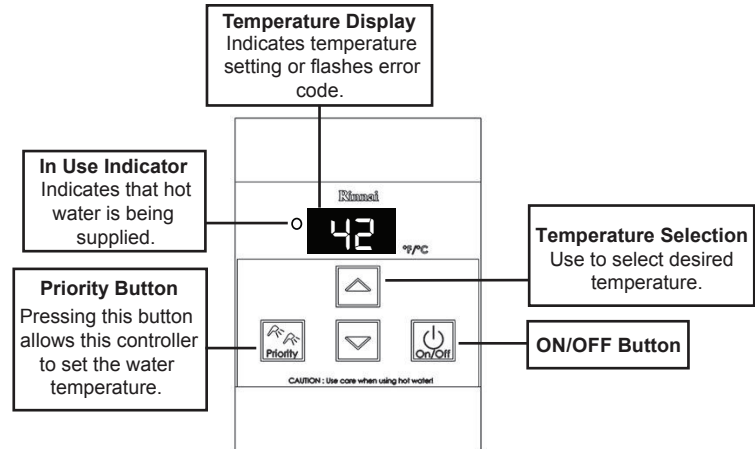


Remote Controller



- To Display Error Codes**
- Press the ON/OFF button, then the thermostat button to cycle through the error codes.
- To Display Performance Data**
- Press and hold the Down button.
 - While holding the Down button for 2 seconds, press and hold the "On/Off" button (hold both buttons simultaneously).
 - Use the Up and Down buttons to scroll to the desired performance information described below.

#	DATA	UNIT
01	Water Flow Rate	x0.1 gal/min
02	Outgoing Temperature	°F
03	Combustion Hours	x100 Hours
04	Combustion Cycles	See following info
05	Fan Frequency	Hz
06	Additional Controllers Connected	See following info
07	Water Flow Control Position	*See note
08	Inlet Temperature	°F
09	Fan Current	x10mA
10	Total Bath Fill Amount	gallons
11	HEX Outlet Temperature	°F
12	Freeze Protection Temperature	°F

*07 --> 0=mid, 1=Open, 2=Closed

04 Combustion Cycles	
DISPLAY	CYCLE COUNT
000 to 999	x100 (0 to 99,900)
10- to 99-	x10,000 (100,000 to 990,000)
1-- to 5--	x1,000,000 (1,000,000 to 6,000,000)

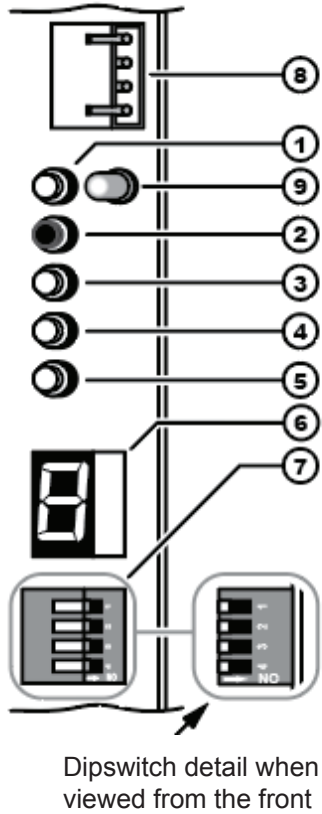
06 Controllers Connected		
Controller Model	CONNECTED	NOT CONNECTED
MC	--1	--0
BC	--1	--0
BSC & BSC2	1-- , 2-- (QTY2)	0--

- 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 Up and Down thermostat buttons until a "beep" is heard (about 5 seconds).

PCB Interface Layout & Functions

- Push Button 1 (PB1) - White**
Data transfer button, for PCB replacement purposes.
- Push Button 2 (PB2) - Black**
MODE button, places the PCB into programming mode.
- Push Button 3 (PB3) - White**
MENU button, cycles through available menus (2,3,4,5 and 6 (see Programming Parameters section). Increases gas pressure during forced mode operation.
- Push Button 4 (PB4) - White**
VALUE button, cycles through available menu values (see Programming Parameters section). Decreases gas pressure during forced mode operation.
- Push Button 5 (PB5) - White**
Forced High / Low selection rate setting.
- LED Digital Display**
Displays MENU (1, 2, etc.), VALUE (R, b, etc.) and Forced Low/High status (L or H).
- Dipswitch**
By factory default, all switches are in OFF position. Used for High Altitude adjustment.
- Communication Interface Socket**
Only used in conjunction with Data transfer button.
- Data transfer indicator LED**
Only used in conjunction with Data transfer button, illuminates to show data transfer is in progress.

