

VWR symphony Low-Temp./BOD Incubator

Low-Temp./BOD Incubator: 414004-626,628,630,632
414004-627,629,631,633



- ✓ The manual described herein is designed to assist in timely diagnosis and to provide solutions for malfunctions that may occur during use.
- ✓ In the event that problems described below do occur, verify fault conditions and perform corrective actions suggested in this manual. If abnormal conditions persist, contact VWR Equipment and Instrument Service 1-888-793-2300.

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I. Description of Key Parts and Specifications

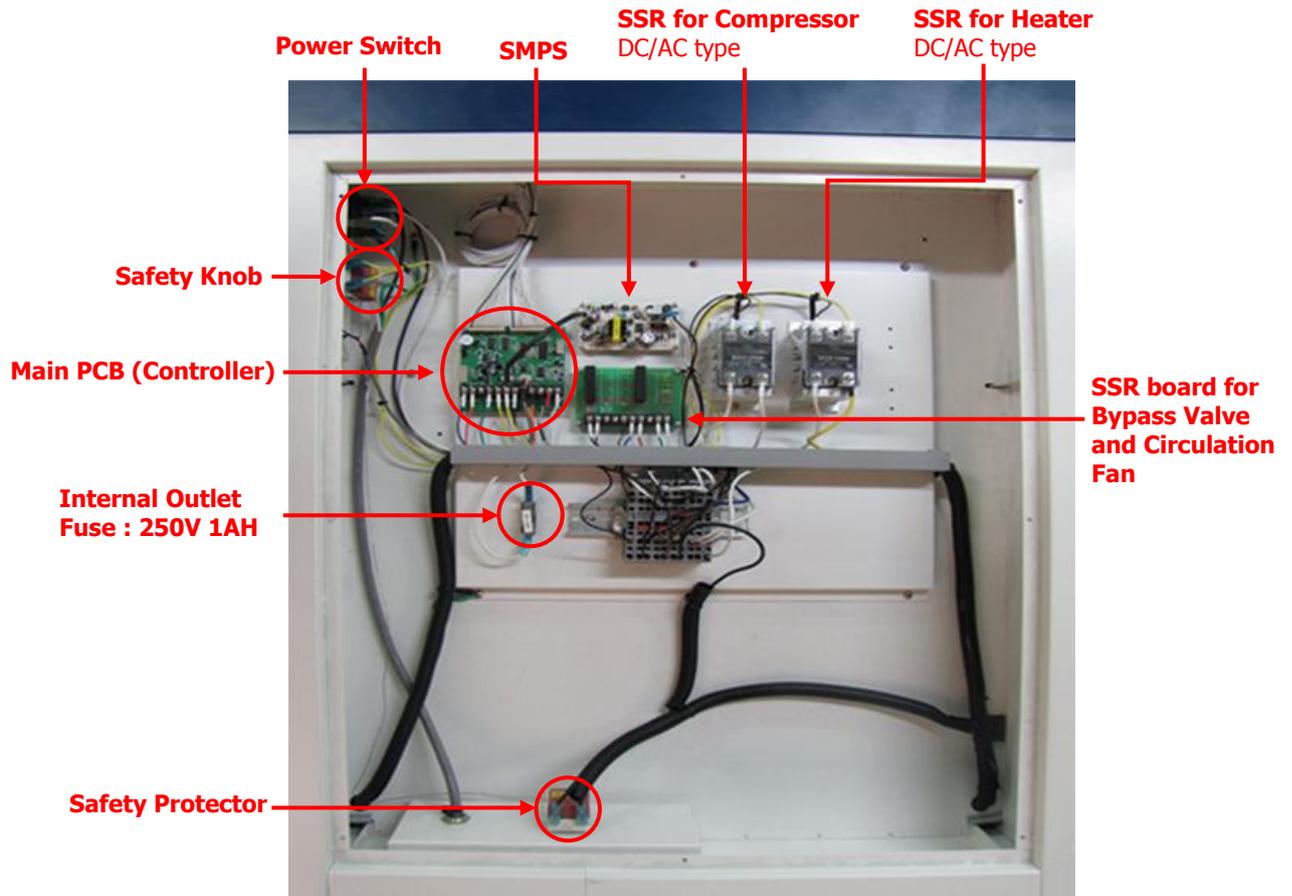
1. Description of Key Parts



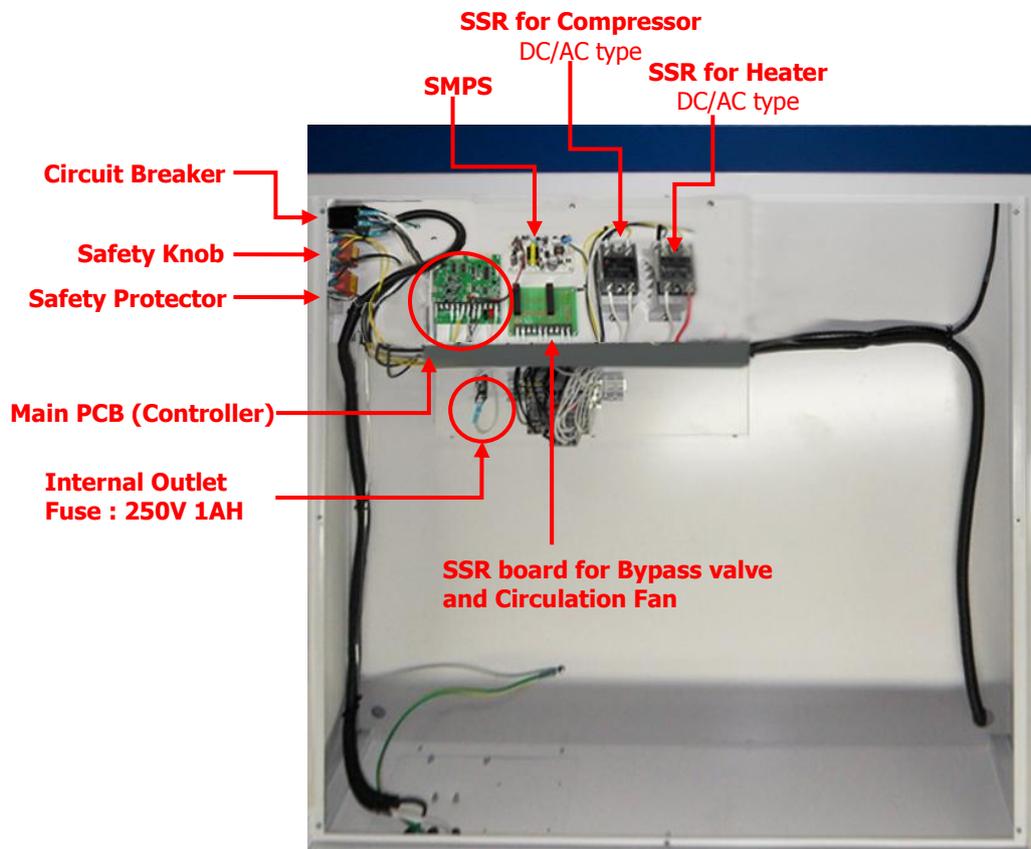
<Figure 1> VWR symphony Low-Temp./BOD Incubator
414004-626,627



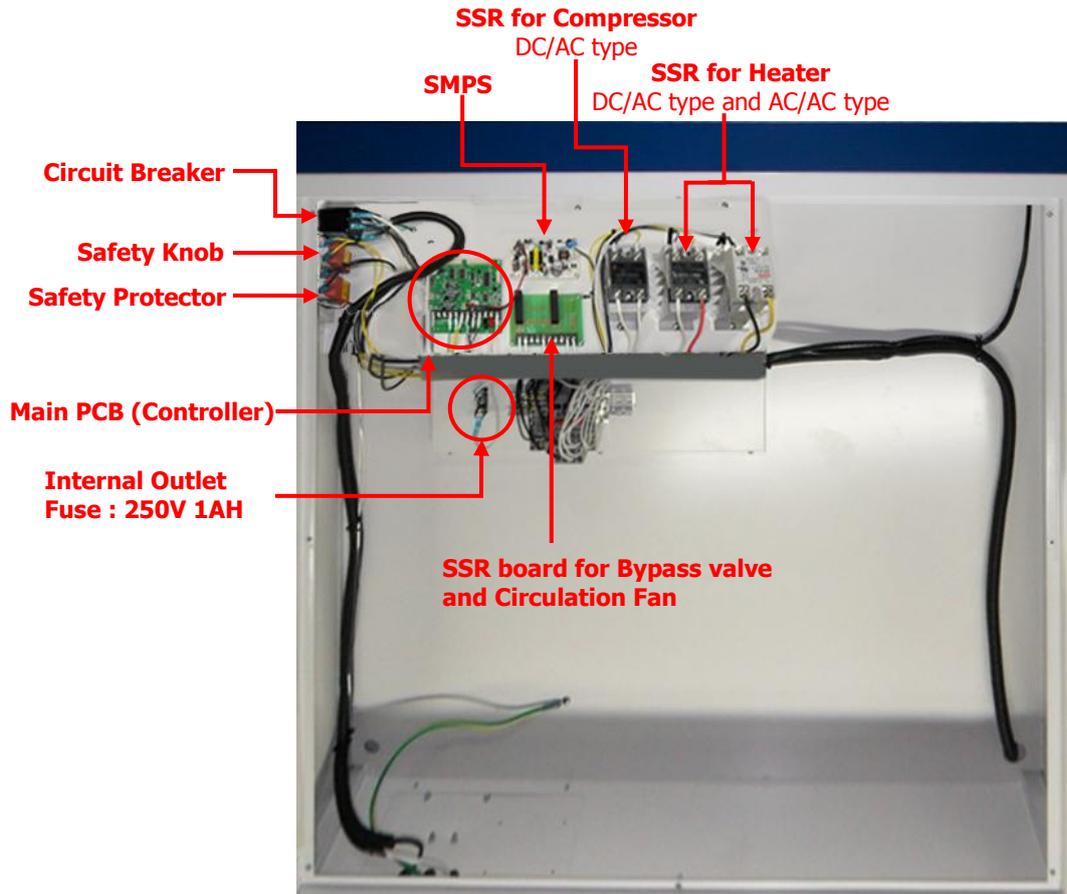
**<Figure 2> VWR symphony Low-Temp./BOD Incubator
414400-628,629,630,631,632,633**



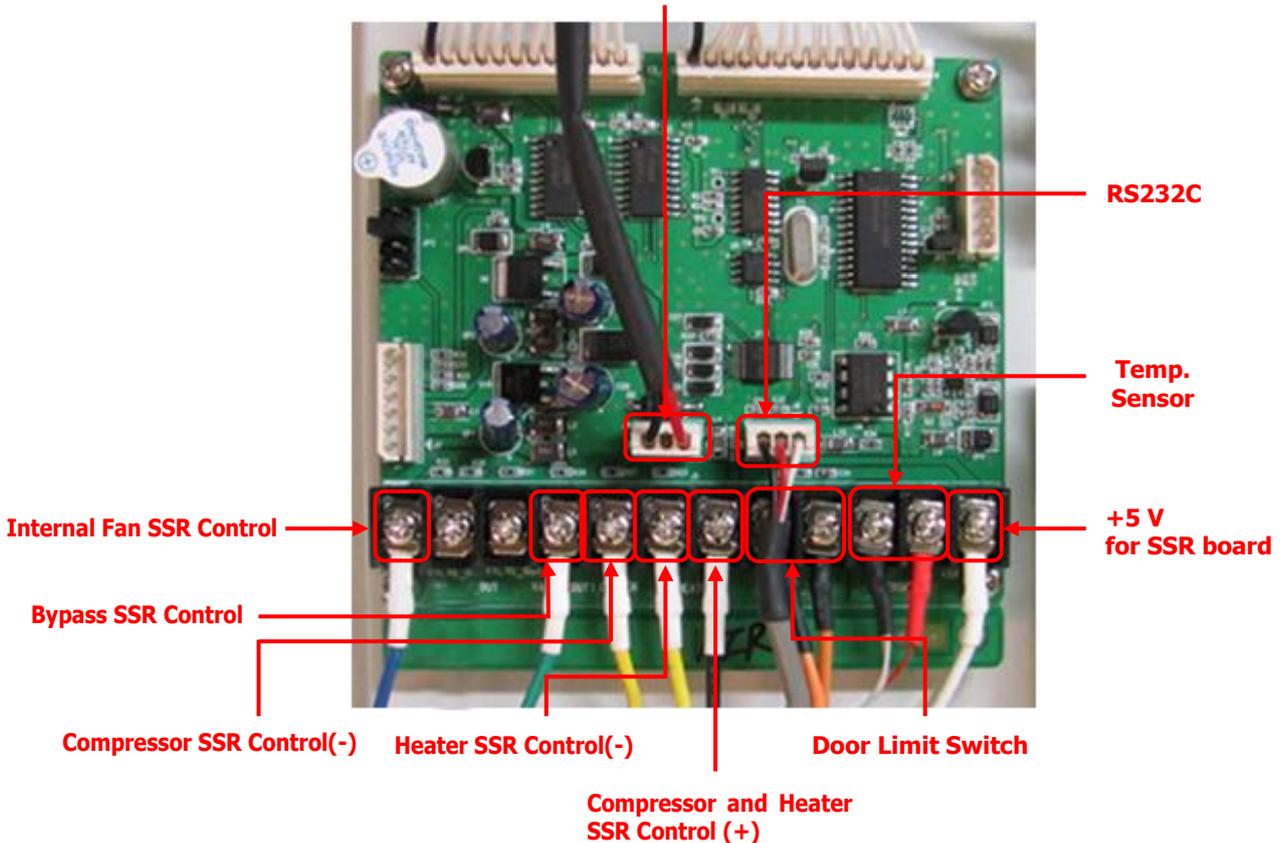
<Figure 3> Distribution board of 414004-626,627



