

# Rinnai

## TECHNICIAN'S TROUBLESHOOTING INFORMATION

### RINNAI ENERGYSAVER RHFE-201FA

#### IMPORTANT SAFETY NOTES:

There are a number of (live) tests that are required to be done in fault finding. Extreme care should be used at all times. You **must** be a qualified service person before proceeding with these test instructions. Before checking resistance readings, turn off power switch and then isolate items to be checked from circuit (unplug it).

(AC IN)

(Connector B)

	Voltage Potential	Read resistance	Pin Numbers
Black-White	120 VAC	CONNECTOR B	Pin # 1-2
Black-Ground	120 VAC		Pin #2-Ground
White-Ground	0 VAC		Pin #1-Ground

(TR) Transformer:

(Connector C) (AC Out)

	Voltage Potential	Read resistance	Pin Numbers
Read voltage across:	Voltage Potential	Read resistance	Pin Numbers
Grey-Grey	90-110 VAC	3-6Ω	Pin #1-7
Red-Yellow	30-42 VAC	0.8-1.5Ω	Pin #4-5
Blank pin-Grey	15-21 VAC	0.6-1.2Ω	Pin #6-7
Grey-Black	180-220VAC	155-260Ω	Pin #7-8

(SP) Sparker:

(Connector D) (Voltage potential while Sparking)

	Voltage Potential	Read resistance	Pin Numbers
Read voltage across:	Voltage Potential	Read resistance	Pin Numbers
Red-Blue	85-100 VAC	100K-120K Ω	Pin #3-6

The spark must be sensed as being at the correct location and intensity before it will allow the gas valve to open. Check across Pin # 1-2 at Connector F and you should read 4-6 VDC potential. When sparking, if the spark is in the right location and intensity the voltage potential will drop to almost 0 (zero) and then return to the 4-6 VDC potential.

(SV1 and SV2) Main Solenoid Valves:

(Connector D)

	Voltage Potential	Read resistance	Pin Numbers
Read voltage across:	Voltage Potential	Read resistance	Pin Numbers
Black-Yellow	85-90 VDC	700-1000 Ω	Pin #1-4

\*Resistance across each coils terminals should be 1400-2000 Ω when isolated.

(POV) Modulating Gas Valve

(Connector G)

	Voltage Potential	Read resistance	Pin Numbers
Read voltage across:	Voltage Potential	Read resistance	Pin Numbers
Grey-Grey	6-16 VDC	80-90 Ω	Pin #2-6

(BL) Combustion Blower Motor:

(Connector G) DC Motor 37VDC 8 Watts

	Voltage Potential	Read resistance	Pin Numbers
Read voltage across:	Voltage Potential	Read resistance	Pin Numbers
Black-White	7-12 VDC	8K-10K Ω	Pin #7-8
Yellow-White	4-5 VDC	4K-6K Ω	Pin #4-8
Red-White	10-30 VDC	N/A	Pin # 3-8

(FM) Convection Fan Motor: (Connector E) Variable 100VAC Motor 60 Hz

Read voltage across:	Voltage Potential	Read resistance	Pin Numbers
Black-Red	37-105 VAC	100-120 $\Omega$	Pin #1-2

\* Be sure to check for obstructions to blades. Check the capacitor before replacing motor.

(PS) Pressure Sensor: (Connector A) Omron Electronic Pressure Switch

Omron Electronic	8.0mm WC" ON	2.8mm WC" OFF	5 VDC
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Note: Insure clear and black hose from pressure switch to blower air chamber is not blocked or crimped with any obstructions including spider webs.

(TF 216°C, OHS1 90°C, OHS2 70°C) (Connector G) Safety Circuit:

Disconnect connector G from PCB. Check for continuity reading from Pin #1 to Pin #5 on the wiring harness White to White wires. If you do not read continuity through this circuit, locate open thermal fuse, bimetal OHS1, or bimetal OHS2, and replace. You must immediately determine what caused the overheat situation and correct. Check combustion specifications, gas pressures, gas type, and for any obstructions to air flow.

(R.TH) Room Thermistor: (Connector H) Negative Co-efficient Thermistor

Disconnect connector H from PCB. Set your meter to the 200K  $\Omega$  scale. Place your meter leads into Yellow to Yellow. Apply heat to the thermistor bulb. The resistance will decrease. Apply cold and the resistance will increase. Examples of readings:  
41°F=91K $\Omega$  50°F=65K $\Omega$  68°F=39K $\Omega$  86°F=23K $\Omega$

(OH.TH) Over Heat Thermistor: (Connector H)

Disconnect connector H from PCB. Set your meter to the proper  $\Omega$  scale. Place your meter leads into White to White. A reading below 0.38k $\Omega$  indicates a short. A reading above 1255k $\Omega$  indicates an open circuit or broken wire. Insure air flow is not obstructed.

