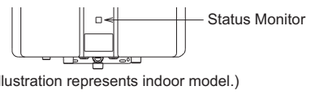
Status Monitor

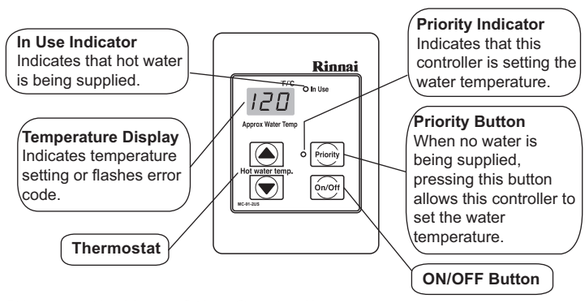


(This illustration represents indoor model.)

Diagnostic Information (on status monitor)

- -	Initial (When unit is connected to power).
(non-displayed)	Standby (power is supplied but there is no demand for hot water).
1,2,3 or 4	Hot water is being supplied without controller.
ON	Hot water is being supplied with controller.
FL or FH	Stands for Forced Low and Forced High combustion. Only seen during the gas pressure setting procedure which is done when certain components are replaced.
Error code flashing	The error code will stop flashing after the problem is corrected and the water heater supplies hot water.

Controller (Optional)



Diagnostic Use of the Controller

1. To display the most recent diagnostic codes press and hold the “On/Off” button for 2 seconds on the MC-91 controller.
2. To enter or exit the maintenance monitor information mode press and hold the down button for 2 seconds and without releasing it press the ON/OFF button.

No.	Data	Unit
01	Water flow rate	0.1 gal/min
02	Outgoing water temperature	Degrees Fahrenheit

To Change the Temperature Scale (ºF / ºC)

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).

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
RUCS75i	Concentric	Short flue length	150PSI	4"W.C/ 10.5"W.C	8"W.C/ 13.5"W.C	1.18	1.20	3.46	4.08
		Long flue length				1.14	1.24	3.20	3.65
	Twin Pipe	Short flue length				1.12	1.17	3.44	3.91
		Long flue length				1.06	1.19	3.04	3.42
RUCS65i	Concentric	Short flue length		4"W.C/ 10.5"W.C	8"W.C/ 13.5"W.C	1.18	1.20	2.37	2.83
		Long flue length				1.14	1.24	2.61	2.92
	Twin Pipe	Short flue length				1.12	1.17	2.32	2.59
		Long flue length				1.06	1.19	2.47	2.71
RUS75e	–	–		4"W.C/ 10.5"W.C	8"W.C/ 13.5"W.C	1.00	1.02	3.03	3.54
RUS65e	–	–						2.09	2.38

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 4” 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.

1. Turn OFF the gas supply.
2. Turn OFF the water supply.
3. Remove the front panel (four screws).
4. Check the gas type using the data plate on the side of the unit. Confirm that the gas type switch is in the correct position (SW1 in DIPSW2 is ON for natural gas, NG, and OFF for propane gas, LPG.) Figure 1.
5. Remove the screw and attach the manometer to the burner test point located on the gas control. Figure 2.
6. Turn on the gas supply and the power supply.
7. Flow water through the water heater at the maximum flow rate obtainable. (At least 3 gallons per minute is recommended. If there is not enough water flowing, the water heater could shut off or sustain damage due to overheating.)
8. Move SW8 in DIPSW1 to ON. Figure 3.
9. Push the PC board switch A for one second. Figure 4.
10. Calibrate “Forced Low” combustion using switch A (up) and switch B (down).
11. Move SW8 in DIPSW1 to OFF and then back to ON. Figure 6.
12. Push the PC board switch B for one second. Figure 4.
13. Calibrate “Forced High” combustion using switch A (up) and switch B (down).
14. Move SW8 in DIPSW1 to OFF. Figure 5.
15. Close hot water taps.
16. Turn off gas supply and 120 V power supply.
17. Remove manometer and re-install screws.
18. Turn on the gas supply and 120 V power supply.
19. Operate the unit and check for gas leaks.
20. Install the front panel using four screws.

