

Diagnostic Use of the Controller

1. 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 \blacktriangle and \checkmark thermostat buttons until a "beep" is heard (about 5 seconds).

Gas Pressure Setting

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

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		Force	d Low	Forced High	
			NAT.G	LPG	NAT.G	LPG	NAT.G	LPG
	RC98HPi	150 PSI	5"W.C. /10.5"W.C.	8"W.C. /13.5"W.C.	0.75"W.C.	1.12"W.C.	2.3"W.C.	3.3"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

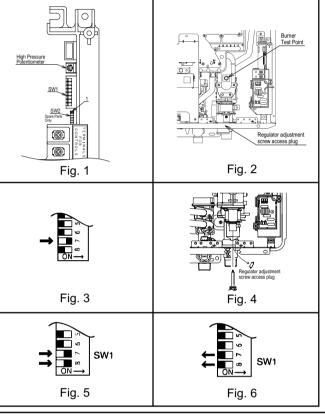
Important Safety Notes

There are a number of (live) tests that are required when fault finding this product. Extreme care should be used at all times to avoid contact with energized components inside the water heater.

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.
- 3. 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 (dip switch 1 of SW2: 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.)
- 5. Attach the pressure gauge to the burner test point, located on the gas control (Fig. 2).
- 6. Turn ON the gas supply.
- 7. Turn ON the 120 V power supply.
- 8. 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.
- 9. Set the unit to "Forced Low" combustion by setting No. 7 dip switch of the SW1 set to ON (Fig. 3).
- 10. Check the burner test point pressure.
- 11. 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.
- 12. Set the unit to "Forced High" combustion by setting both No. 7 and No. 8 dip switches of the SW1 set to ON (Fig. 5). Ensure maximum water flow.
- 13. Check the burner test point pressure.
- 14. Adjust the high pressure potentiometer (POT) on the PC board as required to the pressure shown in Table 1.
- 15. Return the unit to normal operation by setting dip switches 7 and 8 of the SW1 set back to OFF (Fig. 6). Close all water taps.
- 16. Turn OFF the gas supply and 120 V power supply.17. Remove the pressure gauge and install sealing screw.18. Turn ON the gas supply and 120 V power supply.19. Operate the unit and check for gas leaks at the test point.20. Install the front panel.



Heat Exchanger and Outgoing Water Temperature Thermistors:

resistance readings.

Outgoing Water Thermistor

White - White

Pink - White

Black - White

Black - White

Surge Protector:

Remote Controls:

Amp Fuses:

Frost Protection:

Terminals B1

Example:

Heat Exchanger Temperature Thermistor

N/A

N/A

108 ~ 132 VAC 108 ~ 132 VAC

not get continuity then replace the surge protector.

10 ~ 13 VDC

have a resistance reading 24-28 ohms.

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

59°F = 11.4 ~ 14K

86°F = 6.4 ~ 7.8K

113°F = 3.6 ~ 4.5K

the resistance. See below for examples of typical temperatures and

N/A N/A

With the power off you can check the continuity through the surge

protector and pin #3 on the bottom of the surge protector. Check

across these two points then the surge protector is good. If you do

This unit has frost protection heaters mounted at different points to

protect the water heater from freezing. The heaters located on the

heat exchanger piping should have a resistance reading of 156-180

hot water outlet line should have a resistance reading of 180-207

ohms through each of these heaters. The heater located on the

ohms and the one located in the water flow sensor valve should

This unit has one inline (3) 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.

