Service Manual

HYDRA SMART RESIDENTIAL WATER HEATER

Advanced Heating
& Hot Water Systems

120 Braley Road, East Freetown, MA 02717 • 1-800-323-9651 • www.htproducts.com

LP-532 REV. 8.13.2014

Service Manual

Model

RT-199

(Residential Water Heater)

- Natural Gas(NG) – Factory Default
- Liquid Propane Gas (LP) – Contact Factory

ULTRA Low NOx Emissions SCAQMD Rule 1146.2

LEAD FREE Safe Drinking Water Act SDWA • Section 1417

Hydra Smart Residential Water Heater

⚠ WARNING

If the information in these instructions is not followed exactly, a fire or explosion may result, causing property damage, personal injury, or death.

– Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
– WHAT TO DO IF YOU SMELL GAS
  · Do not try to light any appliance.
  · Do not touch any electrical switch; do not use any phone in your building.
  · Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
  · If you cannot reach your gas supplier, call the fire department.
– Installation and service must be performed by a qualified installer, service agency or the gas supplier.

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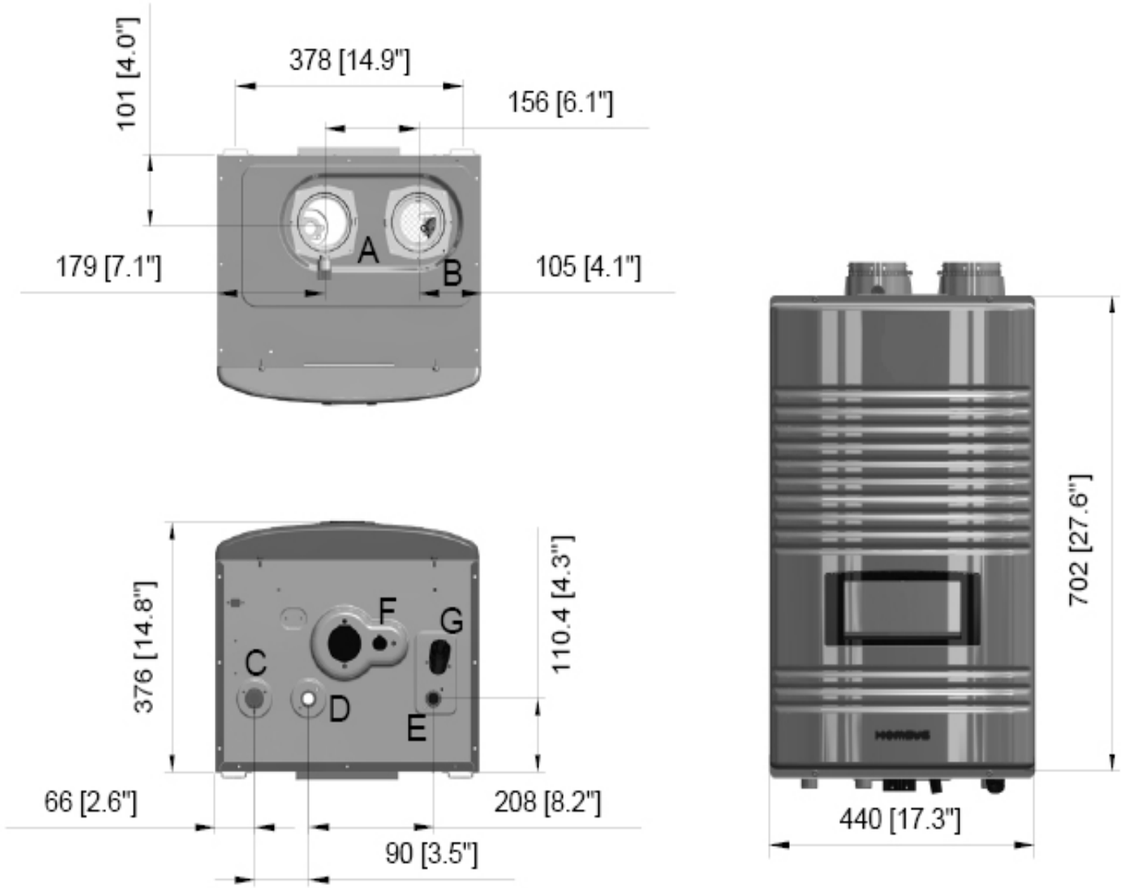
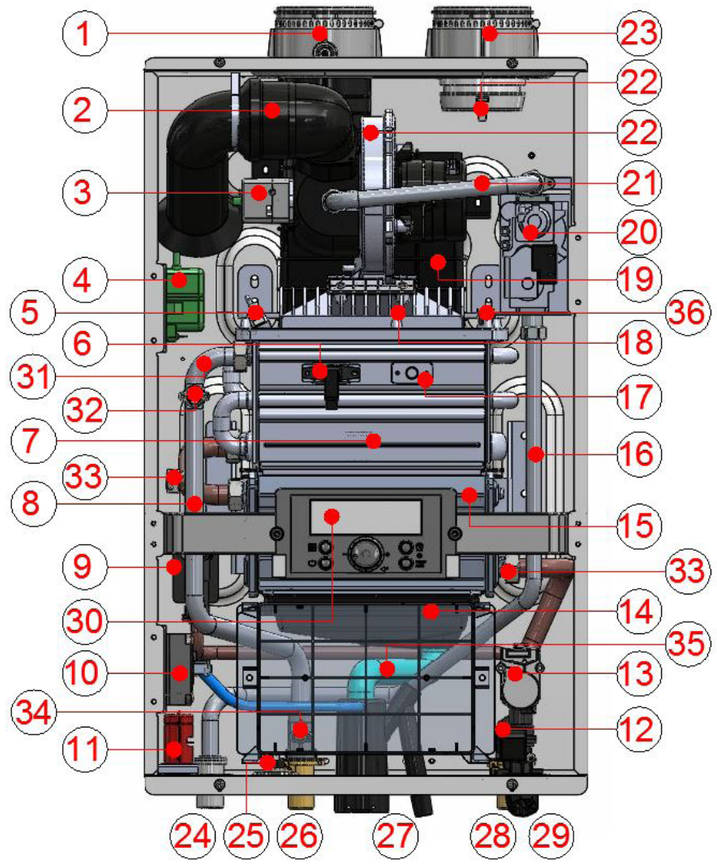
Model Name		RT-199
Gas Input Rate	MAX	199,000 Btu/h
	MIN	19,900 Btu/h
Energy Factor (Recovery Efficiency)		0.98 (98%)
Hot Water Capacity	35°F Rise	11.0 Gal
	45°F Rise	8.5 Gal
	77°F Rise	5.0 Gal
Installation		Indoor, Wall Hung, Fully Condensing
Flue System		Sealed Combustion Direct Vent
Vent Run		2” (15 ft), 3″(100ft) Schedule 40 PVC, CPVC, PP
Orifice Size	NG(Orifice/Needle)	9.5 mm (0.374″) / 9.5 mm (0.374″)
	LP(Orifice/Needle)	Consult the factory
Gas Supply Pressure	NG	3.5″ WC to 14″ WC
	LP	3.5″ WC to 14″ WC
Manifold Pressure	Min (3″)	NG: -0.01”WC, LP: -0.11” WC
	Max (3″)	NG: -0.03”WC, LP: -0.09” WC
Power Supply	Main Supply	120V 60Hz
	Maximum Power Consumption	135W
Ignition System		Direct Electronic Ignition / Automatic Flame Sensing
Burner System		Single Orifice Premixed Fuel Modulation Metal Fiber Infrared
Gas Valve System		Air ratio valve
Minimum Flow Rate		0.5 GPM
Internal Pipe Material		Stainless Steel
Dimensions		W17.3 ″ – H27.6 ″ – D14.8 ″
Weight		88 lbs
Sub Heat Exchanger Water Capacity (DHW)		Under 2 Gallon
Control Panel / Main Controller		P-920C / GTH-9500C
Water Pressure		Min 15 - Max 150 PSI
Connection Sizes	Cold Water Inlet / Hot Water Outlet	3/4″NPT
	Gas Inlet	3/4″NPT
Materials	Casing	Cold Rolled Carbon Steel
	Heat Exchanger	Primary Heat Exchanger : Stainless Steel Secondary Heat Exchanger : Stainless Steel
Safety Devices		Flame Rod, Burner Overheat Cut Off Device (302F/150C), Gas Leak Detector, Exhaust High Limit Switch (149F/65C), Freeze Protection Ceramic Heater (turns on at 41F/5C, turns off at 59F/15C), Water temperature limit switch (199F/93C).



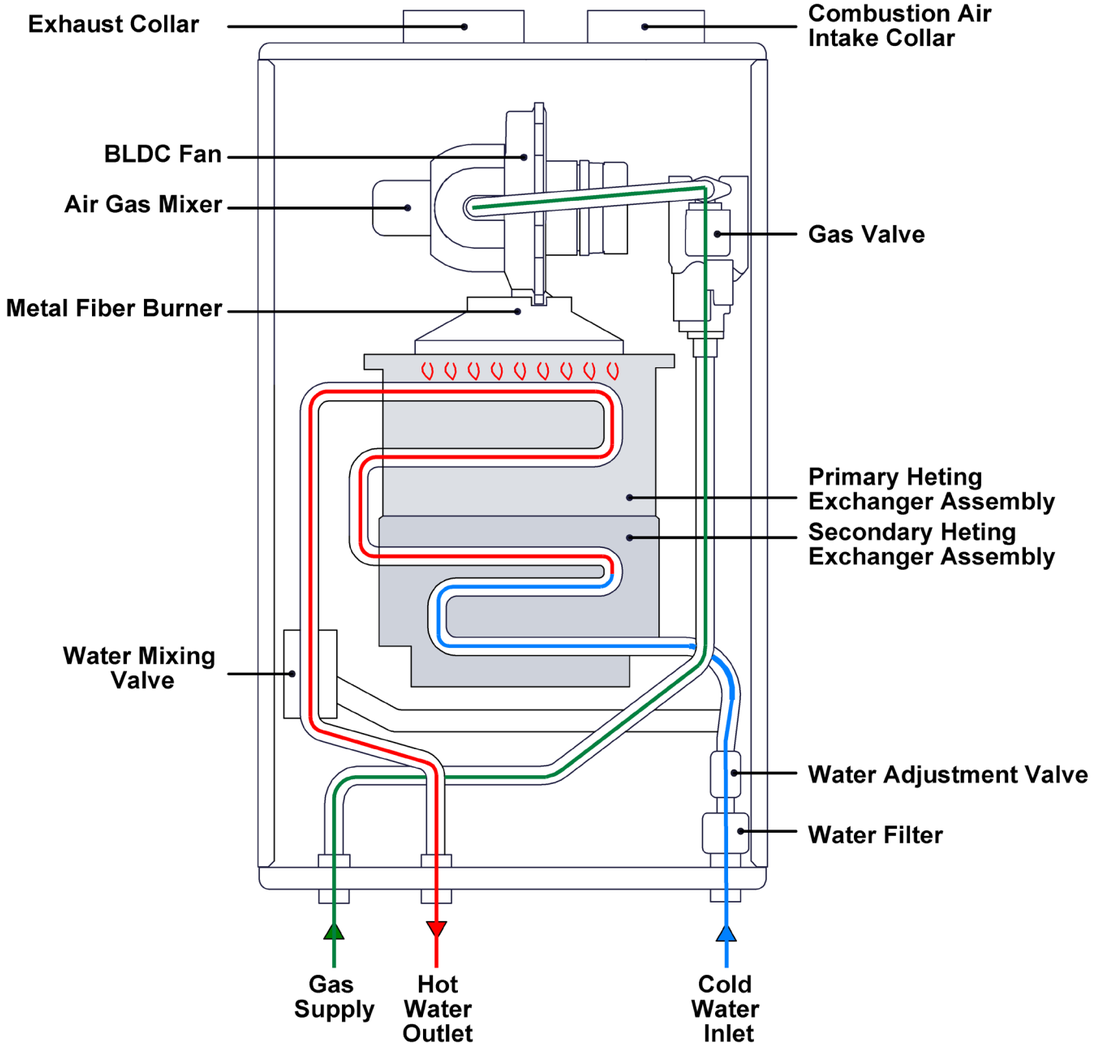
	Description	Diameter
A	Exhaust Outlet Pipe collar	3″
B	Air intake collar	3″
C	Gas Inlet Adapter	3/4″
D	DHW Outlet Adapter	3/4″
E	DHW Inlet Adapter	3/4″
F	Condensate drain	1/2″
G	DHW Inlet filter	N/A



NO	Name of Component
1	Exhaust Vent Adapter
2	Air Intake Adapter
3	AGM(Air Gas Mixer)
4	Ignition Transformer
5	Igniter
6	Flame Detection Sensor
7	Primary Heating Exchanger Assembly
8	Hot Water Outlet Pipe
9	Mixing Valve
10	Air Pressure Switch
11	N/A
12	Manual Power Switch
13	Water Adjustment Valve
14	Main Controller
15	Secondary Heat Exchanger Assembly
16	Gas Inlet Pipe 1
17	Flame sight glass
18	Burner Case

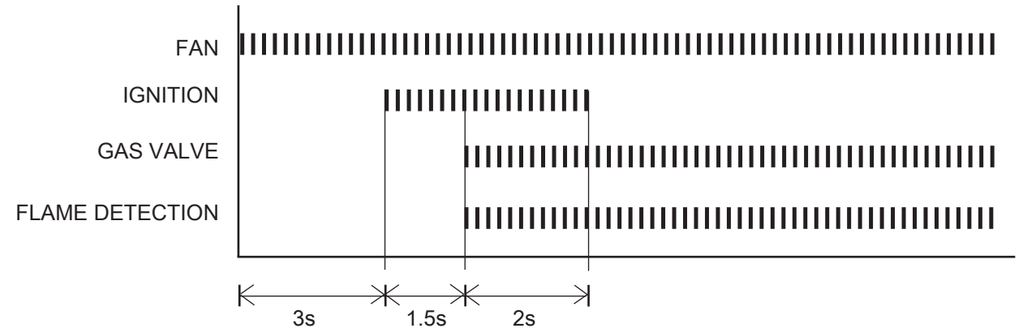
NO	Name of Component
19	Exhaust Duct
20	Gas Valve
21	Gas Inlet Pipe 2
22	BLDC Fan
23	Air Intake Pipe Adapter
24	Gas Inlet Adapter
25	Freeze Protector
26	DHW Outlet Adapter
27	Condensate Trap
28	Cold Water Inlet Adapter
29	Cold Water Inlet Filter
30	Control Panel
31	OP NTC
32	H/L Overheat Switch
33	Ceramic Heater
34	DHW NTC
35	Condensate Trap Hose
36	Burner Overheat Switch

Flow chart

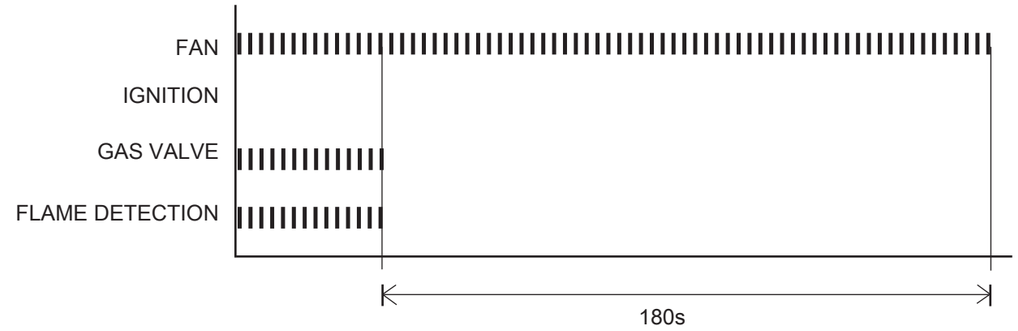


Time chart

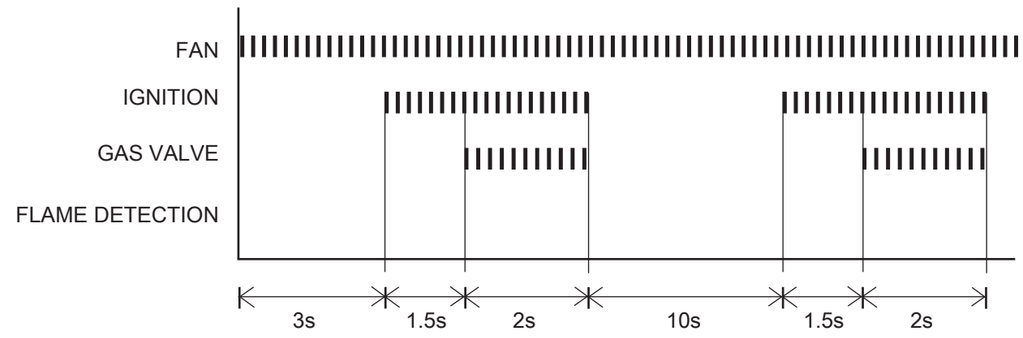
■ If normal ignition



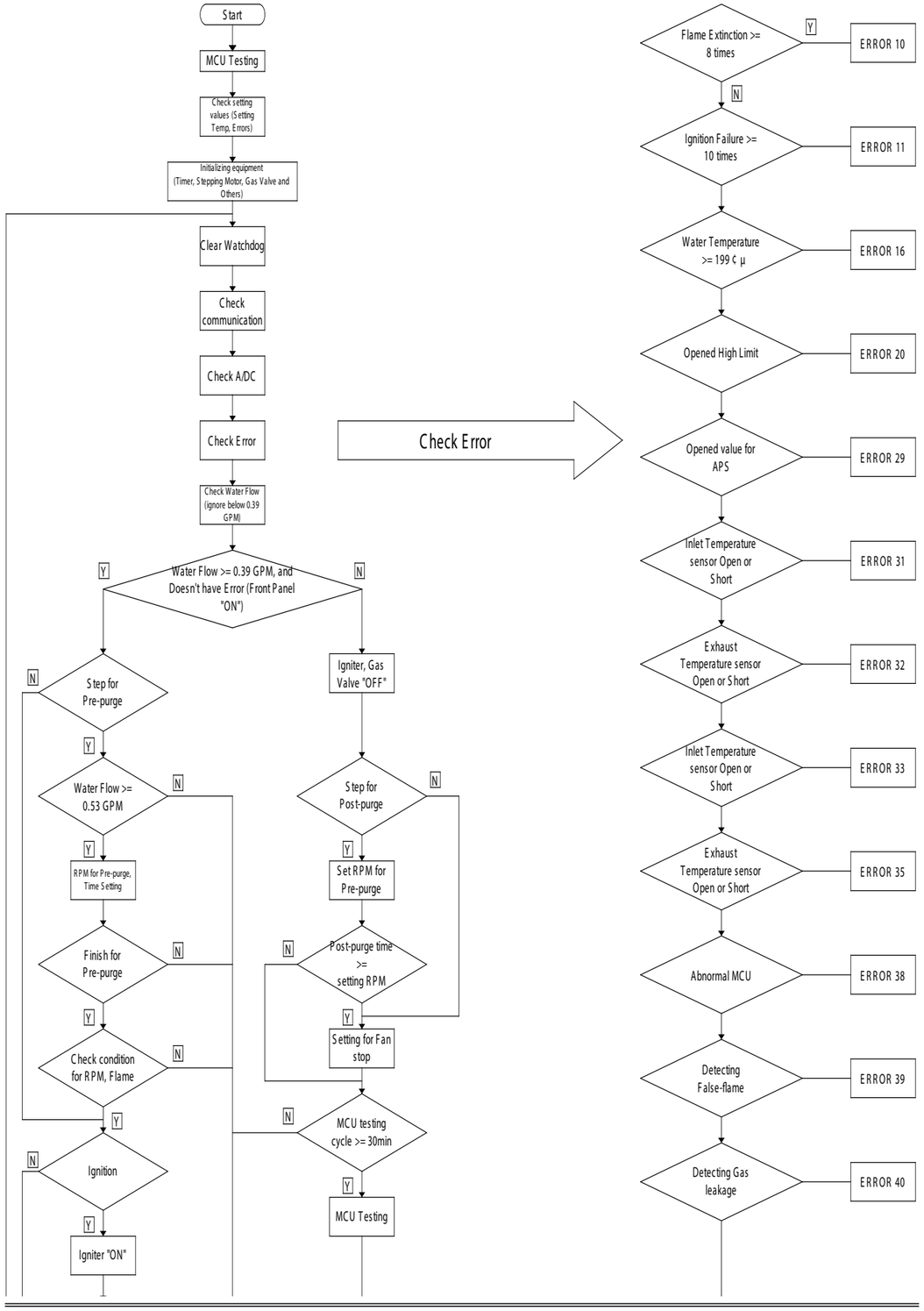
■ If Flame Extinguishes



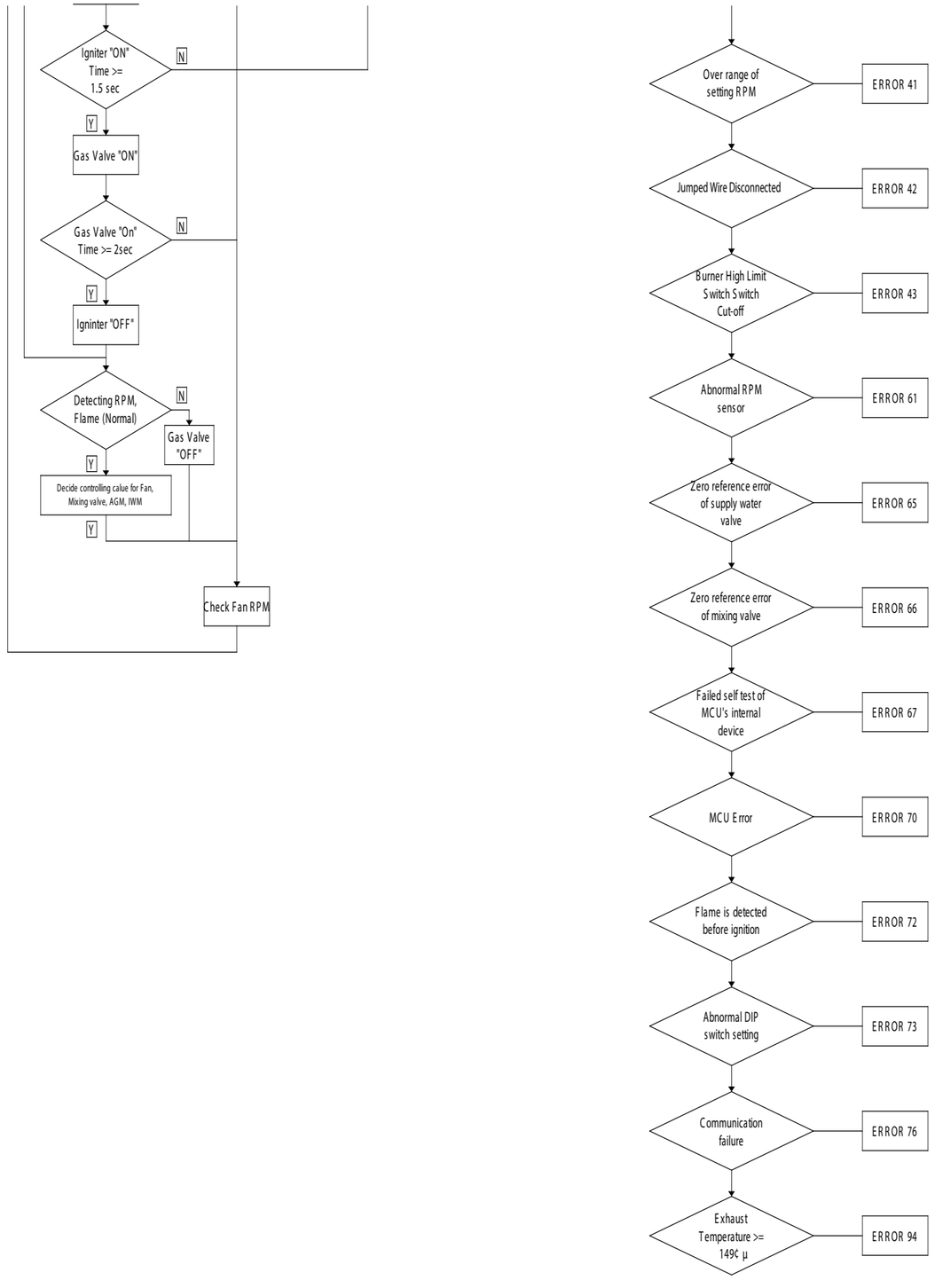
■ If abnormal ignition (Alarm after the 10 trial)



