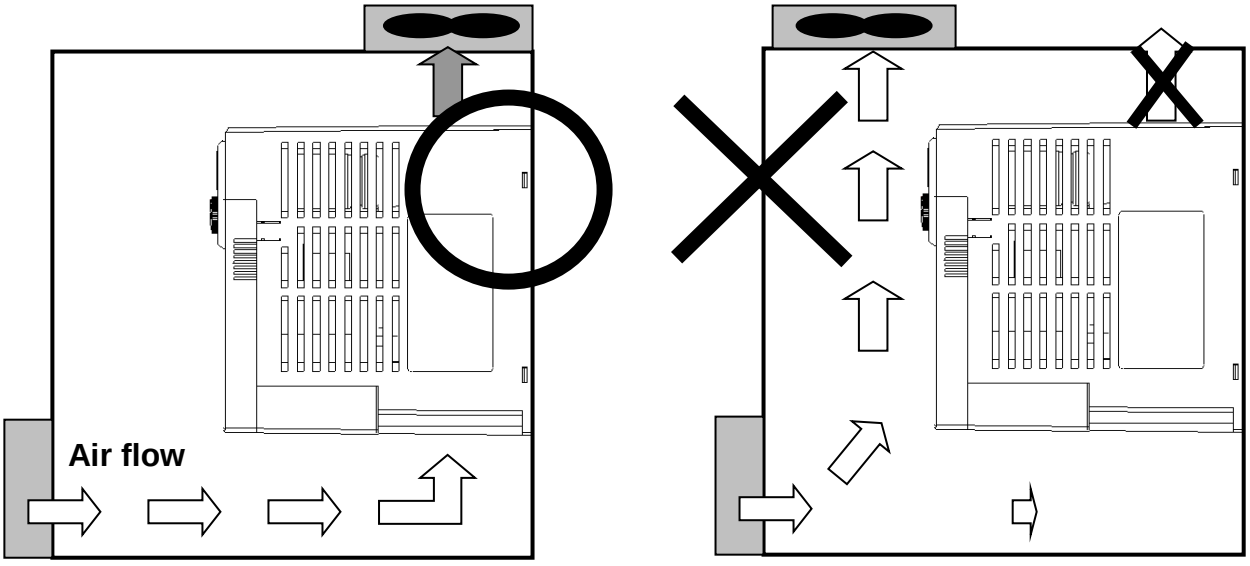
- Protect from moisture and direct sunlight.
- Do not install the inverter in any environment where it is exposed to waterdrops, oil mist, dust, etc. Install the inverter in a clean place or inside a “totally enclosed” panel which does not accept any suspended matter.

- When two or more inverters are installed or a ventilation fan is mounted in inverter panel, the inverters and ventilation fan must be installed in proper positions with extreme care taken to keep the ambient temperature of the inverters below the permissible value. If they are installed in improper positions, the ambient temperature of the inverters will rise and ventilation effect will be reduced.
- Install the inverter using screws or bolts to insure the inverter is firmly fastened.

< For installing multiple inverters in panel>

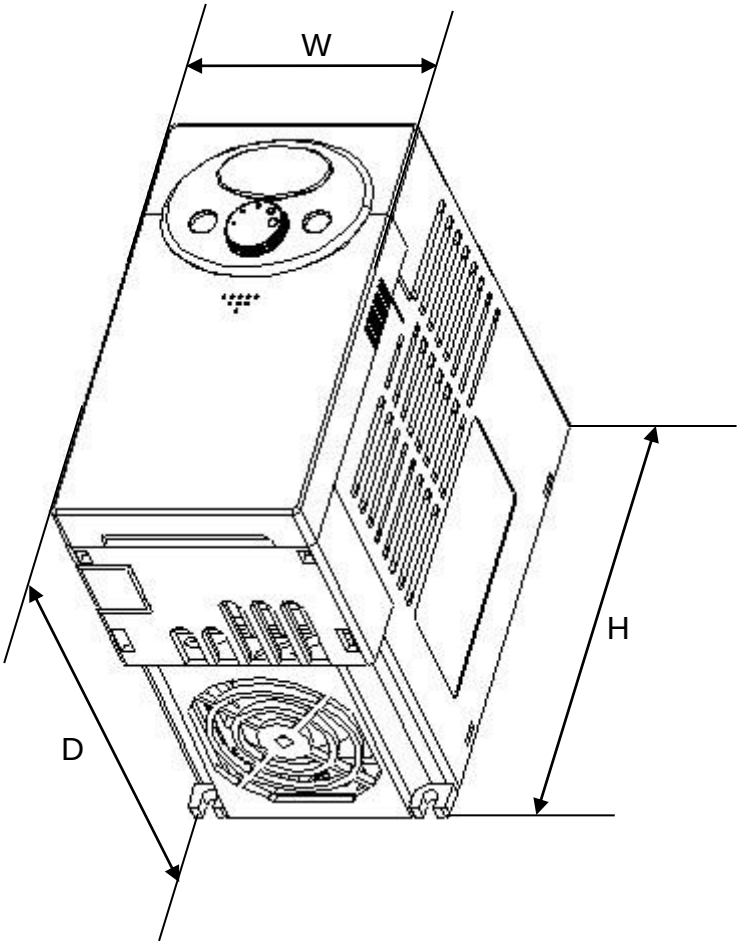


☞ Note : Take caution on proper heat ventillation when installing inverters and fan in a panel.



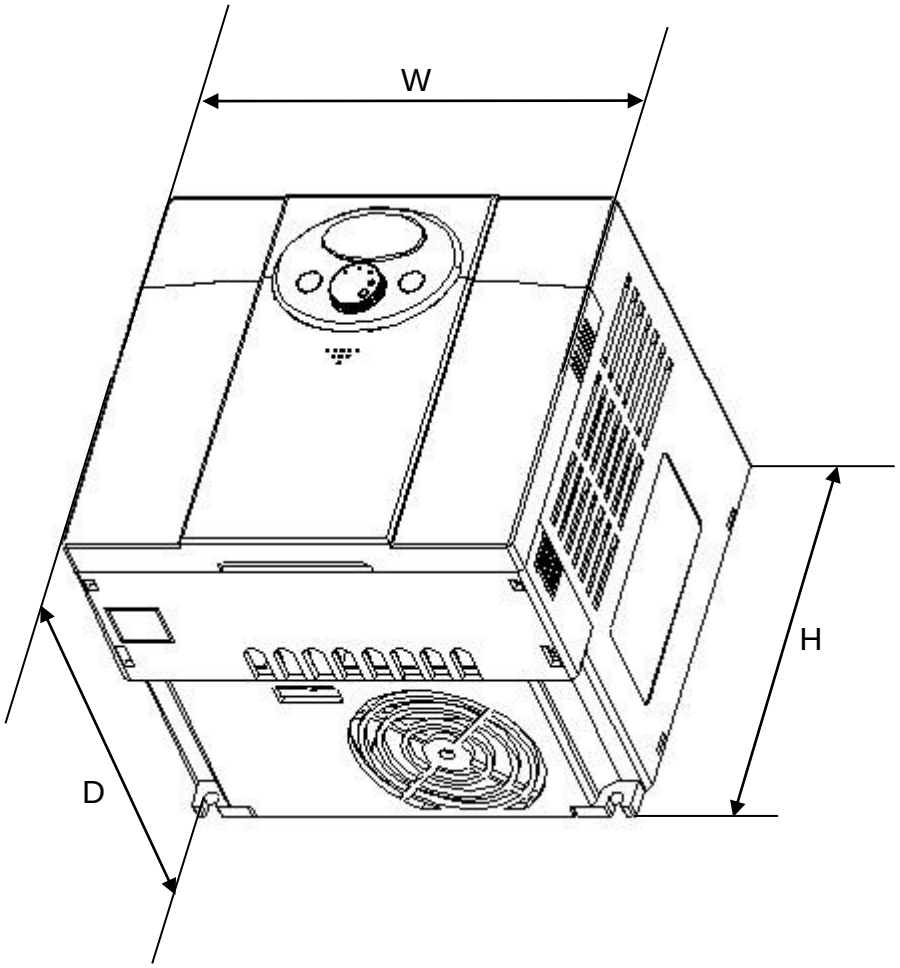
2.2 Dimensions

◆ 0.4, 0.75 kW (1/2~1 HP)



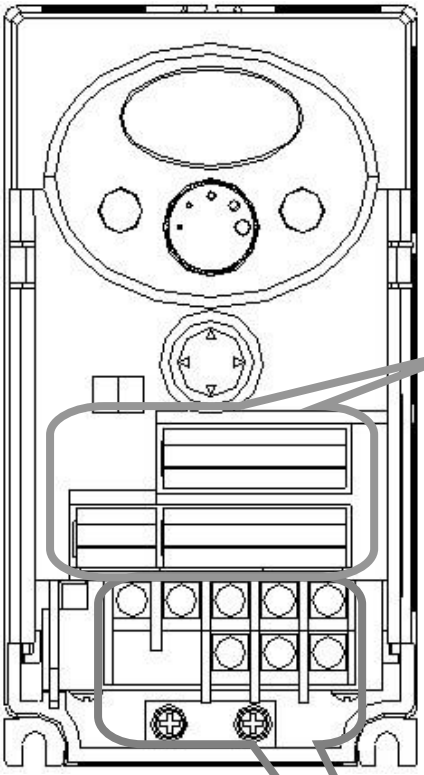
Dimension	004iC5-1	004iC5-1F	008iC5-1	008iC5-1F
W	79	79	79	79
H	143	143	143	143
D	143	143	143	143
Weight (Kg)	0.87	0.95	0.89	0.97

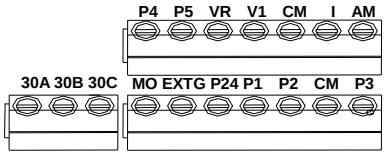
◆ 1.5, 2.2 kW (2~3HP)



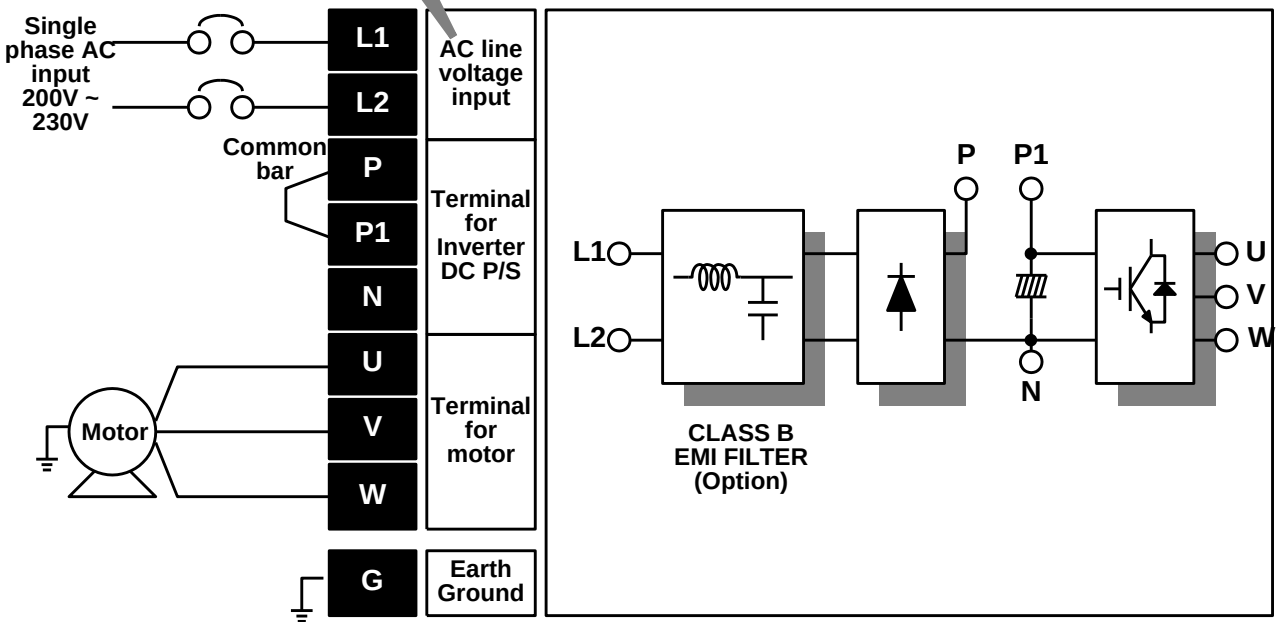
Dimension	015iC5-1	015iC5-1F	022iC5-1	022iC5-1F
W	156	156	156	156
H	143	143	143	143
D	143	143	143	143
Weight (Kg)	1.79	1.94	1.85	2

3. Wiring
3.1 Terminal Wiring

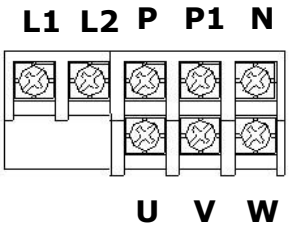
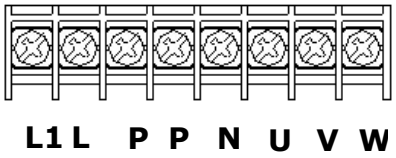




Terminal	Features		
P1	Multi-Function input terminal	Initial setting	FX : Forward run
P2			RX : Reverse run
P3			BX : Emergency stop
P4			RST : Fault reset
P5			JOG : Jog operation
P24	24V power for P1-P5		
VR	12V power supply for potentiometer		
V1	0-10V Analog Input terminal		
I	0-20mA Analog Input terminal		
CM	Common Terminal for P1-P5, AM, P24		
AM	Multi-function Analog output terminal (0 ~ 10V)		
CM	Common terminal for AM terminal		
MO	Multi-function open collector output terminal		
EXTG	Ground T/M for MO		
30A	Multi-function relay output terminal	A contact output	
30B		B contact output	
30C		30A 30B Common	



3.2 Specifications for Power Terminal Block Wiring

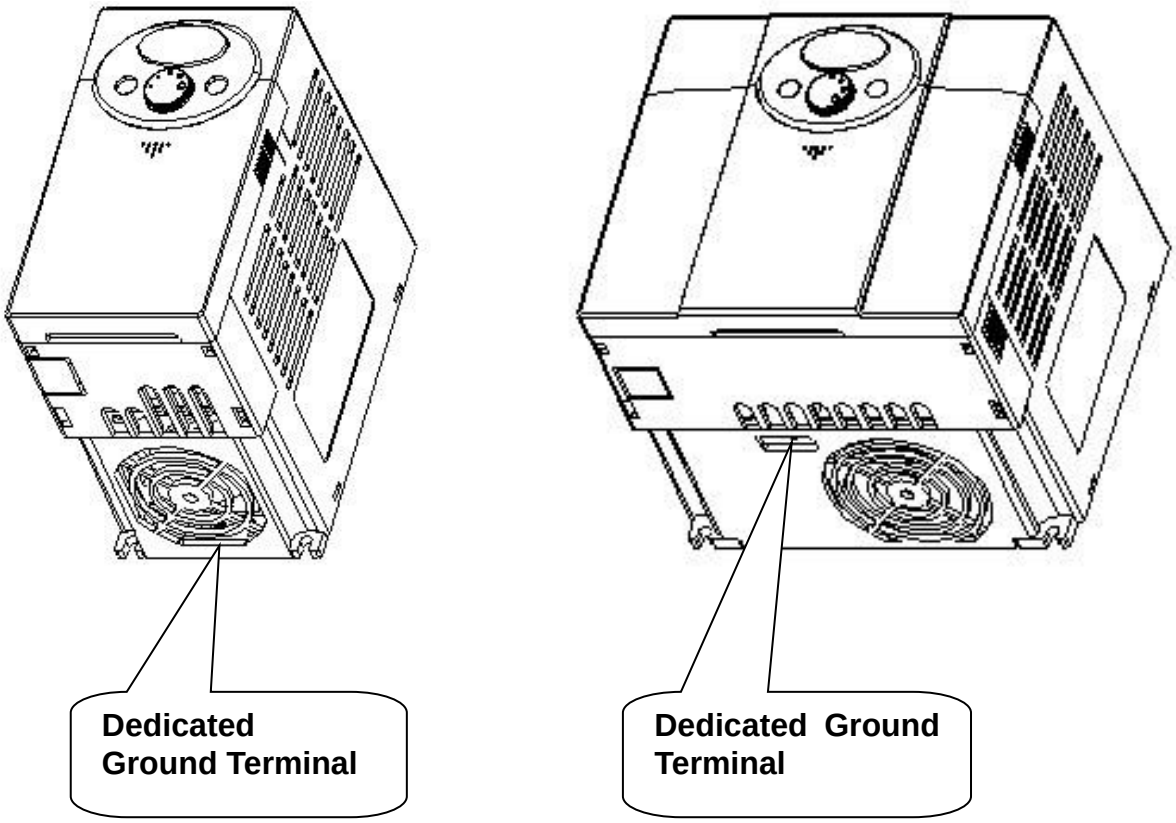
	SV004iC5-1	SV008iC5-1	SV015iC5-1	SV022iC5-1
				
