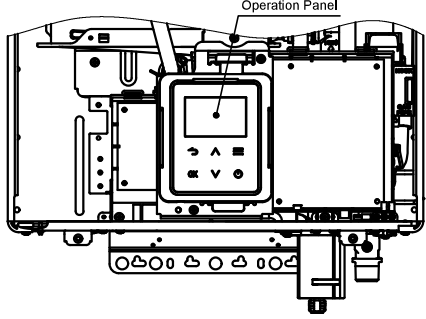
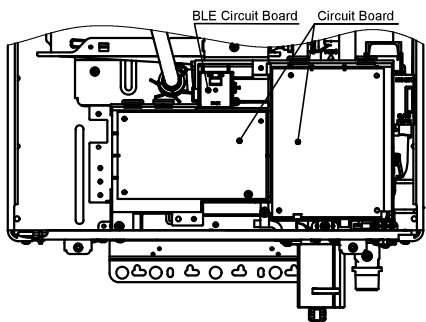
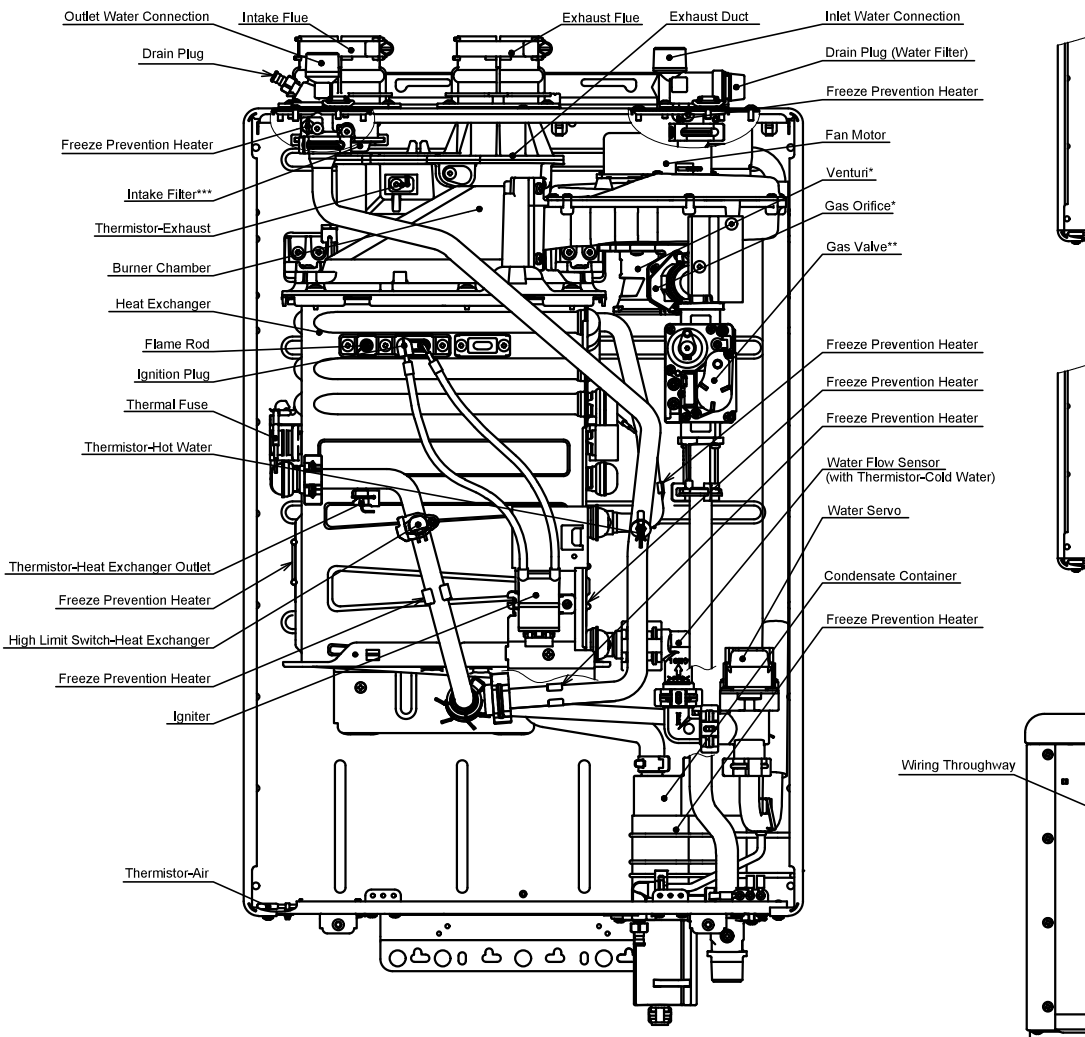
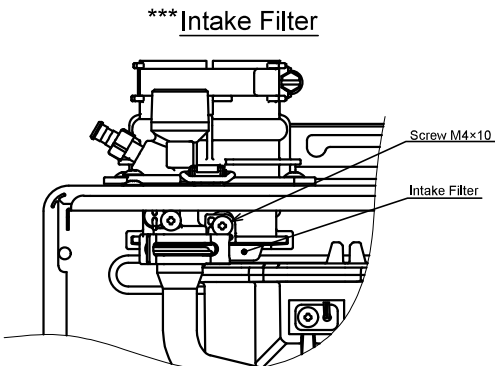
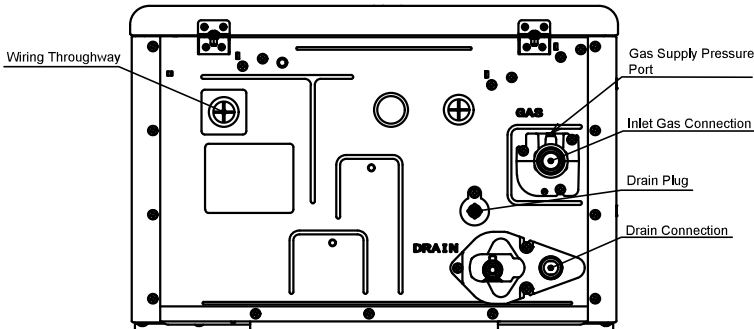


