RKF506-A

Service Manual

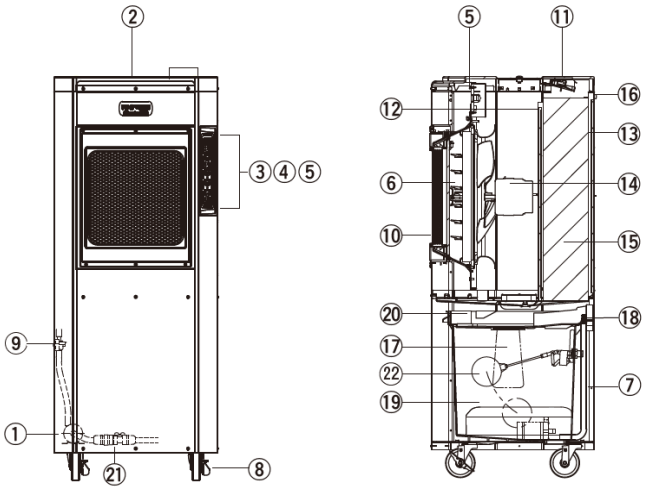
1. RKF506-A Specification

* Operating Temperature: 41℉ to 113℉
* Maximum water supply pressure: 104 PSI

	50Hz	60Hz
Power	110 to 120 Volts	
Power Consumption (W)	335	510
Air Direction	Horizontal, Vertical Automatic Louver	
Flow Volume (Max)	130m3/min.、4,600CFM	150m3/min.、5,300CFM
Evaporation Amount	10.2L/hr、2.7gallons/hr	12.2L/hr、3.2gallons/hr
Water Tank	50 liters, 13.2 gallons	
Continuous Operation	4.8 hr	4.0 hr
Water Supply Method	Water tank with Automatic shutoff	
Timer Operation	1・4・8 hours	
Safety	Fuse、Water shortage、Motor overheat profection	
Operating Noise (dB(A))	65	68
Dimensions	1,565 x 673 x 658mm, 61.6 x 26.5 x 25.9 inch	
Weight	74Kg 163lbs	

* The above specification is for the inlet air condition at 30℃(86℉)/50% relative humidity.
  Air flow measurement by Fan air volume calculation method of JIS C 9601.

2. RKF506-A Parts name



1: Water Pump
2: Top Board
3: Operating Light
4: Operating Switch
5: Circuit Board
6: Automatic Louver
7: Water Level Indicator Hose
8: Caster
9: Water Flow Switch
10: Air Outlet
11: Water Distribution Head
12: Inner Air Filter
13: Outer Air Filter
14: Fan
15: Cooling Element
16: Cooling Element Holder
17: Water Filter
18: Water Hose Inlet
19: Water Tank
20: Water Tank Lid
21: Water Quick Connect
22: Float Switch

3. Safety Devices:

Explanation for Safety Devices.

Overload Protection:
(Fuse)

If too much load goes through, electrical circuit shuts down and automatically shuts down a unit entirely
Operating condition : Full Stop.

Water Flow Sensor:
(Water Flow Switch)

Flow sensor detects no water when water tank is dry, and shuts down a water pump and whole unit with time.
Operating condition : Once flow sensor detects, cool air indicator flash on and water pump shuts down.

