0.75~75kW(200V), 0.75~375kW(400V)

AC Variable Speed Drive

iS7 Troubleshooting Manual

⚠ Safety Instructions

Read this manual carefully before servicing or inspecting this equipment.

Keep this manual within easy reach for quick reference.

Quick Reference Table

The following table contains situations frequently encountered by users while working with inverters. Refer to the typical and practical situations in the table to quickly and easily locate answers to your questions.

Situation	Reference
The motor is too noisy.	P. 35
I want to review recent fault trip and warning histories.	P. 18
The motor runs too hot.	P. 32
The cooling fan does not work.	P. 36
I want to know how can I keep the inverter when I don`t use it.	P. 47
ERR message is displaying on keypad.	P. 21
I want to initialize the parameter.	P. 16
I want to scrap the inverter.	P. 47
I want to review the input/output module.	P. 41
I want to change the FAN when it exceed replacement period	P. 45
I want to change the carrier frequency.	P. 14
I cannot set the parameter.	P. 31
The motor does not work.	P. 35
The motor stop when it accelerate the speed or connect the load.	P. 33

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Introduction

Manual Composition

1 Basic Checklist

1.1 Before You Think It Is Failure

1.2 Basic Operations

1.3 Parameter Change
1.3.1 Carrier Frequency Change
1.3.2 Initializing All Parameters
1.3.3 Read and Write Parameters

1.4 Fault Trip Monitoring

When the problem of inverter occur, you can check the basic checklist before you think it is failure in these pages.

check the set-up of parameter using basic operations first and then check the trip record.

2 Troubleshooting

There are troubleshooting fault trips & other faults in these pages.

If problems are not resolved, please contact your vendor or LSIS.

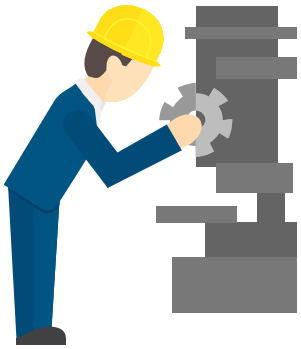
2.1 Trips and Warnings
2.1.1 Fault/Warning List
2.1.2 Troubleshooting Fault Trips

2.2 Troubleshooting Other Fault

3 Maintenance

3.1 Regular Inspection Lists
3.1.1 Daily Inspections
3.1.2 Annual inspections
3.1.3 Bi-annual Inspections
3.1.4 Checking the Input/Output Modules
3.1.5 Replacement of the cooling fan

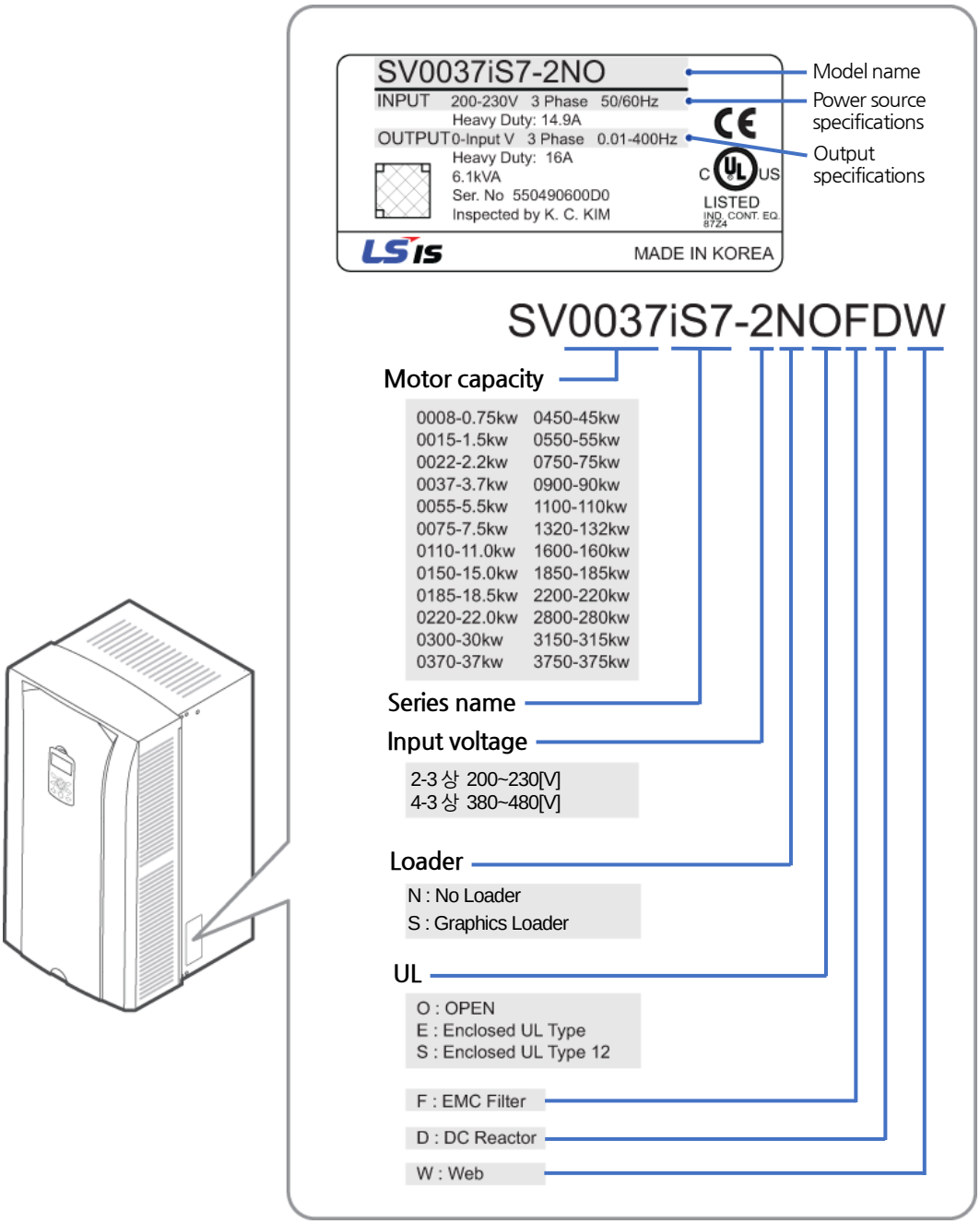
3.2 Storage and disposal
3.2.1 Storage
3.2.2 Disposal



There are the regular inspection lists in these pages.

When the problem of inverter occur, please check the input/output module that is basic hardware check method.

Product Identification



Association Manual

iS7 user manual can be download through the homepage of LSIS.

Link : http://www.lsis.com/support/download/

Safety Information

Read and follow all safety instructions in this manual precisely to avoid unsafe operating conditions, property damage, personal injury, or death.

Safety symbols in this manual

⚠ Danger

Indicates an imminently hazardous situation which, if not avoided, will result in severe injury or death.

⚠ Warning

Indicates a potentially hazardous situation which, if not avoided, could result in injury or death

Caution

Indicates a potentially hazardous situation that, if not avoided, could result in minor injury or property damage.

Safety information

⚠ **위험**

- Do not open the cover of the equipment while it is on or operating. Likewise, do not operate the inverter while the cover is open. Exposure of high voltage terminals or charging area to the external environment may result in an electric shock. Do not remove any covers or touch the internal circuit boards (PCBs) or electrical contacts on the product when the power is on or during operation. Doing so may result in serious injury, death, or serious property damage.
- Do not open the cover of the equipment even when the power supply to the inverter has been turned off unless it is necessary for maintenance or regular inspection. Opening the cover may result in an electric shock even when the power supply is off.
- The equipment may hold charge long after the power supply has been turned off. Use a multi-meter to make sure that there is no voltage before working on the inverter, motor or motor cable.

⚠ Warning

- This equipment must be grounded for safe and proper operation.
- Do not supply power to a faulty inverter. If you find that the inverter is faulty, disconnect the power supply and have the inverter professionally repaired.
- The inverter becomes hot during operation. Avoid touching the inverter until it has cooled to avoid burns.
- Do not allow foreign objects, such as screws, metal chips, debris, water, or oil to get inside the inverter. Allowing foreign objects inside the inverter may cause the inverter to malfunction or result in a fire.
- Do not operate the inverter with wet hands. Doing so may result in electric shock.

Caution

- Do not modify the interior workings of the inverter. Doing so will void the warranty.
- The inverter is designed for 3-phase motor operation. Do not use the inverter to operate a single phase motor.
- Do not place heavy objects on top of electric cables. Doing so may damage the cable and result in an electric shock.

