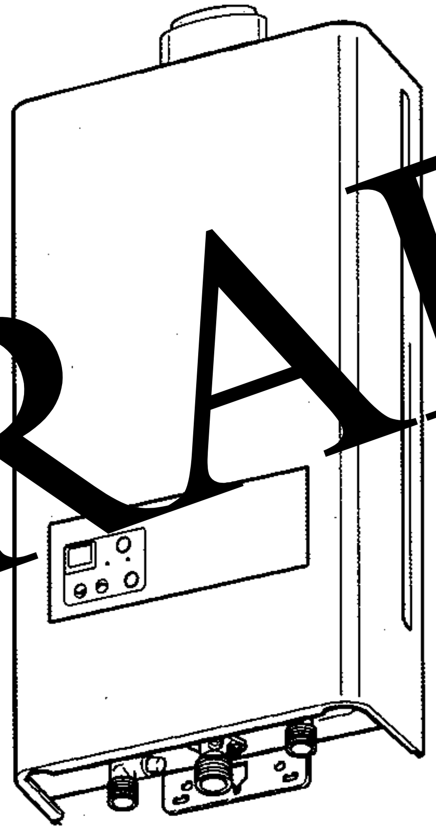
Service Manual

REU - 16 FUA - E

"Infinity 16 i"

DRAFT



Continuous Flow Water Heater

Important.

Read these instructions carefully before attempting service of this appliance. All work must be carried out by competent persons.

The Rinnai Infinity 16i water heater, when correctly installed, complies with the requirements of the United Kingdom Water Regulations / Byelaws (Scotland). These Products can be found listed in the Water Fittings and Materials Directory.

The Rinnai Infinity 16i water heater is CE Marked as allowed by Technigas.
Certificate number E0940/5399
ID number 0461BQ0836
Date of Issue 23 Dec 2005

Quality System Standard

ISO 9001 - 1994

The Design, Development, and Manufacture of Gas Water Heating Appliances done under Rinnai's Quality Management System is certified under the Quality Management System Standard ISO 9001.

Registration Number JQ0003D
Registered since: February 1994
Certified by Japan Gas Appliances Inspection Association.

UK INSTRUCTIONS

This appliance may only be serviced or repaired by someone certified competent to do so. At the time of printing the only people deemed competent to install this appliance are those that are CORGI registered for this type of appliance in this type of location who have a current ACS certificate.

1. **Gas safety (Installation & Use) regulations 1998** are the 'Rules in force'. In your own interest and that of safety, it is law that all gas appliances are installed and serviced by competent persons in accordance with the above regulations. Failure to install appliances correctly could lead to prosecution. Other persons should NOT attempt to install this equipment.

2. Installation must be in accordance with the current issue of the following:

Building Regulations issued by the Department of the Environment
Building Standards (Scotland) Regulations.
I.E.E. Wiring regulations for electrical installations.
Gas safety (Installation and Use) Regulations current issue.
BS 5546
BS 5440
BS 6891
BS 5482
BS 6700
BS 6644
Institute of Gas Engineers Publications
Local byelaws
Water regulations
Health and safety at work etc. Act 1974
IGE/UP/10 Part1 Edition 2.
Building Regulation J

Such other specifications and regulations that may supersede or complement the above documents.

Please be sure that you are fully aware of your obligations and responsibilities under these regulations.

WARNING

Failure to comply with these instructions may result in serious personal injury or damage to the appliance.

ALL WIRING INSIDE THIS APPLIANCE MAY BE AT 230 VOLTS POTENTIAL

ALL SERVICE WORK MUST BE CARRIED OUT BY AN AUTHORISED PERSON.

DO NOT TEST FOR GAS ESCAPES WITH AN OPEN FLAME

Contents

Glossary of Terms and Symbols

dB(A)	-	sound pressure level in decibels, "A" range
DC	-	direct current
AC	-	alternating current
WFCD	-	water flow control device
FB	-	feedback information
FF	-	feedforward information
Hz	-	Hertz
IC	-	integrated circuit
kcal/h	-	kilocalorie per hour
kW	-	kilowatts
LED	-	light emitting diode
L/min	-	Litres per minute
mA	-	milliamps
mbar	-	millibars of pressure
mm	-	millimetres
bar	-	gauge pressure
OHS	-	overheat switch
PCB	-	printed circuit board
CPU	-	central processing unit
POT	-	potentiometer
rpm	-	revolutions per minute
SV	-	solenoid valve
ø	-	diameter
$\Delta\,^{o}C$	-	temperature rise above ambient
POV	-	modulating valve
TE	-	thermal efficiency
TH	-	thermistor
T_{IN}	-	temperature of incoming water
T_{OUT}	-	temperature of outgoing water

Introduction

The Rinnai Infinity hot water units represents the latest technology in continuous flow, temperature controlled hot water.

Features

- The Rinnai **Infinity 16i will NEVER RUN OUT** of hot water. As long as electricity, water, and gas supplies are connected, hot water is available when hot water taps are open.

- Built into the main micro-processor is the facility to **LIMIT THE MAXIMUM TEMPERATURE** of the hot water supplied. The water temperature may be set to various temperatures. This is particularly useful when the hot water unit is installed where young children or the infirm may be using the hot water. If required, the temperature can be changed via the control pad on the front of the unit or with a localised controller. For further information, please contact Rinnai.

- Rinnai Infinity internal units are powered flue appliances. This makes them **COMPACT**, saving both floor and wall space.

- The temperature of outgoing hot water is **CONSTANTLY MONITORED** by a **BUILT-IN SENSOR**. If the temperature of the outgoing hot water rises to more than 55°C the burner is shut OFF and only turned ON again when the temperature falls to below the selected temperature.

- The burner lights automatically when the hot water tap is opened, and extinguishes when the tap is closed. **IGNITION IS ELECTRONIC**, so there is no pilot light. When the hot water tap is off, no gas is used.

- The 16i has a built in controller on the front of the unit for easy control. Two additional external temperature controllers can be mounted remotely from the heater. This offers the following additional features:
  Localised temperature setting.
  Diagnostic message.
  Error Codes.

- Temperatures selected at the controllers are retained in the **SYSTEM MEMORY** when the controller gives up priority or the system is turned off. Temperatures over 55^0C will revert to 55^0C when power and/or priority is regained.

- Operating **NOISE LEVEL IS VERY LOW**.

- **ERROR MESSAGES ARE DISPLAYED** on the Temperature Controllers, assisting with service.

- **FROST PROTECTION** device built in as standard.

Specification of 16i

Type of Appliance		Temp Controlled Continuous Flow Gas Water Heater
Operation		With / Without remotes (Kitchen, Bathroom, etc.)
Flue System		Room Sealed, Forced Draught Flue
Installation		Internally Mounted only
Available Temps		37C - 48C (1 deg Increments) 50, 55, 60
Dimensions	Width	370 mm
	Height	675 mm
	Depth	130 + 45 mm
Weight		15 kg
Connections	Gas	1/2 in bsp
	Cold Water	1/2 in bsp
	Hot Water	1/2 in bsp
Ignition System		Direct Electronic Ignition
Noise Level		49 dB(A)
Nox		55 ppm Max
Water Temp Control		Simulation feed forward and feedback
Safety Devices	Flame Failure	Flame Rod
	Boil Dry	Water Flow Sensor
	Remaining Flame	97 C bimetal switch
	Over current	Glass Fuse 3 Amp
	Over pressure	Pressure Relief Valve 15 bar open, 12 bar close
	Combustion Fan	Integrated circuit system
	Fusible Link	150 C Thermal Fuse
	Over temperature	Lockout Thermistor 95 C
Remote Controls	Heater Mounted	MC-45-SR-EU
	Kitchen	BC-45-SR-EU or BSC-45-SR-EU
	Bathroom	BC-45-SR-EU or BSC-45-SR-EU
Remote Cable		Two core sheathed (double insulated) flex with min 0.55 mm^2

G20 Nat Gas Press Low	1.8	mbar		
G20 Nat Gas Press High	9.0	mbar		
G25 Nat Gas Press Low	1.8	mbar		
G25 Nat Gas Press High	9.0	mbar		
G30 LPG (Butane) Press Low	2.2	mbar		
G30 LPG (Butane) Press High	11.4	mbar		
G31 LPG (Propane) Press Low	2.2	mbar		
G31 LPG Propane) Press High	14.2	mbar		
Gas Consumption Low (Gross)				
G20 Nat Gas	4.7	kW	0.4	m3/hr
G25 Nat Gas	4.0	kW	0.4	m3/hr
G30 LPG (Butane)	4.9	kW	0.35	kg/hr
G31 LPG (Propane)	4.9	kW	0.35	kg/hr
Gas Consumption High (Gross)				
G20 Nat Gas	34.9	kW	3.26	m3/hr
G25 Nat Gas	29.6	kW	3.26	m3/hr
G30 LPG (Butane)	36.8	kW	2.6	kg/hr
G31 LPG (Propane)	36.5	kW	2.6	kg/hr
Max Flow raised 25C	15.2	L/min		
Min Operation Flow	2.4*	L/min		
Water Pressure Nom.	1.1 - 7.0	bar		
Power Supply	230 V / 50 Hz			
Electric Consumption	68	Watts		

Sensors and Safety Devices

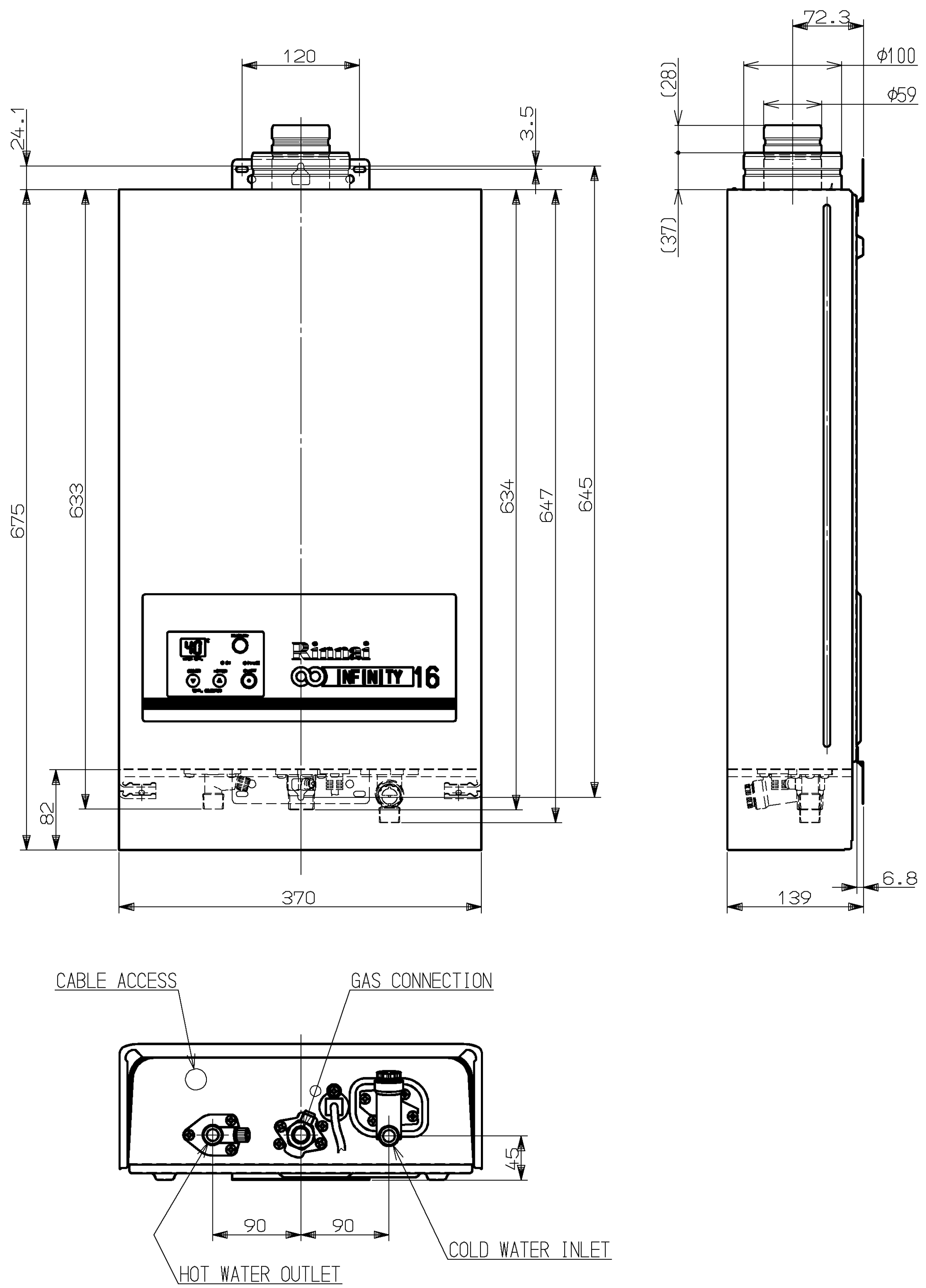
- **Heat Exchanger Thermistor**: Measures hot water temperature at heat exchanger outlet. If water temperature reaches a predetermined limit, gas supply is stopped.
- **Hot Water Delivery Thermistor**: Measures hot water temperature at the outlet valve (i.e. the 'mixed' temperature).
- **Flame Rod**: Monitors combustion characteristics inside the combustion chamber. If the flame fails, gas supply is stopped.
- **Overheat Switch**: Situated on the heat exchanger, gas supply is stopped when water temperature reaches 97ºC for a number of seconds.
- **Fusible Link**: Situated on the heat exchanger, electrical power supply is stopped if the temperature exceeds 150ºC.
- **Water Pressure Relief Valve**: Safeguards the water circuit against excessive inlet pressure. Opens at 15 bar, closes at 12 bar.
- **Electrical Fuse**: (3A glass fuse) prevents against over-current. Surge Protector: prevents against over-current.
- **Boil Dry Prevention**: If water flow sensor detects no flow, gas supply is stopped.
- **Combustion Fan Speed Sensor**: In case of combustion fan defect (no rotation of fan) gas supply is stopped.
- **Temperature Cutout**: If the delivered hot water temperature rises above the required delivery temperature for a number of seconds, the gas supply is stopped.

Combustion Specifications

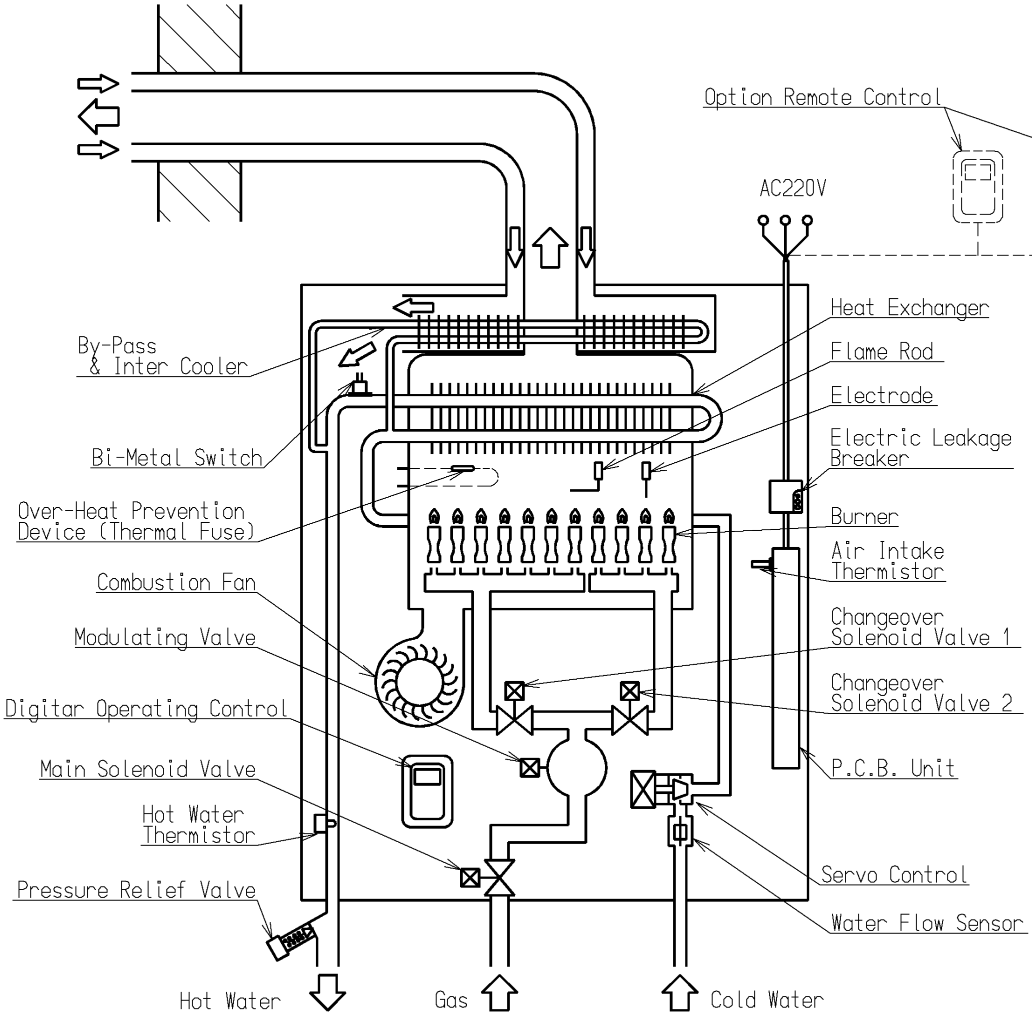
Gas Type	Injector size (mm)	Damper	Primary Pressure (mbar)	Secondary Pressure (mbar)		Gas Input [Gross] (kW)	
				Low	High	Low	High
Natural Gas (G20)	1.3	Nat Gas	20	1.8	9.0	4.7	34.9
Propane (G31)		LPG	37	2.2	14.2	4.9	36.5

The secondary gas pressure is set with the cover off the unit and a manometer measuring the pressure from the gas valve (regulator) test point

Dimensions


120
24.1
3.5
72.3
φ100
φ59
(28)
(37)
675
633
634
647
645
82
370
139
6.8
Rinnai
INFINITY 16
CABLE ACCESS
GAS CONNECTION
45
90
90
COLD WATER INLET
HOT WATER OUTLET

Schematic Diagram



HOT WATER SUPPLY OPERATION

Ignition

Press ON/OFF Button of **Optional Remote Control** to turn on unit . The remote control display and priority LED will light up. When a hot water tap is opened the **Water Flow Sensor** revolves and sends a pulse signal to the **Printed Circuit Board (PCB.)** When the PCB detects a water flow over 2.4 L/min it compares the temperature at the **Hot Water Thermistor** to the set point and begins the ignition process; the **Combustion Fan** starts first. Once the chamber has been purged and the air proving has made the **Electrode** begins to spark to Earth. The **Main Solenoid Valve** and **Changeover Solenoid Valve 2** are opened and the **Burner** lights. The **Flame Rod** will ensure proper burning before **Changeover Solenoid Valve 1** will open.

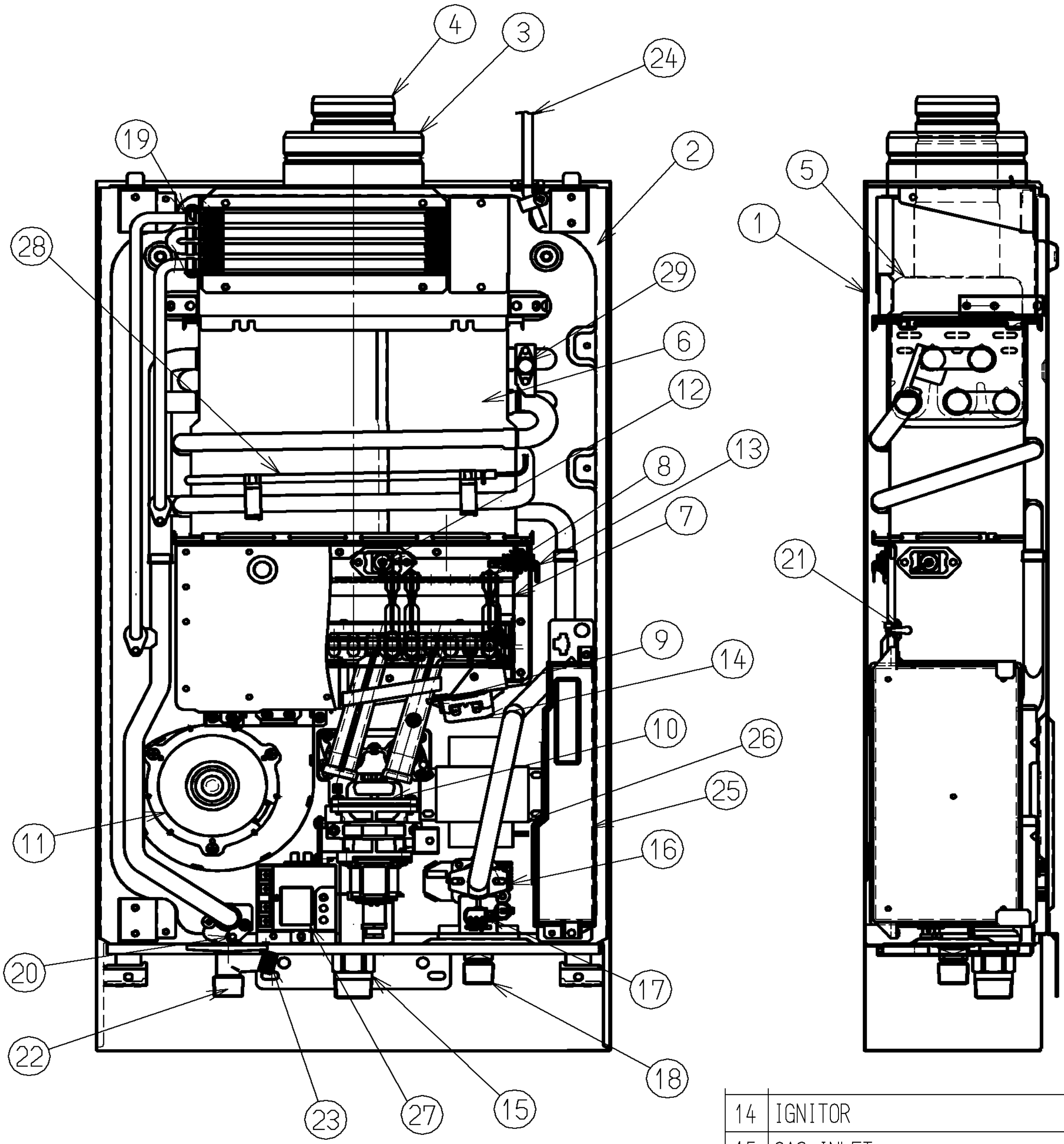
Temperature Setting

With the **Temperature Control Buttons** on the controller the outlet temperature can be set from 37 - 60℃. When the temperature set point is above 50℃ the **High Temperature Indicator** glows. Temperature can not be set above 48℃ while hot water is in use (flowing.) The unit will continually monitor the outgoing temperature and can fully modulate the performance with the **Modulating Valve** and the **Servo Control**.