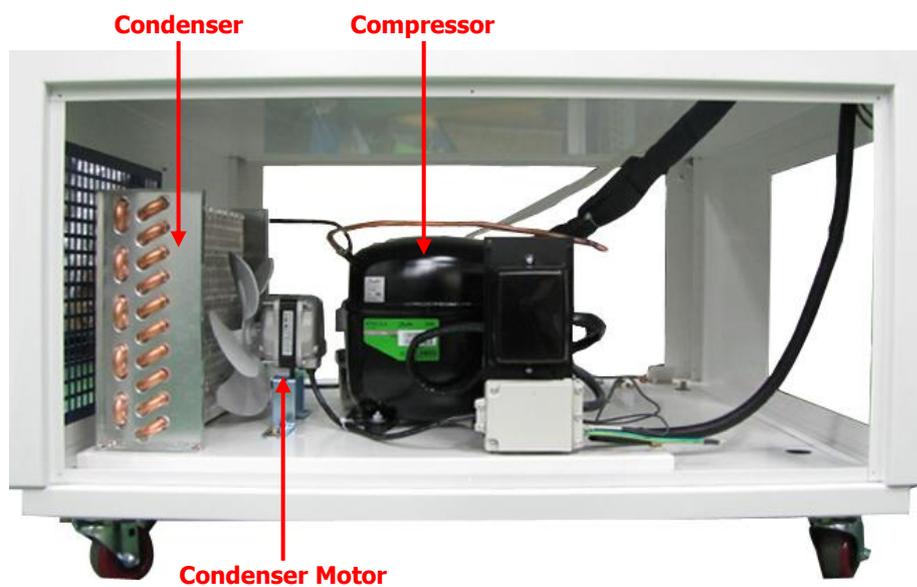
<Figure 4> Distribution board of 414004-628,629,630,631



<Figure 5> Distribution board of 414004-632,633
DC Power



<Figure 6> Main controller of VWR symphony Low Temp./BOD Incubator



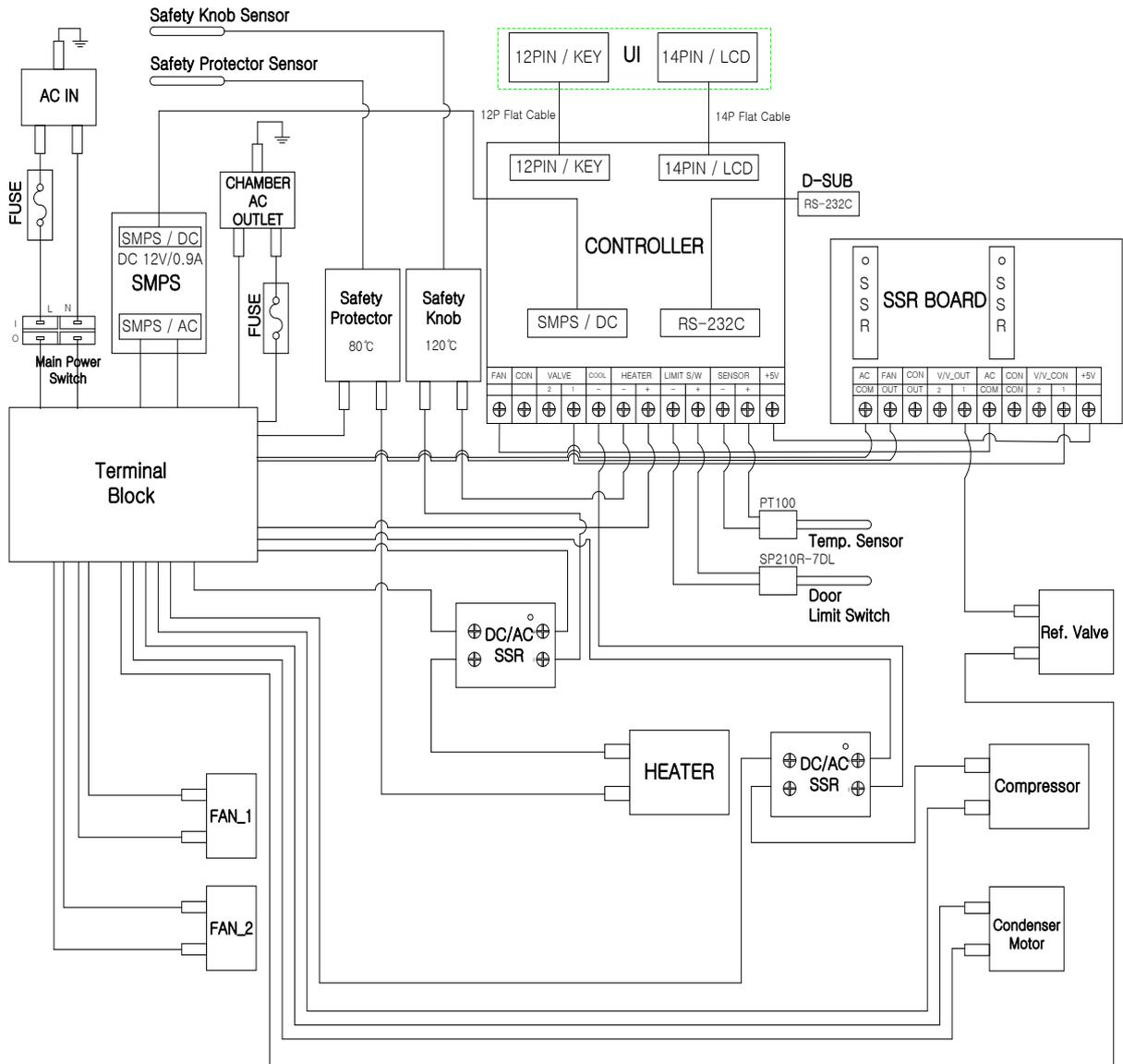
<Figure 7> Compressor Deck of VWR symphony Low Temp./BOD Incubator

2. Specifications

Model Name		414004-626,627	414004-628,629	414004-630,631	414004-632,633
Capacity		150L.L(5.25cuft)	255L(9.0cuft)	425L(15.0cuft)	700L (24.7cuft)
Dimension (w×d×h)	Internal(inch)	19.9 × 19.9 × 24.0	19.9 × 19.9 × 39.4	27.8 × 23.8 × 39.4	31.5 × 27.6 × 53.1
	External(inch)	25.2 × 32.8 × 51.7	25.2 × 32.8 × 67.0	33.1 × 38.7 × 69.0	36.8 × 42.4 × 78.7
Heater		700 W	1 kW	1.2 kW	2 kW
Temp.	Range	0°C ~ 60°C			
	Accuracy	±0.2 at 37°C			
	Uniformity	±0.5°C at 37°C ±1.4°C at 50°C			
	Sensor	PT 100			
Control Sensitivity		±0.1°C			
Heating-up Time		20 min. to 37°C 20 min. to 50°C	20 min. to 37°C 20 min. to 50°C	35 min. to 37°C 35 min. to 50°C	35 min. to 37°C 35 min. to 50°C
Recovery (Door open 30 sec)		10 min. to 37°C 12 min. to 50°C	10 min. to 37°C 12 min. to 50°C	12 min. to 37°C 15 min. to 50°C	12 min. to 37°C 15 min. to 50°C
Controller		Advanced, Adaptive Microprocessor Control with Jog-Shuttle Knob (Turn & Push)			
RS232 Port		Available to connect with PC			
Display		Digital LCD Display with Back Light			
Timer		99hr 59 min (delay/continuous function)			
Compressor Control		Intelligent Control of Refrigerator for preventing Overload of Compressor			
Refrigerant		CFC-Free(134A) Refrigeration System			
Material	Internal	Stainless Steel (#304)			
	External	Powder Coated Steel			
	Inner Door	Inner tempered Glass Door			
Shelves		3ea of Stainless Steel Shelves			
Circulation		Forced Air Type			
Safety device		Over Temp. and Over Current Protector, Sensor Error Detector			
Others		UL / CUL Certified RS232C Interface for Monitoring and Controlling with PC Storage Function (Temp. and Time) Locking Mode (Jog-Shuttle Input Disabled) Alarm (Error Status and Timer-end)			
Net Weight		260.15 lb	346.1 lb	445.3 lb	517.0 lb
Packing Dimension (w×d×h) inch		39.4 x 35.4 x 64.6	39.4 x 35.4 x 80.3	43.3 x 43.3 x 84.3	45.3 x 48.0 x 92.1
Shipping Weight		421.1 lb	478.4 lb	610.7 lb	691.0 lb
Power Consumption		1.6 kW	1.8 kW	2.3 kW	2.4 kW
Power Supply		120V, 60Hz or 230V, 50/60Hz*			

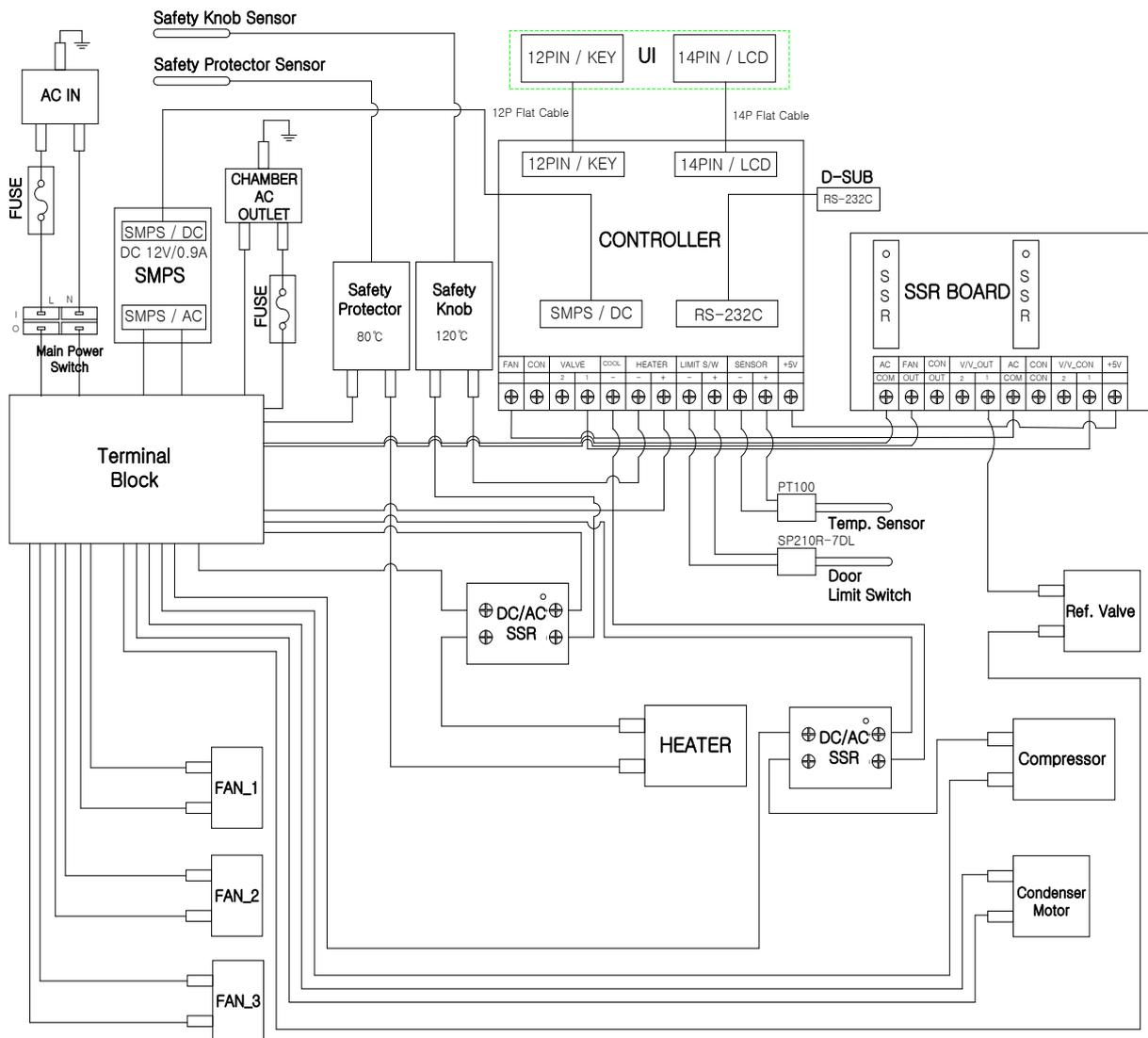
* 230V models are not UL certified.