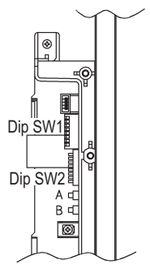


Fig. 1

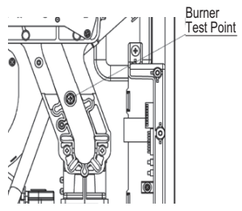


Fig. 2

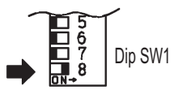


Fig. 3

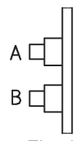


Fig. 4

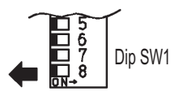


Fig. 5

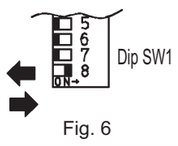


Fig. 6

Troubleshooting

Important Safety Notes

There are a number of (live) tests that are required when 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).

(SV1, SV2, SV3 , SV4 and POV) Gas valve and Modulating solenoids: (Set meter above 2K)

Wire color	Voltage	Resistance	Connector #	Pin #'s
(Main) Black - Grey	11 ~ 13 VDC	24 ~ 28 ohms	D1	B3 - B4
(SV1) Black - Blue	11 ~ 13 VDC	36 ~ 42 ohms	B3	4 - 6
(SV2) Black - Yellow	11 ~ 13 VDC	36 ~ 42 ohms	B2	4 - 7
(SV3) Black - Red	11 ~ 13 VDC	36 ~ 42 ohms	B4	4 - 5
(SV4) Black - Orange	11 ~ 13 VDC	35 ~ 41 ohms	B1	4 - 8
(POV) Pink - Pink	2 ~ 15 VDC	67 ~ 81 ohms	D1	1 - 2

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

Red - Pink	N / A	44 ~ 52 ohms	G1	3 - 4
White - Blue	N / A	44 ~ 52 ohms	G1	1 - 2

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

(QS) Water Flow Sensor:

Black - Red	11 ~ 13 VDC	N / A	L3	E10 - G7
Yellow - Black	4 ~ 7 VDC	N / A	L3	E1 - G7

(IG) Ignition System:

Grey - Grey	110 ~ 130 VAC	N / A	C1	1 - 3

(FM) Combustion Fan Motor:

Red - Black	6 ~ 45 VDC	N / A	L2	5 - 6
White - Black	5 ~ 10 VDC	N / A	L2	3 - 5
Yellow - Black	11 ~ 13 VDC	N / A	L2	4 - 5

Set your meter to the hertz scale. Reading across the white and black wires at terminals 3 and 5 you should read between 60 and 420 hertz.

Thermal Fuse / Overheat Switch:

White - White	11 ~ 13 VDC	N / A	B5 B6	B1 - E10

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.

Heat Exchanger, Outgoing Water Temperature and Exhaust Gas 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 resistance readings.

Example: 59°F = 11.8 ~ 13.3kΩ 140°F = 2.4 ~ 2.7kΩ
86°F = 6.7 ~ 7.4kΩ 221°F = 0.66 ~ 0.76kΩ
113°F = 3.9 ~ 4.3kΩ

Outgoing Water Thermistor:

White - White	N / A	See example above	E6	2 - 3
Blue - Blue	N / A	See example above	E6	4 - 5

Heat Exchanger Temperature Thermistor:

Pink - Pink	N / A	See example above	E5	4 - 7

Exhaust Gas Thermistor:

White - White	N / A	See example above	E8	4 - 9

Remote Controls:

Terminals J	10 ~ 13 VDC	N / A	J	1 - 2

Frost Protection:

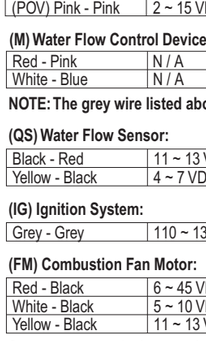
This unit has frost protection heaters mounted at different points to protect the water heater from freezing. All of them should show a positive resistance reading.

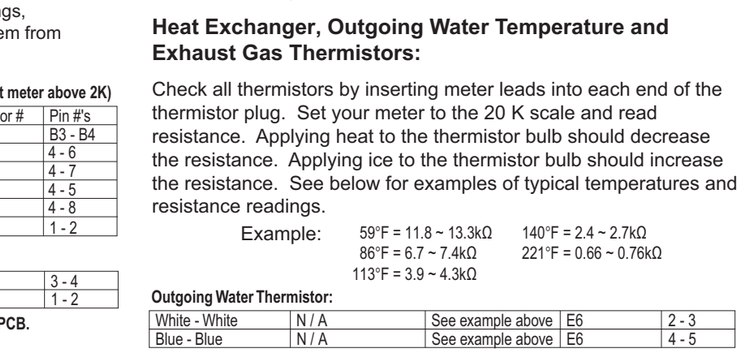
Amp Fuses:

This unit has one inline (10) 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 SW3 in DIPSW1 (upper side) depending on your altitude according to the table below.
For indoor models,adjust SW4 in DIPSW2 to the appropriate venting style.