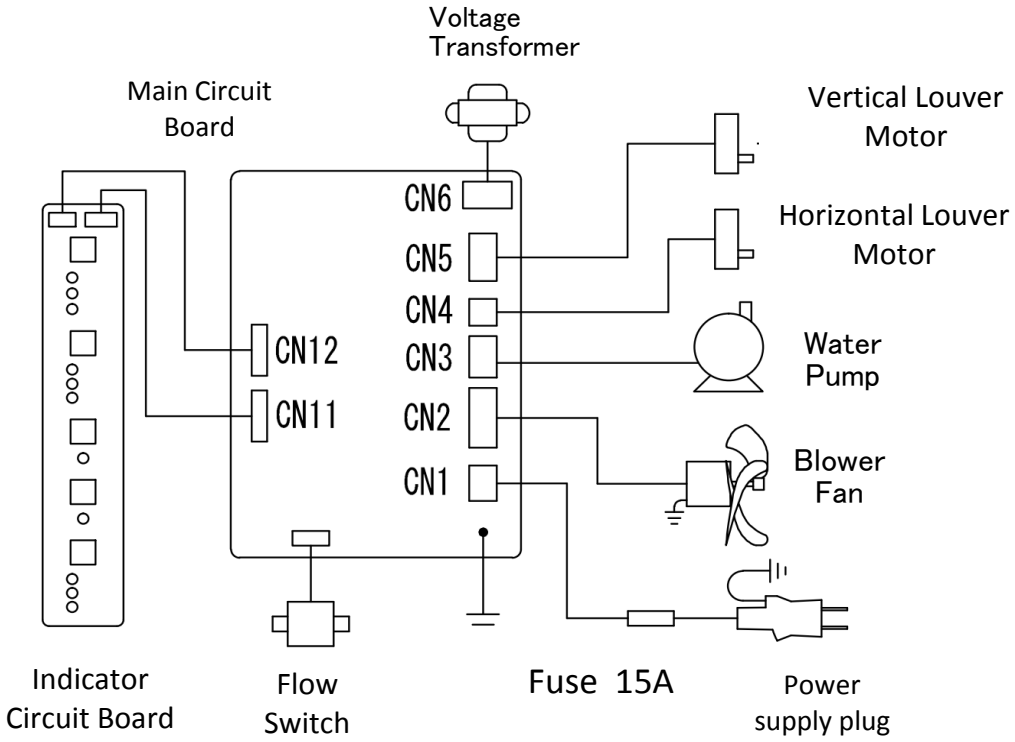
And air fan will shut down depending on air flow level chosen.
High: after 20 minutes
Medium: after 30 minutes
Low: after 40 minutes

Fan Motor Protection:
(Overheat protection)

If too much load goes through fan motor, electrical circuit shuts down, and automatically motor stops.

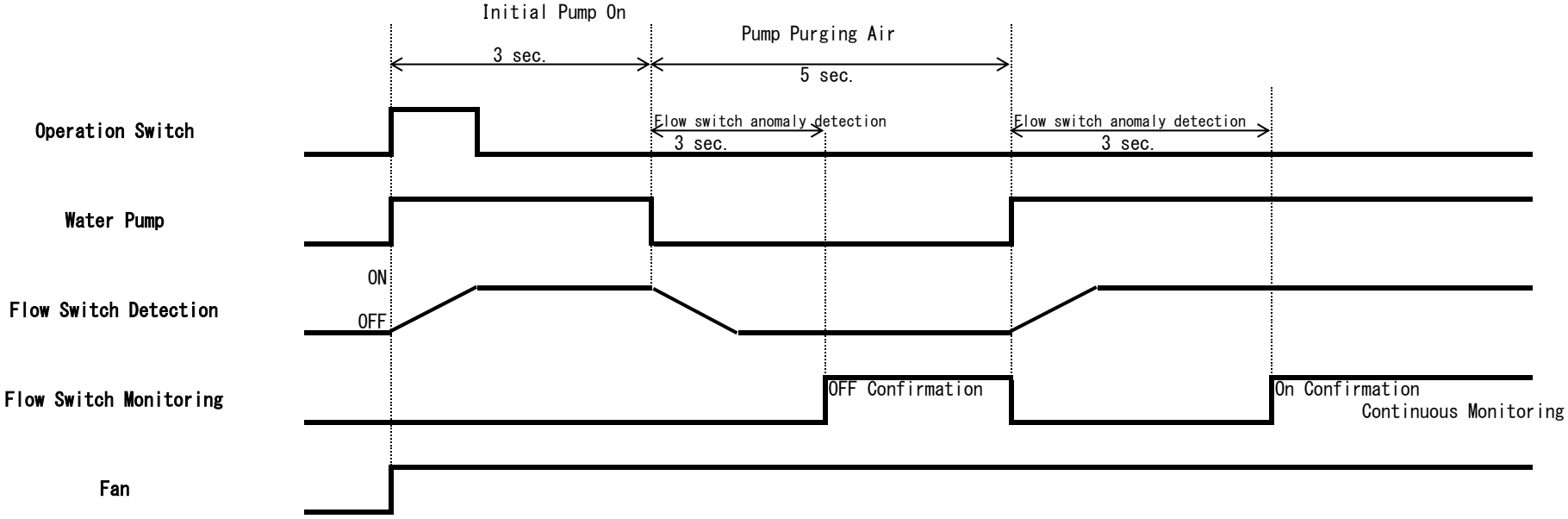
Operating condition : Fan motor stops. After enough cooling, fan motor automatically restart.

