

Controller

Operation Indicator
Indicates that hot water is being supplied.

Temperature Display
Indicates temperature setting or flashes error code.

Temperature Selection

Priority Indicator
Indicates that this controller is setting the water temperature.

Priority Button
When no water is being supplied, pressing this button allows this controller to set the water temperature.

ON/OFF Button

Diagnostic Use of the Controller

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

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	
		NAT.G	LPG	NAT.G	LPG	NAT.G	LPG
J-S180W, J-SP180W	150 PSI	5"W.C. /10.5"W.C.	8"W.C. /13.5"W.C.	0.44"W.C.	0.93"W.C.	2.3"W.C.	4.2"W.C.
J-S199W, J-SP199W						2.8"W.C.	5.0"W.C.

Commissioning

With all gas appliances in operation at maximum gas rate, the flowing inlet pressure at the incoming test point on the 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.

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.

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

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 (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.

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 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	A ₁	Bk-Bk	DC11-13V	
THERMAL FUSE	B ₁ /E ₁	W-W	BELOW 1Ω	
MOD. SOLENOID VALVE	B ₂	O-O	DC2-15v / 67-82Ω	
MAIN SOLENOID VALVE	B ₃	P-Bk	DC11-13v / 37-43Ω	
SOLENOID VALVE 1	B ₄	B-Bk	DC11-13v / 37-43Ω	
SOLENOID VALVE 2	B ₅	Y-Bk	DC11-13v / 37-43Ω	
SOLENOID VALVE 3	B ₆	R-Bk	DC11-13v / 37-43Ω	
SOLENOID VALVE 4	B ₇	O-Bk	DC11-13v / 37-43Ω	
FLAME ROD 1	B ₈	Y-FR	OVER 1μA (DURING OPERATION)	
FLAME ROD 2	M ₁	R-FR	OVER 1μA (DURING OPERATION)	
SURGE PROTECTOR	C ₁	W-Bk	AC108-132V	
SURGE PROTECTOR	C ₂	W-Bk	AC108-132V	
MAIN POWER CODE	C ₃	W-Bk	AC108-132V	
ANTI-FROST HEATER	C ₄	W-W	88-120Ω 156-211Ω	W MODEL FF MODEL
IGNITOR	D ₁	Gy-Gy	AC108-132V (DURING IGNITION)	
HEAT EXCHANGER TH	E ₂	W-W	15℃/59℉ : 11.4-14.0 kΩ 30℃/86℉ : 6.4-7.8 kΩ	
OUTGOING WATER TH1	E ₃	C-W	45℃/113℉ : 3.6-4.5 kΩ 60℃/140℉ : 2.2-2.7 kΩ 105℃/221℉ : 0.6-0.8 kΩ	
OUTGOING WATER TH2	E ₄	B-B		
AIR TEMPERATURE TH	E ₅	W-W		FF MODEL ONLY
BURNER THERMISTOR	E ₆	Bk-Bk	15℃/59℉ : 21.5-23.8 kΩ 30℃/86℉ : 14.7-16.2 kΩ 200℃/392℉ : 0.98-1.02 kΩ 400℃/752℉ : 210.0-223.9 Ω 600℃/1112℉ : 85.7-92.7 Ω	ON: 1.5L/MIN(20Hz) OVER 1980 PULSE/MIN OFF: 1.0L/MIN(13Hz) OVER 1380 PULSE/MIN FF MODEL ONLY
WATER FLOW SENSOR	E ₇	R-Bk Y-Bk	DC11-13V DC4-7V	
BY-PASS FLOW CONTROL DEVICE	G ₁	B-W O-W Y-W R-W	DC12V (DC2-6V DURING OPERATION) 15-35Ω	J-S 199 MODEL ONLY
WATER FLOW CONTROL DEVICE	G ₂	R-O P-O B-O W-O R-P B-W	DC11-13V (DC5-7V DURING OPERATION) 30-50Ω	
		Y-Gy	BELOW DC1V (LIMITER ON) DC4-6V (LIMITER OFF)	FULL OPEN POSITION
		Br-Gy	BELOW DC1V (LIMITER ON) DC4-6V (LIMITER OFF)	FULL CLOSE POSITION
COMBUSTION FAN	L ₁	R-Bk Y-Bk W-Bk	DC15-46V DC11-13V DC5-10V (PULSE 20-420Hz)	

Dip Switches Settings

These models have a default maximum temperature setting of 120°F (49°C). The maximum temperature setting can be increased to 140°F (60°C) by setting dip switch 6 to ON in the SW1 bank of 8 dip switches.