⚠ 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.	ALTITUDE LEVELS				
3	High Altitude	Off	Level 0 0-2000 ft (0-610 m)	On	Level 1 2001-5400 ft (610-1646 m)

Diagnostic Codes

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.
- Verify dip switches are set properly.
- Check fan for blockage.

11 No Ignition
- Check that the gas is turned on at the water heater, meter, or cylinder.
- If the system is propane, make sure that gas is in the tank.
- Ensure appliance is properly grounded.
- 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 igniter is operational.
- Check igniter wiring harness for damage.
- Check gas solenoid valves for open or short circuits.
- Remove burner cover and ensure burners are properly seated.
- Remove burner plate; inspect burner surface for condensation/debris.
- Check the ground wire for the PC board.

12 No Flame
- Check that the gas is turned on at the water heater, meter, or cylinder.
- Check for obstructions in the flue outlet.
- If the system is propane, make sure that gas is in the tank.
- 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.
- 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 reconnect all wiring harnesses on unit and PC board.
- Check for DC shorts at components.
- Check gas solenoid valves for open or short circuits.
- Remove burner plate; inspect burner surface for condensation/debris.

14 Thermal Fuse
- Ensure SW5 in DIPSW2(white) is in the off position.
- Check for restrictions in air flow around unit and vent terminal.
- Check gas type of unit and ensure it matches gas type being used.
- 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 exhaust piping.
- Check heat exchanger for cracks 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. Hard water must be treated to prevent scale build up or damage to the 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 exhaust piping.
- Check for blockage in the heat exchanger.

19 Electrical Grounding
- Check all components for electrical short.

25 Condensate Trap
- Condensate trap is full. Check condensate trap and drain pipe for blockage.
- Ensure a condensate drain line is installed according to local codes.
- Ensure that the end of the condensate drain is open to the atmosphere.
- Ensure that the end of the pipe is not submerged under water.
- Replace condensate trap.

32 Outgoing Water Temperature Sensor

33 Heat Exchanger Outgoing Temperature Sensor

38 Exhaust Gas Temperature Sensor

41 Outside Temperature Sensor
- Check sensor wiring for damage.
- Measure resistance of sensor.
- Clean sensor of scale build-up.
- Replace sensor.

52 Modulating Solenoid Valve Signal
- Check modulating gas solenoid valve wiring harness for loose or damaged terminals.
- Measure resistance of valve coil.

54 High Exhaust Gas Temperature
- Check heat exchanger surface for hot spots which indicate blockage due to scale build up. Refer to instructions in manual for flushing heat exchanger. Hard water must be treated to prevent scale build up or damage to the heat exchanger.
- Contact a licensed professional.

61 Combustion Fan
- 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
- 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 licensed professional.

70 PC Board
- Check PC board DIP switches for correct positons.
- Check the connection harness at the connection on the PC board.
- Replace PC board.