Components

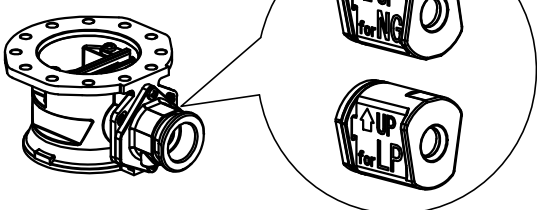


Bottom View

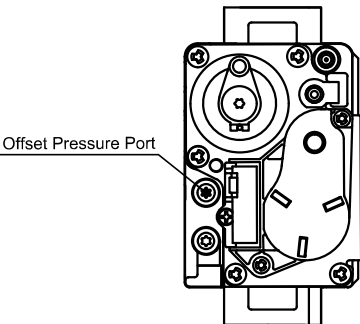


NOTE : When securing the Intake Filter with the Screw (M4x10), only tighten by a hand screwdriver. (No Drills)

Venturi and Gas Orifice



Gas Valve



Error Codes and Checkpoints

Display*	Description	Diagnosis Point (Trouble Point)	Remarks
10	Combustion abnormality	Check air supply vent for blockage or obstruction. Check exhaust vent for blockage or obstruction. Have a professional check the gas supply pressure. Check if the condensate drain line (clogged, frozen or slope down). Check the unit settings on the circuit board.	(Only in error code history) Error 10 occurs only when the fan speed is high. If a blockage is detected, the fan speed is limited and error 10 is logged only in the error history.
(F) 11	Ignition failure (Initial flame fault detection)	Check the gas supply piping and pressure. Check for Igniter spark (9). Check the Gas Valve (10). Check the Flame Rod (7). Check ground, paying special attention to the ground connection to the Circuit Board.	
(F) 12 12-1 12-2	Flame Rod does not detect flame (Flame fault detection)	Check for accidental extinction of the flame. Check for abnormal combustion. Check the Gas Valve (10). Check the Flame Rod (7). Check ground, especially on the Circuit Board. Check for any exhaust gas leaking in the appliance or leaking from the vent pipe.	
(F) 13 13-6	External CO detector triggered	Check for abnormal combustion. Check all vent components are secure and fully connected. Check for any exhaust leaking from vent pipes. Check for damage on "CO Detector" wire (open circuit).	
(F) 14	Thermal Fuse triggered	Measure the resistance through the Thermal Fuse (11). Check for melting or damage to the Thermal Fuse. Check for improper connection of Thermal Fuse.	
(F) 16 16-#	Abnormally high output temperature	Measure the resistance through the Thermistor-Hot Water (3). Check for the offset pressure of the gas valve and gas type.	
(F) 20	High Limit Switch triggered	Check if the High Limit Switch-Heat Exchanger is triggered (13). Check for improper connection of the High Limit Switch-Heat Exchanger. Check if scale build-up in the Heat Exchanger. (This error code may be caused by scale build-up in the Heat Exchanger)	To reset this error code, the power needs to be disconnected and then reconnected.
(F) 29 29-3	External Condensate Pump abnormality	Check external condensate pump for blockage. Check for damage (open circuit) of condensate pump connector.	(Only shows if an external condensate pump is interlocked with water heater)
(F) 30 30-1 30-2	Thermistor-Air abnormality	Measure the resistance through the Thermistor-Air (6). Check for an open or short circuit. Check for improper connection of the Thermistor-Air.	
(F) 31 31-1 31-2	Thermistor-Cold Water abnormality	Measure the resistance through the Thermistor-Cold Water (2). Check for an open or short circuit. Check for improper connection of the Thermistor-Cold Water.	
(F) 32 32-1 32-2	Thermistor-Hot Water abnormality	Measure the resistance through the Thermistor-Hot Water (3). Check for an open or short circuit. Check for improper connection of the Thermistor-Hot Water.	
(F) 33 33-1 33-2	Thermistor-Heat Exchanger Outlet abnormality	Measure the resistance through the Thermistor-Heat Exchanger Outlet (4). Check for an open or short circuit. Check for improper connection of the Thermistor-Heat Exchanger Outlet.	
(F) 35 35-1,35-2 35-3,35-4	Thermistor-Exhaust abnormality	Measure the resistance through the Thermistor-Exhaust (5). Check for an open or short circuit. Check for improper connection of the Thermistor-Exhaust.	