3. Circuit Diagram



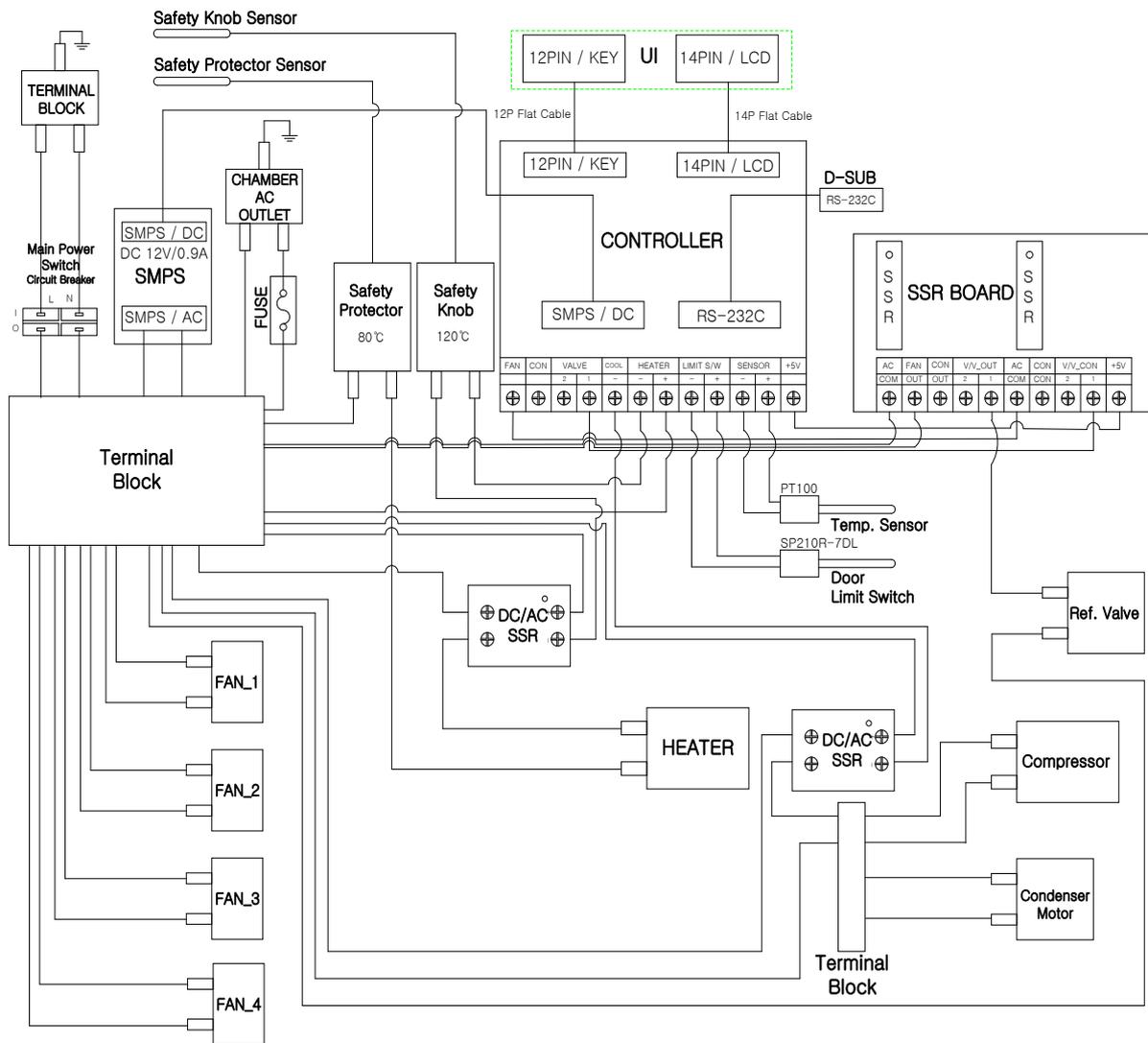
No.	Model	Parts Specification						
		AC Type	Fuse	DC/AC SSR	Heater	Compressor	AC Part Wire	DC Part Wire
1	414004-626,627	Cable Grand	250V / 15A	215Z 240Z	700W	1/3 Hp(660W)	14AWG/105℃	18AWG

<Figure 7> Circuit Diagram of 414004-626,627



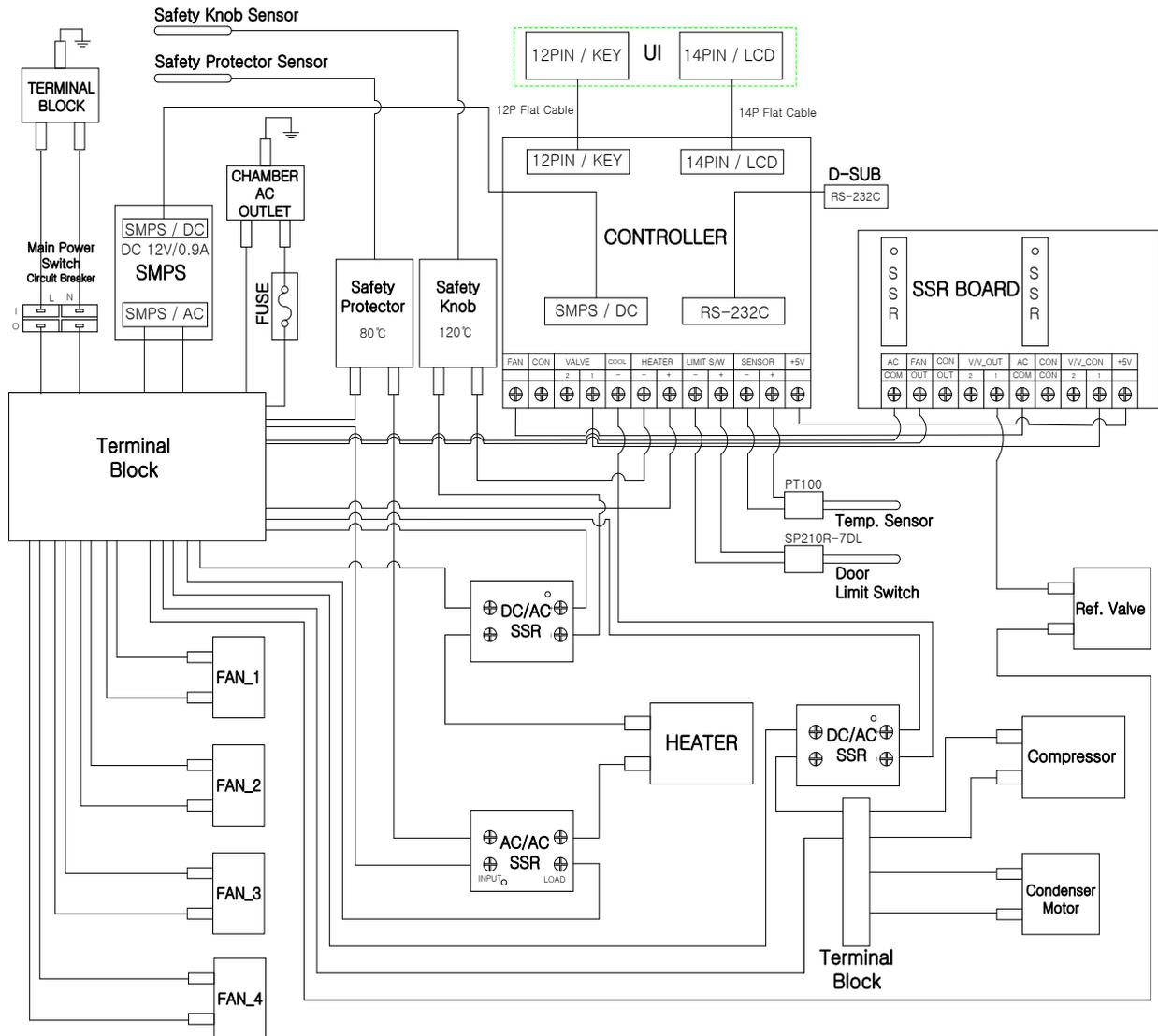
No.	Model	Parts Specification						
		AC Type	Fuse	DC/AC SSR	Heater	Compressor	AC Part Wire	DC Part Wire
1	414004-628,629	Terminal Block	250V / 30A Circuit Breaker	215Z 240Z	1kW	1/3 Hp(660W)	10AWG/105°C	18AWG

<Figure 8> Circuit Diagram of 414004-628,629



No.	Model	Parts Specification						
		AC Type	AC/AC SSR	DC/AC SSR	Heater	Compressor	AC Part Wire	DC Part Wire
1	414004-630,631	Terminal Block	none	215Z 240Z	1.2kW	2/5 Hp(800W)	10AWG/105℃	18AWG

<Figure 9> Circuit Diagram of 414004-630,631



No.	Model	Parts Specification						
		AC Type	AC/AC SSR	DC/AC SSR	Heater	Compressor	AC Part Wire	DC Part Wire
1	414004-632,633	Terminal Block	40AA	225Z 240Z	2kW	1/2 Hp(1kW)	10AWG/105°C	18AWG

<Figure 10> Circuit Diagram of 414004-632,633

II. Corrective Actions for Fault Conditions

1. Power on – no response

(1) Check the power cord is plugged in correctly.

- Verify unit power cord is securely plugged into proper power socket.
- If power cord is plugged in correctly, go to next instruction..

(2) Check for any irregularities in the power supply.

- Position the selector switch of the tester to the AC voltage measurement mode ($\sim V$) and insert the test probe into the outlet to confirm supply of AC 120V or 230V depending on the model.
- Take caution for dangers of electrical shocks.
- If power supply is normal, go to next instruction.



Select the AC voltage measurement mode ($\sim V$)



(3) Check the Power Switch and the Circuit Breaker.

- When the power is turned on, the power switch LED is illuminated. (414004-626,627,629)
- If the Circuit Breaker is defected, replace it. (414004-628,631,632,633)
- If the Circuit Breaker cannot be still activated after replacing, go to instruction (5) to check electrical leakage in the heater.



On Condition



Off Condition

***Power Switch for 414004-626,627**



On Condition



Off Condition

***Power Switch for 414004-628,629,630,631,632,633**

(4) Check the Fuse. (For 414004-626,627)

- ① Open the Fuse Socket on the right side of the product using a tool.
- Replace the Fuse if its exterior is damaged.(Refer to table of Fuse specification)



Model	Capacity Lit. (cuft)	Fuse
414004-626,627	150 (5.25)	250V 15A
414004-628,629	255 (9.0)	250V 30A Circuit Breaker
414004-630,631	425 (15.0)	250V 30A Circuit Breaker
414004-632,632	700 (24.5)	250V 30A Circuit Breaker

<Table> Fuse Specification of each Model

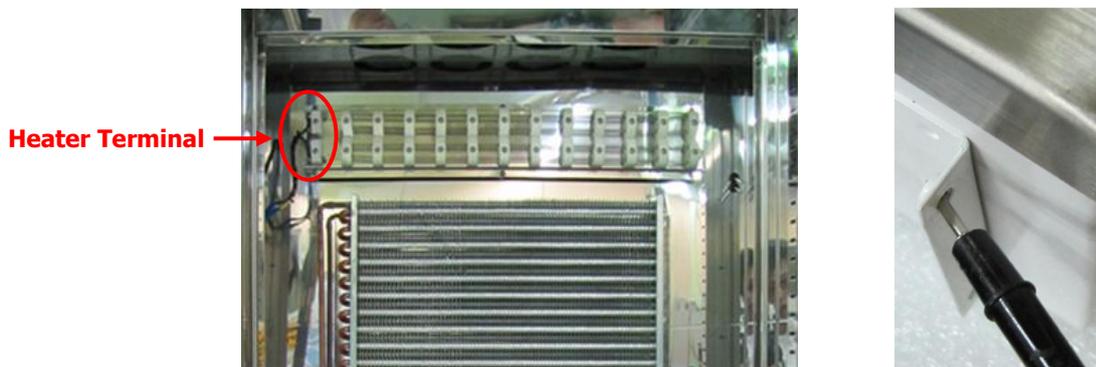
- ② Check for a short circuit in the fuse using the tester.
- Select the 'short circuit check mode' on the tester and then connect a test probe to each terminal of the Fuse. If there is a short circuit in the fuse, buzzer will not sound or resistance displays 0F (Infinity).
 - Replace the Fuse if buzzer does not sound or resistance is measured at 0F (Infinity).
 - Replace the Fuse if Fuse glass tube is damaged. (Refer to table of Fuse specification)
 - If Fuse is not damaged, go to instruction (7).



- ③ If fuse damage recurs after replacing the fuse, check the electrical leakages in the Heater described in instruction (5).
- ④ If fuse damage recurs with no electrical leakages in the Heater, check the short circuit on AC power input line as described in instruction (6).

(5) Check for electrical leakages in the Heater.

- ① Open the front door and loosen the bolts on back of inner chamber and detach the panel.
- ② Position the selector switch of the tester to the short circuit mode and check for electrical leakages between the heater and the body frame.
- If body frame is coated, remove the coating for short circuit test by tester.



- ③ If the electrical leakages in the heater are detected, replace the heater. (Refer to Replacement Instructions for Key Parts in Section 10.1)
- If you successfully replace the heater, go back to the instruction (3)

(6) Check for AC power input line short (condition where 2 wires are joined) circuit.

