

User Manual

SV-iC5

AC Drives

0.4-2.2kW (200V)



Safety Instructions

- Read this manual carefully before Installing, wiring, operating, servicing or inspecting the drive.
- Keep this manual within easy reach for quick reference.

13. Troubleshooting & Maintenance

13.1 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.
	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.

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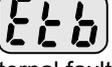
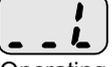
Keypad display	Protective functions	Descriptions
	Inverter hardware fault	This fault message is displayed when an error occurs in the control circuitry of the inverter.
	Communication Error	This fault message is displayed when the inverter cannot communicate with the keypad.
	Cooling fan fault	This fault 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).

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13.2 Fault Remedy

Protective functions	Cause	Remedy
 Overcurrent	<p>Caution: When an overcurrent fault occurs, operation must be started after the cause is removed to avoid damage to IGBT inside the inverter.</p> <ul style="list-style-type: none"> ● 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. 	<ul style="list-style-type: none"> ☞ 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	<ul style="list-style-type: none"> ● Ground fault has occurred at the output wiring of the inverter ● The insulation of the motor is damaged due to heat. 	<ul style="list-style-type: none"> ☞ Check the wiring of the output terminal. ☞ Replace the motor.
 Inverter overload	<ul style="list-style-type: none"> ● Load is greater than the inverter rating. ● Inverter capacity is incorrectly selected. ● Torque boost scale is set too large. 	<ul style="list-style-type: none"> ☞ Upgrade the capacity of motor and inverter or reduce the load weight. ☞ Select correct inverter capacity. ☞ Reduce torque boost scale.
 Overload trip		
 Heat sink overheat	<ul style="list-style-type: none"> ● Cooling system has faults. ● An old cooling fan is not replaced with a new one. ● Ambient temperature is too high. 	<ul style="list-style-type: none"> ☞ 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	<ul style="list-style-type: none"> ● Faulty contact of magnetic switch at output ● Faulty output wiring 	<ul style="list-style-type: none"> ☞ Make connection of magnetic switch at output of the inverter securely. ☞ Check output wiring.
 Cooling fan fault	<ul style="list-style-type: none"> ● An alien substance is clogged in a ventilating slot. ● Inverter has been in use without changing a cooling fan. 	<ul style="list-style-type: none"> ☞ Check the ventilating slot and remove the clogged substances. ☞ Replace the cooling fan.
 Over voltage	<ul style="list-style-type: none"> ● Decel time is too short compared to the GD^2 of the load. ● Regenerative load is at the inverter output. ● Line voltage is too high. 	<ul style="list-style-type: none"> ☞ Increase the Decel time. ☞ Use Dynamic Brake Unit. ☞ Check whether line voltage exceeds its rating.
 Low voltage	<ul style="list-style-type: none"> ● 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. 	<ul style="list-style-type: none"> ☞ 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	<ul style="list-style-type: none"> ● 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. 	<ul style="list-style-type: none"> ☞ 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.

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Protective functions	Cause	Remedy
 External fault A contact input	<ul style="list-style-type: none"> The terminal which is set to "18 (External fault-A)" or "19 (External fault-B)" in I20-I24 in I/O group is ON. 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> No frequency command is applied to V1 and I. 	<ul style="list-style-type: none"> Check the wiring of V1 and I and frequency reference level.
 Parameter save error	 Hardware fault	 Communication Error

13.3 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.**

13.4 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.

13.5 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	Exchange (as required)
Smoothing capacitor on control board	4	Exchange (as required)
Relays	-	Exchange (as required)