Revision Record

Version	Date	Changed main contents	Association page
V1.0	2015.07	First edition	-

1 Basic Checklist

1.1 Before You Think It Is Failure

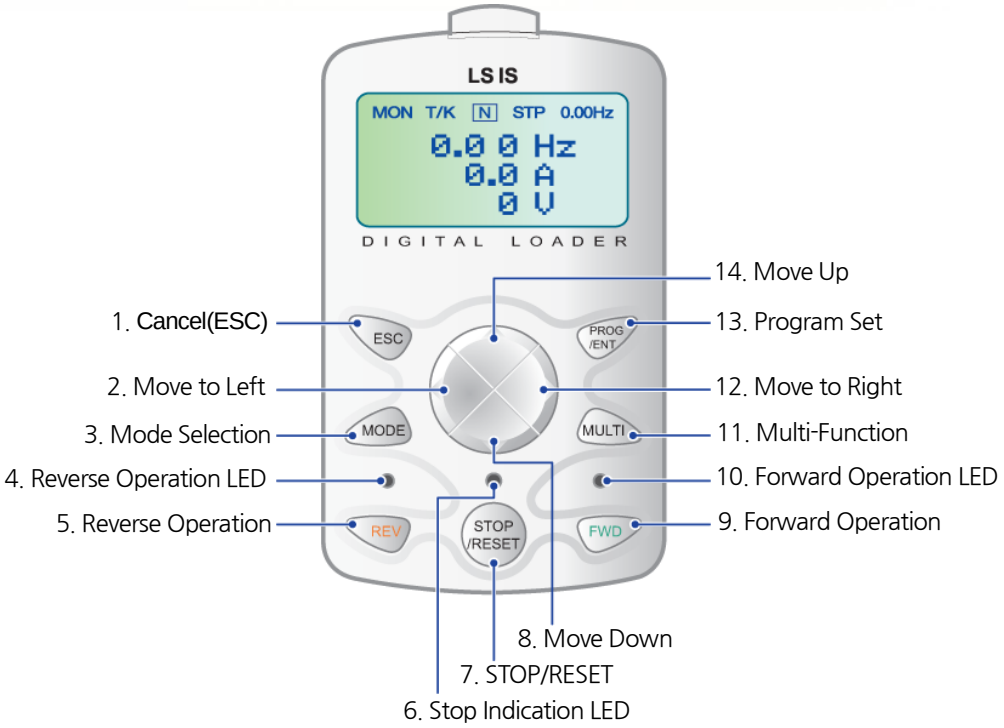
Items	Check Point	Result
Installation Location/ Input/Output voltage	Is the installation location appropriate?	
	Does the environment meet the inverter's operating conditions?	
	Does the power source match the inverter's rated input?	
	Is the inverter's rated output sufficient to supply the equipment?	
Power Terminal Wiring	Is a circuit breaker installed on the input side of the inverter?	
	Is the circuit breaker correctly rated?	
	Are the power source cables correctly connected to the R/S/T terminals of the inverter? (Caution: connecting the power source to the U/V/W terminals may damage the inverter.)	
	Are the motor output cables connected in the correct phase rotation (U/V/W)? (Caution: motors will rotate in reverse direction if three phase cables are not wired in the correct rotation.)	
	Are the cables used in the power terminal connections correctly rated?	
	Is the inverter grounded correctly?	
	Are the power terminal screws and the ground terminal screws tightened to their specified torques?	
	Are the overload protection circuits installed correctly on the motors (if multiple motors are run using one inverter)?	
	Is the inverter separated from the power source by a magnetic contactor (if a braking resistor is in use)?	
	Are advanced-phase capacitors, surge protection and electromagnetic interference filters installed correctly? (These devices MUST not be installed on the output side of the inverter.)	

Items	Check Point	Result
Control Terminal Wiring	Are STP (shielded twisted pair) cables used for control terminal wiring?	
	Is the shielding of the STP wiring properly grounded?	
	If 3-wire operation is required, are the multi-function input terminals defined prior to the installation of the control wiring connections?	
	Are the control cables properly wired?	
	Are the control terminal screws tightened to their specified torques?	
	Is the total cable length of all control wiring < 165ft (50m)?	
	Is the total length of safety wiring < 100ft (30m)?	
Miscellaneous	Are optional cards connected correctly?	
	Is there any debris left inside the inverter?	
	Are any cables contacting adjacent terminals, creating a potential short circuit risk?	
	Are the control terminal connections separated from the power terminal connections?	
	Have the capacitors been replaced if they have been in use for > 2 years?	
	Has a fuse been installed for the power source?	
	Are the connections to the motor separated from other connections?	

1.2 Basic Operations

■ Key Functions

Refer to the following illustration to identify part names and functions



■ Operation Keys

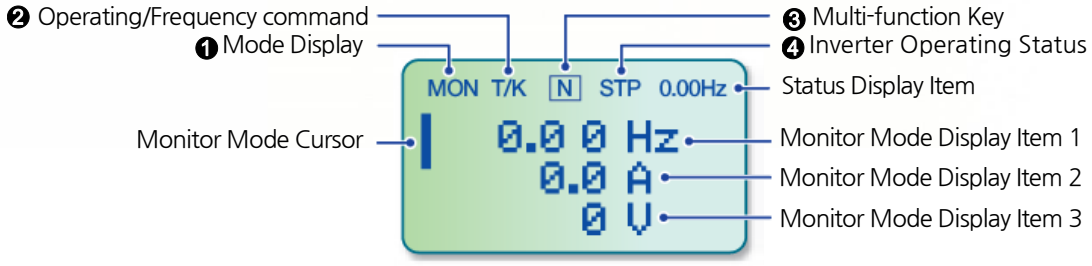
The following table lists the names and functions of the keypad's operation keys.

Key	Key Name	Function Description
MODE	Mode Key	- Change Mode
PROG /ENT	Program Key	- If the button is pressed once, the parameter can be edited at the status of editable parameter code. If the button is pressed after modification, it saves the modified data.
	Up key	- Used when writing data or move codes.
	Down Key	
	Left/Right Key	- Movement among groups. - Movement of cursor in writing.
MULTI	Multi-Function Key	- Register Jog or User codes.
ESC	Cancel Key	- In writing to the drive, it is possible to use saved data previously if this button is pressed before the pressing Program Key. - Move to first code when code moving is required in a group. - Move to Monitor mode when Mode moving.
FWD	Forward Key	- Motor rotates in forward direction.

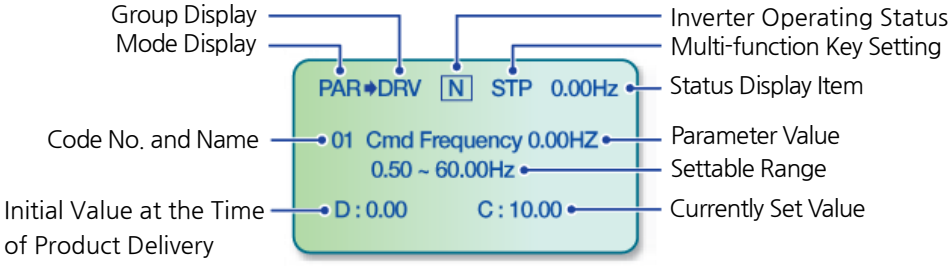
	Reverse Key	- Motor rotates in reverse direction.
	Stop/Reset Key	- Stop during operating. - Trip release after a trip occurs.

■ Composition of Display

(1) Monitor Mode



(2) Parameter change display



■ Display Item List

The following table lists the functions and description of the keypad displays characters.

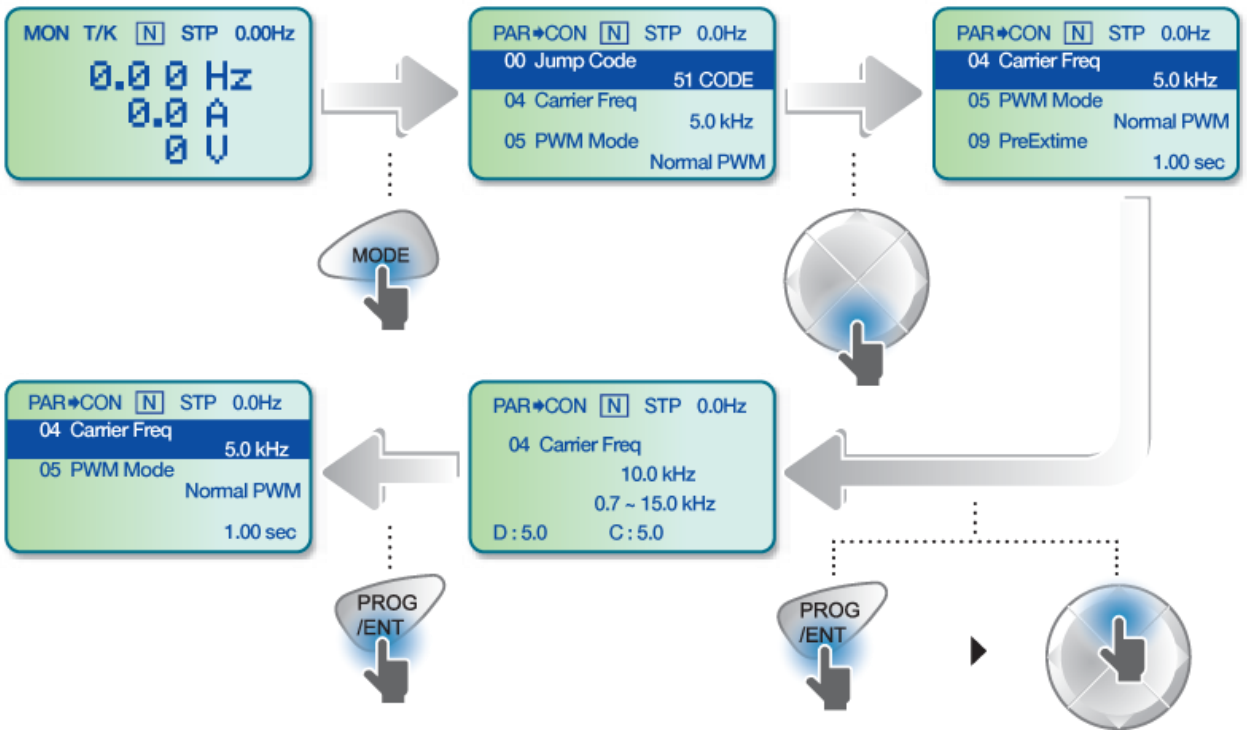
No.	Function	Display	Description
1	Mode Display	MON	Monitor Mode
		PAR	Parameter Mode
		U&M	USR & Macro Mode
		TRP	Trip Mode
		CNF	Config Mode
2	Operating Command	K	Keypad operation command
		O	FieldBus communication option operation command
		A	Application option operation command
		R	Built-in 485 operation command
		T	Terminal block operation command
2	Frequency Command	K	Keypad frequency command
		V	V1 input frequency command
		I	I1 input frequency command
		P	Pulse input frequency command
		U	Frequency command during UP operation (Up-Down operation)
		D	Frequency command during DOWN operation (Up-Down operation)
		S	Frequency command during STOP operation (Up-Down operation)