71 Solenoid Valve Circuit
- Replace the PC Board.

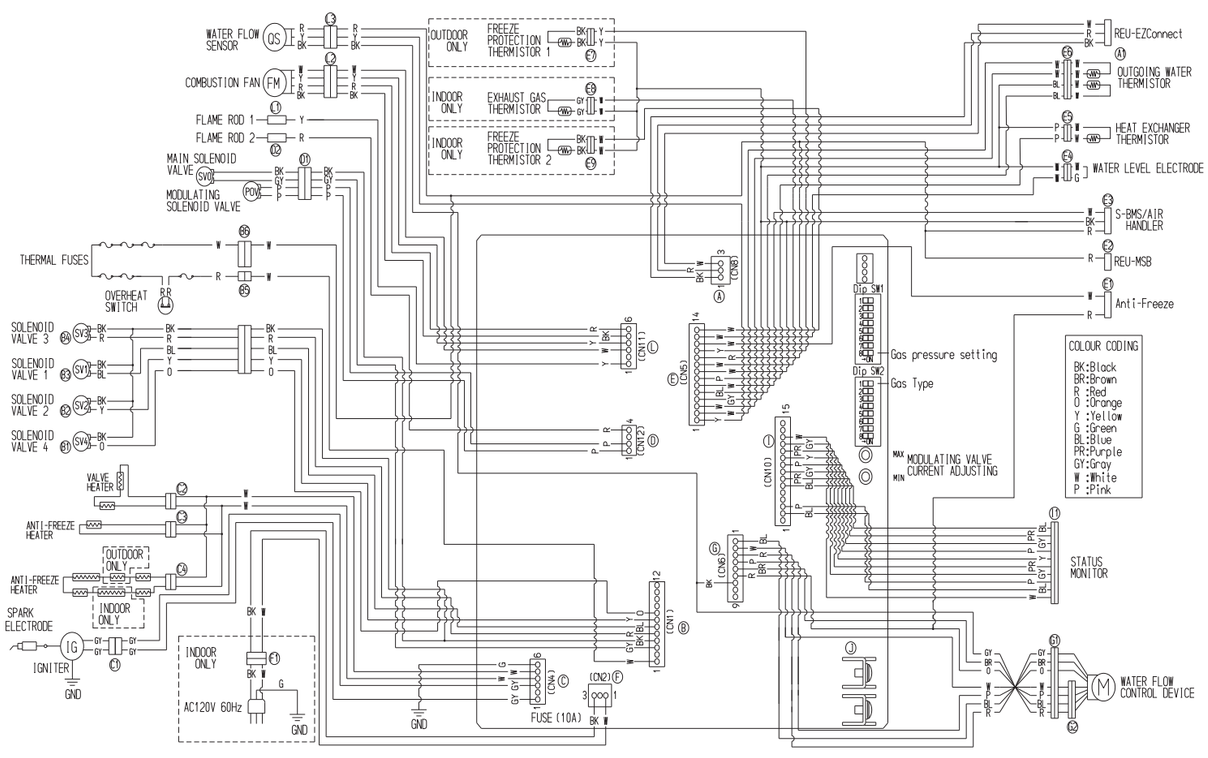
72 Flame Sensing Device
- Verify flame rod is touching flame when unit fires.
- Check all wiring to flame rod.
- Remove flame rod;check for carbon build-up; clean with sand paper.
- Check inside burner chamber for any foreign material blocking flame at flame rod.
- Measure micro amp output of sensor circuit with flame present.
- Replace the PC Board.

LC# Scale Build-up in Heat Exchanger (when checking maintenance code history “00” is substituted for “LC”)
- LC (only when a controller is installed,the monitor shows 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 the flushing instructions in the manual. Hard water must be treated to prevent scale build up or damage to the heat exchanger.
- To operate the water heater temporarily until the heat exchanger can be flushed, push the On/Off button (when a controller is installed) on the temperature controller 5 times. Repeated LC codes will eventually lock out the water heater.

FF Maintenance Performed
- Indicates a service provider performed maintenance or repair. Enter this code by pressing up, down, and ON/OFF simultaneously.

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.
- Verify you have at least the minimum flow rate required to fire unit.
- Check for cold to hot cross over. Isolate circulating system if present.
- Turn off cold water to the unit, open pressure relief valve; if water continues to flow, there is bleed over in your plumbing.
- Verify turbine spins freely.
- Measure the resistance of the water flow control sensor.
- If the display is blank and clicking is coming from the unit, disconnect the water flow servo motor (GY, BR, O, W, P, BL, R). If the display comes on then replace the water flow servo motor.

Wire Diagram



RUCS75i (KCM2528FFU-US)
RUCS65i (KCM2025FFU-US)
RUS75e (KCM2528W-US)
RUS65e (KCM2025W-US)