RC98HPi

1.5 ~ 3.0 K ohms

across the top pin #3 and bottom pin #1. If you read continuity

protector. Place a meter lead on the top pin #1 of the surge

140°F = 2.2 ~ 2.7K

221°F = 0.6 ~ 0.8K

See example above | F4

See example above F

3 - 4

3 - 11

1 - 3

Error	Codes
02 No burner operation during freeze protection mode	25 Neutralizer Error
Service Call	Neutralizer container is full.
03 Power interruption during Bath fill (Water will not flow when	Check condensate drain.
power returns)	Replace neutralizer container.
 Turn off all hot water taps. Press ON/OFF twice. 	31 Burner Sensor Error
1() Air Supply or Exhaust Blockage	Measure resistance of sensor.
	Replace sensor
 Ensure Rinnai approved venting materials are being used. Check that nothing is blocking the flue inlet or exhaust. 	32 Outgoing Water Temperature Sensor Fault
 Check all vent components for proper connections. 	 Check sensor wiring for damage.
 Ensure vent length is within limits. 	Measure resistance of sensor.
 Ensure condensation collar was installed correctly. 	Clean sensor of scale build up.
 Verify dip switches are set properly. 	Replace sensor.
 Check fan for blockage. 	33 Heat Exchanger Outgoing Temperature Sensor Fault
Burner sensor error (see code 31)	Check sensor wiring for damage.
11 No Ignition	Measure resistance of sensor.
 Check that the gas is turned on at the water heater, gas meter, 	Clean sensor of scale build up.
or cylinder.	Replace sensor.
 Ensure gas type and pressure is correct. 	34 Combustion Air Temperature Sensor Fault
 Ensure gas line, meter, and/or regulator is sized properly. 	Check for restrictions in air flow around unit and vent terminal.
Bleed all air from gas lines.	 Check sensor wiring for damage.
Verify dip switches are set properly.	Measure resistance of sensor.
Ensure appliance is properly grounded.Disconnect EZConnect or MSA controls to isolate the problem.	
 Disconnect EZConnect or MSA controls to isolate the problem. Ensure igniter is operational. 	Ensure fan blade is tight on motor shaft and is in good
 Check igniter wiring harness for damage. 	condition.
 Check gas solenoid valves for open or short circuits. 	Replace sensor.
Remove burner cover and ensure all burners are properly	52 Modulating Solenoid Valve Signal Abnormal
seated.	Check modulating gas solenoid valve wiring harness for loose
Remove burner plate and inspect burner surface for condensation or debrie	or damage terminals.
condensation or debris.	 Measure resistance of valve coil.
12 Flame Failure	61 Combustion Fan Failure
 Check that the gas is turned on at the water heater and gas meter. Check for obstructions in the flue outlet. 	Ensure fan will turn freely.
 Ensure gas line, meter, and/or regulator is sized properly. 	Check wiring harness to motor for damaged and/or loose
 Ensure gas type and pressure is correct. 	connections.
Bleed all air from gas lines.	 Measure resistance of motor winding.
 Ensure proper Rinnai venting material was installed. 	65 Water Flow Servo Faulty (does not stop flow properly)
 Ensure condensation collar was installed properly. 	If blank screen is present on remote control then the flow control
Ensure vent length is within limits.	has shorted out. Unplug flow control. If remote lights up and unit
 Verify dip switches are set properly. Ensure appliance is properly grounded. 	starts operating then replace flow control assembly.
Ensure appliance is properly grounded.Disconnect keypad.	71 SV0, SV1, SV2, and SV3 Solenoid Valve Circuit Fault
 Disconnect EZConnect or MSA controls to isolate the problem. 	Check wiring harness to all solenoids for damage and/or loose
 Check power supply for loose connections. 	connections.
 Check power supply for proper voltage and voltage drops. 	Measure resistance of each solenoid valve coil.
Ensure flame rod wire is connected.	72 Flame Sensing Device Fault
 Check flame rod for carbon build-up. 	 Ensure flame rod is touching flame when unit fires.
 Disconnect and re-connect all wiring harnesses on unit and PC 	
board.	 Remove flame rod and check for carbon build-up; clean with

- Check all components for electrical short.
- 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. 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 shortcycling.
 - 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.
- Clean inlet water supply filter.

No Code (Nothing happens when water flow is activated.)

• Check sensor wiring and PCB for damage.

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.

- On new installations ensure hot and cold water lines are not reversed.
 - Oberth familie al sum la data unit fram huilding huiteming

· Check inside burner chamber for any foreign material blocking

Measure micro amp output of sensor circuit with flame present.