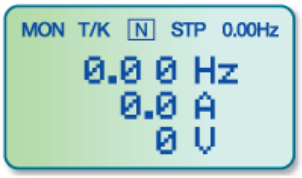
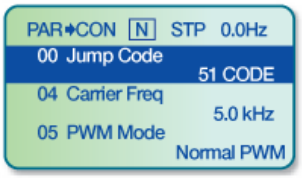
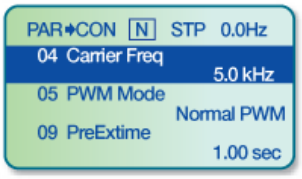
		O	FBus Option frequency command
		X	V2, I2 frequency command of sub-terminal block
		J	Jog frequency command
		R	Internal 485 frequency command
		1~9 A~F	Sequential frequency command
3	Multi Function Key Setting	JOG Key	Used for shift to Keypad JOG mode
		Local/Remote	Used to select local or remote operation
		UserGrp SelKey	Used to register parameters as a user group in the parameter mode or delete parameters in the user group.
4	Inverter Operating Status	STP	Motor stopped
		FWD	Operating forward
		REV	Operating reversely
		DC	DC outputting
		WAN	Warning
		STL	Stalling
		SPS	Speed Searching
		OSS	Software Over Current controlled
		OSH	Hardware OverCurrent controlled
		TUN	Auto Tuning

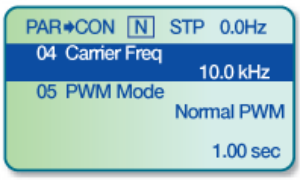
1.3 Parameter Change

1.3.1 Carrier Frequency Change

The following example demonstrates how to configure Carrier Frequency by modifying CON group 04 code(Carrier Frequency) from 5.00(Hz) to 10.00(Hz). You can configure the parameters for different codes in any other group in exactly the same way.



Step	Instruction	Keypad Display
1	Monitor Mode is displayed.	
2	Shift to CON by using Mode key.	
3	Shift to code 04 using Down key. Press PROG.	

4	Change the Carrier Frequency to 10 using Up key. Press ENT.	
5	The display come back to the initialization selection after finishing Carrier Frequency Change	

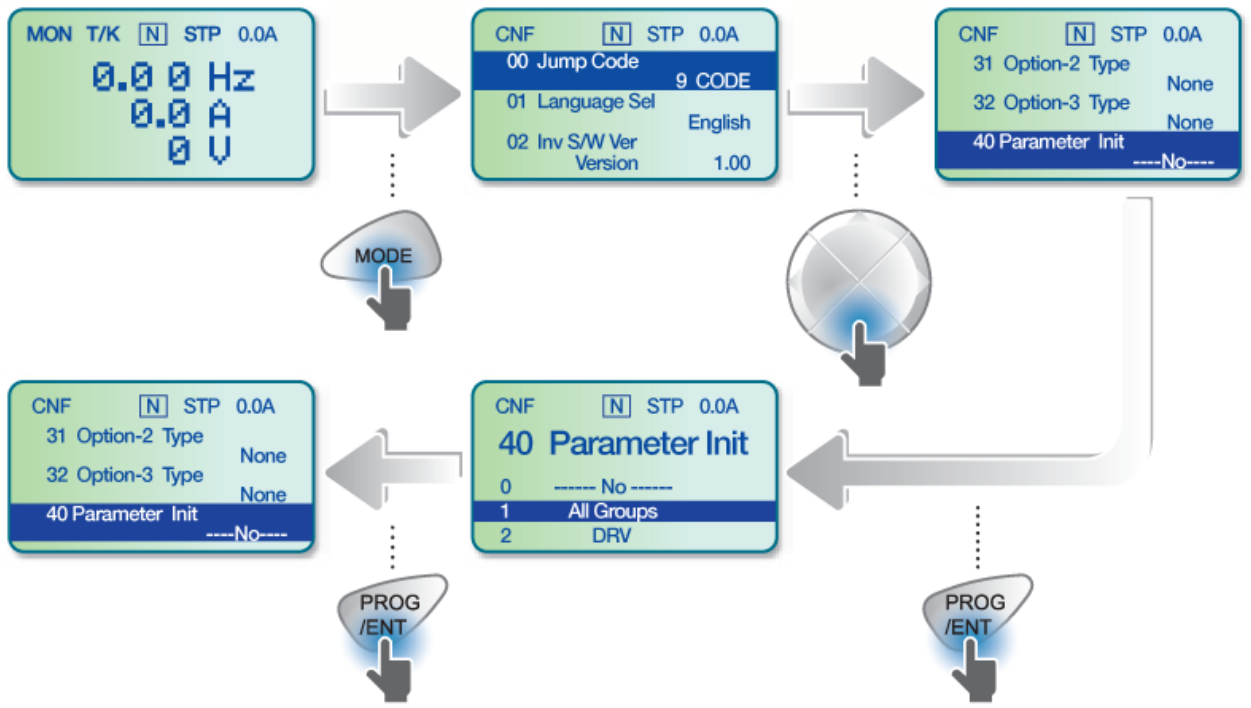
Adjust motor operational noise by changing carrier frequency settings. Power transistors (IGBT) in the inverter generate and supply high frequency switching voltage to the motor. The switching speed in this process refers to the carrier frequency. If the carrier frequency is set high, it reduces operational noise from the motor, and if the carrier frequency is set low, it increases operational noise from the motor.

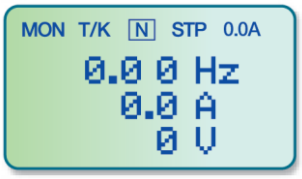
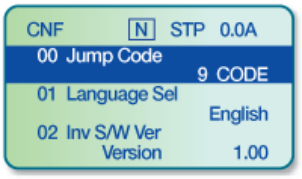
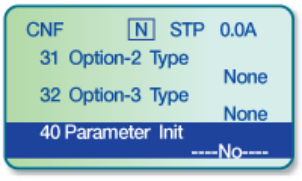
Below are advantages and disadvantages according to the sound of the inverter during operation.

Item	Carrier Frequency	
	LOW	HIGH
Motor noise	↑	↓
Heat generation	↓	↑
Noise generation	↓	↑
Leakage current	↓	↑

1.3.2 Initializing All Parameters

You can initialize the parameter that has been changed by the user to the initial state at the time of delivery. Not only the entire parameter but a group of the parameter mode can be selected and initialized.



Step	Instruction	Keypad Display
1	Monitor Mode is displayed.	
2	Shift to CNF by using Mode key.	
3	Shift to code 40 using Down key. Press PROG.	
4	Among the Parameter items to initialize, select All Groups and press PROG.	

Step	Instruction	Keypad Display
5	The display come back to the initialization selection after finishing Initialization.	

Note

Following parameter initialization, all parameters are reset to factory default values. Ensure that parameters are reconfigured before running the inverter again after an initialization.

1.3.3 Read and Write Parameters

This is the function of copying the parameter saved in the inverter to the keypad and copying the parameter saved in the keypad to the inverter.

Group	Code No.	Function Display	Setting Display		Unit
CNF	46	Parameter Read	1	YES	-
	47	Parameter Write	1	YES	-
	48	Parameter Save	1	YES	-

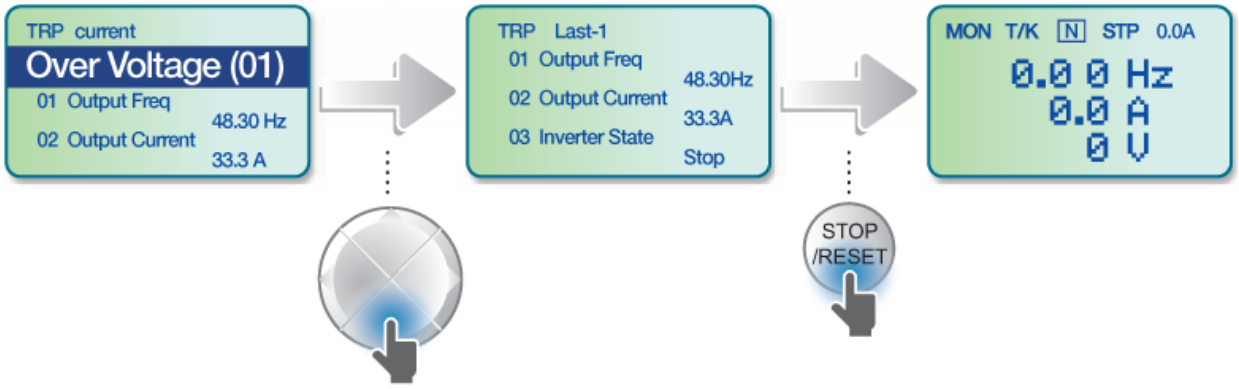
Read and Write Setting Details

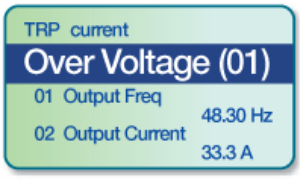
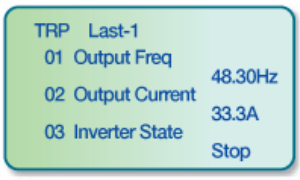
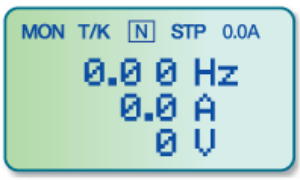
Code	Description
CNF-46 Parameter Read	Copies the parameter in the inverter to the keypad. The existing parameters saved in the keypad are all deleted.
CNF-47 Parameter Write	Copies the parameter saved in the keypad to the inverter. The existing parameters in the inverter are all deleted. In case of an error during parameter writing motion, the previously saved data can be directly used. If there is no data saved in the keypad, a message reading “ EEP Rom Empty “ is displayed.
CNF-48 Parameter Save	Because the parameters set in communication are saved in the RAM area, they are all gone if the inverter power is turned Off/On. If you set parameters in communication and select Yes in CNF-48 Parameter Save, the set parameters remain unchanged even if the inverter power is turned Off/On.