Standby

When the hot water tap is closed the PCB no longer receives a pulse signal from the Water Flow Sensor. The PCB shuts the Main Solenoid Valve and Change-over Solenoid Valves and the Burner extinguishes. The combustion fan will run on to post purge the chamber.

Structure Diagram

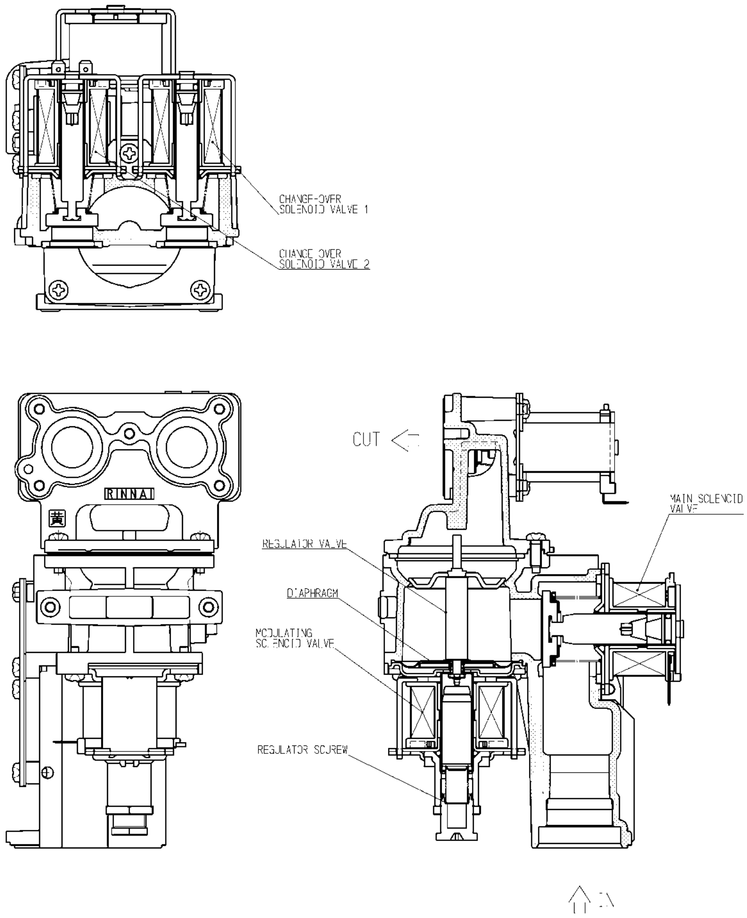


NO	PARTS NAME
1	FRONT COVER
2	MAIN BODY
3	AIR INLET PIPE
4	FLUE OUTLET PIPE
5	FLUE DUCT
6	HEAT EXCHANGER
7	COMBUSTION CHAMBER
8	BURNER
9	MANIFOLD
10	GAS CONTROL
11	COMBUSTION FAN
12	FLAME ROD
13	ELECTRODE
14	IGNITOR
15	GAS INLET
16	SERVO CONTROL
17	WATER FLOW SENSOR
18	WATER INLET
19	INTER COOLER
20	HOT WATER THERMISTOR
21	AIR INTAKE THERMISTOR
22	HOT WATER OUTLET
23	PRESSURE RELIEF VALVE
24	POWER CORD
25	P.C.B
26	TRANSFORMER
27	ELECTRIC LEAKAGE BREAKER
28	THERMAL FUSES
29	BI-METAL SWITCH

Main Components

1. Gas Control Unit

1.1 Modulating Valve
This device is used by the PCB to adjust the volume of gas to the burner in proportion to the volumetric flow rate of water in order to maintain a supply of constant temperature hot water amid changes in water flow rates and incoming temperatures.



1.2 Change-over Solenoid Valves
Additional solenoid valves are included to section the burner and stage the control in 3 steps. This gives the Burner more steady combustion at the required capacity and allows the water heater to operate at very low flow rates and temperature rises.

2. Flame Rod
Monitors combustion characteristics inside the combustion chamber. If the flame fails, gas supply is stopped. Works through rectification of the combustion flame. An AC current is supplied to the flame rod. Electrons can only pass from the rod to the burner, and never from the burner to the rod, so the resultant DC current is used to prove combustion. When the DC current is present the burner has normal combustion, if the DC current is not present (or an AC current is present) the unit shuts the solenoid valve.

Main Components

3. Thermal Fuse

The thermal fuse is an electric link which must be intact for the unit to operate. If the thermal fuse reaches a set temperature it will melt and the unit will shut down. The thermal fuse must be replaced if it melts. It is to protect against over heating and heat exchanger splits where water may leak out and be superheated into steam.

4. Overheat Safety (Bi-metal Switch)

This Bi-metal Switch is fixed at the bend of the Heat Exchanger hot water outlet. If the temperature outlet from the heat exchanger reaches 97^{0}C the bi metal switch will open and the solenoid valve circuit is broken. This will cease combustion in case of overheat.

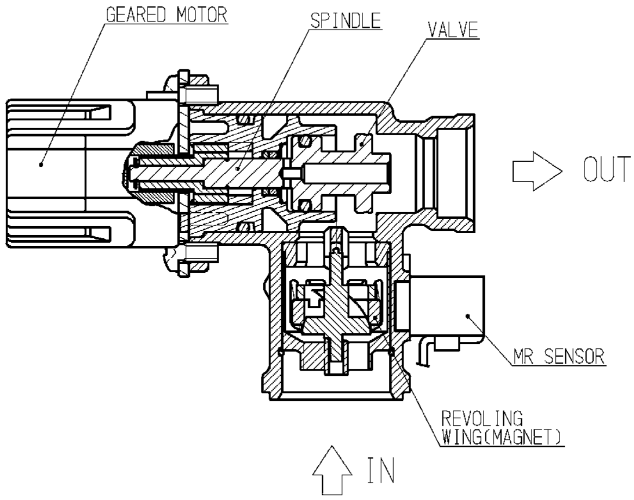
5. Combustion Fan

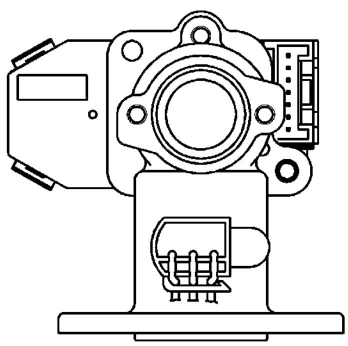
The combustion fan supplies primary air into the wing burners and secondary air up through the Bunsen style burners. The fan is DC low voltage and the speed is controlled by the PCB depending on the hot water flow and temperature. The fan speed is compared to the current required to attain that speed for air proving. If the fan current is over or under the parameters for the given speed the unit will shut down on air proving.

6. Water Volume Servo with Water Flow Sensor

6.1 Water Flow Sensor
Water flow sensing is done with a small turbine that spins when water travels through it in the correct direction. Each of the four fins on the turbine has a small magnet on it. Outside of the valve there is a magnetic sensor that detects the speed that the turbine is revolving. The revolution speed is input to the PCB which relates this speed to the water flow volume and determines whether it is sufficient for ignition.

6.2 Water Volume Flow Servo
The water volume is adjusted by opening and closing the water flow valve with the servo motor. This will limit the maximum hot water flow to 20 L/min, and will limit the water flow further when the burner is at high fire to ensure the temperature setpoint it met.





Water Flow

The figures on the following page show the available water flow rates for different outlet temperatures based on a range of inlet temperatures. Regardless of the output capacity the maximum flow rate is limited to 20 litres/minute.

Water Flows can also be calculated by the following formula:

M = 60 x (Q / C x T)

Where M = Water flow rate in litres/minute. If M is greater than 20, the water must be mixed down at the point of use as the maximum flow rate of the unit is limited to 20.
Q = Heat energy output in kW = 28 kW for the Infinity 16i (the heat input to the water)
C = Specific heat of water = 4.2KJ/Kg C. Constant for this calculation.
T = Temperature rise required (C)

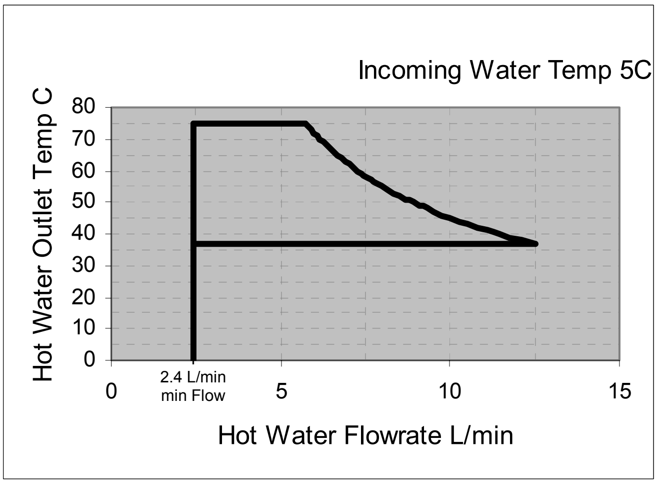
Example:
What is the flow rate available with an incoming water temperature of 10 C and a required temperature of 20 C ?
T = 20 - 10 = 10 C
Q = 28
C = 4.2
M = 60 x (28 / (4.2 x 10)) = 40 l/min. Since 40 is greater than 20 this flow rate must be mixed at the outlet.

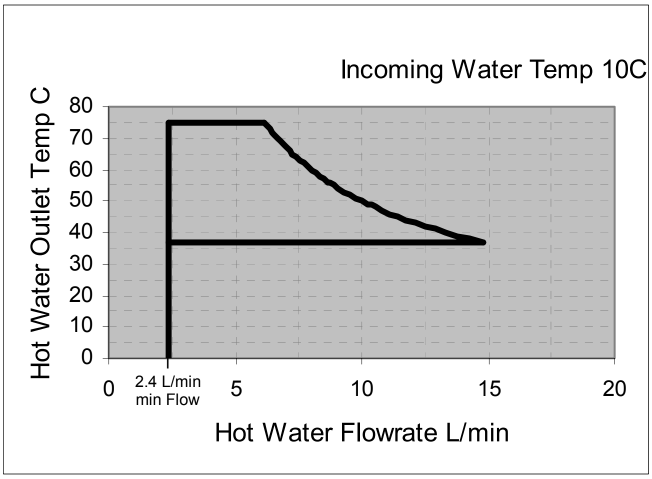
How to read the charts on the following page.

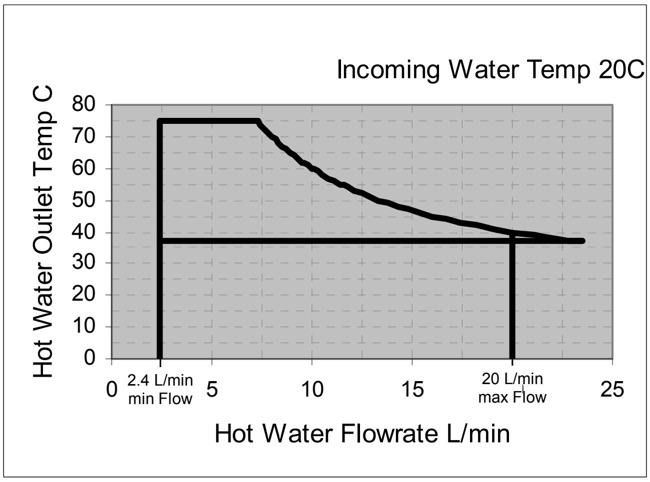
The vertical axis indicates the selected temperature on the remote control and the horizontal axis indicates the flow of water in litres/ minute. Remote control range is between 37^0 C and 60^0 C under normal conditions (temperatures up to 75^0 C may be available if set on the dip switches.) The temperature rise is the difference between the Incoming Water Temp and the Hot Water Outlet Temp as selected on the controller.

Select the appropriate chart based on incoming water temperature. Draw a horizontal line across the graph from the selected temperature at the controller until it intersects the curve. From this point draw a vertical line until it intersects the axis. The value at this point of the axis is the maximum flow rate available. If the value is over 20 litres/minute a higher temperature will have to be used on the controller and the water temperature mixed down at the outlet.

Water Flow

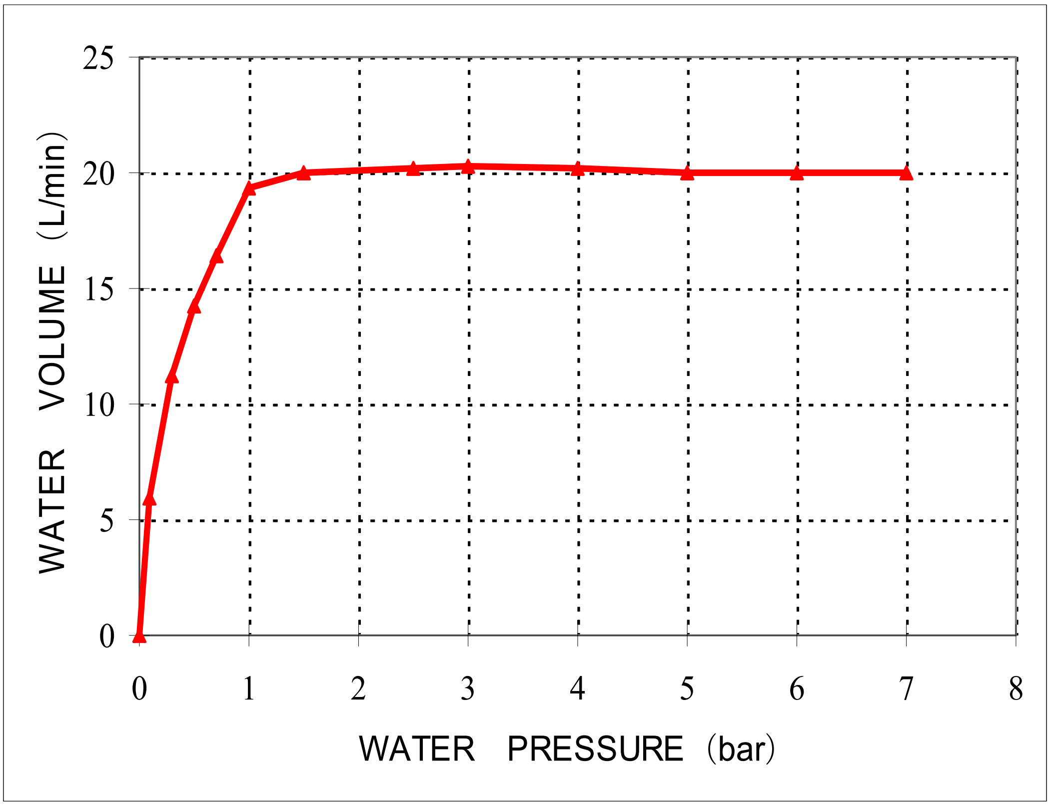

Incoming Water Temp 5C
Hot Water Outlet Temp C
80
70
60
50
40
30
20
10
0
0
2.4 L/min
min Flow
5
10
15
Hot Water Flowrate L/min


Incoming Water Temp 10C
Hot Water Outlet Temp C
80
70
60
50
40
30
20
10
0
0
2.4 L/min
min Flow
5
10
15
20
Hot Water Flowrate L/min


Incoming Water Temp 20C
Hot Water Outlet Temp C
80
70
60
50
40
30
20
10
0
0
2.4 L/min
min Flow
5
10
15
20 L/min
max Flow
25
Hot Water Flowrate L/min

Water Pressure vs. Flow

The water pressure vs. flow characteristics are as follows:



Regardless of how high the incoming water pressure is it is not possible to obtain more than 20 L/min from the Rinnai Infinity 16i. In order to have this much flow the temperature rise must be low enough that the unit has the capacity to satisfy the temperature setpoint for this flow rate. For higher temperature rises the flow rate will be lower, regardless of the incoming pressure.

The water heater has a water flow regulator that will throttle the flow rate back to make sure that the unit only supplies water at the required temperature. If demand exceeds the capacity of the unit, the unit will limit the water flow so the temperature does not alter.

The water heater's heat exchanger has a much higher pressure drop at high flow rates then at low flow rates. For low pressure installations use higher temperature set points.

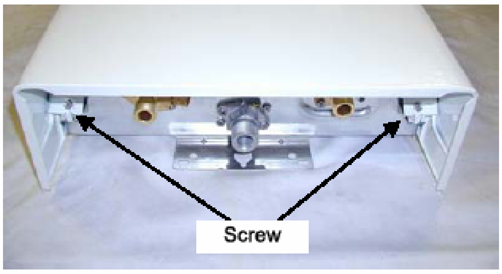
In order to achieve maximum flow rate 1.5 bar pressure is required. The unit will operate on lower pressures. It is advisable to have at least 1.1 bar pressure.

Gas Conversion Procedure

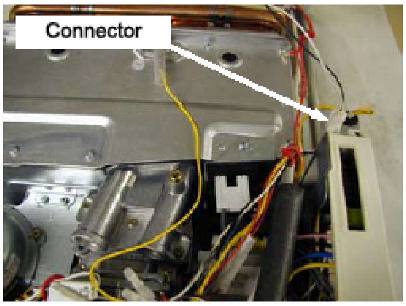
Necessary Tools

⊕screwdriver・ ⊖ small screwdriver(for pre-set resistor adjustment)
gas leakage detector・digital manometer

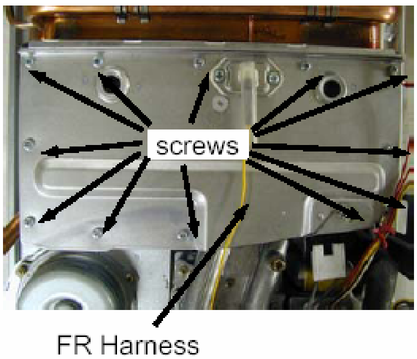
① Isolate gas supply
② Isolate power supply
③ Isolate water supply
④ Drain all water from appliance
⑤ Remove Front Cover（2 screws）



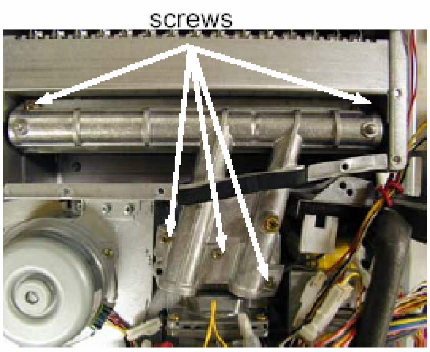
□ Disconnect Remote Control Cable



□ Disconnect FR Harness From Flame Rod
□ Remove Combustion Chamber Front Panel
(12 screws)



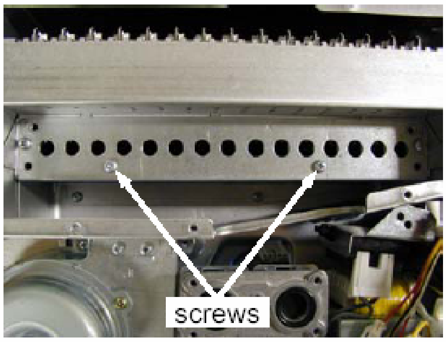
□ Disconnect Manifold (5 screws)

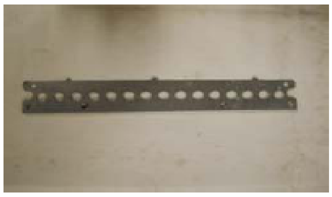


Gas Conversion Procedure

□ Disconnect Damper (2 screws)

□ Replace Damper



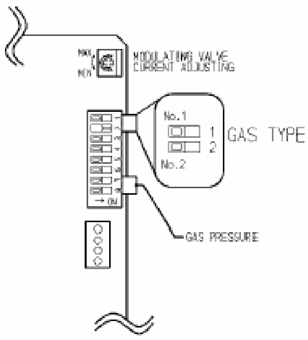


□ Replace Manifold

(not necessary to replace injectors)

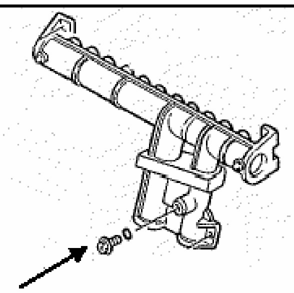
□ Re-attach the parts in order of removal

□ Change No. 1 switch of Dip Switch 1 on P.C.B. to correct position.