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).

(SV1, SV2, SV3 and POV) Gas valve and Modulating solenoids: (Set meter above 2K)

Wire color	Voltage	Resistance	Connector #	Pin #'s
	11 ~ 13 VDC	24 ~ 28 ohms	H3	6 - 7
(SV1) Black - Red	11~13 VDC	37 ~ 43 ohms	H4	5 - 6
(SV2) Black - Orange	11 ~ 13 VDC	37 ~ 43 ohms	H5	4 - 6
(SV3) Black - Yellow	11 ~ 13 VDC	37 ~ 43 ohms	H6	3 - 6
(POV) Orange - Orange	2 ~ 15 VDC	67 ~ 81 ohms	H2	9 - 10

(M) Water Flow Control Device Servo or Geared Motor:

N/A

 Red - Blue
 11 ~ 13 VDC
 22 ~ 28 ohms
 F5

 Grey - Brown
 4 ~ 6 VDC
 N / A
 F5

NOTE: The grey wire listed above turns to black at F connector on the PCB.

(QS) Water Flow Sensor:

Grey - Yellow

Black - Red	11 ~ 13 VDC	5.5 ~ 6.2 K ohms	F2	1 - 3
Yellow - Black	4 ~ 7 VDC	1 ~ 1.4 Mega ohms	F2	2 - 3

N/A

By-pass Flow Control:

Brown - White			G1	1 - :
Orange - White	2 ~ 6 VDC	15 - 25 ohmo	G1	2 -
Yellow - White	(Unit in operating mode)	15 ~ 35 ohms	G1	3 -
Red-White - Ground			G1	4 -

(IG) Ignition System:

Grey - Grey	90 ~ 110 VAC	N/A	C1	1-2

(FM) Combustion Fan Motor

• •				
Red - Black	6 ~ 45 VDC	N/A	E1	1 - 2
White - Black	5 ~ 10 VDC	9.2 ~ 9.4 K ohms	E1	2 - 4
Yellow - Black	11 ~ 13 VDC	3.5 ~ 3.9 K ohms	E1	2 - 3

Set your meter to the hertz scale. Reading across the white and black wires at terminals 2 and 4
you should read between 60 and 420 hertz.

Thermal Fuse / Overheat Switch:

Red - White 11 ~ 13 VDC	Below 1 ohms	F6 H1	F6 - H12	
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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 μ amp scale and series your meter in line with the flame rod. You should read 1 μ amp or greater for proper flame circuit. In the event of low flame circuit remove the flame rod and check for carbon or damage.

Dip Switches Settings

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

The original PC boards on the water heaters do not have the bank of 6 dip switches. Only spare PC boards have this bank.

High Altitude

DO NOT adjust the other dip 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										
2	High Altitude	Off	Level 0 0-2000 ft	Off	Level 1 2001-5200 ft	On	Level 2 5201-7700 ft	On	Level 3 7701-10200 ft		
3	High Altitude	Off	0-2000 It (0-610 m)	On	(610-1585 m)	Off	(1585-2347 m)	On	(2347-3109 m)		

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-
- Check for low water flow in a circulating system causing shortcycling.
- Check for foreign materials in combustion chamber and/or exhaust piping.
- Check for clogged heat exchanger.

 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.