* Available on LCD keypad only.

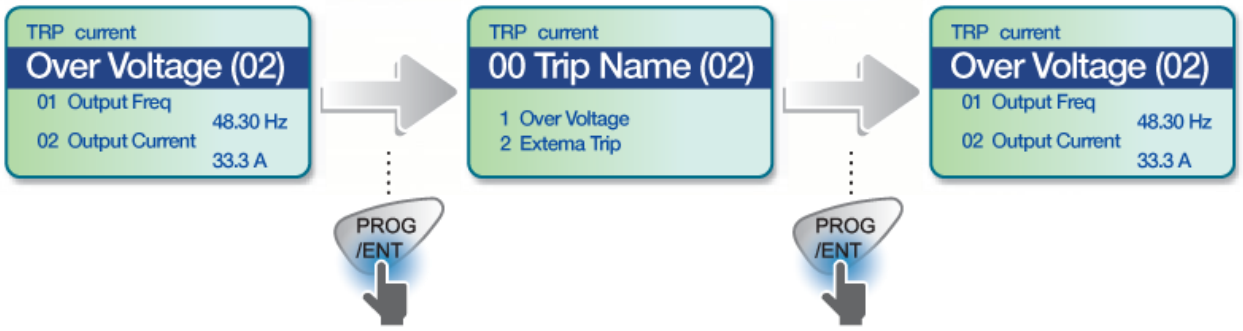
1.4 Fault Trip Monitoring

■ Failure during operation



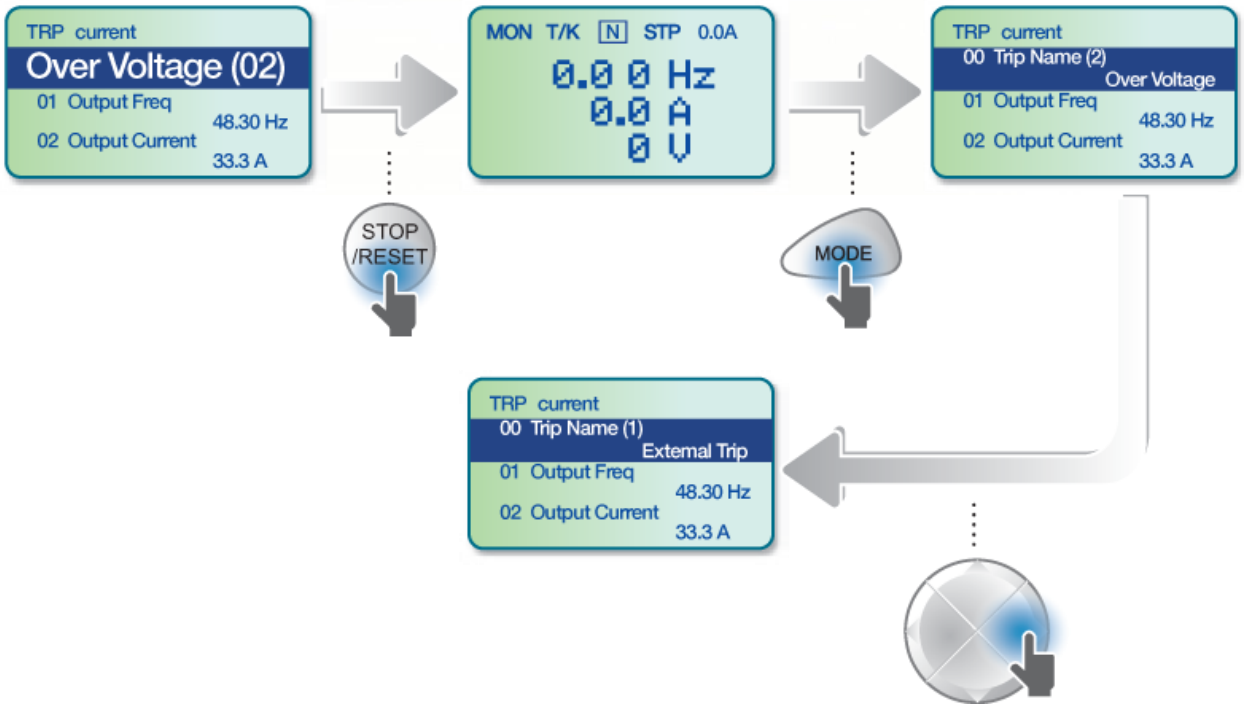
Step	Instruction	Keypad Display
1	In case of a failure during operation, the mode automatically shifts to Trip Mode and the type of the current failure is displayed.	
2	If you press Down key, the output frequency, current and operating status at the time of the failure occurring are displayed.	
3	If the failure status is terminated by Reset, the keypad before the failure comes back.	

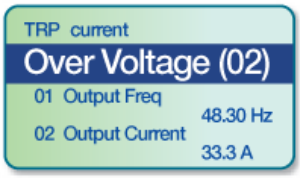
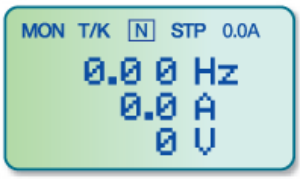
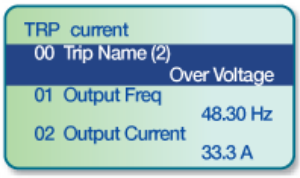
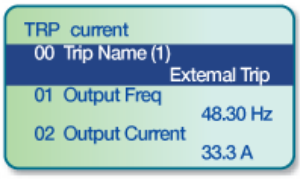
■ Multiple failures at a time



Step	Instruction	Keypad Display
1	In case of multiple failures, the number of failures is displayed next to the failure type. Press PROG.	TRP current Over Voltage (02) 01 Output Freq 48.30 Hz 02 Output Current 33.3 A
2	The type of failures is displayed. Press PROG.	TRP current 00 Trip Name (02) 1 Over Voltage 2 Extema Trip
3	The display mode before failure checking comes back.	TRP current Over Voltage (02) 01 Output Freq 48.30 Hz 02 Output Current 33.3 A

■ Saving and monitoring of failure history



Step	Instruction	Keypad Display
1	In case of a failure during operation, the mode automatically shifts to Trip Mode with the trip displayed.	
2	If you press Reset or the terminal is entered, the failure above is automatically saved and the display goes back to the place before the failure. Move to Trip Mode using Mode key.	
3	The most recent failure is saved in Last-1 code. Press Right key.	
4	A previous failure is saved in Last-2 code. If another failure occurs, what was in Last-2 moves to Last-3.	

2 Troubleshooting

This chapter explains how to troubleshoot a problem when inverter protective functions, fault trips, warning signals, or a fault occurs. If the inverter does not work normally after following the suggested troubleshooting steps, please contact the LSIS customer service center.

2.1 Trips and Warnings

When the inverter detects a fault, it stops the operation (trips) or sends out a warning signal. When a trip or warning occurs, the keypad displays the information briefly. If the LCD keypad is used, detailed information is shown on the LCD display.

Previous failures are saved in Trip Mode. Up to 5 failures can be saved. Failure history is saved not only by Reset but also in case of a low voltage failure due to being switched off. If the number of failures exceeds 5, the Last- 5 messages are automatically deleted.

The fault conditions can be categorized as follows:

• Level: When the fault is corrected, the trip or warning signal disappears and the fault is not saved in the fault history.

• Latch: When the fault is corrected and a reset input signal is provided, the trip or warning signal disappears.

• Fatal: When the fault is corrected, the fault trip or warning signal disappears only after the user turns off the inverter, waits until the charge indicator light goes off, and turns the inverter on again (If the inverter is still in a fault condition after powering it on again, please contact the supplier or the LSIS customer service center).

2.1.1 Fault/Warning List

The following list shows the types of faults and warnings that can occur while using the iS7 inverter.

Category		LCD Display	Details	Page
Major Fault	Latch type	Over Current1	Trip from over current	P. 26
		Over Voltage	Trip from over voltage	P. 26
		External Trip	Trip from exterior signals	-
		NTC Open	Trip from temperature sensors	P.29

Category		LCD Display	Details	Page
		Over Current2	Trip from ARM short current	P.29
		Fuse Open	Fuse open trip	-
		Option Trip-x	Option Trip	-
		Over Heat	Trip from Over heat	P.29
		Out Phase Open	Trip from output phase open	P.29
		In Phase Open	Trip from input phase open	P.28
		Inverter OLT	Trip from inverter overloads	P.28
		Over Speed	Trip from over speed	-
		Ground Trip	Trip from ground fault	P.27
		Encoder Trip	Trip from speed sensor	-
		Fan Trip	Fan trip	P.30
		ParaWrite Trip	Trip from parameter write	-
		E-Thermal	Trip from motor overheat	P.27
		Thermal Trip	Trip from temperature	-
		Pre-PID Fail	Trip from Pre-PID failures	-
		IO Board Trip	Trip from IO Board connection	-
		Speed Dev Trip	Trip from speed deviation	-
		Ext-Brake	Trip from exterior brake	-
		No Motor Trip	Trip from no motor	P. 30
	Level type	Low Voltage	Trip from low voltage	P.27

Category		LCD Display	Details	Page
		BX	Emergency stop trip	-
		Lost Command	Trip from lost command	-
		Lost Keypad	Trip from lost-keypad	-
	Fatal type	EEP Err	Exterior Memory Error	-
		ADC Off Set	Analog Input Error	-
		Watch Dog-1	CPU Watchdog trip	-
		Watch Dog-2		-
		Gate Pwr Loss	DRV operation power error	-
Minor Failure		Over Load	Motor overload trip	P.25
		Under Load	Motor under load trip	P.25
		Lost Command	Trip from lost command	-
		Lost Keypad	Trip from lost keypad	-
Warning		Lost Command	Warning from lost command	-
		Over Load	Warning from overload	-
		Under Load	Warning from under load	-
		Inverter OLT	Warning from inverter overload	-
		Fan Warning	Warning from fan operation	-
		DB Warn %ED	Warning for braking resistance %	-
		Enc Conn Check	Warning for encoder connection error	-
		Enc Dir Check	Warning for rotating direction error	-
		Lost Keypad	Warning for lost keypad	-

Category	LCD Display	Details	Page
	Retry Tr Tune	Warning for Tr tuning retrial	-
	Fire Mode	Warning for working fire function	-

2.1.2 Troubleshooting Fault Trips

When a fault trip or warning occurs due to a protection function, refer to the following table for possible causes and remedies.

