



## Kerosene-Fired Water Heater

# Operation and Maintenance Instructions

### MODEL BS-35(F)

#### **IMPORTANT**

READ AND UNDERSTAND INSTRUCTIONS BEFORE INSTALLING OR USING THIS WATER HEATER. RETAIN INSTRUCTIONS FOR FUTURE REFERENCE. CHECK LOCAL CODES AND ORDINANCES FOR PERMITTED USE.

#### **CAUTION**

THIS WATER HEATER SHALL NOT BE USED FOR COMMERCIAL USE OR ANY PURPOSES OTHER THAN HOT WATER SUPPLY USES. OTHER USAGE MAY CAUSE A MALFUNCTION OR SHORTEN ITS SERVICE LIFE. DO NOT REMOVE THE RATING PLATE AND LABELS FROM THE WATER HEATER UNIT.

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## **SECTION A: SAFETY TIPS**

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### **BE SURE TO FOLLOW THE FOLLOWING INSTRUCTIONS.**

The instructions which are contained in this manual are classified into the following two types, which are "WARNING" and "CAUTION". These instructions are intended to provide the important information for safe operation.

"**WARNING**" indicates the possibility of causing the user a fatal accident or serious injury if the water heater is incorrectly operated.

"**CAUTION**" indicates the possibility of causing the user injuries or material damages if the water heater is incorrectly operated.

### **WARNING**

1. Never use any fuel other than water-clear kerosene. NEVER USE GASOLINE! Use of such fuels can result in an explosion and/or fire and cause injury.
2. Never store flammable liquids or materials such as gasoline near the unit.
3. This unit should be installed by a licensed, authorized person(s) due to the necessity of making electrical, water and fuel connections.
4. **RISK OF BACKFIRE AND INDOOR AIR POLLUTION.** Before operation make sure exhaust pipe is free of snow, icing, leaves, bird's nest or strong drafts.
5. **RISK OF INDOOR AIR POLLUTION AND FIRE.** Be sure the exhaust pipe is properly installed and connected. Aluminum tape may be used for sealing exhaust pipe connections.
6. **RISK OF INJURY FROM MOVING PARTS AND ELECTRICAL SHOCK.** Disconnect power cord before servicing unit.
7. This water heater is designed to be used no more than 1,300 m above sea level. The water heater may have a failure of combustion at a high altitude.  
Ask your local dealer for using at altitudes higher 1,000 m ~ 1,300 m above sea level

### **CAUTION**

1. **HOTTER WATER INCREASES THE RISK OF SCALD INJURY.** Water heaters are intended to produce hot water. Water heated to a temperature which will satisfy clothes washing, dish washing, and other sanitizing needs can scald and permanently injure you upon contact. Before changing temperature setting make sure nobody is using a shower. High temperature setting increases the risk of scald injury.
2. **RISK OF SCALD INJURY.** When using a shower, feel the temperature of the water with your hand before getting under the water.
3. **RISK OF SCALD INJURY.** Do not touch hot water flowing from pressure relief valve.

## **OTHER PRECAUTIONS**

1. This unit is only for indoor use. Avoid its exposure to rain or moisture.
2. Do not use for drinking or cooking until the water supply has been approved by local authorities.
3. Hot water (or cold water) left in heat exchanger or piping must not be used for cooking or drinking.
4. When using a large amount of hot water the temperature may change, even though the temperature setting has not been changed. Special caution must be taken if two faucets are open at the same time.
5. If the unit appears to be operating abnormally or in an emergency, turn off the unit and call an authorized service person.
6. To avoid the use of hard water is recommended. In regions where hard water is the only source, take advantage of a water softener or periodical maintenance of cleaning the accumulated carbonate calcium is recommended..
7. Do not use a damaged unit. If repairs are needed, contact your dealer.
8. Keep the area around the unit, the fuel tank and the exhaust pipe clean and free of flammable materials.
9. If you plan to be away from your home for a long period of time, shut-off the fuel valve from the fuel tank. Press "POWER SWITCH" to "OFF" position and disconnect the power supply cord.
10. If the unit is not used for a long period of time, the fuel tank may contain water cause by condensation. Be sure to check all filters and strainers for this condition, clean or replace filter elements before using the unit.
11. The use of the water heater with the temperature selector knob at "MED" or "LOW" may cause to propagate bacteria in water. In order avoid this, turn the temperature selector knob to "HIGH" once a week to heat the water heater and water at high temperature for approximately one hour.
12. Before changing temperature setting, make sure that the water heater is not being used by any of your family at any place in the house. All family members should be aware of this "Caution."