4. Wiring Diagram



5. Water Function/Detection Diagram

RKF506-A Function Diagram



Initial Pump On (3 seconds): Purging air
Pump Purging Air (5 seconds): Return purged air into water tank

【Error and Identifying Problem】

ERROR #1: Flow switch does not function

RESULT: Cooling light flashes after 11 seconds
(Pumping Purging air 3 seconds + Purged air into water tank 5 sec. + Flow switch detection 3 sec.)

《Identifying your problem/Possible cause》
・No water flow because of pump malfunction or clogged
・Low water flow from clogged pipe
・Float of flow switch does not move well from debris (adhesion of scale or the garbage.)
・Deterioration of magnet on flow switch
・Disconnection of switch of flow switch
・Switch of flow switch malfunction, (always off)

ERROR #2: Flow switch is always on

RESULT: Cooling light flashes after 6 seconds
(Pumping Purging air 3 seconds + Flow switch detection 3 sec.)

《Identifying your problem/Possible cause》
・Float of flow switch does not move well from debris
・Switch of flow switch malfunction, always on

RKF506-A Trouble Shooting Service Manual

Contents

Section	Problem
#1	Nothing at all after turning on operation switch
#2	Warning light flashes at 11 seconds after turning on operation switch
#3	Warning light flashes at 6 seconds after turning on operation switch
#4	Blower fan does not turn
#5	Blowing air is very minimal
#6	Blower fan turn slow
#7	Blower fan stops intermittently
#8	Not able to select blower fan speed
#9	No cool air coming out
#10	Not be able to control direction of blowing air
#11	Cool air has strong odor
#12	Leaking water
#13	Fuse blows

Problem	Cause	Check Point	Ref.	Evaluation	Action
1: Nothing at all after turning on "ON/OFF" switch	No power to circuit board a. No power from power source	Measure voltage of power source Specification: AC 120V		If voltage is 0, no power from source	Turn on power source
	b. Fuse is blown	Reinsert fuse and check conduction. Visual check can be done	Pic. 12	If resistance is 0 ohm, fuse would blow	Find cause of blowing fuse and replace fuse →"Refer 11. Fuse blows"
	c. Breaking of power cable	Pull out CN1 power connector from circuit board and check each lead wire's conductance.		If one of lead wire has no conductance, power cable is broken	Replace power cable
	d. Power cord not plugged in or contact failure	Reinsert CN1 power connector and turn on the switch		If operation is normal, connector had contact failure	Plug in connector securely
	Malfunction of operation switch	Pull out indicator circuit board and check conductance of operation switch. Specification: Approx. 700 k ohms by switching on	Pic. 6	If no conductance after turning switch on, the switch is broken	Replace circuit board
	Unsecure connection or contact failure of voltage transformer connector	Reinsert CN6 voltage transformer connector and turn on the operation switch		If operation is normal, connector had contact failure	Plug in connector securely
	Malfunction of voltage transformer	Measure output voltage of transformer connector CN6	Pic. 4 Table 2	If input voltage is normal but output voltage is 0V; then, voltage transformer is fault	Replace voltage transformer
		Measure coil resistance by pulling out CN6 transformer connector from circuit board	Pic. 3 Table 1	If either one of lead has infinite ohms, coil of transformer is broken	
	Malfunction of circuit board	Measure input voltage of CN6 voltage transformer connector Specification: White – Red 120VAC	Pic. 4 Table 2	If power source voltage is normal but input voltage is 0V; then, circuit board is fault	Replace circuit board
2. "COOL AIR" light will flash after 11 seconds of turning on "ON/OFF" switch	Unsecure connection or contact failure of pump connector	Reinsert CN3 pump connector and turn on the switch		If operation is normal, connector had contact failure	Plug in connector securely
A. Pump does not run	Locked impeller	Disassemble pump and turn the impeller by hand		If impeller does not turn, impeller is locked	Find a cause of locking impeller
	Malfunction of pump	Measure voltage of CN3 pump terminal on circuit board Specification: White–Black 120VAC	Pic. 4 Table 2	If voltage is normal, pump is fault	Replace pump
	Malfunction of circuit board			If no voltage, circuit board is fault	Replace circuit board
B. Pump runs but stops right away	Damaged impeller	Check impeller damage by disassembling the pump	Pic. 7	No water flow if impeller is damaged	Replace pump