LCD Display		Type	Description
Over Load	Overload Trip	Latch	Displayed when you select the motor overload failure and the load exceeds the set degree. Operation can resume after PRT-20 is set at values other than 0.
Cause		Remedy	
The load is greater than the motor's rated capacity.		Ensure that the motor and inverter have appropriate capacity ratings.	
The load set at the overload failure level (PRT-21) is small		Increase the set value..	
There is a fault with the output module (IGBT).		Refer to 3.1.4 Checking the Input/Output Modules on page38 and check a fault with the output module(IGBT) Do not operate the inverter. Contact the retailer or the LSIS customer service center.	
The load is greater than the rated motor capacity.		Replace the motor and inverter with models that have increased capacity.	
The torque boost level is too high.		Reduce the torque boost level.	
Acc/Dec time is too short, compared to load inertia (GD2).		Increase Acc/Dec time.	

LCD Display		Type	Description
Under Load	Under load Trip	Latch	Displayed when you select the under load protection function and the motor load is within the set under load level. Operation can resume after PRT-27 is set at values other than 0.
Cause		Remedy	
There is a problem with the connection between the motor and load		Increase the capacity of the motor and inverter.	
The under load level(PRT-29,30) is lower than the minimum system load.		Increase the set value.	

LCD Display		Type	Description
Over Current1	Over Current Trip	Latch	Displayed when inverter output current exceeds 200% of the rated current.
Cause		Remedy	
Acc/Dec time is too short, compared to load inertia (GD2).		Increase Acc/Dec time.	
The inverter load is greater than the rated capacity.		Replace the inverter with a model that has increased capacity.	
The inverter supplied an output while the motor was idling.		Operate the inverter after the motor has stopped or use the speed search function (Cn.60).	
The mechanical brake of the motor is operating too fast.		Check the mechanical brake.	
Output wiring is short-circuited or a ground fault has occurred.		Remove a short circuit and ground fault and check the motor	
There is a inverter-motor connection problem.		Check the output wiring Ensure that the total cable length between the inverter and the motor is less than 200m (50m for motors rated 3.7 kW or lower).	
There is a fault with the output module (IGBT).		Refer to 3.1.4 Checking the Input/Output Modules on page38 and check a fault with the output module(IGBT) Do not operate the inverter. Contact the retailer or the LSIS customer service center.	

LCD Display		Type	Description
Over Voltage	Over Voltage Trip	Latch	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.
Cause		Remedy	
The input voltage is too high.		Determine if the input voltage is above the specified value.	
The actual DC link voltage is different from the displayed value..		Need to inspect hardware. Contact the retailer or the LSIS customer service center.	
Deceleration time is too short for the load inertia (GD2).		Increase the acceleration time.	
A generative load occurs at the inverter output.		Use the braking unit.	

LCD Display		Type	Description
Low Voltage	Low Voltage trip	Level	Displayed when internal DC circuit voltage is less than the specified value.
Cause		Remedy	
The input voltage is too low.		Determine if the input voltage is below the specified value.	
The actual DC link voltage is different from the displayed value..		Need to inspect hardware. Contact the retailer or the LSIS customer service center.	
Blackout accidents occur		Use speed search function	
An input phase-loss has occurred.		Check the input wiring.	
The magnetic contactor connected to the power source has a faulty connection.		Replace the magnetic contactor.	
A load greater than the power capacity is connected to the system (e.g., a welder, direct motor connection, etc.)		Increase the power capacity.	

LCD Display		Type	Description
Ground Trip	Ground fault trip	Latch	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.
Cause		Remedy	
A ground fault has occurred in the inverter output wiring.		Check the output wiring.	
There is a inverter-motor connection problem.		Check the output wiring Ensure that the total cable length between the inverter and the motor is less than 200m (50m for motors rated 3.7 kW or lower).	
The motor insulation is damaged.		Replace the motor.	
Noise occurs in the peripherals		Change the carrier frequency to the minimum value in H39	

LCD Display		Type	Description
E-Thermal	Electric Thermal	Latch	Displayed based on inverse time-limit thermal characteristics to prevent motor overheating. Operation resumes if PRT-34 is set at values other than 0.
Cause		Remedy	
The motor has overheated.		Reduce the load or operation frequency.	
The inverter load is greater than the rated capacity.		Replace the inverter with a model that has increased capacity.	
The set value for electronic thermal protection(ETH) is too low.		Set an appropriate electronic thermal level(ETH).	

The inverter has been operated at low speed for an extended duration.	Replace the motor with a model that supplies extra power to the cooling fan.

LCD Display		Type	Description
Out Phase Open	Out Phase Open	Latch	Displayed when one of the three phases output of the inverter is phase open. Operation resumes if you set PRT-05 bit 1 at 1.
Cause		Remedy	
The magnetic contactor on the output side has a connection fault.		Check the magnetic contactor on the output side.	
The output wiring is faulty.		Check the output wiring.	

LCD Display		Type	Description
In Phase Open	In Phase Open	Latch	Displayed when one of the three phases input of the inverter is phase open. Operation resumes if you set PRT-05 bit 2 at 1
Cause		Remedy	
The magnetic contactor on the input side has a connection fault.		Check the magnetic contactor on the input side.	
The input wiring is faulty.		Check the input wiring.	
The DC condenser of the inverter needs replacing..		The DC condenser should be replaced. Contact the retailer or the LSIS customer service center..	

LCD Display		Type	Description
Inverter OLT	Inverter Overload trip	Latch	The inverter turns off its output when the output current of the inverter flows more than the rated level (150% for 1 minute).
Cause		Remedy	
The load is greater than the motor's rated capacity.		Ensure that the motor and inverter have appropriate capacity ratings.	
The torque boost level is too high.		Reduce the torque boost level.	

LCD Display		Type	Description
Over Heat	Over Heat Trip	Latch	Displayed when the temperature of the inverter heat sink exceeds the specified value.
Cause		Remedy	
There is a problem with the cooling system.		Determine if a foreign object is obstructing the air inlet, outlet, or vent.	
The inverter cooling fan has been operated for an extended period.		Replace the cooling fan (Refer to 3.1.3 Replacement of the cooling fan)	
The ambient temperature is too high.		Keep the ambient temperature below 50℃.	

LCD Display		Type	Description
Over Current2	Over Current Trip	Latch	Displayed when the DC circuit in the inverter detects a specified level of excessive, short circuit current..
Cause		Remedy	
Acc/Dec time is too short, compared to load inertia (GD2).		Increase Acc/Dec time.	
Output wiring is short-circuited.		Check the output wiring.	
There is a inverter-motor connection problem.		Check the output wiring Ensure that the total cable length between the inverter and the motor is less than 200m (50m for motors rated 3.7 kW or lower).	
There is a fault with the output module (IGBT).		Refer to 3.1.4 Checking the Input/Output Modules on page38 and check a fault with the output module(IGBT) Do not operate the inverter. Contact the retailer or the LSIS customer service center.	

LCD Display		Type	Description
NTC Open	Temperature Sensor Trip	Latch	Displayed when abnormality is detected with the temperature detecting sensor of the power switch(IGBT).
Cause		Remedy	
The surrounding temperature is out of the specified range.		Keep the temperature around the inverter below the specified degree..	
There is a problem with the internal temperature sensor of the inverter.		Contact the retailer or the LSIS customer service center.	

LCD Display		Type	Description
FAN Trip	Fan Trip	Latch	Displayed when a fault condition occurs in the inverter cooling fan. Operation resumes if PRT-79 is set at 0.
Cause		Remedy	
A foreign object is obstructing the fan's air vent.		Remove the foreign object from the air inlet or outlet.	
The cooling fan needs to be replaced.		Replace the cooling fan. (Refer to 3.1.3 Replacement of the cooling fan)	

LCD Display		Type	Description
IP54 FAN Trip	IP54 Fan Trip	Latch	Displayed when a fault condition occurs in the IP54 inverter internal cooling fan
Cause		Remedy	
Internal fan connector is not connected		Connect internal Fan connector.	
Internal fan PCB board's power connector is not connected.		Internal fan PCB board's power connector is connected.	
The cooling fan needs to be replaced.		Contact the retailer or the LSIS customer service center.	

LCD Display		Type	Description
No Motor Trip	No Motor Trip	Latch	Displayed when motor is not detected.
Cause		Remedy	
The motor is disconnected to the output of inverter..		Check the connection of wiring	
The current level of detection of Trip is incorrect.		Check the value of parameter both BAS-13 (Rated current) and PRT-32 (No Motor Level).	

2.2 Troubleshooting Other Fault

When a fault other than those identified as fault trips or warnings occurs, refer to the following table for possible causes and remedies.

Parameters cannot be set.

Cause	Remedy
The inverter is in operation (driving mode).	Stop the inverter to change to program mode and set the parameter.
The parameter access is incorrect.	Check the correct parameter access level and set the parameter.
The password is incorrect.	Check the password, disable the parameter lock by setting UL(Unlock) in CNF-52 Code and set the parameter.
Low voltage is detected.	Check the power input to resolve the low voltage and set the parameter.

The motor does not rotate.