## SAFETY FEATURES

**1. Ignition Safety Device (Flame Sensor)**

The unit will automatically stop all operations if ignition fails or if the flame fails during combustion. "WARNING" lamp will light.

**2. Empty Burning Safety Device**

If the heat exchanger is not filled with water and the unit is turned on, the unit automatically stops all operations. Open a hot water faucet after cooling the heat exchanger down and make sure that water comes out continuously. Then press the POWER SWITCH again after supplying water to the heat exchanger.

**3. Over Heat Protector**

In order to prevent burns, the over heat protector automatically stops all operations if the water in the heat exchanger reaches abnormally high temperatures due to temperature controller malfunction. The "WARNING" lamp will light.

**4. Power Failure Recovery System**

If power fails during water heater operation the unit will turn off. When power resumes the unit will automatically reignite.

**5. Tip-over Switch**

When the unit senses an earthquake or shock, this device activates to stop the operation. Warning lamp will light.

**6. Fuel Strainer**

Special strainer catches any dirt or impurities present in the fuel before it is sent to the burner.

**7. Heat Exchanger Bi-Metal Switch**

If the heat exchanger temperature is raised abnormally because of a malfunctioning thermostat, the burner is automatically extinguished and the all lamps will go out.

**SECTION B:  
SPECIFICATIONS**

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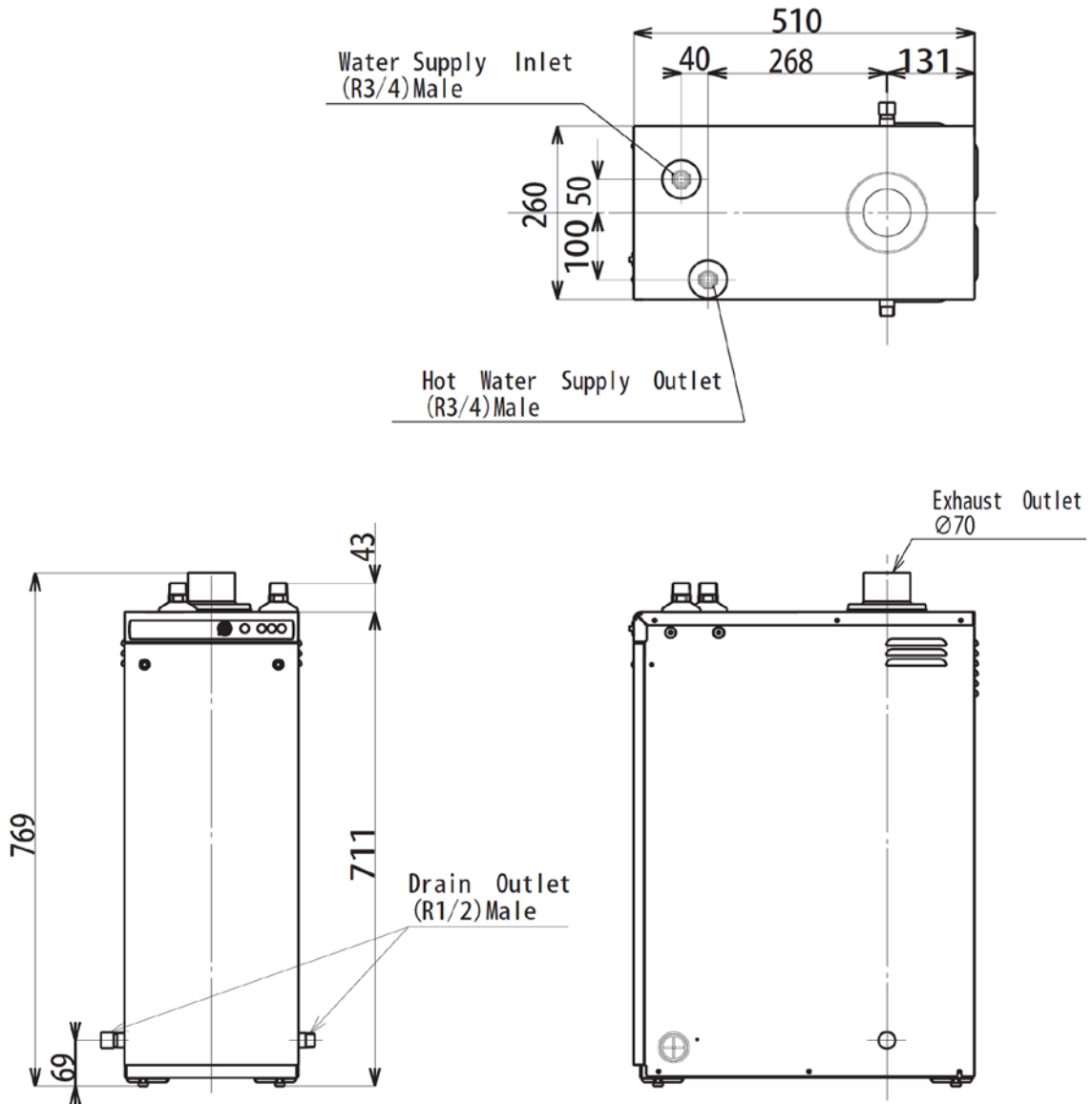
**SPECIFICATIONS**