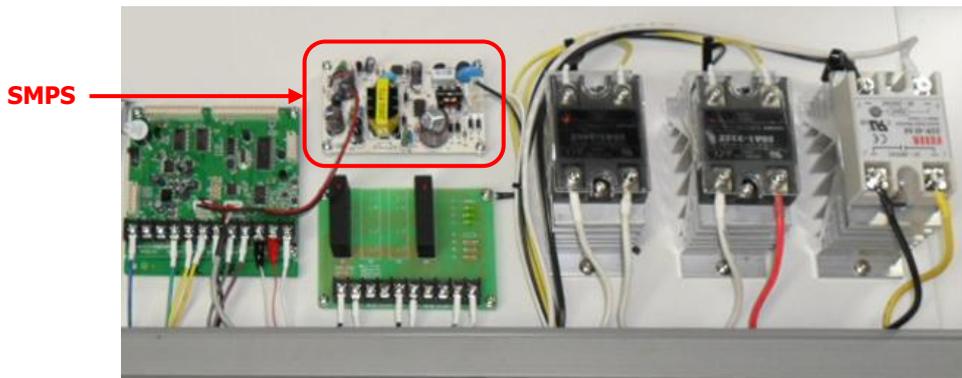
- ① Position the selector switch of the tester to the 'short circuit check mode'.
- ② Place the test probe on two terminals of the AC Inlet.
- ③ 'Beep' noise sounding from the tester indicates, there is a short in the AC power input line.



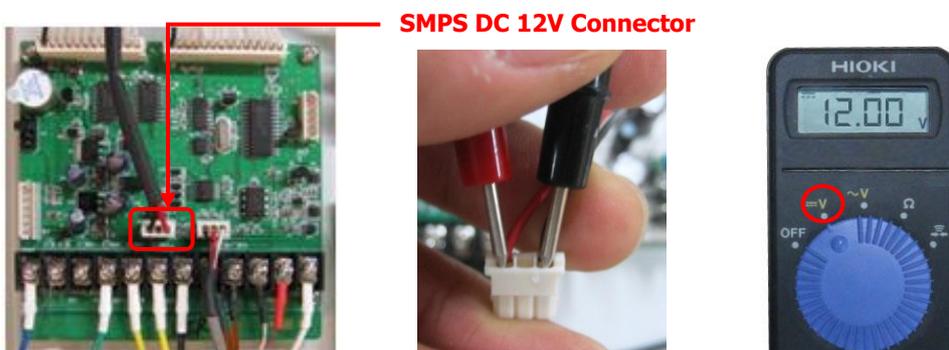
- ④ Loosen bolts on the topside panel and look for a cause of short circuit and eliminate it.
- ⑤ If you successfully eliminate the cause of short circuit in AC power inlet, go back to the instruction (3).

(7) If the LCD Display is still not turned on, check if the SMPS is operative.

- ① Loosen bolts on topside of the product and detach the upper panel.
 - Check the wiring conditions inside the product and firmly connect the cables if loose.



- ② Turn on the power switch, disconnect the SMPS DC12V connector inserted into the Main PCB (Controller), and measure the output voltage of the SMPS using the tester in DC voltage mode.
 - **It should measure approx. 12V. If DC12V is not measured, replace the SMPS.**



2. Temperature does not increase during operation

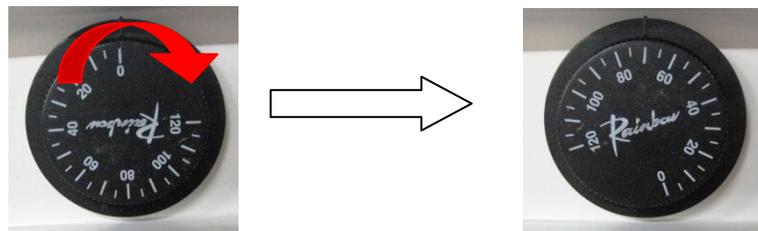
(1) Check the SV(Set Value) in operation.

- If temperature SV(Set Value) is not set, set the temperature by turning Jog-Shuttle knob and press the Jog-Shuttle knob to start operation.
- SV(Set Value) is properly set for operation, go to next instruction.

(2) If temperature SV(Set Value) is set normally, check the Safety Knob operating sound and setting.

- Rotate the Safety Knob from Min to Max, you should hear a switch contact sound near the present temperature value.
- **If you do not hear a switch contact sound, replace the Safety Knob. (Refer to Replacement Instructions for Key Parts in Section 10.2)**
- Check if the Safety Knob is set to less than the temperature SV(Set Value), reset to approx. 20°C higher than the product operating temperature SV(Set Value).
- If the Safety Knob is properly set, go to next instruction.

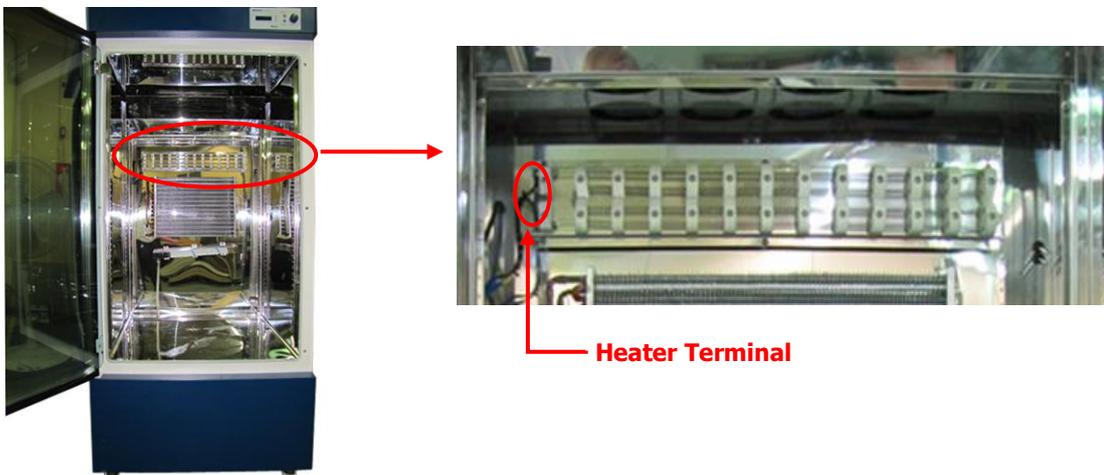
Ex) If operating temperature SV(Set Value) is 60°C, set the Safety Knob to 80°C.



(3) Check the Heater resistance.

If the Safety Knob is operating properly, loosen the bolt on back of the product, remove the back panel, and then measure the Heater resistance.

- ① Turn off the power switch and set the Safety Knob to 0°C.
- ② Open the door and loosen the bolt on backside of inner chamber and detach the panel.



- ③ Select the resistance measurement mode (Ω) on the tester and then measure the Heater resistance.

Model	Capacity Lit (cuft)	Heater Resistance
414004-626	150 (5.25)	18.5 ~ 22.6 Ω
414004-627		62.2 ~ 76.1 Ω
414004-628	255 (9.0)	13.0 ~ 15.8 Ω
414004-629		43.6 ~ 53.2 Ω
414004-630	425 (15.0)	10.8 ~ 13.2 Ω
414004-631		36.3 ~ 44.4 Ω
414004-632	700 (24.5)	6.5 ~ 7.9 Ω
414004-633		21.8 ~ 26.6 Ω

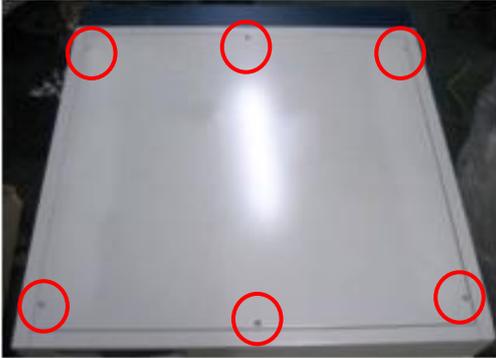
<Table> Heater Specification of each Model

- ④ If Heater resistance value is different from the Table, replace the Heater. (Refer to Replacement Instructions for Key Parts in Section 10.1)
 - If Heater is operative condition, go to next instruction.

(4) Check if the Heater Control SSR is operative.

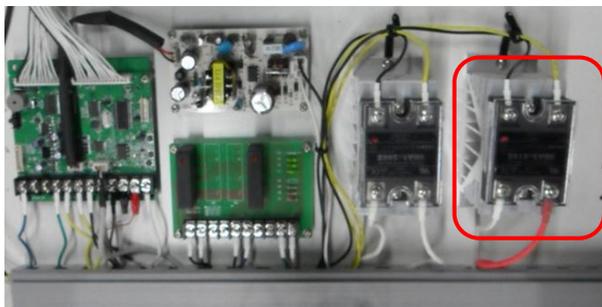
(A) For 414004-626,627,628,629,630,631

- ① Loosen bolts on top side of the product and detach the upper panel.
 - Check the wiring conditions inside the product and firmly connect the cables if loose.



- ② Turn on the Power Switch and Set the Safety knob higher than SV(Set Value).
 ③ Set proper temperature SV(Set Value) and check 'Running...' is displayed on the LCD display.
 ④ During operation, check the flashing of the LED on SSR.

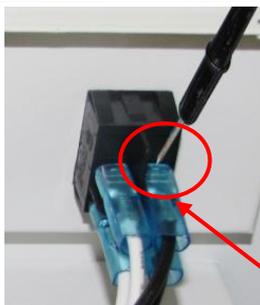
- **If the LED flashes, the Main PCB (Controller) is normal; check the SSR.** (Refer to instruction '⑤') (Once the unit begins to run approx. 8 seconds are required for operating SSR.)
 - **If the LED does not flash, check the Main PCB (Controller).** (Refer to instruction '⑥')



← Heater SSR



- ⑤ If the LED flashes, check the SSR output terminal using the tester.
 ① Position the selector switch of the tester to the AC voltage measurement mode ($\sim V$), and then check the AC voltage between black wire terminal on power switch and SSR terminal connected to Safety Knob(② terminal) as shown in figure below.
It should measure AC 120V or 230V depending on model. If AC 120V or 230V is not measured, check the cables and connections and eliminate any loose connections.
*** Take caution for dangers of electrical shocks.**



Main Power Switch



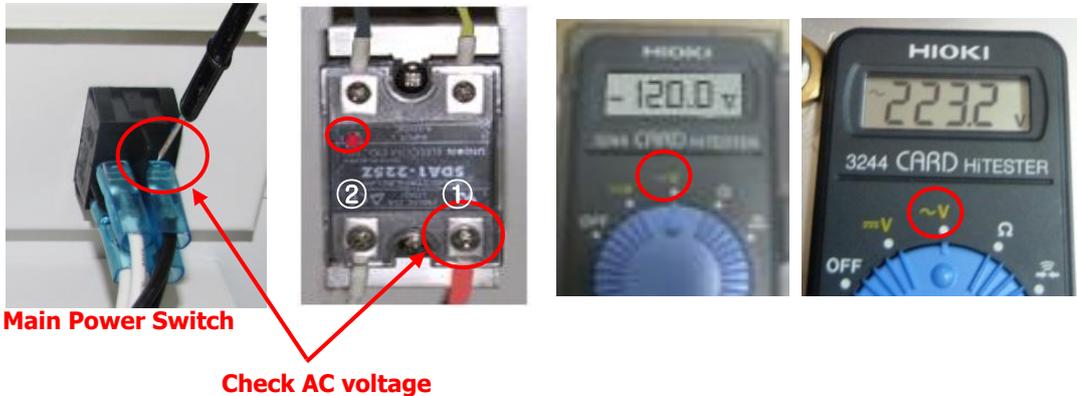
Check AC voltage

(It should measure 120V or 203V)



⑥ After confirmation of AC 120V or 230V on ② terminal on SSR, check the AC voltage between black wire terminal on power switch and SSR terminal connected to Heater(① terminal) while the SSR LED is flashing as shown in figure below.

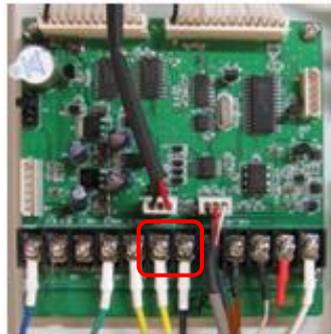
If AC 120V or 230V is not measured on those points, replace the SSR.



⑥ If the LED does not flash, check the output signal for SSR control on the Main PCB (Controller).

① Turn off the Power Switch.

② Disconnect the output wires for SSR control from the Main PCB (Controller), position the selector switch of the tester to the 'DC voltage measurement mode (--V)', and connect the test probe to the output terminal for SSR control on the Main PCB (Controller).



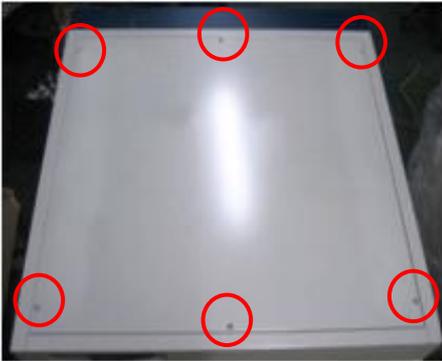
③ Turn on the Power Switch and set proper temperature SV(Set Value). Start the incubator to check if DC5V is measured at output terminal for SSR control on Main PCB(Controller). (Once the unit begins to run(heat), approx. 8 seconds are required for operating SSR)

If DC5V is not measured, the Main PCB (Controller) is defected; replace the Main PCB.

