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# SV-iS7 User Manual

**0.75~22kW(200V) 0.75~160kW[400V]**



## **Safety Instructions**

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

### 12.1 Checking and Troubleshooting

#### 12.1.1 Protective functions

##### 1) Protection from output current and input voltage

Type	Category	Details	Remark
Over Load	Latch	A failure occurs 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.	
Under Load	Latch	A failure occurs when you select the underload protection function and the motor load is within the set underload level. Operation can resume after PRT-27 is set at values other than 0.	
Over Current1	Latch	A failure occurs when the inverter output exceeds 200% of the rated current.	
Over Voltage	Latch	A failure occurs when the DC circuit voltage exceeds the prescribed amount.	
Low Voltage	Level	A failure occurs when the DC circuit voltage goes down below the prescribed degree.	
Ground Trip	Latch	A failure occurs when current above the prescribed amount flows due to earth in the inverter output part. The earth causing current varies according to the capacity of the inverter.	
E-Thermal	Latch	A failure occurs in order to prevent overheat during overload operation according to the inverse time thermal characteristic. Operation resumes if you set PRT-40 at values other than 0.	
Out Phase Open	Latch	A failure occurs when one of the three phases output of the inverter is phase open. Operation resumes if you set PRT-05 bit 1 at 1.	
In Phase Open	Latch	A failure occurs when one of the three phases input of the inverter is phase open. Operation resumes if you set PRT-05 bit 2 at 1.	
Inverter OLT	Latch	This is the inverse time thermal characteristic protection against heat between 150% 1 minute to 200% 0.5 second on the basis of the inverter rated current. 200% 0.5 second might differ according to the inverter capacity.	

##### 2) Protection by internal circuit abnormality or external signals

Type	Category	Details	Remark
Fuse Open	Latch	A failure occurs when the inverter DC fuse responds to over current only above 30kW.	
Over Heat	Latch	A failure occurs when the temperature of the inverter cooling fan rises over the prescribed degree.	
Over Current2	Latch	A failure occurs when the DC part in the inverter detects short circuit current.	
External Trip	Latch	This is an external failure signal by function selection of the multi-function terminal. Of the IN65~75 functions, No.3 External Trip is selected.	
BX	Level	The inverter output is blocked by function selection of the multi-function terminal. Of the IN65~75 functions, No.4 BX is selected.	
H/W-Diag	Fatal	Trouble with the memory device within the inverter(EPP Rom), analog-digital switch output(ADC Off Set) or CPU malfunction(Watch Dog-1,	

## Chapter 12 Checking and Troubleshooting

Type	Category	Details	Remark
		Watch Dog-2).	
NTC Open	Latch	A failure occurs when abnormality is detected with the temperature detecting sensor of the power switch(IGBT).	
Fan Trip	Latch	A failure occurs when abnormality is detected with the cooling fan. Operation resumes if PRT-79 is set at 0.	Only applied to below 22 kW
IP54 FAN Trip	Latch	Detected when IP54 product has a fault of internal circulation at FAN.	Only applied to IP54 product
toPTC Trip	Latch	A failure occurs when resistance goes beyond the prescribed value after the external temperature sensor is connected to the terminal block. Operation resumes if PRT-34 is set at values other than 0.	
ParaWrite Trip	Latch	Trouble during parameter writing with the inverter's main body from the keypad.	
Over Speed Trip	Latch	A failure occurs when the motor speed goes up above the overspeed detection level. The detection level is set in PRT-70.	
Dev Speed Trip	Latch	A failure occurs when the speed that got feedback from the encoder goes up above the set variation value. Operation resumes if PRT-73 is set at 1.	
Encoder Trip	Latch	A failure occurs when PRT-77 Enc Wire Check is set at 1 and abnormality is detected for the set period of time.	
Pre-PID Fail	Latch	A failure occurs when the control amount(PID feedback) is continuously input below the set value during Pre-PID operation by the function setting between APP-34 ~36, which is regarded as an abnormal state of the system.	

