

# Controller

**In Use Indicator**  
Indicates that hot water is being supplied.

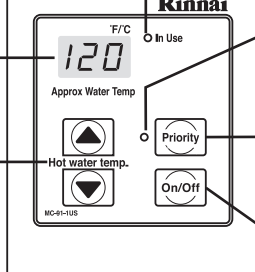
**Temperature Display**  
Indicates temperature setting or flashes error code.

**Thermostat**

**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**



The diagram shows a Rinnai controller unit with a digital display showing 120°F. It has buttons for 'Priority', 'On/Off', and 'Thermostat'. The 'In Use Indicator' is a small light. The 'Temperature Display' shows the current setting. The 'Thermostat' is a slider control. The 'Priority Indicator' is a small light. The 'Priority Button' is a circular button. The 'ON/OFF Button' is a rectangular button.

## Diagnostic Use of the Controller

- 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 ▲ and ▼ 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.



## 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
R63LSe2	150 PSI					2.0°W.C.	3.0°W.C.
R75LSe		5°W.C. /10.5°W.C.	8°W.C. /13.5°W.C.	0.56°W.C.	0.88°W.C.	2.9°W.C.	4.2°W.C.
R94LSe						3.3°W.C.	5.1°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).

Wire Color	Voltage	Resistance	Connector No.	Pin No.'s	
Thermal Fuse / Overheat Switch					
Red - White	12 VDC	below 1 ohm	E6 F1	E5 - F1	
Flame Rod					
Place one lead of the meter to the flame rod and the other to ground. With the unit running, 5-150 VAC should be read. Set the meter to the amp scale and series the meter in line with the flame rod. Proper flame circuit should read 1 amp or greater. If not, then remove the flame rod and check for carbon and damage.					
Thermistors					
Check all thermistors by inserting meter leads into each end of the thermistor plug. Set the meter to the 20 K ohm scale and read resistance. Applying heat to the thermistor bulb should decrease the resistance. Applying ice to the thermistor bulb should increase the resistance. Typical resistance values are: 11.4-14 K ohm for 59°F; 6.4-7.8 K ohm for 86°F; 3.6-4.5 K ohm for 113°F; 2.2-2.7 K ohm for 140°F; 0.6-0.8 K ohm for 221°F					
Outgoing Water Thermistor					
White - White	see above		E4	2 - 3	
Heat Exchanger Temperature Thermistor					
Pink - White	see above		E3	2 - 10	
Surge Protector					
Black - White	108 - 132 VAC	N/A	C2	1 - 3	
Black - White	108 - 132 VAC	N/A	C1		
With the power off, check the continuity through the surge protector. Check by placing one meter lead on the top pin #1 and bottom pin #3. Check by placing one meter lead on the top pin #3 and bottom pin #1. If there is continuity across both sets of points, then the surge protector is good.					
Controller					
Terminals A1	10 - 13 VDC	1.5 - 3.0 K ohms	A	1 - 3	
Frost Protection					
heaters located on the hot water outlet line	180 - 207 ohms				
heater located on heat exchanger piping	156 - 180 ohms				
heater located on water flow sensor	24 - 28 ohms				
Amp fuses					
There are two inline 3 amp glass fuses. Remove the fuse and check continuity through it. If there is continuity then the fuse is good.					
Thermal Fuse / Overheat Switch					
Red - Red	11 - 13 VDC	below 1 ohm	F6 H1	F6 - H12	

## 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 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 resistance readings.

Example:	59°F = 11.4 ~ 14K 86°F = 6.4 ~ 7.8K 113°F = 3.6 ~ 4.5K	140°F = 2.2 ~ 2.7K 221°F = 0.6 ~ 0.8K
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## Outgoing Water Thermistor

White - White	see above	F5	3 - 4
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## Heat Exchanger Temperature Thermistor

Pink - White	see above	F4	3 - 11
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## Surge Protector

Black - White	108 - 132 VAC	N/A	D2	1 - 3
Blue - Brown	108 - 132 VAC	N/A	D1	1 - 3

With the power off, check the continuity through the surge protector. Check by placing one meter lead on the top pin #1 and bottom pin #3. Check by placing one meter lead on the top pin #3 and bottom pin #1. If there is continuity across both sets of points, then the surge protector is good.