Adjusting Pressure

① Follow the Gas Pressure Setting Procedure in the next section. This is very important.



Pressure Point Screw

Testing

1. Purge gas, hot water and cold water supply lines before making the final connection of the water heater. Swarf in either the gas or water supplies may cause damage.

2. Turn on gas and cold water supplies.

3. Test for water leaks and gas escapes near the unit.

4. Isolate gas and electric supply. Remove test point screw located on the inlet gas pipework below the heater and attach pressure gauge.

5. Turn the power on at the switch and turn on gas. **Warning:** There are 230V AC live supplies inside the heater.

6. If remote controllers are fitted, turn the controller on, select the maximum delivery temperature and open ALL available hot water outlets. If remote controllers are not fitted, simply open all available hot water outlets. (CAUTION: Ensure building occupants do not have access to hot water outlets during this procedure).

7. The gas pressure check must be carried out with all other appliances on the same main operating at maximum capacity to ensure that there is sufficient gas pressure.

8. With all appliances on the same main operating at high fire check the pressure at the test point on the inlet to the gas valve. The pressure must be within the local defined limits for the type of gas that is being used. If the pressure is lower, the gas supply is inadequate and the water heater will not operate to specification. Check gas meter, regulator and pipework for correct operation/sizing and rectify as required. Note that the gas regulator on the appliance is electronically controlled and factory pre-set. Under normal circumstances it does not need adjustment during installation.

   UK the gas pressure must be at least **20 mbar** for G20 Natural Gas as used in UK. For G31 Propane as used in the UK the pressure must be at least **34.5 mbar**.

9. Close hot water outlets.

10. Inspect and clean the strainer and the filter located on the cold water inlet pipe. This procedure may need to be repeated to ensure the strainer remains clear.

11. If temperature controllers are fitted, it is necessary to test their operation through the complete range of functions.

12. Confirm the hot water delivery temperature using a thermometer. If controllers are fitted, compare the measured value to the set point.

13. After testing is completed, explain to the user the functions and operation of the water heater and temperature controllers.

Gas Pressure Setting

The working gas pressure on the water heater is electronically controlled and factory set. Under normal circumstances it **does not** require adjustment during installation. Perform this procedure only if the unit is not operating correctly and **all** other possible causes for incorrect operation have been eliminated. **Contact Rinnai before attempting to alter the gas pressure. Failure to do so could void the warranty.**

1. Turn 'OFF' the gas supply.

2. Turn 'OFF' 230V power supply.

3. Remove the front cover from the appliance.

4. Check gas type dip switches no.1 and no. 2 are in the correct position for the type of gas (Nat. or LPG)* you are using. See Fig. 1

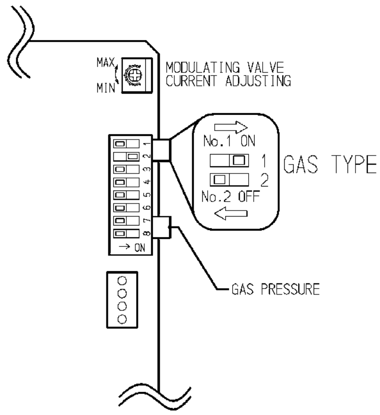


Fig. 1

off	on	SW	
	■	1	-Nat. Gas
■		2	-Nat. Gas
		3	
		4	
		5	
		6	
		7	
		8	

off	on	SW	
■		1	-LPG
■		2	-LPG
		3	
		4	
		5	
		6	
		7	
		8	

On is in the right hand position, Off is in the left hand position.

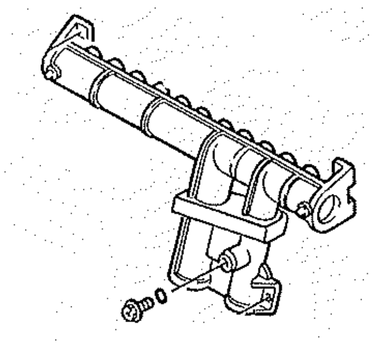


Fig. 2

5. Attach pressure gauge to burner test point. (Fig. 2)

6. Turn 'ON' the gas supply.

7. Turn 'ON' 230V power supply.

8. If remote controllers are fitted, turn the unit 'ON' at the controller and select a maximum delivery temperature.

9. Open a hot water tap fully. **(CAUTION: Ensure building occupants do not have access to hot water outlets during this procedure.)** Wait for the unit to light.

10. Set the Rinnai Infinity to 'Forced Low' combustion by setting No. 7 dipswitch to 'ON'. (Fig. 3)

off	on	SW
		1
		2
		3
		4
		5
		6
	■	7
		8

Fig. 3

*** Note:**
Simply changing the position of the dip switches will not convert the unit from one gas type to the other. The conversion procedure requires a change of injector manifold. Contact Rinnai or your supplier.

Gas Pressure Setting

11.Check the burner test point operating pressure.

12. Remove rubber access plug and adjust the regulator screw on the modulating valve (Fig. 4) as required to the pressure below. Replace rubber access plug.

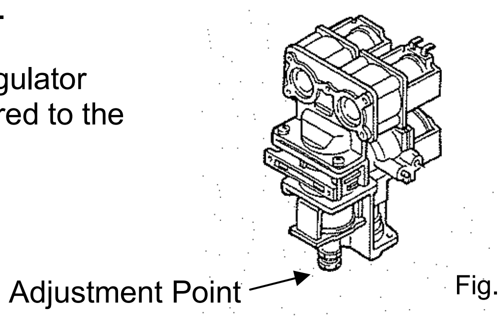


Fig. 4

N.G	**G20** **G25**	**1.8 mbar** **1.8 mbar**
LPG	**G30** **G31**	**2.2 mbar** **2.2 mbar**

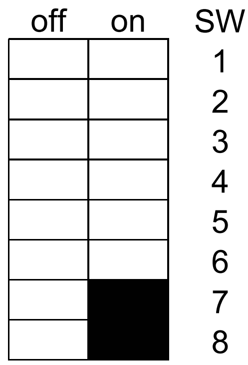


Fig. 5

13. Set the Rinnai Infinity to 'Forced High' combustion by setting no. 7 and no. 8 dipswitches to 'ON'. (Fig.5) Ensure maximum water flow.

14. Check the burner test point pressure.

15. Adjust the high pressure potentiometer on the Printed Circuit Board above SW1 (Fig. 6) to the pressure shown below. The potentiometer is very sensitive, turn no more than a few degrees at a time; then let the pressure settle down before turning it more.

N.G	**G20** **G25**	**9.0 mbar** **9.0 mbar**
LPG	**G30** **G31**	**14.2 mbar** **14.2 mbar**

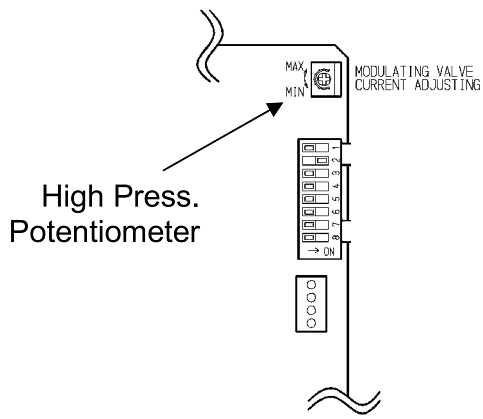


Fig. 6

16. **IMPORTANT**: Set dip switch no. 7 and no. 8 to 'OFF' to return the appliance to 'Normal' combustion.

17. Close hot water tap.

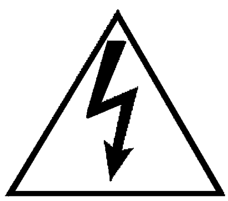
18. Turn OFF the gas supply and 230V power supply.

19. Remove pressure gauge, and replace sealing screw.

20. Turn 'ON' the gas supply and 230V power supply.

21. Operate unit and check for gas leaks at test point.

22. Replace the front cover of the appliance.



CAUTION

Dip Switch Setting

Dip Switch Positions Explained

OFF	ON	SW		
		1	-	Gas Type
		2	-	Gas Type
		3	-	Computer Programming
		4	-	Computer Programming
		5	-	Computer Programming
		6	-	Max. Temperature
		7	-	Combustion
		8	-	Combustion

LEGEND:
Black Section indicates
position of dip switch.

OFF	ON	
■		OFF

OFF	ON	
	■	ON

Dip Switches Explained

GAS TYPE

LPG

OFF	ON	SW	
■		1	off
■		2	off

NAT GAS

OFF	ON	SW	
	■	1	on
■		2	off

COMBUSTION

NORMAL

OFF	ON	SW	
■		7	off
■		8	off

FORCED LOW

OFF	ON	SW	
	■	7	on
■		8	off

FORCED HIGH

OFF	ON	SW	
	■	7	on
	■	8	on

COMPUTER PROGRAMMING

OFF	ON	SW
		1
		2
■		3
■		4
■		5
		6
		7
		8

Computer programming Switches (3-5) must be left in the factory set position for the Infinity 16i.

MAXIMUM TEMPERATURE

OFF	ON		
■		4	Maximum Temperature = 60^0C
	■	4	Maximum Temperature = 75^0C

Troubleshooting the Infinity 16i

Rinnai water heaters have the ability to check their own operation continuously. If a fault occurs, an error code will flash on the Digital Display if you have temperature controllers installed. This assists with diagnosing the fault.

* In all cases, you may be able to clear the Error code by turning the hot water tap OFF, then ON again. If this does not clear the error, try pushing the On/Off button OFF then ON again. If the Error Code still remains contact Rinnai or your nearest service agent for advice.
** Faults caused by insufficient gas/water supply or gas/water quality and installation errors are not covered by the manufacturer's warranty.

Following a power cut the heaters should be restarted in this manner.

Standard system.

Single or multiple water heaters without remote controllers.

The heaters will automatically reset without any user involvement.

Single or multiple water heaters with remote controllers.

The heaters will be required to be switched on using the ON/OFF button on a remote controller. Ensure that all taps/water outlets are closed and no water is flowing through heaters.

Hot water system incorporating secondary recirculation pump.

Single or multiple water heaters without remote controllers.

The heater(s) will automatically reset without any user involvement.

Single or multiple water heater(s) with remote controller(s).

To reset the heaters follow the steps.

1. Turn off all hot water taps.
2. Turn off supply to secondary circulating pump or alternatively, if heater and pump are fed from the same electrical supply, isolate pump flow.
3. Turn on heater at remote control.
4. Select required temperature.
5. Switch on supply to secondary circulating pump or open valve on pump flow.

The heater will now be ready to supply water at the set temperature.

If following the above procedure does not reset the heater switch it on and off at its main supply, and then go through these steps again.

Remotes

Remote temperature controllers are a feature that provides control over the water temperature. The Rinnai Infinity 16i water heater can be operated with 1, 2, or 3 temperature controllers. The controller MC-45-SR-EU comes as standard with this water heater installed into the front panel.

Digital Monitor

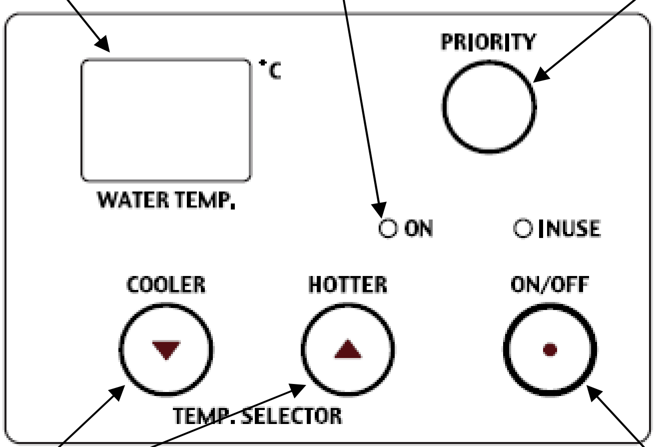
Indicates the temperature selected. Error message flashes in the event of a fault.

Priority Indicator

Indicates that the controller has command of the system (glowing,) or that the system is free to take command of (off.)

Priority Button

Used to transfer control between temperature controllers. The controller with priority has command of the hot water delivery temperature.



Temperature Buttons

Used to select hot water delivery temperature.

ON / OFF Button

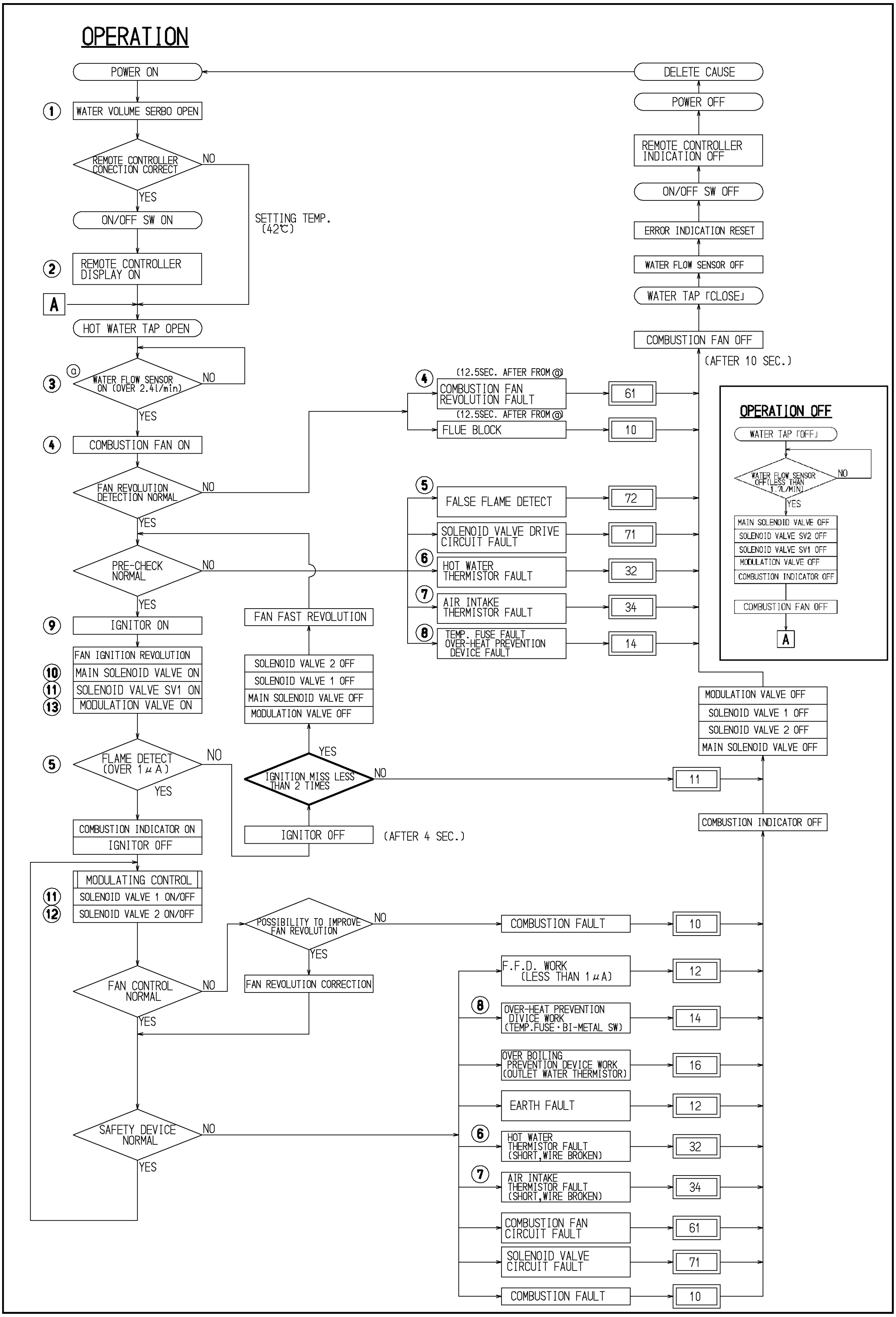
Used to switch hot water system on and off.

Along with temperature control the controllers are useful for servicing and fault finding as they will show an error code if there is a problem. This will be a flashing number on the display.

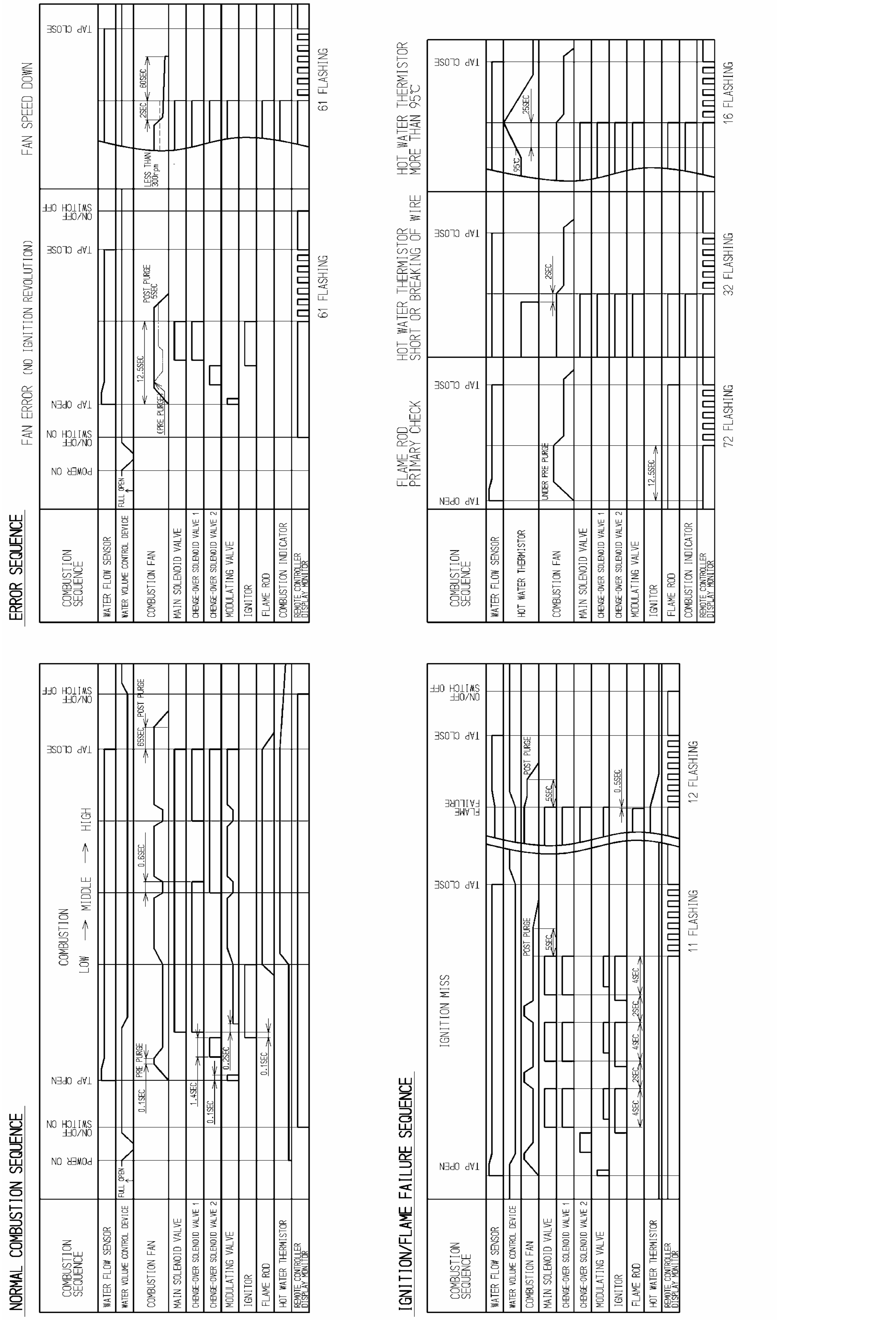
Further to this the flow rate through the unit can be displayed by holding down the Temp UP Arrow Button and pressing the Power Button. The flow will be displayed in L/min. Therefore 4 = 4 L/min and 12 = 12 L/min.

The Remote will also display the outgoing hot water thermistor read temperature by holding down the Temp Down Arrow Button and pressing the Power Button. The temperature is shown in degrees Centigrade.