sand paper

flame at flame rod

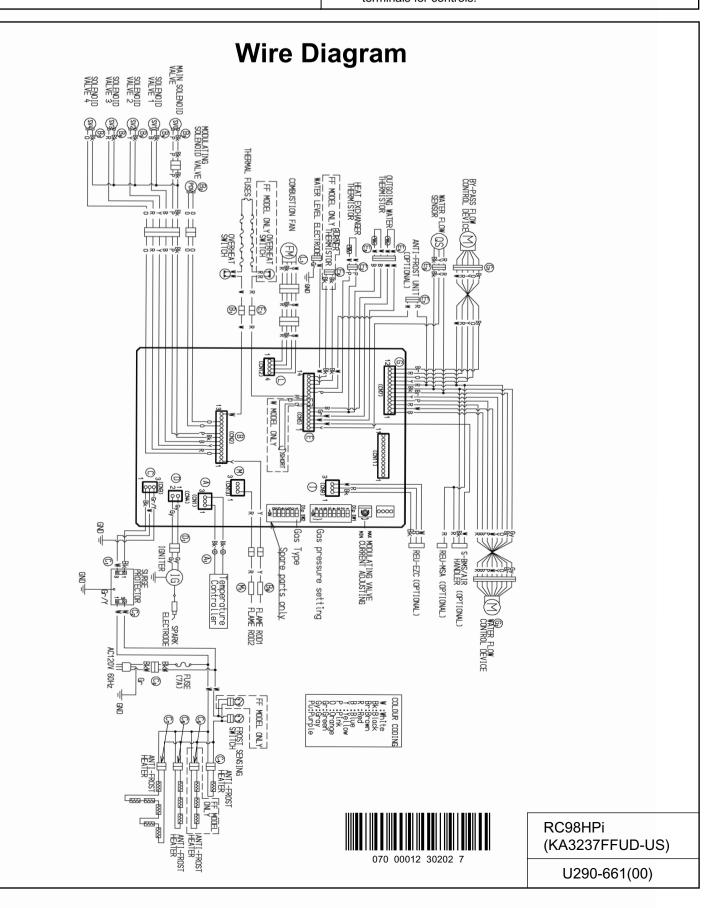
· Replace flame rod.