Model:		BS-35(F)
Type:	Combustion Type Flue Pipe Heating Supply System	Pressure Vapor Forced Exhaust Instantaneous
Ignition:		High Voltage Discharge Spark
Fuel:		Kerosene only
Efficiency:		85.7% <sup>(1)</sup>
Hot Water Output:		35.2 kW (120,000 BTU/h)
Fuel Consumption:		4.0 lit/h
Capacity of Heat Exchanger:		8.8 lit.
Fuel system:		External tank <sup>(2)</sup>
Dimensions (W x H x D):		260 x 700 x 510 mm
Weight:		25 kg (Empty)
Diameter of Required Exhaust Pipe:		ϕ 106 mm
Maximum Length of Exhaust Pipe:		3 m, 3 bends or less
Electrical Rating:		220 Volts AC, 50 Hz Ignition - 117W Burning - 97W
Packaged Accessories:		Pressure relief valve (0.19 MPa) Pressure reducing valve (0.17 MPa) Exhaust pipe top, Metal fuel pipe (Copper pipe), Remote control, Aluminum tape, Extension cord for remote control (8m) Silenser, Exhaust pipe elbow, Fuel pipe joint
Safety Device:		Over-heat protector, Ignition safety device, Empty burning safety device, Heat exchanger bi-metal switch, Tip-over switch
Exhaust Air Temperature:		less than 260°C
Nozzle:	Quantity of Vapor Spraying Angle	1.0 GPH 60°

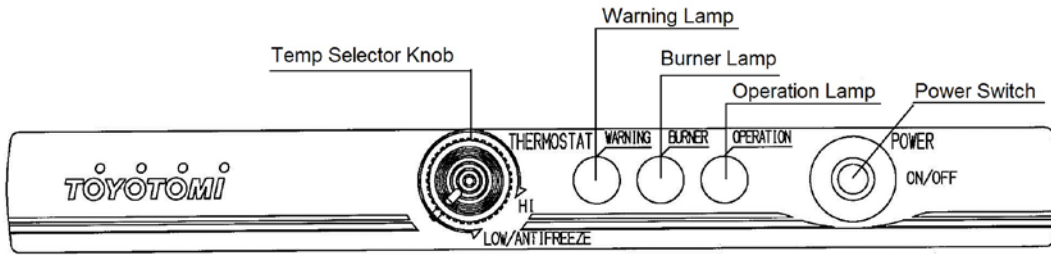
(1) Heat and vaporized water are produced by the combustion process of this water heater. This rating takes into account heat loss due to condensation of water vapor.

(2) External tank to be purchased from local suppliers.