Input wire size	2mm^2	2mm^2	3.5mm^2	3.5mm^2
Output wire	2mm^2	2mm^2	3.5mm^2	3.5mm^2
Ground Wire	2mm^2	2mm^2	3.5mm^2	3.5mm^2
Terminal Lug	2mm^2 , 3.5 φ	2mm^2 , 3.5 φ	3.5mm^2, 3.5 φ	3.5mm^2 , 3.5 φ
Tightening Torque	9 lb-in	9 lb-in	15 lb-in	15 lb-in

⚠ CAUTION

- Make sure the input power is off before wiring.
- When power supply is switched off following operation, wait at least 10 minutes after LED keypad display is off before you start working on it. If tester is available, check the voltage between P1 and N terminals. Wiring should be performed after verifying that input voltage in inverter DC circuitry is all exhausted.
- Applying input power supply to the output terminals U, V and W causes internal inverter damage.
- Use ring terminals with insulated caps when wiring the input power and motor wiring.
- Do not leave wire fragments inside the inverter. Wire fragments can cause faults, breakdowns and malfunctions.
- Never short P1 or P and N terminals. Shorting terminals may cause internal inverter damage.
- Do not install a power factor capacitor, surge suppressor or RFI filters in the output side of the inverter. Doing so may damage these components.

⚠ WARNING

- Use the Type 3 grounding method (Ground impedance: Below 100ohm).
- Use the dedicated ground terminal to ground the inverter. Do not use the screw in the case or chassis, etc for grounding.

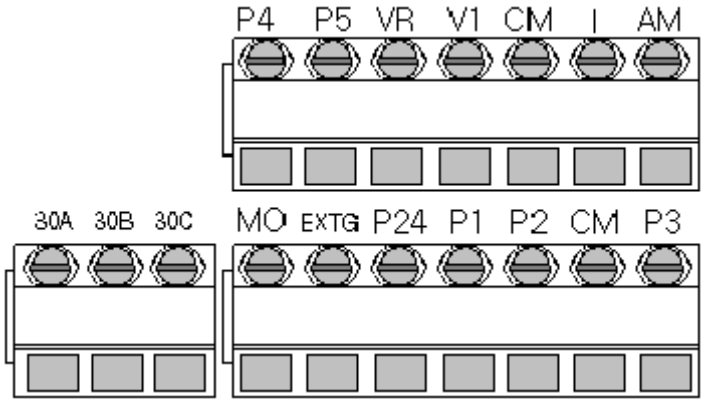


☞ Note : Remove front and bottom cover before starting grounding.

☞ Caution : Follow the specifications below when grounding the inverter.

Model	004iC5, 008iC5 – 1,1F	015iC5, 022iC5 – 1,1F
Wire size	2mm^2	2mm^2
Lug	2mm^2, 3φ	2mm^2, 3φ
Ground impedance	Below 100 ohm	Below 100 ohm

3.3 I/O terminal Block Specification

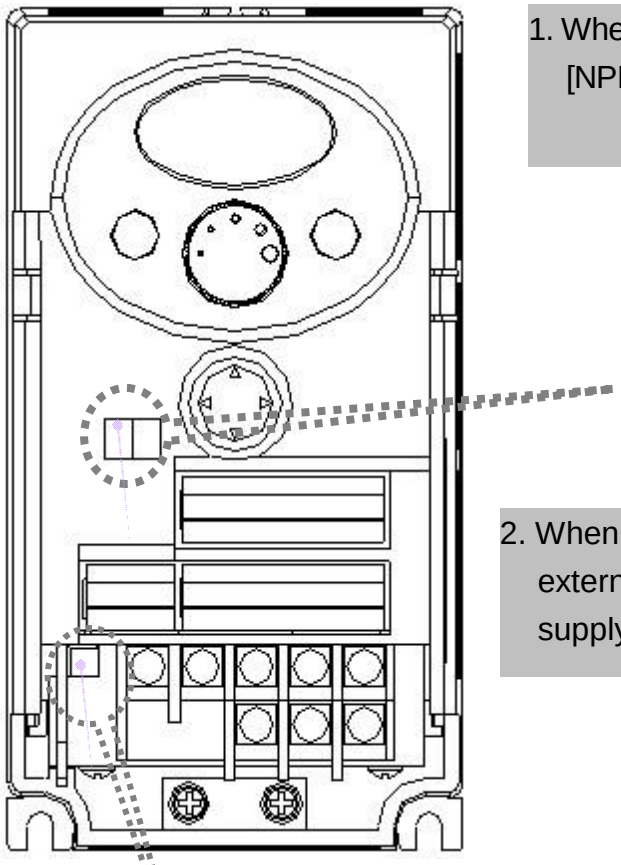


Terminal	Terminal Description	Wire size	Torque (Nm)	Note
P1/P2/P3 /P4/P5	Multi-function input T/M P1-P5	22 AWG, 0.3 mm^2	0.4	-
CM	Common Terminal for P1-P5, AM, P24	22 AWG, 0.3 mm^2	0.4	-
VR	12V power supply for external potentiometer	22 AWG, 0.3 mm^2	0.4	Max. output voltage: 12V Max. output current: 20mA Variable resistor: 10kohm
V1	0-10V Analog Voltage input	22 AWG, 0.3 mm^2	0.4	Input voltage range: 0~12V
I	0-20mA Analog Current input	22 AWG, 0.3 mm^2	0.4	Input current range: 0~20mA
AM	Multi-function Analog output	22 AWG, 0.3 mm^2	0.4	Max. output voltage: 11[V] Max. output current: 10mA
MO	Multi-function open collector output T/M	20 AWG, 0.5 mm^2	0.4	Below DC26V,100mA
EXTG	Ground T/M for MO	20 AWG, 0.5 mm^2	0.4	-
P24	24V Power Supply for P1-P5	20 AWG, 0.5 mm^2	0.4	Max. output current: 10mA
30A	Multi-function relay A/B contact output	20 AWG, 0.5 mm^2	0.4	Below AC 250V, 0.25A Below DC 30V, 2A
30B		20 AWG, 0.5 mm^2	0.4	-
30C	30A, B Common	20 AWG, 0.5 mm^2	0.4	-

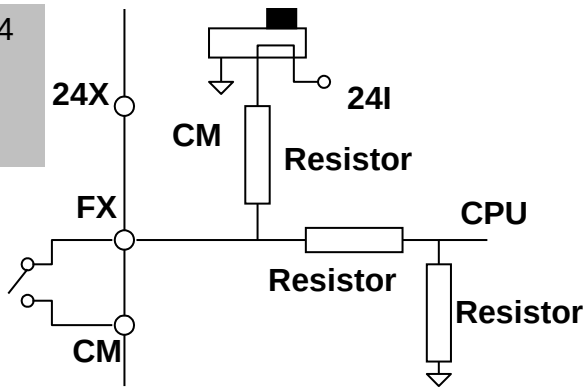
☞Note: Tie the control wires more than 15cm away from the control terminals. Otherwise, it interfere front cover reinstallation.

☞Note: When you use external power supply for multi-function input terminal (P1~P5), apply voltage more than 12V to activate.

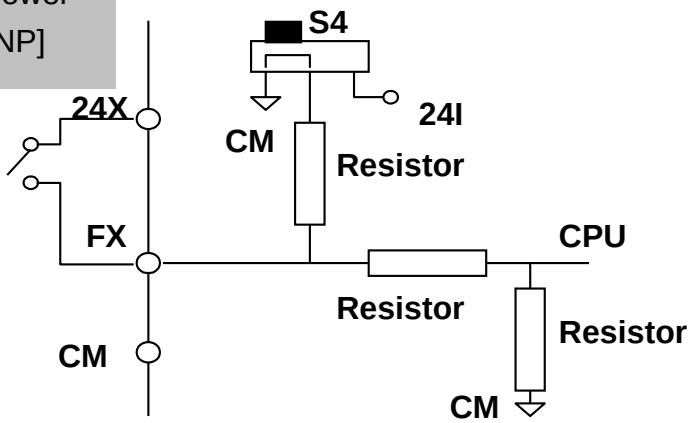
3.4 PNP/NPN Selection and Connector for Communication Option



1. When using P24 [NPN]



2. When using 24V external power supply [PNP]



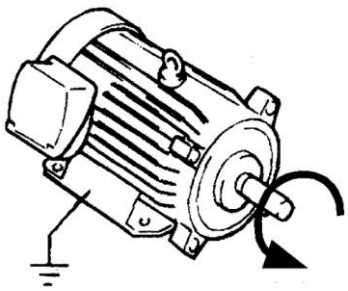
2. Communication Option Card Connector: Install Communication option

☞Note: MODBUS RTU option card is available for SV-iC5. Refer to MODBUS RTU option card manual for more details.

⚠ CAUTION

◆ Direction of motor rotation is indicated in below table and is determined by drC parameter in drive group. In case of CCW (Counter Clock Wise), a motor shaft rotates in counter clock wise when looking at a motor from a load side. If a motor rotates in reverse direction, change U and V wirings with each other.

drC	[Direction of motor rotation select]	Single Phase Inverter	F	CCW(Counter Clock Wise)
			R	CW(Clock Wise)
		Three Phase Inverter	F	CW(Clock Wise)
			R	CCW(Counter Clock Wise)

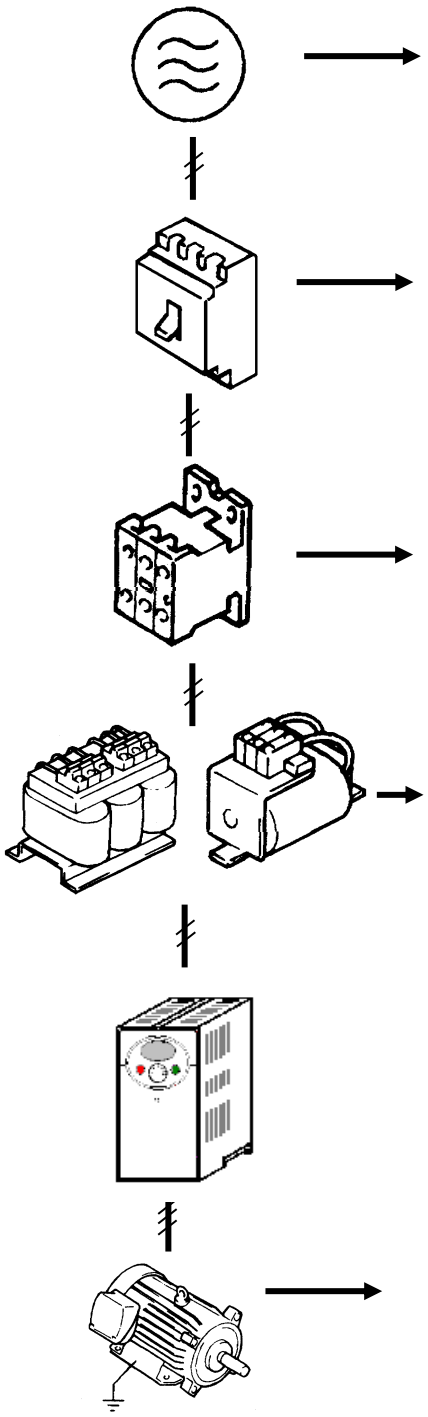


CCW(Counter Clock Wise)

4. Basic Configuration

4.1 Connection of Peripheral Devices to the Inverter

The following devices are required to operate the inverter. Proper peripheral devices must be selected and correct connections made to ensure proper operation. An incorrectly applied or installed inverter can result in system malfunction or reduction in product life as well as component damage. You must read and understand this manual thoroughly before proceeding.



AC Supply Source	Use the power supply within the permissible range of inverter input power rating. (See 9.Specifications)
MCCB or Earth leakage circuit breaker (ELB)	Select circuit breakers with care. A large inrush current may flow in the inverter at power on.
Magnetic Contactor	Install it if necessary. When installed, do not use it for the purpose of starting or stopping. Otherwise, it could lead to reduction in product life.
AC/DC Reactors	The reactors must be used when the power factor is to be improved or the inverter is installed near a large power supply system. (1000kVA or more and wiring distance within 10m)
Installation and wiring	To operate the inverter with high performance for a long time, install the inverter in a proper place in the correct direction and with proper clearances. Incorrect terminal wiring could result in the equipment damage.
To motor	Do not connect a power factor capacitor, surge suppressor or radio noise filter to the output side of the inverter.