Cause	Remedy
The operation command source is set incorrectly.	Check the operation command source setting.
Power is not supplied to the terminal R/S/T.	Check the terminal connections R/S/T and U/V/W.
The charge lamp is turned off.	Turn on the inverter.
The operation command is off.	Turn on the operation command (RUN).
The motor is locked.	Unlock the motor or lower the load level.
The load is too high.	Operate the motor independently.
An emergency stop signal is input.	Reset the emergency stop signal.
The wiring for the control circuit terminal is incorrect.	Check the wiring for the control circuit terminal.
The input option for the frequency command is incorrect.	Check the input option for the frequency command.
The input voltage or current for the frequency command is incorrect.	Check the input voltage or current for the frequency command.
The PNP/NPN mode is selected incorrectly.	Check the PNP/NPN mode setting.
The frequency command value is too low.	Check the frequency command and input a value above the minimum frequency.
The [STOP/RESET] key is pressed.	Check that the stoppage is normal, if so resume operation normally.
Motor torque is too low.	Change the operation modes (V/F, IM, and Sensorless). If the fault remains, replace the inverter with a model with increased capacity.

The motor rotates in the opposite direction to the command.

Cause	Remedy
The wiring for the motor output cable is incorrect.	Determine if the cable on the output side is wired correctly to the phase (U/V/W) of the motor.
The signal connection between the control circuit terminal (forward/reverse rotation) of the inverter and the forward/reverse rotation signal on the control panel side is incorrect.	Check the forward/reverse rotation wiring.

The motor only rotates in one direction.

Cause	Remedy
Reverse rotation prevention is selected.	Remove the reverse rotation prevention.
The reverse rotation signal is not provided, even when a 3-wire sequence is selected.	Check the input signal associated with the 3-wire operation and adjust as necessary.

The motor is overheating

Cause	Remedy
The load is too heavy.	Reduce the load. Increase the Acc/Dec time.
	Check the motor parameters and set the correct values.
	Replace the motor and the inverter with models with appropriate capacity for the load.
The ambient temperature of the motor is too high.	Lower the ambient temperature of the motor.
The phase-to-phase voltage of the motor is insufficient.	Use a motor that can withstand phase-to-phase voltages surges greater than the maximum surge voltage.
	Only use motors suitable for application with inverters.
	Connect the AC reactor to the inverter output (set the carrier frequency to 2 kHz in H39).
The motor fan has stopped or the fan is obstructed with debris.	Check the motor fan and remove any foreign objects.

The motor stops during acceleration or when connected to load.

Cause	Remedy
The load is too high.	Reduce the load.
	Replace the motor and the inverter with models with capacity appropriate for the load.

The motor does not accelerate. /The acceleration time is too long

Cause	Remedy
The frequency command value is low.	Set an appropriate value.
The load is too high.	Reduce the load and increase the acceleration time. Check the mechanical brake status.
The acceleration time is too long.	Change the acceleration time.
The combined values of the motor properties and the inverter parameter are incorrect.	Change the motor related parameters.
The stall prevention level during acceleration is low.	Change the stall prevention level.
The stall prevention level during operation is low.	Change the stall prevention level.
Starting torque is insufficient.	Change to vector control operation mode. If the fault is still not corrected, replace the inverter with a model with increased capacity.

Motor speed varies during operation.

Cause	Remedy
There is a high variance in load.	Replace the motor and inverter with models with increased capacity.
The input voltage varies.	Reduce input voltage variation.
Motor speed variations occur at a specific frequency.	Adjust the output frequency to avoid a resonance area.

The motor rotation is different from the setting.

Cause	Remedy
The V/F pattern is set incorrectly.	Set a V/F pattern that is suitable for the motor specification.

The motor deceleration time is too long even with Dynamic Braking (DB) resistor connected.

Cause	Remedy
The deceleration time is set too long.	Change the setting accordingly.
The motor torque is insufficient.	If motor parameters are normal, it is likely to be a motor capacity fault. Replace the motor with a model with increased capacity.
The load is higher than the internal torque limit determined by the rated current of the inverter.	Replace the inverter with a model with increased capacity.

Operation is difficult in under load applications

Cause	Remedy
The carrier frequency is too high.	Reduce the carrier frequency in CON-04
Over-excitation has occurred due to an inaccurate V/F setting at low speed.	Reduce the torque boost value to avoid over-excitation

While the inverter is in operation, a control unit malfunctions or noise occurs.

Cause	Remedy
Noise occurs due to switching inside the inverter.	Reduce the carrier frequency in CON-04
	Install a micro surge filter in the inverter output.

When the inverter is operating, the earth leakage breaker is activated.

Cause	Remedy
An earth leakage breaker will interrupt the supply if current flows to ground during inverter operation	Connect the inverter to a ground terminal.
	Check that the ground resistance is less than 100Ω for 200V inverters and less than 10Ω for 400V inverters.
	Check the capacity of the earth leakage breaker and make the appropriate connection, based on the rated current of the inverter.
	Reduce the carrier frequency in CON-04
	Make the cable length between the inverter and the motor as short as possible.

The motor vibrates severely and does not rotate normally.

Cause	Remedy
Phase-to-phase voltage of 3-phase power source is not balanced.	Check the input voltage and balance the voltage.
	Check and test the motor’s insulation.

The motor makes humming, or loud noises.

Cause	Remedy
Resonance occurs between the motor's natural frequency and the carrier frequency.	Reduce the carrier frequency in CON-04
Resonance occurs between the motor's natural frequency and the inverter’s output frequency.	Slightly increase or decrease the carrier frequency.
	Use the frequency jump function to avoid the frequency band where resonance occurs.

The motor vibrates/hunts.

Cause	Remedy
The frequency input command is an external, analog command.	In situations of noise inflow on the analog input side that results in command interference, change the input filter time constant (In.07, IN22)
The wiring length between the inverter and the motor is too long.	Ensure that the total cable length between the inverter and the motor is less than 200m (50m for motors rated 3.7 kW or lower).

The motor does not come to a complete stop when the inverter output stops.

Cause	Remedy
It is difficult to decelerate sufficiently, because DC braking is not operating normally.	Adjust the DC braking parameter.
	Increase the set value for the DC braking current.
	Increase the set value for the DC braking stopping time.

The output frequency does not increase to the frequency reference.

Cause	Remedy
The frequency reference is within the jump frequency range.	Set the frequency reference higher than the jump frequency range.
The frequency reference is exceeding the upper limit of the frequency command.	Set the upper limit of the frequency command higher than the frequency reference.
Because the load is too heavy, the stall prevention function is working.	Replace the inverter with a model with increased capacity.

The cooling fan does not rotate.

Cause	Remedy
The control parameter for the cooling fan is set incorrectly..	Check the control parameter setting for the in ADV-64 During Run(active during operation only), Always On(always active), Temp Control(temperature check)

3 Maintenance

This chapter explains how to replace the cooling fan, the regular inspections to complete, and how to store and dispose of the product. An inverter is vulnerable to environmental conditions and faults also occur due to component wear and tear. To prevent breakdowns, please follow the maintenance recommendations in this section.

Caution

- Before you inspect the product, read all safety instructions contained in this manual.
- Before you clean the product, ensure that the power is off
- Clean the inverter with a dry cloth. Cleaning with wet cloths, water, solvents, or detergents may result in electric shock or damage to the product.

3.1 Regular Inspection Lists

3.1.1 Daily Inspections

Inspection method	Judgment standard	Inspection equipment	Inspection method	Judgment standard	Inspection equipment
All	Ambient environment	Is the ambient temperature and humidity within the design range, and is there any dust or foreign objects present?	Refer to Installation & Wiring on User manual.	No icing (ambient temperature: -10 - +40) and no condensation (ambient humidity below 50%)	Thermometer, hygrometer, recorder
	Inverter	Is there any abnormal vibration or noise?	Visual inspection	No abnormality	
	Power voltage	Are the input and output voltages normal?	Measure voltages between R/ S/ T-phases in. the inverter terminal block.	Refer to Technical data on User manual.	Digital multimeter tester
Input/Output circuit	Smoothing capacitor	Is there any leakage from the inside?	Visual inspection	No abnormality	-
		Is the capacitor swollen?			
Cooling system	Cooling fan	Is there any abnormal vibration or noise?	Turn off the system and check operation by rotating the fan manually.	Fan rotates smoothly	-
Display	Measuring device	Is the display value normal?	Check the display value on the panel.	Check and manage specified values.	Voltmeter, ammeter, etc.
Motor	All	Is there any abnormal vibration or noise?	Visual inspection	No abnormality	-
		Is there any abnormal smell?	Check for overheating or damage.		

3.1.2 Annual inspections

Inspection method	Judgment standard	Inspection equipment	Inspection method	Judgment standard	Inspection equipment
Input/Output circuit	All	Megger test (between input/output terminals and and earth terminal)	Disconnect inverter and short R/S/T/U/V/W terminals, and then measure from each terminal to the ground terminal using a Megger.	Must be above 5 MΩ	DC 500 V Megger
		Is there anything loose in the device?	Tighten up all screws.	No abnormality	
		Is there any evidence of parts overheating?	Visual inspection		
	Cable connections	Are there any corroded cables?	Visual inspection	No abnormality	-
		Is there any damage to cable insulation?			
	Terminal block	Is there any damage?	Visual inspection	No abnormality	-
	Smoothing condenser	Measure electrostatic capacity.	Measure with capacity meter.	Rated capacity over 85%	Capacity meter
	Relay	Is there any chattering noise during operation?	Visual inspection	No abnormality	-
		Is there any damage to the contacts?	Visual inspection		
	Braking resistor	Is there any damage from resistance?	Visual inspection	No abnormality	Digital multimeter / analog tester
		Check for disconnection.	Disconnect one side and measure with a tester.	Must be within ±10% of the rated value of the resistor.	
Control circuit Protection circuit	Operation check	Check for output voltage imbalance while the inverter is in operation.	Measure voltage between the inverter output terminal U/ V/ W.	Balance the voltage between phases: within 4V for 200V series and within 8V for 400V series.	Digital multimeter or DC voltmeter

Inspection method	Judgment standard	Inspection equipment	Inspection method	Judgment standard	Inspection equipment
		Is there an error in the display circuit after the sequence protection test?	Test the inverter output protection in both short and open circuit conditions.	The circuit must work according to the sequence.	
Cooling system	Cooling fan	Are any of the fan parts loose?	Check all connected parts and tighten all screws.	No abnormality	-
Display	Display device	Is the display value normal?	Check the command value on the display device.	Specified and managed values must match.	Voltmeter, Ammeter, etc.