50	Extended Continuous Flow Detected	Check if there is any water leaking.	(Only in error code history) This code does not indicate a water heater malfunction. Displayed if flow rate is detected for 24 hours consecutively.
(F) 61 61-1 61-4	Fan Motor abnormality	Check that the fan is rotating and check the pulse frequency from the fan rotational frequency sensor (8). Check for improper connection of the fan. Check voltage from the Circuit Board.	
(F) 65 65-2	Water Servo abnormality	Check that the Water Servo is functioning (12). Check for improper connection of the valve.	To reset this error code, the power needs to be disconnected and then reconnected.
(F) 70 70-#	Circuit Board abnormality	Circuit Board failure.	To reset this error code, the power needs to be disconnected and then reconnected.
(F) 71 71-1,71-2 71-4	Gas Valve drive circuit abnormality	Check for damage to the Gas Valve drive circuit on the Circuit Board.	To reset this error code, the power needs to be disconnected and then reconnected. If the display continues, contact nearest agent.
(F) 72	Flame Rod circuit abnormality	Measure the current from the Flame Rod when there is no flame (7). Check for a ground fault.	Detection of flame when no flame is present.
(F) 73 73-1,73-3 73-4,73-5	Circuit Board setting abnormality (Improper Maintenance Writers settings or gas type setting, etc.)	Check for proper setting of maintenance writers on the Circuit Board. Check the Circuit Board (microcomputer) for damage. Check for the gas type setting and the LP-conversion connector.	This error is displayed when connecting or disconnecting a connector with the power on. To reset this error code, the power needs to be disconnected and then reconnected.
74	BLE connection error	Check voltage from the Circuit Board. Check for improper connection of the BLE Circuit Board.	(Only in error code history)
F76	Multi-system communication error	Check for proper connection of the Quick Connect Cord. Check if the quick connect type in the unit settings is correct.	To reset this error code, the power needs to be disconnected and then reconnected.
760	Remote Controller transmission abnormality	Check for connection from the Remote Controller to the Circuit Board. Check the Remote Controller and the Circuit Board for damage.	(Only in error code history)
(F) 90 90-1 90-2 90-8	Combustion abnormality (Unit shuts off)	Check air supply vent for blockage or obstruction. Check exhaust vent for blockage or obstruction. Have a professional check the gas supply pressure. Check if the condensate drain line is clogged or frozen. Check that the condensate drain pipe slopes down. Check for the unit settings on the circuit board.	To reset this error code, the power needs to be disconnected and then reconnected. If the display continues, contact nearest agent. If "908" is displayed, an lockout has been activated.
(F) 91	May be improper gas type	Check for gas type, gas orifice and gas type setting. Check for proper unit settings. (Vent type/ length/ size or Elevation)	To reset this error code, the power needs to be disconnected and then reconnected.
(F) 94 94-1,94-2	Exhaust temperature is too high	Check for abnormal combustion (5).	To reset this error code, the power needs to be disconnected and then reconnected.
(F) C1#	Descaling Reminder (Warning Indication)	This unit is equipped with a descaling reminder. Excessive scale build-up may cause premature failure of the Heat Exchanger. Excessive dust or lint build-up in the fan and air intake may affect efficiency and combustion performance. Contact the phone number of instruction manual for additional information about recommended maintenance.	

