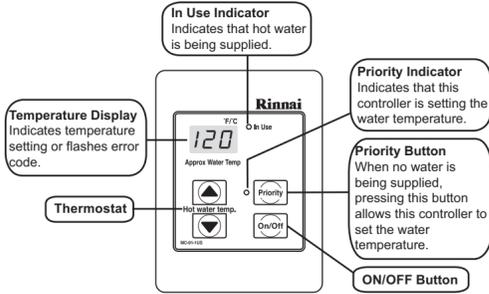


Temperature Controller

The temperature controller is an optional accessory and is not included with the RV53i.



Diagnostic Use of the Controller

- To display error codes, press the ON/OFF button followed by the ▲ thermostat button to cycle through the error codes.
- To display the water flow through the water heater, press the ▲ thermostat button (hold for 2 seconds) and then press the ON/OFF button while continuing to hold the ▲ thermostat button.
- To display the outlet water temperature, press the ▼ thermostat button (hold for 2 seconds) and then press the ON/OFF button while continuing to hold the ▼ thermostat button.

To Change the Temperature Scale (°F / °C)

With the water heater turned off, press and hold the ON/OFF button until the display changes to the other temperature scale (about 5 seconds).

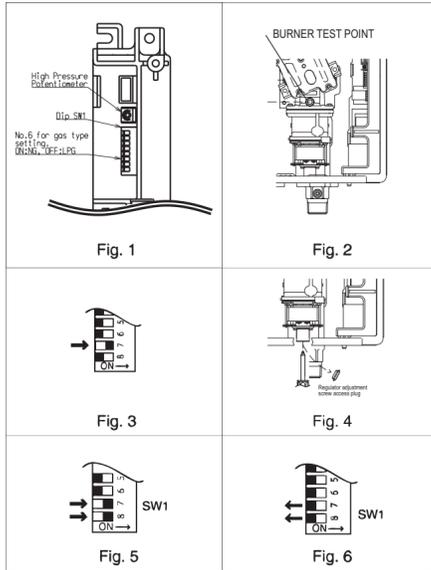
To Turn Off the Controller Sound (Mute)

To turn the sound off (mute), press and hold both the ▲ and ▼ thermostat buttons until a "beep" is heard (about 5 seconds).

Gas Pressure Setting

Ensure gas pressure check under Commissioning has been completed first! The regulator is electronically controlled and factory pre-set. Under normal circumstances it does not require adjustment during installation. Make adjustments only if the unit is not operating correctly and all other possible causes for incorrect operation have been eliminated.

- Turn OFF the gas supply.
- Turn OFF the 120 V power supply.
- Remove the front panel from the appliance.
- Check the gas type using the data plate on the side of the unit. If using a spare PC board, check that the gas type switches are in the correct position (switch No.6 of dip SW1: ON for natural gas, NG, and OFF for propane, LPG). See dip switch settings section below. (ON is towards the right and OFF is towards the left.)
- Attach the pressure gauge to the burner test point, located on the gas control (Fig. 2).
- Turn ON the gas supply.
- Turn ON the 120 V power supply.
- If a controller is installed, turn the unit ON with the controller.
- Select the maximum delivery temperature and open all available hot water taps at full.
- Set the unit to "Forced Low" combustion by setting No. 7 switch of the SW1 set to ON (Fig. 3).
- Check the burner test point pressure.
- Remove the rubber access plug and adjust the regulator screw on the modulating valve (Fig. 4) as required in Table 1. Replace the rubber access plug.
- Set the unit to "Forced High" combustion by setting both No. 7 and No. 8 switches of the SW1 set to ON (Fig. 5). Ensure maximum water flow.
- Check the burner test point pressure.
- Adjust the high pressure potentiometer (POT) on the PC board as required to the pressure shown in Table 1.
- Return the unit to normal operation by setting switches 7 and 8 of the SW1 set back to OFF (Fig. 6). Close all water taps.
- Turn OFF the gas supply and 120 V power supply.
- Remove the pressure gauge and install sealing screw.
- Turn ON the gas supply and 120 V power supply.
- Operate the unit and check for gas leaks at the test point.
- Install the front panel.