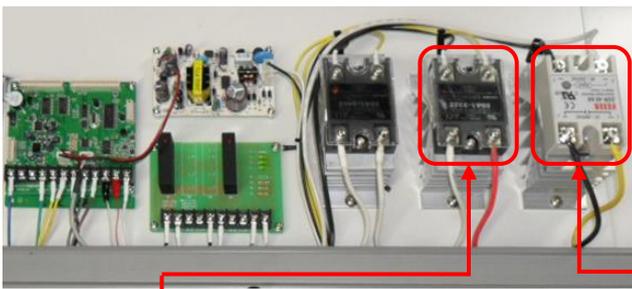


(B) For model 414004-632,633

- ① Loosen bolts on top side of the product and detach the upper panel.
 - Check the wiring conditions inside the product and firmly connect the cables if loose.

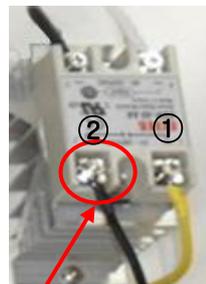


- ② Turn on the power switch, set the Safety Knob to 20°C higher than temperature SV(Set Value) on controller and start the operation.
- ③ During operation, check if the SSR LED flashes on the Heater SSR connected to Safety Protector.
 - **If the LED flashes on heater SSR connected to Safety Protector, Safety Protector is normal; check the SSR.(go to next instruction ④ to check heater SSR connected to Safety Protector.)**
 - **If the LED does not flash on heater SSR connected to Safety Protector, check the Safety Protector; go to instruction '② in (5)' to check if Safety Protector is operative.**


Heater SSR connected to Safety Knob
Heater SSR connected to Safety Protector

- ④ If the LED flashes on heater SSR connected to Safety Protector, check the SSR output terminal using the tester.

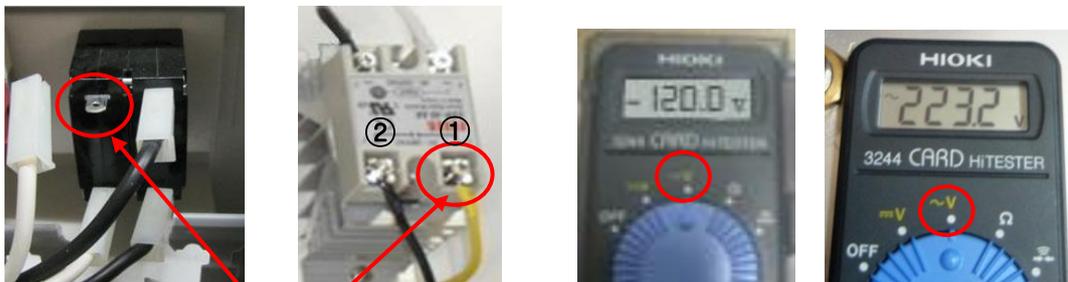
- ③ Position the selector switch of the tester to the AC voltage measurement mode ($\sim V$), and check the AC voltage between white wire terminal on Circuit Breaker and SSR terminal connected with Safety Knob(② terminal) as shown in figure below. **If AC 120V or 230V is not measured, check the cables and connections and eliminate any loose connections.**
 - * Take caution for dangers of electrical shocks.**


Circuit Breaker
**Check AC voltage
(It should measure 120V or 230V)**

④ If AC 120V or 230V is measured, check the AC voltage between white wire terminal on Circuit Breaker and SSR terminal connected to Safety Protector (① terminal) while the SSR LED is flashing as shown in figure below.

- If AC 120V or 230V is not measured on those points, replace the SSR.
- If AC 120V or 230V is measured, go to next instruction ⑤ to check SSR connected to Safety Knob.

*** Take caution for dangers of electrical shocks.**



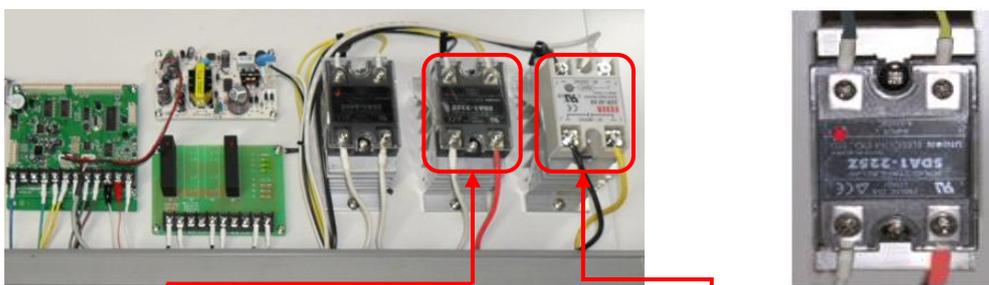
Circuit Breaker

**Check AC voltage
(It should measure 120V or 230V)**

⑤ During operation, check if the SSR LED flashes on the Heater SSR connected to Safety Knob.
- If the LED flashes on heater SSR connected to Safety Knob, the Main PCB (Controller) is normal; check the SSR. (Refer to instruction '⑥')

(Once the unit begins to run(heat), approx. 8 seconds are required for operating SSR.)

- If the LED does not flash on heater SSR connected to controller, check the Main PCB. (Refer to instruction '⑦')



Heater SSR connected to Safety Knob

Heater SSR connected to Safety Protector

⑥ If the LED flashes on heater SSR connected to Safety Knob, check the SSR output terminal using the tester.

① Position the selector switch of the tester to the AC voltage measurement mode (~V), and then check the AC voltage between black wire terminal on power switch and SSR terminal connected to Safety Knob (② terminal) as shown in figure below. **If AC 120V or 230V is not measured, check cables for loose connections.**

*** Take caution for dangers of electrical shocks.**



Circuit Breaker

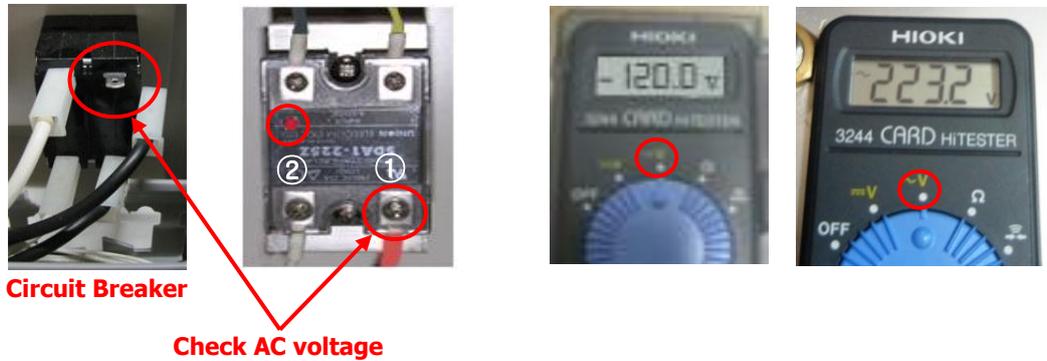
**Check AC voltage
(It should measure 120V or 230V)**

⑥ If AC 120V or 230V is measured, check the AC voltage between black wire terminal on Circuit Breaker and SSR terminal connected to Safety Konb(① terminal) while the SSR LED is flashing as shown in figure below.

-If AC 120V or 230V is not measured on those points, replace the SSR.

-If AC 120V or 230V is measured, go to next instruction ⑦ to check output signal of Heater SSR on Main PCB(Controller).

*** Take caution for dangers of electrical shocks.**



⑦ If the LED does not flash, check the SSR control signal output terminal of the Main PCB (Controller).

① Turn off the Power Switch.

② Disconnect the output terminal for SSR control from the Main PCB (Controller), position the selector switch of the tester to the 'DC voltage measurement mode (--V)', and connect the test probe to the output terminal for SSR control on the Main PCB (Controller).



③ Turn on the Power Switch and set proper temperature SV(Set Value). Start the incubator to check if DC5V is measured at output terminal for SSR control on Main PCB(Controller). (Once the unit begins to run(heat), approx. 8 seconds are required for operating SSR)

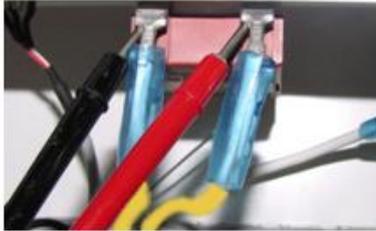
If DC5V is not measured, the Main PCB (Controller) is defected; replace the Main PCB.



(5) If the temperature still does not increase after checking steps (1)~(4) instructions, check for any loose connections in the Safety Knob and Safety Protector.

① Check for **loose connections in Safety Knob**.

- Rotate the Safety Knob located on the right side of the product from Min 0°C to Max 120°C.
- Select the 'disconnection check mode' on the tester and then connect the test probes on the two terminals of the Safety Knob.



- If the Safety Knob is operating properly, the buzzer from the tester will sound a 'beep' noise when passing the present temperature along with the Safety Knob operating noises, but the buzzer does not go off in Min.

- If no buzzer noise is heard from the tester while the Safety Knob is turned by passing the present temperature through to Max, replace the Safety Knob. (Refer to Replacement Instructions for Key Parts in Section 10.2)

② Check the **operative condition of Safety Protector**.

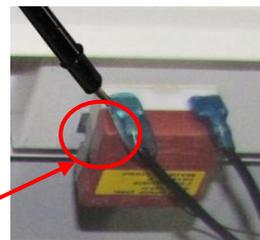
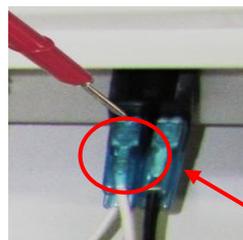
- The Safety Protector prevents the over-heating operation by cutting the power to heater once the unit operates abnormally over 80°C. If the safety Protector has been activated, the heater will not auto-recover, and must be reset manually to recover.
- Usually the Safety Protector needs a cool down time for recovery. We recommend 30 minutes to cool down.
- After cooling down the chamber and the Safety Protector, remove the red cap of the Protector and press the switch once. Then, you should hear the 'click' sound, the protection will be released and the heating operation will be allowed to work.



③ If the heating operation is still not operative even though the Safety Protector has been pressed, check the disconnection of Safety Protector.

- Turn on the power switch and set the operative temperature and operate the incubator.
- Check the AC voltage between Safety protector terminal connected to heater and white wire terminal in power switch. It should be AC 120V or 230V depending on the model.

If 120V or 230V is not measured at the points, replace the Safety Protector. (Refer to Replacement Instructions for Key Parts in Section 10.3)



Check AC voltage

3. Temperature does not decrease during operation

(1) Check the SV(Set Value) for operation.

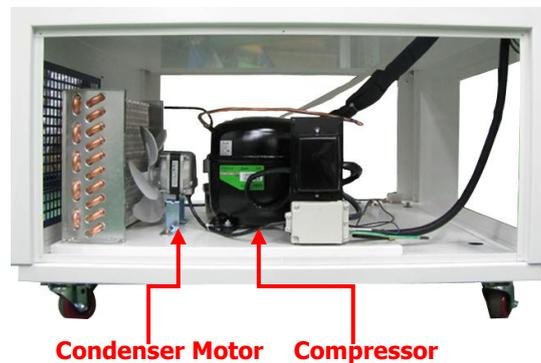
- If temperature is not set at this moment, proceed to temperature setting by turning Jog-Shuttle knob and press the Jog-Shuttle knob to start operation.
- SV(Set Value) is properly set for operation, go to next instruction.

(2) Check product placement and check if there is sufficient space between product and wall for heat emission.

- If the space between product and wall is insufficient, the cooling function of the product may not operate properly.
- Always obtain at least 20cm of space surrounding the product.
- Do not install too close to other equipment with heavy heat emission.

(3) Check if the Condenser Motor and Compressor are operative.

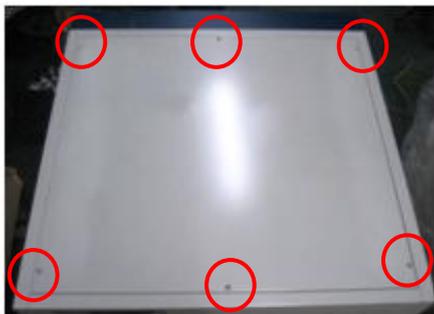
- ① Loosen up bolts on bottom of the product and detach the panel.



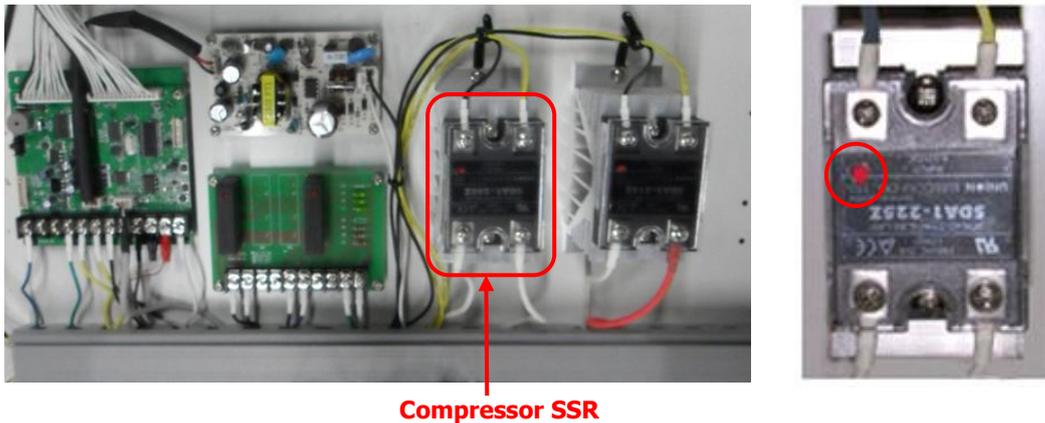
- ② Turn on the Power Switch and Set the Safety knob higher than SV(Set Value).
- ③ Set the temperature SV(Set Value) appropriately to operate the compressor and check 'Running...' is displayed on LCD display.
- ④ Check if the Compressor and Condenser Motor properly operates.
 - Once the unit begins to run at low temperature, the compressor will operate for approx. 1 minute.
 - During cooling operation, Compressor and Condenser Motor would operate simultaneously.
 - **If the Compressor is operating, the Condenser Motor must operate, but if only the Compressor is operating in cooling operation, replace the Condenser Motor. (Refer to Replacement instructions for Key Parts in Section 10.7)**
 - If the Compressor and Condenser Motor do not operate, go to next instruction to check compressor SSR output.