*In a Quick Connect Multi-System with a Remote Controller, "F##" (except F76) indicates an error code from the secondary unit on a Remote Controller.
*# = 0,1,2,3,4,5,6,7,8,9
*In the error history using the Operation Panel or EZ Start Plus App, the three-digit error code (e.g., 731) may be displayed as "73-1".

Circuit Board Checkpoints

Ref. No.	Part	Circuit board Check points (Check the wiring diagram behind the front cover)				Normal value	Remarks
		CN & Pin No.	Wire Color	CN & Pin No.			
1	Water Flow Sensor	CN59	29 R - BL 28 Y - BL	CN59	17 17	DC 14-16 V DC 0.5-15 V	
2	Thermistor-Cold Water	CN63	7 W - W	CN63	2	Note 1)	Note 1)
3	Thermistor-Hot Water	CN63	1 W - W	CN63	2	Note 1)	Note 1)
4	Thermistor -Heat Exchanger Outlet	CN63	8 W - W	CN63	2	Note 1)	Note 1)
5	Thermistor-Exhaust	CN63	3 W - W	CN63	2	Note 2)	Note 2)
6	Thermistor-Air	CN63	6 BK - W	CN63	2	Note 3)	Note 3)
7	Flame Rod	CN78	2 BL - Heat exchanger 2 BL - Electrode	-	GND Flame Rod	10-100 kHz DC 1 μA or more	At flame detection
8	Fan Motor	CN27	6 W - BL 3 R - BL 1 O - BL 2 Y - BL	CN27	4 4 4 4	DC 140-187 V DC 13-16 V DC 1,67-8,25 V 204-1300 Hz	When fan is rotating 12 pulse/revolution
9	Igniter	CN42	6 W - BK	CN1	2	AC 108-132 V	When igniter is sparking
10	Gas Valve	CN10	1 R - BL	CN10	2	DC 90-120 V 1.22-1.50 kΩ	When valve is open Coil resistance Note 4)
11	Thermal Fuse	CN227	10 BK - BK	CN227	7	2 Ω or less	
12	Water Servo	CN59	12 W - O 12 W - G 12 W - V 12 W - BK 11 Y - BL	CN59	7 8 9 10 17	DC 1-16 V DC 1-16 V DC 1-16 V DC 1-16 V DC 1 V or less	When valve is fully open
13	High Limit Switch -Heat Exchanger	CN42	1 BK - W	CN1	1	1 Ω or less	Contact resistance Note 4)
-	Operation Panel	CN232	1 W - W	CN232	4	DC 14-16 V	
-	BLE Circuit Board	CN227	1 R - BK	CN227	4	DC 3.0 V or more	
-	Power Supply (Power Circuit Board)	CN92	2 BL - W	CN92	4	AC 108-132 V	
-	Power Supply (Power Circuit Board)	CN92	1 W - BK	CN92	3	AC 108-132 V	
-	Remote Controller	CN89	1 BL - BL	CN89	3	DC 14-16 V	