- PCB Interface Basic Operation**
- To enter programming mode, press and hold PB2 until the LED Display shows 1. The current set value will display shortly after.
NOTE: If inactive for 10 minutes, the PCB will automatically exit programming mode.
 - To exit programming mode and save selected settings, press and hold PB2 until the LED display clears.



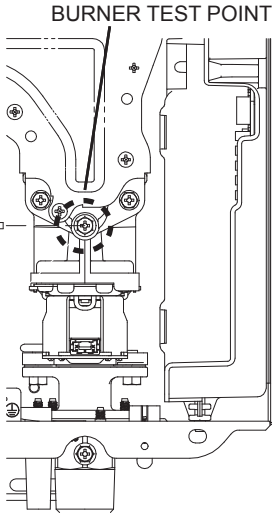
Gas Pressure Setting

- NOTE:** For additional installation and commissioning information refer to the Installation and Operation Manual.
- WARNING**
- This appliance must be installed, serviced and removed by a trained and qualified person. During pressure testing of the consumer piping, ensure the unit is isolated by turning off the gas valve prior to the unit. Failure to do so may result in serious injury to yourself or damage to the unit.

Table 1							
	Water Inlet Max.	Gas Inlet Min./Max		Forced Low		Forced High	
		NAT.G	LPG	NAT.G	LPG	NAT.G	LPG
V53De	150 PSI	4.5"W.C.	8"W.C. 10.5"W.C.	0.63"W.C.	0.79"W.C.	3.9"W.C.	4.7"W.C.

- Commissioning**
- With all gas appliances in operation at maximum gas rate, the inlet pressure at the incoming test point should read 4.5" 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 as required.
- 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.
- Turn ON the 120 V power supply.
- Check the gas type using the data plate on the side of the unit. Enter programming mode. Press and hold PB2 until the LED display shows 1. After 2 seconds the display changes to the current gas type. (R = LPG, C = NG)
- Exit programming mode. Press & hold PB2 until the LED display goes blank.
- Removing sealing screw and attach the pressure gauge to the burner test point, located on the gas control (shown to the right).
- Turn ON the gas supply.
- If a controller is installed, turn the unit ON with the controller. Select the maximum delivery temperature.
- If no controller, press and hold PB2 until the LED display shows 1, after 2 seconds, it will change to R or C. Press PB3 until the LED display shows 3. Press PB4 until the LED display shows 5 for maximum temperature setting. Press and hold PB2 to exit programming mode. LED display will turn off and settings will be saved.
- Open all available hot water taps.
- Push and hold PB5 to set the unit to "Forced Low." The LED display will show L, the front status monitor will show FL.
- If adjustments are required, press PB3 to increase pressure, or PB4 to decrease the pressure.
- Push and hold PB5 to change to "Forced High." The LED display will show H, the front status monitor will show FH.
- If adjustments are required, press PB3 to increase pressure, or PB4 to decrease the pressure.
- Return the unit to normal operation: press and hold PB5 until the LED Display turns off.
- Turn OFF the gas supply and 120 V power supply.
- Remove the pressure gauge and reinstall 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.



Electrical Diagnostics

- NOTE:** Wiring diagram is available on the inside front cover.
- Important Safety Notes**
- There are a number of (live) tests required when performing electrical diagnostics on this product. Proceed with caution 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).
- Freeze Protection**
- This unit has freeze protection heaters mounted at different points to protect the water heater from freezing. All of them should display a positive resistance reading.
- Flame Rod**
- Place one lead of your meter to the flame rod and the other to ground. With the unit running you should read 5 VDC. Set your meter to the micro (µ) amp scale and arrange meter leads 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.
- Amp Fuses**
- This unit has 1 inline (5) amp glass fuse located on the PC Board. Remove the fuses and check continuity through it. If you have continuity through each fuse then it is functioning. Otherwise the fuse is blown and must be replaced.
- 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. Below are examples of typical temperatures and resistance readings.