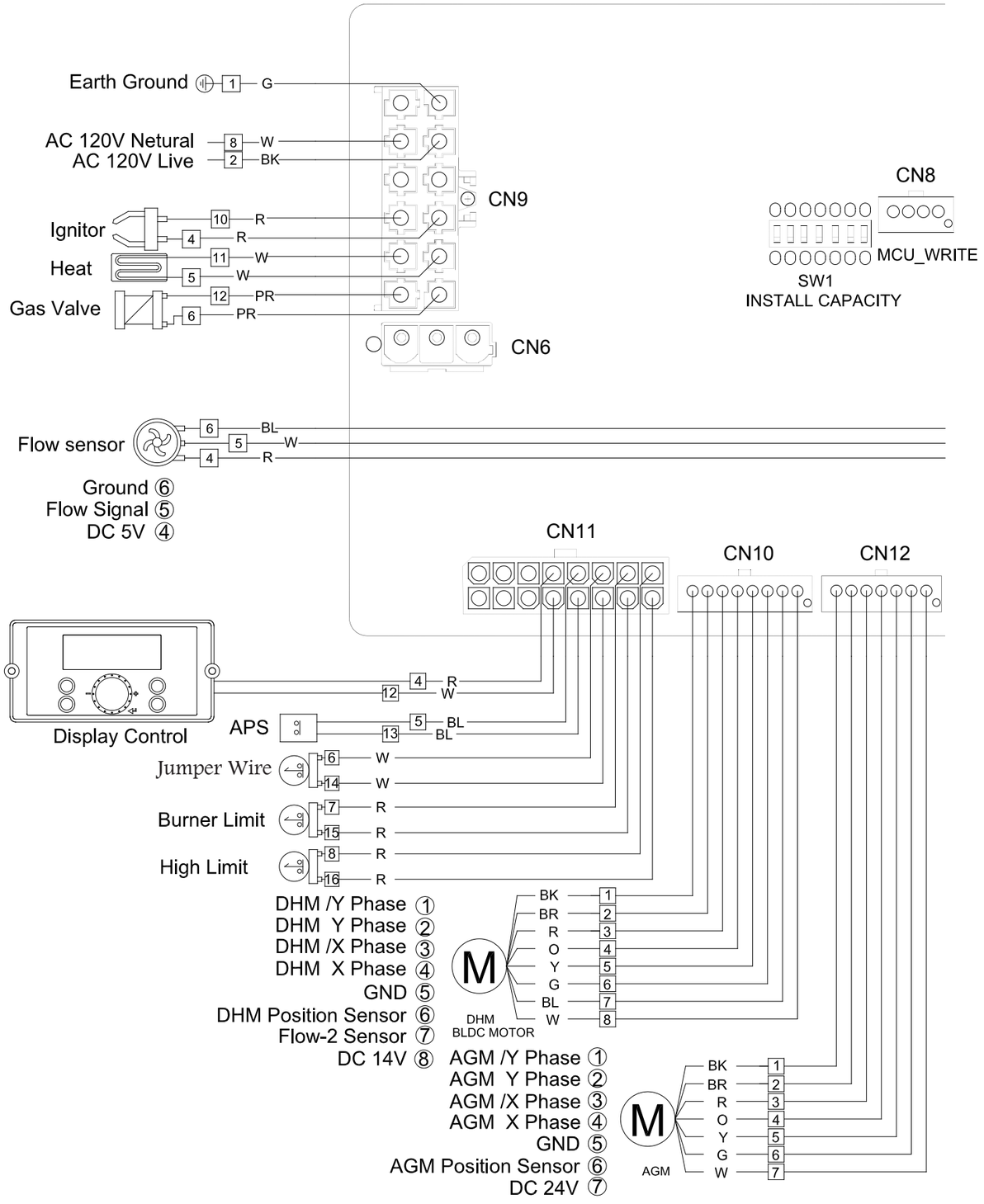
Operation Flow Chart

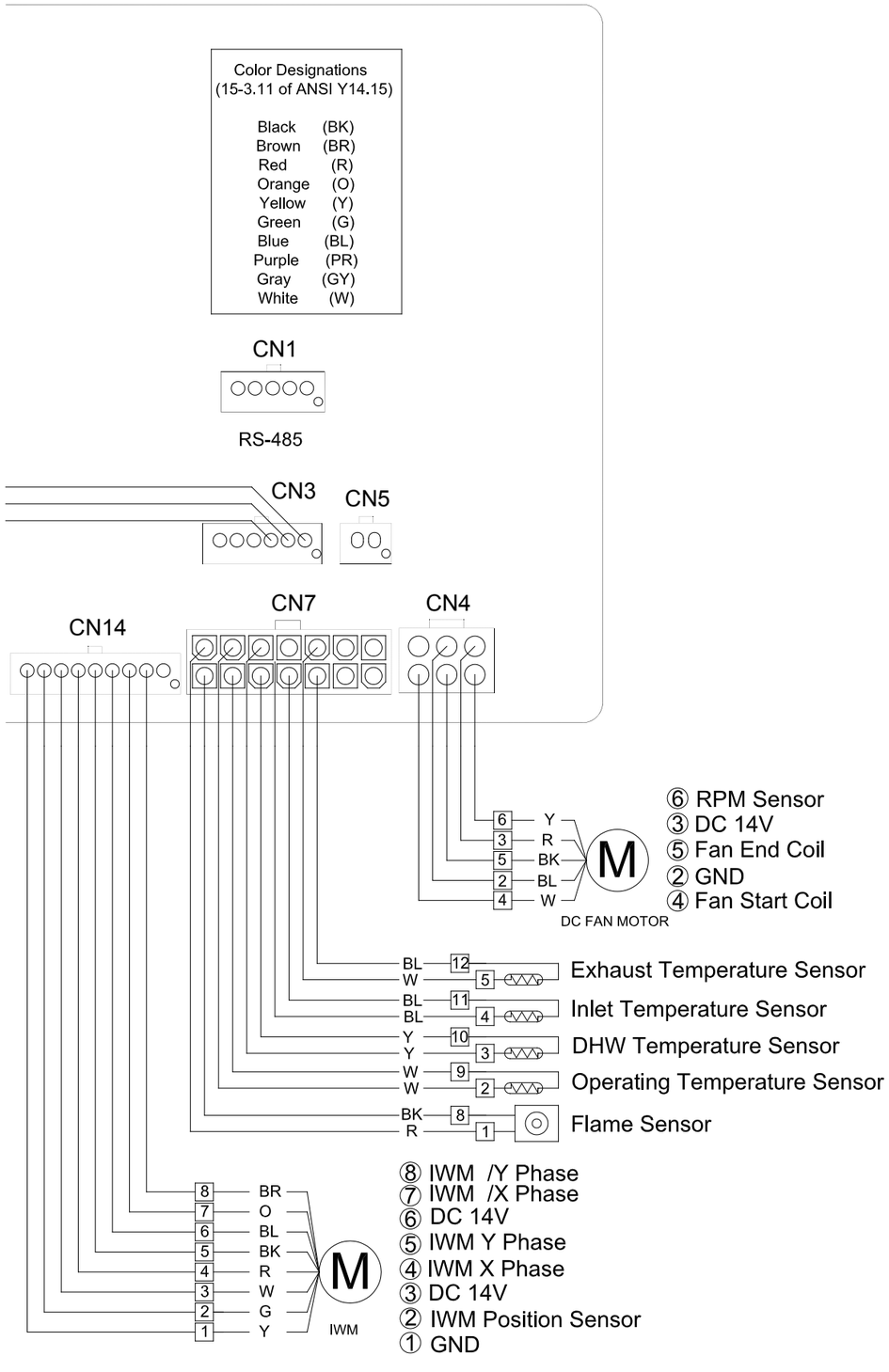


Operation Flow Chart



Wiring diagram

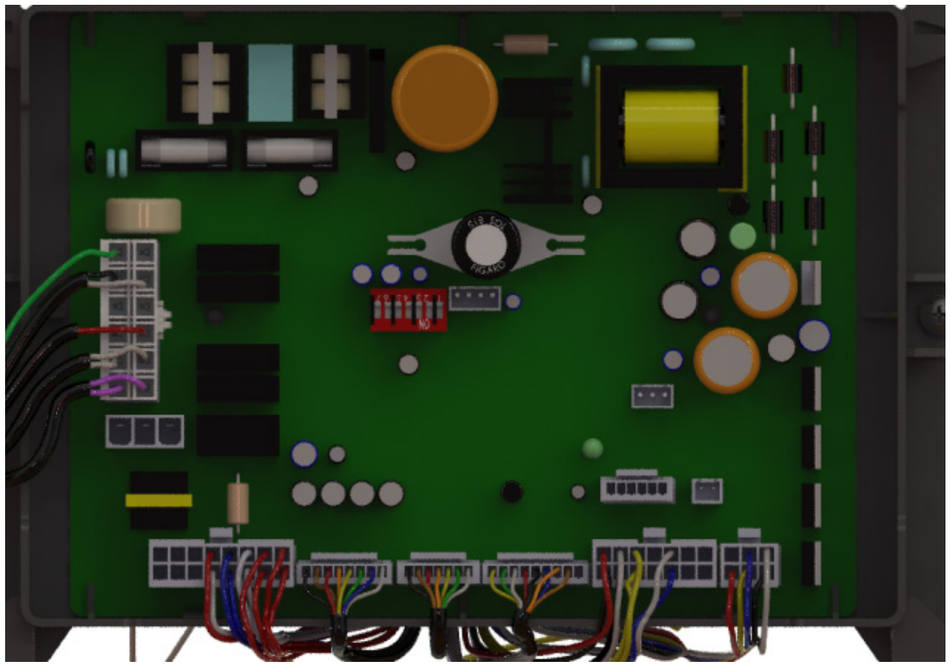




Connector			Descriptions	HT SELV
no. of location and type	Pin nr.	Board Silk		
CN9 65001WS-12	1	-	Unused	-
	2	L	Power Supply Line	HT (120VAC)
	3	CP1	Unused	HT (120VAC)
	4	IT	Igniter	HT (120VAC)
	5	L(HT)	Heater	HT (120VAC)
	6	GV	Gas Valve	HT (120VAC)
	7	⏚	EARTH GROUND	HT (120VAC)
	8	N	Power Supply Neutral	HT (120VAC)
	9-12	⌣ N ⌣	AC Power COM Line	HT (120VAC)
CN1 SMW250-03	1	RS-485	RS485 +	SELV (5VDC)
	2		GND	SELV (5VDC)
	3		RS485 -	SELV (5VDC)
CN4 LWD1140-06	1	FAN	Unused	-
	2		GND	SELV (30VDC)
	3		VDD	SELV (14VDC)
	4		Fan power(start coil)	SELV (30VDC)
	5		Fan power(end coil)	SELV (30VDC)
	6		Fan speed feedback signal	SELV (14VDC)
CN8 SMW250-04	1	MCU ISP	GND	SELV (5VDC)
	2		ISP /Reset port	SELV (5VDC)
	3		ISP TOOL0 Data port	SELV (5VDC)
	4		VCC	SELV (5VDC)
CN11 LWD1140-16	1	HWL	Unused	-
	8			
	2	LWL	Unused	-
	10			
	3	HD	Unused	-
	11			
	4	TH	Connect to the Display Control(Thermostat)	SELV (14VDC)
	12			
	5	APS	Air Pressure Switch	SELV (14VDC)
	13			
	6	EL	Jumper Wire	SELV (14VDC)
	14			
	7	BL	Burner Limit	SELV (14VDC)
	15			
	8	HL	High Limit	SELV (14VDC)
	16			
CN5 SMW250-10	1	RPM	FAN RPM Check	SELV (5VDC)
	2		GND	SELV (5VDC)

Connector			Description	HT SELV
no. of location and type	Pin nr.	Board Silk		
CN7 LWD1140-14	1	F.S	Flame Detect Sensor	SELV (5VDC)
	8			
	2	OP.S	Operation water temperature sensor	SELV (5VDC)
	9			
	3	DH.S	DHW temperature sensor	SELV (5VDC)
	10			
	4	I.S	Inlet water temperature sensor	SELV (5VDC)
	11			
	5	BG.S	Exhaust temperature sensor	SELV (5VDC)
	12			
	6	ST.S	Unused	-
	13			
	7	SP.S	Unused	-
	14			
CN12 SMW250-07	1	AGM	AGM Stepper motor coil /Y phase	SELV (24VDC)
	2		AGM Stepper motor coil Y phase	SELV (24VDC)
	3		AGM Stepper motor coil /X phase	SELV (24VDC)
	4		AGM Stepper motor coil X phase	SELV (24VDC)
	5		GND	SELV (24VDC)
	6		AGM Stepper motor position	SELV (14VDC)
	7		VDD	SELV (24VDC)
CN10 SMW250-08	1	DHM	DHM Stepper motor coil /Y phase	SELV (14VDC)
	2		DHM Stepper motor coil Y phase	SELV (14VDC)
	3		DHM Stepper motor coil /X phase	SELV (14VDC)
	4		DHM Stepper motor coil X phase	SELV (14VDC)
	5		GND	SELV (14VDC)
	6		DHM Stepper motor position	SELV (14VDC)
	7		Unused	SELV (14VDC)
	8		VDD	SELV (14VDC)
CN14 SMW250-09	1	IWM	GND	SELV (14VDC)
	2		IWM Stepper motor position	SELV (14VDC)
	3		VDD	SELV (14VDC)
	4		IWM Stepper motor coil X phase	SELV (14VDC)
	5		IWM Stepper motor coil Y phase	SELV (14VDC)
	6		VDD	SELV (14VDC)
	7		IWM Stepper motor coil /X phase	SELV (14VDC)
	8		IWM power IWM Stepper motor coil /Y phase	SELV (14VDC)
	9		Unused	-
CN3 SMW250-06	1	WPS	Unused	SELV (5VDC)
	2		Unused	SELV (5VDC)
	3		Unused	SELV (5VDC)
	4	FLUX1	VCC	SELV (5VDC)
	5		Water Flow Sensor	SELV (5VDC)
	6		GND	SELV (5VDC)

Description/Part #	Main Control Board / 7850P-058	Check Point (Main PCB)	N/A
Function	This part controls all components contained in the water heater		
Failure Event	Abnormal main controller operation.		
Effects	When the main controller has abnormal condition, components may not operate properly.		
Error Code	Er 38		
Diagonostic	Check each connection and/or wires damage on the PCB		
Color / Wire Number	N/A		



Description/Part #	HX Temperature Sensor / 7850P-081 Exhaust Temp. Sensor / 7850P070 Water Outlet Sensor / 7850P-019 Water Inlet Sensor / 7850P-015	Check Point (Main PCB)	CN7
Function	The controller compares each sensor with setting temperature then goes to safety shutdown when measured temperature is over setting temperature.		
Failure Event	Sensor malfunction or overheating condition is detected.		
Effects	Improper temperature measurement.		
Error Code	Er 16, Er 31, Er 33, Er 35		
Diagonostic	① Check temperature sensors wiring connection. ② measure sensor resistance using a multi meter.		
Color / Wire Number	① Exhaust temperature sensor (white/blue) : Connector ⑤,⑫ ② Water Inlet temperature (blue/blue) : Connector ④,⑪ ③ Heat Exchanger Temperature Sensor (white/black) : Connector ②,⑨ ④ Water Outlet Temperature (yellow/yellow) : Connector ③,⑩		

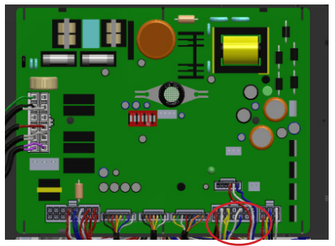
NO	Item	Standard	
1	Temperature – Resistance Type Idling Condition	Temperature(℃)	Resistance(kΩ)
		0 ± 0.1 ℃	-10.99
		25 ± 0.1 ℃	-3.906
		85 ± 0.1 ℃	0.552 ± 3%
		Blank is for reference measurement	
2	B Fixed Number (25/85)	3482.4K ± 2%	
3	Fixed Number of Heat dissipation	2.5mW/℃ (Min.) (While not boiling)	
4	Fixed Number of Heating	8(15)Sec (Max)(63.2% reaching time while boiling)	
5	Range of Workable Temperature	-4 ~ 230 F	

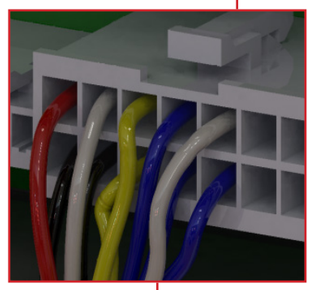
Heat Exchanger temperature

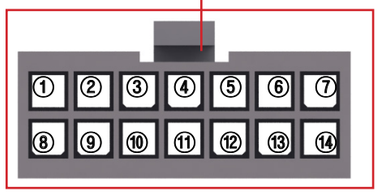
Exhaust temperature Sensor

Water outlet temperature sensor

Water inlet temperature sensor

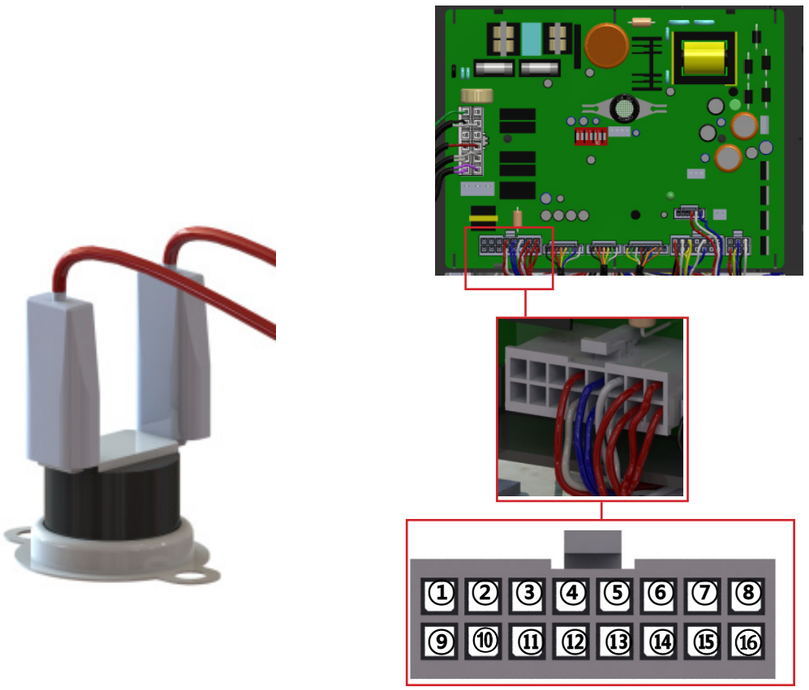






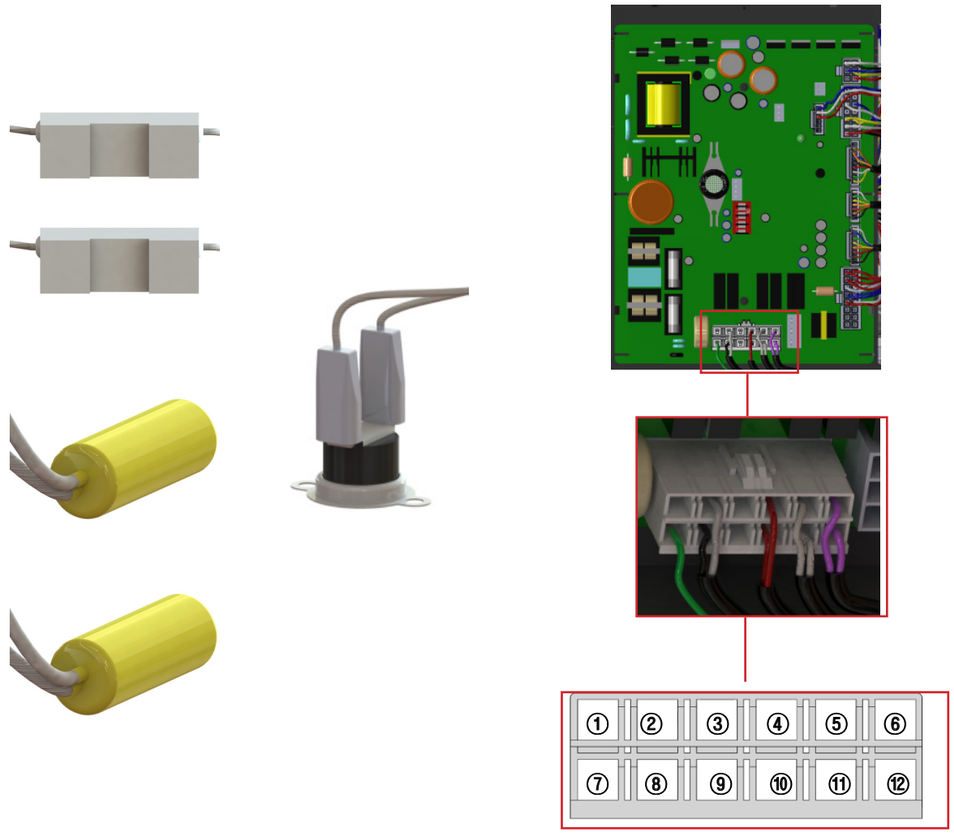
CN7

Description/Part #	Burner Overheat Switch / 7850P-009	Check Point (Main PCB)	CN9 ,CN11
Function	Bunner Overbheat Switch prevents damages to the burner plate caused by temperature exceeding 302 F.		
Failure Event	Detects overheating temperature is switch has an obnormal condition.		
Effects	Water Heater shuts down if burner plate temperature exceeds the setting temperature		
Error Code	Er 20, Er 43		
Diagonostic	① Check the connection around the burner overheat switch and measure resistance by using a multi meter. ② Check the Dip Switch setting. ③ Check gas orifice nozzles.		
Color / Wire Number	① Burner case (Red) : Connector ⑦,⑮ ② Heat exchanger outlet pipe (Red) : Connector ⑧,⑯		



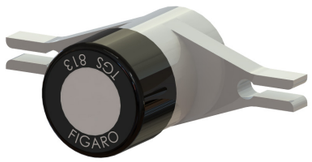
CN9, CN11

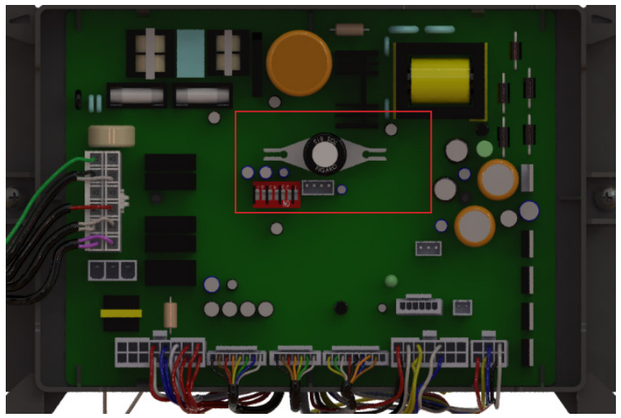
Description/Part #	Freeze protection heater / 7850P-076	Check Point (Main PCB)	CN9
Function	This components prevents the water piping from freezing when water temperature in the pipes is lower than 33 F.		
Failure Event	When temperature is lower than 33 F or ceramic heater is not working properly.		
Effects	Damage of the product is caused by freezing condition.		
Error Code	N/A		
Diagonostic	Check the connection around the ceramic heater.		
Color / Wire Number	Ceramic Heater (White) : Connector ⑤,⑪		



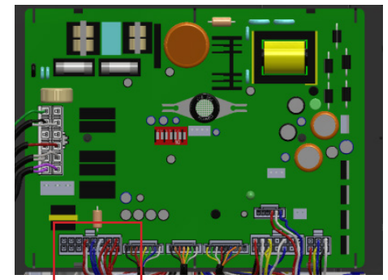
CN9

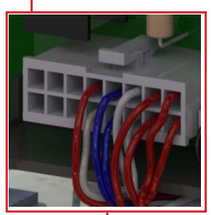
Description/Part #	Gas Leak Detection Sensor / 7850P-093	Check Point (Main PCB)	N/A
Function	This senosr shutsdown the unit if gas leak is detected		
Failure Event	Gas leak detection sensor is not operating properly		
Effects	Risk of explosion and personal injury		
Error Code	Er 40		
Diagonostic	① Follow instruction on the first page of the manual. Check for leakage around the gas valve and gas piping by using soapy water. ② Check the burner assembly		
Color / Wire Number	N/A		

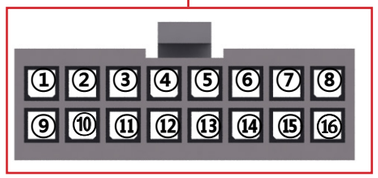




Description/Part #	Jumper Wire Connection / 7850P-096	Check Point (Main PCB)	CN 11
Function	This part is used to jump out circuit		
Failure Event	Jumper is disconnected.		
Effects	Th unit shuts down.		
Error Code	Er 42		
Diagonostic	① Make sure the jumper is properly connected.		
Color / Wire Number	Jumped wire connection (white) : connector ⑥,⑭		

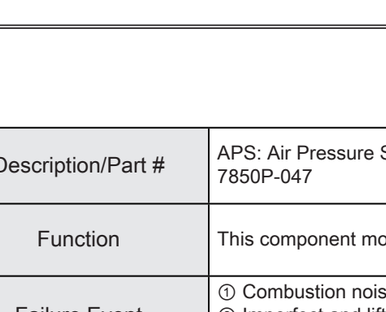


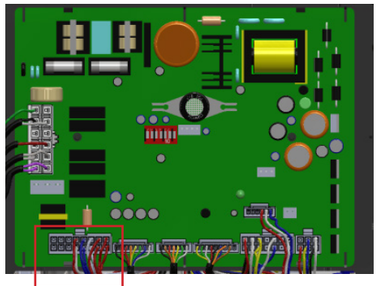


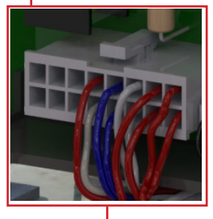


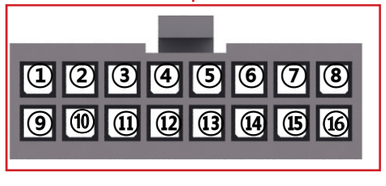
CN11

Description/Part #	APS: Air Pressure Switch / 7850P-047	Check Point (Main PCB)	CN 11
Function	This component monitors the flue for blockage.		
Failure Event	① Combustion noise is generated. ② Imperfect and lifting flame occurs. ③ The unit will not ignite.		
Effects	Pressure due to exhaust blockage will affect the water heater operation.		
Error Code	Er 29		
Diagonostic	① Check APS wiring connection ② Check the hose for blockage or kinking. ③ Check exhaust vent for blockage ④ Check APS resistance using a multi meter.		
Color / Wire Number	Air pressure switch (blue) : connector ⑤, ⑬		



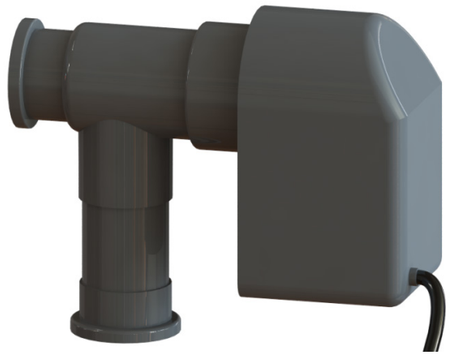




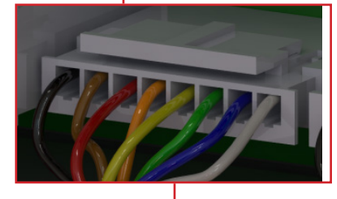


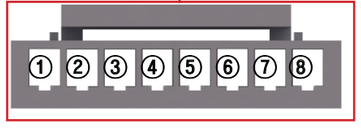
CN11

Description/Part #	Mixing Valve / 7850P054	Check Point (Main PCB)	CN 10
Function	This component controls DHW outlet temperature by mixing cold and hot water.		
Failure Event	① Water flow is not detected and/or water leakage occurs around the mixing valve. ② Abnormal mixing valve operation.		
Effects	① Ignition sequence does not start. ② Operation of product is stopped once water leakage is detected.		
Error Code	Er 66		
Diagonostic	① Restart the product. ② Check the connection around the mixing valve.		
Color / Wire Number	[Mixing Valve] DHM Y Phase (black) : connector ① DHM Y Phase (brown) : connector ② DHM X Phase (red) : connector ③ DHM X Phase (orange) : connector ④ GND (yellow) : connector ⑤ DHM Position sensor (green) : connector ⑥ Flow2 sensor (blue) : connector ⑦ DC 14V (white) : connector ⑧		