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

1
2
3
4
5
6
7
8

← High Altitude

1
2
3
4
5
6
7
8

← Maximum Temperature

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 0-2000ft (0-610m)	Off	Level 1 2001-5200ft (610-1585m)	On	Level 2 5201-7700ft (1585-2347m)	On	Level 3 7701-10200ft (2347-3109m)
3		Off		On		Off		On	

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 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 2 unit link 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 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 2 unit link 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)

The water flow control valve has failed to close during the bath fill function. Immediately turn off the water and discontinue the bath fill function. Contact a qualified service provider.

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.
- If blank screen is present on controller then the flow control has shorted out. Unplug flow control. If controller lights up and starts operating then replace flow control assembly.

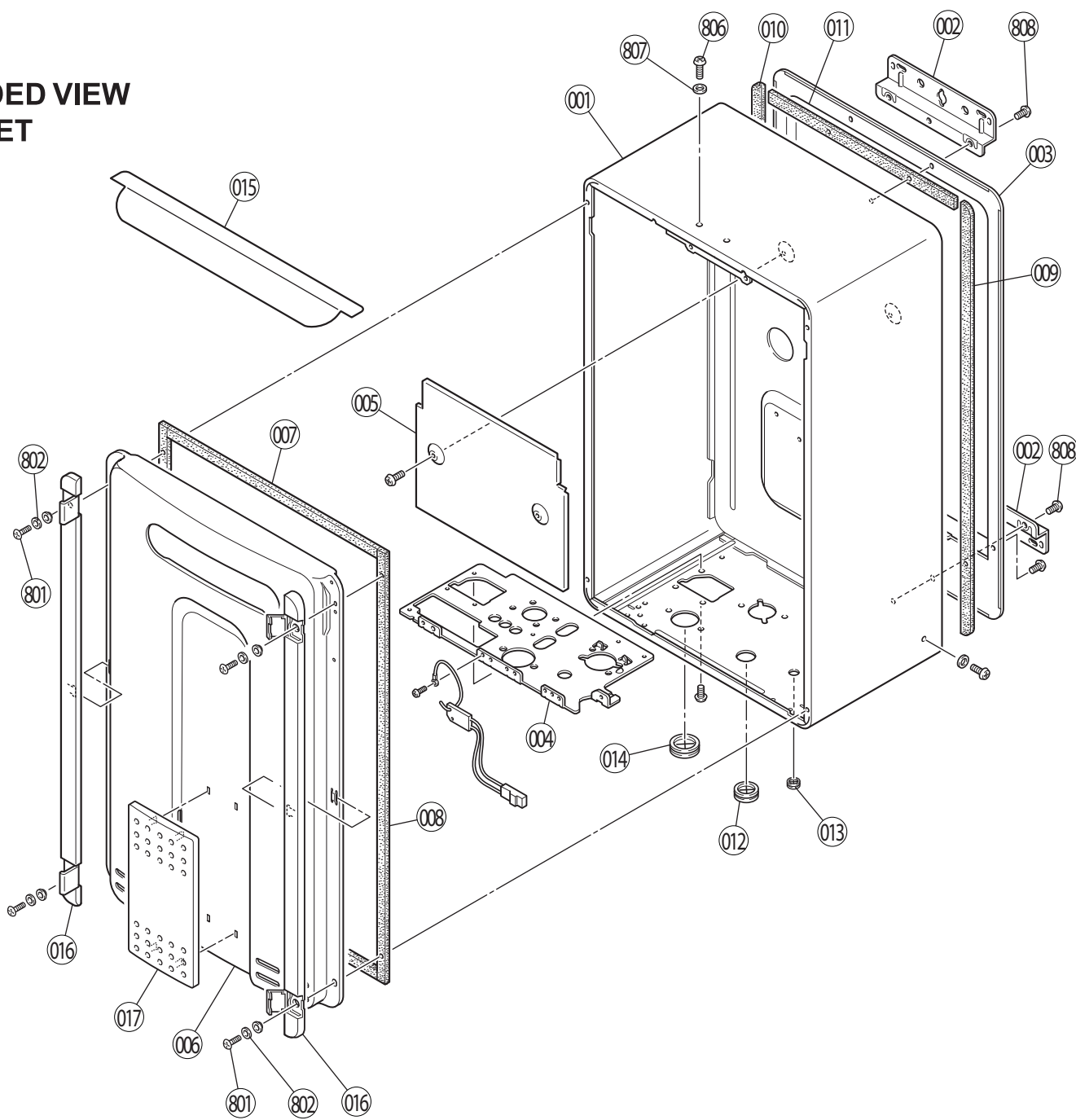
Wiring Diagram

The diagram illustrates the electrical and gas connections for Rinnai water heaters. It includes components such as the Water Flow Control Device, Solenoid Valves (Main, 1, 2, 3, 4), Burner Thermistor, Air Temperature Thermistor, Heat Exchanger Thermistor, Outgoing Water Thermistor, Water Flow Sensor, and various control devices like the Remote Controller, Igniter, and Frost Sensing Switch. It also shows the internal wiring for the Modulating Solenoid Valve and the Main Solenoid Valve. The diagram is color-coded to match the wiring harness components.