DIAGNOSTIC POINTS			
COMPONENT	Measurement CN WIRE COLOR	VALUE RANGE	
Main Power Code	B W-BL	AC108-132V	
Remote Controller	A1 BK-BK	DC11-13V	
Igniter	D3 R-BK	DC11-13V	
Flame Rod	D10 Y-BODY	OVER DC5V	
	Y-FR	OVER 1µA	
Thermal Fuse	D7 R-R	<DC1 V, <1Ω	
Overheat Switch	D2 BK-BK	<DC1 V, <1Ω	
Modulating Solenoid Valve	D9 Y-Y	DC2-17V/10-20Ω	
Main Solenoid Valve	BK-BK	DC8-13.5V/15-25Ω	
Solenoid Valve 1	D8 BL-BK	DC8-13.5V/20-30Ω	
Solenoid Valve 2	Y-BK		
Outgoing Water TH1	D5 W-W (No.1,2)	15°C:11.4-14KΩ	
Outgoing Water TH2		30°C:6.4-7.8KΩ 45°C:3.6-4.5KΩ 60°C:2.2-2.7KΩ 100°C:0.6-0.8KΩ	
Heat Exchanger Water Thermistor	D11 W-W		
Freeze Protection Thermistor	D6 Y-Y		
Water Flow Sensor	D4 R-BK	DC11-13V	
		Y-BK DC4-7V	
	F1 R-O, P-O	DC5-8V	
		BL-O, W-O	
Water Flow Control Device	F1 R-P,BL-W	40-60Ω	
		<DC1 V	
		DC4-6V	
Combustion Fan	D1 R-BK	DC7-48V	
		Y-BK DC11-14V	
		W-BK DC2-14V	

Error Codes

No burner operation during freeze protection mode <ul style="list-style-type: none">Service call.	Outgoing Thermistor <ul style="list-style-type: none">Check sensor wiring for damage.Measure resistance of sensor.Clean sensor of scale build up.Replace sensor.
Air Supply or Exhaust Blockage <ul style="list-style-type: none">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.	Heat Exchanger Thermistor <ul style="list-style-type: none">Check sensor wiring for damage.Measure resistance of sensor.Clean sensor of scale build up.Replace sensor.
No Ignition <ul style="list-style-type: none">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.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.	Outside Temperature Thermistor <ul style="list-style-type: none">Check sensor wiring for damage.Measure resistance of sensor.Clean sensor of scale build up.Replace sensor.
No Flame <ul style="list-style-type: none">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.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.	Modulating Solenoid Valve Signal Abnormal <ul style="list-style-type: none">Check modulating gas solenoid valve wiring harness for loose or damaged terminals.Measure resistance of valve coil.
Thermal Fuse <ul style="list-style-type: none">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.	Combustion Fan <ul style="list-style-type: none">Ensure fan will turn freely.Check wiring harness to motor for damaged and/or loose connections.Measure resistance of motor winding.
Over Temperature Warning <ul style="list-style-type: none">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.	PC Board <ul style="list-style-type: none">Replace PC Board.
Electrical Grounding <ul style="list-style-type: none">Check all components for electrical short.	Solenoid Valve Circuit <ul style="list-style-type: none">Check wiring harness to all solenoids for loose or damaged connections.Measure resistance of each solenoid valve coil.
	Flame Rod <ul style="list-style-type: none">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.
	Scale Build-up in Heat Exchanger <ul style="list-style-type: none">LC0-LC9 indicates that there is scale build up in the heat exchanger and that the heat exchanger needs to be flushed to prevent damage. Refer to flushing instructions in manual. Hard water must be treated to prevent scale build up or damage to the heat exchanger. <p>To operate the water heater temporarily until the heat exchanger can be flushed, push the On/Off button on the temperature controller 5 times. Repeated LC codes will eventually lockout the water heater.</p> <p>Please call Rinnai technical department.</p>
	Maintenance Indicator <ul style="list-style-type: none">Placeholder in Diagnostic code history indicating that a service provider performed maintenance or service. Enter code after performing service by pressing and holding Up, Down and ON/OFF consecutively. FF is visible on the monitor.
No Code (Nothing happens when water flow is activated.) <ul style="list-style-type: none">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.	