3.1.3 Bi-annual Inspections

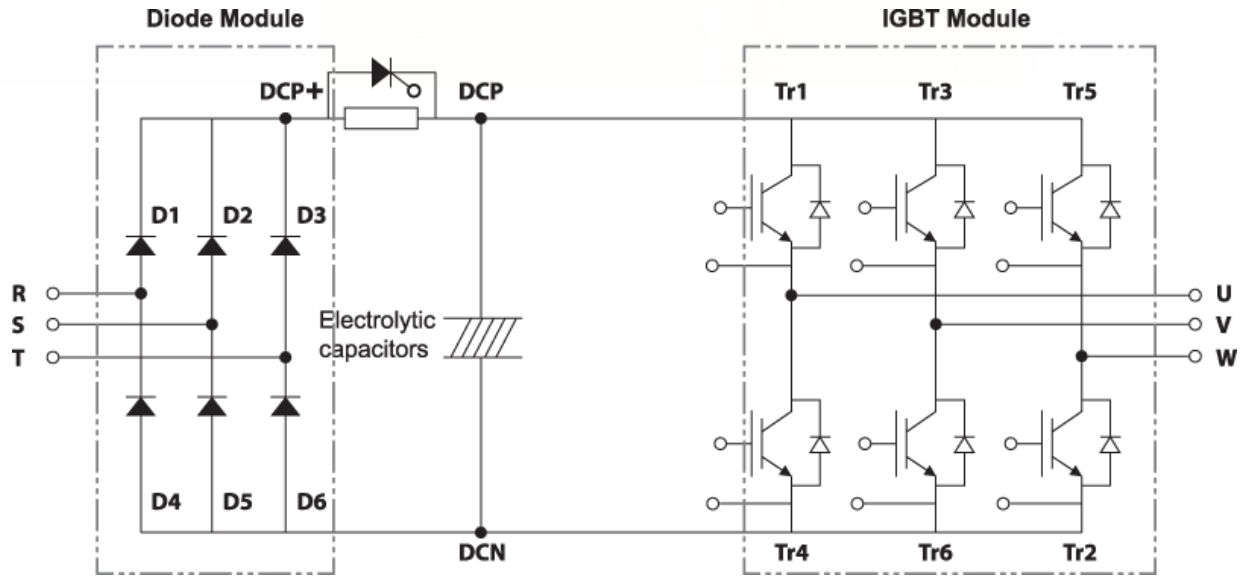
Inspection method	Judgment standard	Inspection equipment	Inspection method	Judgment standard	Inspection equipment
Motor	Insulation resistance	Megger test (between the input, output and earth terminals).	Disconnect the cables for terminals U/V/W and test the wiring.	Must be above 5 MΩ	DC 500 V Megger

Caution

Do not run an insulation resistance test (Megger) on the control circuit as it may result in damage to the product.

3.1.4 Checking the Input/Output Modules

How to check the diode module and IGBT module (SV0008~0075iS7-2/4)

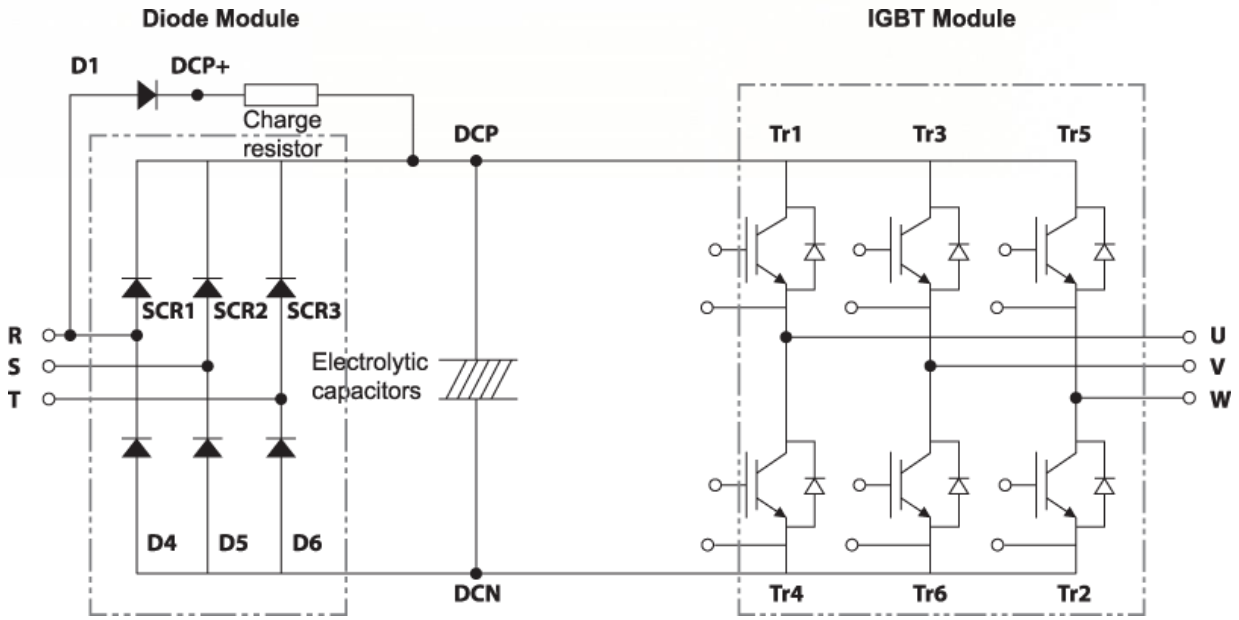


Testing method

1) Disconnect all power cables (R,S,T) and motor output cables (U,V,W)
2) Before testing, check the discharge of electrolytic capacitor (DCP-DCN)
3) When the circuit is open, the DMM indicates a high resistance (several MΩ). In some situations the DMM may indicate a closed circuit (low resistance) and then indicate a high resistance due to the capacitors. When the circuit is closed, the DMM indicates a resistance of several hundred kΩ or less.
4) Displayed values may not be constant as they depend on the module and tester type. However, the value measured between phases can be considered satisfactory if the measured value is within ±10%

Module		Test Polarity		Check Value	Module	Test Polarity		Check Value
		+	-			+	-	
Diode	D1	R	DCP+	Closed	D4	R	DCN	Open
		DCP+	R	Open		DCN	R	Closed
	D2	S	DCP+	Closed	D5	S	DCN	Open
		DCP+	S	Open		DCN	S	Closed
	D3	T	DCP+	Closed	D6	T	DCN	Open
		DCP+	T	Open		DCN	T	Closed
IGBT	Tr1	U	DCP+	Closed	Tr4	U	DCN	Open
		DCP+	U	pen		DCN	U	Closed
	Tr2	V	DCP+	Closed	Tr6	V	DCN	Open
		DCP+	V	Open		DCN	V	Closed
	Tr3	W	DCP+	Closed	Tr2	W	DCN	Open
		DCP+	W	Open		DCN	W	Closed

How to check the diode module and IGBT module (SV0110~0220iS7-2/4, SV0300iS7~1600iS7-4)



Testing method

1) Disconnect all power cables (R,S,T) and motor output cables (U,V,W)
2) Before testing , check the discharge of electrolytic capacitor (DCP-DCN)
3) When the circuit is open, the DMM indicates a high resistance (several MΩ). In some situations the DMM may indicate a closed circuit (low resistance) and then indicate a high resistance due to the capacitors. When the circuit is closed, the DMM indicates a resistance of several hundred kΩ or less.
4) Displayed values may not be constant as they depend on the module and tester type. However, the value measured between phases can be considered satisfactory if the measured value is within ±10%

Module		Test Polarity		Check Value	Module	Test Polarity		Check Value
		+	-			+	-	
Diode	D1	R	DCP+	Closed	D4	R	DCN	Open
		DCP+	R	Open		DCN	R	Closed
	D2	S	DCP+	Open	D5	S	DCN	Open
		DCP+	S	Open		DCN	S	Closed
	D3	T	DCP+	Open	D6	T	DCN	Open
		DCP+	T	Open		DCN	T	Closed
IGBT	Tr1	U	DCP+	Closed	Tr4	U	DCN	Open
		DCP+	U	Open		DCN	U	Closed
	Tr3	V	DCP+	Closed	Tr6	V	DCN	Open
		DCP+	V	Open		DCN	V	Closed
	Tr5	W	DCP+	Closed	Tr2	W	DCN	Open
		DCP+	W	Open		DCN	W	Closed

