

Diagnostic Use of the Controller

- 1. To display error codes, press the ON/OFF button followed by the **\(\Lambda \)** thermostat button to cycle through the error codes.
- 2. To display the water flow through the water heater, press the **A** thermostat button (hold for 2 seconds) and then press the ON/OFF button while continuing to hold the ▲ thermostat button.
- 3. 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.

- 1. Turn OFF the gas supply.
- 2. 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
- 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.

Gas Pressure Setting

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



WARNING

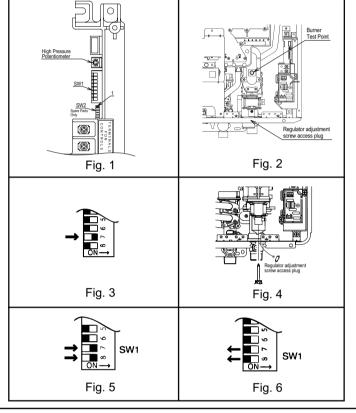
This appliance must be installed, serviced and removed by a trained and qualified person. During pressure testing of the consumer piping, ensure gas valve is turned off before unit is shut off. Failure to do so may result in serious injury to yourself or damage to the unit.

APPLIANCE OPERATING PRESSURES

	Water Inlet Max.	Gas Inlet Min./Max		Forced Low		Forced High	
	miot max.	NAT.G	LPG	NAT.G	LPG	NAT.G	LPG
RC98HPe	150 PSI	5"W.C. /10.5"W.C.	8"W.C. /13.5"W.C.	0.63"W.C.	1.00"W.C.	2.2"W.C.	3.1"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. 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). (SVA SV2 SV2 and BOV) Convelve and Madulating colonidar (Set mater above 2)

(3V 1, 3V2, 3V3 and F	OV) Gas valve allu ivi	odulating solenoids.	(Set meter ab	ove znj
Wire color	Voltage	Resistance	Connector #	Pin #'s
(Main) Pink - Black	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
(CV2) Block Vollage	11 - 12 V/DC	27 - 12 ohmo	LIC	2 6

1	D. I Di	44 401/00	00 00 1		0 10
	(M) Water Flow Contro	ol Device Servo or G	eared Motor:		
	(POV) Orange - Orange	2 ~ 15 VDC	67 ~ 81 ohms	H2	9 - 10
	(SV3) Black - Yellow		37 ~ 43 ohms	H6	3 - 6
	(SV2) Black - Orange	11 ~ 13 VDC	37 ~ 43 ohms	H5	4 - 6
	(SV1) Black - Red	11 ~ 13 VDC	37 ~ 43 ohms	H4	5 - 6
- 1	(Maili) i ilik - Diack	11 10 100	24 20 011113	110	0 - 1

Grey - Yellow	N / A	N/A	F5
NOTE: The grey wire	listed above turns to	black at F connector	on the PCE

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
By-pass Flow Contro	l:	· •		
Brown - White			G1	1 - 5
Orange - White	2 ~ 6 VDC	15 ~ 35 ohms	G1	2 - 5
Yellow - White	(Unit in operating mode)	15 ~ 35 OHIIIS	G1	3 - 5
Red-White - Ground			G1	4 - 5
(IG) Ignition System:				
Grey - Grey	90 ~ 110 VAC	N/A	C1	1 - 2

Red - Black	6 ~ 45 VDC	N/A	E1	1 - 2
White - Black		9.2 ~ 9.4 K ohms		2 - 4
Yellow - Black	11 ~ 13 VDC	3.5 ~ 3.9 K ohms	E1	2 - 3
Cat your mater to the h	ortz coolo Boodina co	rose the white and bla	ak wiraa at tarmii	nale 2 and 4
Set your meter to the h	·	ross the white and bia	ck wires at termin	iais 2 and 4

Set your meter to the he	ertz scale. Reading ac	ross the white and blac	ck wires at termi	nals 2 and 4	
you should read between	en 60 and 420 hertz.				
Thermal Fuse / Overhe	eat Switch:				
			FC		

Red - White	11 ~ 13 VDC	Below 1 ohms	H1	F6 - H12	

Flame Rod:

(QS) Water Flow Sensor:

(FM) Combustion Fan Motor:

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.