Operational Flow Chart



Time Charts



NORMAL COMBUSTION SEQUENCE
COMBUSTION SEQUENCE
WATER FLOW SENSOR
WATER VOLUME CONTROL DEVICE
COMBUSTION FAN
MAIN SOLENOID VALVE
CHENGE-OVER SOLENOID VALVE 1
CHENGE-OVER SOLENOID VALVE 2
MODULATING VALVE
IGNITOR
FLAME ROD
HOT WATER THERMISTOR
REMOTE CONTROLLER DISPLAY MONITOR
POWER ON
ON/OFF SWITCH ON
TAP OPEN
COMBUSTION
LOW → MIDDLE → HIGH
TAP CLOSE
ON/OFF SWITCH OFF
FULL OPEN
PRE PURGE
POST PURGE
ERROR SEQUENCE
FAN ERROR (NO IGNITION REVOLUTION)
FAN SPEED DOWN
LESS THAN 300rpm
61 FLASHING
61 FLASHING
IGNITION/FLAME FAILURE SEQUENCE
IGNITION MISS
FLAME FAILURE
11 FLASHING
12 FLASHING
FLAME ROD PRIMARY CHECK
HOT WATER THERMISTOR SHORT OR BREAKING OF WIRE
HOT WATER THERMISTOR MORE THAN 95℃
UNDER PRE PURGE
72 FLASHING
32 FLASHING
16 FLASHING
COMBUSTION INDICATOR

Error Codes

Error	Fault	Action	Step
10	Combustion fan overcurrent. Unit operates, then stops.	Check flue terminal for blockages	visual
		Check Flue	V
		Check combustion fan.	A
11	Missed or No Ignition. Unit stops without flame igniting	Check Gas Supply is correct	S
		Check Gas Isolating Valves are open	visual
		Check Electrode	B
		Check Flame Rod	C
		Check Sparker	B
		Check Solenoids	D
		Check Gas Filter	F
		Check Earth Wire	H
		Check Flue	V
		Check gas pressure	manual
		Check injector manifold is correct for gas type	manual
		Check Gas Type Dip Switches for Nat. Gas or LPG.	manual
12	Flame Failure / Earth Leakage Lost Ignition	Check Gas Supply is correct	S
		Check Gas Isolating Valves are open	visual
		Check Flame Rod	C
		Check Earth Wire	H
		Check Flue	V
		Check Gas Filter	F
		Check Gas Type Dip Switches for Nat. Gas or LPG.	manual
		Check gas pressure	manual
		Check Remote control	I
14	Thermal Fuse and/or overheat switch activated, unit operates, then stops	Check Overheat Circuit	E
		incl. Thermal Fuse (thermal overload wire)	E
		incl. Overheat switch (black tophat style bi-metal)	E
		Check Gas Type Dip Switches for Nat. Gas or LPG.	manual
		Check gas pressure	manual
		Check combustion dip switch	manual
16	Over temp warning. Unit operates, then stops.	Check Gas Type Dip Switches for Nat. Gas or LPG.	manual
		Check modulating solenoid valve	D
		Check gas pressure	manual
		Check combustion dip switch	manual
		Check water flow sensor	J
		Check water flow servo	G
		Check Heat Ex outlet temperature thermistor	K
		Check hot water outlet thermistor	K
32	Outlet water thermistor faulty	Check hot water outlet thermistor	K
34	Combustion air thermistor faulty	Check Combustion Air Thermistor.	K
61	Combustion Fan rotation error	Check combustion fan.	A
71	Solenoid valve circuit error. Unit does not operate	Check Gas Valves are open	visual
		Check Solenoids	D
72	Flame Rod Circuit Error. Unit does not operate	Check Flame Rod	C
-	No combustion despite remote control indicating that combustion is occurring - if remote controllers are installed	Check water flow sensor	J
		Check Flame Rod	C
		Check hot water outlet thermistor	K
		Check combustion fan.	A
		Check Sparker	B
		Check Gas Valves are open	visual
		Check Overheat Circuit	E

Error Codes

Error	Fault	Action	Step
-	Appliance does not operate at all. No error code on display (if there is a controller), Acts as though there is no water going through the unit and/or it seems electrically dead.	Make sure that if there is a controller, it is on	visual
		Ensure there is enough water flow	R
		Check Filter	Q
		Check for Air lock	M
		Check power cord is plugged in (if applicable)	visual
		Check electrical supply is turned on	visual
		Check Non Return Valves and Mixers in System	L
		Check Gas Isolating Valves are open	visual
		Check for short circuits	visual
		Check Remote control	I
		Check Power supply voltage	N
		Check electrical fuses	O
		Check Sparker	B
		Check Earth Wire	H
		Check water flow sensor	J
		Check transformer	P
-	Combustion stops during operation.	Reset unit if there was a power cut	
		Check Filter	Q
		Check Remote control	I
		Make sure that if there is a controller, it is on	visual
		Check Gas Supply is okay	S
		Check Flame Rod	C
		Check Flue	V
		Check Earth Wire	H
		Check Power supply voltage	N
-	Cannot adjust the hot water temperature via the controllers - only if controllers are installed.	Check hot water outlet thermistor	K
		Check Heat Ex outlet temperature thermistor	K
		Check Gas Valves are open	visual
		Check water flow servo	G
		Check Non Return Valves and Mixers in System	L
		check bypass servo	G
		Check Solenoids	D
-	Anti - Frost Heater does not operate.	Check anti frost heater components	T
		Check frost sensing switch	U
-	Upon commissioning the gas pressure will not achieve correct high pressure	Check Gas Supply is correct	S
		Check Gas Filter	F
		Check flue terminal for blockages	visual
		Check Flue	V
-	Unit makes a loud noise while operating	Check Combustion Fan	A
		Check Flue	V
		Check water flow servo and bypass servo	G
-	fluctuating temperatures.	Check Non Return Valves and Mixers in System	L
		Check Hot water outlet thermistor	K
		Ensure there is enough water flow	R
		Check Solenoids	D
		Check water flow servo	G
		Check Filter	Q
		Check Gas Supply is correct	S

Diagnostic Checks

A. Combustion Fan Circuit.

The voltages should be checked while the unit has the electric power On. The meter leads can be inserted into the connection plug at the pcb (Plub B from wiring diagram.) To test the resistances electrically isolate the water heater, unplug the connector either at fan motor (B1) or at pcb (B), and measure the resistances through the motor.

Red – Black	6 – 40 Vdc	-- fan must be on	do not check Resistance
White – Black	2 – 10 Vdc	-- fan must be on	appx 8.2 kOhms
Yellow – Black	11 – 13 Vdc	-- standby or run	appx 2.5 kOhms

If Black – Red (Drive Power) voltage incorrect (while the fan should be running) replace pcb.
If Yellow – Black (Control Power / Speed) voltage is incorrect replace the pcb
If Yellow – Black resistance is incorrect replace the fan motor
If White – Black (Fan proving) voltage or resistance is incorrect replace the fan motor.

If the water heater is very loud and shaking the combustion fan may not be installed properly. Make sure it is in properly.

To remove the combustion fan assembly first remove the hot water outlet pipe connection, pull out the pipe and bend it out of the way. Then remove the 4 screws from the air outlet duct (2 in front, one each side) and take the fan out the left side of the heater.

B. Ignition System.

The best check for the ignition electrode and sparker is to listen to the unit for the ticking sound as it sparks. If it is ticking the sparker sub pcb is working. Remove the electrode and visually inspect for damage. Be sure to check the burner where the electrode should spark to. The spark will travel to the cleanest place so if the burner is rusty the spark could travel back to the plate. Give the burner a good clean with wire wool or something abrasive.

Check the thick black HT lead from the sparker box to the electrode. Be sure that connections on both ends are tight and the lead has not been damaged. Measure the resistance through the wire if it looks as though it may be damaged. The resistance should be very low.

Sparker box / sub pcb

Test to make sure that the sparker is getting a signal from the pcb through the two grey leads from the sparker to the pcb. The voltage can be measured at the terminals at the sparker by loosening the connector plug and putting multimeter leads on the terminal connectors. Put the meter leads on the terminals, power the heater, then turn on the water. It will only give a quick voltage reading.

Grey – Grey 240 Vac.

If this is not correct replace the pcb.

Diagnostic Checks

If it is correct unplug the HT lead and hold it about 3 – 5 mm from a clean, earthed, screw head. **WARNING: ISOLATE THE GAS SUPPLY. KEEP HANDS WELL AWAY FROM THE END OF THE LEAD – VERY HIGH VOLTAGES**. Power the heater and turn the water on. A spark should jump from the lead to the earthed screw.

If this does not happen replace the sparker box – after you have confirmed voltage between the grey wires onto the sparker box.
If this does happen, but the electrode will not spark when the HT lead is connected then visually inspect the electrode, clean it, set the gap, or replace it as described in the first paragraph under B.

C. Flame Rod.

If the flame rod circuit is faulty the error code will be either 11 or 72.

If 72 is the error disconnect flame rod and cycle unit. If it is 72 again then refer to section on hot water temperature thermistor. If 72 is not displayed, check for electrical current leaks, and continue with this section.

First check to make sure all connections are tight. If not, tighten them and adjust the flame rod.

The next check to be carried out is continuity between the terminal of the flame rod and various points at the sensor end. Check this while holding the ceramic insulator. As the flame rod is metal the continuity should be very good throughout the whole length. If the continuity is not strong then clean the flame rod with steel wool or emery cloth until there is continuity through the whole length of the flame rod.

With the unit in standby measure the voltage (AC) between the flame rod connection spade (that is the yellow wire spade connector) to earth. This can be done with the unit in standby (electric ON) or with the unit on and burning. If it is burning this test will cause the unit to lockout so the reading will only be brief.

FR – Earth   55 – 150 Vac (running)   appx 85 Vac (standby)

If there is no voltage, replace PCB

The next check is the current between the flame rod yellow wire and a clean, earthed screw with the unit in standby. Current should be at least 1 micro (μ)Amp AC. If it is less than this replace the pcb.

Next check the current between the flame rod and the pcb. This is measured by placing the meter in line between the flame rod and the pcb. Unplug the connector at the flame rod and put one meter lead on the spade, and one in the spade connector.

Current should be at least 1 micro (μ)Amp DC

If current is less than this the flame rod is faulty or needs cleaning.

D. Solenoid Valves.

There are 3 solenoid valves and one modulating valve. Two of the solenoids are burner sectional solenoids, and the third is the main, safety solenoid.

The easiest way to check the gas valve is by putting the manometer on the test point on the gas valve and cycling the unit. If the solenoids are working correctly the burner pressure when it lights should be around 8mbar. If the pressure stays at 0 mbar (or goes up slightly, to about 1 mbar) the safety solenoid is not opening; this is only a true test if the sparker is definitely sparking. If the pressure goes up to 21 mbar the sectional solenoid is not opening. Once the suspect solenoid valve has been determined you can determine the faulty component (solenoid valve or pcb.)

The solenoids should be tested for voltage and resistance at pcb connector F from the wiring diagram. The resistance is measured with the unit electrically isolated and the connector unplugged. Put the meter leads on the connections and measure through the solenoid. The voltage is tested while the unit is running and the connections are made. While the unit is lit put the leads into the plug and measure the voltage (DC.) Only the Main SV and SV1 will open upon ignition. SV2 will not have voltage unless the unit is on medium to high fire.

Main SV	Pink – Black	200 – 240 Vdc	appx 6.5 k Ohms
SV1	Black – Blue	200 – 240 Vdc	appx 8.0 k Ohms
SV2	Black – Yellow	200 – 240 Vdc	appx 8.0 k Ohms
Modu SV	Pink – Pink	2 – 15 Vdc	67 – 83 Ohms

If the voltage is incorrect replace the pcb.
If the resistance is incorrect replace the solenoid valve. It should be noted that sometimes solenoids jam and are faulty even though the resistance is correct. If there is voltage to it, and there is no gas getting past it, then it is a faulty solenoid, assuming you have confirmed the incoming pressure. (High gas pressure will prevent a solenoid from opening, for example, if a second stage LPG regulator has not been used.)

The voltage should be present after the spark ignitor has begun to tick. If the unit does not begin to do anything check the Thermal Fuse Circuit (E.)

If the resistances and voltages are correct continue.

Check the secondary gas pressure change when the set temperature is changed from 55 to 37°C.

The secondary pressure should change. If it does, go to the water flow servo circuit (G.) If the pressure does not change replace the modulating valve.

Diagnostic Checks

E. Thermal Fuse (Overheat) Circuit.

First locate the Overheat circuit. It is made up of red wires making a loop through the unit, including a number of thermal fuses, and the overheat bi-metal switch. Along the right-hand side of the unit the red wires can be seen running down the side of the unit from the bi metal switch. One of these red wires has a connector approximately in front of the transformer (Connector A5 from wiring diagram.)

With the unit electrically isolated unplug this connection A5. Unplug connector C from the PCB. Put multimeter lead into the red wire from connector C and the other lead into the half of Connector A5 that is attached to the bimetal switch. Measure the resistance through this overheat circuit.

Resistance should be less than 1 Ohm.

If the resistance is greater than 1 Ohm test each individual sensor to find which one is faulty and replace it AFTER checking the heater for damage. Check that the gas type and combustion dip switch settings are correct. Confirm gas pressure when the unit is operating again.

F. Gas Filter.

There is an inline gas filter in the inlet pipework connection. If the gas pressure will not achieve the correct level, and the inlet pressure is correct (20mbar) then drop the gas connection out to see whether there is a blockage in the filter.

Diagnostic Checks

G. Water Flow Servo Circuit.

If the heater makes a loud ticking unplug the flow servo (motor behind the internal brass cold water inlet connection) and run the unit to see if it stops. If so the motor is faulty.

Water Flow Servo Circuit.

From the water flow servo circuit there are 6 wires. They connect to the pcb at connector A (from the wiring diagram.) Remove the plastic terminal cover so that you can insert the multimeter leads.

First electrically isolate the unit, disconnect the 6 wire plug at pcb connection A and measure the resistance between red and blue across the motor (not the pcb)

Resistance should be 10 – 30 Ohms.

If the resistance is incorrect replace the water flow servo and water flow sensor.

If the resistance is correct then power the unit (with the connector (A) plugged in) and measure the voltage from the pcb by putting the meter leads into the other plug. Do this with the unit in standby mode (no flow.)

Red – Black	11 – 13 Vdc	(control voltage) Incorrect replace the pcb.
Yellow – Black	4 – 6 Vdc	Incorrect replace flow servo motor
Brown – Black	4 – 6 Vdc	Incorrect replace flow servo motor
Red – Blue	11 – 13 Vdc	Voltage only present when servo is (should be) moving

To remove the flow servo first unclip the cold water pipe in the unit (two screws) and pull out the copper pipe connection. Bend this out of the way gently. Then remove four screws from underneath. Now remove the flow servo full assembly.

H. Earth Lead.

Check to make sure that all earth leads are connected and there are no breaks or short circuits. Checks should be made at the earth lead, pcb, power cord, and surge protector. If there is a loose connection the Ignition electrode and flame rod will not work because they need to flash to earth. Tighten any loose connections.

I. Remote control.

Check the voltage at the connector on the right hand side of the unit, above the pcb, where the controller plugs in. Do this with the power on, but no water flowing.

normal voltage: 11 – 13 Vdc.

If this is correct check the remote wire for damage or shorts. If this is all right disconnect the remote and turn on the water. If the unit operates correctly replace the remote control.

If the voltage is incorrect check the water flow sensor (J) before replacing the pcb. If the water flow servo circuit is working correctly replace the pcb.

Diagnostic Checks

J. Water Flow Sensor.

The water flow sensor is located inside the water heater immediately as the cold water enters the unit. From that there are 3 wires (red, yellow, black) running to the pcb, there is a connector plug in between the sensor and the pcb for testing. Measure the voltage with the water heater power on and no flow. Following this measure the voltage between Yellow and Black with water flow on. If there is a remote attached make sure it was turned on before the water began running through the unit.

Black – Red	11 – 13 Vdc	at all times		
Yellow – Black	appx 8.5 Vdc	water off	4 – 7 Vdc	water on

*note: This Yellow-Black voltage is not variable with flow rate.

If Black – Red is incorrect replace pcb

If Yellow – Black is incorrect the water flow sensor may be faulty. Before you replace the water flow sensor be sure you have checked the filter (R) and for air locks (M).

If the voltage is incorrect and you believe the sensor may be faulty remove the water valve and blow through the rotation turbine to make sure it is free to spin – **DO THIS WITH THE GAS ISOLATED**. You will be able to hear/see it spinning when you blow through it. If it is spinning but the unit does not start the sensor is faulty. If it is not spinning it may need freeing up. If its spins and the unit starts then there is a water flow problem – no water is flowing through the unit. Check that the unit is not piped up with cold flow into the hot outlet.

K. Thermistors.

Check all thermistors by unplugging thermistor lead and inserting meter ends into both sides of thermistor plug and measuring resistance on the 20 k Ohms scale. Apply heat to the thermistor bulb and watch the resistance decrease. Apply ice (or cold water) to the thermistor bulb and ensure the resistance increases.

Thermistor values should read about:

15°C : 11.4 – 14 k Ohm
30°C : 6.4 – 7.8 k Ohm
45°C : 3.6 – 4.5 k Ohm
60°C : 2.2 – 2.7 k Ohm

If there is a break in the circuit the resistance reading will be over 1 M Ohm.
If there is a short circuit in the wire the reading will be less than 1 Ohm

If either of these occur the thermistor should be replaced.

Sometimes water thermistors become coated with scale. If the values obtained are unexpected, or the outlet temperature is fluctuating remove the thermistor and check it for scale. Look into the heat exchanger tube to check for a ‘scale pocket’ inside. Beware when replacing the thermistor, there is an o-ring which usually sticks inside the pocket. Remove it and put it on the thermistor before replacing.

Diagnostic Checks

Hot Water Outgoing Thermistor

This thermistor is located at the bottom left of the water heater where the water exits the water heater.

Combustion Air Thermistor

This thermistor is located next to the controller connection point on the right hand side of the unit above the pcb. It is at the end of the two yellow leads.

L. Check Non Return Valves and Mixers in System

Non Return valves and mixing valves occasionally have a tendency to pass cold water, especially if there is a mismatch of pressures. The easiest way to check for this is to isolate the valves on the water heater and turn on all the hot taps, one at a time. If there is a flow of water (besides the initial flow which is the pipework draining down) then there is a mixer valve or non return valve in the system passing.

There is another way to check non mixers and non return valves, especially in situations where the temperature varies or is only warm. Isolate the hot water outlet somewhere between the water heater and the first draw off. If there is a circulating loop (secondary return) isolate this as well. Now if you open the pressure relief valve of the water heater or a drain off point somewhere between the hot water outlet and the valve that has been isolated the only water that will travel through the water heater will be mains water at fairly constant temperature. Measure the outlet temperature at this drain off point. If the temperature is constant, and correct for the setpoint, then the water heater is working as it should and you need to find the mixing valve or non return valve that is faulty.

It is important to make sure that the secondary return has a non return valve installed after the pump.

M. Air Locks in the Heat Exchanger.

Upon commissioning or cleaning the filters, if the water heater is the highest point of the system the heat exchanger may experience an air lock.

To clear it, isolate the hot water outlet and open the pressure relief. The incoming mains should push the air lock out and the unit will fire.

To avoid air locks when cleaning the filter follow the filter replacement steps under section R.

N. Check Power Supply to the unit.

To make sure there is power to the unit make sure all the electrical isolators are On and the fuses are okay. With your meter check for 240Vac on the connection plug I of the pcb. Do this with the connector plugged in, and the unit in standby mode (power on, water off.) Stick the meter leads in the blue and brown plug.

If there is no power at this point you must find where the connection has been lost up to the unit.

Diagnostic Checks

O. 3 Amp Fuses

The unit has two 3 Amp fuses on the pcb and one in the moulded plug lead. Remove the fuses and check for continuity through. If there is continuity the fuse is good, if not replace it.

P. Transformer.

There is one transformer on the 16i located in the back above the cold water connection with the flow sensor and servo. To access it remove the top and bottom screw holding in the pcb and pull the pcb out. Let it hang from its wires, but be careful not to damage it or pull on it.

Test the transformer in standby mode (unit on, water off.)

First check the voltage from the pcb. The white wires from the pcb connection H go directly to the transformer, so if there is power from the pcb there is power to the transformer (check for loose connections.) From the transformer come five wires. These run back to the pcb connection D. Check the voltage from the transformer at this pcb connection. With your meter check Voltage AC by putting your leads in to the connector (while connected.)

White – White	200 – 240 Vac.	If incorrect confirm power to pcb, then replace pcb.
	11 -20 Ohms.	If incorrect replace transformer.

Conn D

Brown – Blue	12 – 14 Vac	(0.7 – 1.3 Ohms)
Yellow – Blue	200 – 240 Vac	
Orange – Orange	50 – 60 Vac	

If any of these are incorrect replace the transformer – assuming the White – White voltage is correct.

Q. Filter.

Below the water heater, on the cold water connection is a brown or black plug. Isolate the water supply, open the pressure relief valve on the heater, and remove this brown plug. It holds a small, 30 micron, basket strainer. The strainer becomes clogged easily, especially after installation. When it is clogged sometimes water will travel through the unit without triggering the flow sensor. Make sure you check any external Y-strainers as well.

When finished cleaning the filter replace it and screw it in finger tight. Next open the cold water valve slowly (do not close pressure relief valve before this.) There will be a bit of water blown out of the pressure relief valve and then the air will be pushed through. Once the air stops and water comes out of the valve tighten it up. Now open the hot water valve and cold water valve fully. This will prevent air locks.