4.2 Recommended MCCB, Earth Leakage Circuit Breaker (ELB) and Magnetic Contactor Specification

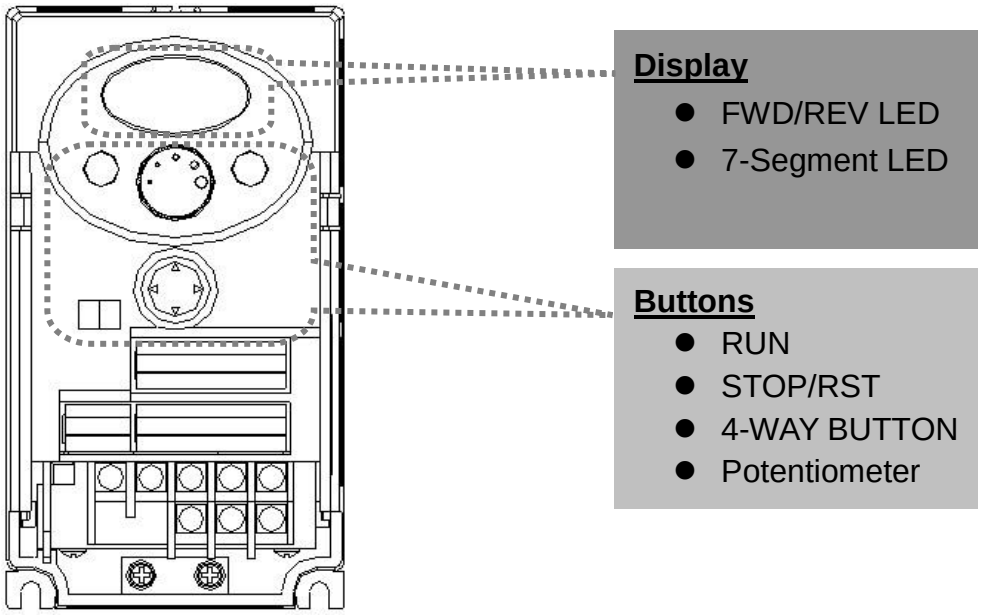
Model	MCCB	ELB	Magnetic Contactor
004iC5-1, 1F	ABS33c, UTE100	EBS33c	MC-6a
008iC5-1, 1F			MC-9a, MC-9b
015iC5-1, 1F			MC-18a, MC-18b
022iC5-1, 1F			MC-22b

4.3 Recommendable AC/DC Reactor

Model	AC input fuse	AC reactor	DC reactor
004iC5-1, 1F	10A	2.13mH, 5.7A	7.00mH, 5.4A
008iC5-1, 1F	20A	1.20mH, 10A	4.05mH, 9.2A
015iC5-1, 1F	30A	0.88mH, 14A	2.92mH, 13 A
022iC5-1, 1F	40A	0.56mH, 20A	1.98mH, 19 A

5. Programming Keypad

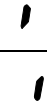
5.1 Keypad Features



Display		
FWD	Lit during forward run	Blinks when a fault occurs
REV	Lit during reverse run	
7-Segment (LED Display)	Displays operation status and parameter information	

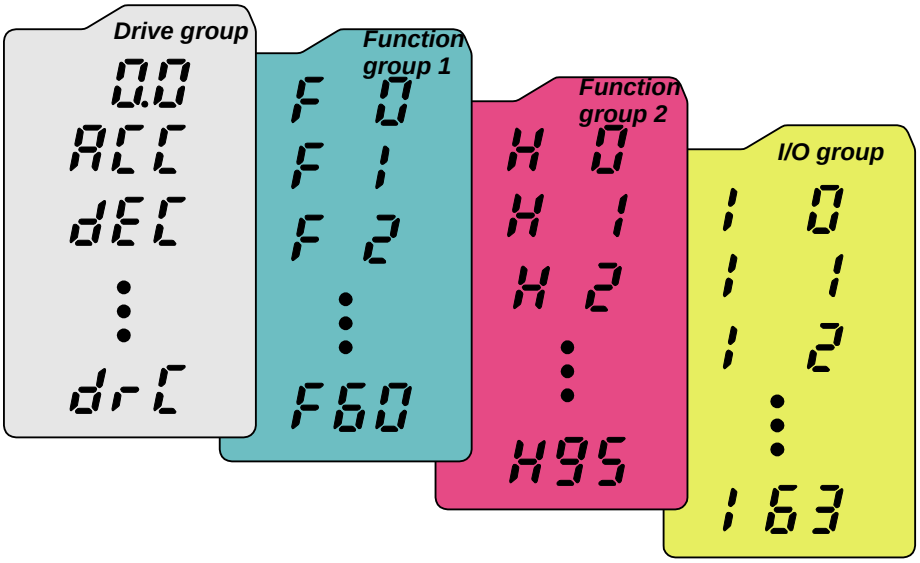
Keys		
RUN		Used to give a run command
STOP/RST		STOP : Stop the operation RST : Reset faults
4-WAY BUTTON		Programming keys (UP/Down/Left/Right arrow and Prog / Ent keys)
▲	UP	Used to scroll through codes or increase parameter value
▼	Down	Used to scroll through codes or decrease parameter value
◀	Left	Used to jump to other parameter groups or move a cursor to the left to change the parameter value
▶	Right	Used to jump to other parameter groups or move cursor to the right to change the parameter value
●	Prog /Ent key	Used to set the parameter value or save the changed parameter value
Potentiometer		Used to change the value of run frequency

5.2 Alpha-numeric View on the LED Keypad

	0		A		K		U
	1		B		L		V
	2		C		M		W
	3		D		N		X
	4		E		O		Y
	5		F		P		Z
	6		G		Q		
	7		H		R		
	8		I		S		
	9		J		T		

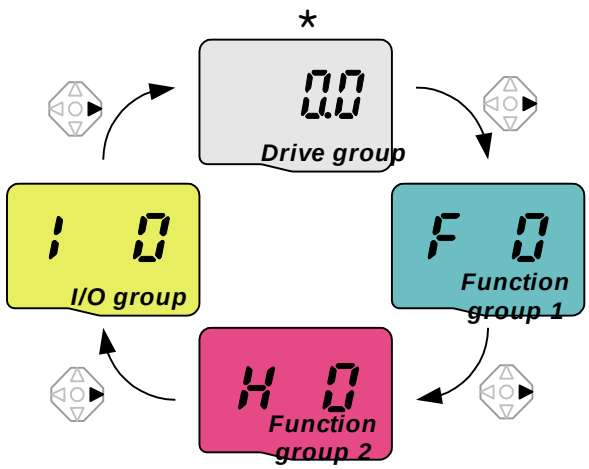
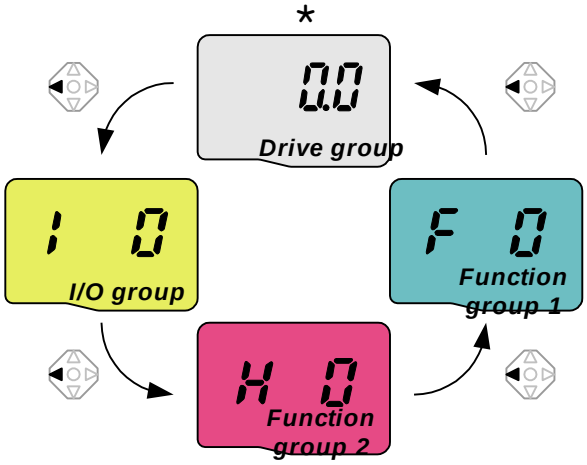
5.3 Moving to Other Groups

◆ There are 4 different parameter groups in SV-iC5 series as shown below.



Drive group	Basic parameters necessary for the inverter to run. Parameters such as Target frequency, Accel / Decel time are settable.
Function group 1	Basic function parameters to adjust output frequency and voltage.
Function group 2	Advanced function parameters to set parameters for such as PID Operation and second motor operation.
I/O (Input/Output) group	Parameters necessary to make up a sequence using Multi-function input/output terminal.

◆ Moving to other parameter groups is only available in the first code of each group as the figure shown below.

Moving to other groups using the Right (▶) key	Moving to other groups using the Left (◀) key
	

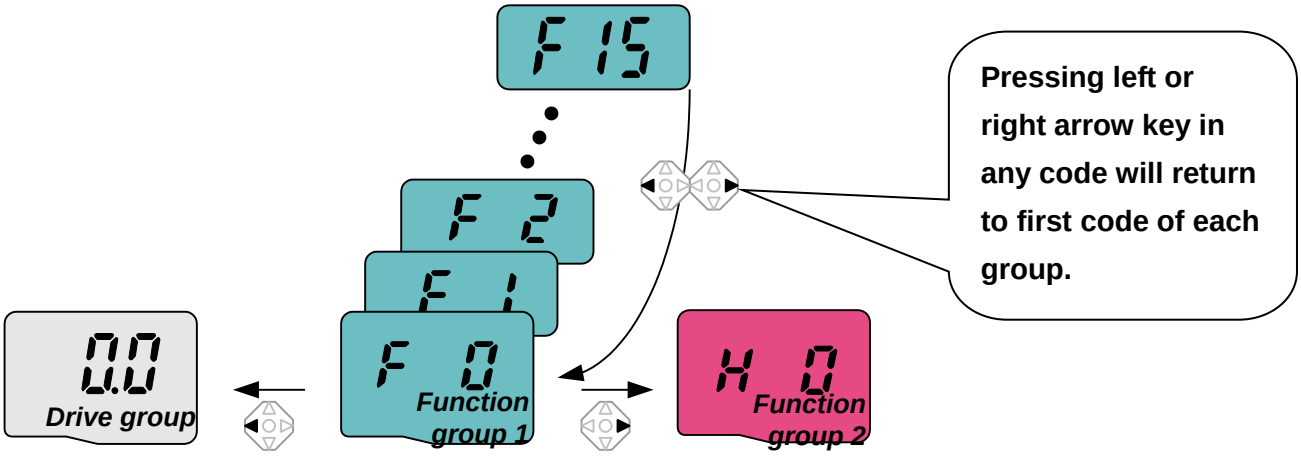
* Target frequency can be set at **0.0** (the 1st code of drive group). Even though the preset value is 0.0, it is user-settable. The changed frequency will be displayed after it is changed.

◆ How to move to other groups at the 1st code of each group.

1	0.0	-. **The 1st code in Drive group "0.0"** will be displayed when AC input power is applied. -. Press the right arrow (▶) key once to go to Function group 1.
2	F 0	-. **The 1st code in Function group 1 "F 0"** will be displayed. -. Press the right arrow (▶) key once to go to Function group 2.
3	H 0	-. **The 1st code in Function group 2 "H 0"** will be displayed. -. Press the right arrow (▶) key once to go to I/O group.
4	I 0	-. **The 1st code in I/O group "I 0"** will be displayed. -. Press the right arrow (▶) key once again to return to Drive group.
5	0.0	-. Return to **the 1st code in Drive group "0.0"**.

♣ If the left arrow key (◀) is used, the above will be executed in the reverse order.

◆ How to move to other groups from any codes other than the 1st code.

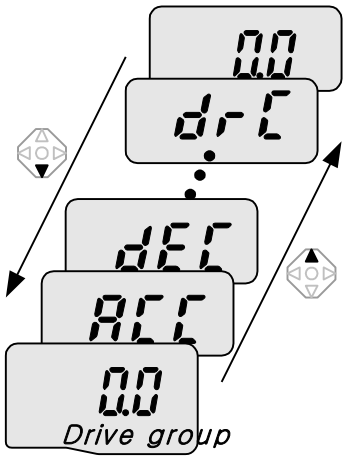


When you would like to move from the F 15 to function group 2

1	F 15	-. In F 15, press the Left (◀) or Right arrow (▶) key. Pressing the key goes to the first code of the group.
2	F 0	-. The 1st code in function group 1 "F 0" is displayed. -. Press the right arrow (▶) key.
3	H 0	-. The 1st code in function group 2 "H 0" will be displayed.

5.4 How to change the codes in a group

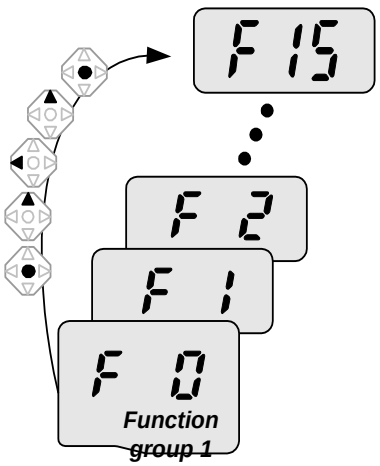
◆ Code change in Drive group



1	0.0	-. In the 1st code in Drive group "0.0", press the Up (▲) key once.
2	ACC	-. The 2nd code in Drive group "ACC" is displayed. -. Press the Up (▲) key once.
3	dEC	-. The 3rd code "dEC" in Drive group is displayed. -. Keep pressing the Up (▲) key until the last code appears.
4	drC	-. The last code in Drive group "drC" is displayed. -. Press the Up (▲) key again.
5	0.0	-. Return to the first code of Drive group.
♣ Use Down (▼) key for the opposite order.		

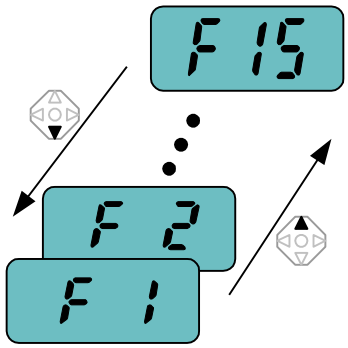
◆ Code change in Function group 1

When moving from the "F 0" to the "F 15" directly



1	F 0	-. Press the Prog/Ent (●) key in "F 0."
2	1	-. 1 (the code number of F1) is displayed. Use the Up (▲) key to set to 5.
3	05	-. "**0**5" is displayed by pressing the Left (◀) key once to move the cursor to the left. The numeral having a cursor is displayed brighter. In this case, **0** is active. -. Use the Up (▲) key to set to 1.
4	15	-. **1**5 is set. -. Press the Prog / Ent (●) key once.
5	F 15	-. Moving to F 15 has been complete.
♣ Function group 2 and I/O group are settable with the same setting.		

◆ For changing code from any codes other than F 0



When moving from F 1 to F 15 in Function group 1.

1	F 1	-. In F 1, continue pressing the Up (▲) key until F15 is displayed.
2	F15	-. Moving to F15 has been complete.

♣ The same rule applies to Function group 2 and I/O group.

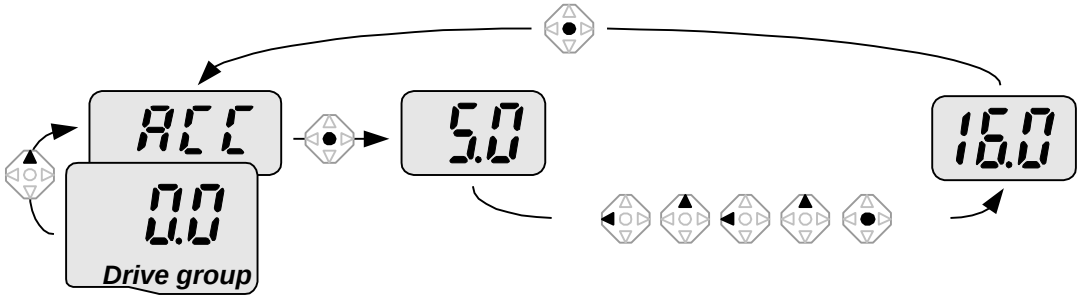
♣ Note: Some codes will be skipped in the middle of increment (▲)/ decrement (▼) for code change. That is because it is programmed that some codes are intentionally left blank for future use or the codes user does not use are invisible.

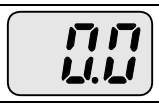
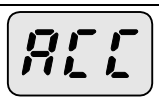
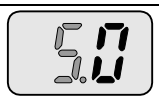
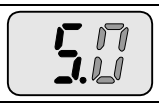
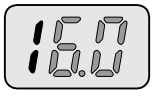
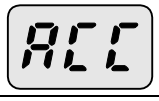
☞For example, when F23 [High/low frequency limit select] is set to “O (No) ”, F24 [High frequency limit] and F23 [Low frequency limit] are not displayed during code change. But When F23 is set to “1(Yes)”, F23 and F24 will appear on the display.

5.5 Parameter Setting Method

◆ Changing parameter value in Drive group

When changing ACC time from 5.0 sec to 16.0

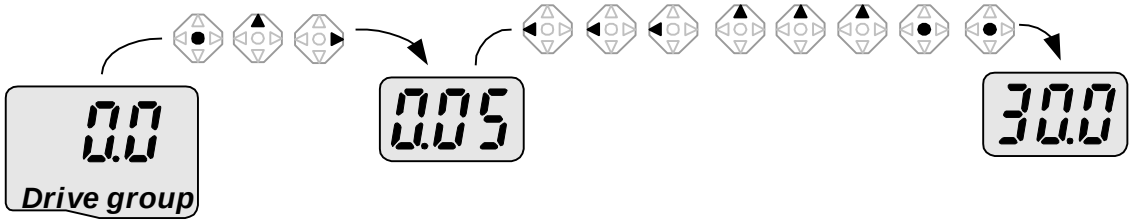


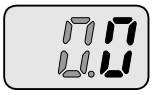
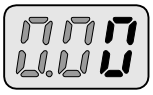
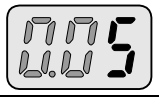
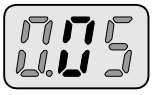
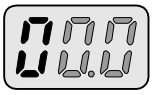
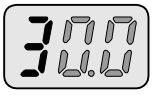
1		-. In the first code “0.0”, press the Up (▲) key once to go to the second code.
2		-. ACC [Accel time] is displayed. -. Press the Prog / Ent key (●) once.
3		-. Preset value is 5.**0**, and the cursor is in the digit **0**. -. Press the Left (◀) key once to move the cursor to the left.
4		-. The digit **5** in **5**.0 is active. Then press the Up (▲) key once.
5		-. The value is increased to **6**.0 -. Press the Left (◀) key to move the cursor to the left.
6		-. **0**.60 is displayed. The first **0** in **0**.60 is active. -. Press the Up (▲) key once.
7		-. **1**6.0 is set. -. Press the Prog / Ent (●) key once. -. **1**6.0 is blinking. -. Press the Prog / Ent (●) key once again to return to the parameter name.
8		-. **ACC** is displayed. **Accel time** is changed from 5.0 to 16.0 sec.