### 3) Protection by KEYPAD and option

Type	Category	Details	Remark
Lost Keypad	Level	A failure occurs when operating commands come from the keypad or there is any problem with the communication between the keypad and inverter's main body in the Keypad JOG Mode. Operation resumes if PRT-11 is set at values other than 0. (occurs 2 seconds after the communication is interrupted)	
Lost Command	Level	When there is a problem with the command if frequency or operating commands are given by the terminal block or communication command other than the keypad. Operation resumes if PRT-12 is set at values other than 0.	
Option Trip-1	Level	When the option gets out of the option slot No. 1 after it was inserted during power supply or when communication is not available with the inverter	
Option Trip-2	Level	When the option gets out of the option slot No. 2 after it was inserted during power supply or when communication is not available with the inverter	
Option Trip-3	Level	When the option gets out of the option slot No. 3 after it was inserted during power supply or when communication is not available with the inverter	

Note) **Level** : automatically terminates when the failure is solved. This is not saved in the failure history.

**Latch** : terminates when the reset signals are input after the failure is solved.

**Fatal** : The failure state terminates when you cut the power supply to the inverter and then supply power again with the internal charging lamp is turned off after the failure is solved.

### 12.1.2 Alarm functions

Type	Description
Over Load	An alarm signal is released in case of overload to the motor. Operation resumes if you set PRT-17 at 1. If signals are necessary for the output contact point, No. 4 overload is selected among the functions of OUT31~33.
Under Load	Set PRT-25 at 1 if an alarm is necessary for an underload situation. As the output signal, No. 6 Under Load is selected among the functions of OUT31~33.
Inv Over Load	An alarm is released if time equal to 60% of the level at which the inverter IOLT functions is accumulated. As the output signal, No. 5 IOL is selected among the functions of OUT31~33.
Lost Command	An alarm signal can be released as well when PRT-12 Lost Cmd Mode is 0. The alarm is released in a certain condition between PRT13~15. As the output signal, No. 12 Lost Command is selected among the functions of OUT31~33.
Fan Warning	An alarm is released if a problem is detected with the cooling fan with PRT-79 FAN Trip Mode set at 1. As the output signal, No.8 Fan Warning is selected among the functions of OUT31~33.
DB Warn %ED	An alarm is released if the DB resistance consumption rate is above the prescribed degree. The detection level is set at PRT-66.
Enc Conn Check	An alarm is signified if No. 3 Enc Test is selected from BAS-20 Auto Tuning and no signal is input during the encoder test. Signals are released if ENC Tune is set among the functions of OUT31~33.
Enc Dir Check	An alarm is signified if No. 3 Enc Test is selected from BAS-20 Auto Tuning and the setting is wrongly changed between encoder phase A and B during the encoder test or the rotation direction is reverse. Signals are released if ENC Dir is set among the functions of OUT31~33.
Lost Keypad	An alarm is signified if the operating command is keypad or any problem is detected with the communication between the keypad and the main body of the inverter in Keypad JOG Mode with PRT-11 Lost KPD Mode set 0. As the output signal, No. 29 Lost Keypad is selected among the functions of OUT31~33.