Diagnostic Checks

R. Water flow.

To operate there must be at least 2.4 l/min flowing through a Rinnai water heater. If there is multiple heaters, installed without PAM valves or a MECS system then there must be 2.4 l/min per heater. A modern wash hand basin could be as low as 3 or 4 l/min, so if there is no means of staging the heaters they may not operate. Isolate all the units except one to find out.

This problem could also crop up with a pumped secondary. Make sure the combination of the pump capacity, and the staging of the units is compatible.

This problem often occurs when a non return valve in a mixing valves sticks in the open position. Although the water flow at the taps will be good most of the water will be cold water crossing over and shooting up the hot pipe.

The flow rate from your tap can be determined with a Weir cup, or a deluxe controller. The deluxe controller manual explains the diagnostics function. If you are not getting enough flow at an outlet, and you used to, check the filter (R.)

With the standard controller hold in the Temp Up button and push the Power button. This will display the flow rate in litres per minute.

S. Gas Supply.

If the unit suddenly goes off you will need to check the gas supply. This is easy when operating on natural gas, and is done by checking the inlet pressure. Other things to check are the meter size, compared to other appliances total offtakes. If the unit has just been installed there may be air in the line, be sure it is fully purged.

If the unit is on LPG make sure that you visually examine the tank or bottles to be sure they are not freezing up. If they are then there is not enough gas. Check the regulators to be sure they will pass enough gas for the system. Make sure the unit is operating with a second stage regulator.

For both LPG and natural gas you will need to confirm that the gas pipe size is correct. You may need to check the gas filter (F.)

T. Check anti frost heater components

The unit has three frost protection heaters mounted on the water pipes to protect them from freezing. The heaters are white ceramic resistive heaters, and come on around 5°C. The voltage through the heaters, when active, is 240Vac. The heaters are located as follows. There is a valve heater in the mains incoming (where the flow sensor is) and another valve heater in the outgoing hot water valve (next to the hot water thermistor.) The third one is located on the front of the unit, at the top on the heat exchanger inlet pipe.

Each heater element can be tested by measuring the resistance through them one at a time.

The top heater resistance should be 50 – 60 k Ohms

The rest of the circuit, including the valve heaters should be about 270 Ohms. Measure it by unconnecting the connector to the top heater and the connector to the hot water outlet valve heater and measure resistance through the sides of the connectors that lead to the valve heaters. Through one side there will be no resistance, through the other side there will be about 270 Ohms.

The entire anti frost heater system is done as a kit, so the easiest check is to see if they heat up when the sensor is closed. If not, replace the system. There will be 240 Vac through the heaters if the system is working so take care.

U. Frost Sensing Switch

The frost sensing switch is located at the top left of the heat exchanger. It is a black, top hat style bi-metal switch. It is a normally open contact so to prove it is working it must be cooled to about 5°C. At this temperature the resistance in the switch can be tested, it should be less than 1 Ohm.

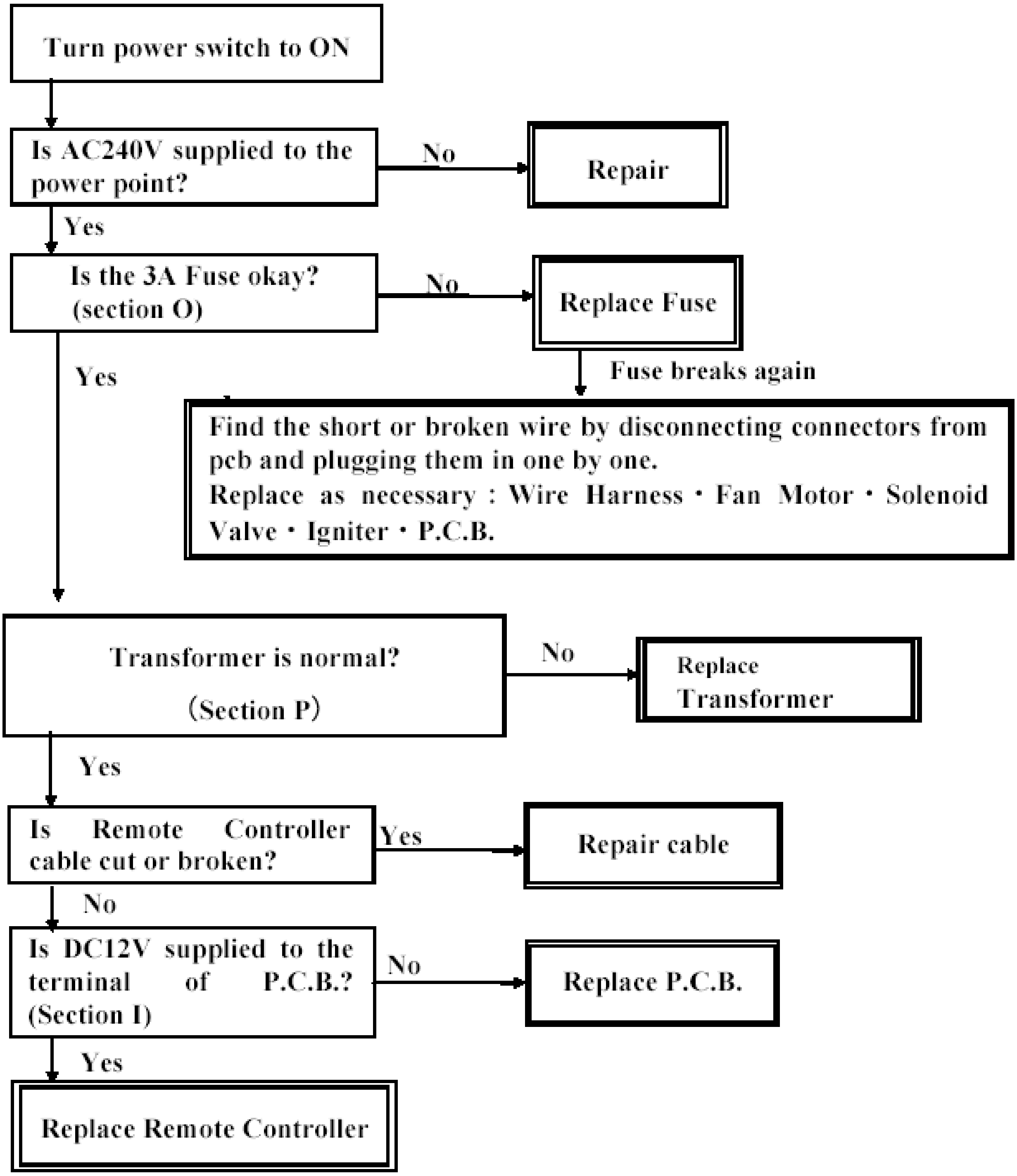
V. Check Flue

If there are combustion problems they could be due to the flue. Is the flue too long? The maximum flue run is 6.5m, less 0.5m per bend, to a maximum of 3 bends. For flue extensions a condensate trap is required If there is a condensate trap installed, be sure it is the right way up.

If the flue gases recirculate back into the combustion air the unit will shake like it is going to come off the wall, and makes a similar noise to the rumble strips on the side of motorways. This can be due to the terminal being in a sheltered place or a corner, or the flue not being put together right..

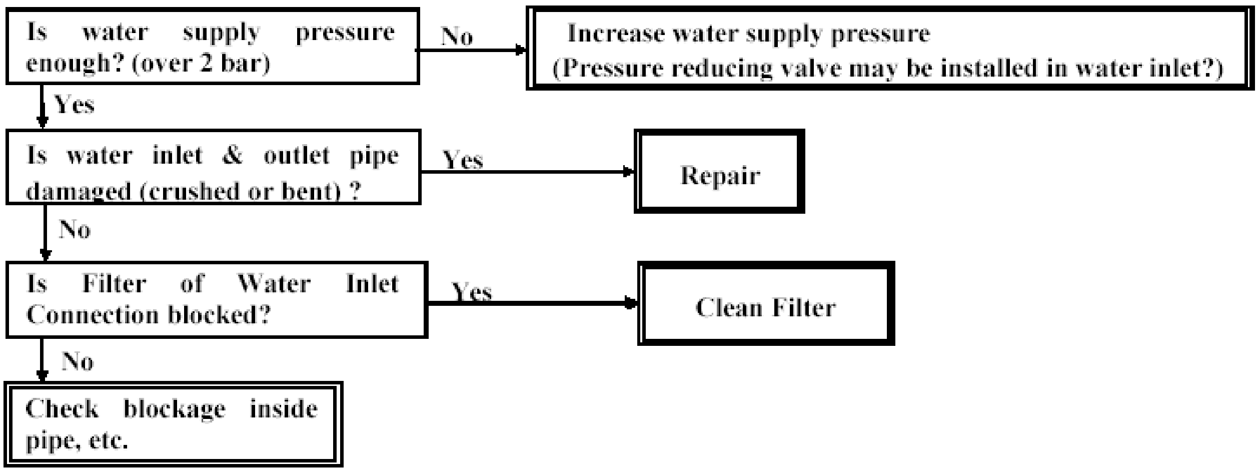
Fault Finding Chart

A. Remote Controller display does not light

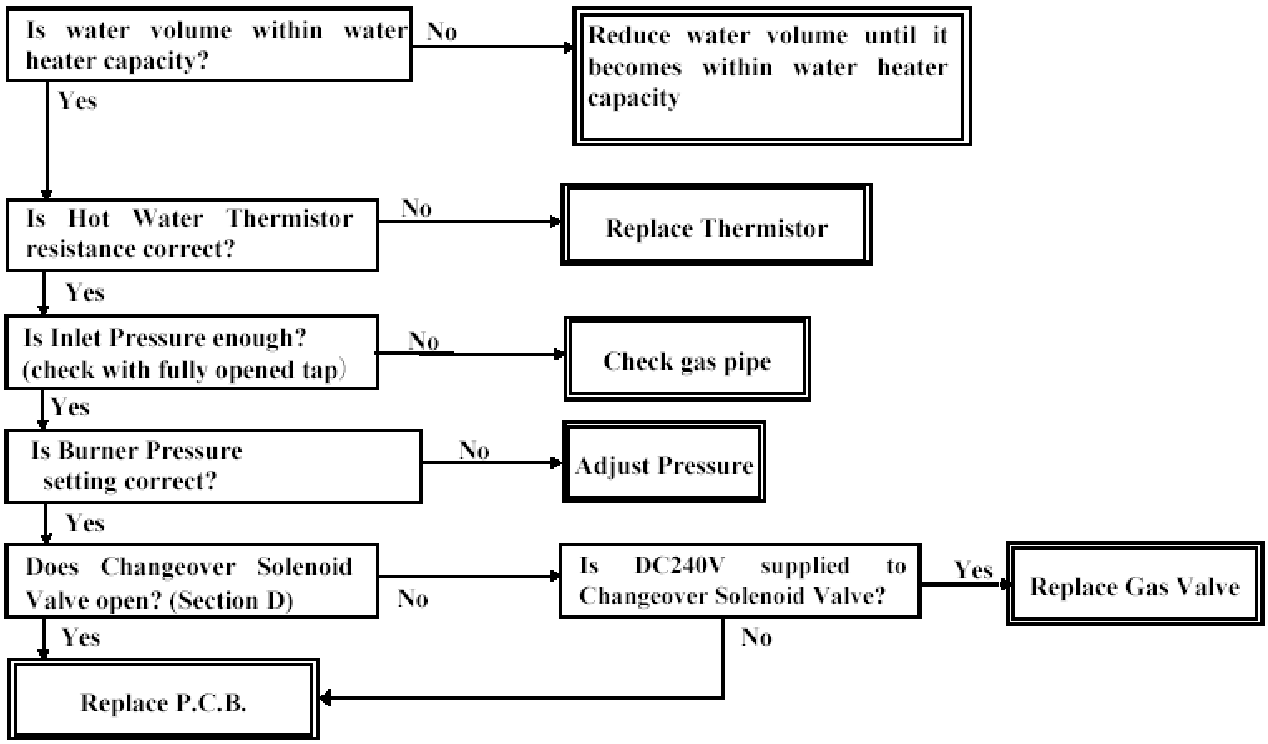


Fault Finding Chart

B. Water flow is low when the water tap is fully open

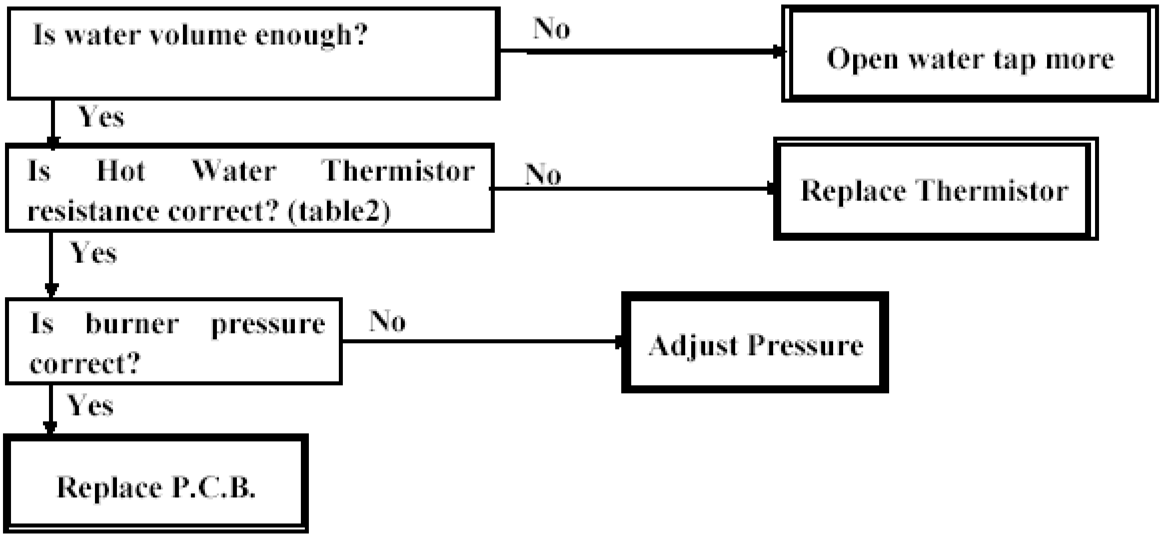


C. Supply water temperature is lower than set temperature



Fault Finding Chart

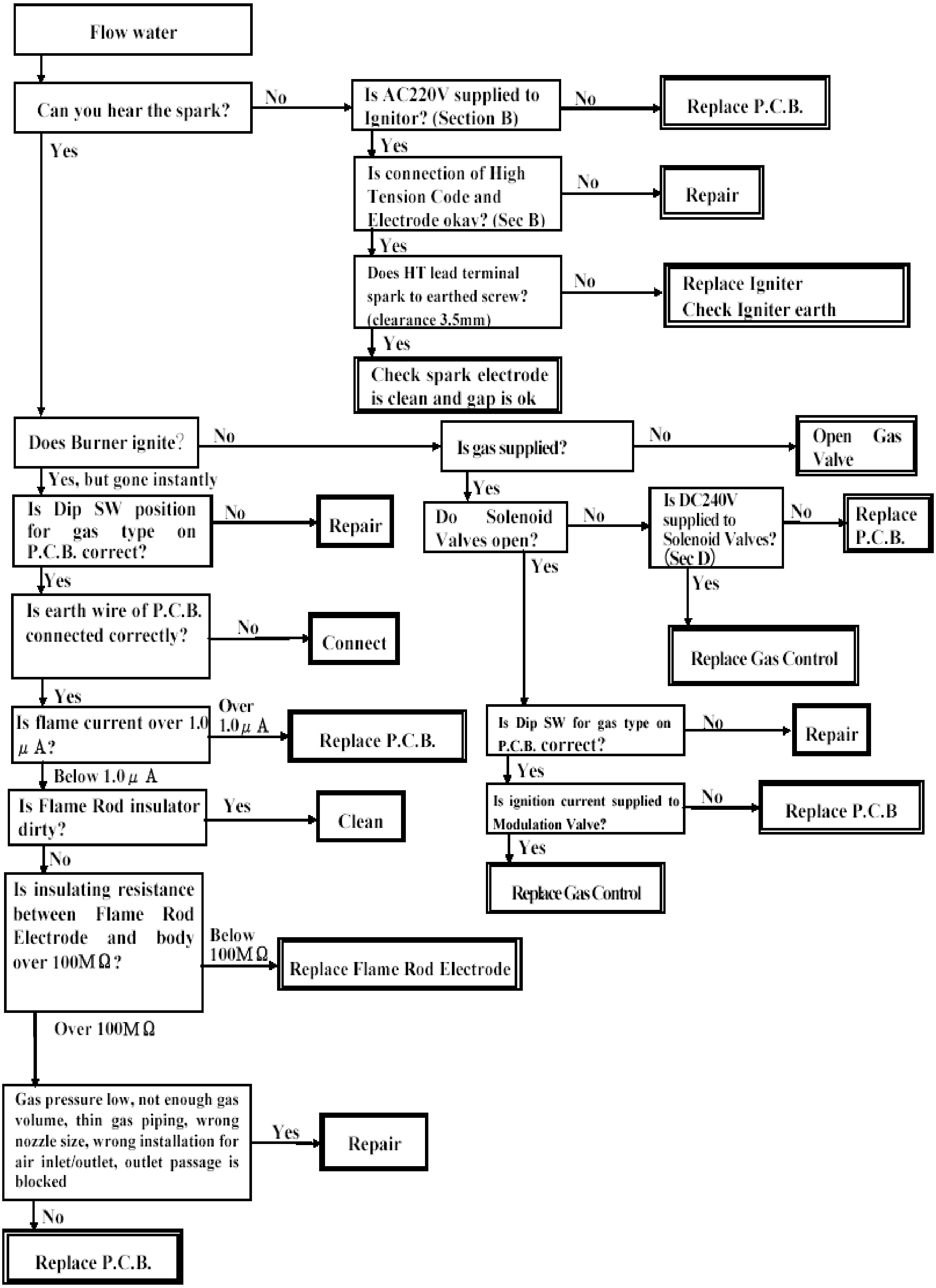
D. Supply water temperature is higher than setting temperature



Fault Finding Chart

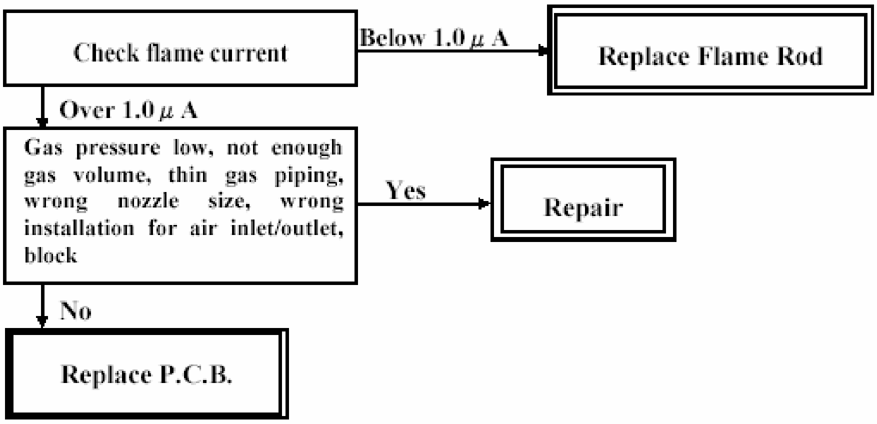
E. Error code flashes at display monitor

E−1 Error code 11 flashing (Ignition failure)

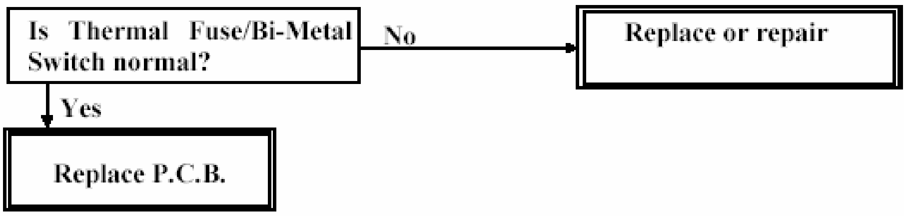


Fault Finding Chart

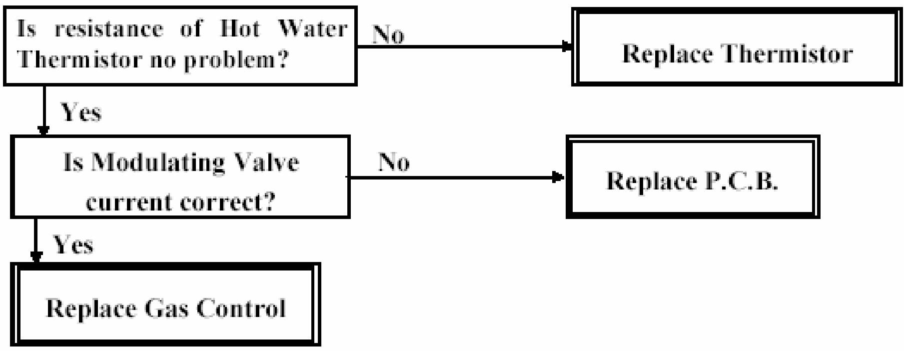
E－2　Error code 1 2 flashing（Flame failure）