Dip Switches Settings

When delivered, the switches are set to OFF by default.

Factory default dip switch settings

SW1 (OFF) ←

SW2 (OFF) ←

SW3 (OFF) ←

SW4 (OFF) ←

Dip switch detail when viewed from the front

SW No.	Level 0	Level 1	Level 2	Level 3
2	Off	0-2000 ft (0-610 m)	Off	2001-5200 ft (610-1585 m)
3	Off	On	5201-7700 ft (1585-2347 m)	On
				7701-10200 ft (2347-3109 m)

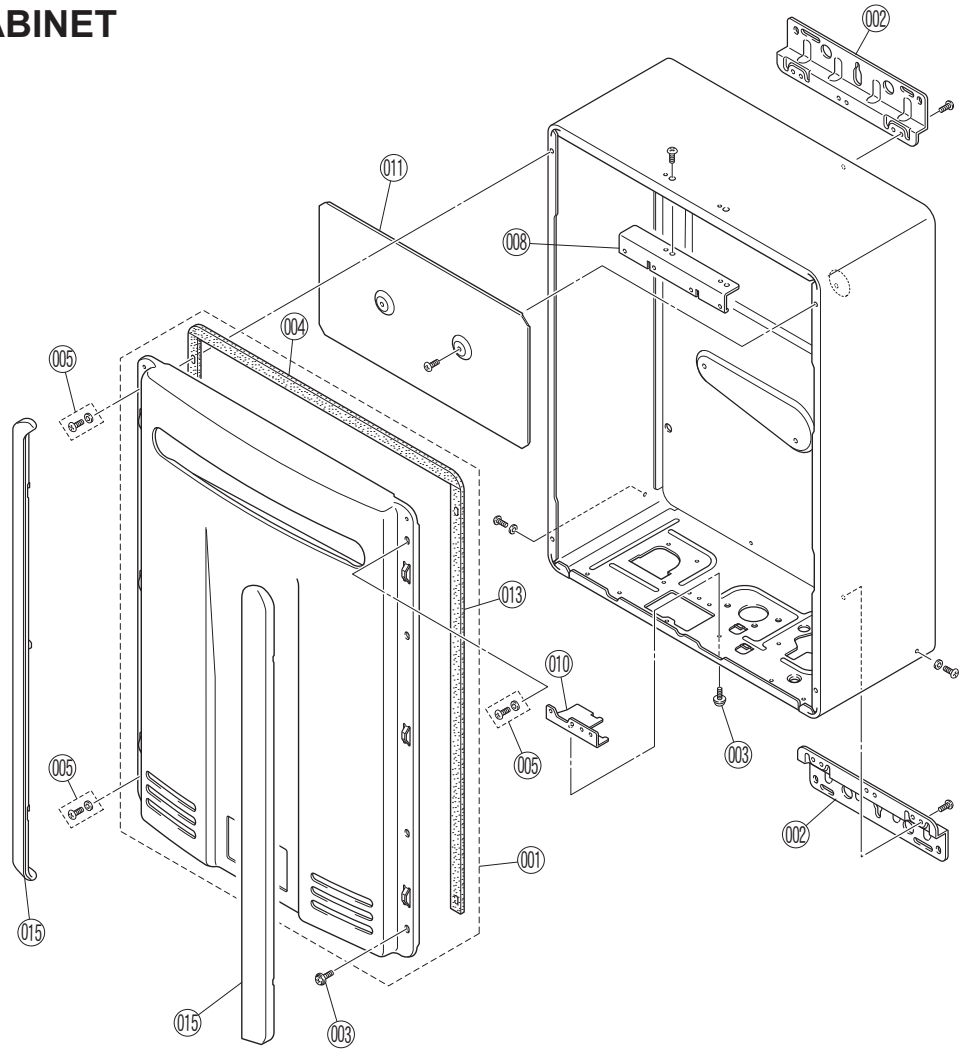
Programming Parameters

MENU #	MENU DESCRIPTION	VALUE			
		R	b	C	d
1	Gas Type	LPG	n/a	NG	n/a
2	Model Type	1620	n/a	n/a	n/a
3	Fixed Temperature	120°F 48.9°C	140°F 60°C	n/a	n/a