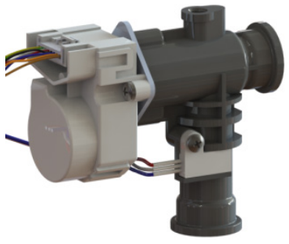
1. Cold water and hot water mixed
2. Step Control Motor Applied.
3. Operating Fluid : 0℃~80℃ (32 ~ 176℉)
4. Operating Pressure: 0~0.98Mpa
5. Supply Voltage : DC24V
6. PPS material Body
7. DHM : Domestic Hot water Mixing Modulation



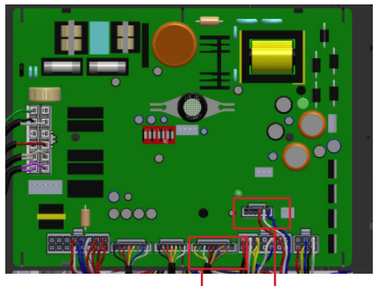


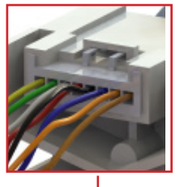
CN10

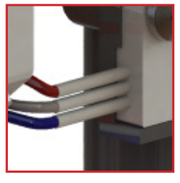
Description/Part #	Flow Control Valve / 7850P-053	Check Point (Main PCB)	CN 14, CN 3
Function	The component detects water flow and regulates water flow rate in order to supply stable hot water (More than 0.5 GPM).		
Failure Event	Water flow rate is not detected and water leakage occurs around the flow control valve.		
Effects	① Ignition sequence does not start. ② Operation of product is stopped once water leakage is detected.		
Error Code	Er 65		
Diagonostic	① Restart the unit ② Check the connection around the flow control valve.		
Color / Wire Number	[IWM (Inlet Water Modulation)] GND (yellow) : connector ① IWM Stepper motor position (green) : connector② VDD (white) : connector ③ IWM Stepper motor coil X phase (red) : connector ④ IWM Stepper motor coil Y phase (black) : connector ⑤ VDD (blue) : connector ⑥ IWM Stepper motor coil /X phase (orange) : connector ⑦ IWM Stepper motor coil /Y phase (brown) : connector ⑧		

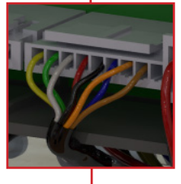


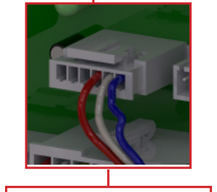
1. PPS material Body
2. Hall sensor rated voltage
   DC5~24V 10mA. Max
3. Operating Fluid :
   0℃~80℃ (32 ~ 176℉)
4. Operating range :
   1.2 ~ 30ℓ (0.32 ~ 8 gpm)



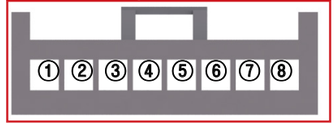


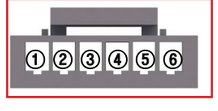


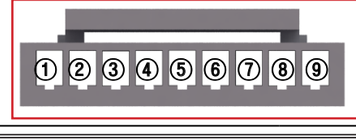




VCC (red) : connector ④
Water flow sensor (white) : connector ⑤
GND (blue) : connector ⑥



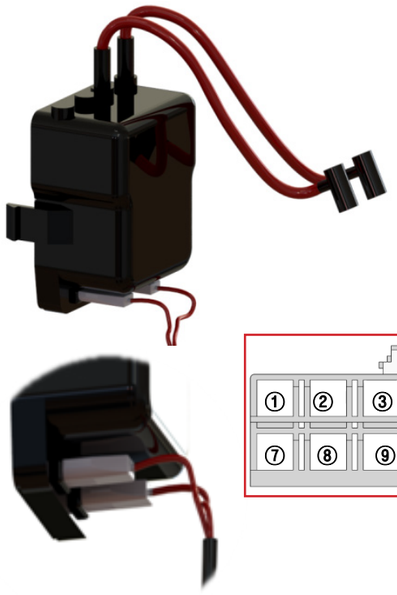


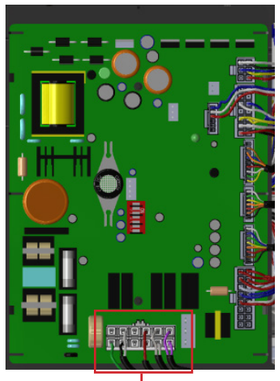


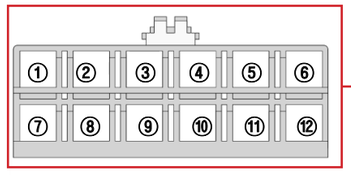
Description/Part #	Inlet Water Filter / 7850P-017	Check Point (Main PCB)	N/A
Function	This component consists of durable STS, PPS material for filtering out debris and heavy metals.		
Failure Event	Input capacity of cold water is not constant and thermal efficiency is poor.		
Effects	Noise at the heat exchanger is generated and pipes are blocked by the debris.		
Error Code	N/A		
Diagonostic	Clean the Cold water inlet filter.		
Color / Wire Number	N/A		

Description/Part #	Ignition Transformer / 7850P-045	Check Point (Main PCB)	CN 9
Function	Generates sparks energy to ignite the fuel.		
Failure Event	Sparks energy is not generated.		
Effects	The unit does not ignite.		
Error Code	Er11		
Diagonostic	① Check wiring for proper connection ② Check voltage range		
Color / Wire Number	Ignition Transformer (red) : connector ④ Ignition Transformer (red) : connector ⑩		

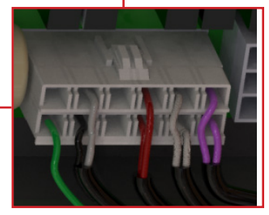
Input voltage	Output current	Output voltage
120V 60Hz	15 ± 2kW	6 ± 2mA



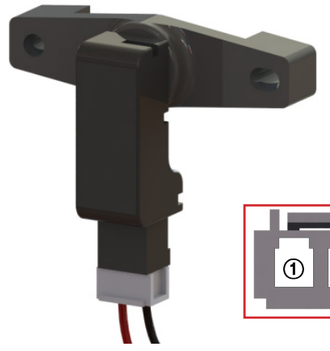




CN9

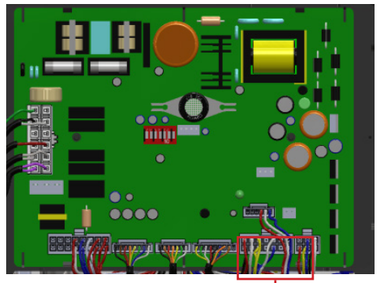


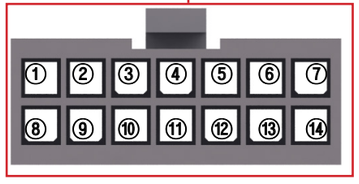
Description/Part #	Flame Detection Sensor / 7850P-031	Check Point (Main PCB)	CN 7
Function	Detects flame during combustion		
Failure Event	Ignition fault.		
Effects	Abnormal product operation.		
Error Code	Er 11, Er 39, Er 72		
Diagonostic	① Check the discoloration of flame monitoring window. ② Check the connection around the flame detection sensor.		
Color / Wire Number	Flame Detect Sensor (red) ① : connector ① Flame Detect Sensor (black) ② : connector ⑧		



1. Electrical Characteristics
 - Maximum workable voltage :DC 35V
 - Maximum allowable current :DC 30mA
 - Maximum power dissipation :DC 80mW

2. Optical characteristics
 - Dark current : 0.05uA/ MAX (0.6uA)
 [Condition: 0LX (Intensity of illumination),
 10V(Voltage)]
 - Spectrum luminosity curve
 : 880nm (Peak Sensitivity)
 - Range of sensing : 800 ~ 1000nm

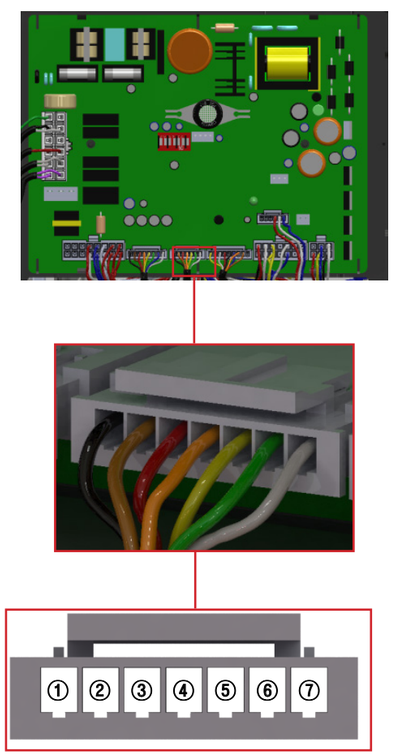




CN7

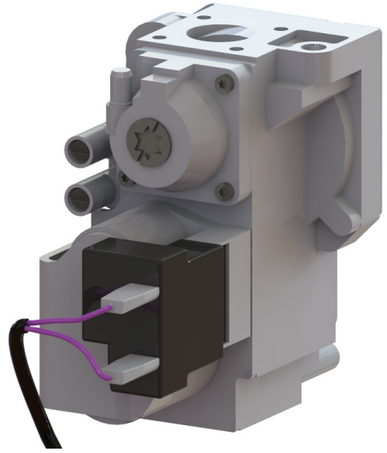
Description/Part #	Air Gas Mixer / 7850P-004	Check Point (Main PCB)	CN12
Function	The component provides proper air and gas mixture to the burner.		
Failure Event	① Imperfect combustion occurs. ② lifting flame occurs.		
Effects	① Abnormal product operation. ② Carbon monoxide exceeding the reference.		
Error Code	Er 67		
Diagonostic	① Restart the water heater. ② Check wiring for proper connection. ③ Check the fan intake.		
Color / Wire Number	Air Gas Mixer (black) : ① connector (AGM/Y Phase) Air Gas Mixer (brown) : ② connector (AGM/Y Phase) Air Gas Mixer (red) : ③ connector (AGM/X Phase) Air Gas Mixer (orange): ④ connector (AGM/X Phase) Air Gas Mixer (yellow) : ⑤ connector (GND) Air Gas Mixer (green) : ⑥ connector (AGM Position Sensor) Air Gas Mixer (white) : ⑦ connector (DC 24V)		

1. Operating Temperature : 32~140 F
2. Using the gas pressure : 5 kPa
3. Maximum amount of gas: 5.5m3/hr (LNG)
4. T/D(Turn/Down ratio) : 1 : 10
5. Motor Specification
   - Type : Stepping Motor
   - Phase : 4 Phase
   - Drive type : Unipolar Drive / V-Constant
   - Supply Power : 24v DC
   - Phase excitation system : 2-2
   - Step angle : 7.5 deg(2-2Phase), (1-2 Phase : 3.75 deg)
   - Direction of rotation : CW / CCW (Bidirectional)
   - Reduction ratio : 1 / 60

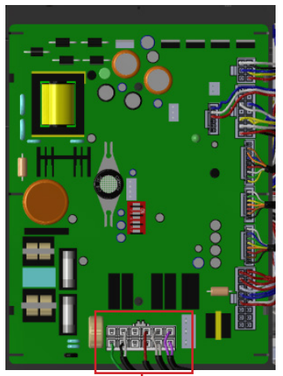


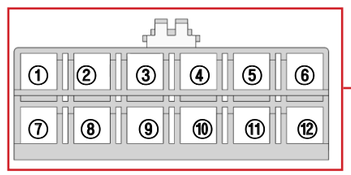
CN12

Description/Part #	Gas Valve / 7850P-012	Check Point (Main PCB)	CN9
Function	Negative gas valve controls the regulation of gas and air mixture in the combustion system.		
Failure Event	① Gas leakage occurs. ② Gas valve does not operated. (Unable to open/close) ③ Gas flow is not modulated. (Proportional gas valve)		
Effects	① Spark is not generated.. ③ Operation of product is stopped. ④ Carbon monoxide exceeding the reference is discharged.		
Error Code	Er 10		
Diagonostic	① Check wiring for proper connection. ② Check the connection and mounting location. ③ Check resistance by using a multimeter.		
Color / Wire Number	Gas Valve (purple) : connector ⑥, ⑫		

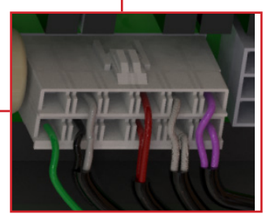


1. Backpressure
   : 1st valve: 50 mbar
   : 2nd valve: 10 mbar
2. Ambient temperature:
   : -15℃ ... 70°C (5 ~ 158°F)
3. Max inlet pressure: 60 mbar
4. Operating Ratings: 24 V /50 Hz
5. Electrical Load
   : 1st + 2nd operator 420mA at 24 V RAC

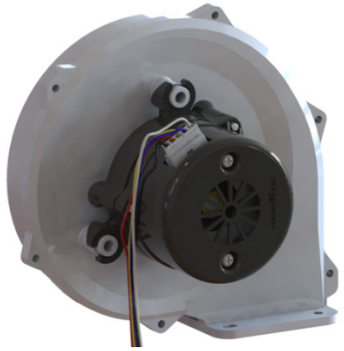


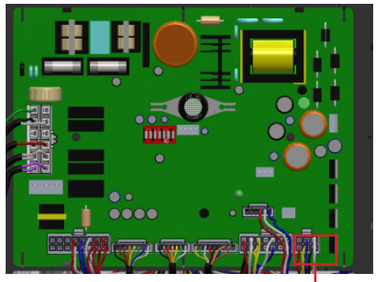


CN9

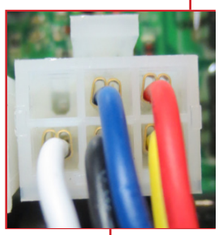


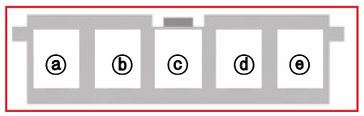
Description/Part #	BLDC Fan / 7850P-002	Check Point (Main PCB)	CN4
Function	Supplies ir and fuel to the burner.		
Failure Event	① Abnormal noise occurs at the fan. ② Abnormal fan speed(RPM). ③ Poor connection.		
Effects	① Abnormal combustion. ② Abnormal noise occurs. ③ The unit does not operated.		
Error Code	Er 41		
Diagonostic	① Check vent blockage ② Check BLDC fan wiring for proper connection ③ Check voltage range using a multimeter.		
Color / Wire Number	[BLDC FAN] GND (blue) ⓒ : connector ② ,30vDC Fan start coil (white) ⓔ : connector ④ ,30vDC Speed feedback signal(yellow) ⓓ : connecotr ⑥ ,30vDC DC 14V (red) ⓑ : connector ③ ,14vDC Power(black) ⓐ : connector ⑤ ,30vDC		

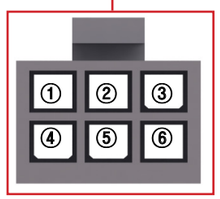




1. Rated Specifications
   - Motor type : DC BRUSHLESS MOTOR
   - Rated Voltage : Vs = 24V / Vc = 12V
   - Working Voltage : Vs = 10 ~ 24V / Vc = 12±1.2V
   - Working Ampere : As = 140 ~ 800 / Ac = 17±1.7
   - Control System : PWM







CN4

Description/Part #	Metal Fiber Premix Burner / 7850P-011	Check Point (Main PCB)	N/A
Function	The component supplies the heat source by mixing and combusting the air and gas.		
Failure Event	① Unable to initialize/sustain combustion. ② Soot occurs on the surface of burner. ③ Gas leakage occurs from burner.		
Effects	① Abnormal combustion. ② Unstable flame generation. ③ Ignition failure.		
Error Code	N/A		
Diagonostic	Visual inspection: Unstable flame conditions during operation.		
Color / Wire Number	N/A		

Description/Part #	Heat Exchanger(STS) / 7850P-032	Check Point (Main PCB)	N/A
Function	The component heats the water by absorbing high-temperature heat generated by the burner.		
Failure Event	① Water or exhaust gas leakage through the crack. ② Abnormal heat exchange.		
Effects	① Operation of product is stopped. ② Exhaust gas leakage. ③ Abnormal noise occurs.		
Error Code	Er33, Er94		
Diagonostic	Check the crack on the surface of heat exchanger.		
Color / Wire Number	N/A		

Description/Part #	Condensate Trap / 7850P-014	Check Point (Main PCB)	N/A
Function	The component reliably discharges the condensate generated by the combustion.		
Failure Event	Unneutralized condensate is discharged.		
Effects	Product corrosion and environmental degradation are caused by the condensate.		
Error Code	Er41		
Diagonostic	Check the hose for blockage or bending.		
Color / Wire Number	N/A		

■ Function explanation

[Initial power-up condition]

When power is supplied, zero point of the mixing valve is checked for 6 seconds. After that, normal 800 steps function is in progress. At this time, if zero point is not confirmed, Er 66 occurs. After error is automatically restored when zero point was confirmed, normal 800step function is in progress.

[DHW mode]

DHW mode is activated by the flow sensor sensing flow of 0.5 GPM or above. When there is DHW demand, flow sensor monitor the frequency (range: 8Hz to12Hz), within 2 minutes. DHW temperature can be set 95~140°F(35°C~60°C). If there is DHW demand, burner starts and mixing valve operates automatically.

Safety device function

[Power supply and frequency stability protection]

If the power supply voltage is less than 90V input for 10 seconds, error code will be displayed, and all outputs will be stopped except for the fan post-purge. The error will automaticall reset when voltage is abore 100V.

The reference frequecy value is determined by checking the power supply frequency 50Hz or 60Hz. If frequency is outside the range of ± 3Hz from the reference frequency, error code will be displayed, and all outputs will be stopped except for the fan post-purge. The error will automaticall reset when the frequency is whithin ± 3Hz of frequency standards.

[Over-heating protection]

The water heater has two overtemperature switch. Over temperature switch is attached to the burner and the outlet side against the failure of the temperature sensor dual protection device. Overheat error occurs when the temperature switch is open and close until the fan is operated.

[Gas leakage detecting]

The controller is designed with a builtin gas leak detection sensor that will shut the unit down in case of gas leak. A fault code will occur if the sensor detects gas leak for more than 10 minutes or 3 times in 1 hour.

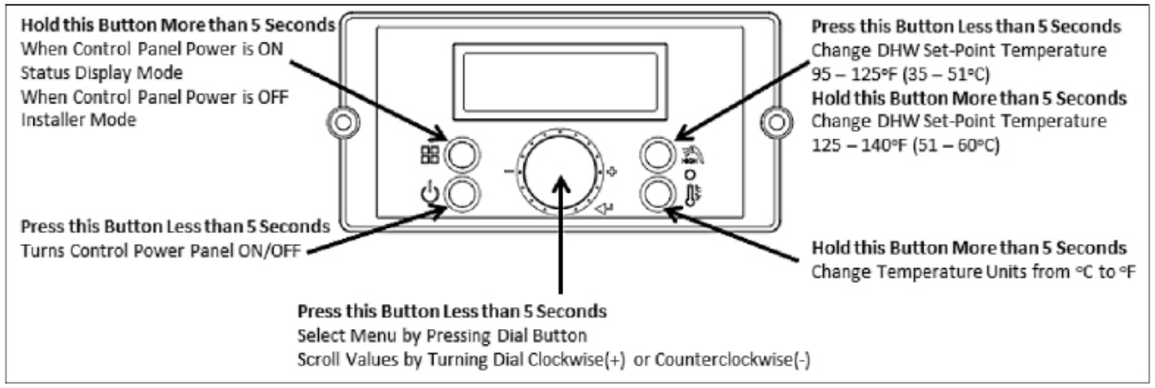
[Mixing valve operation]

During a DHW demand, mixing valve modultaes to control the DHW outlet temperature by mixing the cold and hot water. When there is no DHW demand, mixing valve stands vy at 800 steps. To prevent the mixing valve mechanism from getting stuck, it moves 2,000 steps (fully closed) for 5 sec, then moves to default position (fully opened) and finally back to 800 step.

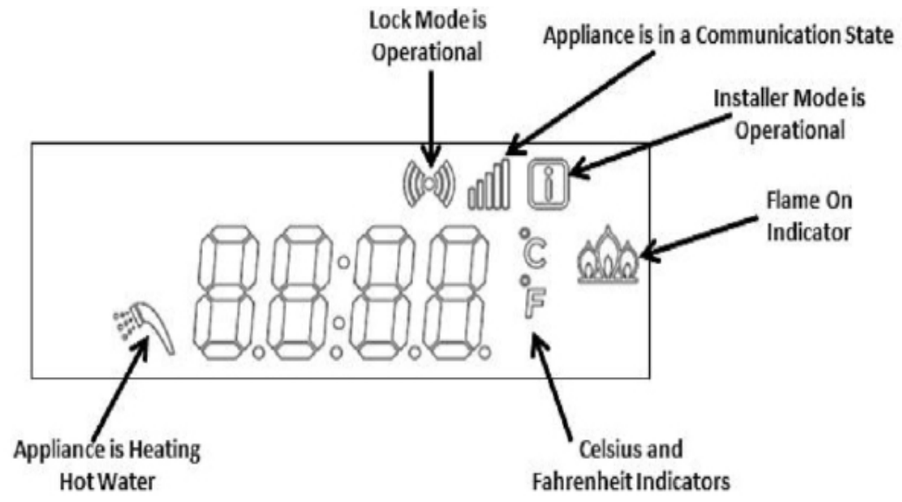
■ Control panel

Customized Temperature Control

Advanced technology used for the flow sensor and heat capacity control makes domestic hot water highly efficient by maintaining constant temperature during usage.



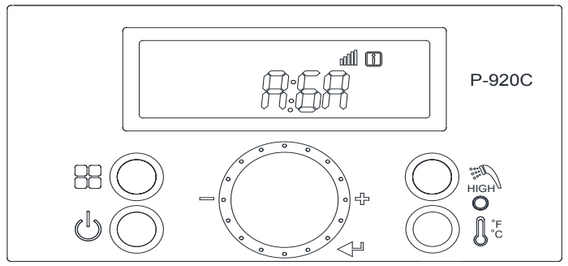
■ Controller LCD Specification



■ Control Panel Mode

Status display mode

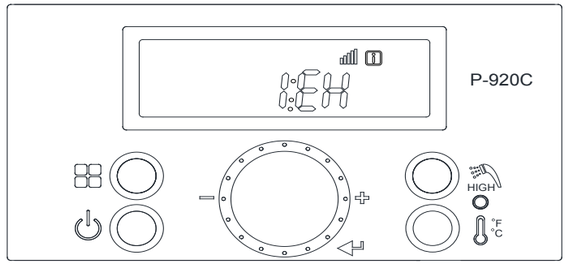
Status display mode will be activated when button B is pressed and held for five seconds when display panel is powered ON.



Parameter		Detail	Description
A: Li or A: GA		Flow 1	Current Flow Value (Li: Liters/min, GA: Gallons/min)
b: Fr		Fan rpm	Current Fan RPM Value
C: Lc		Lock Mode	Lock Mode is In Use (ON) or Unused (OFF) Allows user to lock out any temperature change.
d: oP		OP Temperature	Current Operating Temperature
E: dH		DHW Temperature	Current DHW Temperature
F: Eh		Exhaust Temperature	Current Exhaust Temperature
h: In		Inlet Temperature	Current Inlet Temperature
L:rt		Running Time	Display Running Time
L:rt	1: PH	Power Supply Time	Power Supply Time: 100 hour increments
	2: rh	Burner Operating Time	Burner Operating Time: 1 hour increments
	3: rH	Burner Operating Time	Burner Operating Time: 1,000 hour increments
	4: It	Ignition Attempts Number	Ignition Attempts Number: 10 times unit displayed
	5: IH	Ignition Attempts Number	Ignition Attempts Number: 10,000 times unit displayed
J: AG		N/A	N/A

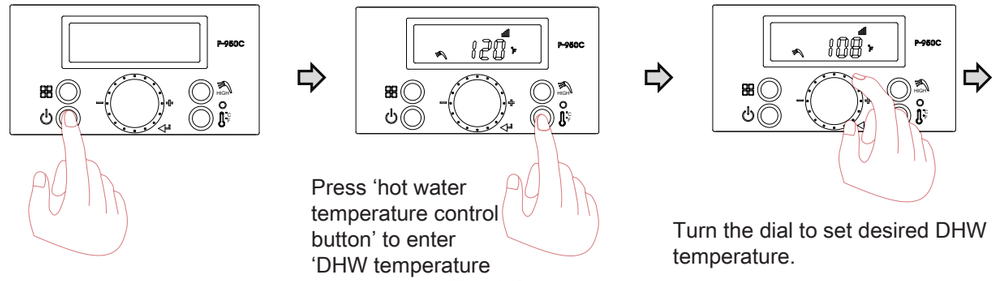
Installer Setting Mode.

Status display mode will be activated when button B is pressed and held for five seconds when display panel is powered OFF.



Index	Default	Parameter	Description
1: EH	E0:00	History	Most Recent History Error Codes (H0 – H9)
2: cE	OFF	Clear Error History	Clears Error History
3: In	OFF	System Reset	Restores System to Default Settings (Burner operation time, Ignition cycles, and Supply power time will not be reset) Range: ON or OFF
4: Fu	GA	Flow Unit	Displays Flow Rate in Liters/Minute or Gallons/Minute Range: GA or Li
5: FH	00	N/A	N/A
6: FL	00	N/A	N/A
7: dr	NO	Reset Burner Operation Time	Reset Burner Operation Time
8: dI	NO	Reset Number of Ignition	Reset Number of Ignition
9: HA	-	N/A	N/A
10: Cn	00	N/A	N/A
11: CI	01	N/A	N/A
12: Eh	ON	N/A	N/A

Domestic Hot water temperature control (Range: 95 ~ 122°F)



Press power button to turn on the unit.