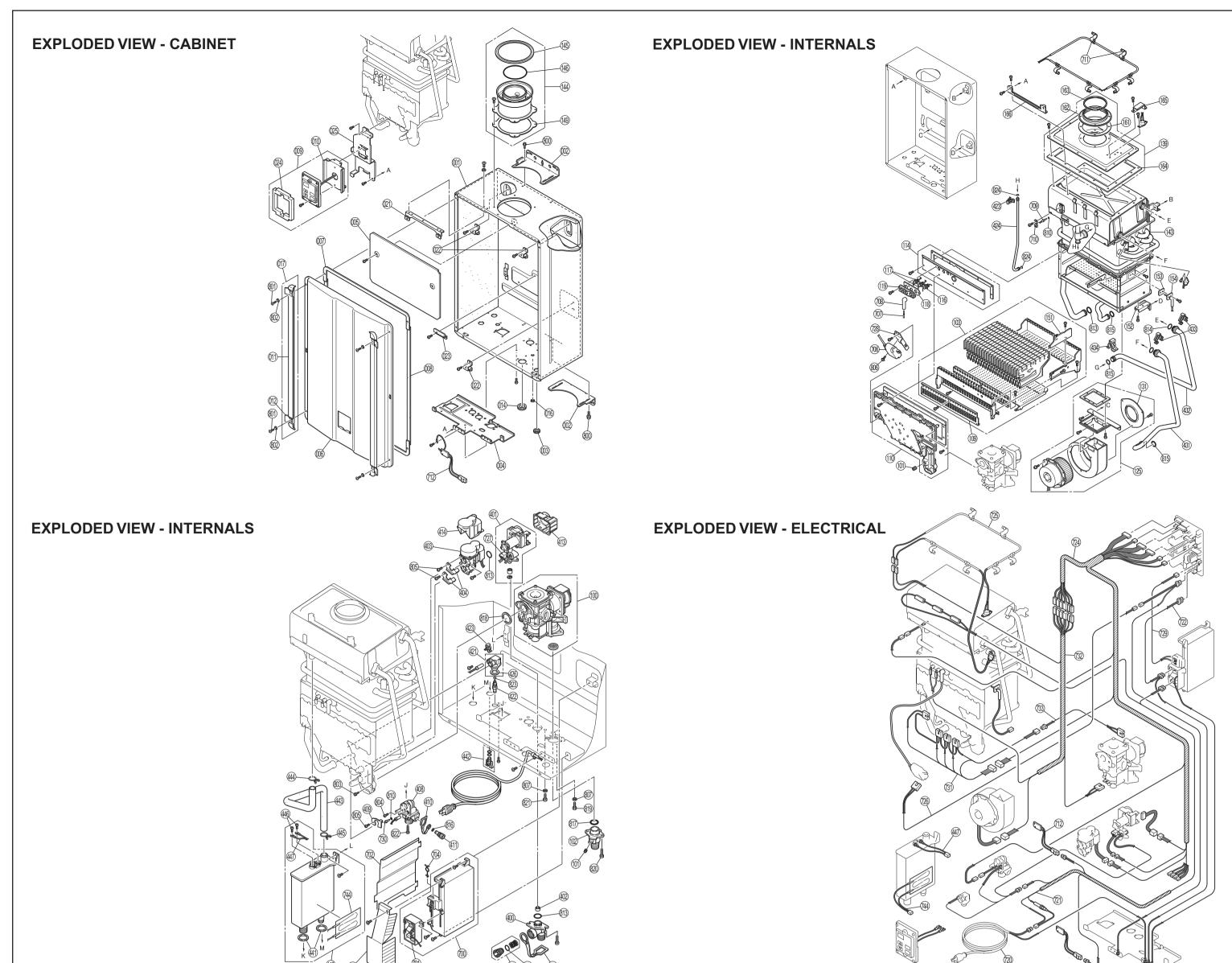
Replace sensor

73 Burner Sensor Circuit Error

Replace heat exchanger.

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.