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. See below for examples of typical temperatures and

colotarios rodalingo.			
Example:	59°F = 11.4 ~ 14K	140°F = 2.2 ~ 2.7K	
·	$86^{\circ}F = 6.4 \sim 7.8K$	$221^{\circ}F = 0.6 \sim 0.8K$	
	113°F = 3.6 ~ 4.5K		
Outgoing Water Thermistor:			

	113°F = 3.6	~ 4.5K		
Outgoing Water Theri	mistor:			
White - White	N/A	See example above	F4	3 - 4
Heat Exchanger Tem	perature Thermistor:			
Pink - White	N/A	See example above	F3	3 - 11
Surge Protector:				
Black - White	108 ~ 132 VAC	N/A	D2	1 - 3
Black - White	108 ~ 132 VAC	N/A	D1	1 - 3
With the power of	off you can chec	k the continuity	through the	surge

protector. Place a meter lead on the top pin #1 of the surge protector and pin #3 on the bottom of the surge protector. Check across the top pin #3 and bottom pin #1. If you read continuity across these two points then the surge protector is good. If you do not get continuity then replace the surge protector.

Terminals B1	10 ~ 13 VDC	1.5 ~ 3.0 K ohms	В	1 - 3

Frost Protection:

This unit has frost protection heaters mounted at different points to protect the water heater from freezing. The heaters located on the hot water outlet line should have a resistance reading of 180-207 ohms through each of these heaters. The heater located on the heat exchanger piping should have a resistance reading of 156-180 ohms and the one located in the water flow sensor valve should have a resistance reading 24-28 ohms.

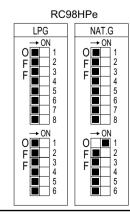
Amp Fuses:

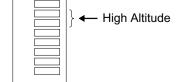
This unit has one inline (3) amp glass fuse. Remove the fuse and check continuity through it. If you have continuity through the fuse then it is good. Otherwise the fuse is blown and must be replaced.

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.





WARNING

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 Allitude	Off	(0-610 m)	On	(610-1585 m)	Off	(1585-2347 m)	On	(2347-3109 m)

Error Codes

02 No burner operation during freeze protection mode

• Turn off all hot water taps. Press ON/OFF twice.

03 Power interruption during Bath fill (Water will not flow when

• Ensure Rinnai approved venting materials are being used.

· Check that the gas is turned on at the water heater, gas meter,

• Disconnect EZConnect or MSA controls to isolate the problem.

• Ensure gas line, meter, and/or regulator is sized properly.

· Check that nothing is blocking the flue inlet or exhaust.

• Check all vent components for proper connections.

· Ensure condensation collar was installed correctly.

Service Call

power returns)

10 Air Supply or Exhaust Blockage

• Ensure vent length is within limits.

• Verify dip switches are set properly.

• Burner sensor error (see code 31)

• Ensure gas type and pressure is correct.

· Verify dip switches are set properly.

• Ensure appliance is properly grounded.

· Check igniter wiring harness for damage.

Check gas solenoid valves for open or short circuits.

· Remove burner plate and inspect burner surface for

meter. Check for obstructions in the flue outlet.

Ensure proper Rinnai venting material was installed.

· Ensure condensation collar was installed properly.

• Ensure gas type and pressure is correct.

Remove burner cover and ensure all burners are properly

• Check that the gas is turned on at the water heater and gas

• Ensure gas line, meter, and/or regulator is sized properly.

• Disconnect EZConnect or MSA controls to isolate the problem.

• Disconnect and re-connect all wiring harnesses on unit and PC

• Check gas type of unit and ensure it matches gas type being

Check for restrictions in air flow around unit and vent terminal.

Check for low water flow in a circulating system causing short-

· Check for foreign materials in combustion chamber and/or

Check heat exchanger surface for hot spots which indicate

• Ensure high fire and low fire manifold pressure is correct.

· Check for restrictions in air flow around unit and vent terminal.

· Check for low water flow in a circulating system causing short-

Check for foreign materials in combustion chamber and/or

blockage due to scale build up. Refer to instructions in manual

Check heat exchanger for cracks and/or separations.

· Check power supply for proper voltage and voltage drops.

• Check fan for blockage.