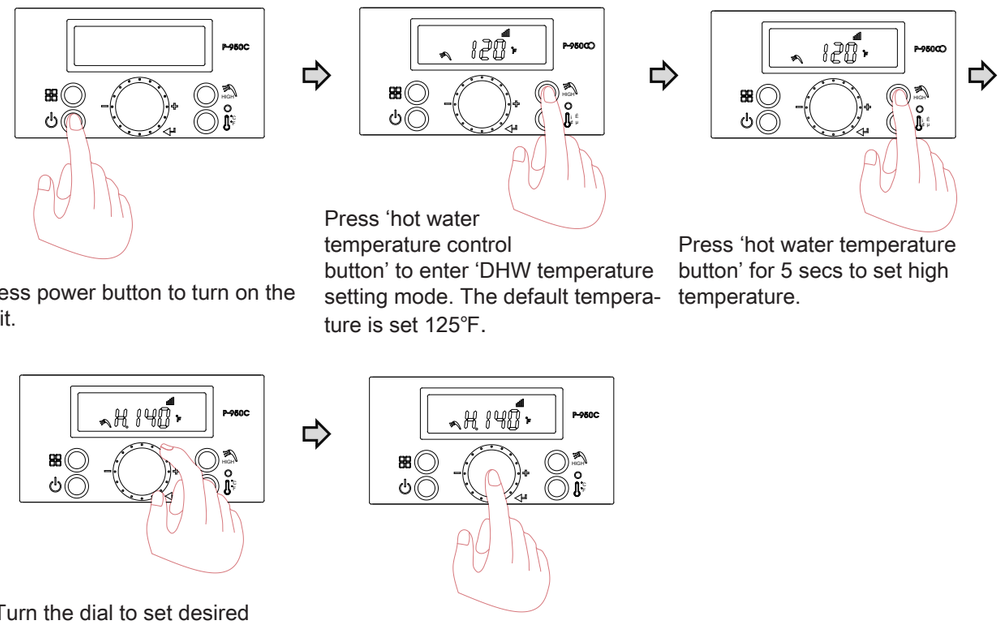
Press ‘hot water temperature control button’ to enter ‘DHW temperature setting mode. The default temperature is set to 125°F.

Turn the dial to set desired DHW temperature.

Press ‘dial button’ to complete setting.

Press ‘heating water temperature button’ for more than 5secs to convert temperature unit (F or C).

Domestic Hot water high temperature control (Range: 121°F ~ 140°F)



Press power button to turn on the unit.

Press ‘hot water temperature control button’ to enter ‘DHW temperature setting mode. The default temperature is set 125°F.

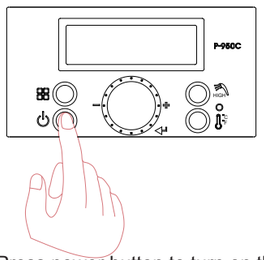
Press ‘hot water temperature button’ for 5 secs to set high temperature.

Turn the dial to set desired DHW temperature.

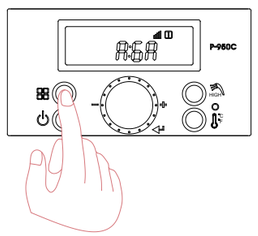
Press ‘dial button’ to complete setting.

View System Parameters

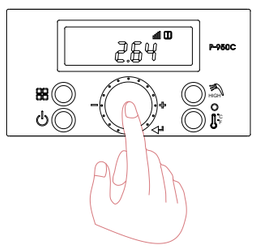
Water flow rate (GPM or LPM)



Press power button to turn on the unit.

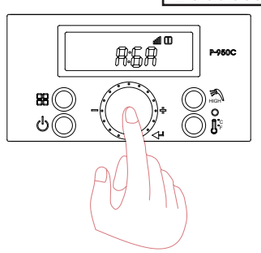


Press ‘current status’ for 5 secs and ‘A:GA’ will show up.



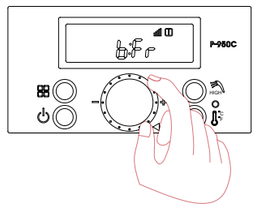
Water flow status will be displayed. (ex : 2.64)

Default setting in common.

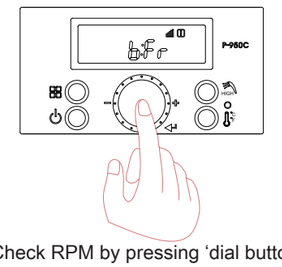


Press ‘dial button’ for a sec again, to go back to the previous mode.

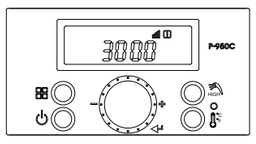
Fan Speed (RPM)



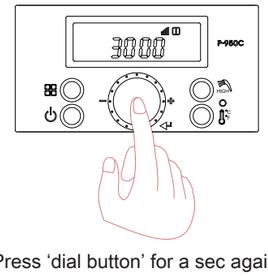
After ‘A:GA’ has been displayed by pressing ‘current status button’ for 5 secs, turn the dial until it shows ‘b:Fr‘.



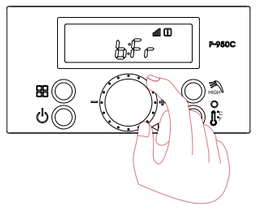
Check RPM by pressing ‘dial button’ for 1 sec when ‘b:Fr’ shows up



Fan RPM’s current status will be displayed.(ex : 3000rpm)

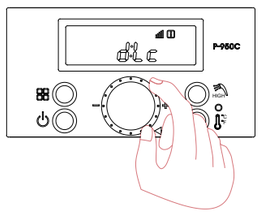


Press ‘dial button’ for a sec again, to go back to ‘b:Fr’ mode.

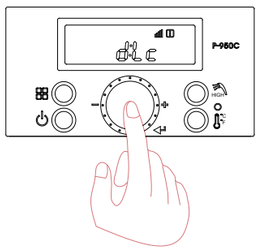


Press ‘current status’ button with ‘b:Fr’ mode to go back to the initial status.

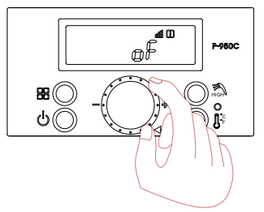
Program Lock mode



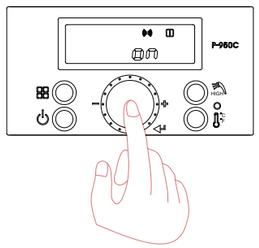
After ‘A:GA’ has been displayed by pressing ‘current status button’ for 5 secs, turn the dial until it shows ‘d:Lc‘.



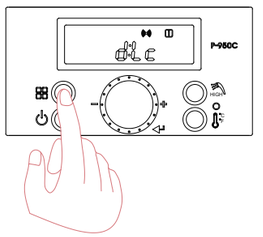
Press the dial button for 1 sec when ‘d:Lc‘ shows up.



Turn the dial until current status ‘off’ mode turns into ‘on’.

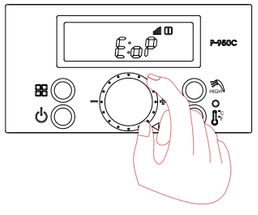


Press ‘dial button’ for a sec again, to go back to ‘d:Lc‘ mode.

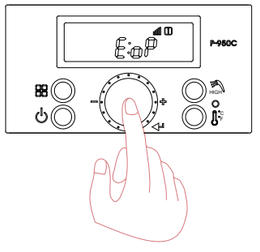


Press ‘current status’ button with ‘d:Lc‘ mode to go back to the initial status.

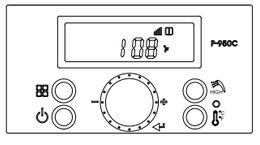
Operating Temperature from the Heat Exchanger



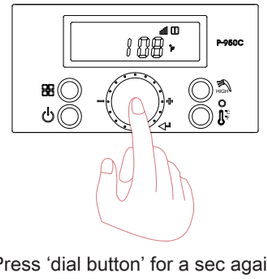
After ‘A:GA’ has been displayed by pressing ‘current status button’ for 5 secs, turn the dial until it shows ‘E:oP’.



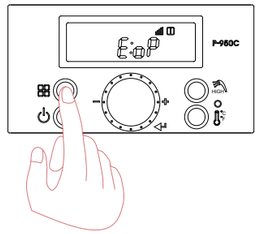
Press ‘dial button’ for 1 sec when ‘E:oP’ shows up



Current return water temperature status will be displayed. (ex : 108℉)

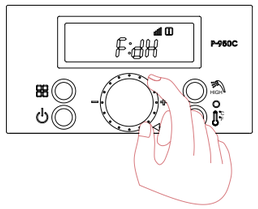


Press ‘dial button’ for a sec again, to go back to the previous mode.

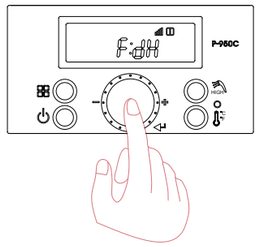


Press ‘current status button’ during ‘E:oP’ mode to go back to the initial status.

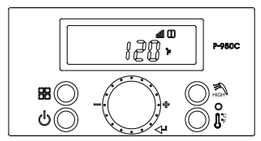
DHW Outlet Water Temperature



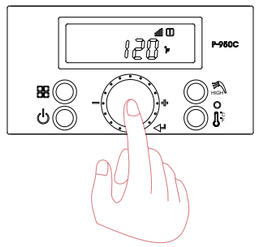
After ‘A:GA’ has been displayed by pressing ‘current status button’ for 5 secs, turn the dial until it shows ‘F:dH’.



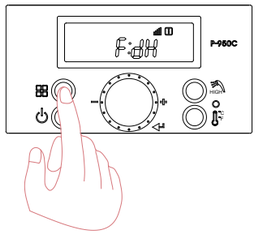
Press ‘dial button’ for 1 sec when ‘F:dH’ shows up



Current DHW outlet water temperature status will be displayed. (ex : 120°F)

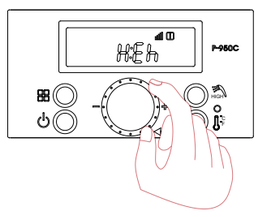


Press ‘dial button’ for a sec again, to go back to the previous mode.

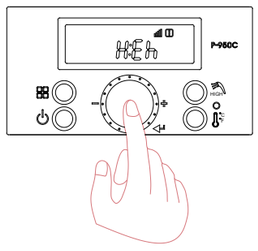


Press ‘current status button’ during ‘F:dH’ mode to go back to the initial status.

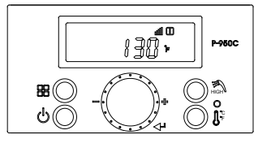
Exhaust Gas Temperature.



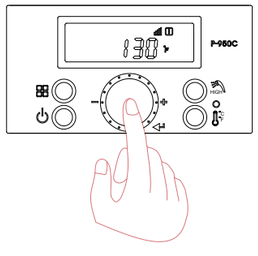
After ‘A:GA’ has been displayed by pressing ‘current status button’ for 5 secs, turn the dial until it shows



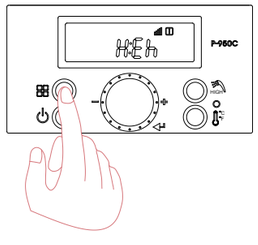
Press ‘dial button’ for 1 sec when ‘H:Eh’ shows up.



Current exhaust gas temperature status will be displayed. (ex : 130°F)

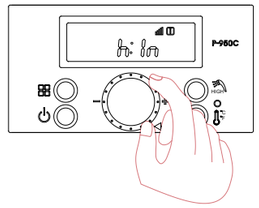


Press ‘dial button’ for a sec again, to go back to the previous mode.

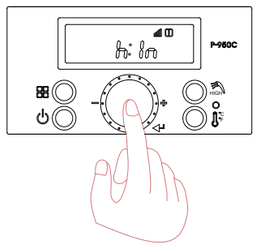


Press ‘current status button’ with ‘H:Eh’ mode to go back to the initial status.

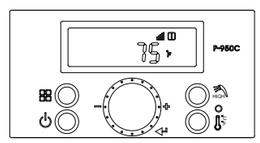
DHW Inlet Water Temperature.



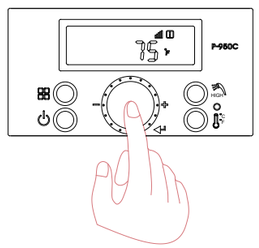
After ‘A:GA’ has been displayed by pressing ‘current status button’ for 5 secs, turn the dial until it shows ‘h:In’.



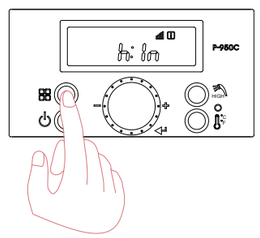
Press ‘dial button’ for 1 sec when ‘h:In’ shows up.



Current Inlet water temperature status will be displayed. (ex : 75°F)

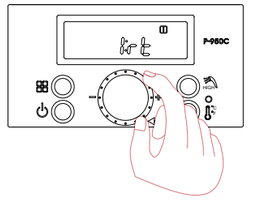


Press ‘dial button’ for a sec again, to go back to the previous mode.

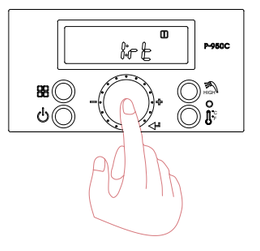


Press ‘current status button’ with ‘h:In’ mode to go back to the initial status.

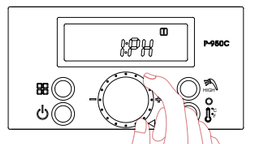
View Supply Power Time (displayed values X 100 Hours)



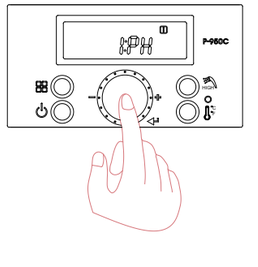
After ‘A:GA’ has been displayed by pressing ‘current status button’ for 5 secs, turn the dial until it shows ‘I:rt’.



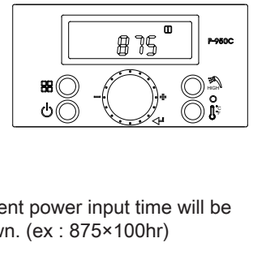
Press ‘dial button’ for 1 sec when ‘I:rt’ shows up



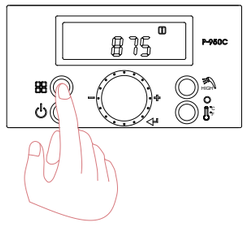
Turn the dial until 1:PH shows up.



Press ‘dial button’ for a sec again, to go back to the previous mode.

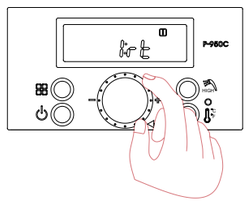


Current power input time will be shown. (ex : 875×100hr)

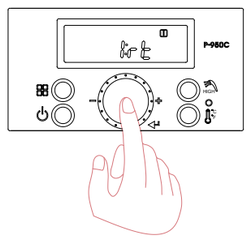


Press current status button for a sec after confirmation to go back to the initial status.

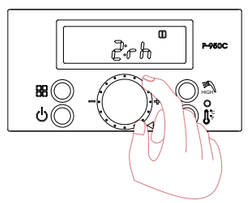
View Burner Operating Time (Unit: 1hr)



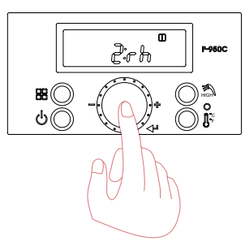
After ‘A:GA’ has been displayed by pressing ‘current status button’ for 5 secs, turn the dial until it shows ‘I:rt’.



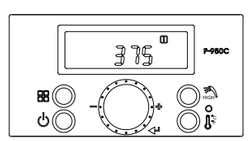
Press ‘dial button’ for 1 sec when ‘I:rt’ shows up



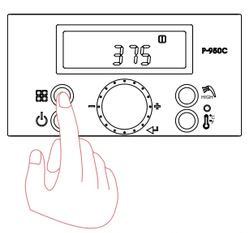
Turn the dial until ‘2:rh’ shows up.



Press ‘dial button’ for a sec when 2:rh shows up.

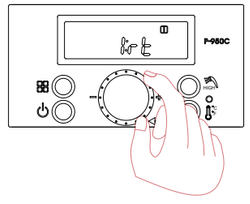


Current power input time will be shown. (ex : 375hr)

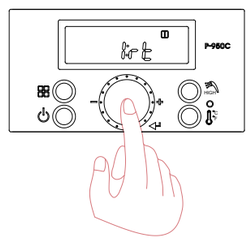


Press current status button for 1 sec after confirmation to go back to the initial status.

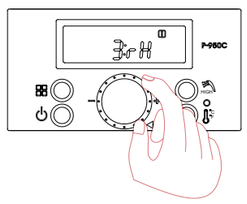
View Burner Operating Time (displayed value X 1000 hours)



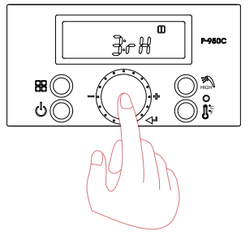
After ‘A:GA’ has been displayed by pressing ‘current status button’ for 5 secs, turn the dial until it shows ‘I:rt’.



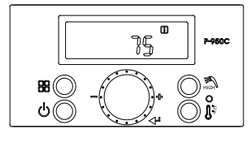
Press ‘dial button’ for 1 sec when ‘I:rt’ shows up



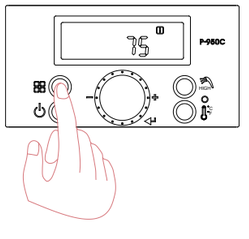
Turn the dial until ‘3:rH’ shows up.



Press ‘dial button’ for a sec when ‘3:rh’ shows up.

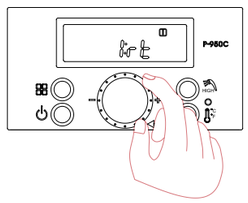


Current power input time will be shown. (ex : 75 ×1000hr=75,000hr)

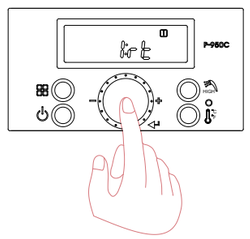


Press current status button for 1 sec after confirmation to go back to the initial status.

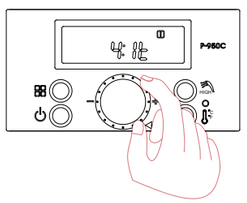
View Ignition Cycles (displayed value X 10 times)



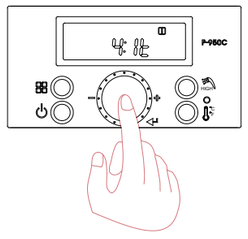
After ‘A:GA’ has been displayed by pressing ‘current status button’ for 5 secs, turn the dial until it shows ‘I:rt’.



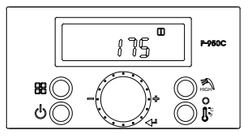
Press ‘dial button’ for 1 sec when ‘I:rt’ shows up



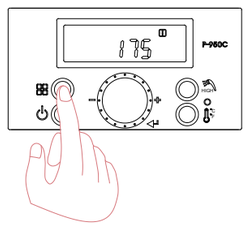
Turn the dial until ‘4:It’ shows up.



Press ‘dial button’ for a sec when ‘4:It’ shows up.

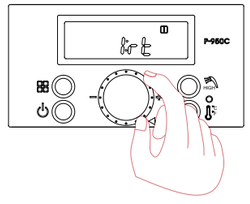


Current ignition attempts number will be shown.
(ex : 175 ×10 times =1 750times)

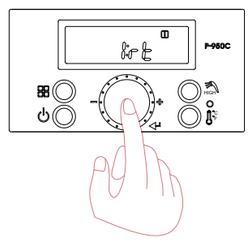


Press current status button for 1 sec after confirmation to go back to the initial status.

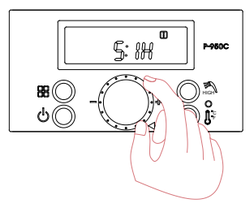
View Ignition Cycles (displayed value X 10,000 times)



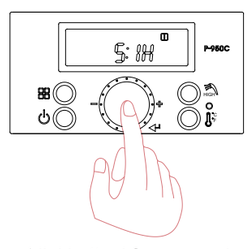
After ‘A:GA’ has been displayed by pressing ‘current status button’ for 5 secs, turn the dial until it shows ‘I:rt’.



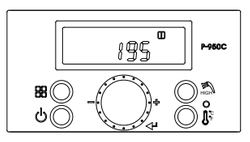
Press ‘dial button’ for 1 sec when ‘I:rt’ shows up



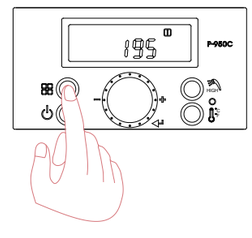
Turn the dial until ‘5:IH’ shows up.



Press ‘dial button’ for a sec when ‘5:IH’ shows up.



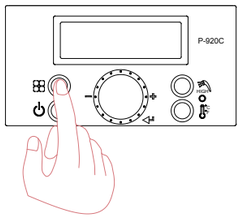
Current ignition attempts number will be shown.
(ex : 95 ×10000 times=950,000 times)



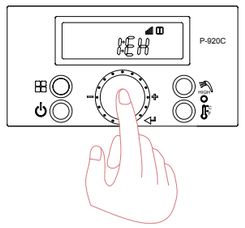
Press current status button for 1 sec after confirmation to go back to the initial status.

Change System Parameters

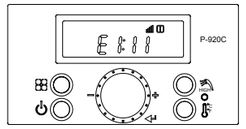
Fault Code History



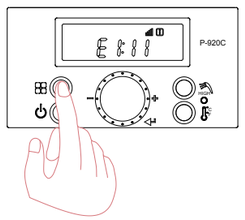
Press ‘current status button’ for 5 secs during panel power off to enter installer setting mode



‘1:EH’ is displayed and then press the dial button for one second to access the codes.

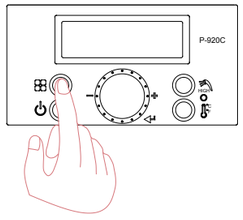


10 recent fault codes can be viewed by turning the dial.

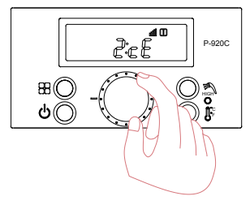


Press ‘current status button’ after confirmation to go back to the initial status.

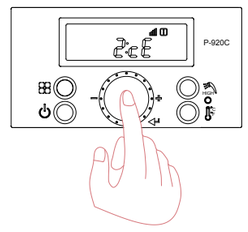
Clear Error Code History.



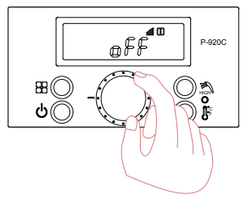
Press ‘current status button’ for 5 secs during panel power off to enter installer setting mode



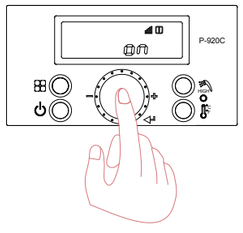
Press ‘dial button’ for 1 sec when ‘2:cE’ shows up.



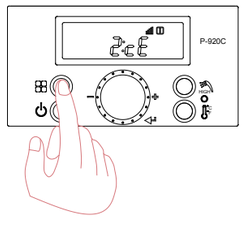
‘2:cE’ is displayed and then press the dial button for one second.



Turn the dial to set ‘on’ status when initial ‘off’ shows up.
(Default : off mode)

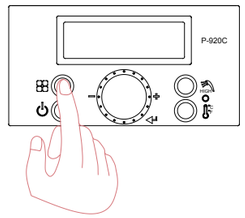


Press ‘dial button’ during ‘on’ status to save the setting.

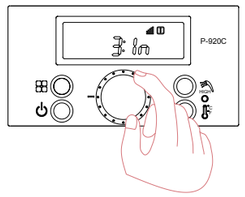


Press ‘current status button’ for a sec to go back to initial status after confirmation.

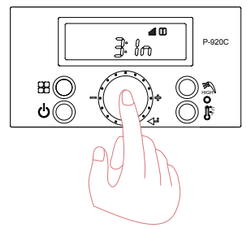
System Reset



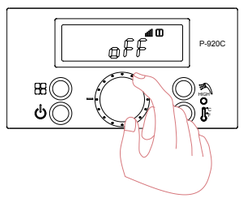
Press ‘current status button’ for 5 secs during panel power off to enter installer setting mode



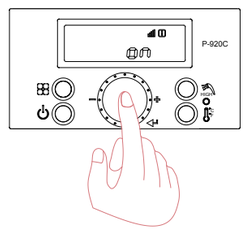
Turn the dial until ‘3:In’ shows up.



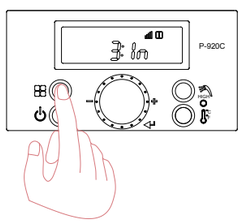
‘3:In’ is displayed and then press the dial button for one second.



Turn the dial to set ‘on’ status when initial ‘of’ shows up.
(Default : off mode)

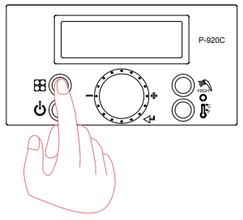


Press ‘dial button’ during ‘on’ status to save the setting.

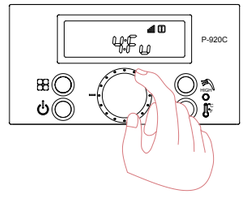


Press ‘current status button’ for a sec to go back to initial status after confirmation.

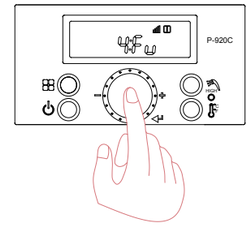
Change DHW flow rate measurement unit.(GA_gallon or LI_litter)



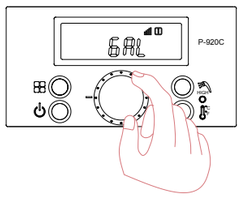
Press ‘current status button’ for 5 secs during panel power off to enter installer setting mode



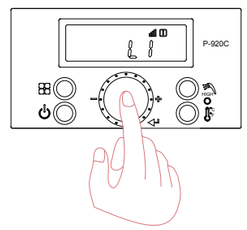
Turn the dial until ‘4:Fu’ shows up.