Error Codes

- 02 No burner operation during freeze protection mode**
 - Service Call
- 03 Power interruption during Bath fill (Water will not flow when power returns)**
 - Turn off all hot water taps. Press ON/OFF twice.
- 10 Air Supply or Exhaust Blockage**
 - Ensure Rinnai approved venting materials are being used.
 - Check that nothing is blocking the flue inlet or exhaust.
 - Check all vent components for proper connections.
 - Ensure vent length is within limits.
 - Ensure condensation collar was installed correctly.
 - Verify dip switches are set properly.
 - Check fan for blockage.
- 11 No Ignition**
 - Check that the gas is turned on at the water heater, gas meter, or cylinder.
 - Ensure gas type and pressure is correct.
 - Ensure gas line, meter, and/or regulator is sized properly.
 - Bleed all air from gas lines.
 - Verify dip switches are set properly.
 - Ensure appliance is properly grounded.
 - Disconnect EZConnect or MSA controls to isolate the problem.
 - Ensure igniter is operational.
 - Check igniter wiring harness for damage.
 - Check gas solenoid valves for open or short circuits.
 - Remove burner cover and ensure all burners are properly seated.
 - Remove burner plate and inspect burner surface for condensation or debris.
- 12 Flame Failure**
 - Check that the gas is turned on at the water heater and gas meter. Check for obstructions in the flue outlet.
 - Ensure gas line, meter, and/or regulator is sized properly.
 - Ensure gas type and pressure is correct.
 - Bleed all air from gas lines.
 - Ensure proper Rinnai venting material was installed.
 - Ensure condensation collar was installed properly.
 - Ensure vent length is within limits.
 - Verify dip switches are set properly.
 - Ensure appliance is properly grounded.
 - Disconnect keypad.
 - Disconnect EZConnect or MSA controls to isolate the problem.
 - Check power supply for loose connections.
 - Check power supply for proper voltage and voltage drops.
 - Ensure flame rod wire is connected.
 - Check flame rod for carbon build-up.
 - Disconnect and re-connect all wiring harnesses on unit and PC board.
 - Check all components for electrical short.
 - Check gas solenoid valves for open or short circuits.
 - Remove burner plate and inspect burner surface for condensation or debris.
 - Check the ground wire for the PC Board.
- 14 Thermal Fuse**
 - Check gas type of unit and ensure it matches gas type being used.
 - Check for restrictions in air flow around unit and vent terminal.
 - Check for low water flow in a circulating system causing short-cycling.
 - Ensure dip switches are set to the proper position.
 - Check for foreign materials in combustion chamber and/or exhaust piping.
 - Check heat exchanger for cracks and/or separations.
 - Check heat exchanger surface for hot spots which indicate blockage due to scale build up. Refer to instructions in manual for flushing heat exchanger.
 - Measure resistance of safety circuit.
 - Ensure high fire and low fire manifold pressure is correct.
 - Check for improper conversion of product.
- 16 Over Temperature Warning**
 - Check for restrictions in air flow around unit and vent terminal.
 - Check for low water flow in a circulating system causing short-cycling.
 - Check for foreign materials in combustion chamber and/or exhaust piping.
 - Check for clogged heat exchanger.
- 31 Burner Sensor Error**
 - Measure resistance of sensor.
 - Replace sensor
- 32 Outgoing Water Temperature Sensor Fault**
 - Check sensor wiring for damage.
 - Measure resistance of sensor.
 - Clean sensor of scale build up.
 - Replace sensor.
- 33 Heat Exchanger Outgoing Temperature Sensor Fault**
 - Check sensor wiring for damage.
 - Measure resistance of sensor.
 - Clean sensor of scale build up.
 - Replace sensor.
- 34 Combustion Air Temperature Sensor Fault**
 - Check for restrictions in air flow around unit and vent terminal.
 - Check sensor wiring for damage.
 - Measure resistance of sensor.
 - Clean sensor of scale build up.
 - Ensure fan blade is tight on motor shaft and is in good condition.
 - Replace sensor.
- 52 Modulating Solenoid Valve Signal Abnormal**
 - Check modulating gas solenoid valve wiring harness for loose or damage terminals.
 - Measure resistance of valve coil.
- 61 Combustion Fan Failure**
 - Ensure fan will turn freely.
 - Check wiring harness to motor for damaged and/or loose connections.
 - Measure resistance of motor winding.
- 65 Water Flow Servo Faulty (does not stop flow properly)**