4	Max Temp Setting of Controllers	120°F 48.9°C	140°F 60°C	n/a	n/a
5	OFF Water Flow Rate	+5°F +3°C¹	+11°F +6°C²	n/a	n/a
6	Adjustment Due to Piping Heat Loss	0°F 0°C	+2°F +1°C	+4°F +2°C	+5°F +3°C

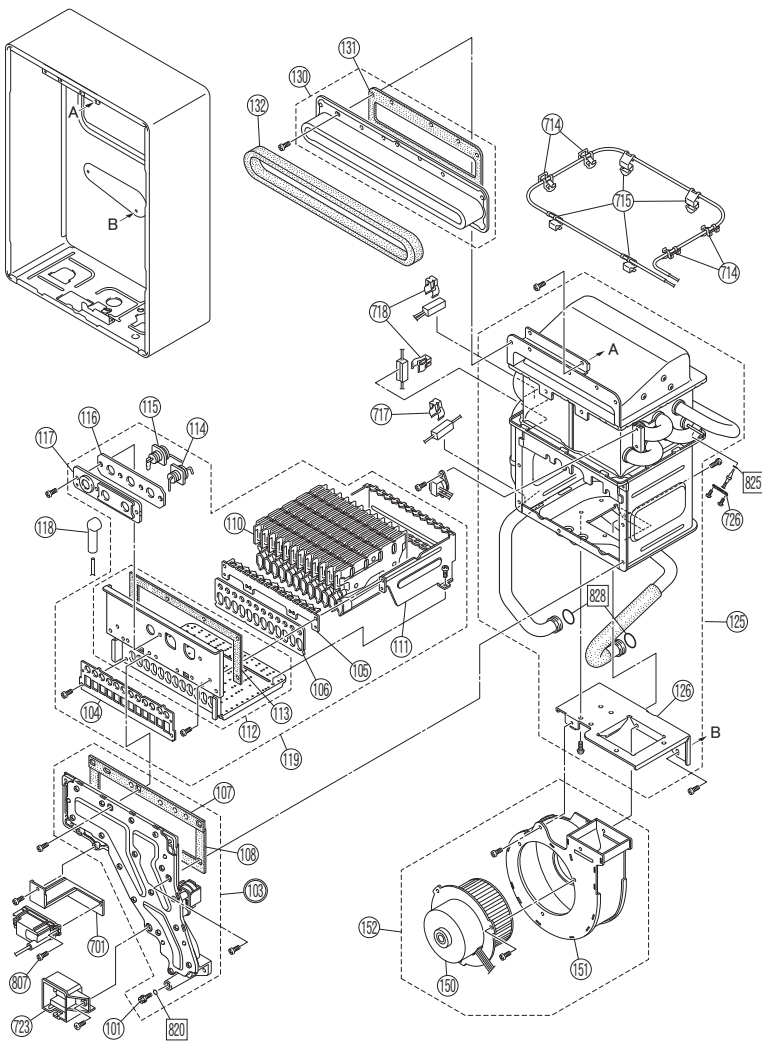
- The temperature of outgoing hot water is constantly monitored by a built-in sensor. If the temperature of the outgoing hot water rises to more than 3°C¹ (6°C)² above the selected temperature shown on the digital monitor or the pre-set limit when water controllers are not fitted, the burner will automatically go out.
- OFF Water Flow Rate +3°C (factory default).
 - OFF Water Flow Rate +6°C.