## Controller

Terminals B1	10 - 13 VDC	1.5 - 3.0 K ohms	B	1 - 3
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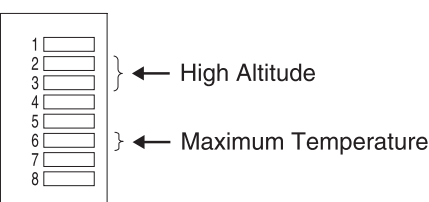
# Dip Switches Settings

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

Water heaters with a model name ending in "-UC" are configured with the maximum temperature set to 120° F (49° C) from the factory. Temperature settings from 125-140 °F (52-60 °C) are available 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.

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			



1  
2  
3  
4  
5  
6  
7  
8

← High Altitude

← 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.

# 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 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.

## 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 EZConnect or MSA controls 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 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.
- Disconnect EZConnect or MSA controls 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.

## 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.

## 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)

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 connections.
- Measure resistance of each solenoid valve coil.

## 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.

## 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.

# Wiring Diagram

BY-PASS SERVO MODEL ONLY

FREEZE PROTECTION OPTION

WATER FLOW SENSOR

INDOOR MODEL ONLY

AIR TEMPERATURE THERMISTOR

HEAT EXCHANGER THERMISTOR

OUTGOING WATER THERMISTOR

WATER FLOW CONTROL DEVICE

COMBUSTION FAN

THERMAL FUSES

OVERHEAT SWITCH

MODULATING SOLENOID VALVE

FLAME ROD

MAIN SOLENOID VALVE

SOLENOID VALVE 1

SOLENOID VALVE 2

SOLENOID VALVE 3

for REU-EZC (Optional)

MODULATING VALVE CURRENT ADJUSTING

Gas pressure

Gas type

Spare Parts Only

CONTROLLER

SPARK ELECTRODE

IGNITER

FROST SENSING SWITCH

ANTI-FROST HEATER

ANTI-FROST HEATER

FUSE (3A)

AC120V

HOT

NEUTRAL

GROUND

COLOR CODING

W :White

BK:Black

BR:Brown

R :Red

BL:Blue

Y :Yellow

P :Pink

O :Orange

G :Green

GY:Gray



This exploded view diagram illustrates the assembly of the MC-91-1US microwave oven. The main components and their part numbers are as follows:

- Main Body:** 001
- Door:** 007
- Door Frame:** 008
- Door Handle:** 015
- Door Latch:** 012
- Door Hinge:** 017
- Door Seal:** 011
- Door Lock:** 010
- Door Mounting Bracket:** 005
- Door Mounting Screws:** 006, 009
- Door Mounting Nut:** 016
- Door Mounting Washer:** 014
- Door Mounting Bolt:** 013
- Door Mounting Pin:** 018
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- Door Mounting Pin:** 099
- Door Mounting Pin:** 100

[illegible]

This exploded view diagram illustrates the internal components of a refrigerator. The main body is shown at the top left. The evaporator assembly, including the evaporator coil (405) and fan motor (404), is shown in the center. The compressor (401) and condenser coil (402) are shown at the bottom right. Various numbered parts are labeled, including screws (e.g., 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000), nuts (e.g., 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000), and other fasteners (e.g., 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000).