(4) If Compressor and Condenser Fan do not operate, check the Compressor SSR output and its operation.

- ① Turn off the Power Switch and loosen up the bolts on top side of the product and detach the panel.
 - Check the wiring conditions inside the product and firmly connect the cables if loose.



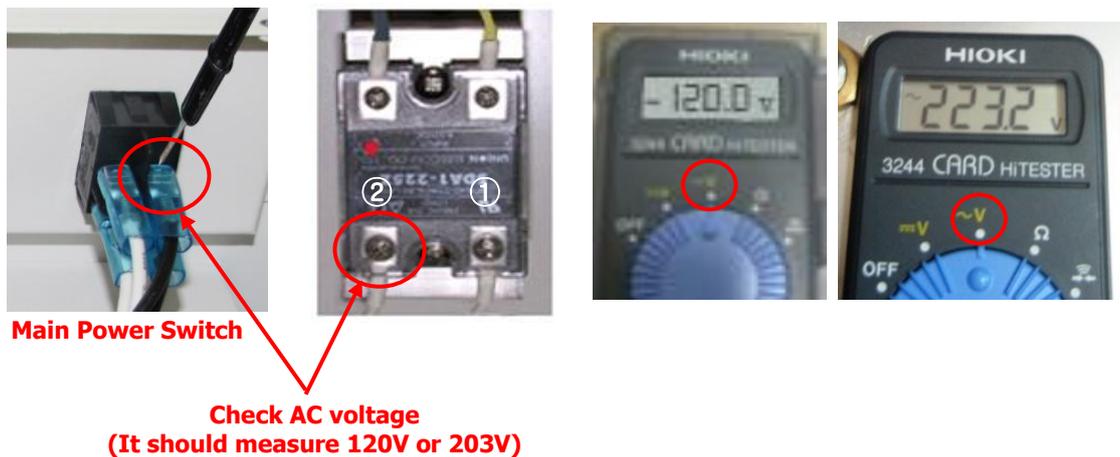
- ② Turn on the Power Switch and Set the Safety knob higher than SV(Set Value).
- ③ Set the temperature SV(Set Value) appropriately to operate the compressor and check 'Running...' is displayed on LCD display.
- ④ During operation, check the flashing of the LED on Compressor SSR.
 - **If the LED flashes, the Main PCB (Controller) is normal; check the SSR. (Refer to instruction '⑤')**
 - Once the unit begins to run at low temperature, the compressor will operate for approx. 1 minute.
 - If the LED does not flash, check the Main PCB (Controller). (Refer to instruction '⑥')**



- ⑤ If the LED flashes, check the SSR output terminal using the tester.
 - ① Position the selector switch of the tester to the AC voltage measurement mode ($\sim V$), and check the AC voltage between black wire terminal on power switch and SSR terminal connected to Terminal Block (② terminal) as shown in figure below.

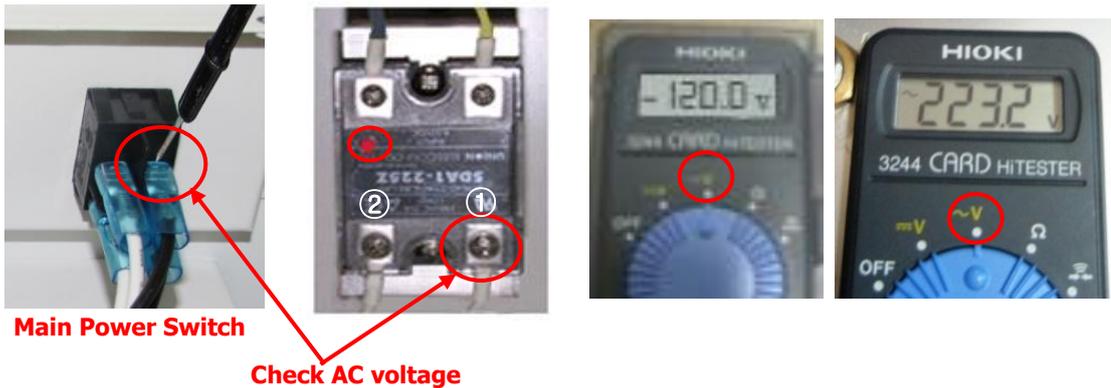
It should measure AC 120V or 230V depend on model. If AC 120V or 230V is not measured, check cables for loose connections.

*** Take caution for dangers of electrical shocks.**

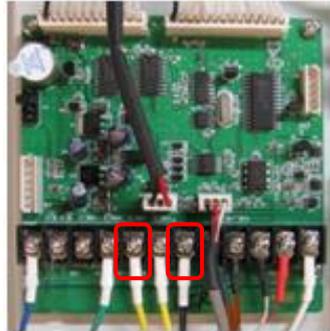


- ② After confirmation of AC 120V or 230V on ② terminal on SSR, check the AC voltage between black wire terminal on power switch and SSR terminal connected to Terminal Block(① terminal) while the SSR LED is flashing as shown in figure below.

If AC 120V or 230V is not measured on those points, replace the SSR.



- ⑥ If the LED does not flash, check the output signal for SSR control on the Main PCB (Controller).
- Turn off the Power Switch.
 - Disconnect the output terminal for SSR control from the Main PCB (Controller), position the selector switch of the tester to the 'DC voltage measurement mode (--V)', and connect the test probes to the ⑤ terminal and ⑦ terminal on the Main PCB (Controller).



- ⑦ Turn on the Power Switch and set proper temperature SV(Set Value). Start the incubator to check if DC5V is measured at output terminal for SSR control on Main PCB(Controller). (Once the unit begins to run at low temperature, the compressor will operate for approx. 1minute.)
- If DC5V is not measured, the Main PCB (Controller) is faulty; replace the Main PCB.**



(5) If temperature still does not decrease after checking (1)~(4) instructions, check the leakage of refrigerant in compressor.

- Please refer to extra instruction document for the recharging refrigerant.

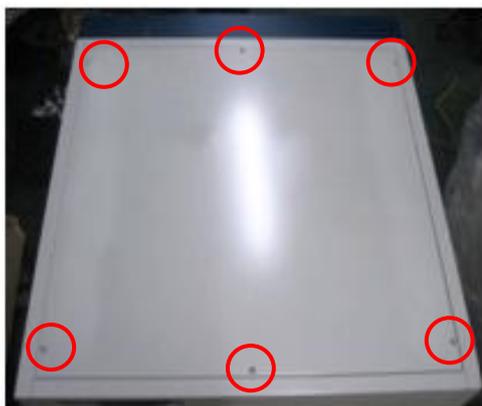
4. Temperature increases while controller not in operation

(1) Check if any temperature SV(Set Value) is set on the controller

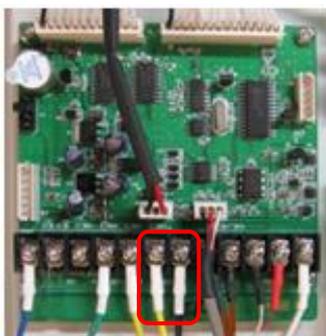
- During operation, check 'Running...' is displayed on LCD display.
- If any temperature SV(Set Value) is set on controller, press Jog-shuttle to cancel the operation.

(2) If temperature PV(Present Value) on controller increases while the incubator is not in operation, check the output signal of Heater SSR on the Main PCB (Controller).

- ① Loosen bolts on top side of the product and detach the upper panel.



- ② Disassemble the Heater controlling terminal on the Main PCB(Controller).



- ③ Set the Safety Knob to maximum.
④ Turn on only the power switch and do not operate the incubator.
⑤ Check the DC voltage of Heater controlling terminal on Main PCB(Controller).



If DC 5 V is measured, replace the Main PCB(Controller).

- If DC 5V is not measured, Main PCB is normal; go to next instruction to check if Heater SSR is damaged.

(3) If the Main PCB (Controller) is normal, check the Heater SSR.

① Check if temperature PV(Present Value) increases while only the power switch is turned on and the SSR LED does not flash.

- Heating operation must not be performed when SSR LED does not flash.



② If temperature increases, check the Heater SSR output terminal using the tester.

- Check the AC voltage between black wire terminal on power switch and SSR terminal connected to Heater (① terminal) as shown in figure below.

If AC 120V or 230V is measured, the Heater SSR is defective; replace SSR.



Check AC voltage

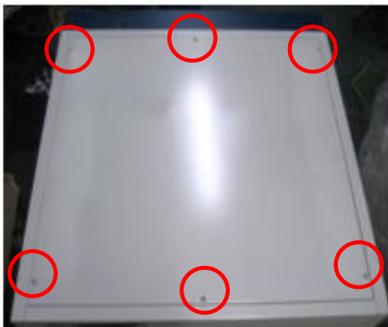
5. Temperature decreases when controller not in operation

(1) Check if any temperature SV(Set Value) is set on the controller

- During operation, check 'Running...' is displayed on LCD display.
- If any temperature SV(Set Value) is set on controller, press Jog-shuttle to cancel the operation.

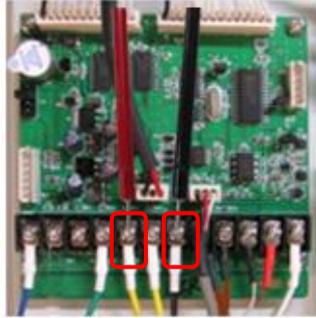
(2) If temperature PV(Present Value) on controller decreases while the incubator is not in operation, check the output signal of Compressor SSR on the Main PCB (Controller).

① Loosen bolts on top side of the product and detach the upper panel.



② Disassemble the Compressor control terminal on the Main PCB(Controller).

- ③ Turn on only the power switch and do not operate the incubator.
- ④ Check the DC voltage of Compressor controlling terminal on Main PCB(Controller).



If DC 5 V is measured, replace the Main PCB(Controller).

- If DC 5 V is not measured, Main PCB is normal; go to next instruction to check if Compressor SSR is damaged.

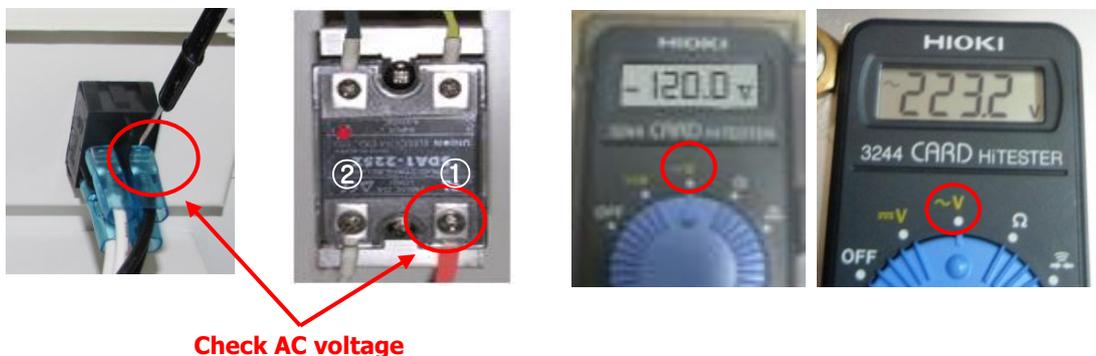
(3) If the Main PCB (Controller) is normal, check the Compressor SSR.

- ① Check if temperature PV(Present Value) decreases while only the power switch is turned on and the SSR LED does not flash.
 - Cooling operation must not be performed when SSR LED does not flash.



- ② If product temperature decreases, check the Compressor SSR output terminal using the tester.
 - Check the AC voltage between black wire terminal on power switch and SSR terminal connected to Compressor(① terminal) as shown in figure below.

If AC 120V or 230V is measured, the Compressor SSR is defective; replace the SSR.



6. Large temperature offset

(1) Check the Temp. Sensor resistance.

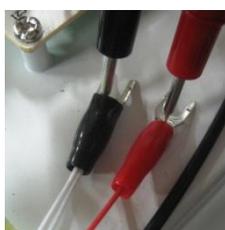
- ① Loosen bolts on top side of the product and detach the upper panel.



- ② Disconnect the Temp. Sensor wires from the Main PCB (Controller) terminal block to measure the resistance of the Temp. Sensor.



- ③ Select the resistance measurement mode (Ω) on the tester, connect the test probes to the terminal where the Temp. Sensor was disconnected, and then measure the resistance of the Temp. Sensor.



- ④ **The Temp. Sensor is PT100 and normal resistances at room temperature(20℃~25℃) are 104.6 ~113.0Ω. If Sensor resistance is abnormal, replace the Temp. Sensor.(Refer to Replacement Instructions for Key Parts in Section 10.5)**

- ⑤ **If Temp. Sensor resistance value is normal, replace the Main PCB.**

7. Error 1 during operation

(1) Error 1 indicates a temperature sensing problem. Check the Temp. Sensor resistance.