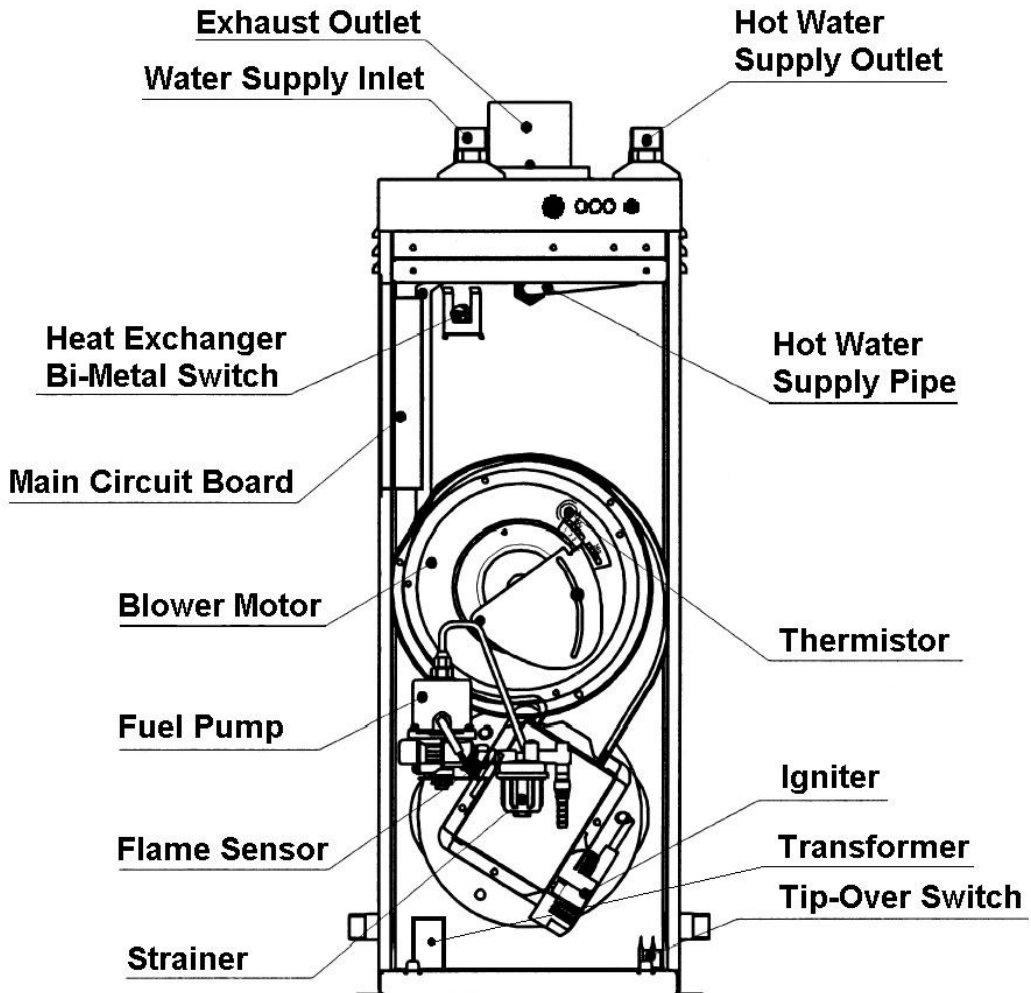
## DIMENSIONAL OUTLINE



## CONTROL PANEL



## CONSTRUCTION



## **SECTION C: FUEL GUIDE**

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The Toyotomi BS-35(F) is designed for use with kerosene only. Use of low-quality kerosene will cause burner performance to drop, leading to abnormal combustion and reduced the unit life.

Purchase only kerosene in non-red cans reserved exclusively for kerosene and marked accordingly with the word "KEROSENE". Always store your kerosene in a separate area from where you store gasoline for your power equipment to avoid accidental use of gasoline in your water heater.

### What to Buy...

- ALWAYS: Clean and high-quality KEROSENE
- ALWAYS: Kerosene free of contaminants, water or cloudiness.
- NEVER: Gasoline, alcohol, white gas, camp stove fuel or additives.
- NEVER: Yellow or sour-smelling fuel.

### How to Store It...

- ALWAYS: Store in a clean container, non-red in color, clearly marked "KEROSENE."
- ALWAYS: Store away from direct sunlight, heat sources or extreme temperature changes.
- NEVER: In a glass container, or one that has been used for other fuels.
- NEVER: For longer than six months.
- NEVER: In the living space.