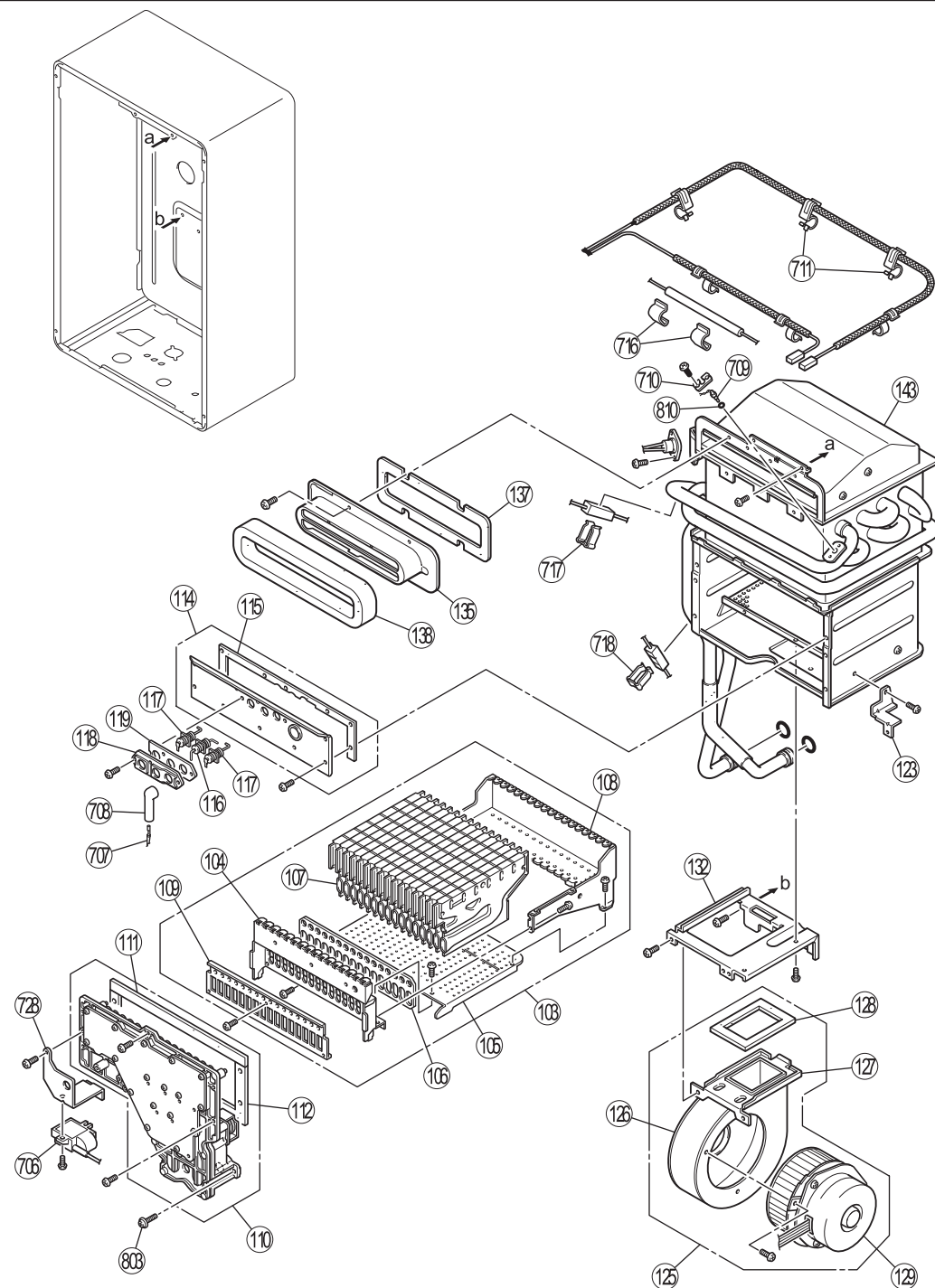
COLOUR CODING

- W : White
- Bk : Black
- Br : Brown
- R : Red
- B : Blue
- Y : Yellow
- P : Pink
- O : Orange
- Gr : Green
- Gy : Gray
- Pu : Purple