♣ **In step 7, pressing the Left (◀) or Right (▶) key while 16.0 is blinking will disable the setting.**

♣Note) Pressing the Left (◀)/ Right (▶) /Up (▲) /Down (▼) key while cursor is blinking will cancel the parameter value change.

When changing run frequency to 30.05 Hz in Drive group



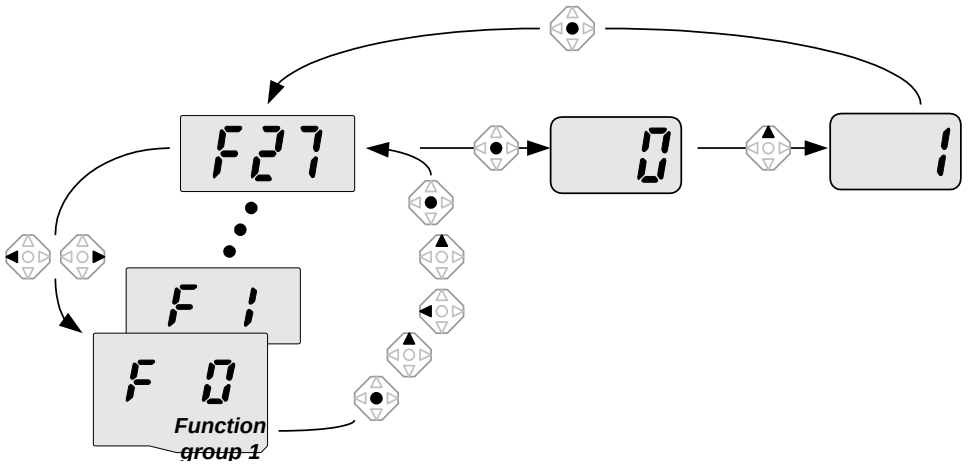
1		-. In “0.0”, press the Prog / Ent (●) key once.
2		-. The second **0** in 0.**0** is active. -. Press the Right (▶) key once to move the cursor to the right.
3		-. 0.0**0** is displayed -. Press the Up (▲) key until 5 is displayed.
4		-. Press the Left (◀) key once.
5		-. The middle digit in 0.**0**5 is active. -. Press the Left (◀) key once.
6		-. Press the Left (◀) key once.
7		-. **0**0.0 is displayed with the first 0 active, but the actual value 0.05 remains unchanged. -. Press the Up (▲) key to set to 3.
8		-. Press the Prog / Ent (●) key once. -. **3**0.0 is blinking. -. Press the Prog / Ent (●) key once.
9		-. Run frequency is set to 30.0 when the blinking stops.

♣ **<u>Three digit LED display is provided in SV-iC5 Series. However, digit expansion is available using the Left(◀)/Right(▶) key for parameter setting and monitoring.</u>**

♣ **In step 8, pressing the Left (◀) or Right (▶) key while 30.0 is blinking will disable the setting.**

◆ Changing parameter values in Function 1, 2 and I/O group

When changing the parameter value of F 27 from 2 to 5

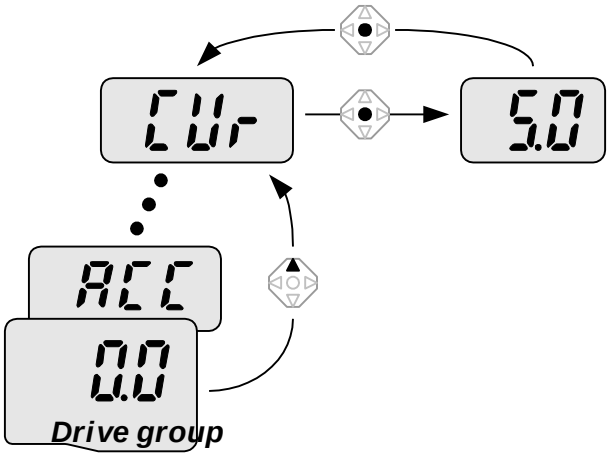


1	F 0	-. In F0, press the Prog / Ent (●) key once.
2	1	-. Check the present code number. -. Increase the value to 7 by pressing the Up (▲) key.
3	7	-. When 7 is set, press the Left (◀) key once.
4	07	-. **0** in **0**7 is active. -. Increase the value to 2 by pressing the Up (▲) key.
5	27	-. **2**7 is displayed -. Press the Prog / Ent (●) key once.
6	F27	-. The parameter number F27 is displayed. -. Press the Prog / Ent (●) key once to check the set value.
7	0	-. The set value is 0. -. Increase the value to 1 by pressing the Up (▲) key.
8	1	-. Press the Prog / Ent (●) key once.
9	F27	-. F27 is displayed after 5 stops blinking. Changing parameter value has been complete. -. Press the either Left (◀) or Right (▶) key once to go to the first code.
10	F 0	-. Return to F0.

♣ **The above setting is also applied to change parameter values in function group 2 and I/O group.**

5.6 Monitoring of Operation Status

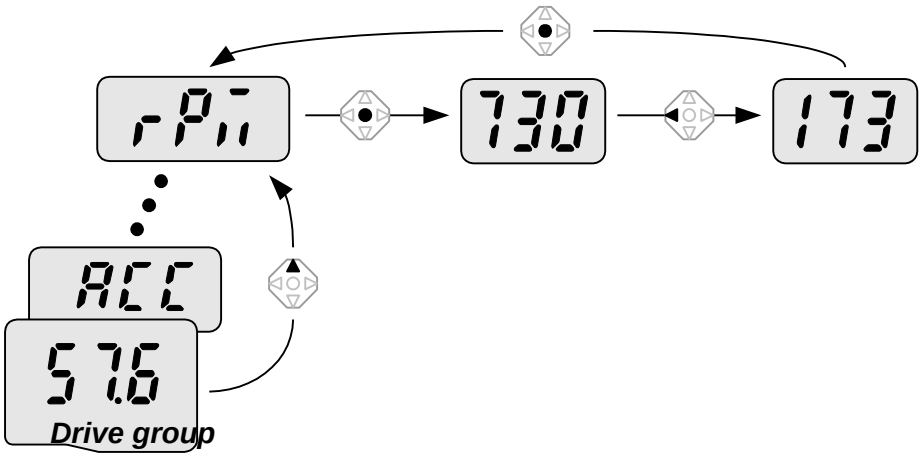
Monitoring output current in Drive group

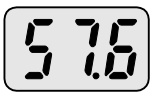
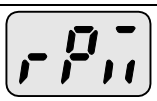
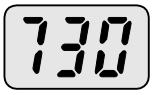
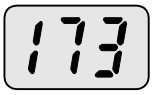
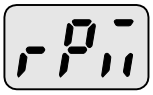


1	0.0	-. In [0.0], continue pressing the Up (▲) or Down (▼) key until [Cur] is displayed.
2	CUr	-. Monitoring output current is provided in this parameter. -. Press the Prog / Ent (●) key once to check the current.
3	5.0	-. Present output current is 5.0 A. -. Press the Prog / Ent (●) key once to return to the parameter name.
4	CUr	-. Return to the output current monitoring code.

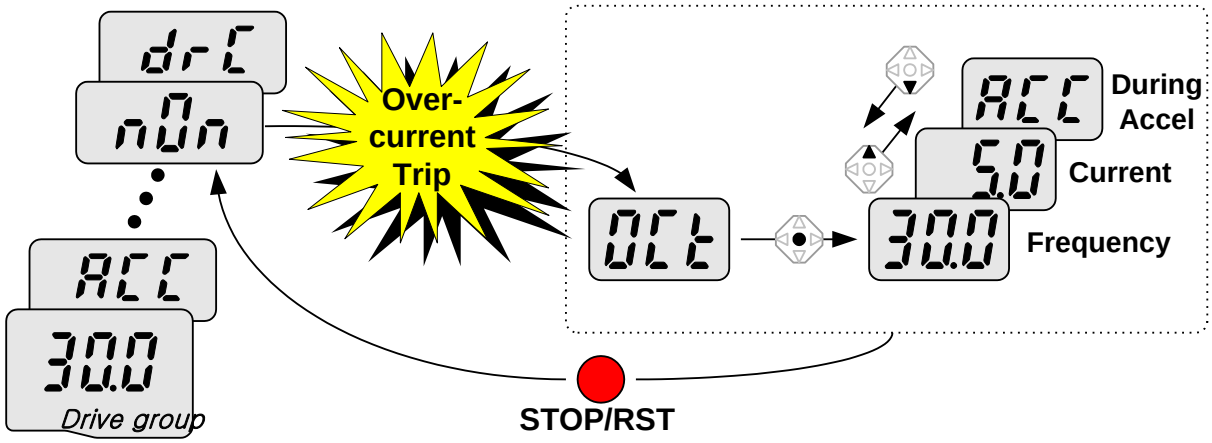
♣ Other parameters in Drive group such as dCL (Inverter DC link current) or vOL (Inverter output voltage) can be monitored via the same method.

How to monitor Motor rpm in Drive group when the motor is rotating in 1730 rpm.



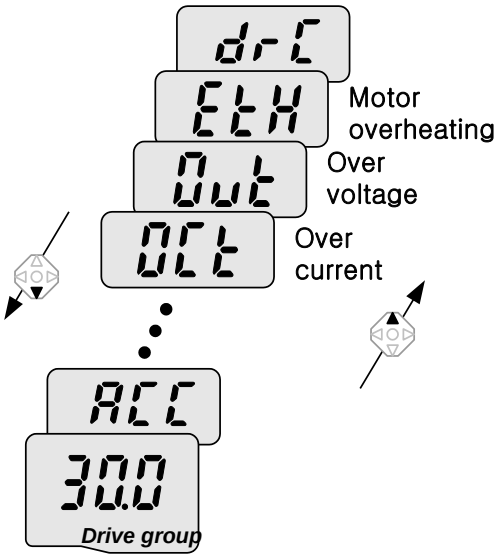
1		-. Present run frequency can be monitored in the first code of Function group 1. The preset frequency is 57.6Hz. -. Continue pressing the Up (▲) /Down (▼) key until rPM is displayed.
2		-. Motor rpm can be monitored in this code. -. Press the Prog / Ent (●) key once.
3		-. Last three digits **730** in 1**730** rpm is shown on the LED. -. Press the Left (◀) key once.
4		-. First three digits **173** in 1730 rpm are shown on the LED. -. Press the Prog / Ent (●) key once.
5		-. Return to the rPM code.

How to monitor fault condition in Drive group.



1	OCt	-. This message appears when an Over-current fault occurs. -. Press the Prog / Ent (●) key once.
2	30.0	-. The **run frequency** at the time of fault (30.0) is displayed. -. Press the Up (▲) key once.
3	5.0	-. The **output current** at the time of fault is displayed. -. Press the Up (▲) key once.
4	ACC	-. Operating status is displayed. A fault occurred during acceleration. -. Press the STOP/RST key once.
5	nOn	-. A fault condition is cleared and “nOn” is displayed.

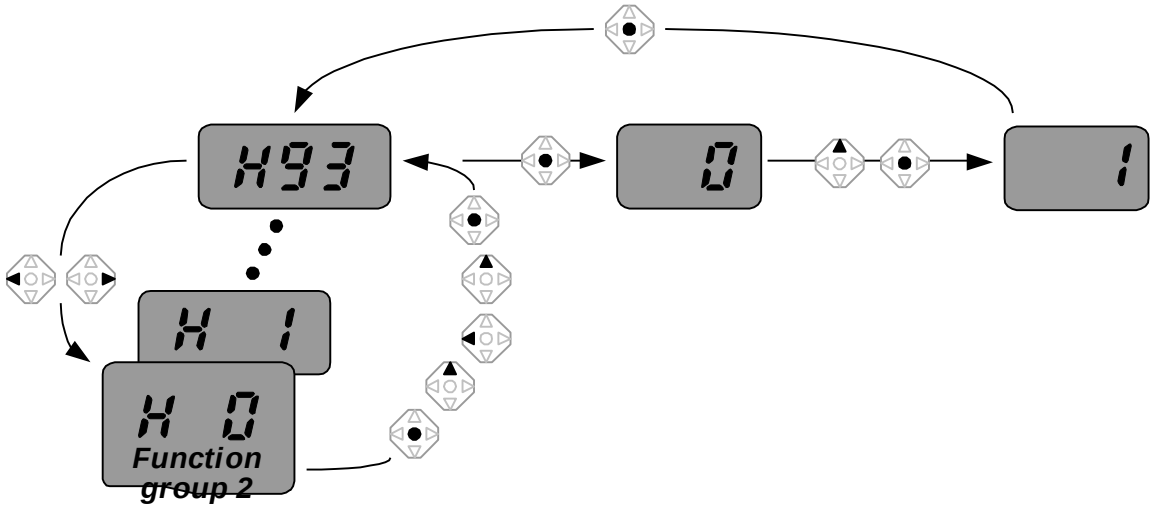
When more than one fault occur at the same time.



-. Maximum three faults information is displayed as shown left diagram.

◆ Parameter initialize

How to initialize parameters of all four groups in H93



1	H 0	-. In H0, press the Prog / Ent (●) key once.
2	1	-. Code number of H0 is displayed. -. Increase the value to 3 by pressing the Up (▲) key.
3	3	-. In **3**, press the Left (◀) key once to move the cursor to the left.
4	03	-. **0**3 is displayed. **0** in **0**3 is active. -. Increase the value to 9 by pressing the Up (▲) key.
5	93	-. **9**3 is set. -. Press the Prog / Ent (●) key once.
6	H93	-. The parameter number is displayed. -. Press the Prog / Ent (●) key once.
7	0	-. Present setting is 0. -. Press the Up (▲) key once to set to 1 to activate parameter initialize.
8	1	-. Press the Prog / Ent (●) key once.
9	H93	-. Return to the parameter number after blinking. **Parameter initialize** has been complete. -. Press the either Left (◀) or Right (▶) key.
10	H 0	-. Return to H0.

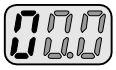
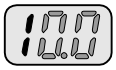
MEMO

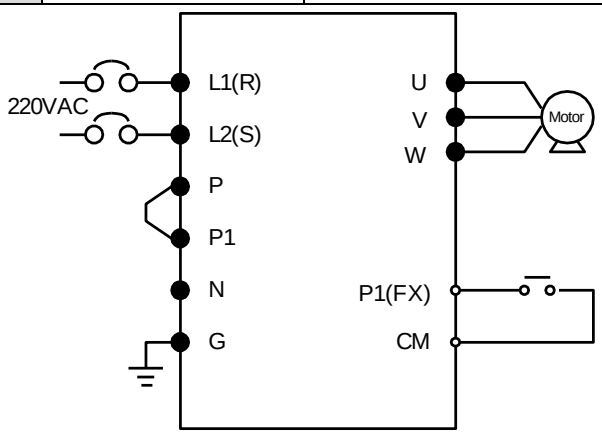
6. Basic Operation

6.1 Frequency Setting and Basic Operation

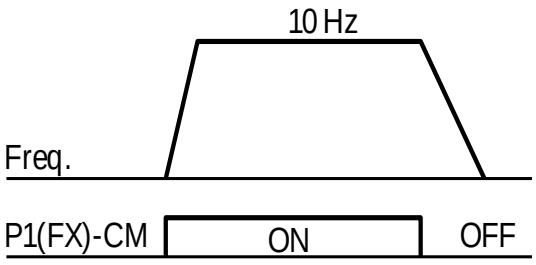
☞ **Caution :** The following instructions are given based on the fact that all parameters are set to factory defaults. Results could be different if parameter values are changed. In this case, initialize parameter values back to factory defaults and follow the instructions below.