### Why It is Important...

Pure, clean kerosene is essential for safe and efficient water heater operation. Poor quality or contaminated kerosene can cause:

- Excess tar deposits on burner and flue pipe
- Incomplete combustion
- Reduced unit life

Use of a highly volatile flammable fuel such as gasoline can produce uncontrollable flames, creating a severe fire hazard.



## SECTION D: OPERATION

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### FUELING

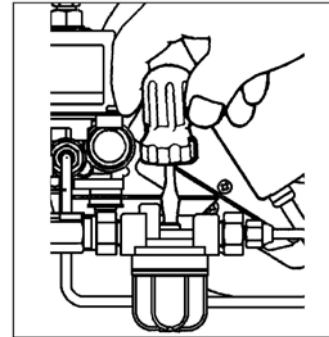
**WARNING:** Use KEROSENE only. Never use gasoline, thinner, benzene, light oil or waste oil.

**CAUTION:** Make sure that the fuel is clean and free from dirt and water. Water and dirt may cause combustion failure and shorten the life of components such as the fuel pump. Be sure to refuel before the tank runs out. Avoid having the fuel tank and fuel line run empty.

### REMOVING AIR TRAP

When operating for the first time or when refueling an empty tank, air may be trapped in the fuel line, making ignition difficult. In this situation, follow the procedures below:

1. Press "POWER SWITCH" to "OFF" position. Disconnect the power supply cord.
2. Release the two (2) screws from the front panel and remove the front panel.
3. To catch the fuel which will drain out, put a small container under the strainer.
4. Loosen the screw on top of the strainer. Immediately wipe off any spilled fuel.
5. Remove the trapped air thoroughly. Failure to remove all the air will cause improper ignition and may extinguish the unit.
6. Tighten the screw after removing trapped air.
7. Plug into the receptacle. Press "POWER SWITCH" to "ON" position.  
Note: In the event of an ignition failure, press "POWER SWITCH" to "OFF" position and after 10 seconds press "POWER SWITCH" to "ON" position once again.



### INSPECTION BEFORE OPERATION

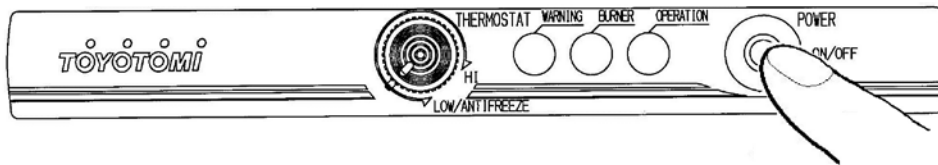
1. Before turning on the POWER SWITCH, make sure that the water supply inlet is open and that water runs out properly by opening a hot water faucet. If not, check the drain valve to see if it has been left open.
2. Check for water leaks in the pipes.
3. Be sure there is a sufficient amount of fuel in the tank and that there are no leaks in the pipe line.
4. Be sure the power supply is properly connected and grounded to the unit.
5. Be sure the area around the water heater is clear of flammable materials such as gasoline, thinner or flammable vapors.
6. Be sure the exhaust pipes are securely connected and that there are no leaks.

## OPERATION

- CAUTION:**
- Hotter water increases the risk of scald injury.
  - Risk of scald injury. When using a shower, feel the temperature of the water you're your hand before getting under the water.
  - When using a large amount of hot water the temperature may change, even though the temperature setting has not been changed. Special caution must be taken if two faucets are open at the same time.

1. Open the fuel tank valve.
2. Press "POWER SWITCH" to "ON". "POWER" lamp will come on. Automatic operation is based upon the temperature of water inside the heat exchanger. "BURNER" lamp is lit when the burner is in its operation mode.

**NOTE:** When operating for the first time or after running out of fuel, ignition may not occur because of air in the fuel line. In that case, remove air as described in the previous section.