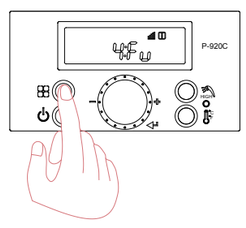
‘4:Fu’ is displayed and then press the dial button for one second.



Turn the dial to set ‘Li’ when initial ‘GAL’ shows. (Convert Liter to Gallon)

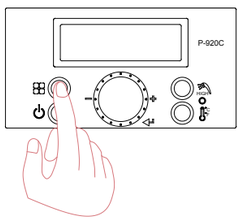


Press ‘dial button’ to save the setting during ‘Li’ status.

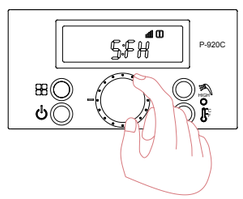


Press ‘current status button’ for a sec to go back to initial status after confirmation.

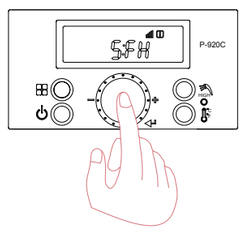
Fan, Max RPM Adjustment



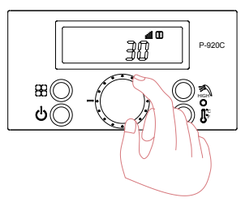
Press ‘current status button’ for 5 secs during panel power off to enter installer setting mode



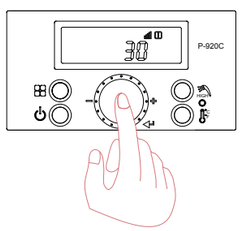
Turn the dial until ‘5:FH’ shows up.



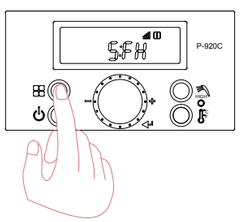
‘5FH’ is displayed and then press the dial button for one second.



Turn the dial to the desired setting when initial 0 is displayed.
(Range: -30 ~ +30, Default : 0)

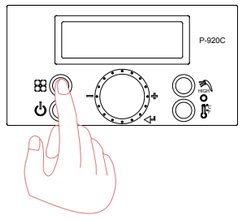


Press ‘dial button’ to save the setting.

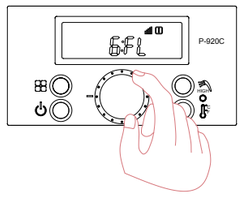


Press ‘current status button’ for a sec to go back to initial status after confirmation.

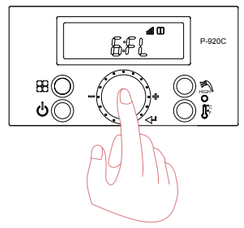
Fan, Min RPM Adjustment



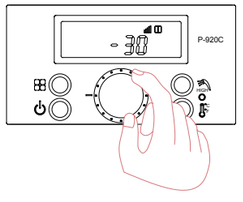
Press ‘current status button’ for 5 secs during panel power off to enter installer setting mode



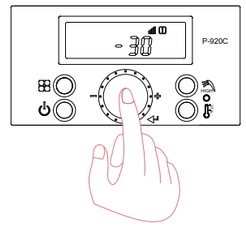
Turn the dial until ‘6:FL’ shows up.



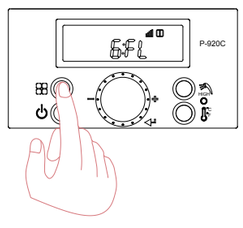
‘6:FL’ is displayed and then press the dial button for one second.



Turn the dial to the desired setting when initial 0 is displayed.
(Range: -30 ~ +30, Default : 0)



Press ‘dial button’ to save the setting.



Press ‘current status button’ for a sec to go back to initial status after confirmation.

Cascade Mode Setting

COMING SOON

Common Vent Mode Setting

COMING SOON

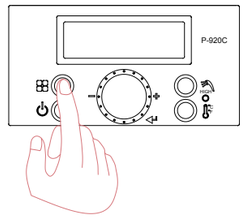
Cascade Master/Slave Setting

COMING SOON

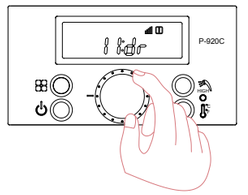
Number of Cascade water heater

COMING SOON

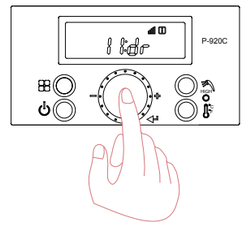
Reset Burner Operating Time



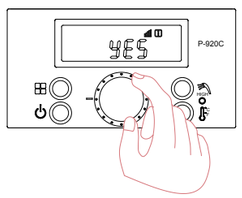
Press ‘current status button’ for 5 secs during panel power off to enter installer setting mode



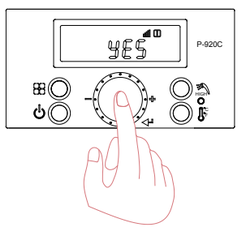
Turn the dial until ‘11:dr’ shows up.



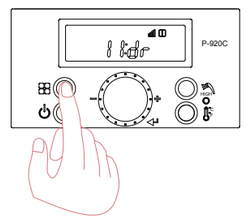
‘11:dr’ is displayed and then press the dial button for one second.



Turn the dial to ‘on’ status when initial ‘off’ shows up. (Default : off)

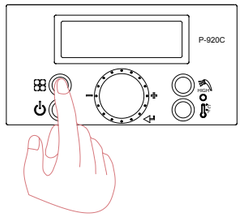


Press ‘dial button’ to save the setting.

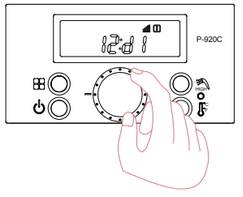


Press ‘current status button’ for a sec to go back to initial status after confirmation.

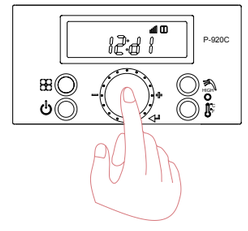
Reset Igniting Cycles



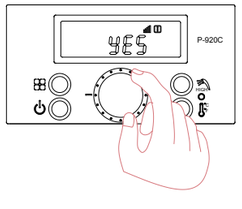
Press ‘current status button’ for 5 secs during panel power off to enter installer setting mode



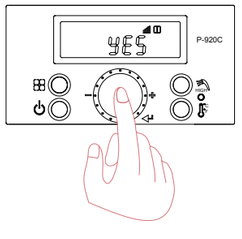
Turn the dial until ‘12:dl’ shows up.



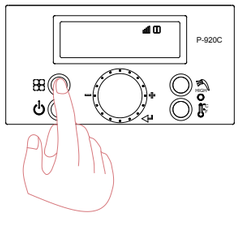
‘12:dl’ is displayed and then press the dial button for one second.



Turn the dial to ‘on’ status when initial ‘off’ shows up.(Default : off)

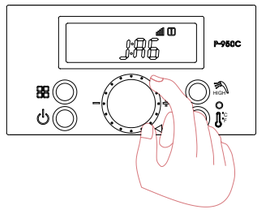


Press ‘dial button’ to save the setting.

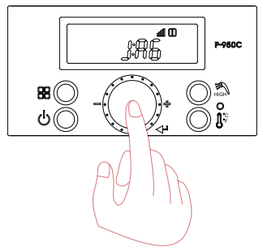


Press ‘current status button’ for a sec to go back to initial status after confirmation.

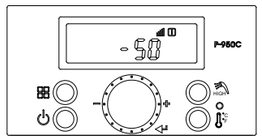
AGM Value correction



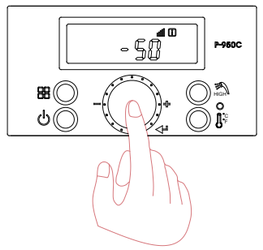
After ‘A:GA’ being displayed by pressing ‘current status button’ for 5 secs, turn the dial until it shows ‘J:AG’.



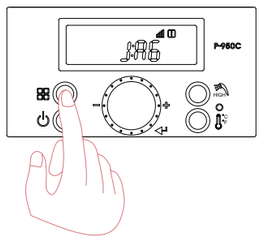
Press ‘dial button’ for 1 sec when ‘J:AG’ shows up



‘11:dr’ is displayed and then press the dial button for one second.

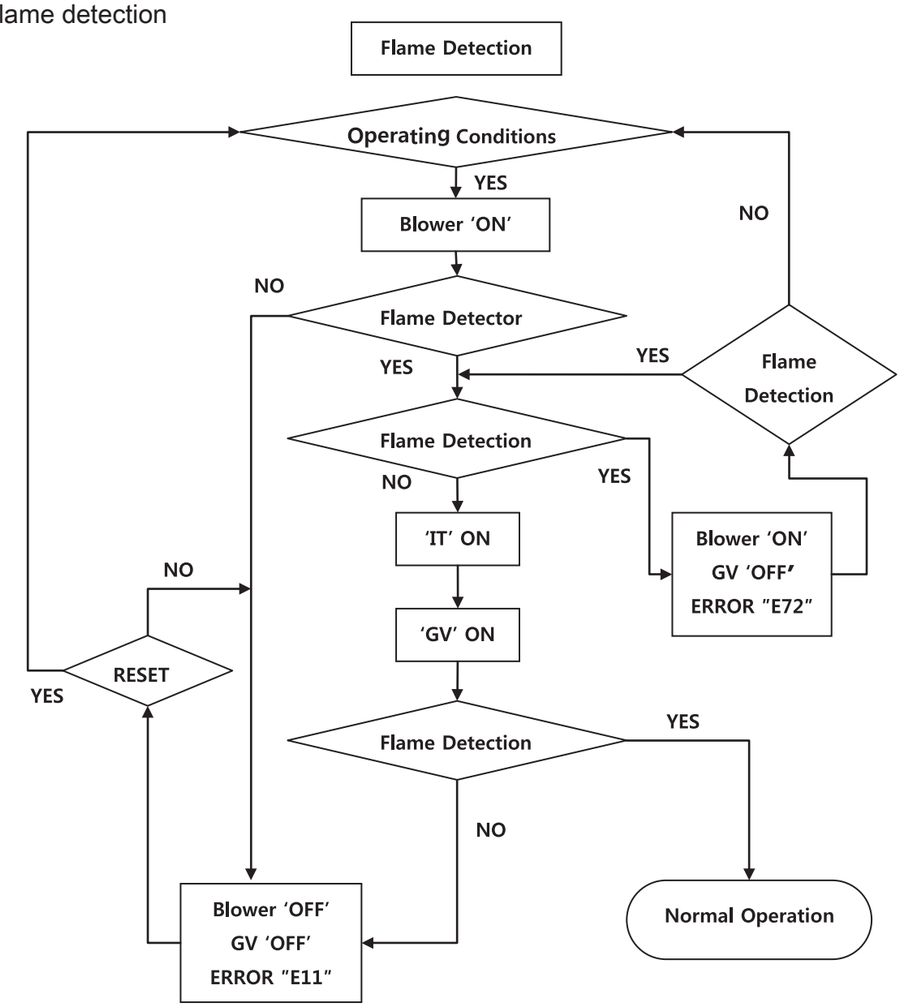


Turn the dial to ‘on’ status when initial ‘off’ shows up. (Default : off)

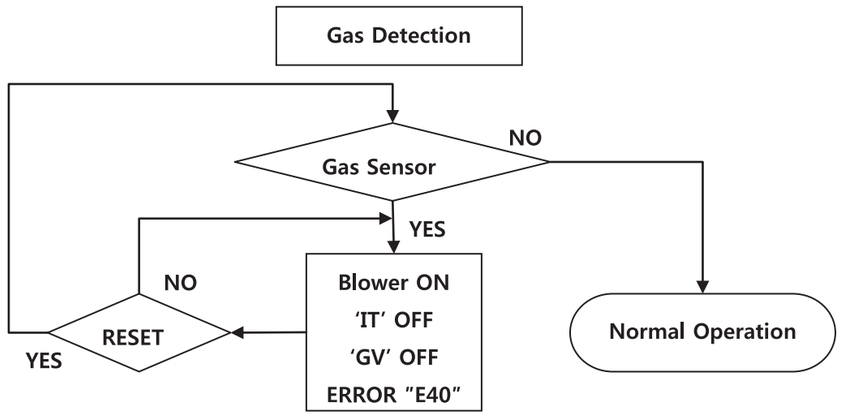


Press ‘dial button’ to save the setting.

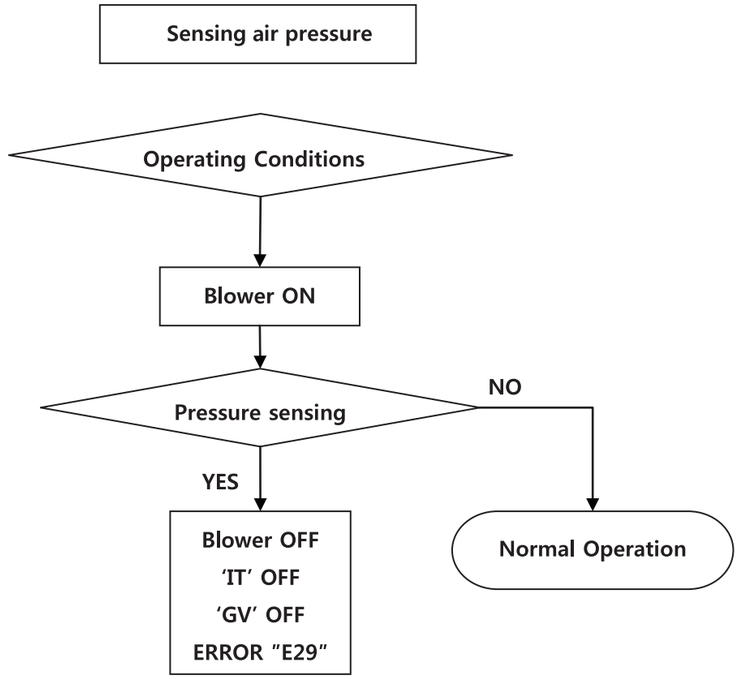
1. Flame detection



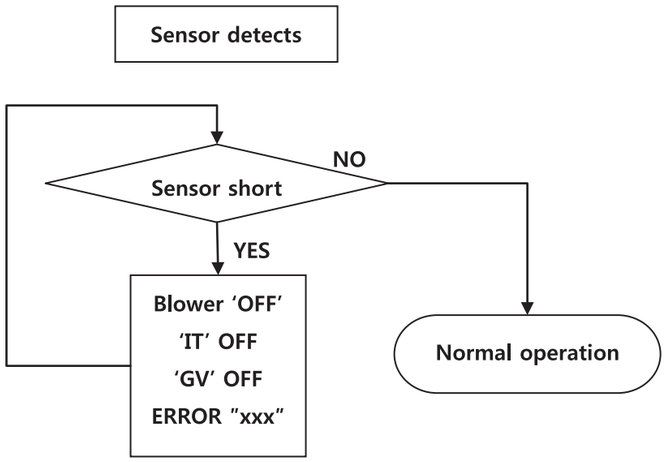
2. Gas Detection



3. Sensing air pressure.



4. 'I/T', 'DHW', 'OP' Sensor detects



Error code.

Error Code	Error Code Description	Possible Remedies
Er:10	Flame has Extinguished 8 (Eight) Times	Press the Power button to clear the Error Code. If Error happens again: 1. Monitor the gas pressure to the water heater while in operation. Ensure pressure is between 3.5 and 14″ WC. 2. Check gas valve wire. Ensure connection is secure. 3. Check flame detection sensor. Ensure connections are secure. Normal operating settings are more than 2.5DC before ignition, less than 2.5DC after ignition. 4. Check vent terminations. Ensure there are no blockages. 5. Assure that the flame is stable when lit. 6. If the problem persists, replace the main control.
Er:11	Ignition has Failed 10 (Ten) Times	Press the Power button to clear the Error Code. If Error happens again: 1. Monitor the gas pressure to the water heater while in operation. Ensure pressure is between 3.5 and 14″ WC. 2. Check gas valve wire. Ensure connection is secure. 3. Check flame detection sensor. Ensure connections are secure. Normal operating settings are more than 2.5DC before ignition, less than 2.5DC after ignition. 4. Check igniter transformer for proper connection. 5. Clean the spark igniter with steel wool to remove oxides. Ensure proper separation (3-4 mm). 6. Replace the spark igniter if damaged. 7. Assure that the flame is stable when lit. 8. If the problem persists, replace the main control.
Er:16	Operating Temperature Sensor or DHW Sensor detects Water Temperature Greater than 199°F (93°C)	This Error Code will go away when the DHW temperature decreases. If Error happens again: 1. Check if dip switch High Fire setting is ON. Switches 6 and 7 should be OFF for normal operation. 2. Check if DHW pipe is blocked. Ensure there is enough water flowing to the water heater. 3. Check DHW sensor at DHW outlet. If resistance is zero, replace the sensor. 4. Check Operating Temperature sensor at the heat exchanger. If resistance is zero, replace the sensor. 5. If the problem persists, replace the main control.
Er:20	High Limit Overheat Switch – Closed is Normal, Open is Fault	Press the Power button to clear the Error Code. 1. Inspect the High Limit Overheat switch. Ensure proper connections. 2. Check High Limit Overheat switch resistance. If resistance is zero, replace the switch. 3. If the problem persists, replace the main control.
Er:29	APS/Condensate – Closed is Normal, Open is Fault (Condensate Drain Trap)	Press the Power button to clear the Error Code. 1. Check APS/Condensate and main controller connections. Ensure all are secure. 2. Check APS/Condensate resistance. If resistance is zero, replace the switch. 3. Check APS/Condensate hose. Ensure it is connected and in good condition. 4. Check condensate line and termination for blockages. 5. Check exhaust vent for blockages. 6. If the problem persists, replace the main control.
Er:31	Inlet Water Sensor Open or Short	This Error Code will go away when inlet water temperature decreases. If Error happens again: 1. Check inlet water temperature sensor. Ensure connections are secure. 2. Check sensor resistance. If resistance is zero, replace the sensor. 3. If the problem persists, replace the main control.
Er:32	DHW Sensor Open or Short	This Error Code will go away when outlet water temperature decreases. If Error happens again: 1. Check DHW outlet temperature sensor. Ensure connections are secure. 2. Check sensor resistance. If resistance is zero, replace the sensor. 3. If the problem persists, replace the main control.
Er:33	Operating Temperature Sensor Open or Short	This Error Code will go away when outlet water temperature decreases. If Error happens again: 1. Check operating temperature sensor. Ensure connections are secure. 2. Check sensor resistance. If resistance is zero, replace the sensor. 3. If the problem persists, replace the main control.
Er:35	Exhaust Sensor Open or Short	This Error Code will go away when exhaust temperature decreases. If Error happens again: 1. Check exhaust temperature sensor. Ensure connections are secure. 2. Check sensor resistance. If resistance is zero, replace the sensor. 3. Check exhaust vent for blockage. 4. If the problem persists, replace the main control.
Er:38	Error Appears When Control Stores Data, but Data is not Saved	Press the Power button to clear the Error Code. Replace the main control.
Er:39	Flame Detected after Exiting a Flame On Condition	This Error Code will go away when the false flame condition is remedied. If Error happens again: 1. Check the water heater cover. Ensure it is secure. Flame detection sensor can detect an external light source. 2. Check flame detection sensor. Ensure connections are secure. Normal operating settings are more than 2.5DC before ignition, less than 2.5DC after ignition. 3. If the problem persists, replace the main control.

Error code.

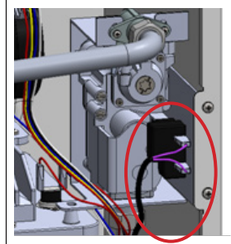
Error Code	Error Code Description	Possible Remedies
Er:40	Gas Leakage is Detected in 10 Minutes, or three times within One Hour (Greater than 5 Seconds Each Time)	**IMPORTANT:** If you smell gas, STOP! Follow the instructions on page 2, this manual, and call a qualified service technician or the fuel gas utility. Press the Power button to clear the Error Code. If Error happens again: 1. Check the water heater cover. Ensure it is secure. 2. Check gas connections for leakage with a soapy solution. Fix any leaks. 3. Check condition of the burner assembly. 4. If the problem persists, replace the main control.
Er:41	Fan Speed too High with Flame On	Press the Power button to clear the Error Code. If Error happens again: 1. Check the vent connections for blockages. 2. Check the burner assembly. 3. Check fan operation. If fan appears to be operating normally but RPMs are too low or too high, replace the fan. 4. If the problem persists, replace the main control.
Er:42	Jumped Wire Disconnected	Press the Power button to clear the Error Code. If Error happens again: 1. Ensure the jumped wire is properly connected. 2. If the problem persists, replace the main control.
Er:43	Burner Overheat Switch Open	Press the Power button to clear the Error Code. If Error happens again: 1. Check burner overheat switch connections. Ensure connections are secure. 2. Check switch resistance. If resistance is zero, replace the switch. 3. If the problem persists, replace the main control.
Er:61	Fan Speed Feedback Signal Abnormal	This Error Code will go away when the condition is remedied. If Error happens again: 1. Check the connections to the fan. Ensure all are secure. 2. If the fan does not rotate during the ignition sequence, check for 120V power at the fan connection. If 120V power is present at the control, replace the fan. If the blower does not have 120V power, check power at the control. If 120V power is not present at the control, replace the control. 3. If the problem persists, replace the main control.
Er:65	Supply Water Valve Error	Press the Power button to clear the Error Code. If Error happens again: 1. Turn power OFF and ON at the main power switch internal to the water heater. 2. Check wiring connections to supply water valve. Ensure all are secure. 3. Replace supply water valve. 4. If the problem persists, replace the main control.
Er:66	Mixing Valve Error	Press the Power button to clear the Error Code. If Error happens again: 1. Turn power OFF and ON at the main power switch internal to the water heater. 2. Check wiring connections to mixing valve. Ensure all are secure. 3. Replace mixing valve. 4. If the problem persists, replace the main control.
Er:67	AGM Error	Press the Power button to clear the Error Code. If Error happens again: 1. Turn power OFF and ON at the main power switch internal to the water heater. 2. Ensure fan inlet hole is completely open after turning the power OFF and ON. 3. Check wiring connections to the AGM. Ensure all are secure. 4. Check AGM operation. 5. Replace AGM components. 6. If the problem persists, replace the main control.
Er:70	Register, Ram, Rom, I/O Port, AD Abnormal, Important EPROM Data or Safe Data Abnormal	This Error Code will go away when the condition is remedied. If Error happens again: 1. Turn power OFF and ON at the main power switch internal to the water heater. 2. If the problem persists, replace the main control.
Er:72	Flame Signal Detected before Ignition	This Error Code will go away when the condition is remedied. If Error happens again: 1. Check the water heater cover. Ensure it is secure. Flame detection sensor can detect an external light source. 2. Check flame detection sensor. Ensure connections are secure. Normal operating settings are more than 2.5DC before ignition, less than 2.5DC after ignition. 3. If the problem persists, replace the main control.
Er:73	DIP Switch is abnormal	This Error Code will go away when the condition is remedied. If Error happens again: 1. Check dip switches. Ensure switches match the ratings plate requirements of the water heater. See dip switch details, this manual, for default settings. 2. If the problem persists, replace the main control.
Er:76	Poor Communication	This Error Code will go away when the condition is remedied. If Error happens again: 1. Check connections from main control to display panel. 2. If the problem persists, replace the display and/or the main control.
Er:94	Exhaust NTC detects Vent Temperature is Greater than 149°F (65°C)	This Error Code will go away when the condition is remedied. If Error happens again: 1. Check if dip switch High Fire setting is ON. Switches 6 and 7 should be OFF for normal operation. 2. Check exhaust temperature sensor. Ensure connections are secure. 3. Check sensor resistance. If resistance is zero, replace the sensor. 4. Check exhaust vent for blockage. 5. If the problem persists, replace the control. 6. If the problem persists, replace the heat exchanger.

Error code	Meaning	Cause
	Flame Loss (Manual restore)	If flame loss issue repeats 8 times while unit is operating, error code 10 will appear.

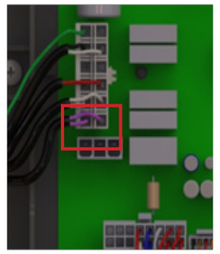
Failure event

If flame is not detected within 1 minute after ignition trial, the unit restarts. If ignition trial is repeated 8 times in a row, ignition sequence will stop. Error code will not desappear until display panel is manually reset.

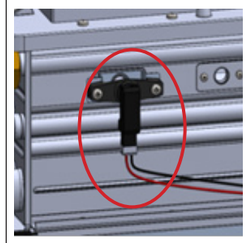
Check point



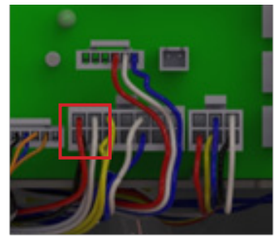
① Ensure gas valve wiring is properly connected.



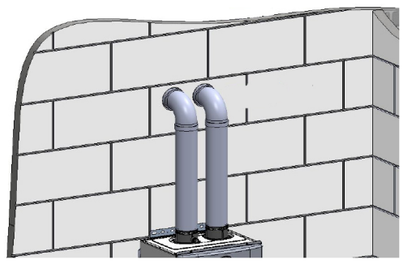
① Please check wire color of gas valve connector on main controller.



② Please check flame detector sensor's connecting line and ensure correct position as shown.



② Please check wire color of flame sensor connector on main controller.



③ Please check tthe blockage of flue (intake and exhaust pipes)

④ If all things are normal, please replace main controller.

WARNING

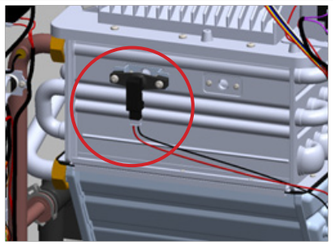
Failure to turn the power off to the appliance before repair could result in serious injury or death.

Error code	Meaning	Cause
	Ignition failure (Manual reset)	During ignition trials, if unit failed to ignite 10 times continuosly, error code 11 will appear.