MENU #	MENU VALUE							
1								
2								
3								
4								
5								
6								
Date	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /

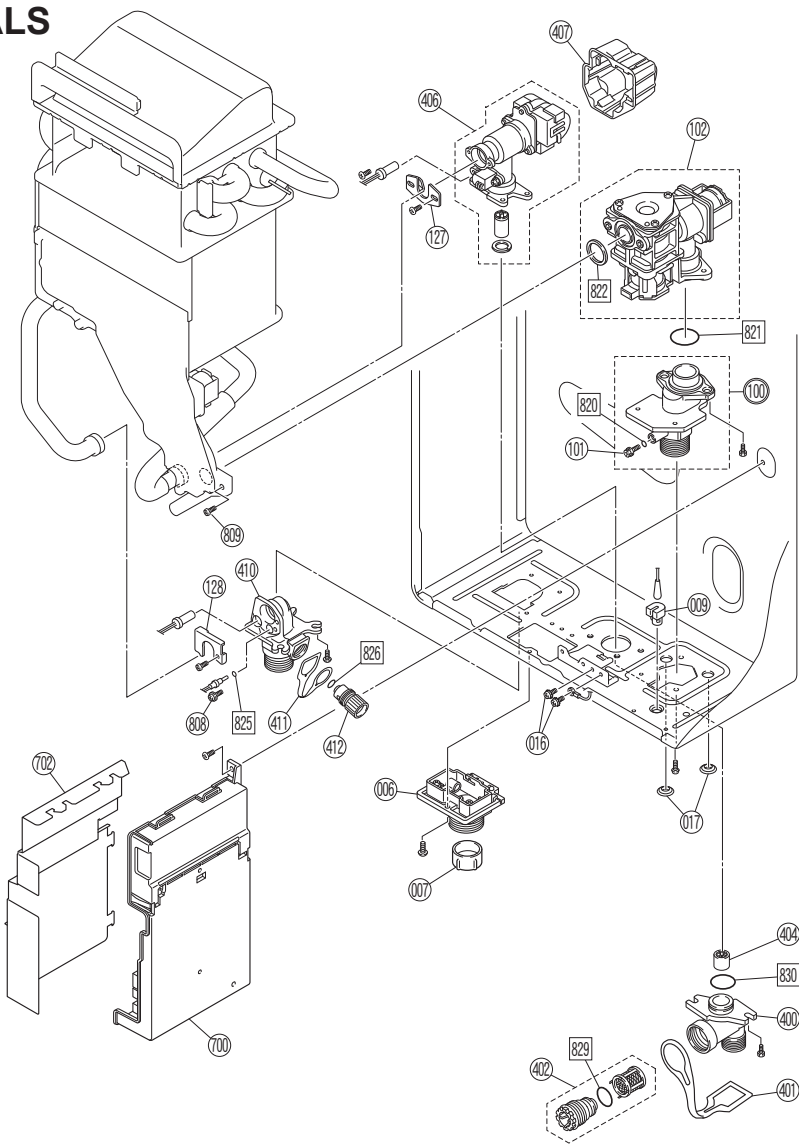
EXPLODED VIEW - CABINET



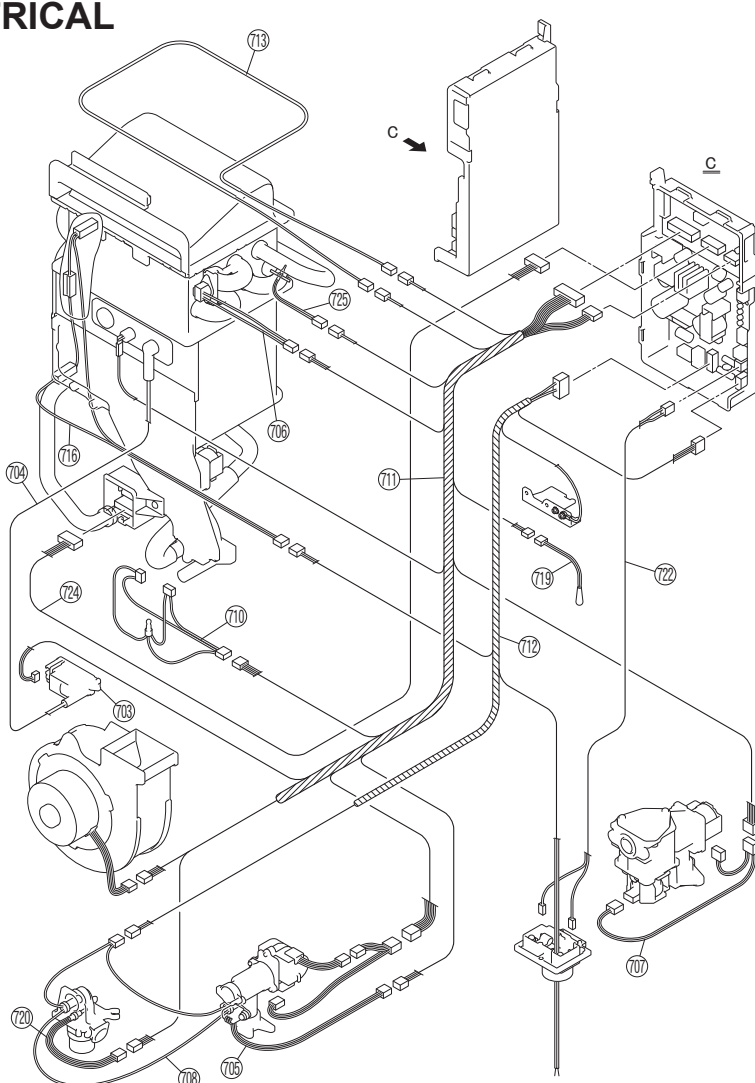