Frequency Setting via keypad and operating via terminals

1		-. Apply AC input power to the inverter.
2		-. When 0.0 appears, press the Prog / Ent (●) key once.
3		-. The second digit in 0.**0** is lit as shown left. -. Press the Left (◀) key twice.
4		-. **0**0.0 is displayed and the first **0** is lit. -. Press the Up (▲) key.
5		-. **1**0.0 is set. Press the Prog / Ent (●) key once. -. 10.0 is blinking. Press the Prog / Ent (●) key once.
6		-. Run frequency is set to **10.0** Hz when the blinking stops. -. Turn on the switch between P1 (FX) and CM terminals.
7		-. FWD (Forward run) lamp begins to blink and accelerating frequency is displayed on the LED. -. When target run frequency 10Hz is reached, **10.0** is displayed. -. Turn off the switch between P1 (FX) and CM terminals.
8		-. FWD lamp begins to blink and decelerating frequency is displayed on the LED. -. When run frequency is reached to 0Hz, FWD lamp is turned off and **10.0** is displayed.

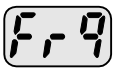
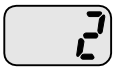


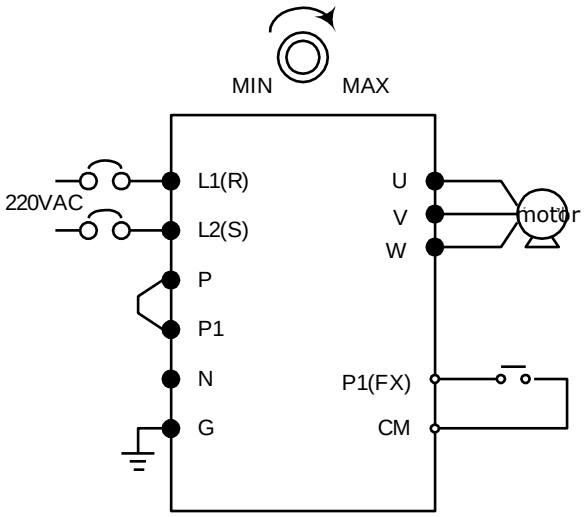
Wiring



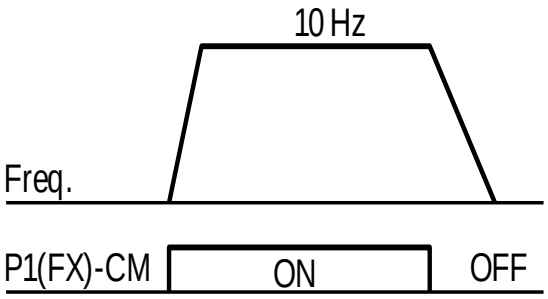
Operating pattern

Frequency Setting via potentiometer and operating via terminals

1		-. Apply AC input power to the inverter.
2		-. When 0.0 appears Press the Up (▲) key four times.
3		-. Frq is displayed. Frequency setting mode is selectable. -. Press the Prog / Ent (●) key once.
4		-. Present setting method is set to 0 (frequency setting via keypad). -. Press the Up (▲) key twice.
5		-. After 2 (Frequency setting via potentiometer) is set, press the Prog / Ent (●) key once.
6		-. Frq is redisplayed after 2 stops blinking. -. Turn the potentiometer to set to 10.0 Hz in either Max or Min direction.
7		-. Turn on the switch between P1 (FX) and CM (See Wiring below). -. FWD lamp begins to blink and the accelerating frequency is displayed on the LED. -. When run frequency 10Hz is reached, the value is displayed as shown left. -. Turn off the switch between P1 (FX) and CM terminals.
8		-. FWD lamp begins to blink and the decelerating frequency is displayed on the LED. -. When the run frequency is reached to 0 Hz, FWD lamp is turned off and **10.0** is displayed as shown left.



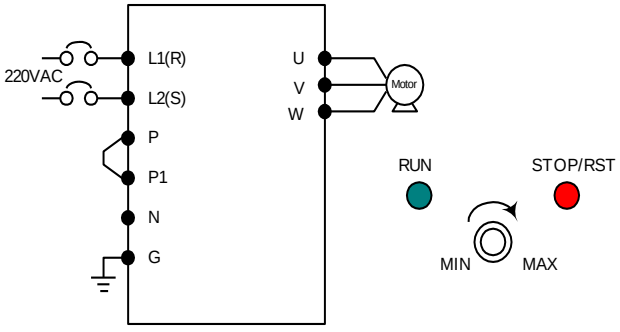
Wiring



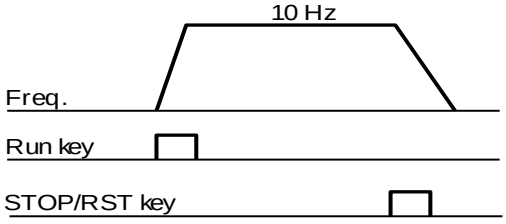
Operating pattern

Frequency setting via potentiometer and operating via the Run key

1		-. Apply AC input power to the inverter.
2	0.0	-. When 0.0 is displayed, press the Up (▲) key three times.
3	drv	-. drv is displayed. Operating method is selectable. -. Press the Prog / Ent (●) key.
4	1	-. Check the present operating method ("1" is run via control terminal) -. Press the Prog / Ent (●) key and then Down (▼) key once.
5	0	-. After setting "0", press the Prog / Ent (●) key.
6	drv	-. "drv" is displayed after "0" is blinking. Operation method is set via the Run key on the keypad. -. Press the Up (▲) key once.
7	Frq	-. Different frequency setting method is selectable in this code. -. Press the Prog / Ent (●) key.
8	0	-. Check the present frequency setting method ("**0**" is run via keypad). -. Press the Up (▲) key twice.
9	2	-. After checking "**2**" (frequency setting via potentiometer), press the Prog / Ent (●) key.
10	Frq	-. "**Frq**" is displayed after "2" is blinking. Frequency setting is set via the potentiometer on the keypad. -. Turn the potentiometer to set to 10.0 Hz in either Max or Min direction.
11	10.0	-. Press the Run key on the keypad. -. FWD lamp begins to blink and accelerating frequency is displayed on the LED. -. When run frequency 10Hz is reached, **10.0** is displayed as shown left. -. Press the STOP/RST key.
12	10.0	-. FWD lamp begins to blink and decelerating frequency is displayed on the LED. -. When run frequency is reached to 0Hz, FWD lamp is turned off and **10.0** is displayed as shown left.



Wiring



Operating pattern

MEMO

7. Function List

* The number of page is for User's manual uploaded at LSIS website. You can download the User's manual which is described detailed function of parameter from website. (http://www.lsis.biz)

7.1 Drive Group

LED display	Parameter name	Min/Max range	Description	Factory defaults	Adjustable during run	Page
0.0	[Frequency command]	0/400 [Hz]	▪ This parameter sets the frequency that the inverter is commanded to output. ▪ During Stop: Frequency Command ▪ During Run: Output Frequency ▪ During Multi-step operation: Multi-step frequency 0. ▪ It cannot be set greater than F21- [Max frequency].	0.0	O	
ACC	[Accel time]	0/6000 [sec]	▪ During Multi-Accel / Decel operation, this parameter serves as Accel / Decel time 0.	5.0	O	
dEC	[Decel time]			10.0	O	
Drv	[Drive mode] (Run/Stop mode)	0/3	0: Run/Stop via Run/Stop key on the keypad 1: Run/Stop via control terminal — FX : Motor forward run, RX : Motor reverse run 2: Run/Stop via control terminal — FX : Run/Stop enable, RX : Reverse rotation select 3: Operation via Communication Option	1	X	
Frq	[Frequency mode]	0/8	0: Digital — Setting via Keypad 1 1: Digital — Setting via Keypad 2 2: Analog — Setting via potentiometer on the keypad(V0) 3: Analog — Setting via V1 terminal 4: Analog — Setting via I terminal	0	X	

LED display	Parameter name	Min/Max range	Description	Factory defaults	Adjustable during run	Page
			5 Setting via potentiometer on the keypad + I terminal 6 Setting via V1 + I terminal 7 Setting via potentiometer on the keypad + V1 terminal 8 Modbus-RTU Communication			
St1	[Multi-Step frequency 1]	0/400 [Hz]	▪ This parameter sets Multi-Step frequency 1 during Multi-step operation.	10.0	O	
St2	[Multi-Step frequency 2]		▪ This parameter sets Multi-Step frequency 2 during Multi-step operation.	20.0	O	
St3	[Multi-Step frequency 3]		▪ This parameter sets Multi-Step frequency 3 during Multi-step operation.	30.0	O	
CUr	[Output current]	-	▪ This parameter displays the output current to the motor.	-	-	
rPM	[Motor RPM]	-	▪ This parameter displays the number of Motor RPM.	-	-	
dCL	[Inverter DC link voltage]	-	▪ This parameter displays DC link voltage inside the inverter.	-	-	
vOL	[User display select]	-	▪ This parameter displays the item selected at H73-[Monitoring item select]. vOL Output voltage POr Output power tOr Torque	vOL	-	
nOn	[Fault Display]	-	▪ This parameter displays the types of faults, frequency and operating status at the time of the fault	-	-	
drC	[Direction of motor rotation select]	F/r	▪ This parameter sets the direction of motor rotation when drv - [Drive mode] is set to either 0 or 1. F Forward r Reverse	F	O	

7.2 Function Group 1

LED display	Parameter name	Min/Max range	Description	Factory defaults	Adjustable during run	Page
F 0	[Jump code]	0/60	▪ This parameter sets the parameter code number to jump.	1	O	
F 1	[Forward/ Reverse run disable]	0/2	0 Fwd and rev run enable 1 Forward run disable 2 Reverse run disable	0	X	
F 2	[Accel pattern]	0/1	0 Linear 1 S-curve	0	X	
F 3	[Decel pattern]					
F 4	[Stop mode select]	0/2	0 Decelerate to stop 1 Stop via DC brake 2 Free run to stop	0	X	
F 8 1)	[DC Brake start frequency]	0/60 [Hz]	▪ This parameter sets DC brake start frequency. ▪ It cannot be set below F23 - [Start frequency].	5.0	X	
F 9	[DC Brake wait time]	0/60 [sec]	▪ When DC brake frequency is reached, the inverter holds the output for the setting time before starting DC brake.	0.1	X	
F10	[DC Brake voltage]	0/200 [%]	▪ This parameter sets the amount of DC voltage applied to a motor. ▪ It is set in percent of H33 – [Motor rated current].	50	X	
F11	[DC Brake time]	0/60 [sec]	▪ This parameter sets the time taken to apply DC current to a motor while motor is at a stop.	1.0	X	
F12	[DC Brake start voltage]	0/200 [%]	▪ This parameter sets the amount of DC voltage before a motor starts to run. ▪ It is set in percent of H33 – [Motor rated current].	50	X	
F13	[DC Brake start time]	0/60 [sec]	▪ DC voltage is applied to the motor for DC Brake start time before motor accelerates.	0	X	
F14	[Time for magnetizing a motor]	0/60 [sec]	▪ This parameter applies the current to a motor for the set time before motor accelerates during Sensorless vector control.	1.0	X	

1) : Set F4 to 1 (Stop via DC brake) to view this function

LED display	Parameter name	Min/Max range	Description	Factory defaults	Adjustable during run	Page
F20	[Jog frequency]	0/400 [Hz]	▪ This parameter sets the frequency for Jog operation. ▪ It cannot be set above F21 – [Max frequency].	10.0	O	
F21	[Max frequency]	40/400 * [Hz]	▪ This parameter sets the highest frequency the inverter can output. ▪ It is frequency reference for Accel / Decel (See H70) ▪ If H40 is set to 3(Sensorless vector), it can be settable up to 300Hz *. ☞ **Caution : Any frequency cannot be set above Max frequency.**	60.0	X	
F22	[Base frequency]	30/400 [Hz]	▪ The inverter outputs its rated voltage to the motor at this frequency (see motor nameplate). In case of using a 50Hz motor, set this to 50Hz.	60.0	X	
F23	[Start frequency]	0.1/10 [Hz]	▪ The inverter starts to output its voltage at this frequency. ▪ It is the frequency low limit.	0.5	X	
F24	[Frequency high/low limit select]	0/1	▪ This parameter sets high and low limit of run frequency.	0	X	
F25 2)	[Frequency high limit]	0/400 [Hz]	▪ This parameter sets high limit of the run frequency. ▪ It cannot be set above F21 – [Max frequency].	60.0	X	
F26	[Frequency low limit]	0/400 [Hz]	▪ This parameter sets low limit of the run frequency. ▪ It cannot be set above F25 - [Frequency high limit] and below F23 – [Start frequency].	0.5	X	
F27	[Torque Boost select]	0/1	0 Manual torque boost 1 Auto torque boost	0	X	
F28	[Torque boost in forward direction]	0/15 [%]	▪ This parameter sets the amount of torque boost applied to a motor during forward run. ▪ It is set in percent of Max output voltage.	5	X	

LED display	Parameter name	Min/Max range	Description	Factory defaults	Adjustable during run	Page
F29	[Torque boost in reverse direction]		▪ This parameter sets the amount of torque boost applied to a motor during reverse run. ▪ It is set as a percent of Max output voltage	5	X	
F30	[V/F pattern]	0/2	0 {Linear} 1 {Square} 2 {User V/F}	0	X	
F31 3)	[User V/F frequency 1]	0/400 [Hz]	▪ This parameter is active when F30 – [V/F pattern] is set to 2 {User V/F}. ▪ It cannot be set above F21 – [Max frequency]. ▪ The value of voltage is set in percent of H70 – [Motor rated voltage]. ▪ The values of the lower-numbered parameters cannot be set above those of higher-numbered.	15.0	X	
F32	[User V/F voltage 1]	0/100 [%]		25	X	
F33	[User V/F frequency 2]	0/400 [Hz]		30.0	X	
F34	[User V/F voltage 2]	0/100 [%]		50	X	
F35	[User V/F frequency 3]	0/400 [Hz]		45.0	X	
F36	[User V/F voltage 3]	0/100 [%]		75	X	
F37	[User V/F frequency 4]	0/400 [Hz]		60.0	X	
F38	[User V/F voltage 4]	0/100 [%]		100	X	
F39	[Output voltage adjustment]	40/110 [%]	▪ This parameter adjusts the amount of output voltage. ▪ The set value is the percentage of input voltage.	100	X	
F40	[Energy-saving level]	0/30 [%]	▪ This parameter decreases output voltage according to load status.	0	0	
F50	[Electronic thermal select]	0/1	▪ This parameter is activated when the motor is overheated (time-inverse).	0	0	

2) Only displayed when F24 (Freq High/Low limit select) is set to 1.

3): Set F30 to 2 (User V/F) to display this parameter.