PARTS LIST														
Quantity					Quantity					Quantity				
Number	Description	Part Number	R94LSe	R63LSe2 R75LSe	Number	Description	Part Number	R94LSe	R63LSe2 R75LSe	Number	Description	Part Number	R94LSe	R63LSe2 R75LSe
001	Main Body (W)	109000011	1	1	143	Heat Exchanger Assembly	104000033	-	1	722	Power Harness	105000033	1	1
002	Wall Bracket	BU195-121	2	2	400	3/4 Water Inlet B	H73-501	1	1	723	Solenoid Valve Harness	105000034	1	1
003	Rubber Bushing	U245-125	1	1	401	Water Flow Servo & Sensor Assy	104000028	1	-	724	Sensor Harness	105000037	1	-
004	Connection Reinforcement Panel	109000023	1	1	401	Water Flow Servo & Sensor Assy	104000029	-	1	724	Sensor Harness	105000038	-	1
005	Heat Protection Plate	U245-107	1	1	402	Rectifier	M8D1-15X01	1	1	725	Thermal Fuse Harness Assembly	105000039	1	1
006	Front Panel Assembly	109000013	1	1	403	By-pass Servo Assembly	M6J-1-4	1	-	726	Ignitor Harness	105000040	1	1
007	Front Panel Gasket-2	U245-3185-2	2	2	404	Stop Bracket	AH69-310	2	-	727	Flow Sensor	105000041	1	1
008	Front Panel Gasket-1	U245-3185-1	2	2	404	Stop Bracket	AU195-321X01	-	1	729	Temperature Controller Harness	105000042	1	1
011	Side Cover	U245-3121X05	2	2	405	Plug Band	109000018	1	1	730	Thermistor	H111-650	1	1
012	Side Cover Lid	U245-3122X02	4	4	408	Hot Water Outlet (3/4" NPT)	U245-865-3	1	1	801	Screw	CP-30580	4	4
013	Cable Access Assy	BU56-602-N	1	1	409	Stop Bracket	AU162-1876X01	1	1	802	Resin Washer	CF83-41430	4	4
014	Rubber Bushing	AU169-126	1	1	410	Plug Band (small)	109000019	1	1	803	Screw	108000021	3	3
015	Rain Hood	109000026	1	1	411	Drain Valve	107000021	1	1	804	Thermistor Stop Screw	U217-449	1	1
016	Packing	AU105-113	1	1	412	Water Filter Assembly	H98-510-S	1	1	805	Screw	ZAA0408UK	3	2
017	Side Cover Assy	109000022	2	2	413	Cover	109000020	1	1	806	Screw	109000025	2	2
100	Gas Control Assembly	104000021	1	1	700	PC Board	104000063	1	-	807	Resin Washer	AU48-174	2	2
101	Test Port Set Screw	AU38-965X01	2	2	700	PC Board	104000131	-	1	808	Screw	CP-30583	4	4
102	Gas Connection 3/4" NPT	CU195-1866	1	1	701	Surge Protector	105000067	1	1	810	O-ring	M10B-2-4	1	1
103	Burner Unit Assembly (LPG)	H73-110	1	1	701	Surge Protector with Terminal (optional)	104000057	1	1	812	O-ring	M10B-13-4	1	1
103	Burner Unit Assembly (NG)	106000012	1	1	702	PC Board Cover - Side	105000016	1	1	813	O-ring	M10B-2-18	2	1
110	Manifold Assembly (LPG)	106000013	1	1	703	PC Board Cover - Front	105000017	1	1	814	O-ring	M10B-2-16	2	2
110	Manifold Assembly (NG)	106000015	1	1	706	Ignitor	105000068	1	1	815	O-ring	M10B-2-14	2	1
113	Pressure Point Sealing Screw	C10D-5	1	1	707	High Tension Cord	105000019	1	1	816	O-ring	M10B-2-7	1	1
114	Combustion Chamber Sightglass Plate	106000016	1	1	708	Electrode Sleeve	AU206-218	1	1	817	O-ring	M10B-1-24	1	1
116	Electrode	104000023	1	1	709	Thermistor	105000020	1	1	818	Packing	C36E1-6	2	2
117	Flame Rod	105000010	1	1	710	Thermistor Clip - Large	CP-90172	1	1	819	Screw	ZQAA0512UK	2	2
118	Electrode Packing	AH66-398X01	1	1	711	Thermal Fuse Clip	U217-676X02	5	5	820	Screw	ZQAA0514UK	4	4
119	Electrode Holder	AH66-393	1	1	712	Frost Sensing Switch	U242-511	1	1	821	Screw	ZQAA0508UK	2	2
125	Fan Motor All Assembly	104000025	1	1	713	Antifrost Heater (120 V)	105000023	1	1	822	Screw	ZBA0512UK	3	3
132	Combustion Chamber Fan Bracket	U245-255X01	1	1	715	Valve Heater (120 V) Assembly	105000024	1	1	888	Manual	100000114	1	1
135	Flue Outlet													