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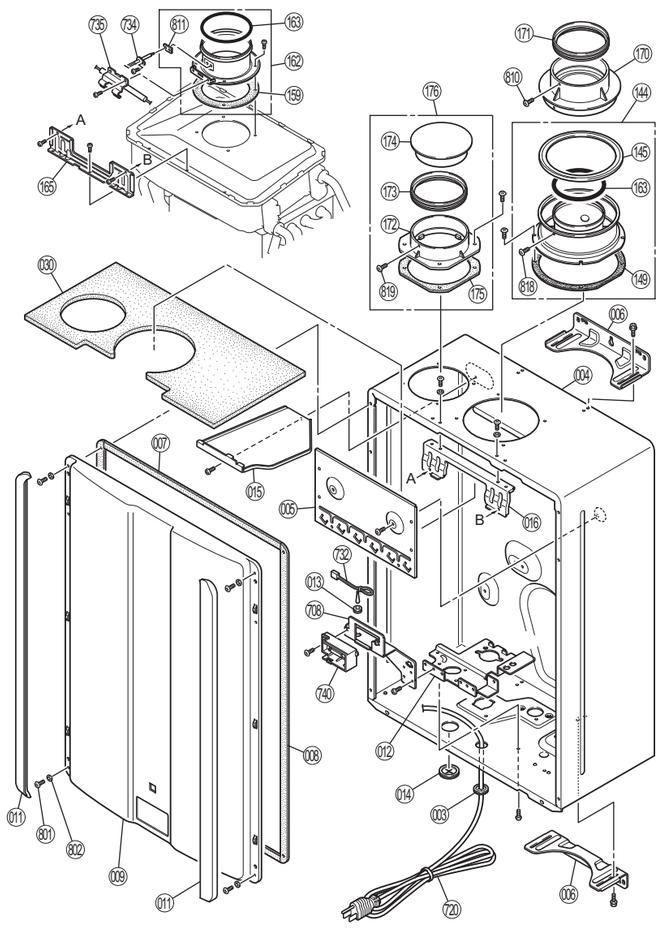
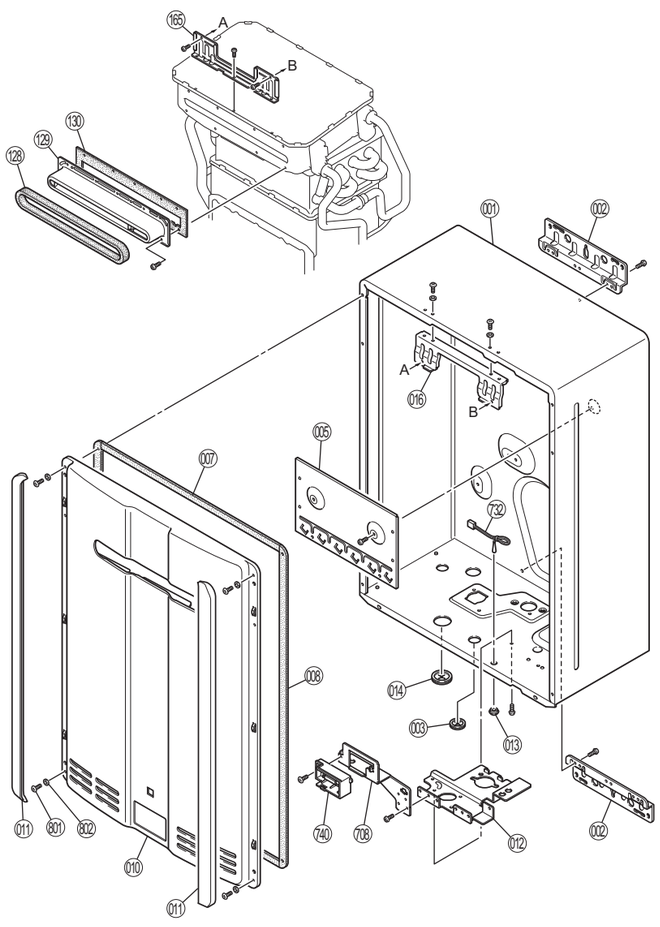
U328-0710(00)