If blank screen is present on remote control then the flow control has shorted out. Unplug flow control. If remote lights up and unit starts operating then replace flow control assembly.
- 71 SV0, SV1, SV2, and SV3 Solenoid Valve Circuit Fault**
 - Replace the PC Board.
- 72 Flame Sensing Device Fault**
 - Ensure flame rod is touching flame when unit fires.
 - Check all wiring to flame rod for damage.
 - Remove flame rod and check for carbon build-up; clean with sand paper.
 - Check inside burner chamber for any foreign material blocking flame at flame rod.
 - Measure micro amp output of sensor circuit with flame present.
 - Replace flame rod.
- 73 Burner Sensor Circuit Error**
 - Check sensor wiring and PCB for damage.
 - Replace sensor
- LC Scale Build-up in Heat Exchanger** (when checking maintenance code history "00" is substituted for "LC")
 - Flush heat exchanger. Refer to instructions in manual.
 - Replace heat exchanger.
- No Code** (Nothing happens when water flow is activated.)
 - Clean inlet water supply filter.
 - On new installations ensure hot and cold water lines are not reversed.
 - Check for bleed over. Isolate unit from building by turning off hot water line to building. Isolate the circulating system if present. Open your pressure relief valve; if unit fires, there is bleed over in your plumbing.
 - Ensure you have at least the minimum flow rate required to fire unit.
 - Ensure turbine spins freely.
 - Measure the resistance of the water flow control sensor.
 - Remote control does not light up but you have 12 VDC at the terminals for controls.

Gas Pressure Setting

NOTE: For additional installation and commissioning information refer to the Operation and Installation Manual.

WARNING

This appliance must be installed, serviced and removed by a trained and qualified person. During pressure testing of the consumer piping, ensure gas valve is turned off before unit is shut off. Failure to do so may result in serious injury to yourself or damage to the unit.

APPLIANCE OPERATING PRESSURES

Table 1

	Water Inlet Max	Gas Inlet Min./Max		Forced Low		Forced High	
		NAT.G	LPG	NAT.G	LPG	NAT.G	LPG
RV53i	150 PSI	5"W.C. (10.5"W.C.)	8"W.C. (13.5"W.C.)	0.57"W.C.	0.98"W.C.	2.1"W.C.	3.4"W.C.

Commissioning

With all gas appliances in operation at maximum gas rate, the flowing inlet pressure at the incoming test point on the Rinnai water heater should read 5" W.C. - 10.5" W.C. on natural gas and 8" W.C. - 13.5" W.C. on propane gas. If the pressure is lower, the gas supply is inadequate and the unit will not operate to specification. Check the gas meter regulator and pipework for correct operation/sizing and correct as required.

Troubleshooting

Important Safety Notes

There are a number of live tests that are required when troubleshooting this product. Extreme caution should be used at all times to avoid contact with energized components inside the water heater. Only trained and qualified service technicians should attempt to repair this product. Before checking for resistance readings, disconnect the power source to the unit and isolate the item from the circuit (unplug it).

Heat Exchanger and Outgoing Water Temperature Thermistors:

Check all thermistors by inserting meter leads into each end of the thermistor plug. Set your meter to the 20 K scale and read resistance. Applying heat to the thermistor bulb should decrease the resistance. Applying ice to the thermistor bulb should increase the resistance.

Frost Protection:

This unit has frost protection heaters mounted at different points to protect the water heater from freezing.