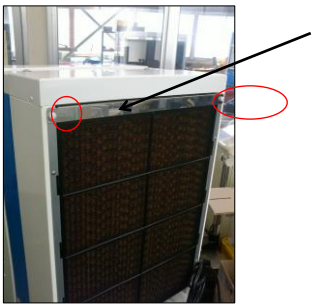
	Debris on impeller	Check debris on impeller by disassembling the pump	Pic. 7	Water flow amount decreases if debris on impeller	Clean the pump
	Debris on pump inlet			Water flow amount decreases	Clean pump inlet
Problem	Cause	Check Point	Ref.	Evaluation	Action
	Clogged water distribution shower plate	Check each groove for clogging	Pic. 8	If water groove is clogged, water flow is decreased	Clean water groove
	Clogged pipe	Check inside pipe for clogging		If pipe is clogged, water flow is decreased	Clean pipe
	Kinked hose	Check inlet and outlet hose for kink		If hose is kinked, water flow is decreased	Fix kinked hose
	No water or very small amount in tank	Check plenty of water is in tank		If no water in tank, flow sensor will stop the pump	Put water in tank
	Electrical flow sensor is not in place	Be sure the flow sensor is in place	Pic. 9	If flow sensor is not in place, sensor will not operate	Fit the flow sensor into a place
	Locked flow switch	Remove a flow switch and check for smooth movement of flow switch	Pic. 10	If switch movement is very stiff, flow switch is locked	Fix the cause of locking switch. If problem still persists, replace a flow switch
	Clogged flow switch	Disassemble flow switch and check for clogging inside the switch	Pic. 10	If flow switch is clogged, switch will not operate	Clean inside flow switch
	Malfunction of flow switch	Remove flow switch and check conductance Specification: Push the switch towards to the electrical flow sensor side and make conduction (0 ohm)	Pic. 10 Table 1	If no conductance, flow switch is fault	Replace flow switch
3. "COOL AIR" light will flash after 6 seconds of turning on "ON/OFF" switch	Flow switch is on continuously	Switch pendulum(magnet) is always up	Pic. 10	Switch pendulum(magnet) stuck	Find the cause of stuck
		Check conductance of electrical flow sensor		Flow sensor contacts are bound	Replace flow switch
4. Blower fan does not turn	Unsecure or contact failure of fan connector	Reinsert CN2 fan connector and turn on the switch		If operation is normal, contact failure	Plug in connector securely
	Locked fan	Turn the fan by hand		If fan does not turn or hard to turn, fan motor is locked	Find cause of locked fan. If problem still persists, replace fan
	Ambient temperature is too high and thermal protection switch of fan motor is on	Cool down the fan motor and retry		If operation is normal, thermal protection switch was the cause	Operate RKF cooler in lower ambient temperature

	Malfunction of fan motor	Measure voltage of CN2 terminal on circuit board	Pic. 4 Table 2	If voltage is normal, fan motor is fault	Replace fan
	Malfunction of circuit board	Specification: High: White-Black 120VAC Medium: White-Red 120VAC Low: White-Green 120VAC		If no voltage is found, circuit board is fault	Replace circuit board
Problem	Cause	Check Point	Ref.	Evaluation	Action
5. Blowing air is very minimal	Clogged filter	Check condition of outer and inner air filter		Much reduced blowing air because of clogged air filter	Clean air filters
	Clogged cooling element	Check condition of cooling element		Much reduced blowing air because of clogged cooling element	Clean or replace cooling element
	malfunction of blower fan	Measure voltage of CN2 terminal	Pic. 4 Table 2	If voltage is normal, blower fan is fault	Replace blower fan
	Circuit board is fault	Specification: Refer Table 2		If no voltage is measured, circuit board is fault	Replace circuit board
6. Blower fan turns slow	Voltage of power source is low	Measure voltage of power source		Voltage below specification	Plug into another power source
	Capacitor of blower fan is fault	Measure voltage of power source		Power source voltage is normal but fan turns slow	Replace blower fan
7. Blower fan stops intermittently	Thermal protection of motor kicks in	Be sure ambient temperature is below 45℃(113℉)		If ambient temperature is over 45℃ (113℉), it is normal behavior	Use RKF cooler where ambient temp is below 45℃ (113℉)
	Thermal protection of motor is fault	Be sure ambient temperature is below 45℃(113℉)		If ambient temperature is below 45℃(113℉), thermal protection of motor is fault	Replace blower fan
8. Not able to select blower fan speed	Fan speed switch is fault	Remove switch panel and check conductance of fan speed switch Specification: Approx. 700 k Ω by pressing switch	Pic. 6	If no conductance by pressing fan switch, fan speed switch is fault	Replace circuit board
9. No cool air coming out					
A. No flow of water	⇒Refer to #2 "COOL AIR" light will flash after 11 seconds of turning on "ON/OFF" switch				
B. Water is flowing	Room humidity is too high by running RKF cooler	Check room ventilation is adequate		If ventilation is not enough, room humidity would increase	Ventilate room air