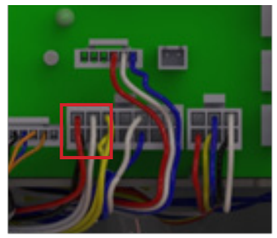
Failure event

If the unit failed to detect flame during ignition sequence, pre-purge time will exceed 10 seconds, and error core Er 11 will appear.

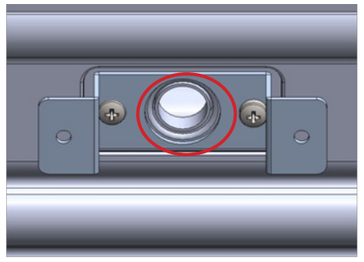
Check point



① Please check flame detector sensor's connecting line and ensure proper connection.



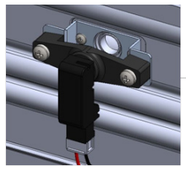
② Please check flame sensor wire color of connector in the main controller.



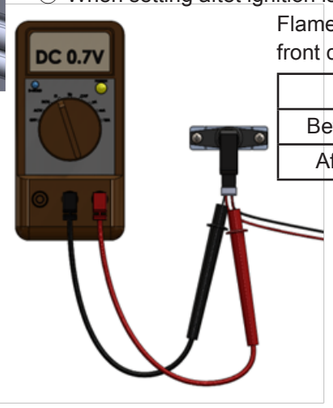
② If the flame sensing viewing port is excessively discolored, loss of fame will occur. To correct this problem, replace the flame viewing glass as shown.

WARNING

Failure to turn the power off to the appliance before repair could result in serious injury or death.



■ From more than DC 2.5V after ignition safety cut-off will appear
① When setting before ignition is less than DC 2.5V : Replace infrared sensor
② When setting aftet ignition is more than DC 2.5V : Replace infrared sensor



Flame detector sensor setting (Please check after closing front cover)

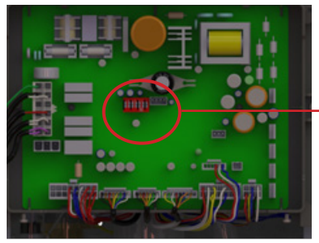
ITEM	Normal operating settings
Before ignition	More than DC 2.5V
After ignition	Less than DC 2.5V

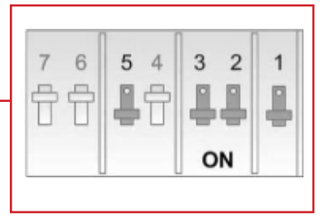
Error code	Meaning	Cause
	DHW overheating issue (Automatic reset)	If the temperature on the water temperature sensor (tagged OP on Pppe) and the water outlet sensor exceed 199.4F error 16 will appear.

Failure event

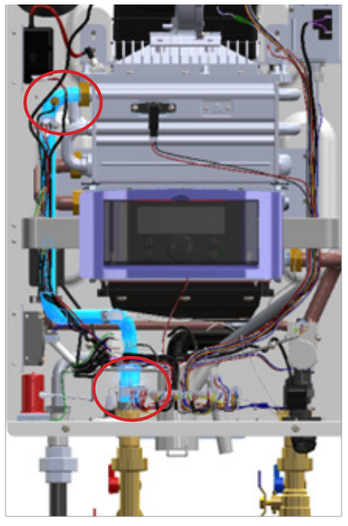
In case that OP and/or DHW temperature exceeds 119.4F, water temperature overheating fault will occur and all output except for fan post-purge is stopped.

Check point

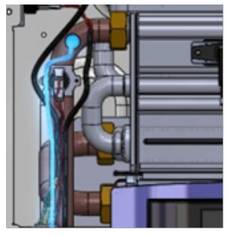


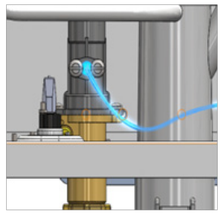


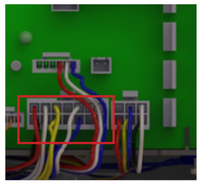
① Check to see if the default DIP SWITCH settings have been changed from the factory settings - assure that default settings are set to correct overheating condition.

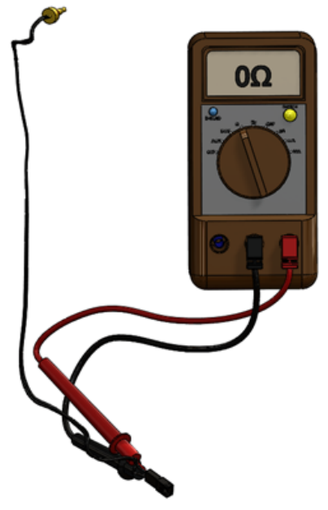


② Check if DHW pipe is folded or blocked.









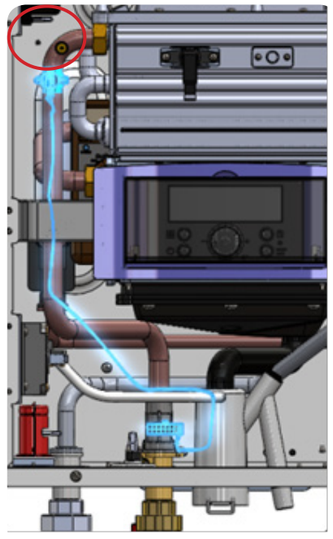
Please check the Water Outlet Sensor. When the value measured with a multi-meter is 0Ω, replace water outlet sensor.

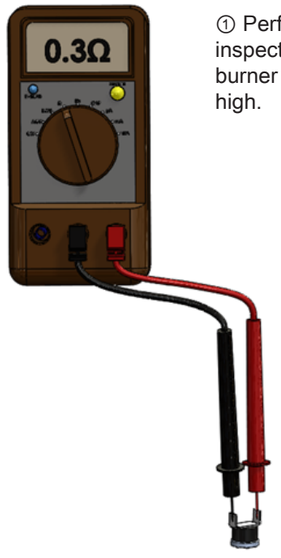
Error code	Meaning	Cause
	Operating DHW overheating switch (Manual reset)	This water heater has two overheating switches. One attached at burner and the other at DHW outlet. These sensors act as dual safety device in case of DHW temperature sensor's malfunction.When the overheating switch is disconnected an error code is shown, fan continues to operate until error code is clear.

Failure event

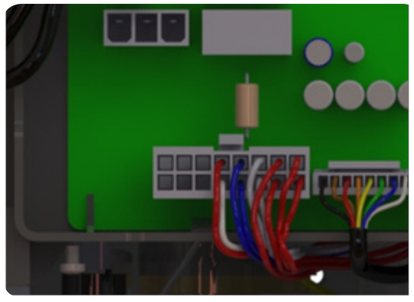
DHW overheating switch faulty or disconnected.

Check point





① Perform overheating switch inspection when error appears and burner physical temperature is not high.



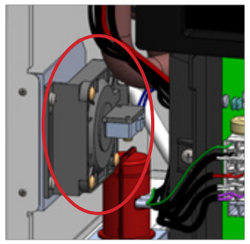
② Check connector and if no problem, measure resistance of the overheating switch located at heat exchanger outlet and replace overheating switch when the value is 0Ω.

Error code	Meaning	Cause
	Air Pressure Switch open (Manual reset)	When exhaust vent or condensate blockages occur, error code 29 will appear.

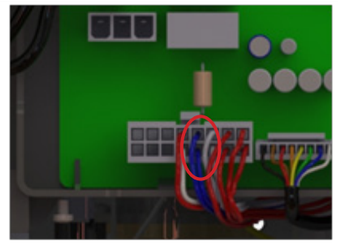
Failure event

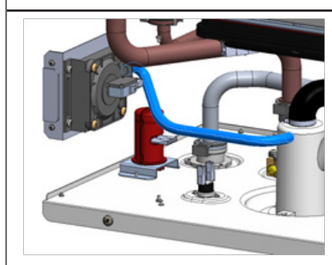
In case of vent or condensate blockage, the air pressure in the combustion system exceeds the APS setting and Er 29 is displayed.

Check point

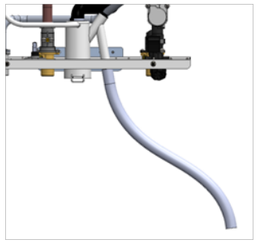


① Check APS wiring to ensure proper connection.



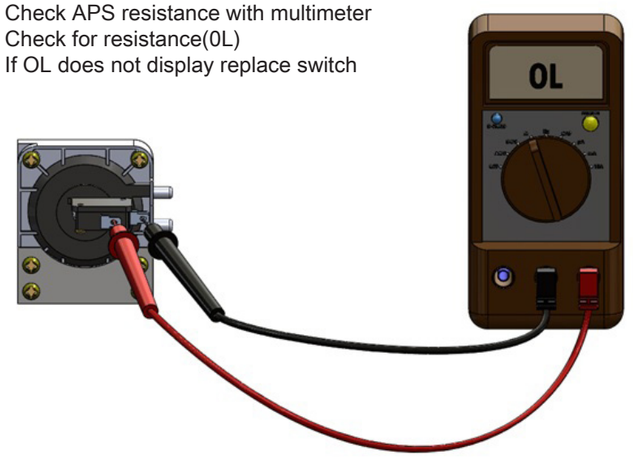


② Check APS hose (check hose damages).



③ Check condensate discharging line.

④ If above conditions are normal:
Check APS resistance with multimeter
Check for resistance(0L)
If OL does not display replace switch

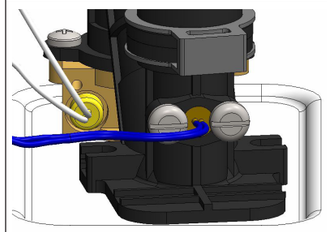


Error code	Meaning	Cause
	Water Inlet Sensor error (Automatic reset)	When DHW Inlet temperature sensor wiring line located at DHW inlet adapter is disconnected or having issue.

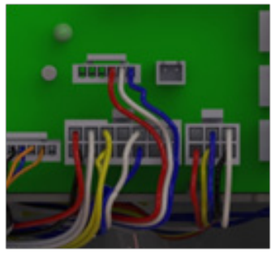
Failure event

DHW inlet temperature sensor mulfunction or disconnected

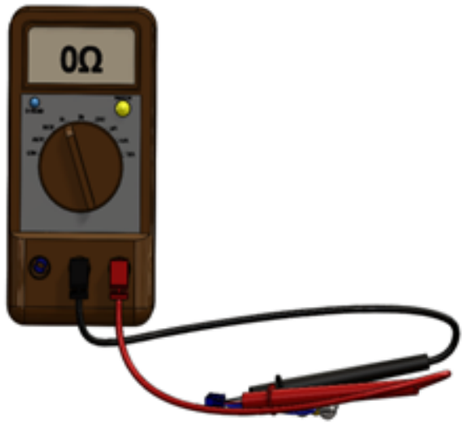
Check point



① Check if DHW Inlet temperature sensor's wiring connected at DHW inlet adapter is disconnected. And check main control's socket.



② Connect multimeter leads to the DHW Inlet temperature sensor socket and measure the resistance value (If value is 0Ω it's a sensor's malfunction so sensor needs to be replace)

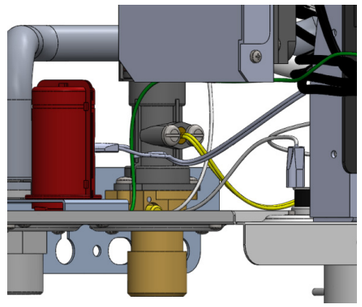


Error code	Meaning	Cause
	Water Outlet Sensor error (Automatic reset)	Error is displayed when DHW outlet temperature sensor wiring line is disconnected or faulty.

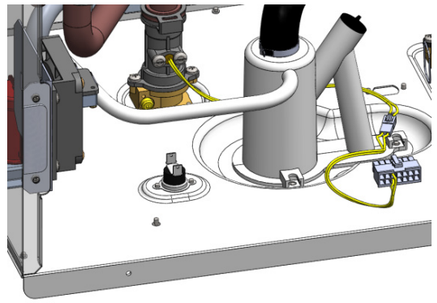
Failure event

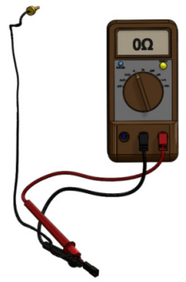
Water outlet sensor faulty or disconnected.

Check point

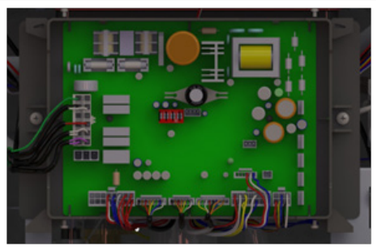


① Check if Water Outlet Temperature Sensor wiring and main controller connected at water outlet adapter is disconnected. Also check main controller's socket.





② ▸ Connect multimeter leads to the Water Outlet Sensor socket and measure the resistance value (If value is 0Ω it's a sensor's malfunction so replace it)



③ If all things are normal, please replace main controller.

WARNING

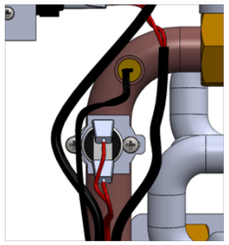
Failure to turn the power off to the appliance before repair could result in serious injury or death.

Error code	Meaning	Cause
	Water temperature sensor error (Automatic reset)	When heat exchanger's water temperature sensor wiring line is disconnected or faulty.

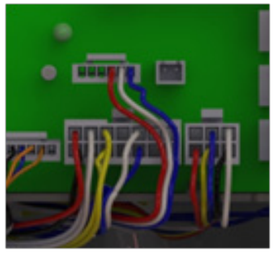
Failure event

Water temperature sensor (tagget OP) faulty or disconnected.

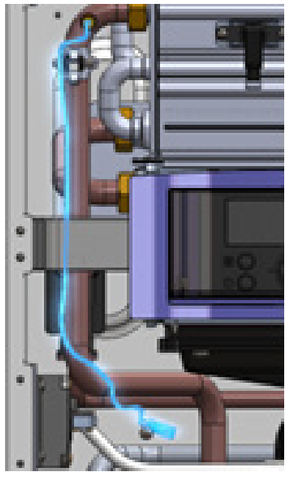
Check point

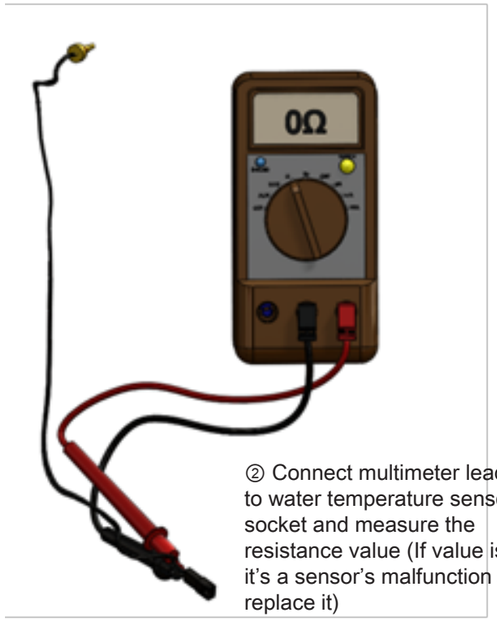


① Check if water temperature sensor's wiring connected at heat exchanger is disconnected. Also check main control's socket.



Water temperature sensor (black/black)





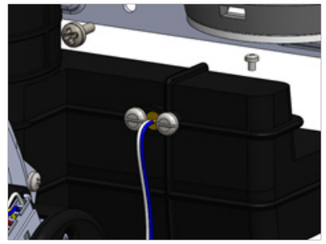
② Connect multimeter leads to water temperature sensor's socket and measure the resistance value (If value is 0Ω it's a sensor's malfunction so replace it)

Error code	Meaning	Cause
	Exhaust Temperature sensor error (Automatic reset)	When exhaust temperature sensor wiring line is disconnected or faulty.

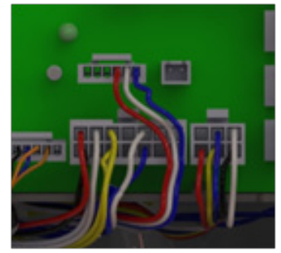
Failure event

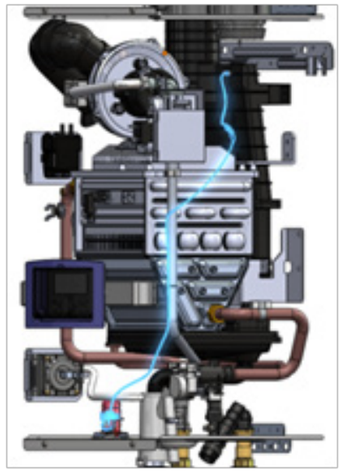
Exhaust temperature sensor faulty or disconnected.

Check point

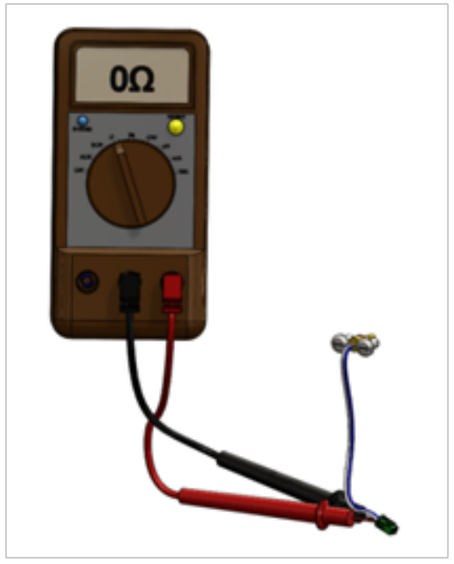


① Check if exhaust temperature sensor wiring is disconnected. Also check main controllers socket.





Exhaust duct (white/blue)



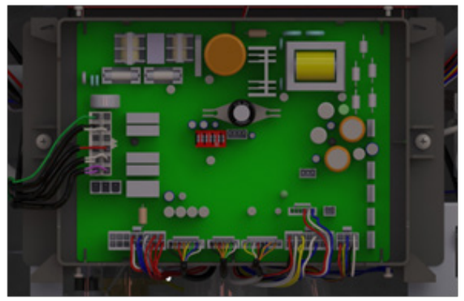
② Connect multimeter leads to exhaust temperature sensor socket and measure the resistance value (If value is 0Ω it's a sensor's malfunction and will need to be replaced)

Error code	Meaning	Cause
	EEPROM error (Manual reset)	Check EERPOM setting temperature is within 95~140℉. When EEPROM malfunctions,error occurs and all of the outputs will stop except fan post-purge.

Failure event

When EEPROM malfunctions, error occurs and all of the outputs will stop except post-purge

Check point



① Replace main controller when error occurs.

WARNING

Failure to turn the power off to the appliance before repair could result in serious injury or death.

Error code	Meaning	Cause
	False flame sensing (Automatic reset)	If false flame is detected after combustion is ended, error code 39 will appear.

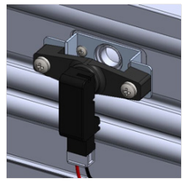
Failure event

Flame is detected after combustion is ended.

Check point

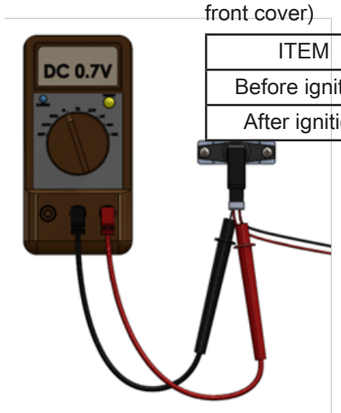
① Ensure the appliance cover is secured. Flame detection sensor can dtect external light source and cause an error code.

Please check flame detection sensor's connecting line and ensure correct position as shown.

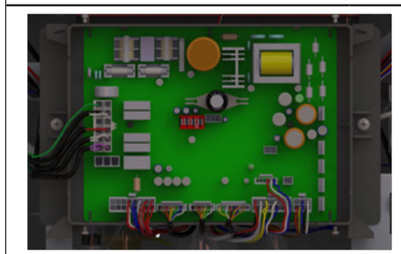


② From more than DC 2.5V after ignition safety cut-off will appear
ⓐ When setting before ignition is less than DC 2.5V : Replace infrared sensor
ⓑ When setting after ignition is more than DC 2.5V : Replace infrared sensor

Flame detector sensor setting (Please check after closing front cover)



ITEM	Normal operating settings
Before ignition	More than DC 2.5V
After ignition	Less than DC 2.5V



③ If all things are normal, replace main controller.

WARNING

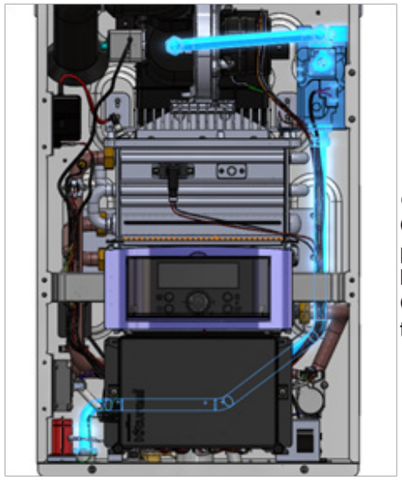
Failure to turn the power off to the appliance before repair could result in serious injury or death.

Error code	Meaning	Cause
	Gas leakage (Manual reset)	When gas leakage is detected during operation error code 40 will appear.

Failure event

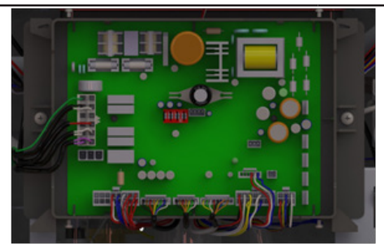
When gas leak is detected for more than 10 minutes continuosly or 3 times in a hour, error code will appear.

Check point



① Follow instruction on first page of installation manual. Check leakage by using soapy water on all related gas pipe connection and gas valve to determine source of leak. Once determined, repair leak and reassemble. Check conditions of O-rings and gaskets and replace them if damged.

② If leaks are not present on the gas piping and valve, start the unit and monitor for leaks around blower assembly and connection to determine source of leaks.



③ If all things are normal, replace main controller.

WARNING

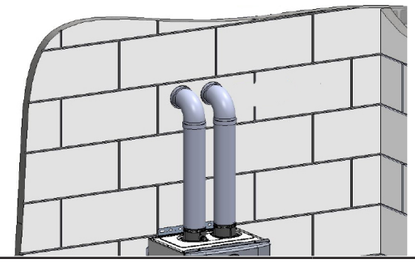
Failure to turn the power off to the appliance before repair could result in serious injury or death.

Error code	Meaning	Cause
	Excess fan speed detected (Manual reset)	When standard fan speed is exceeded during combustion, error code 41 will appear

Failure event

Excess fan speed.

Check point



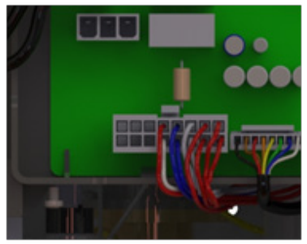
① Check vent blockage

Error code	Meaning	Cause
	Jumped wire disconnected (Manual reset)	Er 42 will appear if wire is disconnected.

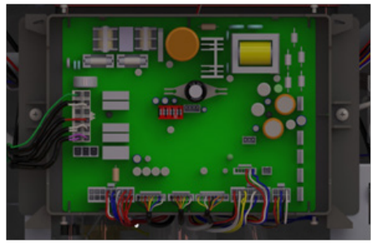
Failure event

Jumped wire disconnected.

Check point



① Ensure that jumped wire is properly connected on the main controller.



② If all things are normal, replace main controller.

WARNING

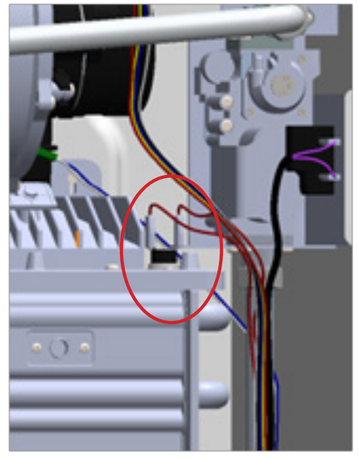
Failure to turn the power off to the appliance before repair could result in serious injury or death.

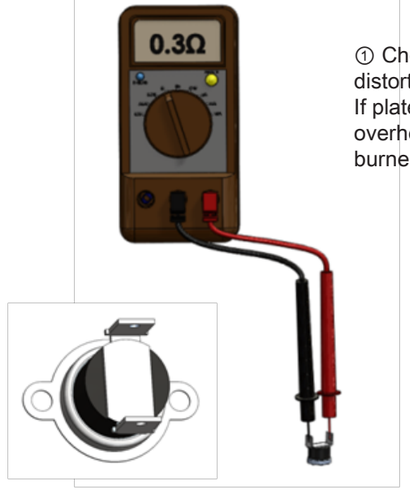
Error code	Meaning	Cause
	Burner plate overheating protection switch open (Manual reset)	If burner temperature is higher than the switch high limit (302 F), error code 43 will appear.

Failure event

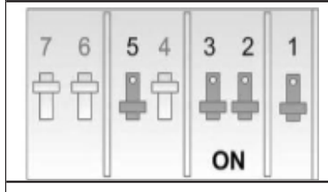
When burner overheating switch's temperature exceeds 392 F, error code will appear.

Check point

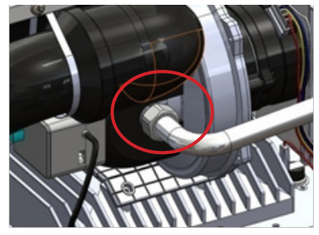




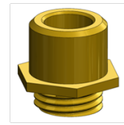
① Check burner plate for distortion or burn marks. If plate shows signs of overheating, replace entire burner plate assembly.



② Check to see if the default DIP SWITCH settings have been changed from the factory settings – assure that default settings are set to correct overheating condition.



③ When all the things are normal check gas nozzle. Check assembly condition of burner and heat exchanger.



WARNING

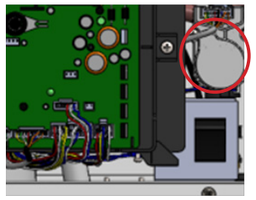
Failure to turn the power off to the appliance before repair could result in serious injury or death.