■ Checking the diode module and IGBT module samples

Checking the Diode D2

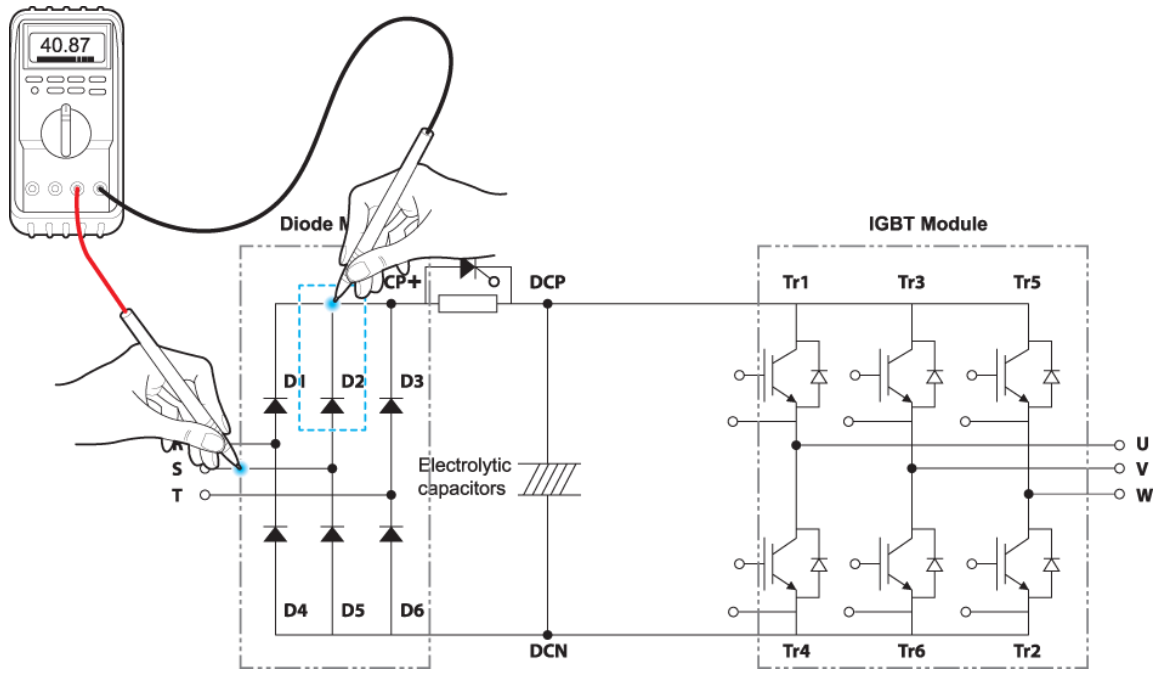
1) Measure the resistance value of D2 by placing the red lead from positive terminal of DMM on S phase and placing black lead from negative terminal of DMM on DCP+

   → If the DMM indicates the resistance of several hundred kΩ or less, It is normal

2) Measure the resistance value of D2 by placing the red lead from positive terminal of DMM on DCP+ and placing black lead from negative terminal of DMM on S phase

   → If the DMM indicates the high resistance (several MΩ), It is normal.

3) In the same way, Measure the resistance values of other diodes



Caution

Before testing , check the discharge of electrolytic capacitor (DCP-DCN)

Checking the IGBT Tr6

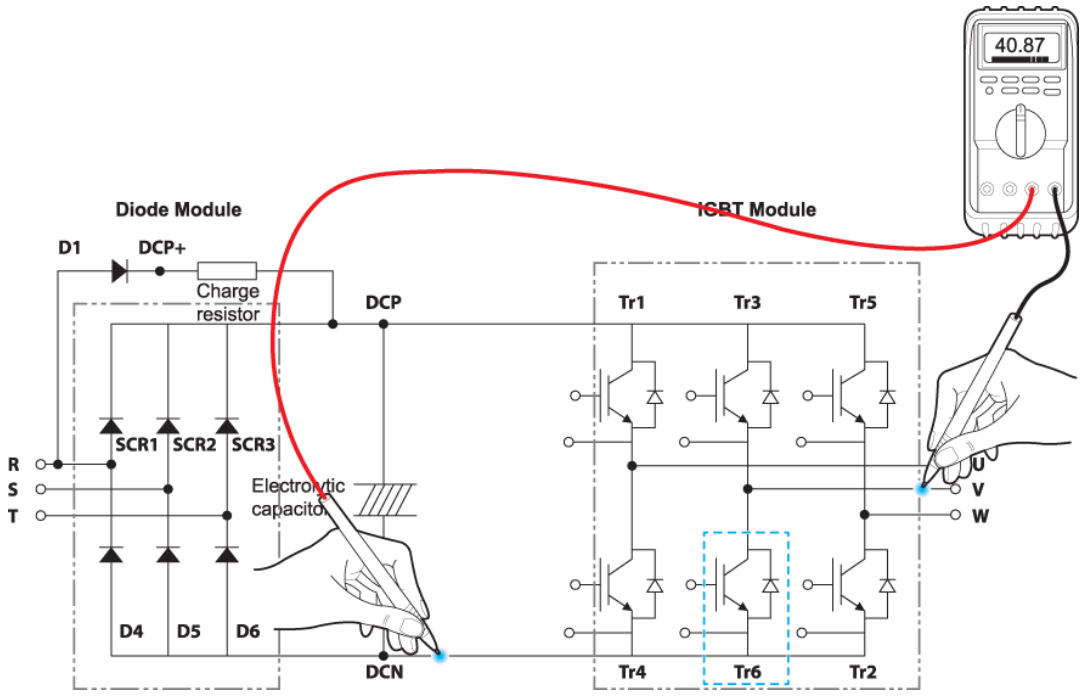
1) Measure the resistance value of Tr6 by placing the red lead from positive terminal of DMM on DCN and placing black lead from negative terminal of DMM on V phase

   →. If the DMM indicates the resistance of several hundred kΩ or less, It is normal

2) Measure the resistance value of Tr6 by placing the red lead from positive terminal of DMM on V phase and placing black lead from negative terminal of DMM on DCN

   → If the DMM indicates the high resistance (several MΩ), It is normal.

3) In the same way, Measure the resistance values of other IGBTs



Caution

Before testing , check the discharge of electrolytic capacitor (DCP-DCN)

3.1.5 Replacement of the cooling fan

If operation is continued after cooling fan trip occurs, Overheat trip may happen and protective function be activated. It also reduces the life of main components due to rise in inverter inner temperature.

When the fan has been operated for an extended duration, the inverter can be damaged or their lifecycle reduced. Standard replacement interval of the cooling fan is 3years. Replace the old cooling fan with a new one periodically.

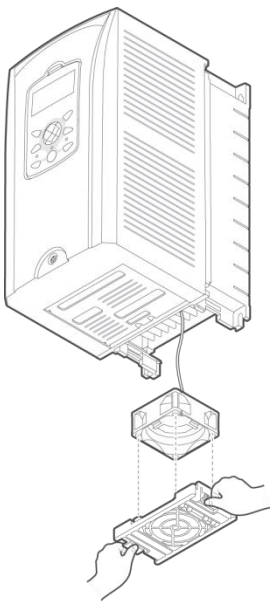
Methods of replacement of the cooling fan can be categorized as following frames:

Caution

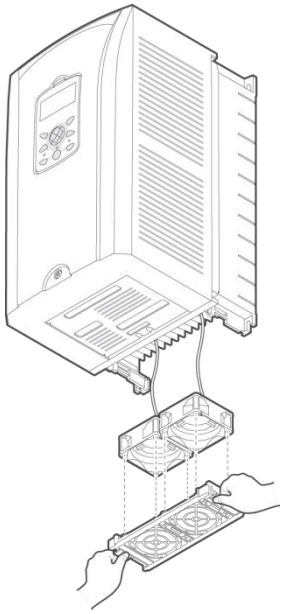
- Before replacing the Fan, Turn off the power supply and ensure all DC voltage has been fully discharged for about1~3 minutes
- Be careful not to get caught the fan wire and connector in wings of the fan as it may result in damage to the inverter
- Reinstall the fan in reverse order of removal method. Before operating inverter, ensure the fan operation is normal after turning on the power supply
- Be careful about the direction of the fan

Replacement of the 0.75~7.5kW Fan

1) Remove the fan cover by holding hooks of the fan cover.
2) Disconnect the fan wire and remove the fan.



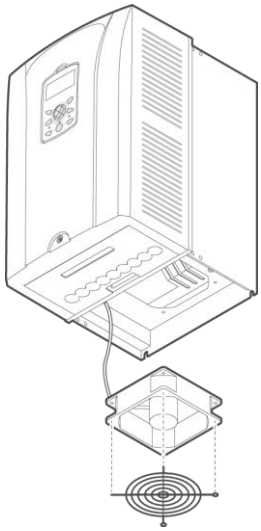
<3.7 kW >



<7.5kW>

Replacement of the 11~15kW 200V/400V, 18.5~22kW 400V Fan

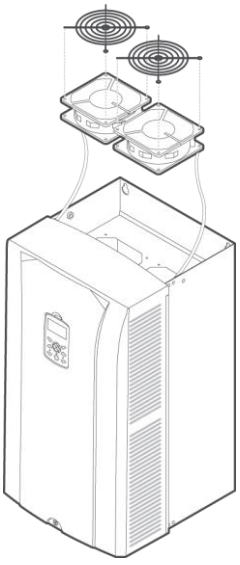
1) Remove the screws attaching the fan
2) Remove the fan cover.
3) Disconnect the fan wire and remove the fan.



<15kW>

Replacement of the 18.5~22kW 200V, 30~75kW 400V Fan

1) Remove the screws attaching the fan
2) Remove the fan cover.
3) Disconnect the fan wire and remove the fan.



<75kW>

For replacement of the FAN over 75kW, Contact the retailer or the LSIS customer service center

3.2 Storage and disposal

3.2.1 Storage

If you are not using the product for an extended period, store it in the following way:

- Store the product in the same environmental conditions as specified for operation
- When storing the product for a period longer than 3 months, store it between 10˚C and 30˚C, to prevent depletion of the electrolytic capacitor.
- Do not expose the inverter to snow, rain, fog, or dust.
- Package the inverter in a way that prevents contact with moisture. Keep the moisture level below 70% in the package by including a desiccant, such as silica gel.

3.2.2 Disposal

When disposing of the product, categorize it as general industrial waste. Recyclable materials are included in the product, so recycle them whenever possible. The packing materials and all metal parts can be recycled. Although plastic can also be recycled, it can be incinerated under controlled conditions in some regions.

Caution

If the inverter has not been operated for a long time, capacitors lose their charging characteristics and are depleted. To prevent depletion, turn on the product once a year and allow the device to operate for 30-60 min. Run the device under no-load conditions.