· Bleed all air from gas lines.

· Ensure igniter is operational.

condensation or debris.

Bleed all air from gas lines.

· Disconnect keypad.

• Ensure vent length is within limits.

· Verify dip switches are set properly.

• Ensure flame rod wire is connected.

• Check flame rod for carbon build-up.

condensation or debris.

14 Thermal Fuse

cycling.

exhaust piping.

for flushing heat exchanger.

16 Over Temperature Warning

exhaust piping.

· Measure resistance of safety circuit.

Check for clogged heat exchanger.

Check for improper conversion of product

• Ensure appliance is properly grounded.

• Check power supply for loose connections.

· Check all components for electrical short.

Check gas solenoid valves for open or short circuits.

• Remove burner plate and inspect burner surface for

• Ensure dip switches are set to the proper position.

12 Flame Failure

11 No Ignition

- 25 Neutralizer Error
 - · Neutralizer container is full.
 - · Check condensate drain.
 - · Replace neutralizer container.

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.

- **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 · Check wiring harness to all solenoids for damage and/or loose

72 Flame Sensing Device Fault

· Measure resistance of each solenoid valve coil.

- 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
- · 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

connections

maintenance code history "00" is substituted for "LC") • Flush heat exchanger. Refer to instructions in manual.

LC Scale Build-up in Heat Exchanger (when checking

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

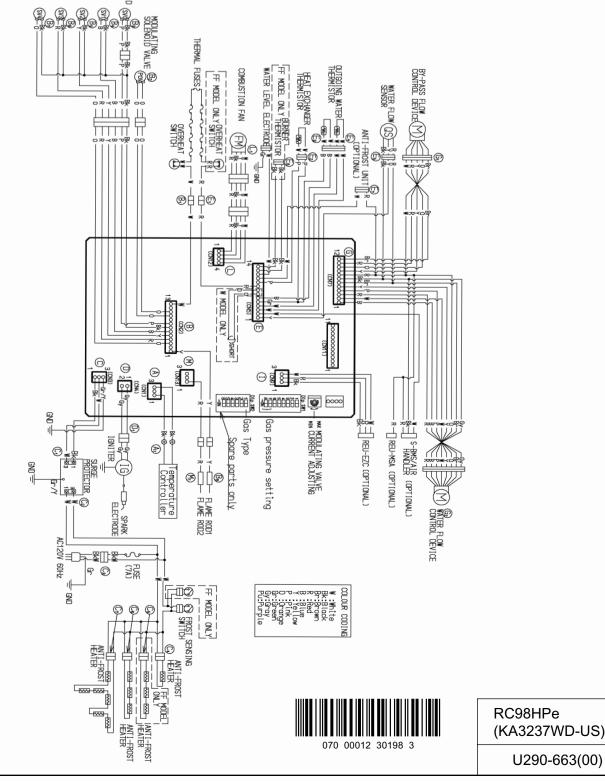
Replace heat exchanger.