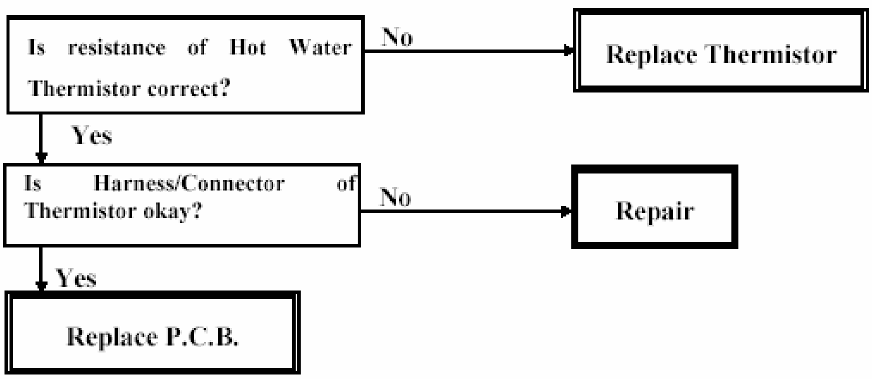
E－3　Error Code 1 4 flashing（Thermal Fuse/Bi-Metal Switch）



E－4　Error code 1 6 flashing（Hot water temperature problem）

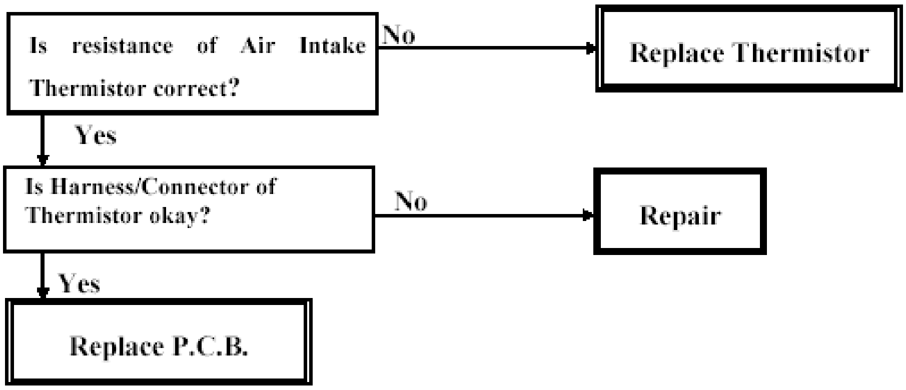


E－5　Error Code 3 2 flashing（Hot Water Thermistor fault）

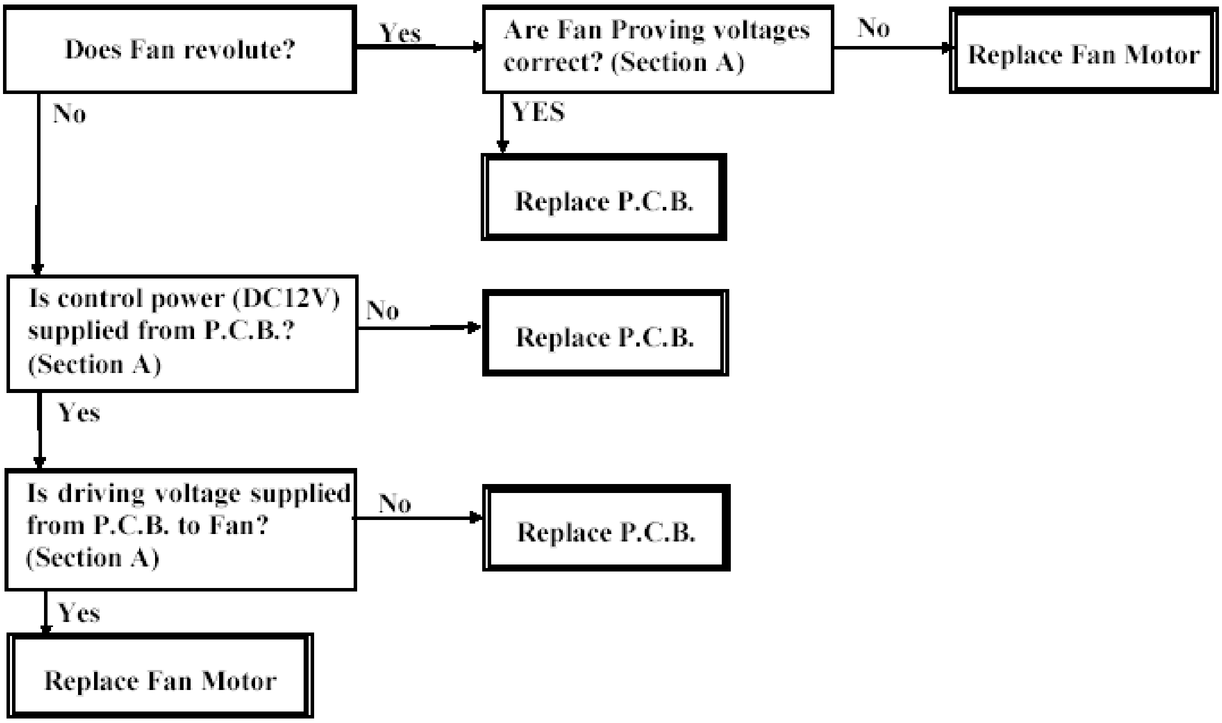


Fault Finding Chart

E−6 Error code 3 4 flashing (Air Intake thermistor fault)



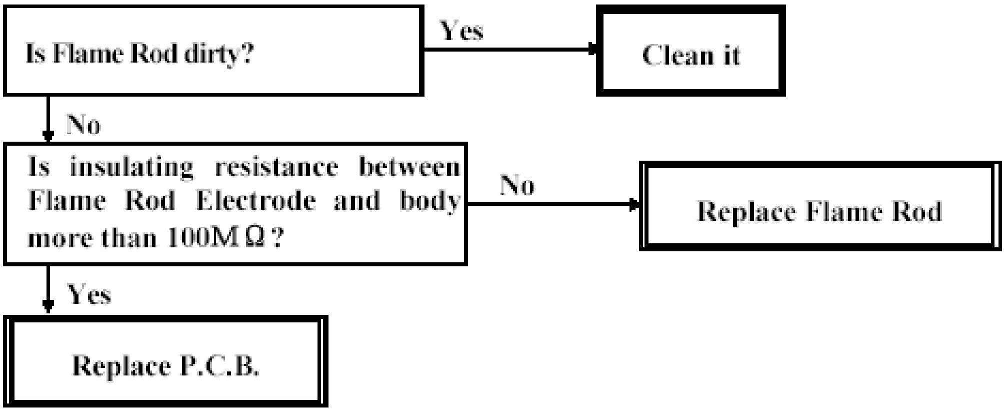
E−7 Error code 6 1 flashing (Fan revolution problem)



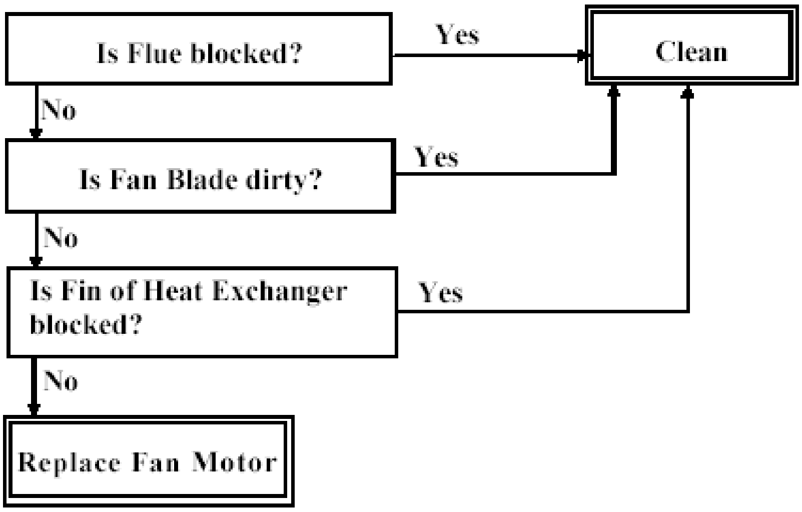
Fault Finding Chart

E－8　Error code　7 1 flashing（P.C.B. Pre-check is fault）

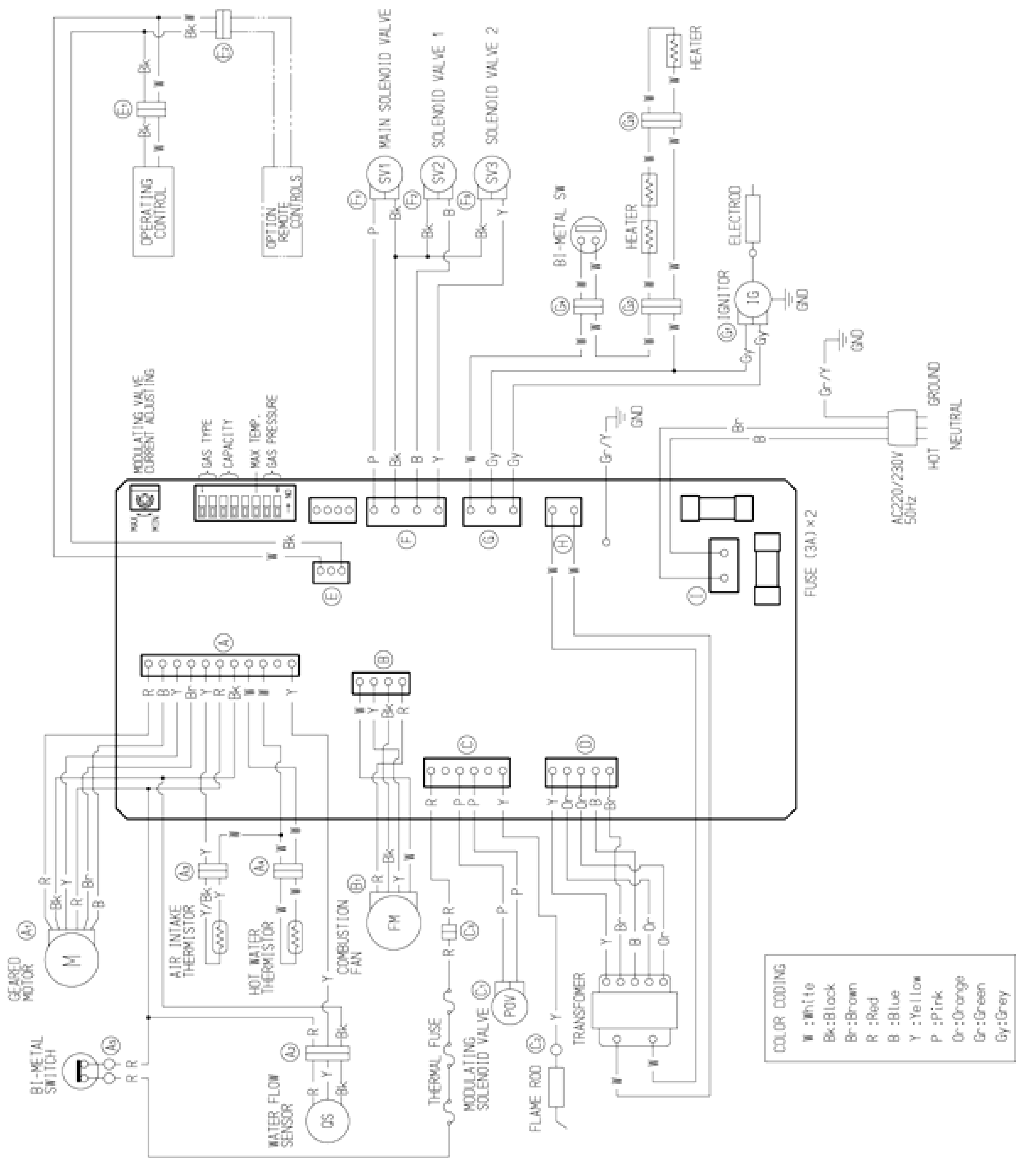
E－9　Error code 7 2 flashing（detect false flame）



E－10　Error code 1 0 flashing



Wiring Diagram



Diagnostic Points

Flow Chart No.	Component	Measurement point CN	Wire Color	Determination (normal figure) Upper : Voltage Lower : Resistance, Current	Remark
		I	B-Br	AC200～AC240V	AC power
①	GEARED MORTOR	A_1	R-B	DC11～13V 10～30Ω	Drive power
			R-Bk	DC11～13V	Control power
			Y-Bk	Below DC1V(limiter ON) Below DC4～6V(limiter OFF)	Full open limiter
			Br-Bk	Below DC1V(limiter ON) Below DC4～6V(limiter OFF)	Full close limiter
②	REMOTE CON TROLS	E_1	Bk-W	DC11～13V	
③	WATER FLOW SENSOR	A_2	R-Bk	DC11～13V	ON2.4L/min (35Hz) over 2100 pulse/min. OFF1.7L/min (24Hz) below 1440 pulse/min
			Y-Bk	DC4～7V(pulse 17～400Hz)	
④	FAN MOTOR	B_1	R-Bk	DC6～40V (fan on)	More than 1200 pulse/min
			Y-Bk	DC11～13V (standby or on)	
			W-Bk	DC2～10V(pulse 20～400Hz) fan on	
⑤	FLAME ROD	C_2	Y-earth	More than DC1 μ A	At ignition
⑥	HOT WATER THERMISTOR	A_4	W-W	15 ℃···11.4～14.0kΩ 30 ℃··· 6.4～ 7.8kΩ 45 ℃··· 3.6～ 4.5kΩ 60 ℃··· 2.2～ 2.7kΩ 105℃··· 0.6～ 0.8kΩ	Measure Thermis-tor side (small wire)
⑦	AIR INTAKE THERMISTOR	A_3	Y/Bk-Y	15 ℃···20.1～17.9kΩ 30 ℃···10.2～ 8.9kΩ 45 ℃··· 5.5～ 4.7kΩ 60 ℃··· 3.1～ 2.6kΩ 105℃··· 0.7～ 0.5kΩ	Measure Thermis-tor side (small wire)
⑧	THERMAL FUSE	C_3 A_5	R-switch	Less than 1Ω	
⑨	IGNITOR	G_1	Gy-Gy	AC200～240V	
⑩	MAIN SOLE-NOID VALVE	F_1	P-Bk	DC200～240V 6.0～7.8KΩ	
⑪	SOLENOID VALVE 1	F_2	B-Bk	DC200～240V 7.8～10.8KΩ	
⑫	SOLENOID VALVE 2	F_3	Y-Bk	DC200～240V 7.8～10.8KΩ	
⑬	MODULATING VALVE	C_1	P-P	DC2～15V 67～83Ω	

TRANSFORMER VOLTAGES AND RESISTANCES

Connector	Wire Color	Normal Value
H	W-W	AC200～240V 11～20Ω
D	Or-Or	AC49～55V 1.3～1.7Ω
D	B-Br	AC12～14V 0.7～1.3Ω
D	Br-Y	AC195～216V 175～215Ω

Servicing Procedure

Servicing Infinity Water Heaters

Isolate electrics and valve off hot, cold, and gas to unit.

Check the water filter and strainer to be sure there are no blockages.

Remove the combustion fan and clean the impeller.

Check the burner for wear or water damage. Vacuum out any debris. Wipe out chamber.

Check the heat exchanger for soot or hot spots that could be caused by poor combustion.

Clean carbon build up from ionisation and ignition probes.

Check flue terminal for blockages or potential blockages, check that flue is in good condition.

Check all electrical connections are reconnected

The gas pressures should then be re-set. The procedure is detailed in the manual.

Verify temperature control by checking temperature at outlet, bear in mind that there will be pipework losses.

Check all gas joints inside the unit with an electronic gas detection device when starting unit.

Leak check all joints back to the service valve (commercial installations) or tightness test the installation for domestic installations.

Dismantling for Service

・Isolate gas supply.
・Cut off power supply.
・Isolate water supply.
・Drain all water from appliance.

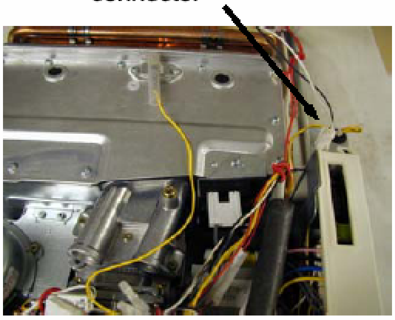
1) Remove Front Cover

① Remove Front Cover (2 screws)

screws

②Disconnect connectors of Remote Controller Cable

connector



2) Remove P.C.B. Unit

① Disconnect PCB Earth wires (1 screw)

② Remove 2 screws and pull out P.C.B. Unit

screws

Earth screw

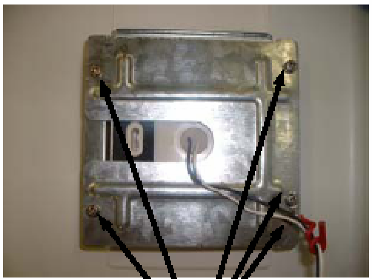
③ Pull out 9pcs. Connectors

・The P.C.B.

3) Remove Remote Controller

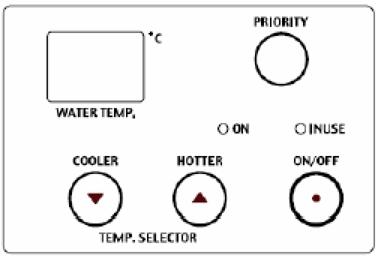
①Disconnect connectors of Remote Controller Cable (refer to 1)

② Remove 5 screws

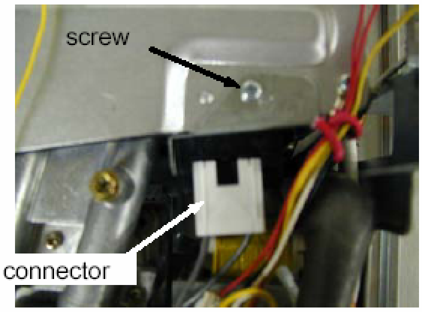


screws

・Remote Controller

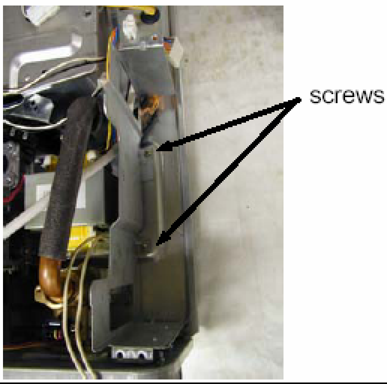


4) Remove Ignitor
① Disconnect connector of Ignitor
② Remove Ignitor (1 screw)

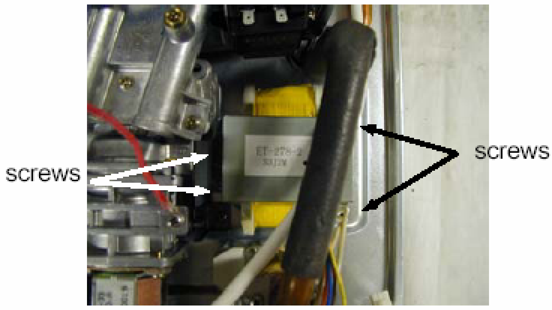


・Ignitor

5) Remove transformer
① Disconnect P.C.B. Earth wires (1 screw)
② Remove 2 screws and pull out P.C.B. Unit (refer to 2))
③ Disconnect connectors of Transformer
④ Remove 2 screws P.C.B. Case Cover

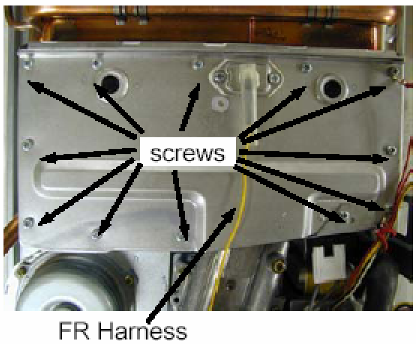


⑤ Remove transformer (4 screws)

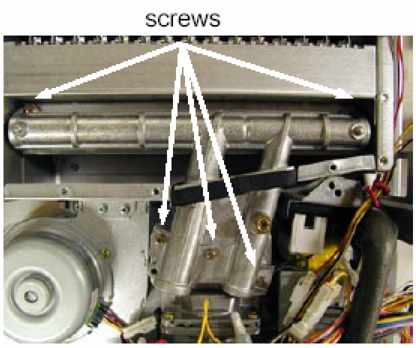


・ Transformer

6) Remove Burner Unit and Manifold
① Disconnect connector of FR Harness From Flame Rod
② Remove Combustion Chamber Front Panel (12 screws)

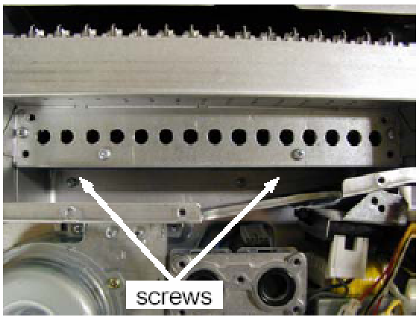


③ Remove Manifold (5 screws)