	Using RKF cooler in high humidity environment	Check ambient humidity		If humidity is over 80%, output air may not be cool enough	Use RKF cooler in lower humidity environment
10. Not be able to control direction of blowing air	Louver switch is not working	Remove switch panel and check conductance of louver switch Specification: Approx. 700 k Ω by pressing switch	Pic. 6	If no conductance by pressing louver switch, the switch is fault	Replace circuit board
	Locked or dislocated of louver plate	Check louver plate for locking or dislocation	Pic. 13	If louver plate is locked or dislocated, louver plate would not	Fix louver plate
	Connector of turning motor is loose or contact failure	Reinsert CN4 and CN5 connectors and turn on the switch		If operation is normal, connector had contact failure	Plug in connector securely
	FASTON terminal of motor connector is loose or contact failure	Pull FASTON terminal	Pic. 13	If FASTON terminal pulls out easily, connector had contact failure	Be sure FASTON terminal is plugged in securely
Problem	Cause	Check Point	Ref.	Evaluation	Action
	Turning motor is not working	Measure terminals of CN4 and CN5 on circuit board Specification: White-White (Horizontal turn) 120VAC Black-Black (vertical turn) 120VAC	Pic.4 Table 2	If voltage is normal, turning motor is fault	Replace turning motor
	Circuit board is fault			If no voltage is measured, circuit board is fault	Replace circuit board
11. Cooling air has odor	Odor of resin comes from cooling element	Run RKF cooler for 2 to 3 days		If resin odor is gone, odor was because of cooling element	Run RKF cooler until odor is gone
	Using well water or industrial water	Change to tap water		If odor is gone, bacteria from water is the cause	Use tap water
	Bacteria on cooling element	Run "Auto Dry" every time after each use		If odor is gone, problem is bacteria generated from wet cooling element	Be sure to run "Auto Dry" every time after each use
	Bacteria generated from remaining water in tank	Dump remaining water every week and clean inside the tank		If odor is gone, problem is bacteria generated from remaining water in tank	Clean water tank every week
	Ambient air has strong odor	Run RKF cooler in less odor environment		If odor is gone, RKF's cooling air had ambient odor mixed	Find cause of ambient odor
12. Leaking water	Water pipe connection is disconnected	Check pipe disconnection		If pipe is disconnected, water would leak	Be sure pipe is connected securely
	Clogged water filter bag	Check debris in water filter bag		If water filter bag is clogged, water will overflow	Clean water filter bag
	Element case is broken	Check crack on element case		If crack is on the case, water would leak	Replace element case
	Quick connect malfunction	Be sure quick connect is securely connected		Quick connect is broke if connection is secured and water still leaks	Replace quick connect
	Scratch on quick connect connection	Check if scratch exists on quick connect		Water would leak if quick connect has scratch on connector	Replace quick connect