Amp Fuses:

This unit has one inline (5) amp glass fuse. Remove the fuse and check continuity through it. If you have continuity through the fuse then it is good. Otherwise the fuse is blown and must be replaced.

Flame Rod:

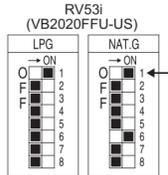
Place one lead of your meter to the flame rod and the other to ground. With the unit running you should read between 5-150 VAC. Set your meter to the amp or greater for proper flame circuit. In the event of low flame circuit remove the flame rod and check for carbon or damage.

COMPONENT	MEASUREMENT POINT	WIRE COLOUR	RANGE OF VALUE	REMARKS
REMOTE CONTROLLER	A1	Bk-Bk	DC11-13V	
THERMAL FUSE	B1/E1	W-W	BELOW 1Ω	
MOD. SOLENOID VALVE	B2	O-O	DC2-15v / 67-62Ω	
MAIN SOLENOID VALVE	B3	P-Bk	DC11-13v / 37-43Ω	
SOLENOID VALVE 1	B4	Y-Bk	DC11-13v / 37-43Ω	
SOLENOID VALVE 2	B5	B-Bk	DC11-13v / 37-43Ω	
SOLENOID VALVE 3	B6	R-Bk	DC11-13v / 37-43Ω	
FLAME ROD 1	B8	Y-FR	OVER 1μA (DURING OPERATION)	
SURGE PROTECTOR	C1	W-Bk	AC108-132V	
SURGE PROTECTOR	C2	W-Bk	AC108-132V	
MAIN POWER CODE	C3	W-Bk	AC108-132V	
ANTI-FROST HEATER	C4	W-W	156-211Ω	
IGNITOR	D1	Gy-Gy	AC108-132V (DURING IGNITION)	
HEAT EXCHANGER TH	E2	W-W	15°C/59°F : 11.4-14.0 kΩ 30°C/86°F : 8.4-7.8 kΩ 45°C/113°F : 3.6-4.5 kΩ 60°C/140°F : 2.2-2.7 kΩ 105°C/221°F : 0.6-0.8 kΩ	
OUTGOING WATER TH1	E3	W-W		
OUTGOING WATER TH2	E4	B-B		
AIR TEMPERATURE TH	E5	W-W		
BURNER THERMISTOR	E6	Bk-Bk	15°C/59°F : 21.5-23.8 kΩ 30°C/86°F : 14.7-16.2 kΩ 200°C/392°F : 0.98-1.02 kΩ 400°C/752°F : 210.0-225.9 Ω 600°C/1112°F : 85.7-92.7 Ω	
WATER FLOW SENSOR	E7	R-Bk Y-Bk	DC11-13v DC4-7V (PULSE 20-300Hz)	ON: 2.4L/MIN OFF: 1.7L/MIN
WATER FLOW CONTROL DEVICE	G2	R-O P-O B-O W-O R-P B-W Y-Gy Br-Gy	DC11-13V (DURING OPERATION) DC5-7V (DURING OPERATION) 30-50Ω BELOW DC1V (LIMITER ON) DC4-6V (LIMITER OFF) BELOW DC1V (LIMITER ON) DC4-6V (LIMITER OFF)	FULL OPEN POSITION FULL CLOSE POSITION
COMBUSTION FAN	L1	R-Bk Y-Bk W-Bk	DC15-46V DC11-13V DC5-10V (PULSE 20-420Hz)	

Dip Switches Settings

These models have a default, fixed, temperature setting of 120°F (49°C). The fixed temperature setting (see below) can be changed to 140°F (60°C) by moving switch No. 5 to ON. When using the temperature controller, the maximum temperature is always 140°F (60°C).

Adjust switches 2 and 3 in the bank of 8 depending on your altitude according to the table below.



Move switch 1 to OFF for long flue lengths. See below.