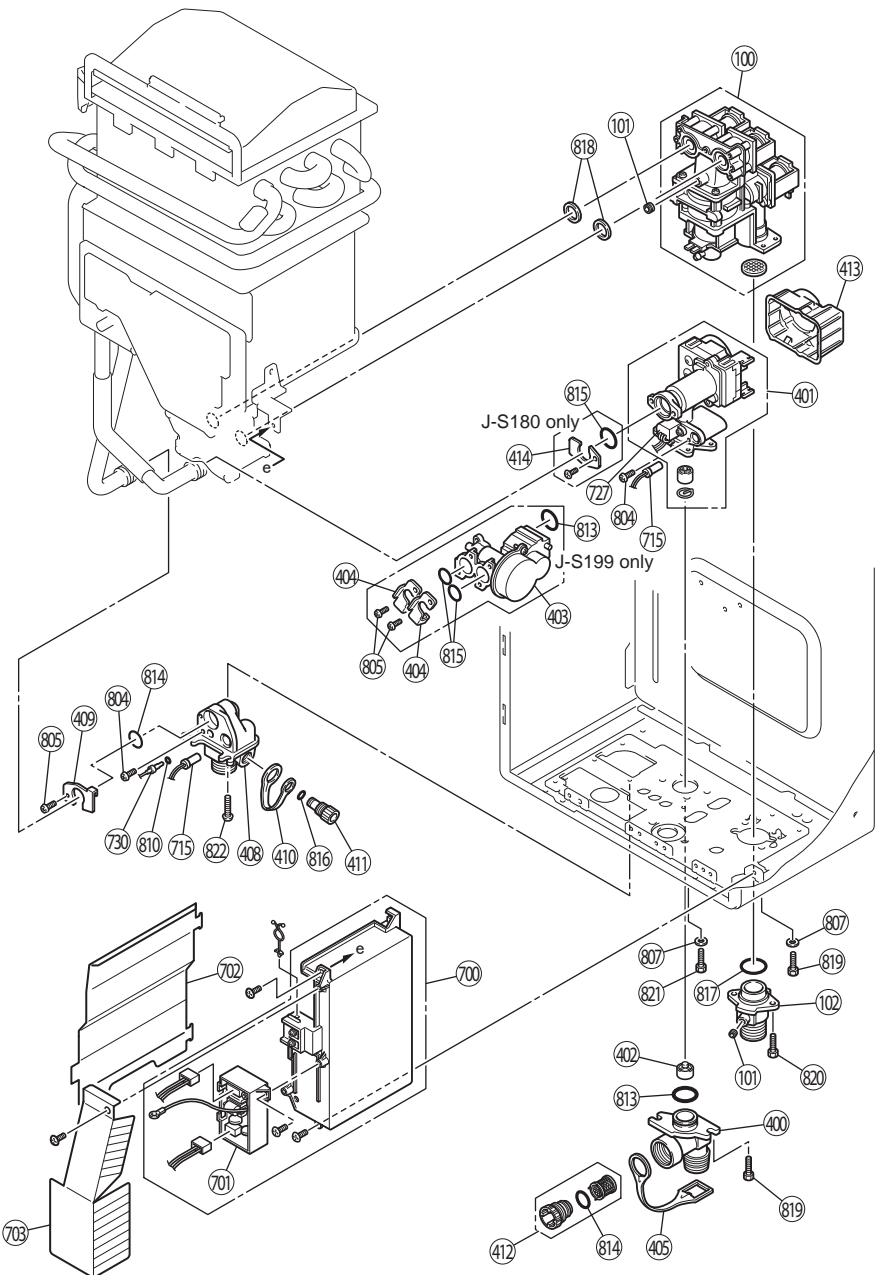
EXPLODED VIEW
- CABINET



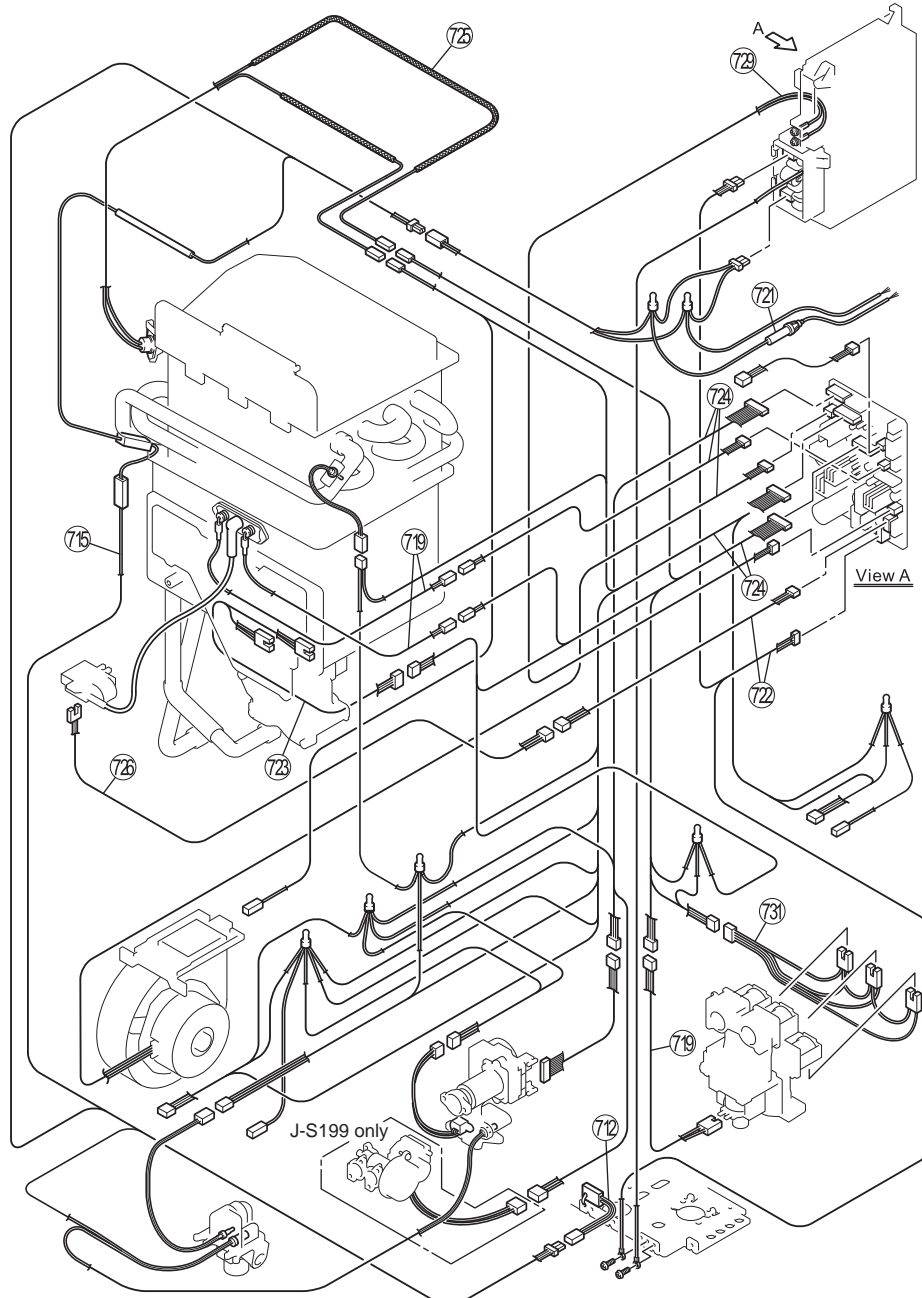
EXPLODED VIEW
- INTERNALS



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, J-VALVES.