Note 1) •Cold Water / Hot water / Heat Exchanger Outlet Thermistor Temperature Characteristics

Temperature (° F)	32	50	68	86	104	122	140	158	176
Temperature (° C)	0	10	20	30	40	50	60	70	80
Resistance (k Ω)	23.7	15.5	10.3	7.0	4.9	3.5	2.5	1.9	1.4
Voltage (V)	4.5	4.3	4.0	3.6	3.2	2.8	2.4	2.0	1.7

Note 2) •Thermistor - Exhaust Temperature Characteristics

Temperature (° F)	-4	14	32	50	68	86
Temperature (° C)	-20	-10	0	10	20	30
Resistance (k Ω)	487	276	162	98.3	61.4	39.5
Voltage (V)	4.6	4.3	3.9	3.4	2.8	2.3

Note 3) •Thermistor - Air Temperature Characteristics

Temperature (° F)	-4	14	32	50	68	86
Temperature (° C)	-20	-10	0	10	20	30
Resistance (k Ω)	101.7	57.7	33.8	20.4	12.6	8.0
Voltage (V)	4.4	4.0	3.5	2.9	2.3	1.7

Note 4) When measuring the resistance, disconnect the connector from circuit board and check the connector side.

Refer to appliance's installation manual or reach out to our customer care, if more information is needed.
Contact details are available on the rating plate of the appliance.

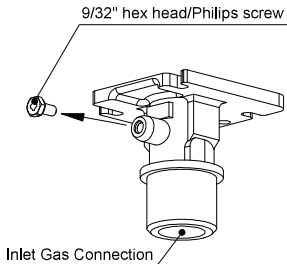
■ Adjusting Gas Valve Offset Pressure

- Use the following procedure to adjust the gas valve offset pressure:
1. Shut off the main gas supply valve.
 2. When the gas valve offset pressure is adjusted, remove the front cover.
 3. Remove the 9/32" hex head/Philips screw from the Gas Supply Pressure port on the Inlet Gas Connection and connect the manometer or pressure gauge using a silicon tube.
 4. Loosen the screw of Offset Pressure Port on the gas valve and connect the manometer or pressure gauge using a silicon tube.
For dual port manometer, use the positive pressure side.
 5. Open the gas supply valve and operate the unit.
-
6. Press the Up and Down Buttons at the same time.
Setting must be done within the first 10 minutes of connecting the electrical power to the water heater.
 7. Use the Up or Down Button to select "Maintenance Menu", then press the OK Button.
 8. Select "Fixed Combustion", then press the OK Button.
 9. Select "Min", then press and hold the OK Button for about 5 seconds.
The minimum fire condition persist.
NOTE : DO NOT select "Max", selecting "Max" will cause maximum fire condition.
-
10. If gas valve offset pressure adjustment needed, remove the cap of gas valve, and then adjust the gas offset pressure by turning the set screw no more than 1/8 turn.
 11. After offset pressure adjustment, do not forgot to tighten the 9/32" hex head/Philips screw to the Gas Supply Pressure Port.
-
12. Press the OK Button, the unit returns from minimum combustion to normal combustion.