・Manifold

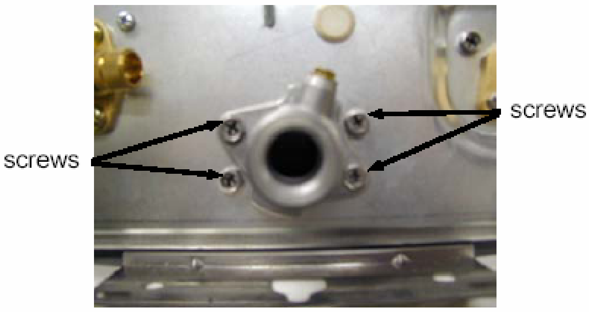
④ Remove Burner Units (2 screws)
⑤ Pull out Burner Unit to front



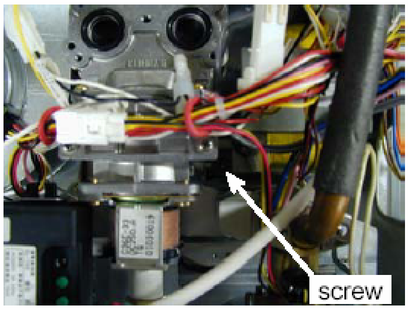
・Burner Unit

7) Remove Gas Control

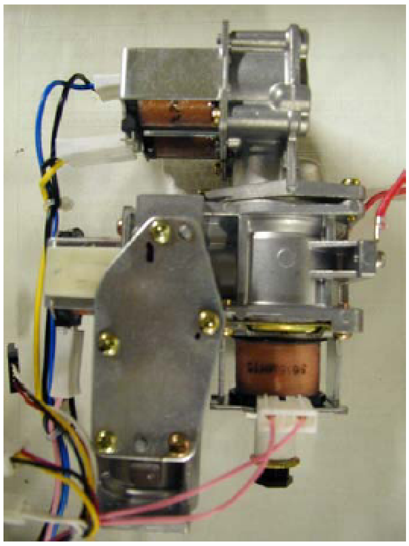
① Remove Burner Unit and Manifold (refer to 6)①~③)
② Remove Gas Inlet (4 screws)



③ Remove Gas Control (1 screws)

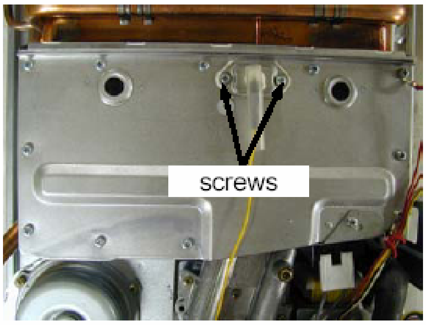


④ Pull out Gas Control to front and disconnect the harness connectors from Gas Modulating Valve(pink・pink), Main Solenoid Valve(pink・black), Change Solenoid Valve1(blue・black), Change Solenoid Valve2(yellow・black)



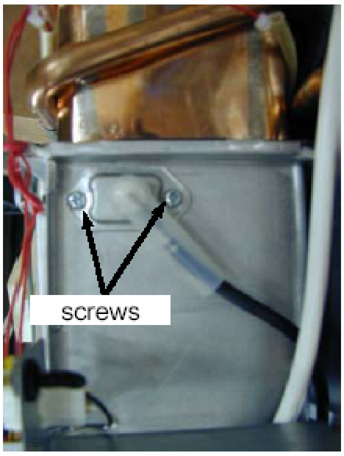
・Gas Control

8) Remove Flame Rod
① Disconnect connector of FR Harness from Flame Rod (refer to 6) ①)
② Remove Flame Rod (2 screws)



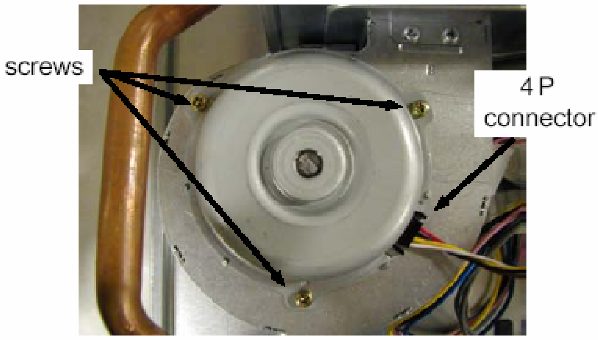
・Flame Rod・Packing・Retainer・Connector Tube

9) Remove Electrode
① Disconnect High Tension Cord from Electrode
② Remove Electrode (2 screws)



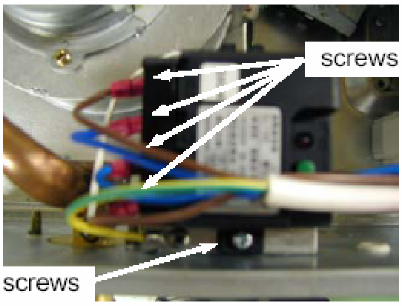
・Electrode・Target・Packing・Retainer・Electrode Tube

10) Remove Fan Motor
① Disconnect 4P connector (red・black・yellow・white)
② Remove Fan Motor Assy (3 screws)



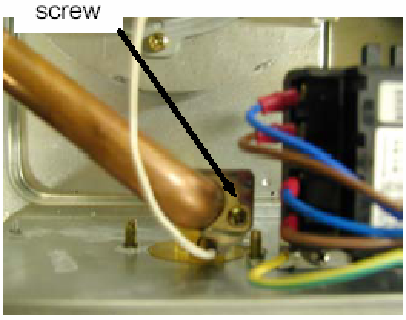
・Fan Motor Assy

11) Remove R.C.C.B.
① Disconnect round-shape Terminal of Electric Cord and Electric Harness (4 screws)
② Remove R.C.C.B. (1 screw)

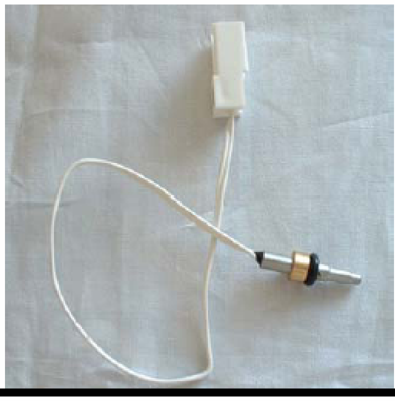


・R.C.C.B.

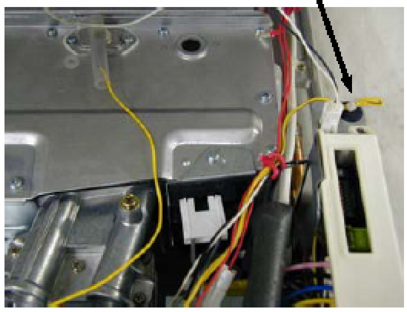
12) Remove Hot Water Thermistor
① Disconnect Hot Water Thermistor connector (white・white)
② Remove Hot Water Thermistor (1 Screw)



・Hot Water Thermistor

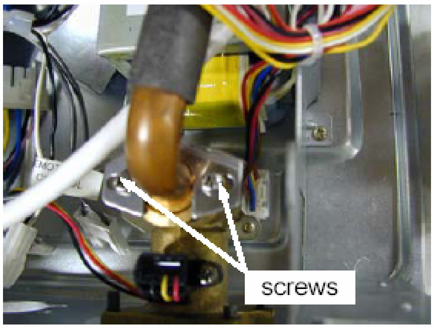


13) Remove Air Intake Thermistor
① Disconnect Air Intake Thermistor connector (yellow・yellow)
② Pull out of Air Intake Thermistor

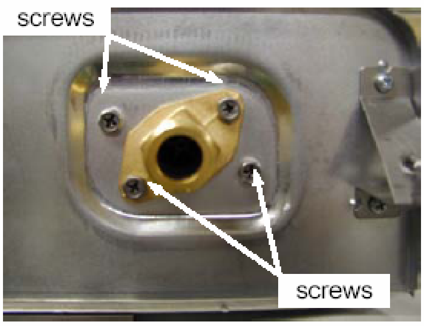


・Air Intake Thermistor

14) Remove Water Flow Control
① Disconnect Connector of Water Flow Sensor
② Pull out Water Inlet Pipe from Water Flow Control (2 screws)



③ Remove Water Inlet (4 screws)

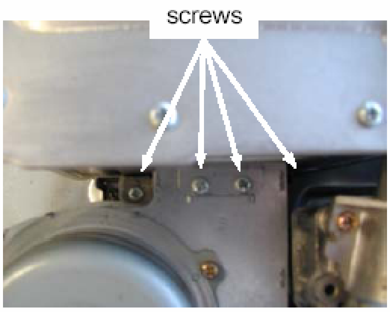


・Water Flow Control

15) **Remove Fan Motor All Assy**

① Disconnect 4P connector (red・black・yellow・white) (refer to 10) ①)

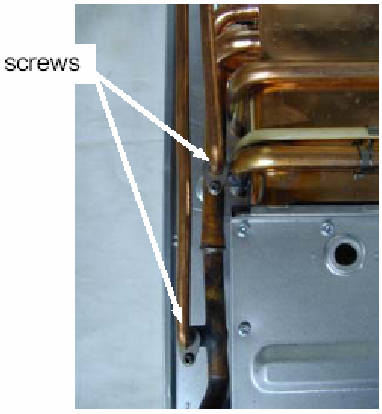
② Remove Fan Motor All Assy (4 screws)



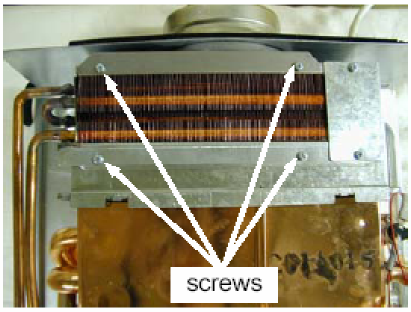
・Fan Motor All Assy

16) **Remove Inter Cooler**

① Pull out Inter Cooler 2 Pipe (2 screws)



② Remove Inter Cooler of the Air Inlet Box (4 screws)



・Inter Cooler

17) **Remove Heat Exchanger**

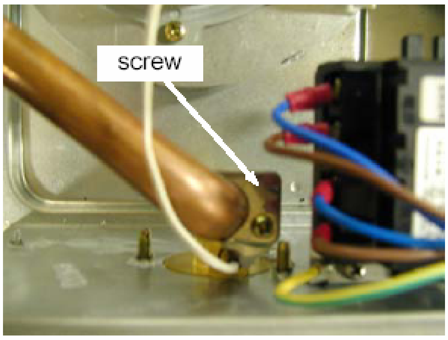
① Remove Burner Unit and Manifold (refer to 6))

② Remove Fan Motor All Assy (refer to 15))

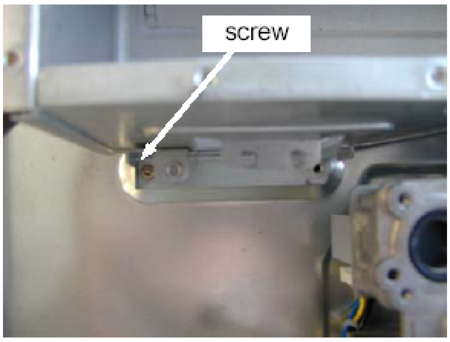
③ Disconnect Bi-Metal switch connector (red) and Thermal Fuse Assy connector (red)

④ Pull out Water Inlet Pipe from Water Flow Control (refer to 14)②)

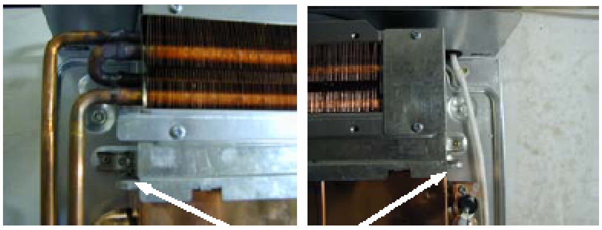
⑤ Pull out Hot Water Outlet Pipe from Hot Water Outlet (1 screw)



⑥ Remove Combustion Chamber Box (1 screw)

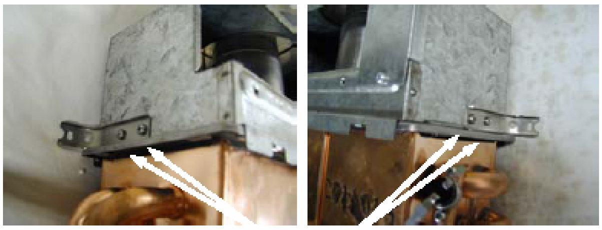


⑦ Remove Air Inlet Box and Heat Exchanger (2 screws)

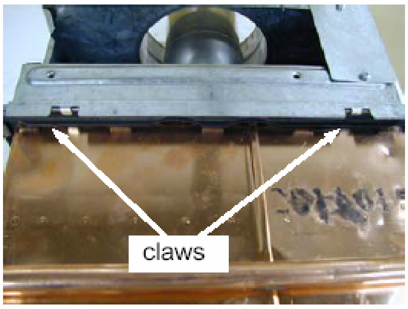


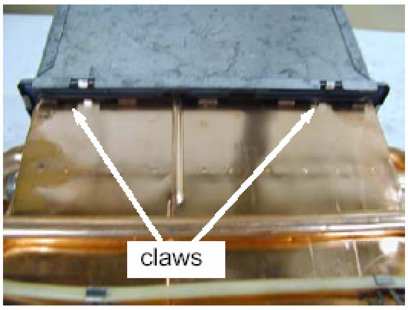
screws

⑧ Remove Inter Cooler (refer to 16))
⑨ Remove Air Inlet Box of the Heat Exchanger by 4 screws and Air Inlet Box 4 claws



screws





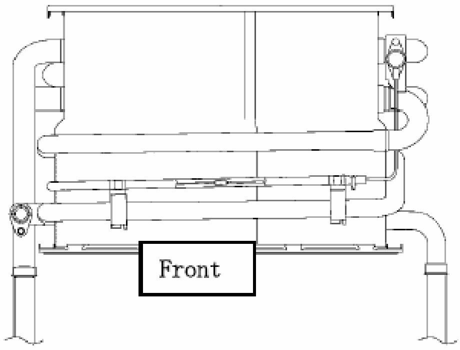
・Heat Exchanger

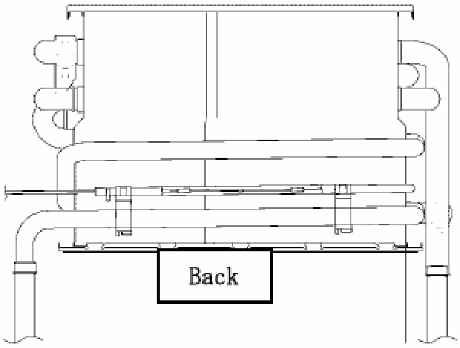
18) Disassemble Thermal Fuse

① Disassemble Heat Exchanger (refer to 17)①～⑨)