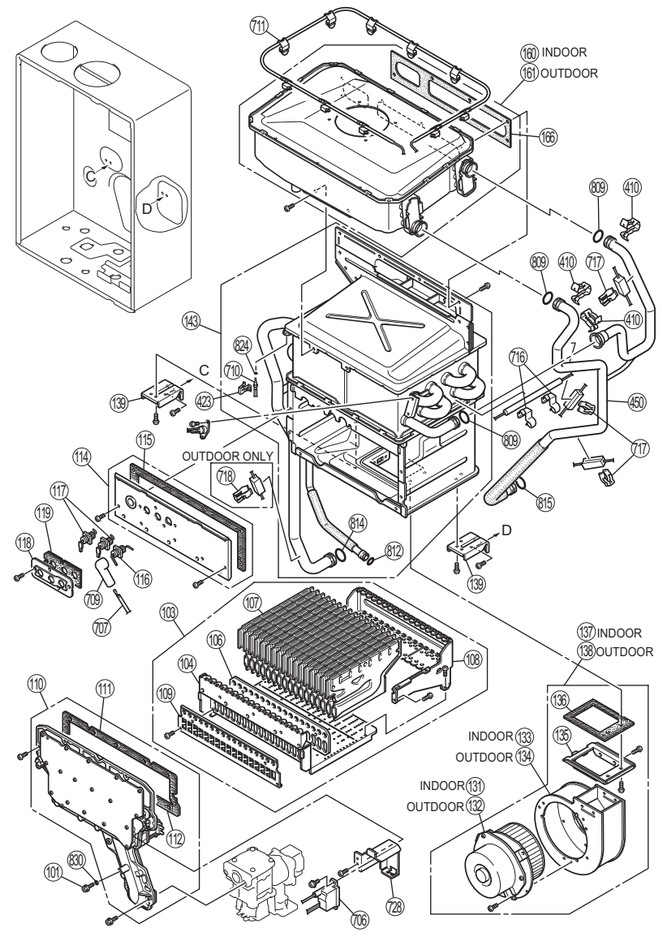
EXPLODED VIEW-CABINET(INDOOR)



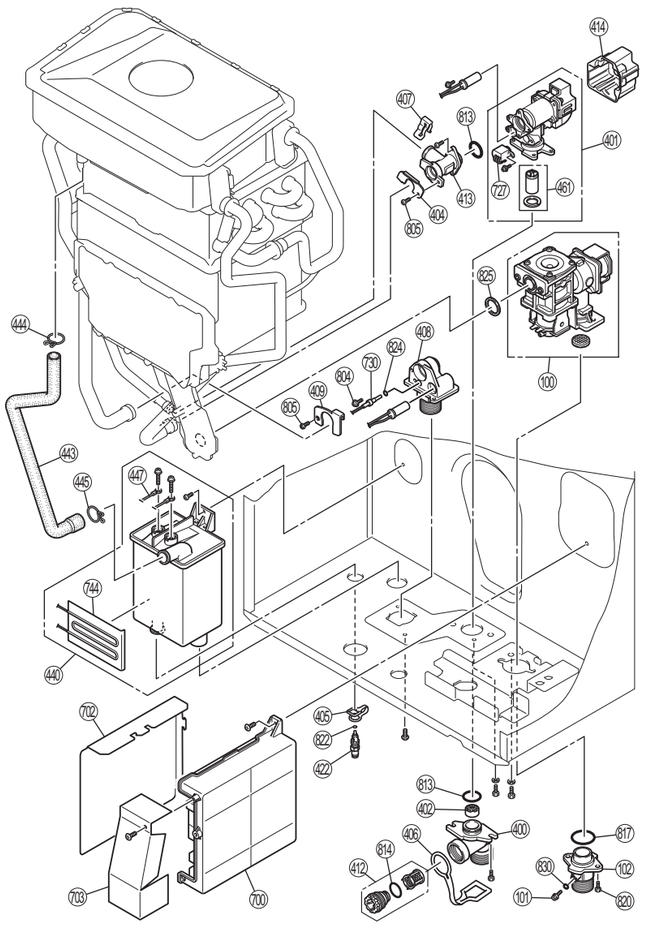
EXPLODED VIEW-CABINET(OUTDOOR)