	PARTS LIST										
Item	Description	Part Number	Qty	Item Description	Part Number	Qty	Item	Description	Part Number	Qty	
001	Main Body	109000142	1	153 Burner Sensor Gasket	109000149	1	712	Frost Sensing Switch	105000097	2	
002	Wall Bracket	109000143	2	154 Burner Thermistor	105000100	1	713	Anti Frost Heater 120V	105000098	1	
003	Rubber Bushing	109000015	1	161 Outlet pipe packing	109000161	1	715	Valve Heater 120V Assembly	105000099	1	
004	Connection Reinforcement Panel	109000118	1	162 Outlet pipe	107000064	1	716	Anti Frost Heater Clip B	105000026	2	
005	Heat Protection Plae	H73-065	1	163 O-ring	108000018	2	717	Anti Frost Heater Clip A	AU124-618X01	1	
006	Front Panel	109000144	1	164 Packing	109000162	2	718	Anti Frost Heater Clip C	105000027	1	
007	Gasket - Top and Bottom	109000120	2	165 OHS cover	109000163	1		Inlet Air Thermistor	105000029	1	
008	Gasket - Side	109000121	2	166 Reinforcement Bracket	109000129	1	720	Power Cord	105000030	1	
009	Temperature Controller	103000021	1	400 Water Inlet 3/4" NPT	H73-501-2	1		Fuse Harness	105000101	1	
010	Temperature Controller Bracket	109000156	1	401 Water Flow Servo and Sensor Assemble		1	722	Power Harness	105000107	1	
011	Screw Cover	109000122	2	402 Rectifier	M8D1-15X01	1	723	Solenoid Valve Harness	105000102	1	
012	Screw Cover Lid	109000150	4	403 By-pass Flow Assembly	M6J-1-4	1	724	Sensor Harness	105000103	1	
	Rubber Bushing	U245-125	1	404 Stop Bracket	AH69-310	2		Thermal Fuse Harness Assembly		1	
016	Packing	109000016	1	405 Plug Band	109000018	1		Ignitor Harness	105000112	1	
017	Screw Cover Assembly	109000123	2	408 Hot Water Outlet 3/4" NPT	107000056	1		Flow sensor	105000041	1	
021	Reinforcement Bracket	109000124	1	409 Stop Bracket	U211-322X01	1		Ignitor Attachment Plate	109000165	1	
022	Attachment Bracket	109000125	3	410 Plug Band (small)	109000019	1		Temperature Controller Harness	105000042	1	
023	Reinforcement Bracket	U273-113	1	411 Drain Valve	107000021	1		Thermistor	105000108	1	
024	Tempereture Controller Packing	109000157	1	412 Water Filter Assembly	H98-510-S	1		Solenoid Connection Harness	105000109	1	
025	Temperature Controller Bracket	109000145	1	413 Cover	109000130	1		AWG#18 Harness	105000110	1	
100	Gas Controller Assembly	106000034	1	421 Drain Connection	107000057	1		Connection Harness	105000111	1	
100	Test port set screw	109000151	2	422 Drain Plug	107000058	1		Secondary Heat Exchanger Heater		1	
	Gas Connection 3/4" NPT	CU195-1866	1	423 Clip	109000131	2		Heater and Harness	105000106	1	
102	Burner Unit Assembly LPG	106000024	1	424 Connecting Pipe	107000059	1		Screw	ZIHD0510UK	8	
103	Burner Unit Assembly NG	106000035	1	426 Packing	109000153	1		Screw	CP-30580-3	4	
	Damper LPG	106000025	1	431 Connecting Pipe - Inlet	107000060	1		Washer	CF83-41430	ч Д	
	Damper NG	106000039	1	432 Connecting Pipe - HEX	107000061	1		Screw	CP-30627-414	3	
	Manifold Assembly NG	106000036	1	433 Clip	109000132	2		Screw	U217-449	1	
	Manifold Assembly LPG	106000037	1	434 Clip	109000133	1		Screw	ZAA0408UK	3	
	Pressure Point Sealing Screw	C10D-5	1	440 Condensate Trap	109000134	1		Screw	CP-80452	1	
	Combustion Chamber Sight Glass Plate	106000038	1	441 Packing	109000154	2		Washer	AU48-174X01	2	
	Electrode	H73-120	1	442 Condensate Trap Plug	109000135	1		O-ring	M10B-2-4	2	
	Flame Rod	105000093	2	443 Condensate Drain Tube	109000136	1		O-ring	M10B-2-3	1	
	Electrode Packing	109000126	1	444 Band	109000137	1		O-ring	M10B-2-6	2	
	Electrode Holder	109000127	1	445 Band	109000138	1		O-ring	M10B-2-18	3	
	Tube Joint	109000146	1	446 Screw	109000155	2		O-ring	M10B-2-16	3	
	Vent Tube	109000147	1	447 Conection Harness	105000105	1		O-ring	M10B-2-14	4	
	Fan Motor All Assembly	108000037	1	700 PC Board	105000094	1		O-ring	M10B-2-7	1	
	φ40 Bell Mouth	109000158	1	701 Surge Protector	105000014	1		O-ring	M10B-1-24	1	
	Combustion Chamber Fan Bracket	109000148	1	701 Surge Protector with Terminals	BU195-1873-2X01	1		Packing	C36E3-7	1	
	Air Inlet Box All Assembly	108000038	1	702 PC Board Cover Side	109000164	1		Screw	ZQAA0512UK	2	
	Air Inlet Duct	108000039	1	703 PC Board Cover Front	109000139	1		Screw	ZQAA0514UK	4	
	Heat Exchanger Assembly	107000062	1	704 Clip	109000140	1		Screw	ZQAA0508UK	2	
144	Flue Connection Assembly	108000040	1	706 Ignitor	105000018	1	822	Screw	ZBA0512UK	3	
	O-ring	108000017	1	707 High TensionCord	105000095	1		O-ring	M10B-2-5	1	
	O-ring	108000018		708 Electrode Sleeve	AU206-218	1		O-ring	M10B-2-6	2	
	Gasket Burner Attachment Bracket	109000159	1	709 Thermistor 710 Thermister Clin Large	105000096 CP-90172	1		Tech Sheet	100000149	1 ₁	
151 152	Burner Attachment Bracket Reinforcement Bracket	109000160 109000128	1	710 Thermistor Clip Large 711 Thermal Fuse Clip	109000141	5		Manual Front Panel Label	100000150 100000148	1	
152		100000120	1			5	300		1000001-0	I	