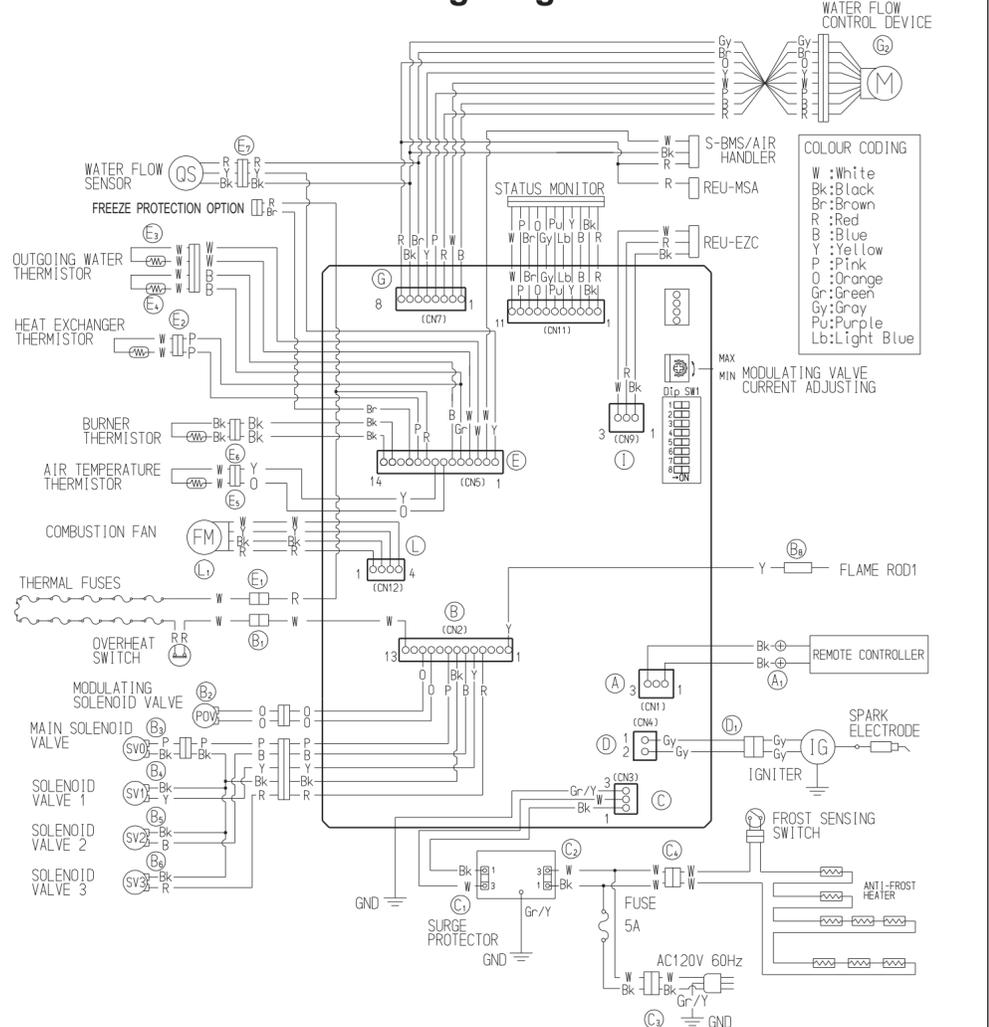
- Adjustment for long flue length:
- Determine the equivalent length using the formula:
Equivalent length = Straight length + [no. of 90° elbows x 6]
(Two 45° elbows = one 90° elbow)
 - If the equivalent length is greater than 21 ft then move switch no. 1 to OFF. If the equivalent length is longer than 41 ft the heater may not work properly. The installer should be called.

WARNING

DO NOT adjust the other switches unless specifically instructed to do so. Incorrect Dip Switch Settings can cause the Rinnai water heater to operate in an unsafe condition and may damage the water heater and void the warranty.