EXPLODED VIEW - INTERNALS



EXPLODED VIEW - INTERNALS

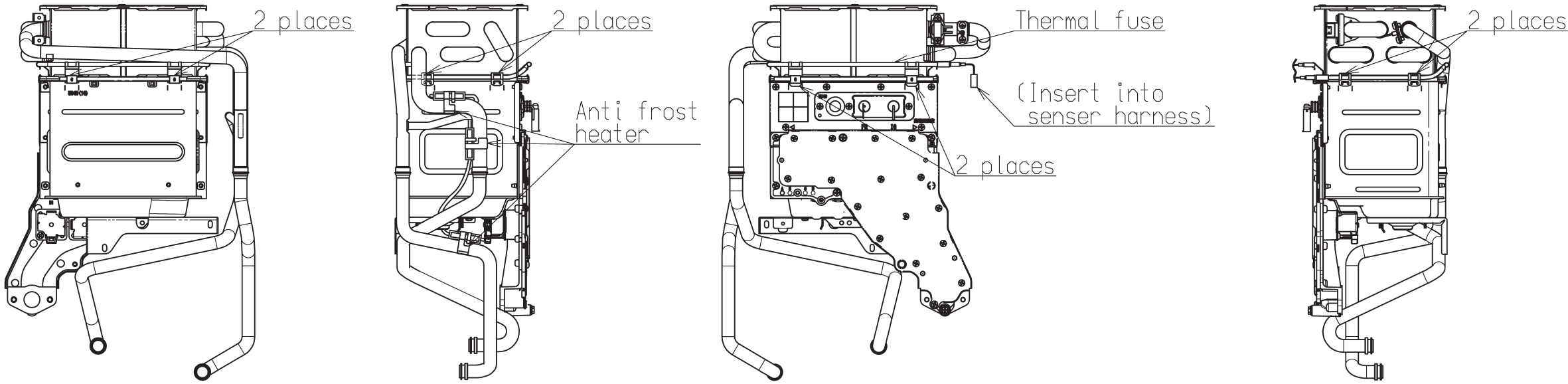


EXPLODED VIEW - ELECTRICAL



THERMAL FUSE LOCATION

When replacing heat exchanger, thermal fuse must be properly installed and secured. Refer to the following illustration.