PARTS LIST

Item	Description	Part Number	Qty	Item	Description	Part Number	Qty	Item	Description	Part Number	Qty
001	MAIN BODY (W)	109000213	1	119	ELECTRODE PACKING	109000126	1	715	VALVE HEATER(120V)ASSY	105000128	1
002	WALL HANG BRACKET	BU195-121X03	2	123	PCB FIXING PLATE-VB	109000199	1	716	HEATER FIXING PLATE	CF29-742X01	2
003	BACK INLET CHAMBER	109000187	1	125	FAN MOTOR ALL ASSEMBLY	104000165*	1	717	HEATER FIXING PLATE	AU111-653	1
004	CONNECTION REINFORCEMENT	109000188	1	126	FAN CASING ALL ASSEMBLY	108000023	1	718	HEATER FIXING PLATE	AU100-721X03	1
005	HEAT PROTECTION PLATE	U245-107	1	127	FAN CONNECTING BRACKET	BH29-606X09	1	719	AWG18 HARNESS	105000130	1
006	FRONT PANEL	109000217	1	128	PACKING FAN CONN. BRACKET	AU183-562	1	721	FUSE HARNESS(W)	105000131	1
007	FRONT PANEL PACKING-2	U245-3185-2X02	2	129	FAN MOTOR	108000050	1	722	POWER HARNESS	105000107	1
008	FRONT PANEL PACKING	109000077	2	132	COMBUSTION CHAMBER BRACKET	U245-255X04	1	723	CONNECTION HARNESS	105000118	1
009	BACK INLET CHAMBER PACKING	109000192	1	135	FLUE OUTLET	108000012	1	724	SENSOR HARNESS-2	105000133	1
010	BACK INLET CHAMBER PACKING	109000194	1	137	FLUE OUTLET PACKING	U245-1122	1	724	SENSOR HARNESS-4	105000134	1
011	BACK INLET CHAMBER PACKING	109000195	1	138	SEAL PACKING	109000017	1	725	FUSE HARNESS-26-4	105000121	1
012	RUBBER BUSH-A	CF79-41020-A	1	143	HEAT EXCHANGER ASSEMBLY	104000184*	1	726	IGNITOR HARNESS	105000112	1
013	SEAL PACKING (GRAY)	AU105-113	1	143	HEAT EXCHANGER ASSEMBLY	104000185*	1	727	MR SENSOR	105000041	1
014	RUBBER BUSH	U245-125	1	400	WATER INLET	H73-501-2	1	728	IGNITOR FIXING PLATE	109000204	1
015	RAIN HOOD	109000196	1	401	WATER FLOW SERVO & SENSOR	104000162*	1	729	TEMP CONTROL HARNESS	105000042	1
016	SCREW COVER	109000220	2	401	WATER FLOW SERVO & SENSOR	104000163*	1	730	TWIN THERMISTOR	104000208*	1
017	JACUZZI LOGO PANEL	100000230	1	402	RECTIFIER	M8D1-15X01	1	731	CONNECTION HARNESS	105000120	1