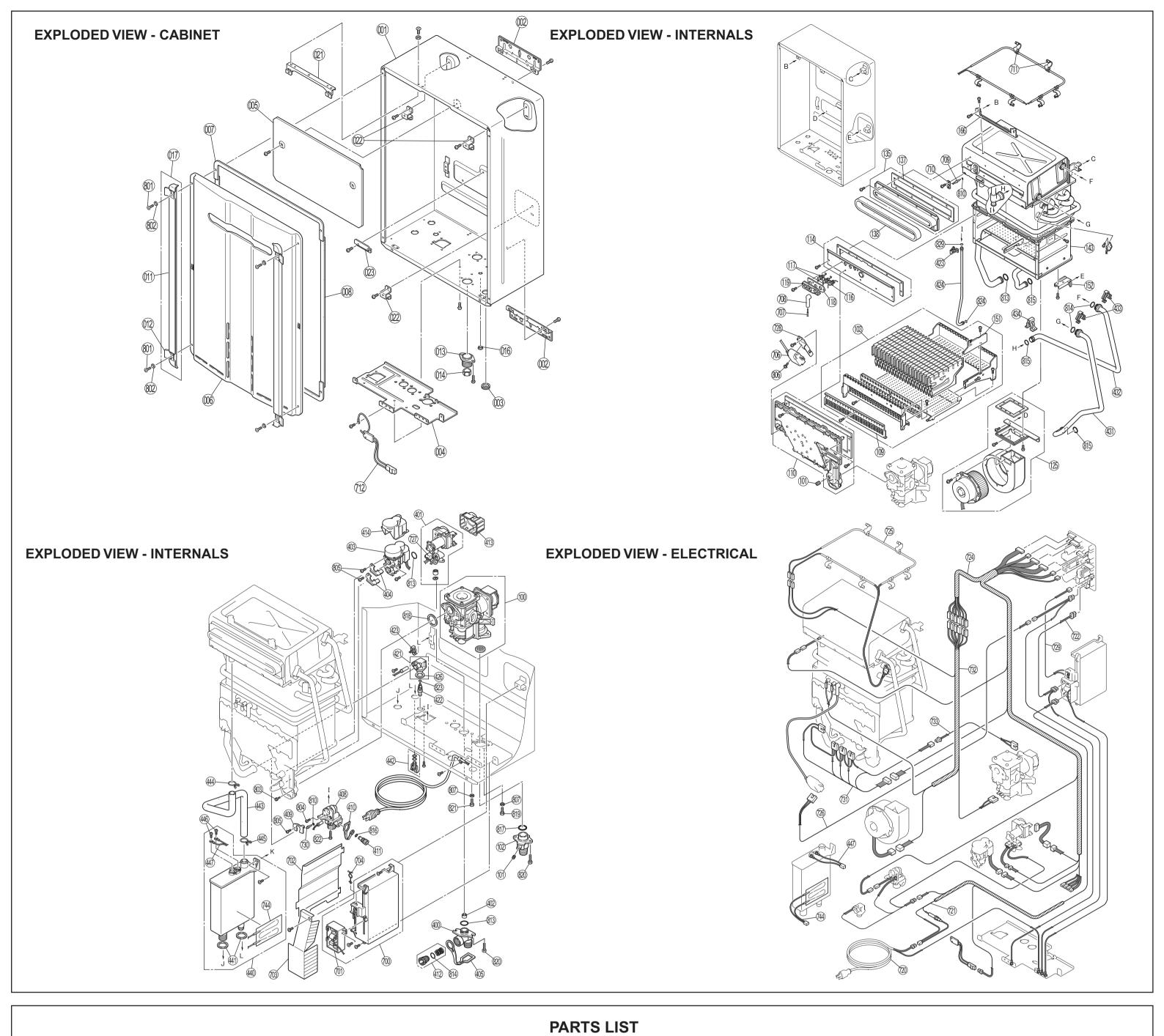
- · Clean inlet water supply filter. • On new installations ensure hot and cold water lines are not
- reversed. Check for bleed over. Isolate unit from building by turning off hot water line to building. Isolate the circulating system if

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.