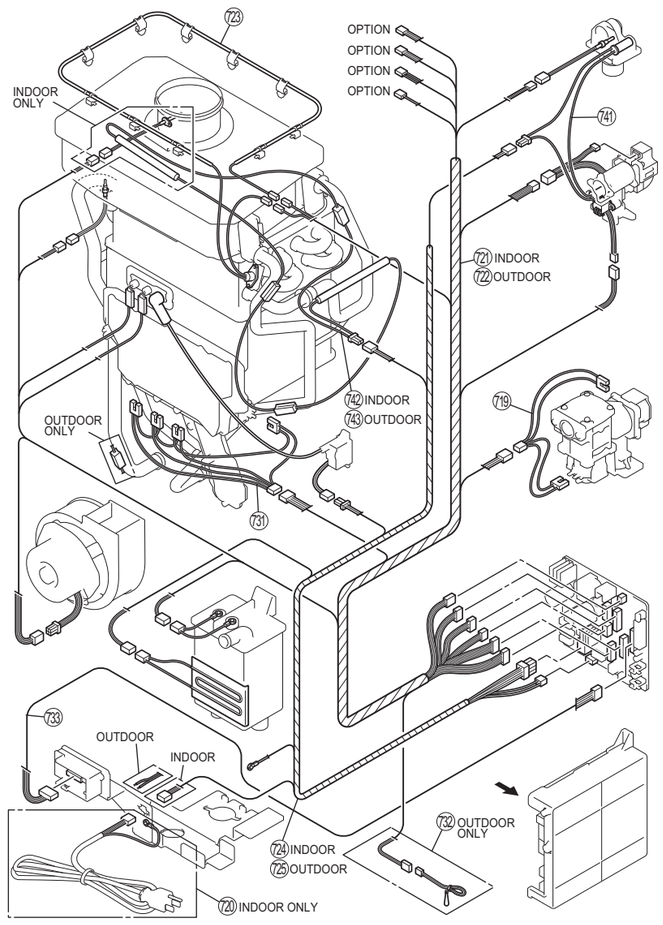
EXPLODED VIEW-INTERNALS(INDOOR,OUTDOOR)
ILLUSTRATION REPRESENTS INDOOR MODEL



EXPLODED VIEW-INTERNALS(INDOOR,OUTDOOR)
ILLUSTRATION REPRESENTS INDOOR MODEL

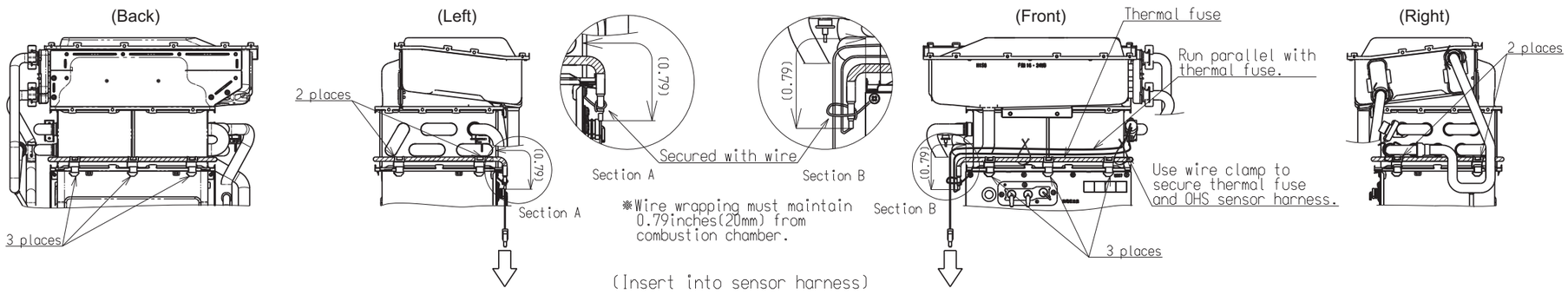


EXPLODED VIEW-ELECTRICAL(INDOOR,OUTDOOR)
ILLUSTRATION REPRESENTS INDOOR MODEL



Thermal fuse location

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



This sheet does not include part numbers. For part numbers information, please visit www.rinnai.us