### 12.1.3 Troubleshooting

Type	Cause of Trouble	Solution
Over Load	<ul style="list-style-type: none"> <li>■ The load is higher than the rated load of the motor.</li> <li>■ The load set at the overload failure level (PRT-21) is small.</li> </ul>	<ul style="list-style-type: none"> <li>☞ Raise the capacity of the motor and inverter.</li> <li>☞ Increase the set value.</li> </ul>
Under Load	<ul style="list-style-type: none"> <li>■ There is a problem with the connection between the motor and load.</li> <li>■ The underload level(PRT-29,30) is lower than the minimum system load.</li> </ul>	<ul style="list-style-type: none"> <li>☞ Raise the capacity of the motor and inverter.</li> <li>☞ Increase the set value.</li> </ul>
Over Current1	<ul style="list-style-type: none"> <li>■ Acc/Dec time is too short compared with the inertia of the load(GD2).</li> <li>■ The load of the inverter is bigger than its rated load.</li> <li>■ Inverter output is ON during idling of the motor.</li> <li>■ The braking of the motor is too fast.</li> </ul>	<ul style="list-style-type: none"> <li>☞ Raise the Acc/Dec time.</li> <li>☞ Replace the inverter for one with bigger capacity.</li> <li>☞ Operate the inverter after the motor stops or use speed search(CON-60).</li> <li>☞ Check the machine brake.</li> </ul>
Over Voltage	<ul style="list-style-type: none"> <li>■ Decelerating time is too short compared with the inertia of the load(GD2).</li> <li>■ Regenerative load is located at the inverter output.</li> <li>■ The supply voltage is too high.</li> </ul>	<ul style="list-style-type: none"> <li>☞ Set the decelerating time higher.</li> <li>☞ Use a braking resistance device.</li> <li>☞ Check whether the supply voltage is above the prescribed degree.</li> </ul>
Low Voltage	<ul style="list-style-type: none"> <li>■ The supply voltage is too low.</li> <li>■ Load larger than the power supply capacity is connected(a welder or motor direct on line)</li> <li>■ Nonconformity of the electronic contactor, etc. on the power supply side.</li> </ul>	<ul style="list-style-type: none"> <li>☞ Check whether the supply voltage is below the prescribed degree.</li> <li>☞ Raise the power supply capacity.</li> <li>☞ Replace the electronic contactor.</li> </ul>
Ground Trip	<ul style="list-style-type: none"> <li>■ Earth of the outlet cord of the inverter</li> <li>■ Deterioration of the insulation of the motor</li> </ul>	<ul style="list-style-type: none"> <li>☞ Check the output terminal distribution of the inverter.</li> <li>☞ Replace the motor.</li> </ul>

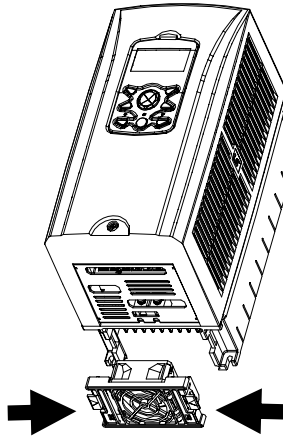
## Chapter 12 Checking and Troubleshooting