LED display	Parameter name	Min/Max range	Description	Factory defaults	Adjustable during run	Page
F51 4)	[Electronic thermal level for 1 minute]	50/200 [%]	▪ This parameter sets max current capable of flowing to the motor continuously for 1 minute. ▪ The set value is the percentage of H33 – [Motor rated current]. ▪ It cannot be set below F52 –[Electronic thermal level for continuous].	150	0	
F52	[Electronic thermal level for continuous]	50/150 [%]	▪ This parameter sets the amount of current to keep the motor running continuously. ▪ It cannot be set higher than F51 – [Electronic thermal level for 1 minute].	100	0	
F53	[Motor cooling method]	0/1	0 Standard motor having cooling fan directly connected to the shaft 1 A motor using a separate motor to power a cooling fan.	0	0	
F54	[Overload warning level]	30/150 [%]	▪ This parameter sets the amount of current to issue an alarm signal at a relay or multi-function output terminal (see I54, I55). ▪ The set value is the percentage of H33- [Motor rated current].	150	0	
F55	[Overload warning time]	0/30 [sec]	▪ This parameter issues an alarm signal when the current greater than F54- [Overload warning level] flows to the motor for F55- [Overload warning time].	10	0	
F56	[Overload trip select]	0/1	▪ This parameter turns off the inverter output when motor is overloaded.	1	0	
F57	[Overload trip level]	30/200 [%]	▪ This parameter sets the amount of overload current. ▪ The value is the percentage of H33- [Motor rated current].	180	0	
F58	[Overload trip time]	0/60 [sec]	▪ This parameter turns off the inverter output when the F57- [Overload trip level] of current flows to the motor for F58- [Overload trip time].	60	0	

4): Set F50 to 1 to display this parameter

<table>
<tr><th>LED display</th><th>Parameter name</th><th>Min/Max range</th><th>Description</th><th>Factory defaults</th><th>Adjustable during run</th><th>Page</th></tr>
<tr><td>F59</td><td>[Stall prevention select]</td><td>0/7</td><td>▪ This parameter stops accelerating during acceleration, decelerating during constant speed run and stops decelerating during deceleration.
<table>
<tr><th></th><th>During Deceleration</th><th>During constant speed</th><th>During Acceleration</th></tr>
<tr><td></td><td>Bit 2</td><td>Bit 1</td><td>Bit 0</td></tr>
<tr><td>0</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>1</td><td>-</td><td>-</td><td>✓</td></tr>
<tr><td>2</td><td>-</td><td>✓</td><td>-</td></tr>
<tr><td>3</td><td>-</td><td>✓</td><td>✓</td></tr>
<tr><td>4</td><td>✓</td><td>-</td><td>-</td></tr>
<tr><td>5</td><td>✓</td><td>-</td><td>✓</td></tr>
<tr><td>6</td><td>✓</td><td>✓</td><td>-</td></tr>
<tr><td>7</td><td>✓</td><td>✓</td><td>✓</td></tr>
</table></td><td>0</td><td>X</td><td></td></tr>
<tr><td>F60</td><td>[Stall prevention level]</td><td>30/150 [%]</td><td>▪ This parameter sets the amount of current to activate stall prevention function during Accel, constant or Decel run.
▪ The set value is the percentage of the H33- [Motor rated current].</td><td>150</td><td>X</td><td></td></tr>
</table>

7.3 Function Group 2

LED display	Parameter name	Min/Max range	Description	Factory defaults	Adjustable during run	Page
H 0	[Jump code]	1/95	▪ This parameter sets the code number to jump.	1	O	
H 1	[Fault history 1]	-	▪ This parameter stores information on the types of faults, the frequency, the current and the Accel/Decel condition at the time of fault. ▪ The last fault is automatically stored in the H 1- [Fault history 1].	nOn	-	
H 2	[Fault history 2]	-		nOn	-	
H 3	[Fault history 3]	-		nOn	-	
H 4	[Fault history 4]	-		nOn	-	
H 5	[Fault history 5]	-		nOn	-	
H 6	[Reset fault history]	0/1	▪ This parameter clears the fault history saved in H 1-5.	0	O	
H 7	[Dwell frequency]	F23/400 [Hz]	▪ When run frequency is issued, motor starts to accelerate after dwell frequency is applied to the motor during H8- [Dwell time]. ▪ [Dwell frequency] can be set within the range of F21- [Max frequency] and F23- [Start frequency].	5.0	X	
H 8	[Dwell time]	0/10 [sec]	▪ This parameter sets the time for dwell operation.	0.0	X	
H10	[Skip frequency select]	0/1	▪ This parameter sets the frequency range to skip to prevent undesirable resonance and vibration on the structure of the machine.	0	X	
H11 1)	[Skip frequency low limit 1]	0/400 [Hz]	▪ Run frequency cannot be set within the range of H11 thru H16. ▪ The frequency values of the low numbered parameters cannot be set above those of the high numbered ones.	10.0	X	
H12	[Skip frequency high limit 1]			15.0	X	
H13	[Skip frequency low limit 2]			20.0	X	

LED display	Parameter name	Min/Max range	Description	Factory defaults	Adjustable during run	Page
H14	[Skip frequency high limit 2]			25.0	X	
H15	[Skip frequency low limit 3]			30.0	X	
H16	[Skip frequency high limit 3]			35.0	X	
H17	S-Curve accel/decel start side	1/100 [%]	▪ Set the speed reference value to form a curve at the start during accel/decel. If it is set higher, linear zone gets smaller.	40	X	
H18	S-Curve accel/decel end side	1/100 [%]	▪ Set the speed reference value to form a curve at the end during accel/decel. If it is set higher, linear zone gets smaller.	40	X	
H19	[Output phase loss protection select]	0/1	▪ Inverter turns off the output when the phase of the inverter output (U, V, W) is not properly connected.	0	O	
H20	[Power On Start select]	0/1	▪ This parameter is activated when drv is set to 1 or 2 (Run/Stop via Control terminal). ▪ Motor starts acceleration after AC power is applied while FX or RX terminal is ON.	0	O	
H21	[Restart after fault reset]	0/1	▪ This parameter is active when drv is set to 1 or 2 (Run/Stop via Control terminal). ▪ Motor accelerates after the fault condition is reset while the FX or RX terminal is ON.	0	O	

1) Set H10 to 1 to be displayed.
H17, 18 is used when F2, F3 is set to 1 S-Curve.

<table>
<tr><th>LED display</th><th>Parameter name</th><th>Min/Max range</th><th>Description</th><th>Factory defaults</th><th>Adjustable during run</th><th>Page</th></tr>
<tr><td>H22
2)</td><td>[Speed Search Select]</td><td>0/15</td><td>▪ This parameter is active to prevent any possible fault when the inverter outputs its voltage to the running motor.
<table>
<tr><th></th><th>1. H20- [Power On start]</th><th>2.Restart after instant power failure</th><th>3.Operation after fault occurred</th><th>4.Normal acceler-ation</th></tr>
<tr><td></td><td>Bit 3</td><td>Bit 2</td><td>Bit 1</td><td>Bit 0</td></tr>
<tr><td>0</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>1</td><td>-</td><td>-</td><td>-</td><td>✓</td></tr>
<tr><td>2</td><td>-</td><td>-</td><td>✓</td><td></td></tr>
<tr><td>3</td><td>-</td><td>-</td><td>✓</td><td>✓</td></tr>
<tr><td>4</td><td>-</td><td>✓</td><td>-</td><td>-</td></tr>
<tr><td>5</td><td>-</td><td>✓</td><td>-</td><td>✓</td></tr>
<tr><td>6</td><td>-</td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>7</td><td>-</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>8</td><td>✓</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>9</td><td>✓</td><td>-</td><td>-</td><td>✓</td></tr>
<tr><td>10</td><td>✓</td><td>-</td><td>✓</td><td>-</td></tr>
<tr><td>11</td><td>✓</td><td>-</td><td>✓</td><td>✓</td></tr>
<tr><td>12</td><td>✓</td><td>✓</td><td>-</td><td>-</td></tr>
<tr><td>13</td><td>✓</td><td>✓</td><td>-</td><td>✓</td></tr>
<tr><td>14</td><td>✓</td><td>✓</td><td>✓</td><td>-</td></tr>
<tr><td>15</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
</table></td><td>0</td><td>O</td><td></td></tr>
<tr><td>H23</td><td>[Current level during Speed search]</td><td>80/200 [%]</td><td>▪ This parameter limits the amount of current during speed search.
▪ The set value is the percentage of the H33- [Motor rated current].</td><td>100</td><td>O</td><td></td></tr>
<tr><td>H24</td><td>[P gain during Speed search]</td><td>0/9999</td><td>▪ It is the Proportional gain used for Speed Search PI controller.</td><td>100</td><td>O</td><td></td></tr>
<tr><td>H25</td><td>[I gain during speed search]</td><td>0/9999</td><td>▪ It is the Integral gain used for Speed search PI controller.</td><td>1000</td><td>O</td><td></td></tr>
</table>

2) #4.Normal acceleration has first priority. Even though #4 is selected along with other bits, Inverter starts Speed search #4.

LED display	Parameter Name	Min/Max Range	Description	Factory defaults	Adjustable during run	Page
H26	[Number of Auto Restart try]	0/10	▪ This parameter sets the number of restart tries after a fault occurs. ▪ Auto Restart is deactivated if the fault outnumbers the restart tries. ▪ This function is active when [drv] is set to 1 or 2 {Run/Stop via control terminal}. ▪ Deactivated during active protection function (OHT, LVT, EXT, HWT etc.)	0	O	
H27	[Auto Restart time]	0/60 [sec]	▪ This parameter sets the time between restart tries.	1.0	O	
H30	[Motor type select]	0.2/2.2	0.2 – 0.2 kW 0.4 – 0.4 kW 0.75 – 0.75 kW 1.5 – 1.5 kW 2.2 – 2.2 kW	- 1) Automatically set	X	
H31	[Number of motor poles]	2/12	▪ This setting is displayed via rPM in drive group.	-	X	
H32	[Rated slip frequency]	0/10 [Hz]	▪ $f_s = f_r - \left(\frac{rpm \times P}{120}\right)$ Where, f_s = Rated slip frequency f_r = Rated frequency rpm = Motor nameplate RPM P = Number of Motor poles	- 2) Automatically set	X	
H33	[Motor rated current]	1.0/20 [A]	▪ Enter motor rated current on the nameplate.	-	X	
H34	[No Load Motor Current]	0.1/12 [A]	▪ Enter the current value detected when the motor is rotating in rated rpm after the load connected to the motor shaft is removed. ▪ Enter the 50% of the rated current value when it is difficult to measure H34 - [No Load Motor Current].	-	X	
H36	[Motor efficiency]	50/100 [%]	▪ Enter the motor efficiency (see motor nameplate).	-	X	

LED display	Parameter Name	Min/Max Range	Description	Factory defaults	Adjustable during run	Page
H37	[Load inertia rate]	0/2	▪ Select one of the following according to motor inertia. 0 Less than 10 times that of motor inertia 1 About 10 times that of motor inertia 2 More than 10 times that of motor inertia	0	X	
H39	[Carrier frequency select]	1/15 [kHz]	▪ This parameter affects the audible sound of the motor, noise emission from the inverter, inverter temp, and leakage current. If the value is set higher, the inverter sound is quieter but the noise from the inverter and leakage current will become greater.	3	O	
H40	[Control mode select]	0/3	0 {Volts/frequency Control} 1 {Slip compensation control} 2 {PID Feedback control} 3 {Sensorless vector control}	0	X	
H41	[Auto tuning]	0/1	▪ If this parameter is set to 1, it automatically measures parameters of the H42 and H43.	0	X	
H42	[Stator resistance (Rs)]	0/5.0[Ω]	▪ This is the value of the motor stator resistance.	-	X	
H44	[Leakage inductance (Lσ)]	0/300.0 [mH]	▪ This is leakage inductance of the stator and rotor of the motor.	-	X	
H45 1)	Sensorless P gain	0/32767	▪ P gain for Sensorless control	1000	O	
H46	Sensorless I gain		▪ I gain for Sensorless control	100	O	
H50	[PID Feedback select]	0/1	0 Terminal I input (0 ~ 20 mA) 1 Terminal V1 input (0 ~ 10 V)	0	X	

1) : Set H40 to 2 (PID control) or 3(Sensorless vector control) to display these parameters.

LED display	Parameter Name	Min/Max Range	Description	Factory defaults	Adjustable during run	Page
H51	[P gain for PID controller]	0/999.9 [%]	▪ This parameter sets the gains for the PID controller.	300.0	O	
H52	[Integral time for PID controller (I gain)]	0.1/32.0 [sec]		1.0	O	
H53	Differential time for PID controller (D gain)	0.0 /30.0 [sec]		0.0	O	
H54	F gain for PID controller	0/999.9 [%]	▪ This is the Feed forward gain for the PID controller.	0.0	O	
H55	[PID output frequency limit]	0/400 [Hz]	▪ This parameter limits the amount of the output frequency thru the PID control. ▪ The value is settable within the range of F21 – [Max frequency] and H23 – [Start frequency].	60.0	O	
H70	[Frequency Reference for Accel/Decel]	0/1	0 The Accel/Decel time is the time that takes to reach the F21 – [Max frequency] from 0 Hz. 1 The Accel/Decel time is the time that takes to reach a target frequency from the run frequency.	0	X	
H71	[Accel/Decel time scale]	0/2	0 Settable unit: 0.01 second. 1 Settable unit: 0.1 second. 2 Settable unit: 1 second.	1	O	
H72	[Power on display]	0/13	▪ This parameter selects the parameter to be displayed on the keypad when the input power is first applied. 0 Frequency command 1 Accel time 2 Decel time 3 Drive mode 4 Frequency mode 5 Multi-Step frequency 1	0	O	

LED display	Parameter Name	Min/Max Range	Description	Factory defaults	Adjustable during run	Page
			6 Multi-Step frequency 2 7 Multi-Step frequency 3 8 Output current 9 Motor rpm 10 Inverter DC link voltage 11 User display select 12 Fault display 13 Direction of motor rotation select			
H73	[Monitoring item select]	0/2	▪ One of the following can be monitored via vOL - [User display select]. 0 Output voltage [V] 1 Output power [kW] 2 Torque [kgf · m]	0	O	
H74	[Gain for Motor rpm display]	1/1000 [%]	▪ This parameter is used to change the motor speed display to rotating speed (r/min) or mechanical speed (m/mi). $RPM = \left(\frac{120 \times f}{H31}\right) \times \frac{H74}{100}$	100	O	
H79	[Software version]	0/10.0	▪ This parameter displays the inverter software version.	X.X	X	
H81	[2nd motor Accel time]	0/6000 [sec]	▪ This parameter is active when the selected terminal is ON after I20-I24 is set to 12 {2nd motor select}.	5.0	O	
H82	[2nd motor Decel time]			10.0	O	
H83	[2nd motor base frequency]	30/400 [Hz]		60.0	X	
H84	[2nd motor V/F pattern]	0/2		0	X	
H85	[2nd motor forward torque boost]	0/15 [%]		5	X	
H86	[2nd motor reverse torque boost]		-	5	X	

H87	[2nd motor stall prevention level]	30/150 [%]		150	X	
H88	[2nd motor Electronic thermal level for 1 min]	50/200 [%]		150	O	
H89	[2nd motor Electronic thermal level for continuous]			100	O	
H90	[2nd motor rated current]	0.1/20 [A]		1.8	X	
H93	[Parameter initialize]	0/5	▪ This parameter is used to initialize parameters back to the factory default values. 0 - 1 All parameter groups are initialized to factory default value. 2 Only Drive group is initialized. 3 Only Function group 1 is initialized. 4 Only Function group 2 is initialized. 5 Only I/O group is initialized.	0	X	
H94	[Password register]	0/FFF	▪ Password for H95-[Parameter lock].	0	O	
H95	[Parameter lock]	0/FFF	▪ This parameter is able to lock or unlock parameters by typing password registered in H94. UL (Unlock) Parameter change enable L (Lock) Parameter change disable	0	O	