	Crack on water inlet pipe of water tank	Check crack or hole on water inlet pipe		If crack or hole is found, water would leak	Replace water tank
13 Fuse blows A. Fuse blows right after plugging in power code	Short circuit of voltage transformer	Measure coil resistance of CN6 transformer connector after pull out from circuit board If no multimeter is available: Plug in power code after pulling out CN6 connector from circuit board	Pic. 3 Table 1	If one of lead wire shows 0Ω, voltage transformer coil is short circuited If fuse does not blow, voltage transformer coil is short circuited	Replace voltage transformer
	Short circuit of SA1 surge protector	Measure resistance of SA1 surge protector	Pic. 11	If resistance is 0 ohm, surge protector is short circuited	Replace circuit board
Problem	Cause	Check Point	Ref.	Evaluation	Action
B. Fuse blows right after turning on operation switch	Short circuit of water pump coil	Measure resistance between CN3 terminals after pulling out connector from circuit board Specification: About 70 Ω for RKF-506A If no multimeter is available: Pull out CN3 pump connector and turn on operation switch	Pic. 3 Table 1	If 0 Ω, coil of water pump is short circuited If fuse does not blow, coil of water pump is short circuited	Replace water pump
	Short circuit of blower fan coil	Measure resistance between CN2 terminals after pulling out the connector from circuit board If no multimeter is available: Pull out CN2 connector and turn on operation switch	Pic. 3 Table 1	If 0 Ω, coil of blower fan is short circuited (If resistance value is very small from specification) If fuse does not blow, coil of blower fan is short circuited	Replace blower fan
C. Fuse blows right after air direction switch is turned on	Short circuit of turning motor coil	Measure resistance between terminals of CN4 and CN5 after pulling out the connector from circuit board Specification: White-White (horizontal turn) approx.. 11.8 K Ω Black-Black (vertical turn) approx.. 11.8K Ω If no multimeter is available: Pull out CN4 and CN5 connectors and turn on operation switch	Pic. 3 Table 1	If 0 Ω, coil of turning motor is short circuited If fuse does not blow, coil of turning motor is short circuited	Replace turning motor

Picture 1: How to access to circuit board



Element
holder plate

Pull up the air filter and remove it.
Then loose 2 thumb screws and remove cooling element holder plate.

Pull out cooling element

Wiggle water splash guard to left and right and remove it

Remove 2 screws indicated on the circuit board protective cover.

Remove the cords passing through the bushing.

Remove circuit board protective cover
If top plate from body is removed, access to circuit board becomes much easier.

Picture 2: How to access to indicator plate

Remove 2 large plastic screws on the top plate

Remove 9 screws and remove top plate from the body

Display circuit board cover

Remove 2 circled screws from indicator plate cover

Tilt the plastic cover to right ad remove it

Remove 2 circled screws
Pull out the entire indicator plate assembly

Pull out from the top.

Removed 2 circled screws and pull out indicator plate

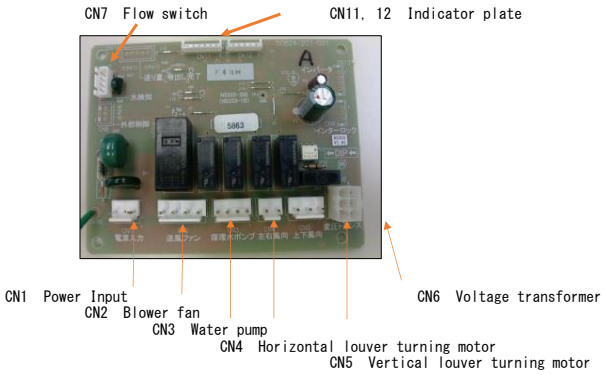
Picture 3: How to measure resistance or check conductance

#1 Disconnect the connector of the device
whose resistance you want to measure from the board.
#2 Set appropriate resistance range on a multimeter
#3 Insert test leads into a connector and measure
which resistance you want to measure from the board.

Picture 4: How to measure voltage

#1 Turn on "ON/OFF" switch of RKF cooler
#2 Set an appropriate AC voltage range on a multimeter
#3 Insert test leads into a connector and measure

Picture 5: Circuit Board



Picture 6: Indicator Plate of Circuit board

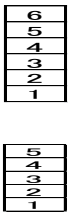
Actual installation of circuit board on RFK unit
Note the circuit board is up side down from the left picture

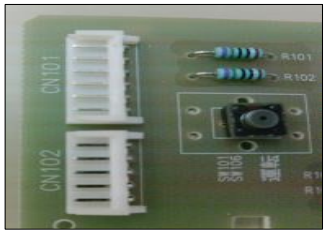
Conductance Testing

Multimeter polarity	Positive		Negative	
	Connector #	Pin #	Connector #	Pin #
Operation Switch	CN 101	5	CN 102	1
Fan Speed Switch		4		1
Louver Switch (Right and Left)		4		2
Louver Switch (Up and Down)		5		2
Timer Switch		3		1