(FR) Flame Rod (Connector C1)

Set your meter to read micro-amps ( $\mu$ ). Disconnect connector C1 and place your meter in series with the Yellow to Yellow wires. Upon flame development you should read 1 -2 micro-amps. Depending on gas type and firing rate you should read 4 to 8 micro-amps. You must have a grounded and polarized electrical supply with no obstructions in burner or build up on flame rod to proof flame. The micro-amp symbol on your meter is  $\mu$ .

(Hard Lock Out Information)

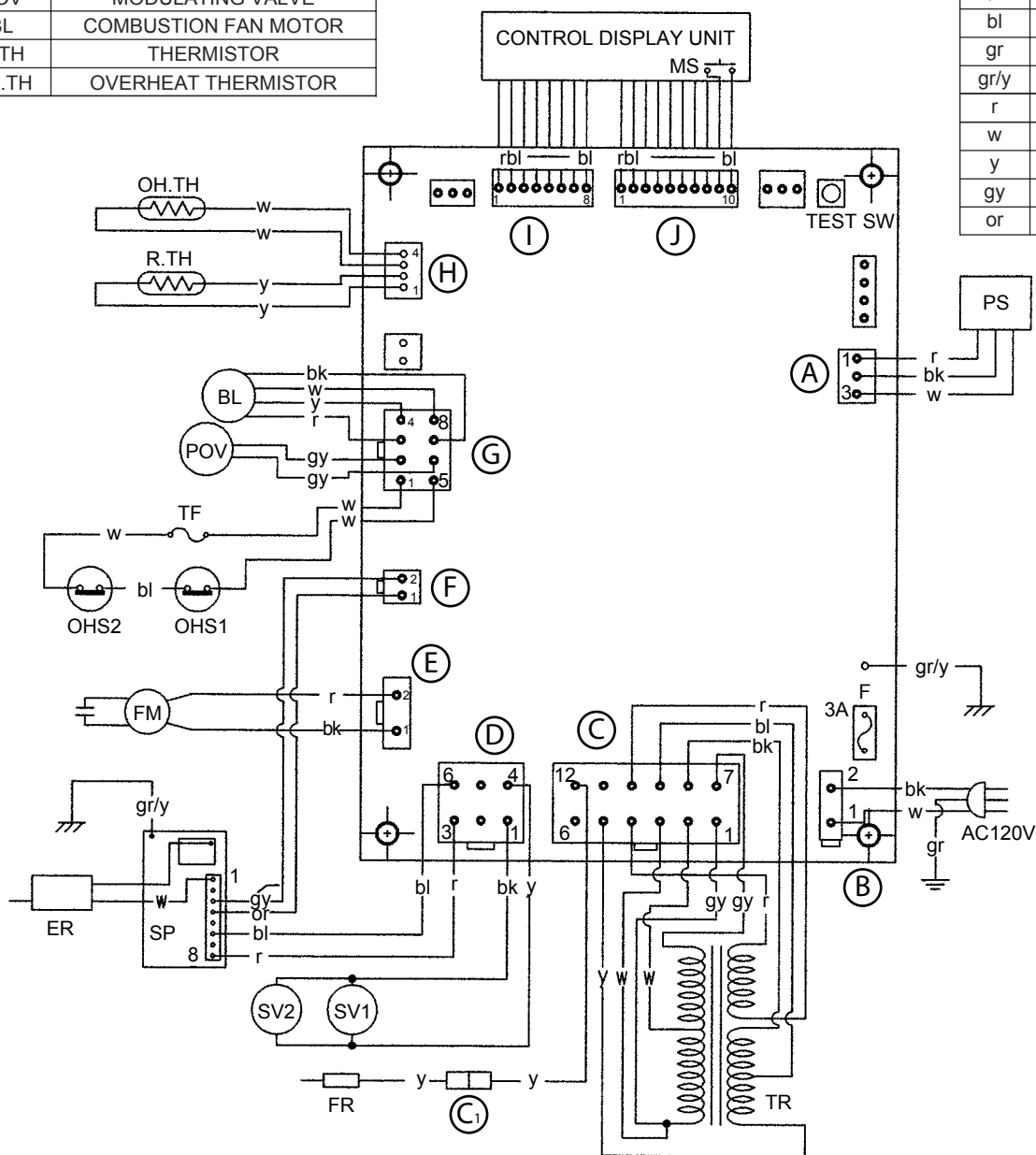
Improper sized gas lines, low pressure drops, defective or freezing pressure regulators, improper electrical supply and failure to ground, spider webs in burners, intake and exhaust air blockage of vents, broken or damaged wiring harnesses, or blown fuses can cause hard lock outs. Before replacing components in furnace, insure the above items are within the specifications. The above listed items are not a warranty issue or defect in unit.