PARTS LIST

Number	Description	Part Number	Quantity	Number	Description	Part Number	Quantity	Number	Description	Part Number	Quantity
001	Front Panel	109000787	1	117	Electrode Bracket	109000780	1	710	Solenoid Harness	105000302	1
002	Wall Bracket	109000788	2	118	Electrode Sleeve	AU206-218	1	711	Sensor Harness	105000303	1
003	Ground Screw	109000076	2	119	Burner Unit Assembly	106000152	1	712	Power Supply Harness	105000304	1
004	Front Panel Packing	109000789	1	125	Heat Exchange Assembly	107000406	1	713	Fuse Harness	105000305	1
005	Screw	CP-30580-JW	3	126	Comb Chamber Bracket	109000781	1	714	Fuse Holder	109000786	4
006	Quick Control Connection	109000048	1	127	Pipe Bracket	109000782	1	715	Fuse Holder	109000499	4
007	Cable Seal Packing	AU169-126	1	128	Pipe Bracket	109000783	1	716	Heater	105000306	1
008	Top Reinforcement	109000790	1	130	Flue Outlet	108000103	1	717	Heater Clip	U250-625	1
009	Thermistor Grommet	109000490	1	131	Flue Outlet Packing	U216-406X03	1	718	Heater Clip	109000795	2
010	Connection Reinforcement Plate	109000774	1	132	Seal Packing	109000054	1	719	Thermistor Sensor	105000296	1
011	Heat Shield Plate	109000775	1	150	Fan Motor Assembly	108000100	1	720	Twin Thermistor	105000297	1
013	Front Panel Packing	109000791	2	151	Fan Casing Assembly	108000101	1	722	Remote Control Harness	105000052	1
015	Screw Cover	109000792	2	152	Fan Motor All Assembly	108000102	1	723	Status Monitor	105000307	1
016	Ground Screw	109000793	2	400	3/4 Water Inlet	H73-501-2	1	724	Status Monitor Harness	105000308	1
017	Rubber Bushing	AU105-113	2	401	Plug Band	109000018	1	725	Heat Exchanger Thermistor	105000309	1
100	3/4 Gas Inlet	106000153	1	402	Filter Assembly	H98-510-S	1	726	Thermistor Bracket	CP-90172	1
101	Test Port Set Screw	C10D-5	2	404	Rectifier	M8D1-15	1	807	Ground Screw	CP-80452	1
102	Gas Control Assembly	106000154	1	406	Water Flow Servo & Sensor Assembly	107000404	1	808	Screw	U217-449	1
103	Manifold Assembly (LPG)	106000144	1	407	Water Flow Servo Cover	107000093	1	809	Screw	108000021	2
103	Manifold Assembly (NG)	106000145	1	410	3/4 Water Outlet	107000407	1	820	O-Ring	M10B-13-4	2
104	Damper	106000146	1	411	Plug Band	109000784	1	821	O-Ring	M10B-1-24	1
105	Burner Case Front Panel	106000147	1	412	Drain Valve	107000405	1	822	Packing	109000181	1
106	Packing	109000776	1	700	PC Board	105000298	1	825	O-Ring	M10B-2-4	2
107	Manifold Upper Packing	109000777	1	701	Igniter Bracket	109000785	1	826	O-Ring	M10B-2-7	1
108	Manifold Lower Packing	109000778	1	702	PCB Electric Cover	109000794	1	828	O-Ring	M10B-2-14	2
110	Burners	106000148	12	703	Igniter	105000295	1	829	O-Ring	M10B-2-16	1
111	Burner Case Back Panel	106000149	1	704	Height Tension Cord	BH38-710-200	1	830	O-Ring	M10B-2-18	1
112	Comb Chamber Front Panel	106000150	1	705	MR Sensor	105000176	1	882	Card Board Set	109000796	1
113	Comb Chamber Front Panel Packing	106000151	1	706	Over Heat Switch	105000299	1	884	Styrofoam Set	109000797	1
114	Electrode	105000293	1	707	Main Solenoid Harness	105000300	1	888	Manual	100000561	1
115	Flame Rod	105000294	1	708	Valve Heater 120V	105000301	1	889	Tech Sheet	100000562	1
116	Electrode Packing	109000779	1								