Type	Cause of Trouble	Solution
E-Thermal	<ul style="list-style-type: none"> <li>■ The motor is overheated.</li> <li>■ The load of the inverter is bigger than its rated load.</li> <li>■ The electronic thermal level is set too low.</li> <li>■ The inverter has operated for a long time at a low speed.</li> </ul>	<ul style="list-style-type: none"> <li>☞ Reduce the load or frequency.</li> <li>☞ Raise the capacity of the inverter.</li> <li>☞ Set the electronic thermal level properly.</li> <li>☞ Replace the motor for one that can separately supply power to the cooling fan.</li> </ul>
Out Phase Open	<ul style="list-style-type: none"> <li>■ Contact trouble of the electronic contactor of the output side.</li> <li>■ Bad distribution of output</li> </ul>	<ul style="list-style-type: none"> <li>☞ Check the electronic contactor of the output side of the inverter.</li> <li>☞ Check the output distribution.</li> </ul>
In Phase Open	<ul style="list-style-type: none"> <li>■ Contact trouble of the electronic contactor of the input side</li> <li>■ Bad distribution of input</li> <li>■ The DC condenser of the inverter needs replacing.</li> </ul>	<ul style="list-style-type: none"> <li>☞ Check the electronic contactor of the input side of the inverter.</li> <li>☞ Check the input distribution.</li> <li>☞ You should replace the DC condenser of the inverter. Get customer service from an agency.</li> </ul>
Inverter OLT	<ul style="list-style-type: none"> <li>■ The load of the inverter is bigger than it's the inverter rating.</li> <li>■ Torque boost is too high.</li> </ul>	<ul style="list-style-type: none"> <li>☞ Raise the capacity of the inverter and motor.</li> <li>☞ Reduce the torque boost amount.</li> </ul>
Over Heat	<ul style="list-style-type: none"> <li>■ There is a problem with the cooling system.</li> <li>■ The inverter has been used longer than the replacement cycle of the cooling fan.</li> <li>■ The surrounding temperature is too high.</li> </ul>	<ul style="list-style-type: none"> <li>☞ Check whether there is any foreign substance in the vent, air duct or outlet.</li> <li>☞ Replace the inverter cooling fan.</li> <li>☞ Keep the temperature around the inverter below 50°C.</li> </ul>
Over Current2	<ul style="list-style-type: none"> <li>■ Earth of the output cord of the inverter</li> <li>■ There is a problem with the inverter power switch(IGBT).</li> </ul>	<ul style="list-style-type: none"> <li>☞ Check the output terminal distribution of the inverter.</li> <li>☞ Inverter operation is impossible. Contact a near service provider.</li> </ul>
NTC Open	<ul style="list-style-type: none"> <li>■ The surrounding temperature is out of the prescribed range.</li> <li>■ There is a problem with the internal temperature sensor of the inverter.</li> </ul>	<ul style="list-style-type: none"> <li>☞ Keep the temperature around the inverter below the prescribed degree.</li> <li>☞ Contact a near service provider.</li> </ul>
FAN Trip	<ul style="list-style-type: none"> <li>■ There is foreign substance in the inverter vent where the fan is.</li> <li>■ The cooling fan of the inverter needs replacing.</li> </ul>	<ul style="list-style-type: none"> <li>☞ Check the vent or air outlet.</li> <li>☞ Replace the cooling fan of the inverter.</li> </ul>
IP54 FAN Trip	<ul style="list-style-type: none"> <li>■ Internal fan connector is not connected.</li> <li>■ Internal fan PCB board's power connector is not connected.</li> <li>■ Inverter cooling fan become to change period time.</li> </ul>	<ul style="list-style-type: none"> <li>☞ Connect internal Fan connector.</li> <li>☞ Internal fan PCB board's power connector is connected.</li> <li>☞ Inverter cooling fan have to changed.</li> </ul>

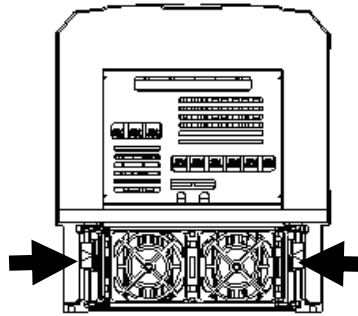
### 12.1.4 Replacement of cooling fan

#### 1) Replacement steps of the product below 7.5kW

Push the bracket on the bottom to the arrow direction and pull it forward. Disconnect the connector of the fan, then you can replace the fan.



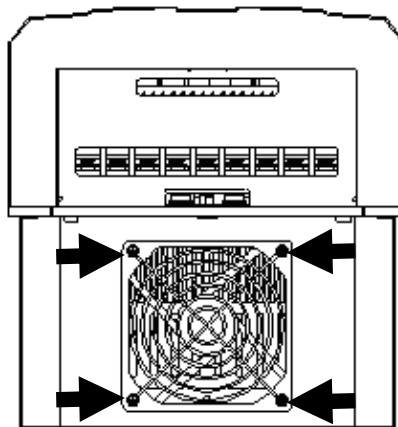
<below 3.7kW>



<below 7.5 kW>

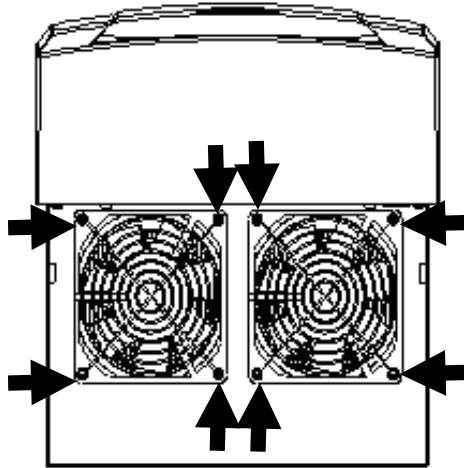
#### 2) Replacement steps of product of 11~15kW 200V/400V, 18.5~22 kW 400V

Release the volts under the In-Out put terminals and disconnect the connector of the fan, then you can replace the fan.