100	GAS CONTROL ASSEMBLY	104000021*	1	403	BY-PASS SERVO ASSY	104000198*	1	801	TRUSS SCREW	CP-30580	4
101	TEST PORT SET SCREW	AU39-965X01	2	404	FIXING BRACKET	AH69-310	2	802	NYLON WASHER	CF83-41430	4
102	3/4 GAS INLET	CU195-1866	1	405	PLUG BAND	109000018	1	803	SCREW	108000021	3
103	BURNER UNIT ASSY (LPG)	106000047	1	408	HOT WATER OUTLET(3/4 NPT)	107000066	1	804	SCREW	U217-449	2
103	BURNER UNIT ASSY (NG)	106000048	1	409	STOP BRACKET	AU162-1876X01	1	805	SCREW	CP-20883-408UK	3
104	U BURNER CASE FRONT PANEL	CH51-209X04	1	410	PLUG BAND US	109000201	1	806	SCREW	109000025	2
105	BURNER CASE BOTTOM PANEL	106000041	1	411	HEX CAP	107000021	1	807	PLASTIC WASHER	AU48-174X01	6
106	PACKING	BH51-218X01	1	412	FILTER ASSY	H98-510-S	1	808	SCREW	CP-30583	7
107	BURNERS	106000054	16	413	COVER	109000130	1	810	O-RING	M10B-2-4	2
108	BURNER CASE BACK PANEL	106000042	1	414	FIXING BRACKET	AU195-321X01	1	813	O-RING	M10B-2-18	2
109	24 DAMPER E (NG)	106000017	1	700	PCB A	104000164*	1	814	O-RING	M10B-2-16	2
109	24 DAMPER (LPG)	H73-115	1	700	PCB A	104000166*	1	815	O-RING	M10B-2-14	2
110	MANIFOLD ASSEMBLY (LPG)	106000045	1	701	SUB PCB	105000067	1	816	O-RING	M10B-2-7	1
110	MANIFOLD ASSEMBLY (NG)	106000059	1	702	COVER	109000164	1	817	O-RING	M10B-1-24	1
111	COMBUSTION CHAMBER PACKING	AU155-207-2	1	703	EC COVER	109000173	1	818	PACKING	C36E1-6X01	2
112	COMB. CHAMBER PACKING BOTTOM	106000050	1	706	IGNITOR	105000068	1	819	HEXAGON HEAD SCREW	ZQAA0512UK	4
114	COMBUSTION CHAMBER FRONT	109000168	1	707	HIGH TENSION CORD	BH38-710-240	1	820	HEXAGON HEAD SCREW	ZQAA0514UK	2
115	COMBUSTION CHAMBER PACKING-2	106000046	1	708	ELECTRODE SLEEVE	AU206-218	1	821	HEXAGON HEAD SCREW	ZQAA0508UK	2
116	ELECTRODE KIT CONTAINS 1 ELECTRODE	104000192*	1	709	THERMISTOR	104000207*	1	822	SCREW	ZBA0512UK	3
117	FLAME ROD AND 2 FLAME RODS	104000192*	2	710	RETAINER (LARGE)	CP-90172	1	888	MANUAL	100000223	1
118	ELECTRODE HOLDER	109000127	1	711	TEMPERATURE FUSE FIXING	U217-676X02	6	889	TECH SHEET	100000226	1
				712	FROST SENSING SWITCH	105000097	1				