① Loosen the bolt on upper side of the product, remove the upper panel, and then disconnect the Temp. Sensor wires from the Main PCB (Controller) to measure the Temp. Sensor resistance.



② Select the resistance measurement mode (Ω) on the tester, connect the test probes to the wires where the Temp. Sensor was disconnected, and then measure the resistance of the Temp. Sensor.

- The Temp. Sensor is PT100 and normal resistances at room temperature(20 °C~25 °C) are 104.6 ~113.0 Ω . If Sensor resistance is abnormal, replace the Temp. Sensor.(Refer to Replacement Instructions for Key Parts in Section 10.5)

- If Temp. Sensor resistance value is normal, replace the Main PCB(Controller).

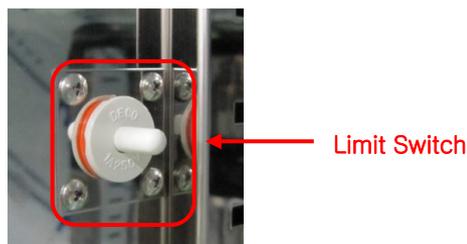


8. Error 3 during operation

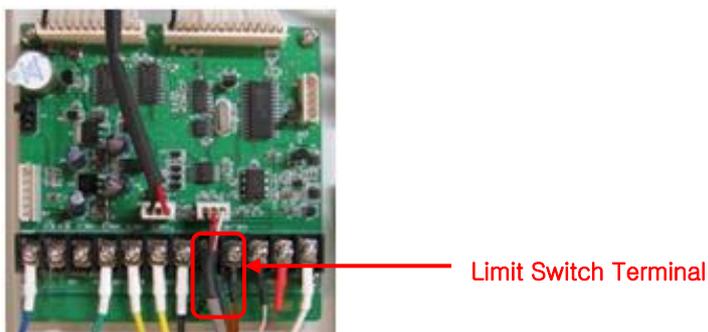
(1) Error 3 indicates a door open alert. Check the Front Door Limit Switch.

① Check the location of Front Door Limit Switch.

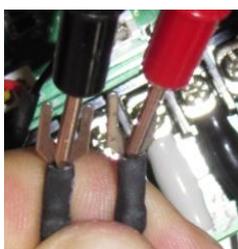
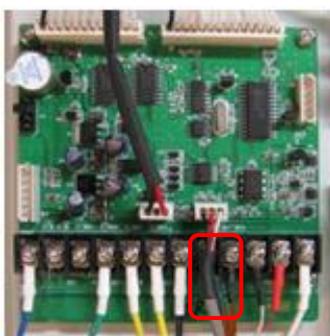
- Error 3 is developed if the Limit Switch is not pressed down during product operation. Open the door and look in the upper left corner. There will be a Limit Switch as shown in the figure below.



- ② Loosen the bolt on upper side of the product and detach the upper panel.



- ③ Disassemble the Limit Switch terminal to check its continuity connection of wires.
- Check the continuity status at terminal of Limit Switch while pressing the Limit Switch. The buzzer sound in tester should ring at once.
 - Check the continuity status at the terminal of Limit Switch without pressing the Limit Switch. The buzzer sound in the tester must not ring at once.



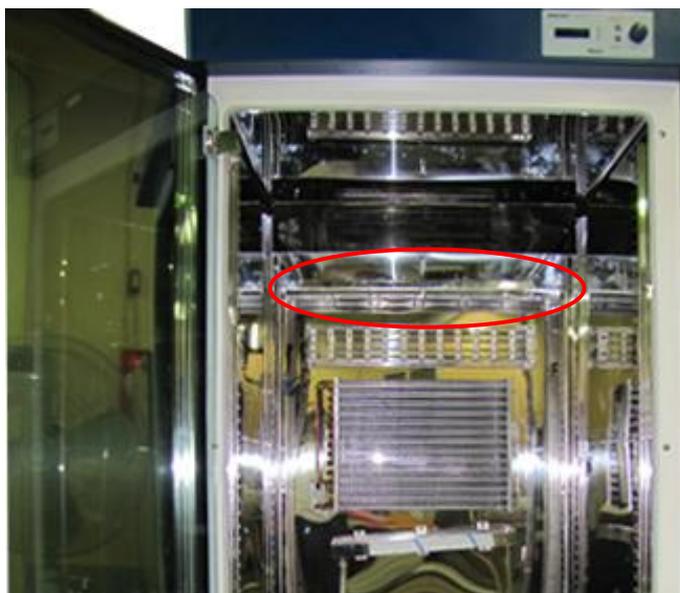
If the Limit Switch is in inoperative condition, replace the Limit Switch. (Refer to Replacement Instructions for Key Parts in Section 10.4)

If Error 3 continues to occur with no abnormalities of the Limit Switch, replace the Main PCB.

9. Internal circulation fan is not operative

(1) Check if the Fan is operative.

- ① Turn the power off, open the front door and loosen up the bolts on the inner chamber.
- ② Rotate the Fan Motor by hand.
 - The Internal circulation Fan is equipped above heater.
 - If abnormal rotation or noise is observed during rotation of the Fan Motor in the Chamber by hand, check for any foreign substances in the Fan Motor and then replace the Fan Motor. (Refer to Replacement Instructions for Key Parts in Section 10.6)



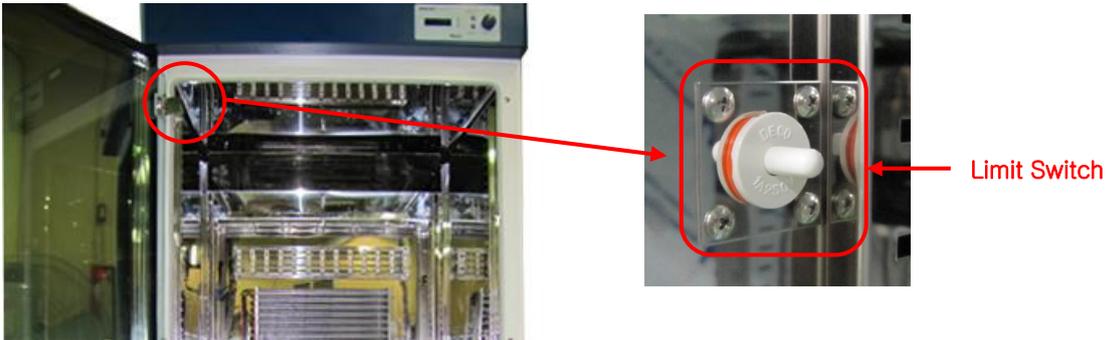
- ③ Check the resistance of Fan.
 - **Loosen the wires connected to the Fan Motor and check the resistance of Fan as shown below and if 0 or OF(infinity) is measured, replace the Fan Motor. (Refer to Replacement Instructions for Key Parts in Section 10.6)**



(2) If no abnormalities are inspected in Fan, open the Front Door and check the Limit Switch.

- ① Turn on the power switch only, do not set the any temperature.
 - Once the power is supplied, the fan motor should operate normally.

- ② Open the door and press the Limit Switch to check the Fan operation.
 - The Fan should operate while pressing the Limit Switch.

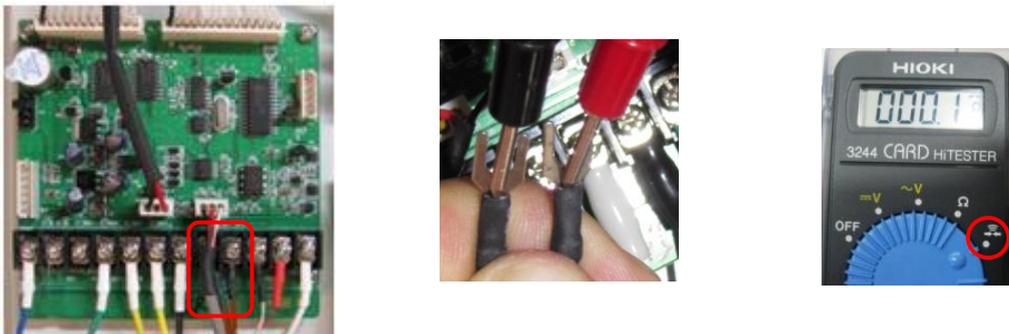


- ③ If the Fan is inoperative while pressing Limit Switch, check the connections of the Limit Switch using tester.

- ④ Detach the upper panel and disconnect the Limit Switch terminal from the Main PCB(Controller) and check if the terminal is normal using the tester.

- Check the continuity test of Limit Switch.
- If normal, the tester buzzer will sound when the Door is opened; if abnormal, the tester buzzer will not sound when the Door is closed.

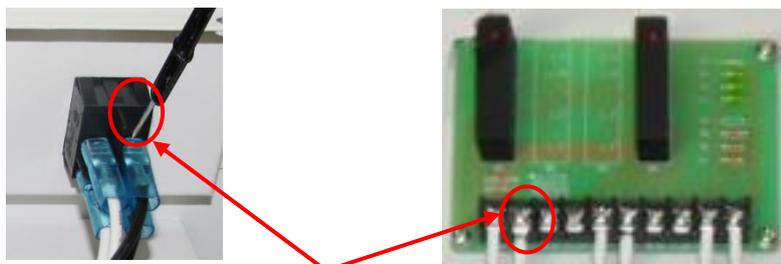
-If the Limit switch is faulty, replace it. (Refer to Replacement Instructions for Key Parts in Section 10.4)



- ⑤ Check the AC voltage between the black wire terminal on the power switch and Fan output terminal on Main PCB(controller) after closing the door.

- **It should measure AC 120V or 230V at those points. If not, replace the Main PCB (Controller).**

- **If the SSR LED is not illuminated when the door is closed, replace the Main PCB (Controller).**



Check AC voltage

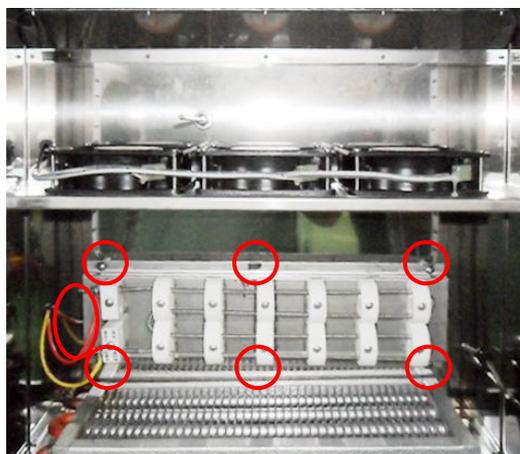
10. Replacement Instructions for Key Parts

(1) How to replace the Heater.

- ① Loosen the bolt on inside of the chamber and disassemble the panel.



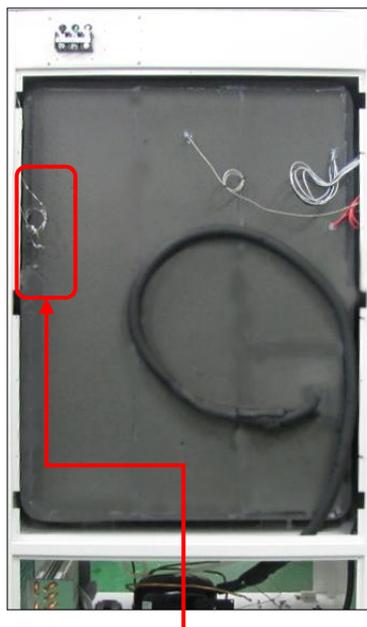
- ② Disassemble wires from the Heater terminal.
- Loosen the nuts and disassemble wires from the Heater terminal.



- ③ Heater assembly is conducted in reverse order of disassembly

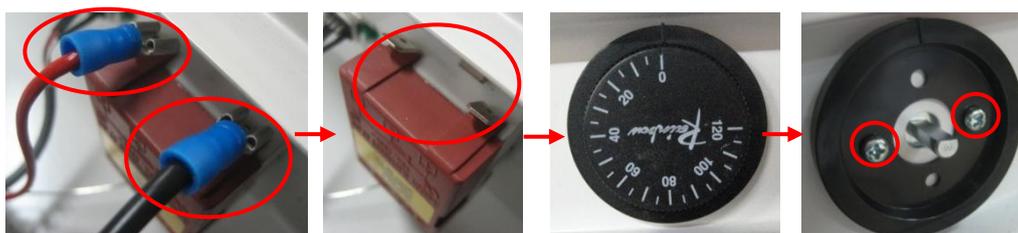
(2) How to replace the Safety Knob

- ① Loosen the bolt on back of the product and disassemble the back panel.
- Loosen the bolt on the back and disassemble the back panel.
- ② Detach the back panel, check the position of the Safety Sensor, and then detach the Sensor.
- Hold and pull the Safety Knob Sensor out from the securing hole.



Safety Knob Sensor secured position

- ③ Disconnect the Safety Knob terminal mounted on the distribution board. Disconnect the terminal from the Safety Knob. Pull out the Safety Knob by hand.

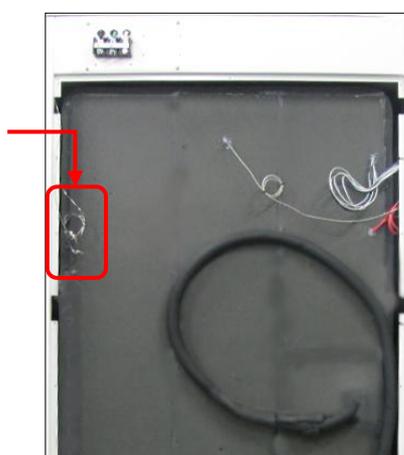


- ④ Safety Knob assembly is conducted in reverse order of disassembly.