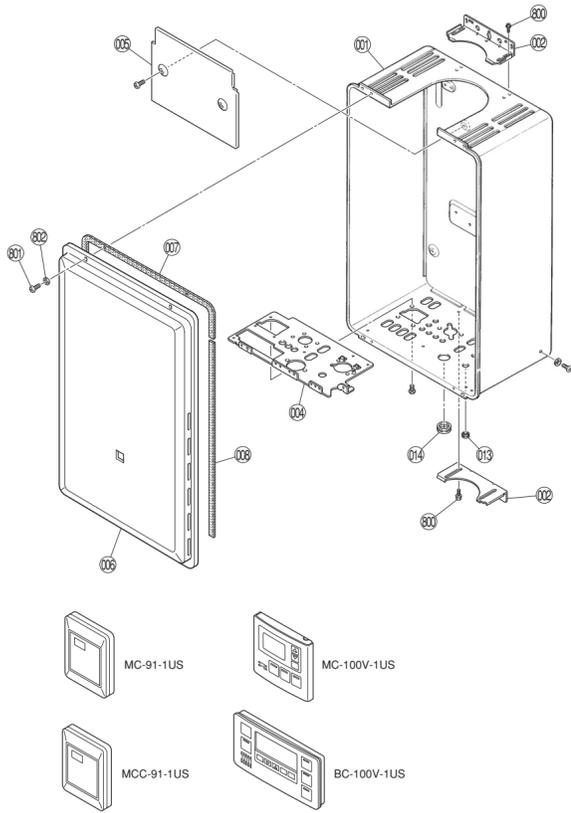
SW No.	NOTES	Level 0	Level 1	Level 2	Level 3
2	High Altitude	Off	On	On	On
3	High Altitude	Off	Off	Off	On

Wiring Diagram

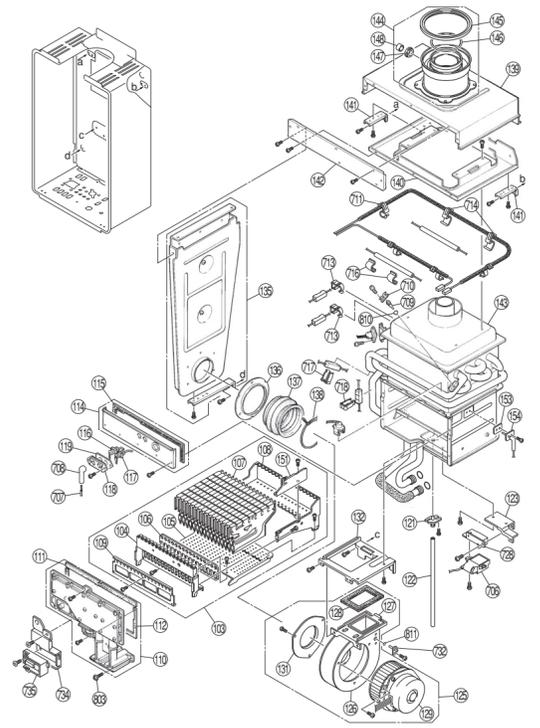


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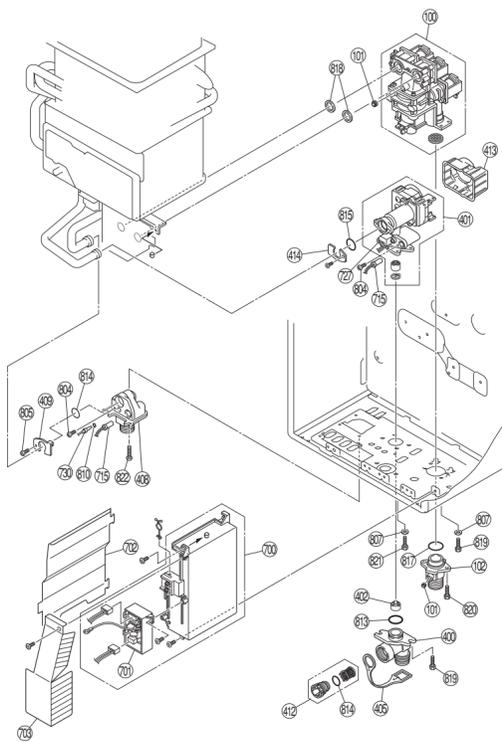
**EXPLODED VIEW
- CABINET**