7.4 I/O Group

LED display	Parameter name	Min/Max range	Description	Factory defaults	Adjustable during run	Page
I 0	[Jump code]	0/63	▪ This parameter sets the code number to jump	1	O	
I 1	[Filter time constant for V0 input]	0/9999	▪ This is used to adjust the analog voltage input signal via keypad potentiometer.	10	O	
I 2	[V0 input Min voltage]	0/10 [V]	▪ Set the minimum voltage of the V0 input.	0	O	
I 3	[Frequency corresponding to I 2]	0/400 [Hz]	▪ Set the inverter output minimum frequency at minimum voltage of the V0 input.	0.0	O	
I 4	[V0 input Max voltage]	0/10 [V]	▪ Set the maximum voltage of the V0 input.	10	O	
I 5	[Frequency corresponding to I 4]	0/400 [Hz]	▪ Set the inverter output maximum frequency at maximum voltage of the V0 input.	60.0	O	
I 6	[Filter time constant for V1 input]	0/9999	▪ Set the input section's internal filter constant for V1 input.	10	O	
I 7	[V1 input Min voltage]	0/10 [V]	▪ Set the minimum voltage of the V1 input.	0	O	
I 8	[Frequency corresponding to I 7]	0/400 [Hz]	▪ Set the inverter output minimum frequency at minimum voltage of the V1 input.	0.0	O	
I 9	[V1 input max voltage]	0/10 [V]	▪ Set the maximum voltage of the V1 input.	10	O	
I10	[Frequency corresponding to I 9]	0/400 [Hz]	▪ Set the inverter output maximum frequency at maximum voltage of the V1 input.	60.0	O	
I11	[Filter time constant for I input]	0/9999	▪ Set the input section's internal filter constant for I input.	10	O	
I12	[I input minimum current]	0/20 [mA]	▪ Set the Minimum Current of I input.	4	O	

LED display	Parameter name	Min/Max range	Description			Factory defaults	Adjustable during run	Page
I13	[Frequency corresponding to I 12]	0/400 [Hz]	▪ Set the inverter output minimum frequency at minimum current of I input.			0.0	O	
I14	[I input max current]	0/20 [mA]	▪ Set the Maximum Current of I input.			20	O	
I15	[Frequency corresponding to I 14]	0/400 [Hz]	▪ Set the inverter output maximum frequency at maximum current of I input.			60.0	O	
I16	[Criteria for Analog Input Signal loss]	0/2	0	Disabled		0	O	
			1	Less than half the value set in I 2/7/12 entered				
			2	Below the value set in I 2/7/12 entered				
I20	[Multi-function input terminal P1 define]	0/24	0	Forward run command {FX}		0	O	
			1	Reverse run command {RX}				
I21	[Multi-function input terminal P2 define]		2	Emergency Stop Trip {EST}		1	O	
			3	Reset when a fault occurs {RST}.				
I22	[Multi-function input terminal P3 define]		4	Jog operation command {JOG}		2	O	
			5	Multi-Step frequency – Low				
I23	[Multi-function input terminal P4 define]		6	Multi-Step frequency – Mid		3	O	
			7	Multi-Step frequency – High				
I24	[Multi-function input terminal P5 define]		8	Multi Accel/Decel – Low		4	O	
			9	Multi Accel/Decel – Mid				
			10	Multi Accel/Decel – High				
			11	DC brake during stop				
			12	2nd motor select				
			13	-				
			14	-				
			15	Up-down operation	Frequency increase command (UP)			

LED display	Parameter name	Min/Max range	Description					Factory defaults	Adjustable during run	Page
			16			Frequency decrease command (DOWN)				
			17	3-wire operation						
			18	External trip: A Contact (EtA)						
			19	External trip: B Contact (EtB)						
			20	-						
			21	Exchange between PID operation and V/F operation						
			22	Exchange between option and Inverter						
			23	Analog Hold						
			24	Accel/Decel Disable						
I25	[Input terminal status display]	-	BIT4	BIT3	BIT2	BIT1	BIT0	-	-	
			P5	P4	P3	P2	P1			
I26	[Output terminal status display]	-	-			BIT1	BIT0	-	-	
			-			30AC	MO			
I27	[Filtering time constant for Multi-function Input terminal]	2/50	▪ If the value is set higher, the response of the Input terminal is getting slower.					15	O	
I30	[Multi-Step frequency 4]	0/400 [Hz]	▪ It cannot be set greater than F21 – [Max frequency].					30.0	O	
I31	[Multi-Step frequency 5]							25.0	O	
I32	[Multi-Step frequency 6]							20.0	O	
I33	[Multi-Step frequency 7]							15.0	O	
I34	[Multi-Accel time 1]	0/6000 [sec]	-					3.0	O	
I35	[Multi-Decel time 1]							3.0		
I36	[Multi-Accel time 2]							4.0		

LED display	Parameter name	Min/Max range	Description	Factory defaults	Adjustable during run	Page
I37	[Multi-Decel time 2]			4.0		
I38	[Multi-Accel time 3]			5.0		
I39	[Multi-Decel time 3]			5.0		
I40	[Multi-Accel time 4]			6.0		
I41	[Multi-Decel time 4]			6.0		
I42	[Multi-Accel time 5]			7.0		
I43	[Multi-Decel time 5]			7.0		
I44	[Multi-Accel time 6]			8.0		
I45	[Multi-Decel time 6]			8.0		
I46	[Multi-Accel time 7]			9.0		
I47	[Multi-Decel time 7]			9.0		
I50	[Analog output item select]	0/3	- Output item: 10[V] Output (200V / 400V) 0 Output frequency: Max frequency 1 Output current: 150 % 2 Output voltage: 282 V 3 DC link voltage: DC 400V	0	O	
I51	[Analog output level adjustment]	10/200 [%]	-	100	O	
I52	[Frequency detection level]	0/400 [Hz]	▪ This parameter is used when I54 – [Multi-function output terminal select] or I55 – [Multi-function relay	30.0	O	

LED display	Parameter name	Min/Max range	Description				Factory defaults	Adjustable during run	Page
I53	[Frequency detection bandwidth]		select] are set to 0-4. ▪ It cannot be set greater than F21 – [Max frequency].				10.0	O	
I54	[Multi-function output terminal select]	0/17	0	FDT-1			12	O	
			1	FDT-2					
I55	[Multi-function relay select]		2	FDT-3			17		
			3	FDT-4					
			4	FDT-5					
			5	Overload {OL}					
			6	Inverter Overload {IOL}					
			7	Motor stall {STALL}					
			8	Over voltage trip {OV}					
			9	Low voltage trip {LV}					
			10	Inverter heatsink overheat {OH}					
			11	Command loss					
			12	During run					
			13	During stop					
			14	During constant run					
			15	During speed searching					
			16	Wait time for run signal input					
			17	Fault relay output					
I56	[Fault relay output]	0/7		When setting the H26– [Number of auto restart try]	When the trip other than low voltage trip occurs	When the low voltage trip occurs	2	O	
				Bit 2	Bit 1	Bit 0			
			0	-	-	-			
			1	-	-	✓			
			2	-	✓	-			
			3	-	✓	✓			
			4	✓	-	-			
			5	✓	-	✓			
			6	✓	✓	-			
			7	✓	✓	✓			

I60	[Inverter station number]	1/32	▪ This parameter is set when the inverter uses RS485 communication.	1	O	
I61	[Baud rate]	0/4	▪ Select the Baud rate of the RS485 0: 1200 bps 1: 2400 bps 2: 4800 bps 3: 9600 bps 4: 19200 bps	3	O	
I62	[Drive mode select after loss of frequency command]	0/2	▪ It is used when frequency command is given via V1 and I terminal or communication option. 0: Continuous operation 1: Free Run stop (Coast to stop) 2: Decel to stop	0	O	
I63	[Wait time after loss of frequency command]	[sec]	▪ This is the time inverter determines whether there is the input frequency command or not. If there is no frequency command input during this time, inverter starts operation via the mode selected at I62.	1.0	-	

MEMO

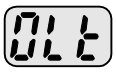
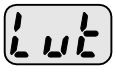
8. Troubleshooting and Maintenance

8.1 Protective Functions

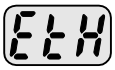
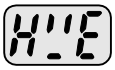
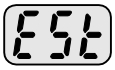
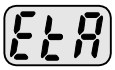
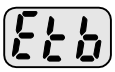
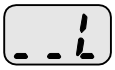
⚠ WARNING

When a fault occurs, the cause must be corrected before the fault can be cleared. If protective function keeps active, it could lead to reduction in product life and damage to the equipment.

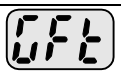
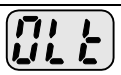
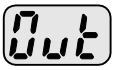
Fault Display and information

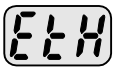
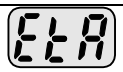
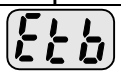
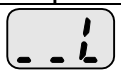
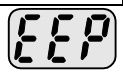
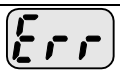
Keypad display	Protective functions	Descriptions
	Overcurrent	The inverter turns off its output when the output current of the inverter flows more than 200% of the inverter rated current.
	Ground fault current	The inverter turns off its output when a ground fault occurs and the ground fault current is more than the internal setting value of the inverter.
	Inverter Overload	The inverter turns off its output when the output current of the inverter flows more than the rated level (150% for 1 minute).
	Overload trip	The inverter turns off its output if the output current of the inverter flows at 150% of the inverter rated current for more than the current limit time (1 min).
	Heat sink overheat	The inverter turns off its output if the heat sink overheats due to a damaged cooling fan or an alien substance in the cooling fan by detecting the temperature of the heat sink.
	DC link capacitor overload	The inverter turns off its output when it is time to replace the old DC link capacitor to a new one.
	Output Phase loss	The inverter turns off its output when the one or more of the output (U, V, W) phase is open. The inverter detects the output current to check the phase loss of the output.
	Over voltage	The inverter turns off its output if the DC voltage of the main circuit increases higher than 400 V when the motor decelerates. This fault can also occur due to a surge voltage generated at the power supply system.
	Low voltage	The inverter turns off its output if the DC voltage is below 180V because insufficient torque or overheating of the motor can occur when the input voltage of the inverter drops.

Fault Display and information

Keypad display	Protective functions	Descriptions
	Electronic Thermal	The internal electronic thermal of the inverter determines the overheating of the motor. If the motor is overloaded the inverter turns off the output. The inverter cannot protect the motor when driving a motor having more than 4 poles or multi motors.
	Parameter save error	This fault message is displayed when user-setting parameters fails to be entered into memory.
	Inverter hardware fault	This fault message is displayed when an error occurs in the control circuitry of the inverter.
	Communication Error	This fault message is displayed when the inverter cannot communicate with the keypad.
	Cooling fan fault	This fault message is displayed when a fault condition occurs in the inverter cooling fan.
	Instant cut off	Used for the emergency stop of the inverter. The inverter instantly turns off the output when the EST terminal is turned on. ☞ **Caution :** The inverter starts to regular operation when turning off the Est terminal while FX or RX terminal is ON.
	External fault A contact input	When multi-function input terminal (I20-I24) is set to 19 {External fault signal input : A (Normal Open Contact)}, the inverter turns off the output.
	External fault B contact input	When multi-function input terminal (I20-I24) is set to 19 {External fault signal input : B (Normal Close Contact)}, the inverter turns off the output..
	Operating method when the frequency command is lost	When inverter operation is set via Analog input (0-10V or 0-20mA input) or option (RS485) and no signal is applied, operation is done according to the method set in I62 (Operating method when the frequency reference is lost).

8.2 Fault Remedy

Protective functions	Cause	Remedy
 Overcurrent	☞ **Caution:** **When an overcurrent fault occurs, operation must be started after the cause is removed to avoid damage to IGBT inside the inverter.**	
	● Accel / Decel time is too short compared to the GD^2 of the load. ● Load is greater than the inverter rating. ● Inverter output is issued when the motor is free running. ● Output short circuit or ground fault has occurred. ● Mechanical brake of the motor is operating too fast.	☞ Increase the Accel/ Decel time. ☞ Replace the inverter with appropriate capacity. ☞ Resume operation after stopping the motor or use H22 (Speed search) in Function group 2. ☞ Check output wiring. ☞ Check the mechanical brake.
 Ground fault current	● Ground fault has occurred at the output wiring of the inverter. ● The insulation of the motor is damaged due to heat.	☞ Check the wiring of the output terminal. ☞ Replace the motor.
 Inverter overload  Overload trip	● Load is greater than the inverter rating. ● Inverter capacity is incorrectly selected. ● Torque boost scale is set too large.	☞ Upgrade the capacity of motor and inverter or reduce the load weight. ☞ Select correct inverter capacity. ☞ Reduce torque boost scale.
 Heat sink overheat	● Cooling system has faults. ● An old cooling fan is not replaced with a new one. ● Ambient temperature is too high.	☞ Check for alien substances clogged in the heat sink. ☞ Replace the old cooling fan with a new one. ☞ Keep ambient temperature under 40°C.
 Output Phase loss	● Faulty contact of magnetic switch at output ● Faulty output wiring	☞ Make connection of magnetic switch at output of the inverter securely. ☞ Check output wiring.
 Cooling fan fault	● An alien substance is clogged in a ventilating slot. ● Inverter has been in use without changing a cooling fan.	☞ Check the ventilating slot and remove the clogged substances. ☞ Replace the cooling fan.
 Over voltage	● Decel time is too short compared to the GD^2 of the load. ● Regenerative load is at the inverter output.	☞ Increase the Decel time. ☞ Use Dynamic Brake Unit.

Protective functions	Cause	Remedy
	● Line voltage is too high.	☞ Check whether line voltage exceeds its rating.
 Low voltage	● Line voltage is low. ● Load larger than line capacity is connected to line (ex: welding machine, motor with high starting current connected to the commercial line). ● Faulty magnetic switch at the input side of the inverter.	☞ Check whether line voltage is below its rating. ☞ Check the incoming AC line. Adjust the line capacity corresponding to the load. ☞ Change a magnetic switch.
 Electronic thermal	● Motor has overheated. ● Load is greater than inverter rating. ● ETH level is set too low. ● Inverter capacity is incorrectly selected. ● Inverter has been operated at low speed for too long.	☞ Reduce load weight and operating duty. ☞ Change inverter with higher capacity. ☞ Adjust ETH level to an appropriate level. ☞ Select correct inverter capacity. ☞ Install a cooling fan with a separate power supply.
 External fault A contact input	● The terminal which is set to “18 (External fault-A)” or “19 (External fault-B)” in I20-I24 in I/O group is ON.	☞ Eliminate the cause of fault at circuit connected to external fault terminal or cause of external fault input.
 External fault B contact input		
 Operating method when the frequency command is lost	● No frequency command is applied to V1 and I.	☞ Check the wiring of V1 and I and frequency reference level.
 Parameter save error  Hardware fault  Communication Error		☞ Contact your local LSIS sales representative.

8.3 Precautions for Maintenance and Inspection

CAUTION

- Make sure to remove the input power while performing maintenance.
- Make sure to perform maintenance after checking the DC link capacitor has discharged. The bus capacitors in the inverter main circuit can still be charged even after the power is turned off. Check the voltage between terminal P or P1 and N using a tester before proceeding.
- SV-iC5 series inverter has ESD (Electrostatic Discharge) sensitive components. Take protective measures against ESD before touching them for inspection or installation.
- Do not change any inner parts and connectors. Never modify the inverter.

8.4 Check Points

- Daily inspections
  - ✓ Proper installation environment
  - ✓ Cooling system fault
  - ✓ Unusual vibration and noise
  - ✓ Unusual overheating and discoloration
- Periodic inspection
  - ✓ Screws and bolts may become loose due to vibration, temperature changes, etc.
    - ☞ Check that they are tightened securely and retighten as necessary.
  - ✓ Alien substances are clogged in the cooling system.
    - ☞ Clean it using the air.
  - ✓ Check the rotating condition of the cooling fan, the condition of capacitors and the connections with the magnetic contactor.
    - ☞ Replace them if there are any abnormalities.