Item	Description	RUCS75i RUCS65i Qty	RUS75e RUS65e Qty
001	Main Body-Outdoor	–	1
002	Wall Bracket	–	2
003	Rubber Bushing-A	1	1
004	Main Body-Indoor	1	–
005	Heat Protection Plate	1	1
006	Wall Bracket	2	–
007	Gasket-Top and Bottom	2	2
008	Gasket-Side	2	2
009	Front Panel-Indoor	1	–
010	Front Panel-Outdoor	–	1
011	Screw Cover	2	2
012	Connetion Reinforcement Panel	1	1
013	Thermistor Packing	1	1
014	Rubber Bushing	1	1
015	Rain Tray Plate	1	–
016	Reinforcement Bracket	1	1
030	Top Plate Insulation	1	–
100	Gas Control Assembly	1	1
101	Test Port Set Screw	2	2
102	Gas Inlet	1	1
103	Burner Unit Assy	1	1
104	Burner Case Front Panel	1	1
106	Packing	1	1
107	Burners	17	17
108	Burner Case Back Panel	1	1
109	Damper	1	1
110	Manifold Assembly(LPG)	1	1
110	Manifold Assembly(NG)	1	1
111	Comb Chamber Packing Upper	1	1
112	Comb Chamber Packing Lower	1	1
114	Comb Chamber Front Panel	1	1
115	Comb Chamber Packing-2	1	1
116	Electrode	1	1
117	Flame Rod	2	2
118	Electrode Bracket	1	1
119	Electrode Packing	1	1
128	Seal Packing	–	1
129	Flue Outlet	–	1
130	Flue Outlet Packing	–	1
131	Fan Motor-Indoor	1	–
132	Fan Motor-Outdoor	–	1
133	Fan Casing-Indoor	1	–
134	Fan Casing-Outdoor	–	1
135	Fan Connecting Bracket	1	1
136	Fan Connecting Bracket Packing	1	1
137	Fan Assembly/Motor-Indoor	1	–
138	Fan Assembly/Motor-Outdoor	–	1
139	Heat Exchanger Bracket	2	2
143	Primary Heat Exchanger Assembly	1	1
144	Flue Connection Assembly	1	–
145	O-ring	1	–
149	Gasket	1	–
159	Outlet Pipe Packing	1	–
160	Secondary Heat Exchanger-Indoor	1	–
161	Secondary Heat Exchanger-Outdoor	–	1
162	Outlet Pipe	1	–
163	O-ring	2	–
165	Connecting Plate	1	1
166	Gasket	1	1
170	Exhaust Adapter Ring	1	–
171	Exhaust O-Ring	1	–
172	Air Intake Pipe	1	–
173	Air Intake O-Ring	1	–
174	Intake Cap	1	–
175	Air Intake Pipe Gasket	1	–
176	Air Intake Assembly	1	–
400	Water Inlet	1	1
401	Water Flow Servo & Sensor	1	1
402	Rectifier	1	1
404	Pipe Braket	1	1
405	Drain Valve Band A	1	1
406	Plug Band	1	1
407	Clip	1	1
408	Hot Water Outlet	1	1
409	Stop Bracket	1	1
410	Clip	3	3
412	Water Filter Assembly	1	1
413	Fixed Bypass	1	1
414	Cover	1	1
422	Drain Plug	1	1
423	Clip	1	1
440	Condensate Trap	1	1
443	Condensate Drain Tube	1	1
444	Band	1	1
445	Band	1	1
447	Connection Harness	1	1
450	Cold Water Pipe	1	1
461	Water Flow Turbine	1	1
700	PC Board	1	1
702	PC Board Cover Side	1	1
703	PC Board Cover Front	1	1
706	Ignitor	1	1
707	High Tension Cord	1	1
708	Status Monitor Plate	1	1
709	Electrode Sleeve	1	1
710	Thermistor	1	1
711	Thermal Fuse Clip	10	10
716	Heater Clip	2	2
717	Heater Clip	3	3
718	Heater Clip A	–	1
719	Main Solenoid Harness	1	1
720	Power cord	1	–
721	Sensor Harness-Indoor	1	–
722	Sensor Harness-Outdoor	–	1
723	Thermal Fuse Harness	1	1
724	Power Supply Harness-Indoor	1	–
725	Power Supply Harness-Outdoor	–	1
727	Water Flow Sensor	1	1
728	Ignitor Bracket	1	1
730	Twin Thermistor	1	1
731	Solenoid Harness	1	1
732	Frost Sensing Thermistor Assembly	1	1
733	Status Monitor Harness	1	1
734	Exhaust Gas Thermistor	1	–
735	Latent Heater Bracket	1	–
740	Status Monitor Assembly	1	1
741	Valve Heater	1	1
742	Anti Frost Heater-Indoor	1	–
743	Anti Frost Heater-Outdoor	–	1
744	Condensate Trap Harness	1	1
801	Screw	4	4
802	Washer	4	4
804	Screw	1	1
805	Screw	2	2
809	O-ring	3	3
810	Self Tapping Screw	2	–
811	Exhaust Gas Thermistor Packing	1	–
812	O-ring	1	1
813	O-ring	2	2
814	O-ring	2	2
815	O-ring	3	3
817	O-ring	1	1
818	Exhaust Adapter Ring Fastener	1	–
819	Intake Cap Fastener	1	–
820	Screw	2	2
822	O-ring	1	1
824	O-ring	2	2
825	Packing	1	1
830	O-ring	2	2
888	Manual	1	1
889	Tech Sheet	1	1