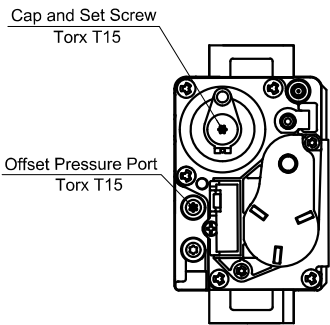
Gas Offset Value		
Gas type	Supply Pressure (inch H ₂ O)	Offset (inch H ₂ O)
NG	3.5-10.5	-0.02
LP	8.0-13.0	-0.02

Gas offset pressure values are subject to change without prior notice.
Check the latest burner specification table.

●Gas Supply Pressure Port



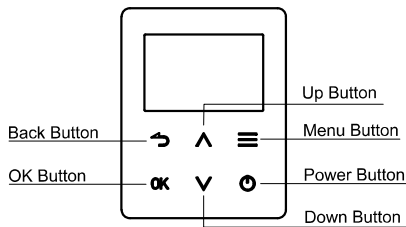
●Gas Valve



■ Displaying Maintenance Monitors

●Using the Operation Panel

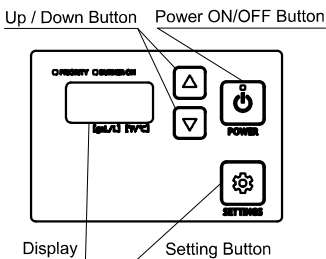
1. Press the Menu Button.
2. Use the Up or Down Button to select "Maintenance Monitor", then press the OK Button.



●Using Remote Controller

- <Display Procedure>
1. Press and hold both the "Up [▲] and Down [▼]" Buttons simultaneously for more than 2 seconds.
This can be done regardless of whether the power has been turned on or the unit is operating.

- <Indications>
1. The data No. will appear on the display for 2 seconds, and then the data will appear.
 2. In order to switch to other data, press either the up or down button once.
The data No. will then reappear, then different data No. can be selected using the "Up [▲]" and "Down [▼]" Buttons.
When the data No. is changed, the data No. will be displayed for 2 seconds, after which the data will appear.
- NOTE:** With the Remote Controller in maintenance mode, the hot water set temperature and Settings cannot be adjusted.



- <Returning to Normal Mode>
1. To return to normal mode, press and hold both the "Up [▲] and Down [▼]" Button simultaneously more than 2 seconds, or leave it alone for more than 10 minutes.