8.5 Part Replacements

The inverter consists of many electronic parts such as semiconductor devices. The following parts may deteriorate with age because of their structures or physical characteristics, leading to reduced performance or failure of the inverter. For preventive maintenance, the parts must be changed periodically. The parts replacement guidelines are indicated in the following table. Lamps and other short-life parts must also be changed during periodic inspection.

Part name	Change period (unit: Year)	Description
Cooling fan	3	Exchange (as required)
Smoothing capacitor in main circuit	4	
Smoothing capacitor on control board	4	
Relays	-	

9. Specifications

9.1 Technical Data

- Input and output ratings

Model : SV xxx iC5 – 1x		004	008	015	022
Max motor capacity[1]	[HP]	0.5	1	2	3
	[kW]	0.4	0.75	1.5	2.2
Output ratings	Capacity [kVA][2]	0.95	1.9	3.0	4.5
	FLA [A]	2.5	5	8	12
	Frequency	0 ~ 400 [Hz][3]			
	Voltage	Three Phase 200 ~ 230V[4]			
Input ratings	Voltage	Single Phase 200 ~ 230V (±10%)			
	Frequency	50 ~ 60 [Hz] (±5%)			
	Current	5.5	9.2	16	21.6

- Control

Control mode	V/F control, Sensorless vector control
Frequency setting resolution	Digital: 0.01Hz Analog: 0.06Hz (Max. frequency : 60Hz)
Accuracy of Frequency command	Digital: 0.01% of Max. output frequency Analog: 0.1% of Max. output frequency
V/F Ratio	Linear, Squared Pattern, User V/F
Overload capacity	Software: 150% for 60 s
Torque boost	Auto/Manual torque boost

- Operation

Operation mode		Keypad/ Terminal/ Communication option selectable
Frequency setting		Analog: 0 ~ 10[V], 0 ~ 20[mA], Keypad Potentiometer Digital : Keypad
Operation features		PID control, Up-Down operation, 3-wire operation
Input	Multi-function terminal	NPN/ PNP selectable Function: (refer to page 3-5)

[1] Indicates the maximum applicable motor capacity when using a 4-pole standard motor.
[2] Rated capacity is based on 220V.
[3] Max. settable freq is 300Hz when H30 is set to 3 “Sensorless Vector Control”.
[4] Max. output voltage will not be greater than the input voltage. Output voltage less than the input voltage can be programmed.

Output	Multi-function open collector terminal	Operating status and Fault output (N.O., N.C.)	Below DV 24V 50mA
	Multi-function relay terminal		(N.O., N.C.) Below AC250V 0.3A, Below DC 30V 1A
	Analog output	0 ~ 10 Vdc : Frequency, Current, Voltage, DC link voltage selectable	

- Protective functions

Inverter Trip	Over-voltage, Under-voltage, Over-current, Ground fault current detection, Over-temperature of inverter and motor, Output phase open, Overload, Communication error, Loss of frequency command, H/W fault
Alarm Conditions	Stall prevention, Overload
Momentary power loss	Less than 15 msec : Continuous operation More than 15 msec : Auto Restart enable

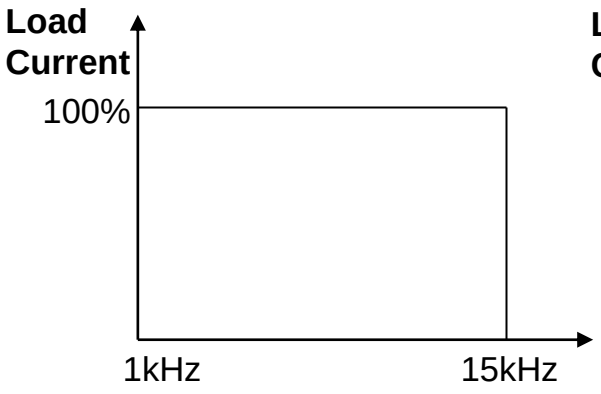
- Environment

Cooling method	Forced air cooling
Degree of protection	Open, Pollution degree 2
Ambient temperature	-10°C ~ +50°C
Storage temperature	-20°C ~ +65°C
Relative humidity	Less than 90% (no condensation)
Altitude, Vibration	1,000m above sea level, Max. 5.9m/sec^2 (0.6G)
Application site	Protected from corrosive gas, combustible gas, oil mist or dust

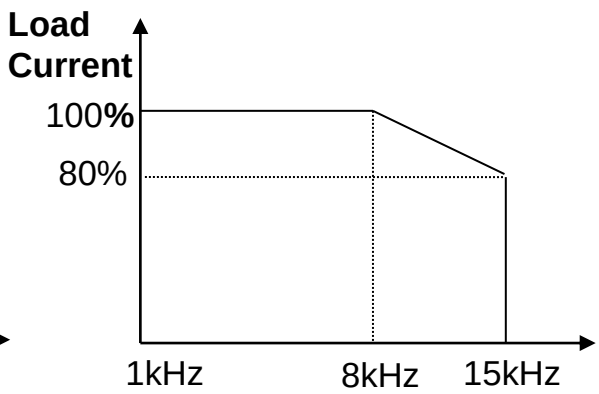
9.2 Temperature Derating Information

◆ Load current VS Carrier frequency

▶ **For 0.4kW, 0.8kW, 1.5kW inverter**



▶ **For 2.2kW inverter**



☞ Note :

1. The above graph is applied when inverter is in use within the permissible ambient temp. If the unit is installed in a panel, install it where heat dissipation is properly done to keep the panel ambient temperature within permissible range.
2. This derating curve is based on inverter current rating when rated motor is connected.

MEMO

DECLARATION OF CONFORMITY

Council Directive(s) to which conformity is declared:

CD 73/23/EEC and CD 89/336/EEC

Units are certified for compliance with:

EN 50178:1998
EN 50081-2:1993
EN 55011:1998+A1:1999
EN 50082-2:1995
EN 61000-4-2:1995+A1:1998
EVN 50140:1993(EN 61000-4-3:1995)
EVN 50204:1995
EN 61000-4-4:1995
EN 61000-4-5:1995
ENV 50141:1993(EN 61000-4-6:1996)
EN 61000-4-8:1993
EN 61000-4-11:1994

Type of Equipment:	Inverter (Power Conversion Equipment)
Model Name:	**SV - iC5 Series**
Trade Mark:	**LSIS Co., Ltd.**
Representative:	**LG International (Deutschland) GmbH**
Address:	**Lyoner Strasse 15, 60528, Frankfurt am Main, Germany**
Manufacturer:	**LSIS Co., Ltd.**
Address:	**181, Samsung-Ri, Mokchon-Eup, Chonan, Chungnam, 330-845, Korea**

We, the undersigned, hereby declare that equipment specified above conforms to the Directives and Standards mentioned.

Place :	**Frankfurt am Main Germany**	**Chonan, Chungnam, Korea**
	I. S. Yang 02.12.16	송 진 구 02.12.12
	(signature/date)	(signature/date)
	Mr. Ik-Seong Yang / Dept. Manager (Full name / Position)	Mr. Jin-Gu Song / General Manager (Full name / Position)

TECHNICAL STANDARDS APPLIED

The standards applied in order to comply with the essential requirements of the Directives 73/23/EEC "Electrical material intended to be used with certain limits of voltage" and 89/336/EEC "Electromagnetic Compatibility" are the following ones:

• **EN 50178:1998**	"Electronic equipment for use in power installations".
• **EN 50081-2:1993**	"Electromagnetic compatibility-Generic emission standard. Part 2 : Industrial environment."
• **EN 55011:1998+A1:1999**	"Industrial, scientific and medical(ISM) radio-frequency equipment Radio disturbance characteristics-Limits and methods of measurement."
• **EN 50082-2:1995**	"Electromagnetic compatibility-Generic immunity standard. Part 2: Industrial environment."
• **EN 61000-4-2:1995+A1:1998**	"Electromagnetic compatibility (EMC). Part 4-2: Testing and measurement techniques. Electrostatic discharge immunity test."
• **EN 61000-4-3:1995**	"Electromagnetic compatibility (EMC). Part 4-3: Testing and measurement techniques. Radiated, radio-frequency,electromagnetic field immunity test."
• **EN 61000-4-4:1995**	"Electromagnetic compatibility (EMC). Part 4-4: Testing and measurement techniques. Electrical fast transients / burst immunity test."
• **EN 61000-4-5:1995**	"Electromagnetic compatibility (EMC). Part 4-5: Testing and measurement techniques. Surge immunity test."
• **EN 61000-4-6:1996**	"Electromagnetic compatibility (EMC). Part 4-6: Testing and measurement techniques. Immunity to conducted disturbances, induced by radio-frequency fields."
• **EN 61000-4-8:1993**	"Electromagnetic compatibility (EMC). Part 4-8: Testing and measurement techniques. Power frequency magnetic field immunity test."
• **EN 61000-4-11:1994**	"Electromagnetic compatibility (EMC). Part 4-11: Testing and measurement techniques. Voltage dips, short interruptions and voltage variations immunity test."
• **ENV 50140:1993**	"Electromagnetic compatibility - Basic immunity standard - Radiated radio- frequency electro magnetic field - Immunity test."
• **ENV 50141:1993**	"Electromagnetic compatibility. Basic immunity standard. Conducted disturbances induced by radio-frequency fields."
• **ENV 50204:1995**	"Radio electromagnetic field from digital radio telephones."

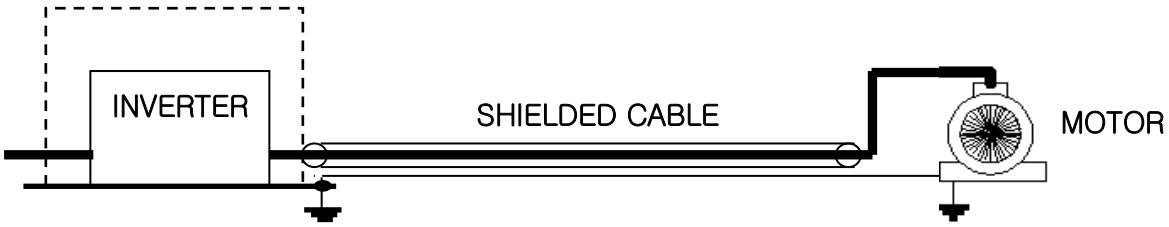
EMC INSTALLATION GUIDE

LS inverters are tested to meet Electromagnetic Compatibility (EMC) Directive 89/336/EEC and Low Voltage (LV) Directive 73/23/EEC using a technical construction file. However, Conformity of the inverter with CE EMC requirements does not guarantee an entire machine installation complies with CE EMC requirements. Many factors can influence total machine installation compliance.

Essential Requirements for CE Compliance

Following conditions must be satisfied for LS inverters to meet the CE EMC requirements.

1. CE compatible LS inverter
2. Installing inverter in an EMC enclosure
3. Grounding enclosure and shielded parts of wire
4. Using shielded cable
5. Use it under industrial environment.
6. It is important that all lead lengths are kept as short as possible and that incoming mains and outgoing motor cables are kept well separated.



No	Models	Description	Interface Module1*	Interface Module 2**	CE Mark	
					EMC	LVD
1	SV004iC5-1F	AC Drive, 0.5HP, 220V, 1 phase	-	-	Yes	1
2	SV008iC5-1F	AC Drive, 1HP, 220V, 1 phase	-	-	Yes	2
3	SV015iC5-1F	AC Drive, 2HP, 220V, 1 phase	-	-	Yes	3
4	SV022iC5-1F	AC Drive, 3HP, 220V, 1 phase	-	-	Yes	4
5	SV004iC5-1	AC Drive, 0.5HP, 220V, 1 phase	10120001681	10120001677	Yes	5
6	SV008iC5-1	AC Drive, 1HP, 220V, 1 phase	10120001682	10120001678	Yes	6
7	SV015iC5-1	AC Drive, 2HP, 220V, 1 phase	10110001458	09710000110	Yes	7
8	SV022iC5-1	AC Drive, 3HP, 220V, 1 phase	10110001458	09710000110	Yes	8

- Models No. 1, 2, 3 and 4 are EMC Filters integrated and compliant with CE.
- EMC Filters are not provided for models No. 5, 6, 7 and 8. They should be provided with Interface Module 2 for CE compliance.

***** Module 1: Non-Filter Type PCB Assembly
** Module 2: Filter Type PCB Assembly

UL Marking

1. SHORT CIRCUIT RATING

The drive is suitable for use in a circuit capable of delivering not more than 5,000A RMS at the drive's maximum rated voltage.
(L'entraînement convient pour une utilisation dans un circuit capable de délivrer pas plus de 5,000A RMS à la tension nominale maximale de l'entraînement.)

2. SHORT CIRCUIT FUSE/BREAKER MARKING

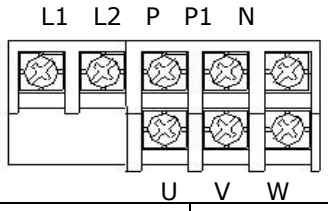
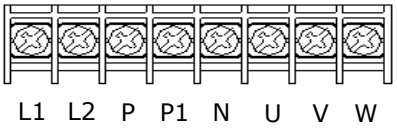
Use Class H or RK5 UL listed Input fuses and UL listed breakers ONLY. See the table above for the voltage and current ratings for the fuses and breakers.
(Utiliser UNIQUEMENT des fusibles d'entrée homologués de Classe H ou RK5 UL et des disjoncteurs UL. Se reporter au tableau ci-dessus pour la tension et le courant nominal des fusibless et des disjoncteurs.)

Voltage and current, fuse Class

Input Voltage	Motor [kW]	Inverter	Input Fuse		Breaker	
			Current [A]	Voltage [V]	Current [A]	Voltage [V]
200	0.4	SV004iC5	10	500	15	220VAC
	0.75	SV008iC5	20	500	20	220VAC
	1.5	SV015iC5	30	500	30	220VAC
	2.2	SV022iC5	40	500	40	220VAC

3. FIELD WIRING TERMINAL

1) Use copper wires only with 75℃ ratings for wiring.
   (Utiliser uniquement des fils de cuivre avec une valeur nominale de 75 ℃ pour le câblage de la borne d'alimentation.)
2) Tightening torque

MODEL	SV004iC5-1	SV008iC5-1	SV015iC5-1	SV022iC5-1
Terminal				
Tightening Torque	9 lb-in	9 lb-in	15 lb-in	15 lb-in

EAC mark

The EAC (EurAsian Conformity) mark is applied to the products before they are placed on the market of the Eurasian Customs Union member states.
It indicates the compliance of the products with the following technical regulations and requirements of the Eurasian Customs Union:
Technical Regulations of the Customs Union 004/2011 “On safety of low voltage equipment”
Technical Regulations of the Customs Union 020/2011 “On electromagnetic compatibility of technical products”

Revision History

No.	Revision	Date	Remarks
1	First Edition	2002. 12	S/W Version: 1.3
2	S/W version update	2003. 10	S/W Version: 1.5
3	S/W version update	2004. 5	S/W Version: 1.8
4	S/W version update	2005. 6	S/W Version: 1.9

WARRANTY

Maker	LSIS Co., Ltd	Installation (start-up) date	
Model No.	SV-iC5	Warranty period	
Customer info	Name		
	Address		
	Tel.		
Sales office	Name		
	Address		
	Tel.		

Note

This product has been manufactured through the strict QC control and inspection of LSIS. Warranty period is 12 months after installation or 18 months after manufactured when the installation date is unidentified. However, the guarantee term may vary on the sales term.

◆ In-warranty service information

- If the defective part has been identified under normal and proper use within the guarantee term, contact your local authorized LS distributor or LS Service center.

◆ Out-of-warranty service information

- The guarantee will not apply in the following cases.
- Troubles are attributable to a user's intentional negligence or carelessness.
- Damage was caused by abnormal voltage and peripheral devices' malfunction (failure).
- Damage was caused by natural disasters(earthquake, fire, flooding, lightning and etc).
- When LS nameplate is not attached.