Wire Diagram





Item Description	Part Number	Qty	Item Description	Part Number	Qty	Item Description	Part Number	Qt
001 Main Body	109000117	1	403 By-pass Flow Assembly	107000016	1	717 Anti Frost Heater Clip A	AU124-618X01	1
002 Wall Bracket	BU195-121X03	2	404 Stop Bracket	AH69-310	2	718 Anti Frost Heater Clip C	105000027	1
003 Rubber Bushing	CF79-41020-A	1	405 Plug Band	109000018	1	720 Power Cord	105000030	1
004 Connection Reinforcement Panel	109000118	1	408 Hot Water Outlet 3/4" NPT	107000056	1	721 Fuse Harness	U290-370-2X03	1
005 Heat Protection Plate	H73-065	1	409 Stop Bracket	U211-322X01	1	722 Power Harness	105000107	1
006 Front Panel	109000119	1	410 Plug Band (small)	109000019	1	724 Sensor Harness	U290-371-2X03	1
007 Gasket - Top and Bottom	109000120	2	411 Drain Valve	107000021	1	725 Thermal Fuse Harness Assemb	y U290-378-4	1
008 Gasket - Side	109000121	2	412 Water Filter Assembly	H98-510-S	1	726 Ignitor Harness	105000112	1
011 Screw Cover	109000122	2	413 Cover	109000130	1	727 Flow sensor	105000041	1
012 Screw Cover Lid	109000150	4	421 Drain Connection	107000057	1	728 Ignitor Attachment Plate	109000165	1
013 Cable Access Assembly	BU56-602-NX06	1	422 Drain Plug	107000058	1	729 Temperature Controller Harness	105000042	1
014 Rubber Bushing	109000049	1	423 Clip	109000131	1	730 Thermistor	105000108	1
016 Packing	109000016	1	424 Connecting Pipe	107000059	1	731 Solenoid Connection Harness	105000109	1
017 Screw Cover Assembly	109000123	2	426 Packing	109000153	1	732 AWG#18 Harness	105000110	1
021 Reinforcement Bracket	109000124	1	431 Connecting Pipe - Inlet	107000060	1	733 Connection Harness	105000111	1
022 Attachment Bracket	109000125	3	432 Connecting Pipe - HEX	107000061	1	744 Condensate Trap Harness	105000106	1
023 Reinforcement Bracket	U273-113	1	433 Clip	109000132	2	800 Screw	ZIHD0510UK	8
100 Gas Controller Assembly	106000034	1	434 Clip	109000133	1	801 Screw	CP-30580-3	4
101 Test port set screw	109000151	2	440 Condensate Trap	109000134	1	802 Washer	CF83-41430	4
102 Gas Connection 3/4" NPT	CU195-1866	1	441 Packing	109000154	2	803 Screw	CP-30627-414	3
103 Burner Unit Assembly LPG	106000024	1	442 Condensate Trap Plug	109000135	1	804 Screw	U217-449	1
103 Burner Unit Assembly NG	106000035	1	443 Condensate Drain Tube	109000136	1	805 Screw	ZAA0408UK	3
109 Damper LPG	106000025	1	444 Band	109000137	1	806 Screw	CP-80452	1
109 Damper NG	106000039	1	445 Band	109000138	1	807 Washer	AU48-174X01	2
110 Manifold Assembly NG	106000036	1	446 Screw	109000155	2	810 O-ring	M10B-2-4	2
110 Manifold Assembly LPG	106000037	1	447 Conection Harness	105000105	1	812 O-ring	M10B-2-6	2
114 Combustion Chamber Sight Glass Plate	106000038	1	700 PC Board	105000094		813 O-ring	M10B-2-18	3
116 Electrode	H73-120	1	701 Surge Protector	105000014	1	814 O-ring	M10B-2-16	3
117 Flame Rod	105000093	2	702 PC Board Cover Side	109000164	1	815 O-ring	M10B-2-14	4
118 Electrode Packing	109000126	1	703 PC Board Cover Front	109000139	1	816 O-ring	M10B-2-7	1
119 Electrode Holder	109000127	1	704 Clip	109000140	1	817 O-ring	M10B-1-24	1
125 Fan Motor All Assembly	108000035	1	706 Ignitor	105000018	1	818 Packing	C36E3-7	1
135 Flue Outlet Assembly	108000036	1	707 High Tension Cord	105000095	1	819 Screw	ZQAA0512UK	2
137 Flue Outlet Packing	109000152	1	708 Electrode Sleeve	AU206-218	1	820 Screw	ZQAA0514UK	4
138 Seal Packing	AH24-653-6	1	709 Thermistor	105000096	1	821 Screw	ZQAA0508UK	2
143 Heat Exchanger Assembly	107000054	1	710 Thermistor Clip Large	CP-90172	1	822 Screw	ZBA0512UK	3
152 Reinforcement Bracket	109000128	1	711 Thermal Fuse Clip	109000141	5	823 O-ring	M10B-2-5	1
166 Reinforcement Bracket	109000129	1	712 Frost Sensing Switch	105000097	1	824 O-ring	M10B-2-6	2
400 Water Inlet 3/4" NPT	H73-501-2	1	713 Anti Frost Heater 120V	105000098	1	888 Tech Sheet	100000146	1
401 Water Flow Servo and Sensor Assembly	107000055	1	715 Valve Heater 120V Assembly	105000099	1	889 Manual	100000117	1
402 Rectifier	M8D1-15X01	1	716 Anti Frost Heater Clip B	105000026	2	900 Front Panel Label	100000148	1