Be sure to place multimeter's probes correctly to measure specific function

Orientation of pins

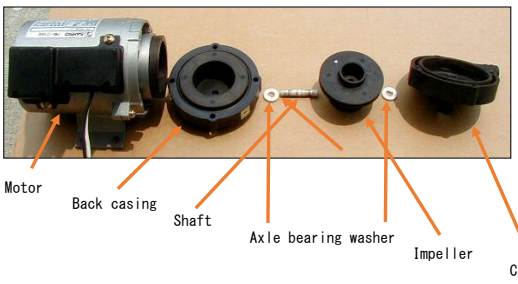




Picture 7: Water Pump

Loosen 4 screws and take off
the front cover

Check debris on the shaft and impeller



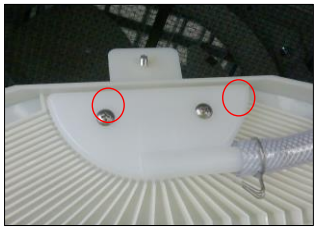
Picture 8: Water Distribution Shower Plate

After taking off the filter and cooling element,
shower plate holding screw can be seen from the bottom.
Shower plate holding screw would not fall off from the plate.

Water distribution shower plate is held by
leaf springs

Pull in the water distribution shower plate

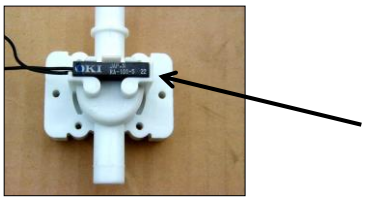
Water distribution shower plate



Remove 2 screws and pull out the water distribution shower plate from water hose

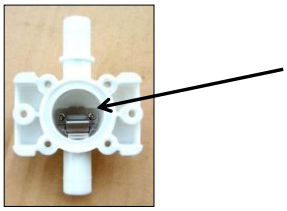
Clean any debris from each groove

Picture 9: Electrical water flow sensor



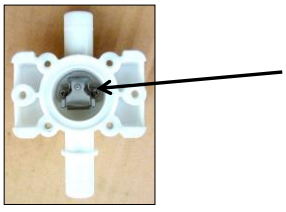
Place electrical water flow sensor with white wording upward

Picture 10: Flow Switch



Flow switch is upward and no conductance to electrical water flow sensor

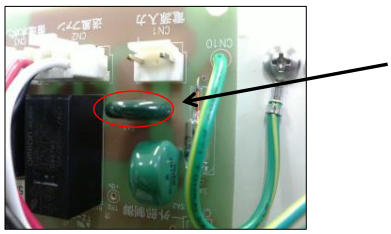
Magnet is pushed down and flow passage is close



Flow switch is downward and conduct to electrical water flow sensor

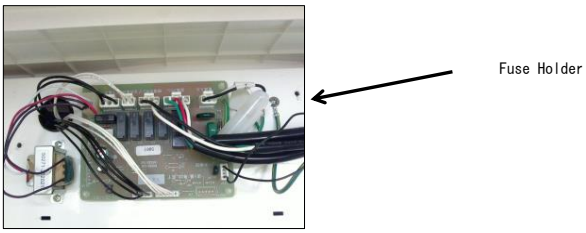
Magnet is up and flow passage is open

Picture 11: Surge Protector



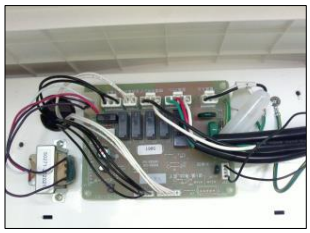
Measure resistance of surge protector from the back of circuit board

Picture 12: Fuse



Please open fuse holder and check fuse.