Error code	Meaning	Cause
	DHW flow control valve error (Manual reset)	Not able to supply hot water in setting temperature when flow rate exceeds water heater maximum capacity

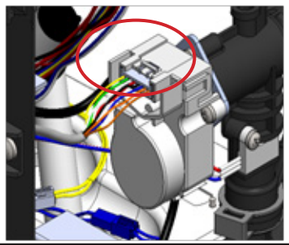
Failure event

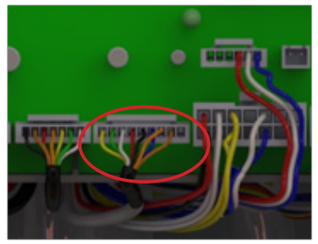
Flow control valve opearation error.

Check point

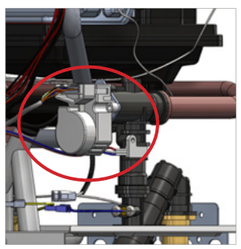


① Flow control valve recognizes zero point after turning off and on the power. Check indication of error after basically turning off and on the power.





② Check wiring line connection carefully.



③ If above conditions are normal, replace flow control valve

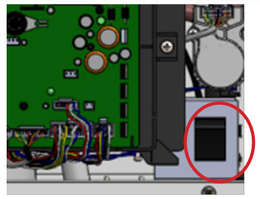
WARNING
Failure to turn the power off to the appliance before repair could result in serious injury or death.

Error code	Meaning	Cause
	Mixing valve error (Manual reset)	Unable to operate normally due to manual reset error. When flow rate decreases temperature gap gets bigger.

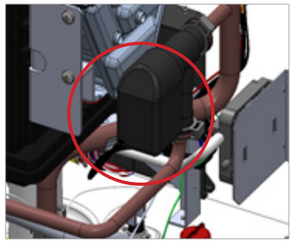
Failure event

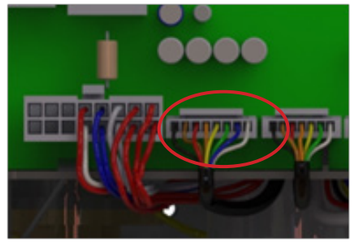
Mixing valve operation error.

Check point

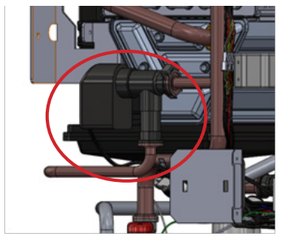


① Mixing Valve recognizes zero point after turning off and on the power. Check indication of error after basically turning off and on the power.





② Check wiring line connection carefully.



③ If above conditions are normal, replace mixing valve

④ If all things are normal, replace main controller.

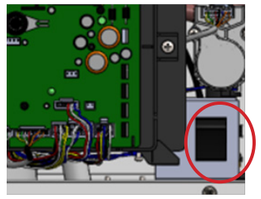
WARNING
Failure to turn the power off to the appliance before repair could result in serious injury or death.

Error code	Meaning	Cause
	AGM Error (Manual reset)	Failed to control gas and air mixture, the exhaust gas exceeds limits or causes noises. Hot water supplied is not reaching target setting

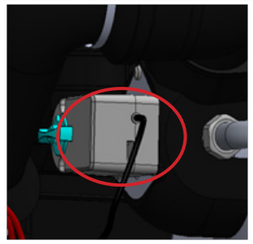
Failure event

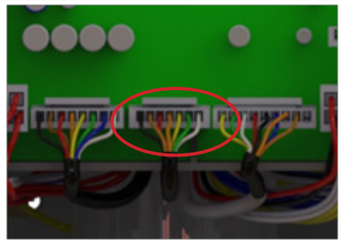
AGM operation error.

Check point



① AGM recognizes zero point after turning off and on the power.
Check indication of error after basically turning off and on the power.
If the erro is still present, turn off the power and manually move the AGM handle (blue) and turn on the power to clear the error.





② Check wiring line connection carefully.

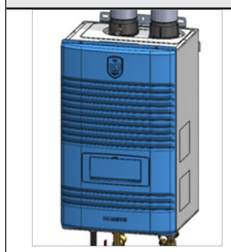
③ Check fan inlet/outlet hole is completely opened after stopping the operation.

Error code	Meaning	Cause
	Flame detector error (Automatic reset)	When flame is detected before ignition, error code 72 appears.

Failure event

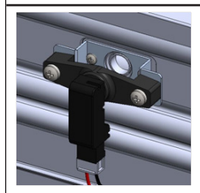
Flame detected before ignition.

Check point



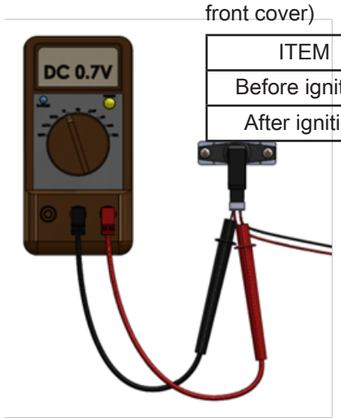
① Ensure the appliance cover is secured. Flame detection sensor can dtect external light source and cause an error code.

Please check flame detection sensor's connecting line and ensure correct position as shown.



■ From more than DC 2.5V after ignition safety cut-off will appear
① When setting before ignition is less than DC 2.5V : Replace infrared sensor
② When setting after ignition is more than DC 2.5V : Replace infrared sensor

Flame detector sensor setting (Please check after closing front cover)



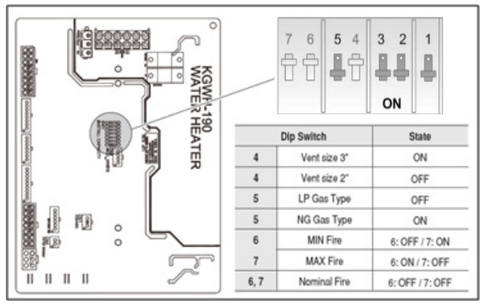
ITEM	Normal operating settings
Before ignition	More than DC 2.5V
After ignition	Less than DC 2.5V

Error code	Meaning	Cause
	Board setting fault (Automatic reset)	If DIP switch is abnormal, 'Er 73' is displayed

Failure event

DIP SWITCH abnormal.

Check point



Dip Switch		State
4	Vent size 3"	ON
4	Vent size 2"	OFF
5	LP Gas Type	OFF
5	NG Gas Type	ON
6	MIN Fire	6: OFF / 7: ON
7	MAX Fire	6: ON / 7: OFF
6, 7	Nominal Fire	6: OFF / 7: OFF

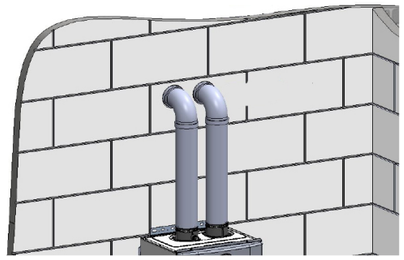
①Check to see if the default DIP SWITCH settings have been changed from the factory settings – assure that default settings are set to correct overheating condition.

Error code	Meaning	Cause
	Exhaust temperature over heating fault (Manual reset)	If exhaust NTC detects vent temperature higher than 149 ◦F, 'Er 94' is displayed.

Failure event

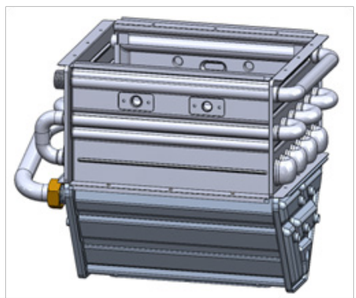
Exhaust temperature overheating issue.

Check point



① Please check the blockage of flue (intake and exhaust pipes).

② Check to see if the default DIP SWITCH settings have been changed from the factory settings – assure that default settings are set to correct overheating condition.



③ ▸ When all check points are normal related to the internal pin, replace heat exchanger.

WARNING

Failure to turn the power off to the appliance before repair could result in serious injury or death.

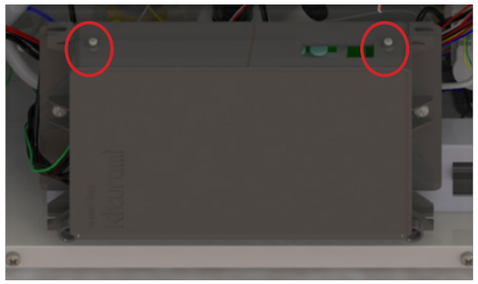
WARNING

Failure to wait for appliance to cool before continuing with repair could result in serious injury or death.

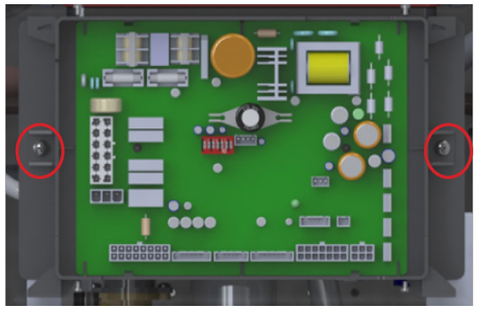
Main components Replacement Instructions

1. Main Controller

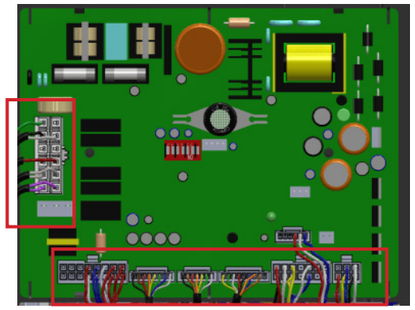
1. Close the gas shut off valve
2. Turn the power off
3. Loosen two screws to remove main controller cover.
4. Disconnect all the electrical connection to the main controller

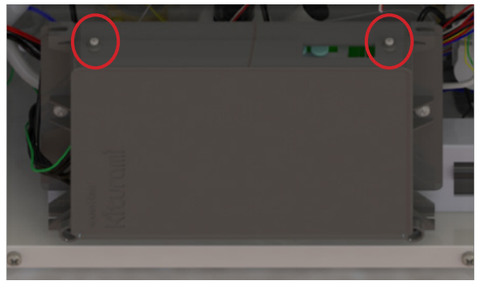


5. Loosen two screws on both sides to remove main controller.



6. Assembly is in the reverse order as the part was repaired.





7. Open the gas shut off valve
8. Turn the power on
9. Turn the unit on and ensure proper operation.

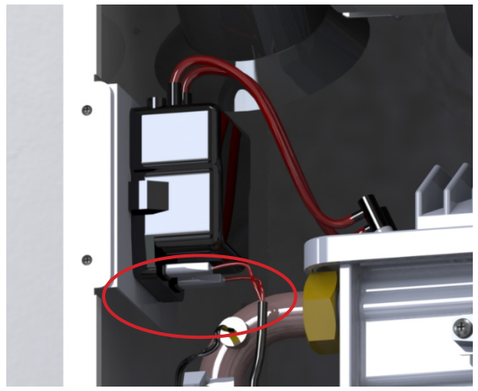
NOTE: When assemble connector, check wiring color and proper connection to avoid mistake.

WARNING
Failure to turn the power off to the appliance before repair could result in serious injury or death.

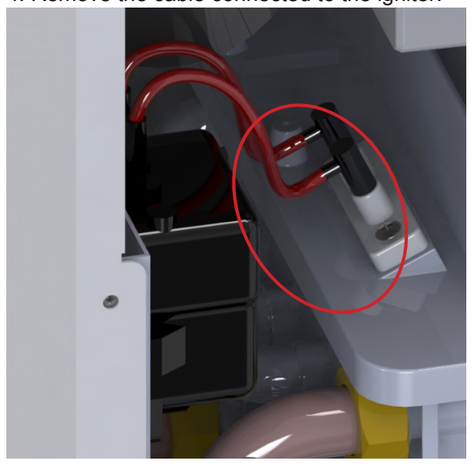
Main components Replacement Instructions

2. Igniton Transformer

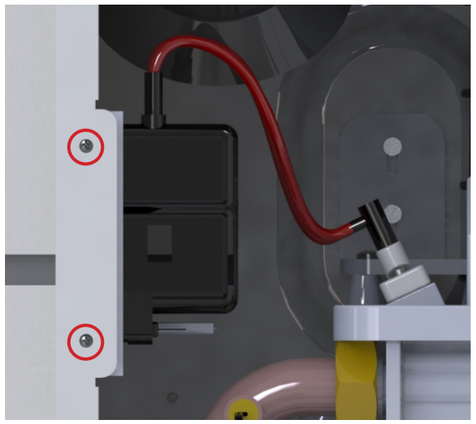
1. Close the gas shut off valve
2. Turn the power off
3. Disconnect the electrical connection to the main controller



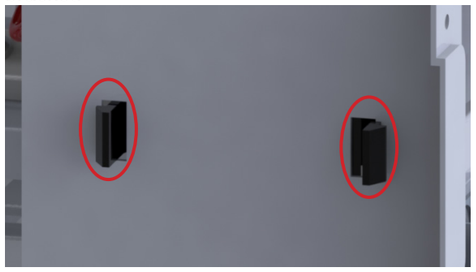
4. Remove the cable connected to the igniter.



5. Remove two screws to separate ignition transformer from the water heater cabinet.



6. Separate ignition transformer from the bracket by unlocking the palstic pieces on the back side of the bracket.



7. Replace ignition transformer with new component
8. Assembly is in the reverse order as the part was repaired.
9. Open the gas shut off valve
10. Turn the power on
11. Turn the unit on and ensure proper operation.

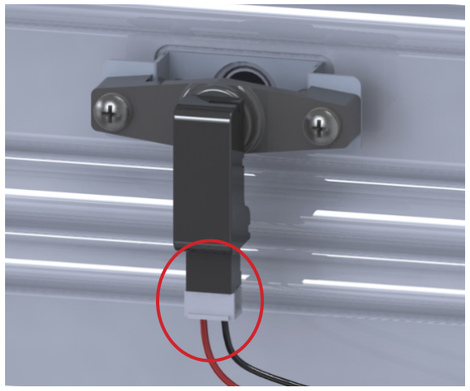
NOTE
Ensure the ignition transformer is properly secured.

WARNING
Failure to turn the power off to the appliance before repair could result in serious injury or death.

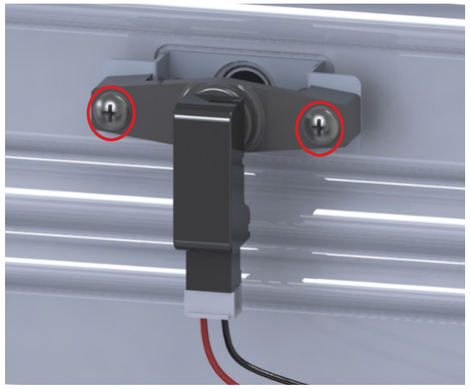
Main components Replacement Instructions

3. Flame Detection Sensor

1. Close the gas shut off valve
2. Turn the power off
3. Disconnect all the electrical connection to the flame detection sensor



4. Rotate flame detection sensor 45 degrees clockwise and pull forward.

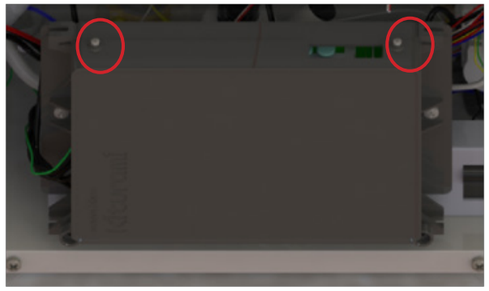


5. Replace flame detection sensor with new component.
6. Assembly is in the reverse order as the part was repaired.
7. Open the gas shut off valve
8. Turn the power on
9. Turn the unit on and ensure proper operation.

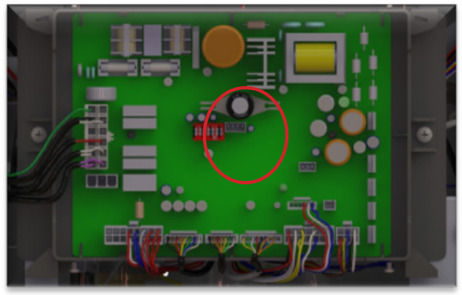
NOTE: Ensure the flame detection sensor is properly secured.

4. Gas Leak Detector

1. Close the gas shut off valve
2. Turn the power off
3. Disconnect all the electrical connection to the main controller



5. Pluck away PCB's gas leakage detector.



6. Replace leak detection with new component.
7. Assembly is in the reverse order as the part was repaired.
8. Open the gas shut off valve
9. Turn the power on
10. Turn the unit on and ensure proper operation.

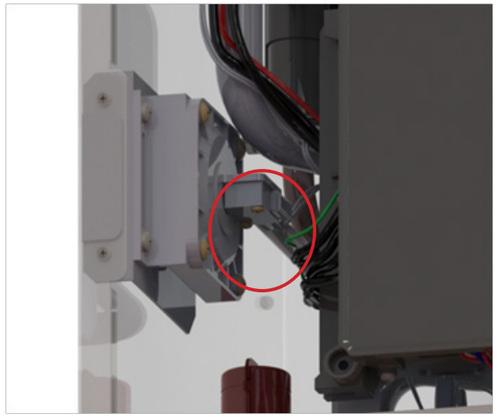
WARNING

Failure to turn the power off to the appliance before repair could result in serious injury or

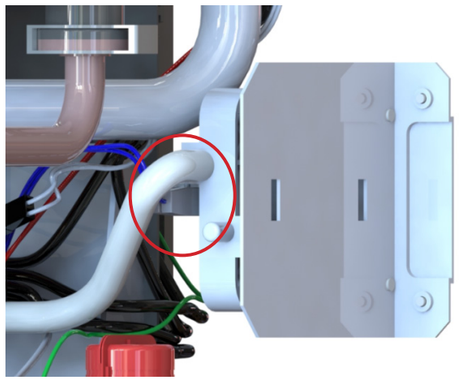
Main components Replacement Instructions

5. Air pressure swtich (APS)

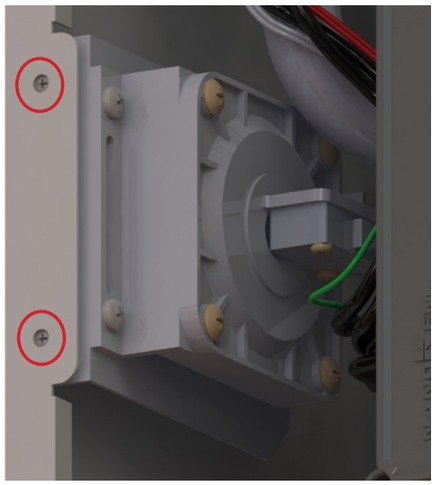
1. Close the gas shut off valve
2. Turn the power off
3. Disconnect the electrical connection to the APS



4. Separate hose from Air Pressure switch.



5. Loosen Air Pressure switch bracket's two screws.

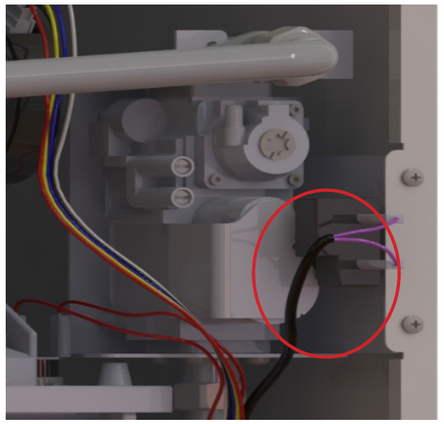


6. Replace APS with new component
7. Assembly is in the reverse order as the part was repaired.
8. Open the gas shut off valve
9. Turn the power on
10. Turn the unit on and ensure proper operation.

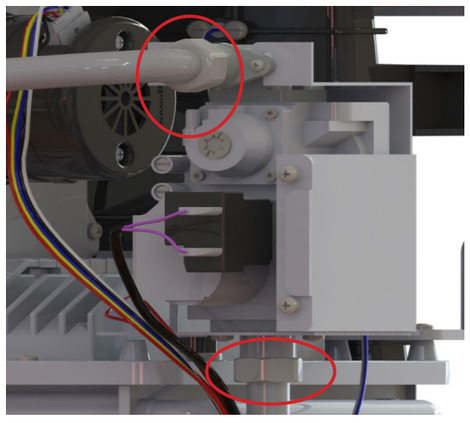
Main components Replacement Instructions

6. Gas valve

1. Close the gas shut off valve
2. Turn the power off
3. Disconnect all electrical connection to the gas valve



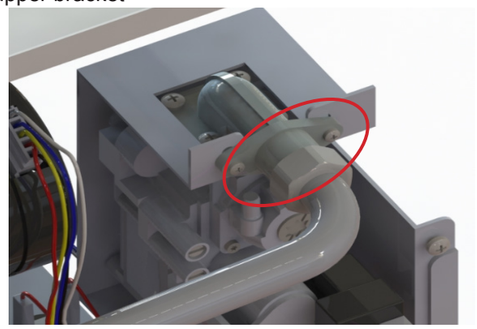
4. Disconnect the gas line from the gas valve by loosing the nuts as shown.



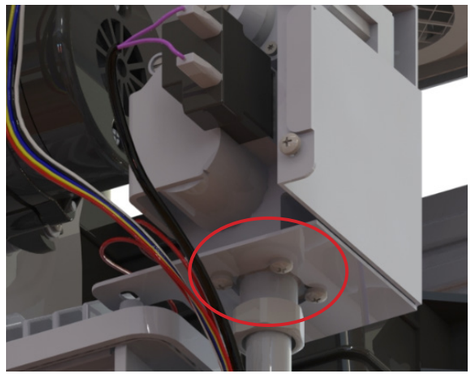
WARNING

Failure to turn the power and gas off to the appliance before repair could result in serious injury or death.

5. Loosen fours screws to separate gas valve from upper bracket



6. Loosen fours screws to separate gas valve from lower bracket



7. Replace gas valve with new component.
8. Assembly is in the reverse order as the part was repaired.
9. Open the gas shut off valve
10. Turn the power on
11. Turn the unit on and ensure proper operation.

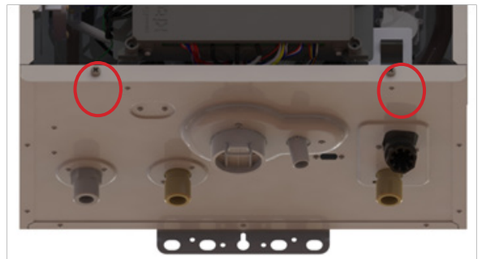
NOTE: You must check for gas leaks around gas valve assembly. failure to do so will result in death or serious personal injury.

Main components Replacement Instructions

7. Condensate Trap

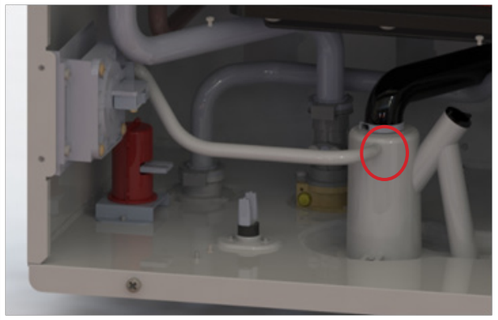
1. Close the gas shut off valve
2. Turn the power off
3. Removed condensate trap drain cap and ensure it is drained properly.

4. Loosen two screws to open the front cover.

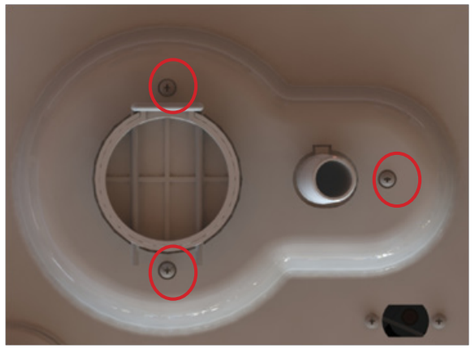


5. Remove hose inlet hocse from the HX condensate pan connected to condensate trap.

6. Remove hose that connect connected from APS to condensate trap.



7. Loosen 3 screws on the bottom of the cabinet that holds condensate trap in place.



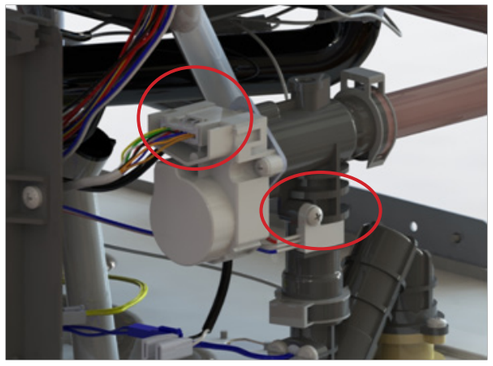
8. Replace condensate trap with new component.
9. Assembly is in the reverse order as the part was repaired.
10. Open the gas shut off valve
11. Turn the power on
12. Turn the unit on and ensure proper operation.

Main components Replacement Instructions

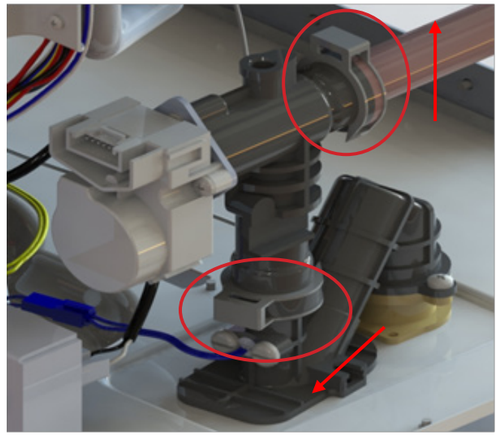
8. Flow Control valve

1. Close the gas shut off valve
2. Turn the power off
3. Close all water valves and drain water from unit.
4. Disconnect the electrical connection to the flow control valve.
5. Loosen two screws to open the front cover.

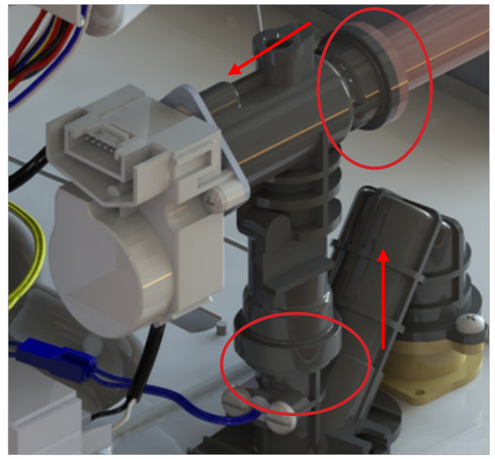
6. Remove connector connected to flow control valve and flow detection sensor.