■ Maintenance Monitor List

Data No.	Item	Data (Display Reading X Multiplier)		Minimum Value for Indication	Remarks		
		Multiplier	Unit				
03	Total Plug-in Time	X 100	hour	100 hour	Disp. Range [000] - [1310]		
04	Total Combustion Time	X 1	hour	1 hour	Disp. Range [000] - [999]		
05	Total Combustion Time	X 1000	hour	1000 hour	Disp. Range [000] - [065]		
07	Number of Ignition Times	X 10	time	20 times	Disp. Range [000] - [998]		
08	Number of Ignition Times	X 10000	time	10000 times	Disp. Range [000] - [131]		
10	Fan Rotational Frequency	X 10	rpm	10 rpm			
11	Service Reminder Hours Accumulated(1)	X 1	hour	1 hour	Disp. Range [000] - [999]		
12	Service Reminder Hours Accumulated(1)	X 1000	hour	1000 hour	Disp. Range [000] - [065]		
14	Total Flow Rate	X 0.1	gal/min	0.1 gal/min	*		
		X 0.1	L/min	0.1 L/min	*2		
16	Output BTUH	X 1000	BTUH	1000 BTUH			
18	Output (%)	X 1	%	1%			
20	Calculated Fan Speed	X 10	rpm	10 rpm			
21	Service Reminder Hours Accumulated(2)	X 1	hour	1 hour	Disp. Range [000] - [999]		
22	Service Reminder Hours Accumulated(2)	X 1000	hour	1000 hour	Disp. Range [000] - [065]		
29	Reason why the unit does not run.	---	---	---	[001] : Water inlet temperature is too high → If possible decrease water inlet temperature [002] : Calculated water outlet temperature is too high → If possible increase flow rate [004] : Inlet and Outlet temperature are reversed → Check the pipes and re-install it correctly		
30	Thermistor-Cold Water Detection Temperature	X 1	°F	1°F	*1		
		X 0.1	°C	0.5°C	*2		
31	Thermistor-Hot Water Detection Temperature	X 1	°F	1°F	*1		
		X 0.1	°C	0.5°C	*2		
32	Thermistor-Heat Exchanger Outlet Detection Temperature	X 1	°F	1°F	*1		
		X 0.1	°C	0.5°C	*2		
36	Thermistor-Exhaust Detection Temperature	X 1	°F	1°F	*1		
		X 1	°C	1°C	*2		
38	Thermistor-Air Detection Temperature	X 1	°F	1°F	Disp. Range [014] - [050] *1		
		X 1	°C	1°C	Disp. Range [-10] - [010] *2		
50	FF No.-Primary Heat exchanger	X 0.1		0.1			
51	FF+FB No.-Primary Heat exchanger	X 0.1		0.1			
52	Output-Primary Heat exchanger	X 0.1		0.1			
53	Output-Total	X 0.1		0.1			
60	Position of Water Servo	X 2	Step		[000](open) - [1461](closed) / Error code 65: [1999]		
78	Flame Rod Condition	---	---	---	OFF [-0], ON [-1]		
80	Remaining Time of Scale Flushing	X 1	minute	1 minute	[000] - [060]		
82	Number of Scale Flushing Times	X 1	time	1 times	[000] - [255]		
86	Recirculation Mode	---	---	---		Dedicated Mode	Crossover Mode
					Manual Timer Recirc	12	22
					Always Recirc ON	13	23
					Always Recirc OFF	14	24
87	Circuit Board ID1: Product 1	[1:xy]			A=101,B=102,C=103, . . . ,Z=226		
88	Circuit Board ID2: Product 2	[2:xy]			A=201,B=202,C=203, . . . ,Z=326		
89	Circuit Board ID3: Version	[3:xy]			A=301,B=302,C=303, . . .		
91	Error Code History 1	Most Recent Error Code		If the same error code is repeated, it will appear in the history list twice. If it is repeated more than twice, it will only appear twice.			
92	Error Code History 2	Next Most Recent Error Code					
93	Error Code History 3	Next Most Recent Error Code					
94	Error Code History 4	Next Most Recent Error Code					
95	Error Code History 5	Next Most Recent Error Code					
96	Error Code History 6	Next Most Recent Error Code					
97	Error Code History 7	Next Most Recent Error Code					
98	Error Code History 8	Next Most Recent Error Code					

*1 When measurement unit is in °F/Gallons mode.
*2 When measurement unit is in °C/Liters mode.

■ When setting the maximum temperature to 100-140°F (37-60°C)

●Using the Operation Panel

1. Press the Menu Button.
2. Use the Up or Down Button to select "Settings", then press the OK Button.
3. Select "Max Set Temperature", then press the OK Button.
4. Select the upper limit of the hot-water supply temperature to 100-140°F (37-60°C), then press the OK Button.

●Using Remote Controller

1. Turn the unit off by pressing the "Power ON/OFF" Button on the Remote Controller.
2. Press and hold the Setting Button until a sound is heard (2 sec.) and 120°F (50°C) appears on the display.
3. Set the upper limit of the hot-water supply temperature to 100-140°F (37-60°C) using the "Up [▲]" and "Down [▼]" Buttons.
4. To put the unit back into operation, press the "power ON/OFF" Button.
To keep the unit off, let the unit sit for 30 sec. to return to the original display.

■ Displaying Error History

●Using the Operation Panel

1. Press the Menu Button.
2. Use the Up or Down Button to select "Error History", then press the OK Button.