(3) How to replace the Safety Protector

- ① Loosen the bolt on back of the product and disassemble the back panel.
 - Loosen the bolt on the back and disassemble the back panel.
- ② Detach the back panel, check the position of the Safety Sensor, and then detach the Sensor.
 - Hold and pull the Safety Knob Sensor out from the securing hole.

Safety Knob Sensor secured position



- ③ Open the Distribution Board, disassemble the Safety Protector and replace it.
 - Remove the cap of Safety Protector by unscrewing in counterclockwise and Unscrew the 2 bolts and nut with using a phillips head screwdriver and spanner



Remove the cap of Safety Protector

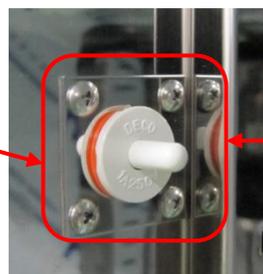
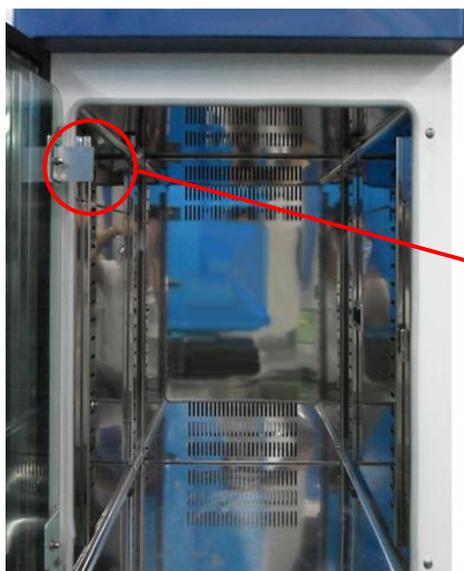


Unscrew 2 bolts and nut

- ④ Safety Protector assembly is conducted in reverse order of disassembly.

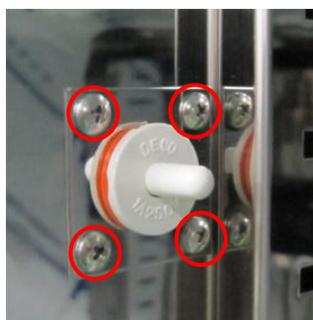
(4) How to replace the Limit Switch

- ① Open the front door and find the Limit Switch.



Limit Switch

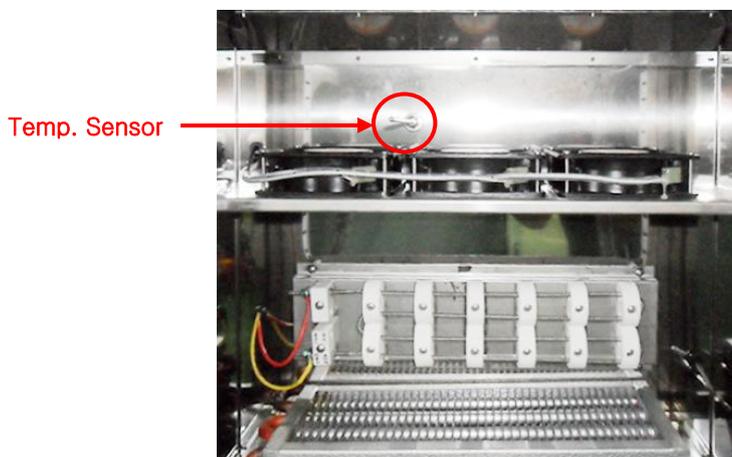
- ② Loosen the bolts and pull out the Limit Switch to replace.



- ③ Remove the shrink tube and replace the Limit Switch.
- ④ Limit Switch assembly is conducted in reverse order of disassembly.

(5) How to replace the Temp. Sensor

- ① Loosen the bolt on back of the product and disassemble the back panel.
 - Loosen the bolt on the back and disassemble the back panel.
- ② Open the front door and detach the back panel of inner chamber.
 - Loosen the nuts and push out the Temp. Sensor from inside to outside to disassemble.



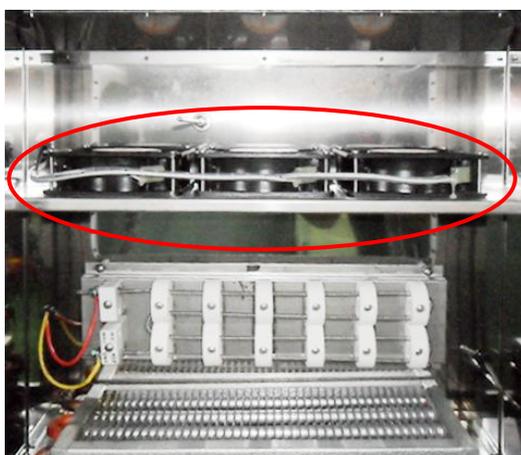
- ③ Disassemble the Temp. Sensor wires from Main PCB(Controller) terminal block and replace it.



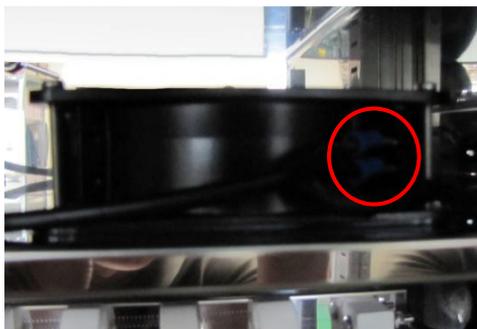
- ④ Temp. Sensor assembly is conducted in reverse order of disassembly.

(6) How to replace the Internal Circulation Fan.

- ① Open the front door and detach the back panel of inner chamber.



② Disassemble the wires connected the Fan Motor, loosen up the bolts and replace the Fan Motor.



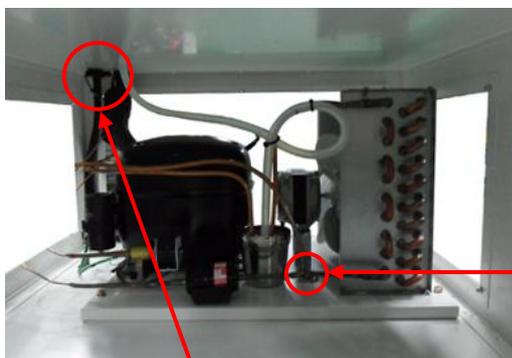
③ Fan Motor assembly is conducted in reverse order of disassembly.

(7) How to replace the Condenser Motor.

① Loosen up the bolts on the bottom of chamber and detach the panel of compressor deck.



② Disassemble the power supply wires and loosen the nuts to remove the Condenser Motor.



**Connector of Power Supply Wire
For 414004-626,627,628,629**



**Terminal block of Power Supply
For 414004-630,631,632,633**

Nuts

III. Cautions

1. When the product is not used for a long time, unplug and dry the power cord and then package the product for storage.
2. Use only the genuine parts provided by VWR International if replacement part is necessary due to a product malfunction during use.
3. Any malfunctions caused by using the product outside of VWR recommendations may not be repaired.
4. When cleaning the product, unplug the power cord and clean it with a soft cloth. For a soiled area not cleaned easily, soak a cloth into fluid with low freezing point and just clean the affected area.

IV. Spare Parts List

VWR Part Number	Description 1	Description 2
414004-871	Main Controller BOD Incubator	for all symphony BOD Incubators
414004-875	LCD, 2 Lines, sym incubtr/oven	incl. 14P Flat Cable, for all symphony Incubators and Ovens
414004-876	UI Board, S/W sym incubator/ovn	incl. 12P Flat Cable, for all symphony Incubators and Ovens
414004-877	Cable, UIBoard,sym incubatr/ovn	12P Flat Cable, all symphony Incubators and Ovens
414004-878	Cable, for LCD and FND Display	14P Flat Cable, all symphony & VWR Incubators and Ovens
414004-888	SMPS, 12V, 0.9A sym BODincbtor	for all symphony BOD Incubators
414004-889	SSR, DC/AC	SDA1-215Z, for 414004-546~551,553,556~561,563~567,569, 572~575,577~581,583~609,616,617,624~631
414004-891	SSR, DC/AC	SDA1-240Z,414004-554,555,570,571, 626~633(for Comp.)
414004-892	SSR, AC/AC	SSR-40 AA,414004-554,555,570,571,632,633
414004-894	Safety Knob, 120C/2M	for Incubators, 414004-592~597,602~609,614~617,622~633
414004-900	Safety Protector, 80C/2M all incbtr	for all symphony & VWR Gravity & Forced Air Incubators,Reach-in Incubators and BOD Incubators
414004-901	Power Switch, Green	all symphony & VWR Ovens(except 414004-554,555,570,571) and all symphony & VWR Incubators(except 414004-628,629,630,631,632, 633)
414004-902	Power Switch, Black	Circuit Breaker, for 414004-554,555,570,571,628~633
414004-903	Inlet Terminal Block	for 414004-554,555,570,571,628~633
414004-906	Fuse, 250V/15A	for 414004-550,552,560,562,566,568,574,576,582,596,606,626,627
414004-908	Terminal Block	DRT-4.0Q, for all symphony & VWR BOD Incubators,VWR Gravity Convection Ovens and 414004-546~553,568,569,576,577
414004-909	Terminal Block	DRT-6.0T,symphony BOD & Reach-in Incubators and 414004-554,555,570,571
414004-910	RS232C Port (D-SUB) all sym	for all symphony Ovens and Incubators
414004-911	Door Limit Switch all Incbtors	for all symphony & VWR Incubators
414004-914	Temp. Sensor	for all symphony & VWR Forced Air Incubators, BOD Incubators, Reach-in Incubators
414004-919	Interal Circulation Fan Motor, 0.26A	120V, for symphony BOD & Reach-in Incubators
414004-920	Interal Circulation Fan Motor, 0.26A	230V, for symphony BOD & Reach-in Incubators
414004-923	Fan Motor, for condensor,	120V, for symphony BOD Incubators
414004-924	Fan Motor, for condensor	230V, for symphony BOD Incubators
414004-941	Heater, 700W, 120V	for BOD Incubators, 414004-626
414004-942	Heater, 700W, 230V	for BOD Incubators, 414004-627
414004-943	Heater, 1kW, 120V	for BOD Incubators, 414004-628
414004-944	Heater, 1kW, 230V	for BOD Incubators, 414004-629
414004-945	Heater, 1.2kW, 120V	for BOD Incubators, 414004-630
414004-946	Heater, 1.2kW, 230V	for BOD Incubators, 414004-631
414004-947	Heater, 2kW, 120V	for BOD Incubators, 414004-632
414004-948	Heater, 2kW, 230V	for BOD Incubators, 414004-633

Continued in next page

VWR Part Number	Description 1	Description 2
414004-971	Cooling Coil	1/2 4 line 3 floor 360, for BOD Incubator, 414004-626,627
414004-972	Cooling Coil	1/2 4 line 3 floor 360, for BOD Incubator, 414004-628,629
414004-973	Cooling Coil	1/2 4 line 3 floor 360, for BOD Incubator, 414004-630,631
414004-974	Cooling Coil	1/2 4 line 3 floor 360, for BOD Incubator, 414004-632,633
414004-975	Compressor, 1/3HP	SC10CLX.2, 120V, for BOD Incubator, 414004-626,628
414004-976	Compressor, 1/3HP	230V, for BOD Incubator, 414004-627,629
414004-977	Compressor, 2/5HP	SC15CLX.2, 120V, for BOD Incubator, 414004-630
414004-978	Compressor, 2/5HP	230V, for BOD Incubator, 414004-631
414004-979	Compressor, 1/2HP	SC18CLS.2, 120V, for BOD Incubator, 414004-632
414004-980	Compressor, 1/2HP	230V, for BOD Incubator, 414004-633
414004-981	Condensor	for BOD Incubator, 414004-626,627
414004-982	Condensor	for BOD Incubator, 414004-628,629
414004-983	Condensor	for BOD Incubator, 414004-630,631
414004-984	Condensor	for BOD Incubator, 414004-632,633
414004-985	Solenoid Valve	for bypass valve system, all VWR BOD Incubators
414004-986	Refrigerant, 190g	for BOD Incubator, 414004-626,627
414004-987	Refrigerant, 290g	for BOD Incubator, 414004-628,629
414004-988	Refrigerant, 400g	for BOD Incubator, 414004-630,631
414004-989	Refrigerant, 450g	for BOD Incubator, 414004-632,633
414004-999	Magnet Packing, 5.3cuft	for Incubators, 414004-626,627
414004-1000	Magnet Packing, 9.0cuft	for Incubators, 414004-628,629
414004-1001	Magnet Packing, 15.0cuft	for Incubators, 414004-630,631
414004-1002	Magnet Packing, 24.7cuft	for Incubators, 414004-632,633
414004-1020	Inner Glass Door, 5.3cuft	for Incubators, 414004-626,627
414004-1021	Inner Glass Door, 9.0cuft	for Incubators, 414004-628,629
414004-1022	Inner Glass Door, 15.0cuft	for Incubators, 414004-630,631
414004-1023	Inner Glass Door, 24.7cuft	for Incubators, 414004-632,633