7. Remove two clips from flow control valve.



8. Separate flow control valve from DHW pipe and DHW inlet filter.



9. Replace flow control valve with new component.
10. Assembly is in the reverse order as the part was repaired.
11. Open the gas shut off valve
12. Turn the power on
13. Open all water valves.
14. Turn the unit on and ensure proper operation.

WARNING

Failure to turn the power off to the appliance before repair could result in serious injury or death.

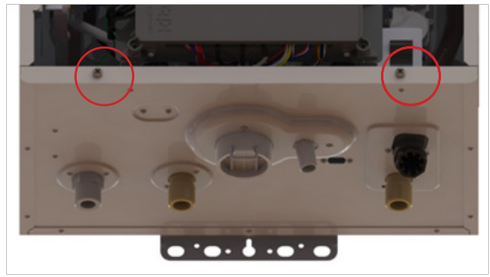
WARNING

Failure to wait for appliance to cool before continuing with repair could result in serious injury or death.

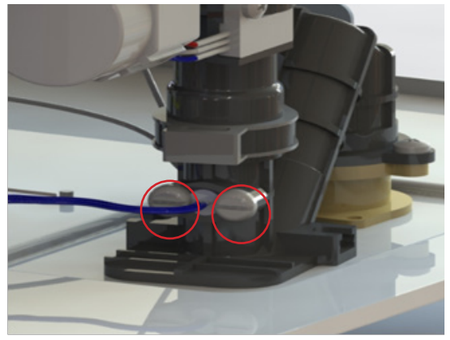
Main components Replacement Instructions

9. Cold Water Inlet Filter Assembly.

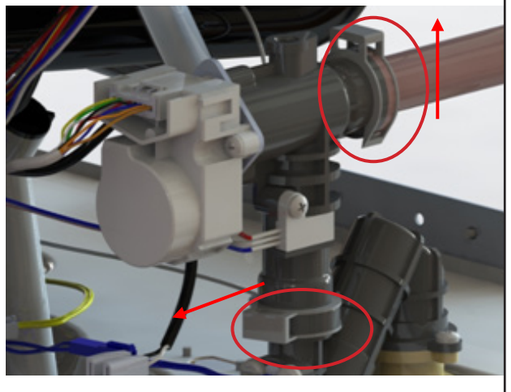
1. Close the gas shut off valve
2. Turn the power off
3. Close all water valves and drain water from unit.
4. Loosen two screws to open the front cover.



5. Loosen two screws and remove temperature sensor connected with DHW inlet filter.

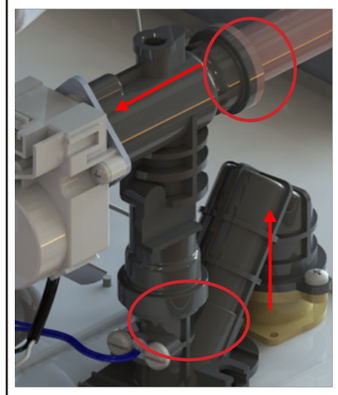


6. Remove two clips from flow control valve.

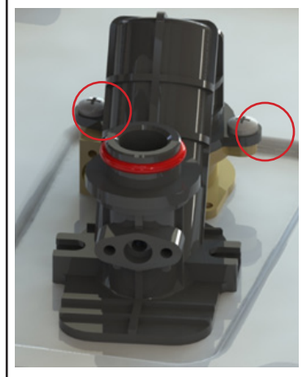


11. Mixing Valve

7. Separate flow control valve from DHW pipe and DHW inlet filter.



8. Loosen two top screws and four bottom screws connected with DHW supply filter and adapter.



9. Replace cold water inter filter assembly with new component.
10. Assembly is in the reverse order as the part was repaired.
11. Open the gas shut off valve
12. Turn the power on
13. Open all water valves.
14. Turn the unit on and ensure proper operation.

WARNING

Failure to turn the power off to the appliance before repair could result in serious injury or death.

WARNING

Failure to wait for appliance to cool before continuing with repair could result in serious injury or death.

Main components Replacement Instructions

10. Cold Water Inlet Filter

1. Close the gas shut off valve
2. Turn the power off
3. Close all water valves and drain water from unit.
4. Place a bucket under the appliance to collect the residual water inside the water heater.
5. Separate cold water inlet filter by rotating counter-clockwise.

6. Clean it with a small brush and clean running water.
7. Open the gas shut off valve
8. Turn the power on
9. Open all water valves.
10. Turn the unit on and ensure proper operation.

WARNING

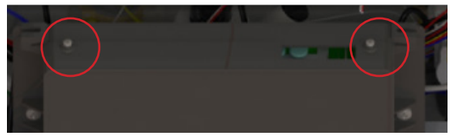
Failure to turn the power off to the appliance before repair could result in serious injury or death.

WARNING

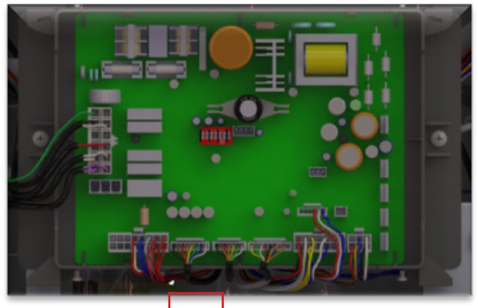
Failure to wait for appliance to cool before continuing with repair could result in serious injury or death.

11. Mixing Valve

1. Close the gas shut off valve
2. Turn the power off
3. Close all water valves and drain water from unit.
4. Loosen two screws to access controller connections



5. Separate connector connected with mixing valve.



6. Remove two clips connected with mixing valve and outlet pipe.

7. Separate mixing valve and outlet pipe
8. Remove mixing valve and replace with new component.
9. Assembly is in the reverse order as the part was repaired.
10. Open the gas shut off valve
11. Turn the power on
12. Open all water valves.
13. Turn the unit on and ensure proper operation.

WARNING

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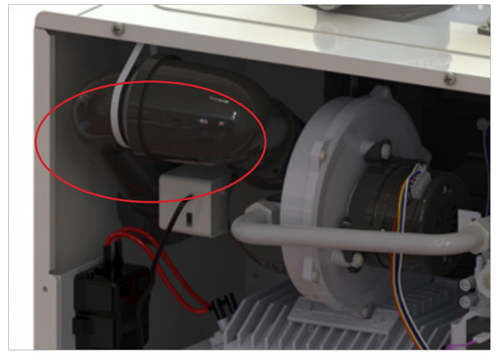
WARNING

Failure to wait for appliance to cool before continuing with repair could result in serious injury or death.

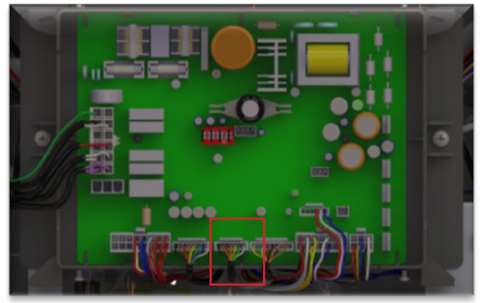
Main components Replacement Instructions

12. Air Gas Mixer(AGM)

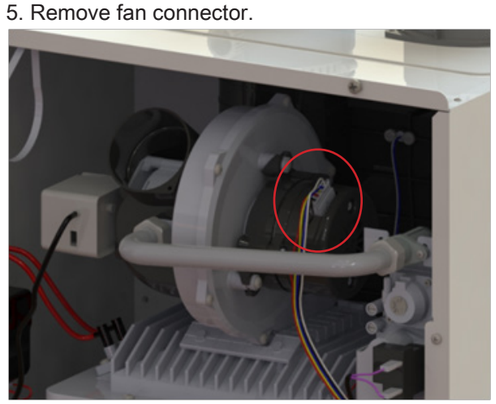
1. Close the gas shut off valve
2. Turn the power off
3. Separate intake pipe attached to AGM.



4. Remove AGM connector.

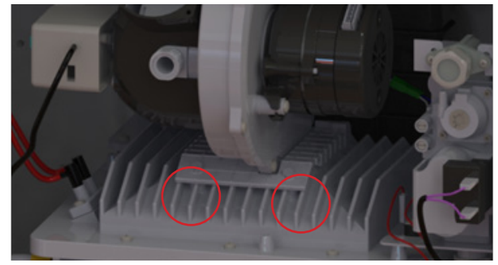


5. Remove fan connector.

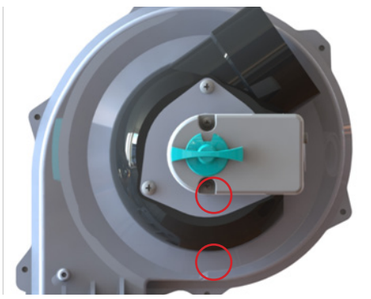


6. Loosen gas pipe nut connected with AGM

7. Loosen burner plate bracket's by loosen two screws as shown.



8. Loosen two screws to remove AGM



9. Replace AGM with new component
10. Assembly is in the reverse order as the part was repaired.
11. Open the gas shut off valve
12. Turn the power on
13. Open all water valves.
14. Turn the unit on and ensure proper operation.

WARNING

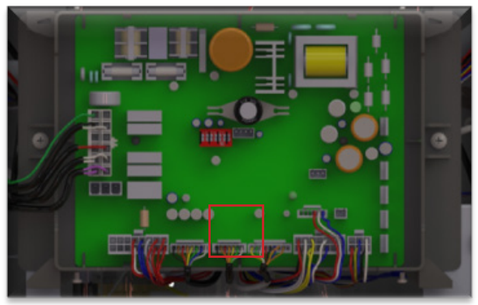
Failure to turn the power and gas off to the appliance before repair could result in serious injury or death.

Main components Replacement Instructions

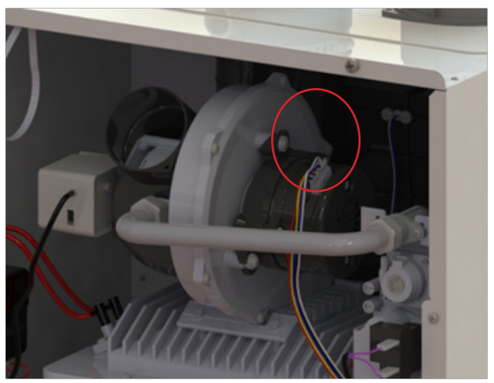
13. BLDC Fan Assembly

1. Close the gas shut off valve
2. Turn the power off
3. Separate intake pipe attached to AGM.

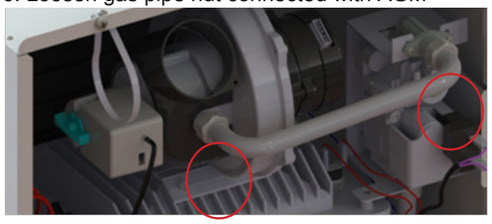
4. Remove AGM connector.



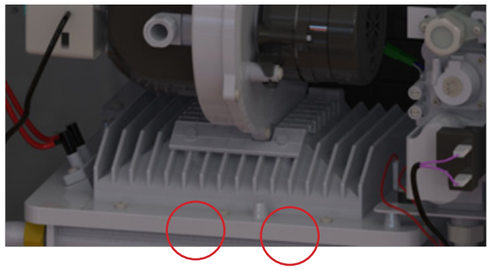
5. Remove fan connector.



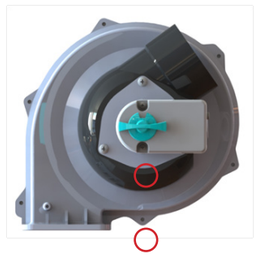
6. Loosen gas pipe nut connected with AGM

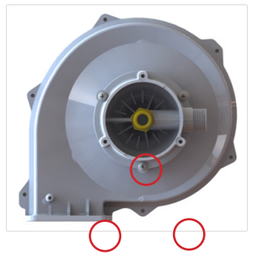


7. Loosen burner plate bracket's by loosen two screws as shown.



8. Loosen three screws to separate AGM cover and motor.(Loosen AGM's two screw.)
9. Remove three screws to separate Fan, connected with AGM.





10. Replace BLDC fan with new component
11. Assembly is in the reverse order as the part was repaired.
12. Open the gas shut off valve
13. Turn the power on
14. Open all water valves.
15. Turn the unit on and ensure proper operation.

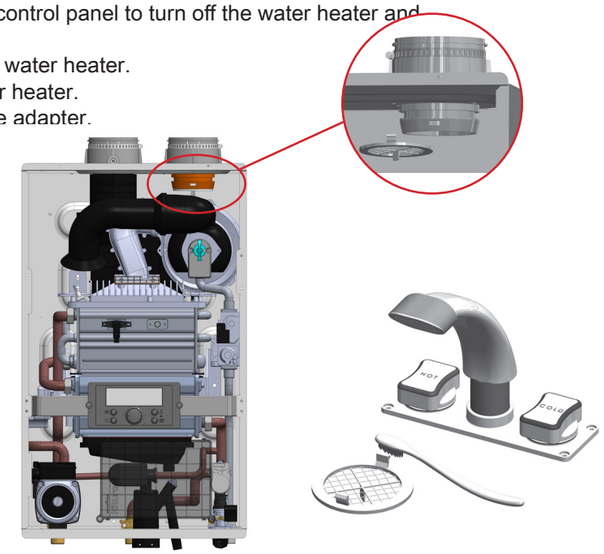
WARNING

Failure to turn the power and gas off to the appliance before repair could result in serious injury or death.

Cleaning Air Intake Filter

To properly maintain the water heater, you should clean air intake filter every month.

To clean air intake filter:
1. Press Power button on the control panel to turn off the water heater and turn off the gas valve.
2. Disconnect power supply to water heater.
3. Remove front cover of water heater.
4. Pull the filter out of air intake adapter.



5. Remove the filter from the plastic assembly and clean it with a small brush and clean running water.
6. Dry the filter completely and then reinsert the filter into the plastic assembly.
7. Replace the front cover and reconnect the power supply to the water heater.
8. Press Power button on the front panel to turn on water heater.

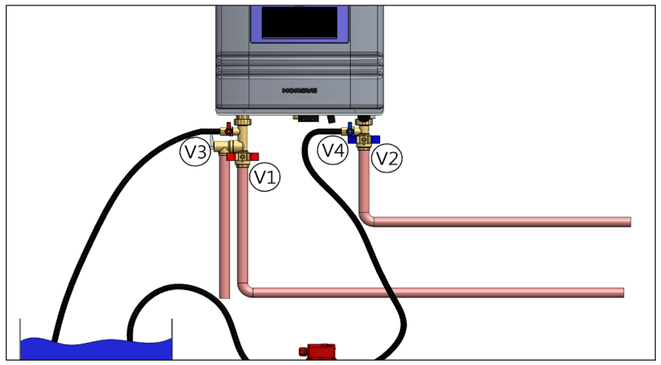
Cleaning cold water Inlet Filter (Draining the Water Heater)

1. Place a bucket under the appliance to collect the residual water inside the water heater.
2. Press Power button on the front control panel to turn off the electrical power to the water heater and turn off the gas valve.
3. Close water supply valve on the inlet to the appliance.
4. Open the hot water faucets completely.
5. Remove the cold water inlet filter. Clean inlet filter with a small brush and clean running water.

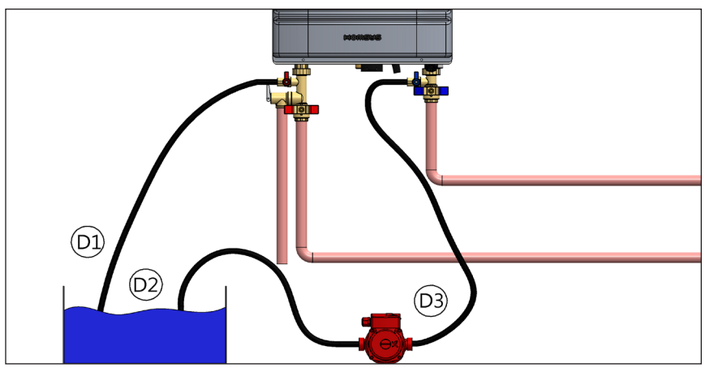
Flushing the Water Heater

Flushing the Heat Exchanger is a complicated procedure that should only be performed by a qualified service technician.
NOTE: Improper maintenance WILL AVOID water heater warranty.

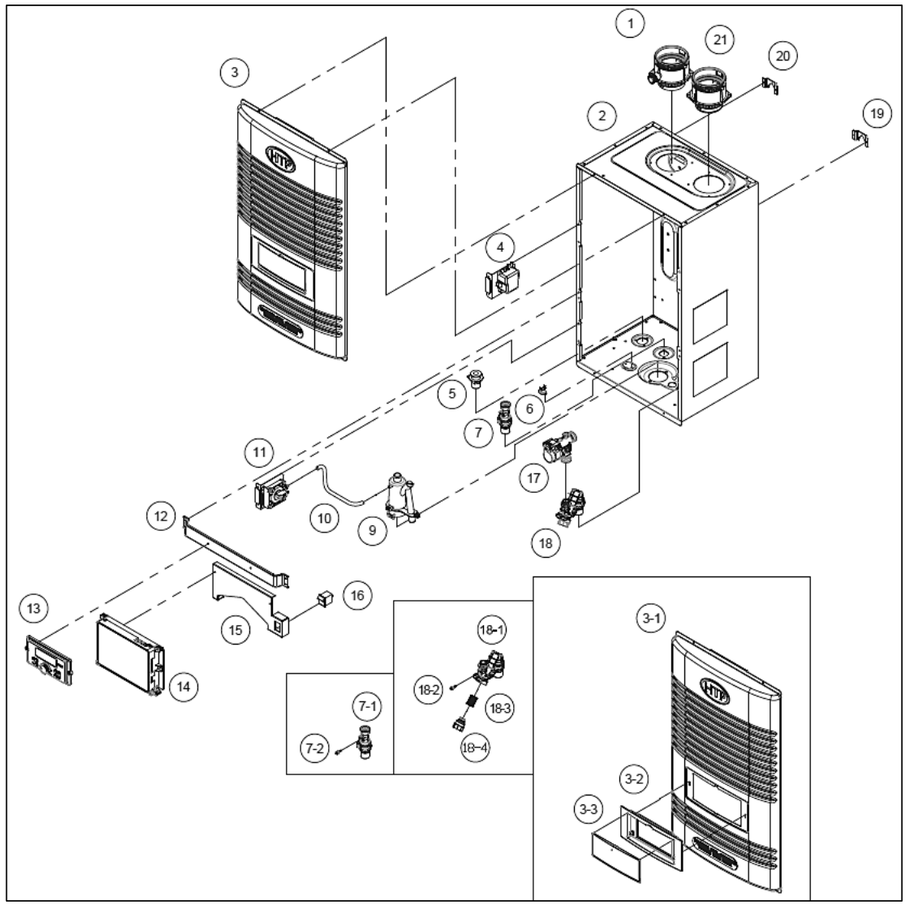
1. Disconnect electrical power to the water heater.
2. Close the shut-off valves on both hot water outlet and cold water inlet lines. (V1 & V2)
3. Connect one hose “D1” to the valve “V3” and place the free end in the bucket. Connect one of the hoses “D3” to the circulation pump outlet and the cold water inlet line at the valve “V4”. Connect other hose “D2” to the circulation pump inlet and place the free end in the bucket.



4. Pour the tankless water heater cleaning solution into the bucket. Ensure the cleaning solution is approved for potable water systems.
   Place the drain hose (D1) and the hose (D2) to the pump inlet into the cleaning solution.
5. Open service valves (V3 & V4) on the hot water outlet and cold water inlet lines.
6. Turn on the circulation pump. Operate the pump and allow the cleaning solution to circulate through the water heater for at least 1 hour at a rate of 4 gallons per minute. This will remove any possible harmful scale deposits.
7. Rinse the cleaning solution from the water heater as follows:
   - Remove the free end of the drain hose (D1) from the bucket.
   - Close service valve, (V4), and open shut-off valve, (V2). Do not open shut-off valve, (V1).
   - Allow water to flow through the water heater for 5 minutes.
   - Close shut-off valve (V2).
8. Disconnect all hoses.
9. Remove the cold water inlet filter from water heater and clean out any residues.
10. Reinsert the filter and ensure the filter cap is securely tightened.
11. Connect electrical power to the water heater.
12. Open hot water faucet. Run the water heater continuously for five minutes to ensure all cleaning solution is purged from the system. Check for leaks and ensure the water heater is operating properly.

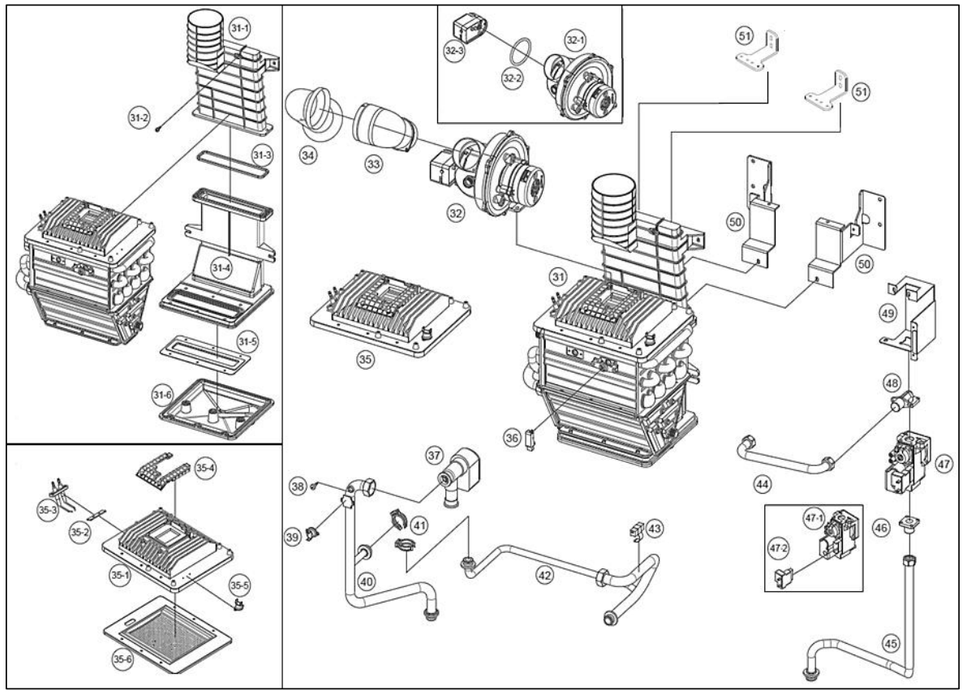


Main components diagram and part list



NUMBER	DESCRIPTION	PART NUMBER	NUMBER	DESCRIPTION	PART NUMBER
1	EXHAUST ASSY	7850P-021	11	AIR PRESSURE SWITCH	7850P-047
2	CASE	7850P-044	12	DISPLAY BRACKET	7850P-065
3	DOOR ASSY	7850P-025	13	DISPLAY	7850P-057
3-1	FRONT COVER	7850P-062	14	CONTROL	7850P-058
3-2	DISPLAY PANEL BRACKET	7850P-024	15	CONTROL BRACKET	7850P-066
3-3	DISPLAY PANEL	7850P-023	16	ROCKER SWITCH	7850P-059
4	IGNITION TRANSFORMER	7850P-045	17	FLOW CONTROL VALVE	7850P-053
5	GAS INLET NIPPLE	7850P-043	18	WATER INLET VALVE ASSY	7850P-018
6	OVERHEAT SENSOR	7850P-050	18-1	WATER INLET VALVE BODY	7850P-067
7	DHW SUPPLY PIPE ASSY	7850P-020	18-2	WATER INLET SENSOR	7850P-015
7-1	DHW SUPPLY PIPE	7850P-063	18-3	WATER INLET FILTER	7850P-017
7-2	WATER OUTLET SENSOR	7850P-019	18-4	WATER INLET FILTER CAP	7850P-016
8	N/A	N/A	19	CASE BRACKET (LEFT)	7850P-068
9	SIPHON ASSY	7850P-014	20	CASE BRACKET (RIGHT)	7850P-069
10	SIPHON AIR PRESSURE HOSE	7850P-064	21	INTAKE AIR ASSY	7850P-022

Main components diagram and part list



NUMBER	DESCRIPTION	PART NUMBER	NUMBER	DESCRIPTION	PART NUMBER
31	HEAT EXCHANGER ASSY	7850P-032	35-6	METAL FIBER	7850P-075
31-1	EXHAUST PIPE ASSY (UP)	7850P-033	36	FLAME DETECTOR SENSOR	7850P-031
31-2	EXHAUST TEMPERATURE SENSOR	7850P-070	37	MIXING VALVE	7850P-054
31-3	EXHAUST GASKET 1	7850P-071	38	WATER TEMPERATURE SENSOR	7850P-081
31-4	EXHAUST PIPE ASSY (DOWN)	7850P-034	39	WATER TEMPERATURE OVERHEAT SENSOR	7850P-051
31-5	EXHAUST GASKET 2	7850P-072	40	DHW OUTLET PIPE	7850P-049
31-6	CONDENSATE GUTTER	7850P-073	41	WATER PIPING CLIP	7850P-055
32	FAN ASSEMBLY	7850P-006	42	DHW INLET PIPE	7850P-048
32-1	FAN	7850P-002	43	CERAMIC HEATER	7850P-076
32-2	O-RING	7850P-003	44	GAS VALVE PIPE	7850P-039
32-3	AGM (ACTUATOR)	7850P-004	45	GAS VALVE PIPE	7850P-040
33	SILENCER ELBOW	7850P-036	46	GAS VALVE ADAPTER (STRAIGHT)	7850P-077
34	SILENCER BODY	7850P-035	47	GAS VALVE ASSY W/ PLUG	7850P-078
35	BURNER ASSY	7850P-011	47-1	GAS VALVE	7850P-012
35-1	BURNER HEAD	7850P-007	47-2	GAS VALVE PLUG	7850P-013
35-2	IGNITION ROD BRACKET	7850P-010	48	GAS VALVE ADAPTER (90 DEGREE)	7850P-079
35-3	IGNITION ROD	7850P-008	49	GAS VALVE BRACKET	7850P-080
35-4	BLOWER HEAD BRACKET	7850P-074	50	BOTTOM HEAT EXCHANGER BRACKETS	7850P-028
35-5	OVERHEAT SENSOR (BURNER)	7850P-009	51	TOP HEAT EXCHANGER BRACKETS	7850P-082

Memo