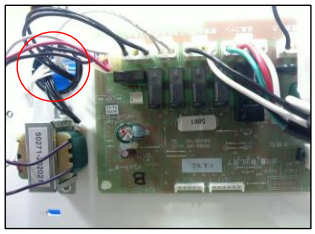
Picture 13-1: Louver drive section



Refer to "Picture 1 How to access to circuit board"

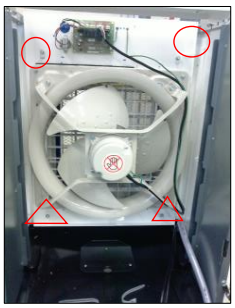
Remove top plate(face screw*2, fixing screw*9)

Remove ground wires except circuit board ground
and blower fan ground wires.
Not to lose teethed washer.
Since the position of the ground is arbitrary,
it does not necessarily match the position of the photograph



Pull out connector from indicator circuit board and
pull through the connector from rid circled wire hole.

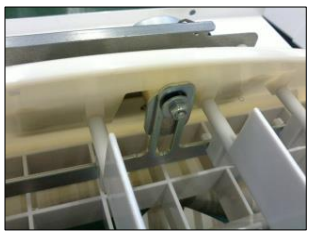
Pull out power cord, pump, and flow switch connectors.
As shown in the figure above, keep the cords hanging down



Remove shower plate.
Loose red circled screws and remove
red triangle nuts.

Push up the blower fan assembly and
remove from top nut.
Then pull in to remove the entire assembly.

Check no terminal of blower motor was
pulled out accidentally.



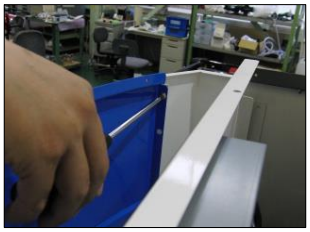
Check no loose parts and locked in section on
louver moving parts.
On the left, right, top and bottom.

Rod holder

Check the rod is placed into rod holder

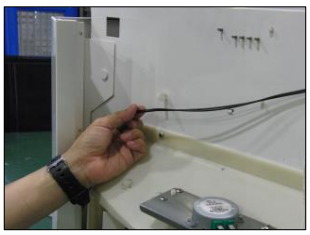
Picture 13-2: Louver moving parts section

Remove top plate and 6 screws
to take off the air outlet cover



Loosen 4 screws to remove front panel

Detach lead wires from louver motor



Detach lead wires from plastic lock

Detach lead wires from another plastic lock

Remove 2 screws on the top section of louver guard

Remove screws on bottom section of louver guard

Push up the entire louver guard

When vertical louver motor appears
by pushing up the entire louver guard,
detach lead wires from the louver motor.
Then, remove the entire louver guard assembly.

Check louver assembly

Table 1: Resistance Values

Description	Connector #	Lead wire color	Status	Resistance Value	Note
Operation Switch	See Picture 6 Note for Polarity	N/A	Switch On	About 700 KΩ	
Fan Speed Switch					
Horizontal Louver Switch					
Vertical Louver Switch			Switch Off	Infinite Ω	
Timer Switch					
Flow Switch	CN7	Black - Black	With Flow	0 Ω	
			Without Flow	Infinite Ω	
Voltage Transformer	CN6	White - Red	Input	About 1.5 KΩ	
		Purple - Purple	Output	About 5.5 Ω	
Water Pump	CN3	White - Black	Room Temperature	About 70 Ω	Resistance Value will change right after starting operation
Blower Fan Motor	CN2	White - Black	Room Temperature	About 5 Ω	Resistance Value will change right after starting operation
		White - Red		About 9 Ω	
		White - Green		About 12 Ω	
Horizontal Louver Motor	CN4	White - White		About 11.8 KΩ	
Vertical Louver Motor	CN5	Black - Black		About 11.8 KΩ	

＊Connector No. is the connector number of the control board

Table 2: Input/output on Circuit Board

Description	Connector #	Lead wire color	Status	Voltage Value	Note
Power Cord	CN1	White - Black	Input	120V AC	
Blower Fan	CN2	White - Black	Output	120V AC	High
		White - Red			Medium
		White - Green			Low
Water Pump	CN3	White - Black	Output	120V AC	
Horizontal Louver Motor	CN4	White - White	Output	120V AC	
Vertical Louver Motor	CN5	Black - Black	Output	120V AC	
Voltage Transformer	CN6	White - Red	Input	120V AC	
		Purple - Purple	Output	14V AC	
Flow Switch	CN7	Black - Black	Input at Conta	N/A	
Display panel circuit board	CN11/CN12	N/A	N/A	N/A	