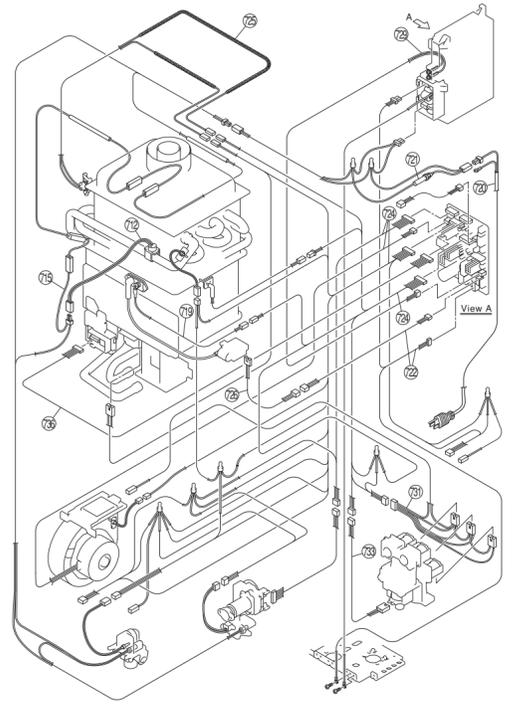
**EXPLODED VIEW
- INTERNALS**



**EXPLODED VIEW
- INTERNALS**



**EXPLODED VIEW
- ELECTRICAL**



Parts with an * are kits and include other required parts such as gaskets or O-rings.
The isolation valves and pressure relief valve are sold as an accessory kit, P/N WR1K-LF-F.

PARTS LIST

Item	Description	Parts Number	Qty	Item	Description	Parts Number	Qty	Item	Description	Parts Number	Qty
001	MAIN BODY (FFU)	109000088	1	135	AIR INLET BOX ALL ASS Y	108000013	1	717	HEATER FIXING PLATE	AU111-653	1
002	WALL HANG BRACKET	109000186	2	136	JOINT BRACKET	U245-408	1	718	HEATER FIXING PLATE	AU100-721	1
004	CONNECTION REINFORCEMENT	109000188	1	137	SEAL PACKING	U245-409	1	719	AWG18-FR HARNESS	105000139	1
005	HEAT PROTECTION PLATE	U245-107	1	138	JOINT FIXING BRACKET	U245-567	1	720	POWER CORD	CP-90580	1
006	FRONT PANEL	109000206	1	139	AIR INLET DUCT	108000014	1	721	FUSE HARNESS	105000132	1
007	FRONT PANEL PACKING	BU195-167	1	140	EXHAUST BRACKET	109000207	1	722	POWER HARNESS	105000107	1
008	FRONT PANEL PACKING	AU115-163	2	141	EXHAUST TUBE FRAME SUPPORT	U245-435	2	724	SENSOR HARNESS	105000140	1
013	SEAL PACKING (GRAY)	AU105-113	1	142	INLET BOX CAP	U245-419	1	725	FUSE HARNESS-26-4	105000121	1
014	RUBBER BUSH	U245-125	1	143	HEAT EXCHANGER ASSEMBLY	104000168*	1	726	IGNITOR HARNESS	105000112	1
100	GAS CONTROL ASSEMBLY	104000021*	1	144	FLUE CONNECTION ASSEMBLY	108000015	1	727	MR SENSOR	105000041	1
101	TEST PORT SET SCREW	AU39-965	2	145	INLET SEALING	108000017	1	728	IGNITOR FIXING PLATE	109000208	1
102	3/4 GAS INLET	CU195-1866	1	146	O-RING	108000018	1	729	TEMP CONTROL HARNESS	105000042	1
103	BURNER UNIT ASSY (LPG)	106000060	1	147	PIPE SEAL	108000019	1	730	TWIN THERMISTOR	104000208*	1
103	BURNER UNIT ASSY (NG)	106000061	1	148	CAP	108000020	1	731	CONNECTION HARNESS		