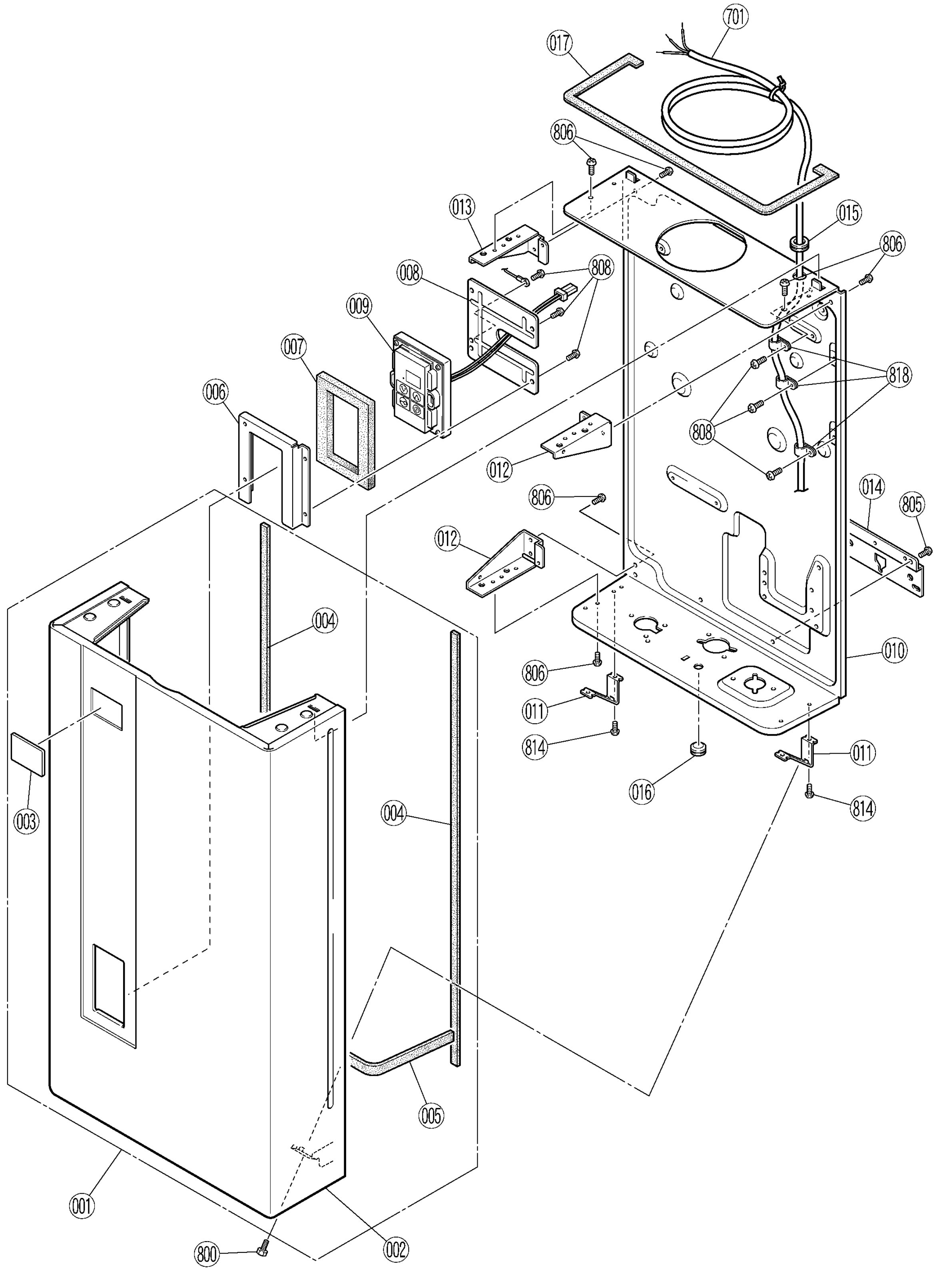
② Disassemble Thermal Fuse

※After replase Thermal Fuse, assemble as follows

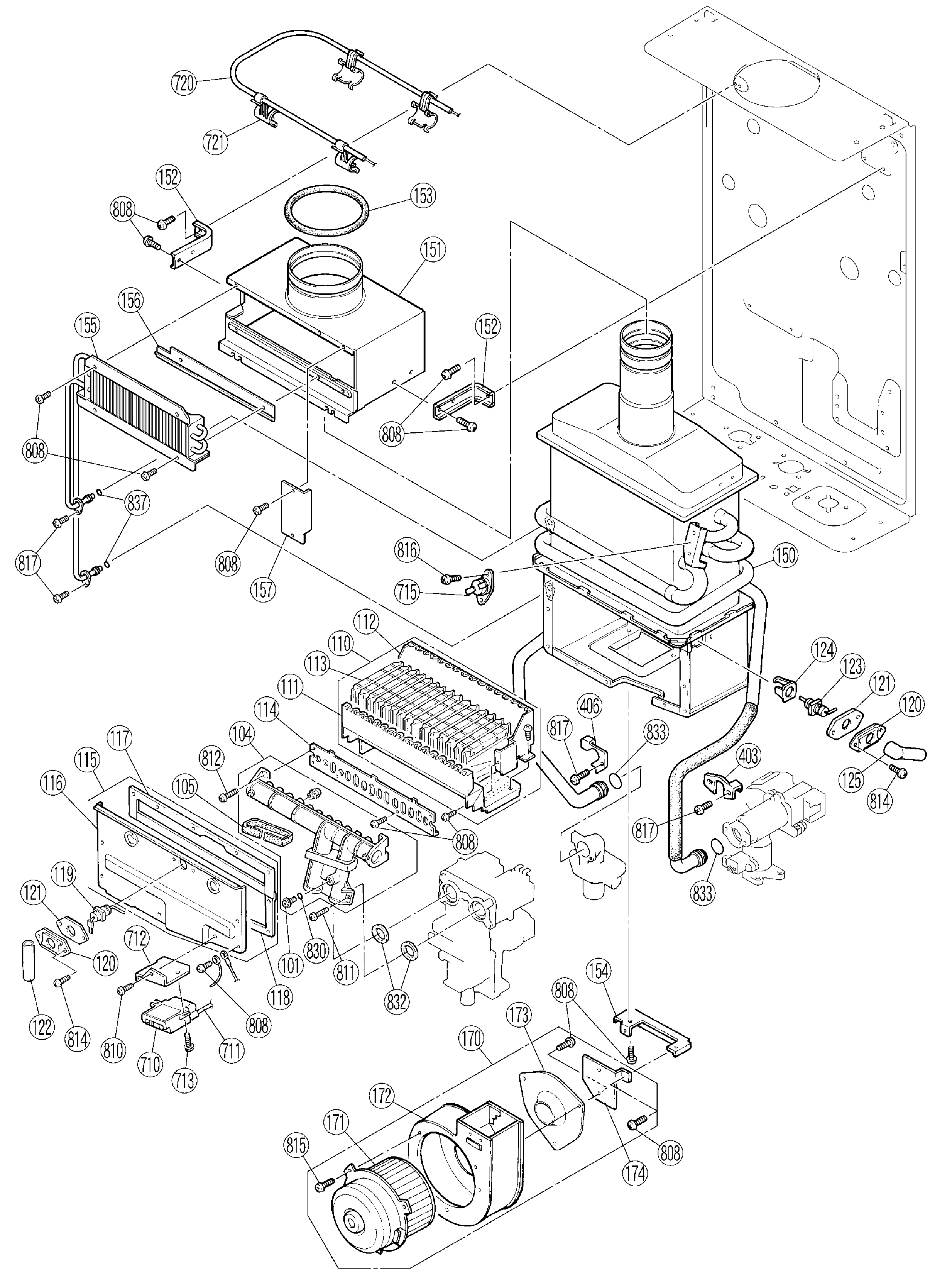




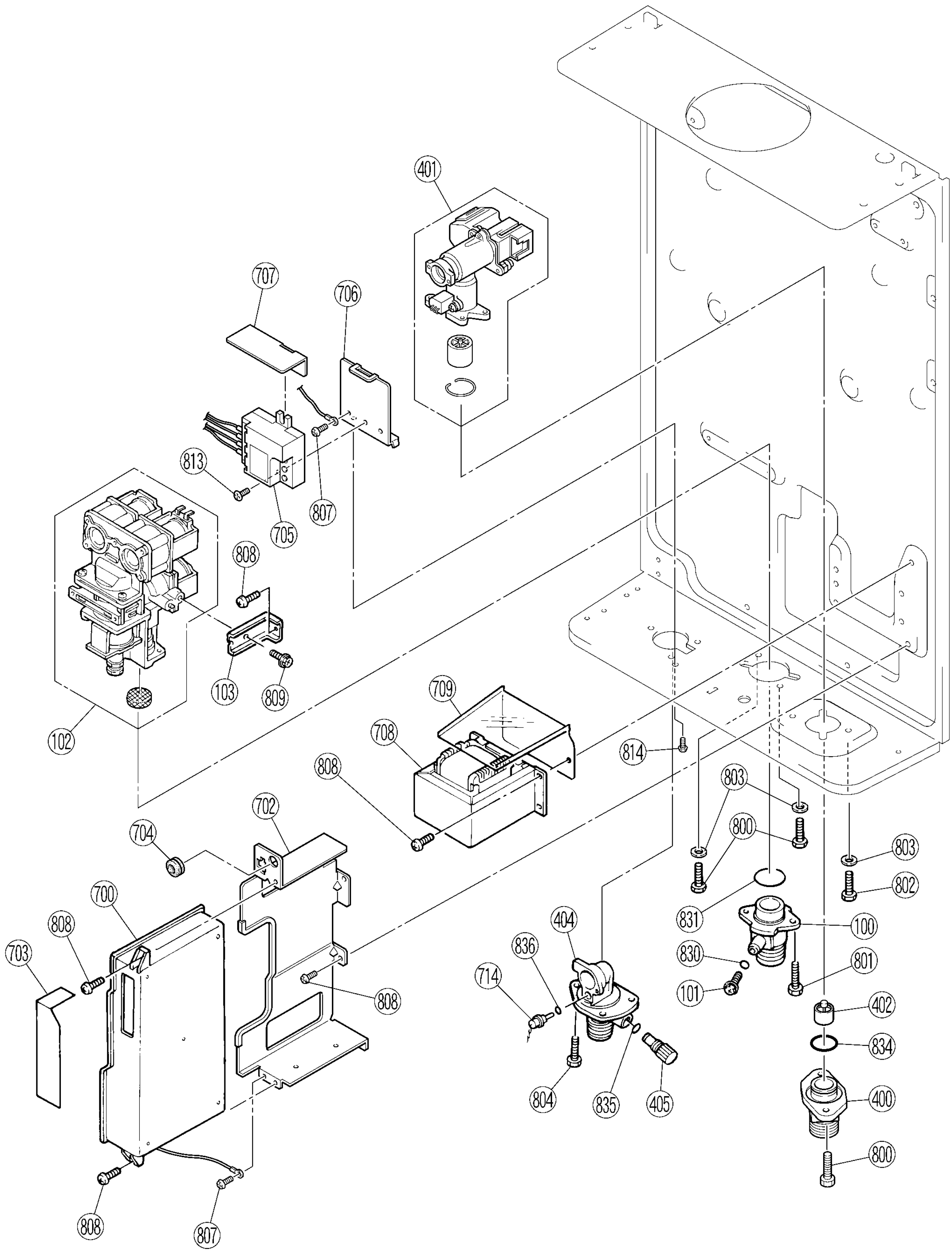
Exploded Diagram



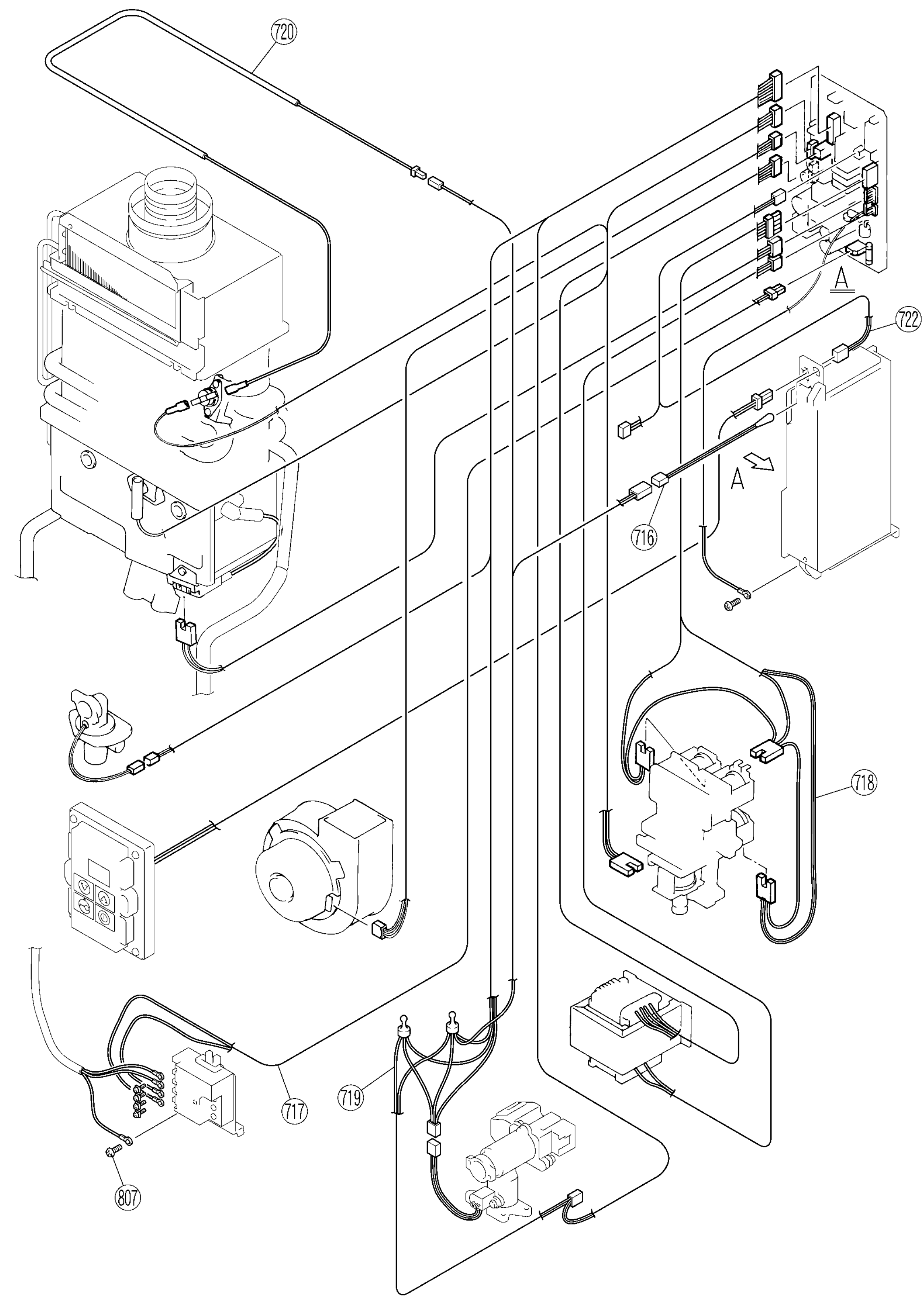
Exploded Diagram



Exploded Diagram

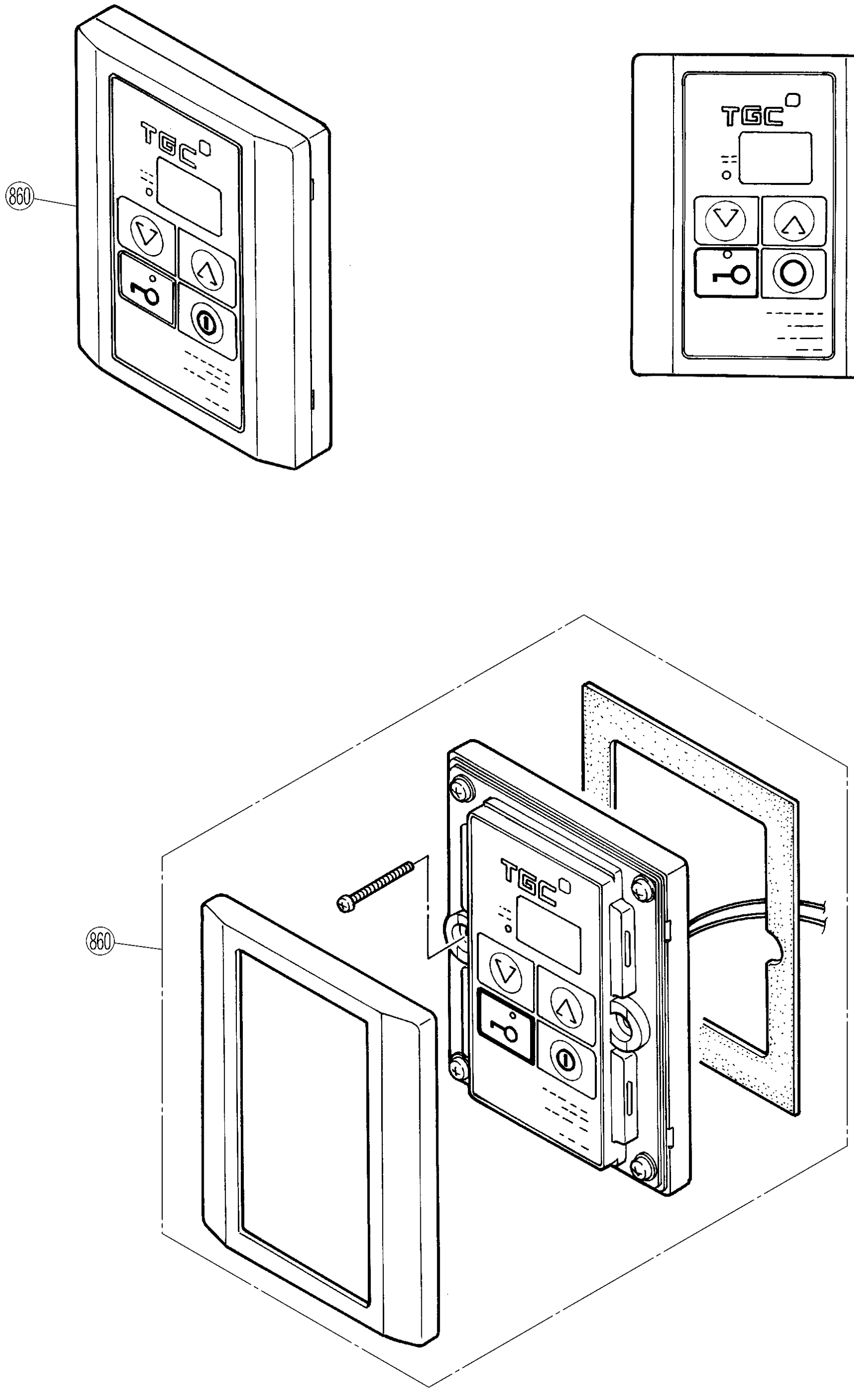


Exploded Diagram



Exploded Diagram

(MC-90-1H)



Parts List

KEY NO.	PARTS NAME	PARTS NO.	Quantity	REMARKS
001	Front Cover All Assy	U247-150-16TF-AS	1	with side/ upper/bottom packing and front panel
002	Front Cover	U247-150	1	
003	Front Panel	U247-191-1	1	
004	Front Panel Side Packing	U247-166	2	
005	Front Panel Up/Bottom Packing	U247-165	1	
006	Remote Control Mounting Plate	U247-160	1	
007	Remote Control Seal Packing	U247-161	1	
008	Remote Control Mounting Rear Plate	U247-621	1	
009	Remote Controller (BC-90S-1CH)	U220-710	1	
010	Body	U247-101-1	1	with Up Panel packing
011	Front Cover Fixing Plate	U247-106	2	
012	Body Reinforcement Plate R	U247-102-1	2	
013	Body Reinforcement Plate L	U247-102-2	1	
014	Mounting Bracket	U247-105	1	
015	Cable Bush	U247-109	1	
016	Packing	AU105-113-3	1	
017	Up Panel Packing	U247-167	1	
100	3/4 Gas Inlet	U247-282	1	
101	Pressure Point Seal Screw	C10D-5	2	
102	Gas Control Assy	C36E-33-S	1	TG
103	Gas Control Mounting Plate	U222-121	1	
104	Manifold Assy	U222-551S-2-290	1	with Packing
105	Manifold Assy Packing	U222-558-1	1	
110	Burner Unit Assy	U222-201	1	TG
111	Burner Case Front	U222-205	1	
112	Burner Case Back	U222-206	1	
113	Burner Assy	B3A3-1	15	TG
114	Damper	U222-208-W	1	TG

Parts List

KEY NO.	PARTS NAME	PARTS NO.	Quantity	REMARKS
115	Combustion Chamber Front Assy	U222-215-T-AS	1	with Upper/Bottom Packing
116	Combustion Chamber Front Panel	U222-216-T	1	
117	Upper Packing	U222-217	1	
118	Bottom Packing	U222-218	1	
119	Electrode	U222-225	1	
120	Electrode Retainer	U222-227	2	
121	Electrode Packing	U222-228	2	
122	Electrode Sleeve	AU102-681	1	
123	Electrode	U222-224	1	
124	Ignition Target	U222-226	1	
125	Electrode Sleeve	AU206-218	1	
150	Heat Exchanger Assy	U247-300-N-AS	1	with Exhaust Duct･Combustion Chamber Assy・Water Pipe Keep Warm Material
151	Exhaust Duct Assy	U247-410	1	
152	Exhaust Duct Support	U222-415	2	
153	Front Cover Seal Packing	BH29-486-K	1	
154	Combustion Chamber Fixing Plate	U222-220	1	
155	Inter Cooler Assy	U247-400	1	
156	Drain Receiver Plate	U247-441	1	
157	Air Inlet Seal Plate	U247-413	1	
170	Fan Motor All Assy	U222-305-31	1	
171	Fan Motor Assy	U222-307	1	
172	Fan Case Assy	CU169-552	1	
173	Bell-mouth	U217-570	1	
174	Fan Mounting Plate	U220-310	1	
400	Water Inlet	U247-701	1	
401	Water Servo with Water Volume Sensor	M8E-3-7	1	
402	Flow Straightener	M8D1-15	1	

Parts List

KEY NO.	PARTS NAME	PARTS NO.	Quantity	REMARKS
403	Water Inlet Retainer	U222-703	1	
404	Water Outlet	U223-708	1	
405	Drain Valve	BBF9-305	1	
406	Water Outlet Retainer	U222-708	1	
700	P.C.B. Assy	U247-601	1	
701	Power Cable Assy	U247-614	1	
702	Case Cover	U247-604	1	
703	Switch Cover	U222-606	1	
704	TH Packing	AH52-062	1	
705	R.C.C.B.	EL-143	1	
706	R.C.C.B. Mounting Plate	U247-611	1	
707	R.C.C.B. Cover	U247-655	1	
708	Transformer Assy	ET-278-2	1	
709	Transformer Cover	U223-631	1	
710	Igniter	EI-202	1	
711	High Tension Cord	BH38-710-200	1	L=200
712	Igniter Mounting Plate	U223-615	1	
713	Screw	CP-80452	1	Igniter Earth
714	Thermistor	BH45-650	1	
715	Overheat SW	AU129-665	1	
716	Thermistor 2	U262-639	1	
717	R.C.C.B. Harness	U247-612	1	
718	Solenoid Valve Harness	U247-645	1	
719	Sensor Harness	U247-641	1	
720	Temp. Fuse Harness	U222-647	1	
721	Temp. Fuse Mounting Plate	U222-649	4	
722	Remote Controller Wire	U247-622	1	
800	Screw	ZAG0512UK	6	
801	Screw	ZAG0514UK	2	
802	Screw	ZAG0508UK	2	
803	Washer	H78-099	4	

Parts List

KEY NO.	PARTS NAME	PARTS NO.	Quantity	REMARKS
804	Screw	ZBA0512UK	3	
805	Screw	ZBA0508UK	2	
806	Screw	ZBA0408UK	9	
807	Screw	ZHAA0408UK	2	
808	Screw	ZFAB0408SZ	42	
809	Screw	ZAA0408SZ	1	
810	Screw	ZFDB0408UK	12	
811	Screw	ZAA0412SZ	3	
812	Screw	ZFAB0410SZ	2	
813	Screw	ZFDB0410SZ	1	
814	Screw	ZFAB0408UK	9	
815	Screw	ZIAA0410SZ	3	
816	Screw	ZFAB0406UK	2	
817	Screw	ZAA0408UK	5	
818	Clamp	AU33-327-C	3	
830	O Ring	M10B-13-4	2	
831	O Ring	M10B-1-24	1	
832	Packing	C36E1-6	2	
833	O Ring	M10B-2-14	2	
834	O Ring	M10B-2-18	1	
835	O Ring	M10B-2-5	1	
836	O Ring	M10B-2-4	1	
837	O Ring	M10B-2-8	2	
860	Remote Controller	MC-45-SR-EU	1	option
862	Remote Controller	BC-45-SR-EU	1	option
862	Remote Controller	BSC-45-SR-EU	1	option
880	Instruction Manual	U247-880	1	

Letter of Compliance

Rinnai
CORPORATION

GAS AND HOME
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Declaration of conformity

We, Rinnai Corporation, Nagoya herewith confirm that the REU-16FUA-E is in accordance with the following directives

Directive:
90/396/EEC Gas directive
73/23/EEC Low Voltage directive
89/336/EEC EMC directive

Nagoya, 20th December 2005
Rinnai Corporation

Yuzo Yoshida
Director, General Manager

CE Certificate

TECHNIGAS **Module B**

EC TYPE EXAMINATION CERTIFICATE

Annex II Paragraph I directive 90/396/EEC

Certificate number : *E0940/5399* *Date of issue : 23/12/2005*
ID number : *0461BQ0836*

Fabricant
Manufacture
Fabrikant
: RINNAI Corporation
Fukuzumi-Cho 2-26
JP - Nakagawa, Nagoya

Marque commerc.
Trade mark
Handelsmerk
: RINNAI

Type
Model
Type
: REU-16FUA-E

Genre d'appareil
Kind of product
Soort toestel
: INSTANTANEOUS WATER HEATER

Type d'appareil
Appliance type
Type toestel
: C13/ C33

Countries of destination, appliance categories :

AT Cat: I2H/ I3B/P G20/20mbar/ G30/50mbar/ G31/50mbar
BE Cat: I2E(S)B/ I3P G20/20mbar/ G25/25mbar/ G31/37mbar
CY/ HU/ MT Cat: I3B/P G30/30mbar/ G31/30mbar
CZ/ DK/ EE/ FI/ GR/ IT/ LT/ LV/ NO/ SK/ SI/ SE Cat: I2H/ I3B/P G20/20mbar/ G30/30mbar/ G31/30mbar
DE/ LU Cat: I2E/ I3B/P G20/20mbar/ G30/50mbar/ G31/50mbar
FR Cat: I2Esi/ I3P G20/20mbar/ G25/25mbar/ G31/37mbar
IE/ PT/ ES/ CH/ GB Cat: I2H/ I3P G20/20mbar/ G31/37mbar
NL Cat: I2L/ I3B/P G25/25mbar/ G30/30mbar/ G31/30mbar
PL Cat: I2E/ I3B/P G20/20mbar/ G30/37mbar/ G31/37mbar

Normative references : EN 26 edition 01/1997
EN 26/A1 edition 10/2000

DIRECTOR
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TGP-08-14
2002-04-12

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