# Wiring Diagram

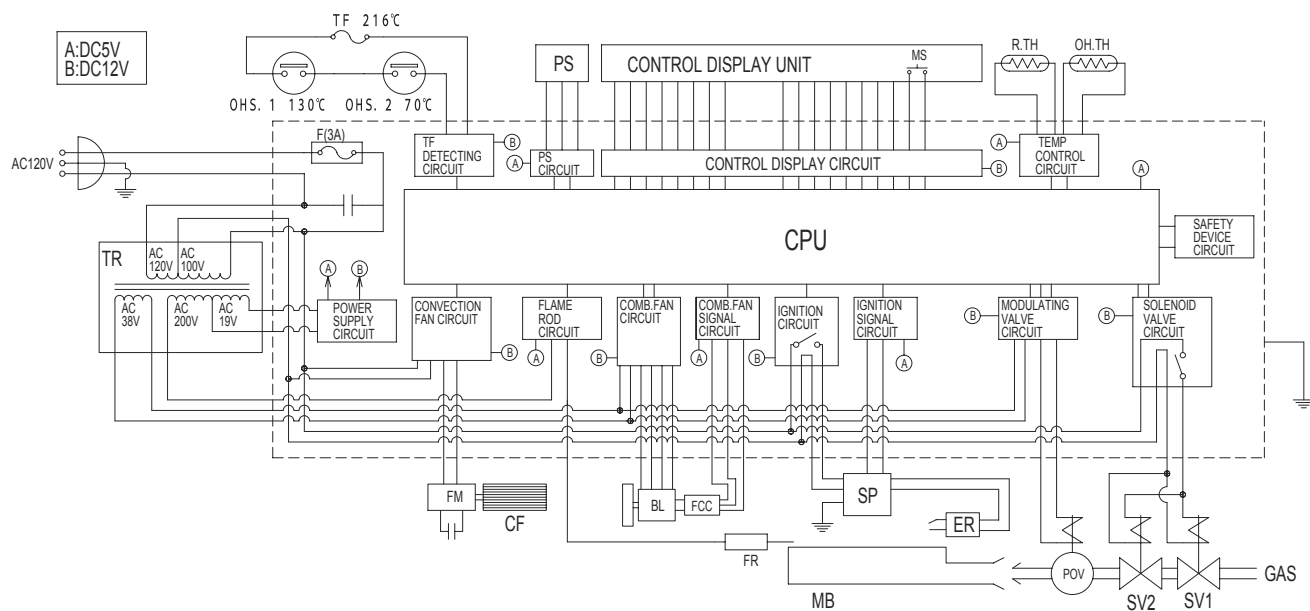
MARK	PARTS NAME
PS	PRESSURE SENSOR
FR	FLAME ROD
F	FUSE
TR	TRANSFORMER
SV1,2	SOLENOID VALVE 1,2
ER	ELECTRODE
SP	SPARKER
FM	CONVECTION FAN MOTOR
OHS1,2	OVERHEAT SWITCH1,2
TF	THERMAL FUSE
POV	MODULATING VALVE
BL	COMBUSTION FAN MOTOR
R.TH	THERMISTOR
OH.TH	OVERHEAT THERMISTOR

If any of the original wires as supplied with the appliance must be replaced, it must be replaced with a wire of a least a 194°F temperature rating and number 18AWG or its equivalent.  
 “CAUTION: Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation.”  
 Verify operation after servicing

CODE	COLOR
bk	black
bl	blue
gr	green
gr/y	green/yellow
r	red
w	white
y	yellow
gy	gray
or	orange



# Ladder Diagram



MARK	PARTS NAME
MS	MAIN SWITCH
R.TH	THERMISTOR
TF	THERMAL FUSE
F	FUSE
ER	ELECTRODE
POV	MODULATING SOLENOID VALVE
TR	TRANSFORMER
FR	FLAME ROD
CF	CONVECTION FAN
FM	CONVECTION FAN MOTOR
SP	SPARKER
OH.TH	OVER HEAT THERMISTOR
SV1~2	SOLENOID VALVE 1~2
BL	COMBUSTION FAN MOTOR
FCC	FAN CONTROL CIRCUIT
CPU	CENTRAL PROCESSING UNIT
MB	MAIN BURNER
PS	PRESSURE SENSOR
OHS. 1~2	OVERHEAT SWITCH 1~2