### 3) Replacement steps of product of 18.5~22 kW 200V, 30~75kW 400V (Check capacity.)

Release the volts upper of the product and disconnect the connector of the fan, then you can replace the fan .





### 12.1.5 Daily and regular checkup list

Checkup Part	Checkup items	Check up	Checkup cycle			Way of Checkup	Criterion decision	Counter -plan
			daily	Regular (Year)				
				1	2			
Total	environment	Check: temperature,umidity, dust, ETC.	O			See warning	No freezing under temperature of -10~+40.  No dew under humidity of 50%	thermometer, hygrometer, recorder
	Entire devices	Is there any abnormal vibration or sound?	O			By seeing or hearing	If no matter	
	Power Source Voltage	Normal or not of the Voltage of main circuit?	O			Voltage check among the terminal R, S, T phase of the inverter		Digital multimeter/ tester
Main circuit	Total	1) Megger check (between main circuit terminals and connecting terminals) 2) Are all of the fixed parts on the position? 3) Is there any evidences of overheating on each parts? 4) cleaning		O	O	1) Disconnect the inverter and short terminals R,S,T, U,V,W, and then measure these terminals and connecting terminals with Cycle megger 2) Screw up 3) Check by seeing.	1) over 5MΩ 2),3) no matter	DC 500V Megger
				O				
				O				
	Connected conductors /Wires	1)Is there any corrosion on the conductor 2) Is there any damage on coverings of the wire?		O		Check by seeing.	If no matter	
	Terminals	Is there any damaged?		O		Check by seeing.	If no matter	
	Intermediate Condenser	1) Is liquid leaking inside? 2) Is the safety apparatus on the position? Is there any protuberance? 3) Check the power failure capacity	O O			1), 2) Check by seeing.  3) Check with Capacity meter	1),2) If no matter  3) 85% Over than Rated capacity	Capacity meter
			O					
Relay	1) Is there any chattering sound under operation 2) Is there any damage on contact point?		O		1)check by hearing 2)check by seeing	If no matter		
Resistor	1) Is there any damage on isolating method of Resistor? 2) Check disconnection		O		1) check by seeing 2) Disconnect one side and check with the tester	1) If no matter 2) within ±10% variation of indicated resistance value	Digital multimeter/a nalogue tester	

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Checkup Part	Checkup items	Checkup	Checkup cycle			Way of Checkup	Criterion decision	Counter plan
			daily	Regular (Year)				
				1	2			
Control circuit Protective circuit	Operation checking	1) Check the imbalance of each output voltage during the operation.		O		1) Check the voltage of the Inverter output terminal among U,V,W	1) Voltage within phases: For balance 200V (400V) - within 4V(8V)	Digital multimeter/rectification voltmeter
		2) No abnormalities on the display circuit after executing sequence protection test		O		2) short or open the Inverter protection circuit by force.	2) Abnormal circuit is on the operation according to the sequence.	
Cooling system	Cooling fan	1) Is there any abnormal vibration or sound? 2) Is there any laxness on the connecting parts?	O		O	1) Turn it with hands under condition of power off 2) Fasten it Again.	1) It turns smoothly  2) No Abnormality should be founded	
Display	Meter	Is the displayed value normal?	O	O		Check the displayed value on the surface of panel	Check the regulational and administrative value	voltagemeter /amperemeter
Motor	Total	1) Is there any abnormal vibration or sound? 2) Is there any abnormal smell?	O			1)Check by ears, eyes and hands 2)Check the abnormality such as overheating, damage etc.	No Abnormality should be founded	
	Isolation resistance	Megger check (Between the output terminal and conneting terminal)				O	Disconnect the connection of U,V,W and connect the moter wires.	Over 5MΩ  500V class Megger