## ADJUSTING WATER TEMPERATURE

- CAUTION:**
- Hotter water increases the risk of scald injury.
  - Risk of scald injury. When using a shower, feel the temperature of the water with your hand before getting under the water.
  - Risk of scald injury. Before changing the temperature setting, make sure that the water heater is free from being used by any of your family at any place in-house.
  - When using a large amount of hot water the temperature may change, even though the temperature setting has not been changed. Special caution must be taken if two faucets are open at the same time.
  - The use of the water heater with the temperature selector knob at "MED" or "LOW" may cause to propagate bacteria in water. In order avoid this, turn the temperature selector knob to "HIGH" once a week to heat the water heater and water at high temperature for approximately one hour.

The temperature of the hot water is raised by turning the temperature selector knob clockwise.

Position of Temperature Selector Knob	Hot Water Temperature
HIGH	around 80°C
MED	around 55°C
LOW	Around 15~20°C

- NOTE:**
- Seasonal change in temperature of water from main results in different hot watertemperature supplied. Use hot water supply faucet to control hot water temperature, or readjust temperature setting.
  - The hot-cold mixing faucet is recommended to be used for your harmless and comfortable use of the water heater. Choose a mixing faucet which can provide a pleasant feeling of water temperature with less temperature fluctuation.
  - After installing the mixing faucet, turn to first set the temperature selector knob at the position of "VERY HOT" and next gradually adjust the water temperature by adding cold water to your preferable level. Sufficient care must be taken not to misoperate this adjustment, which may cause to scald your hands.

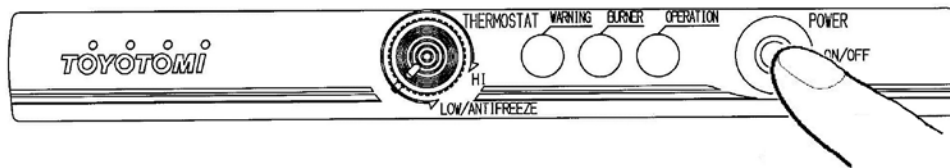
## FLOW RATE AND WATER TEMPERATURE

SEASON	INCOMING WATER TEMP	HOT WATER TEMP	FLOW RATE
SUMMER	25°C	50°C (25°C RISE)	1260 L/h
SPRING & FALL	15°C	50°C (35°C RISE)	900 L/h
WINTER	5°C	50°C (45°C RISE)	700 L/h

NOTE: Whenever high temperature water is required for continuous demand, lessen the flow rate. Whenever low temperature water is required, the flow rate may be increased.

## TURNING UNIT OFF

1. Press "POWER SWITCH" to "OFF" position. All lamps will go out.



2. Close the fuel tank valve.

## PREVENTING FREEZE UP

In order to prevent any kind of damage or leaks caused by freezing, keep the pipes heated at all times, as specified below.

**CAUTION:** In order to prevent the water heater from being broken or develop a leak, regardless of being used in a cold region or in a warm or hot region, the water supply piping, hot water supply piping, drain pipe, check valve, valves, pressure relief valve and pressure reducing valve are to be protected with sufficient insulation materials (by wrapping with heat insulation or by equipping an freeze prevention heater).

### 1. OPERATING AT HIGH TEMPERATURE

**CAUTION:** Risk of scald injury. Before changing temperature setting make sure that the water heater is not being used by any of your family at any place in the house.

Set the Thermostat to the "HIGH" position, and press "POWER SWITCH" to "ON" position.

**NOTE:** Since this method cannot prevent the water inside of the piping from being frozen, sufficient insulation measures are to be given according to the requirements mentioned in the above cautions.

## 2. DRAINING WATER

When you do not plan to use the unit for an extended period, the following procedures are recommended.

1. Turn the unit off.
2. Disconnect the power supply cord.
3. Close the fuel tank valve securely.
4. After closing the main water supply valve, open up all the faucets.
5. Open the drain valve on the bottom of the unit.
6. Pull up the lever of the pressure relief valve.
7. Press the drain valve of the pressure reducing valve.

NOTE: If the water heater is not used in the winter season or in a cold region where the water supply is frozen, or if it is not used for a long period of time, the water heater should be drained and related piping system shut off completely.

When re-supplying water in the water heater and system:

1. Close the air exit valve, if it is provided for the piping.
2. Close the drain valve.
3. Pull down the lever of the pressure relief valve.
4. Close all the hot and cold mixing faucets once.
5. Fully open the main water supply valve.
6. First slowly open the valve for the hot and cold mixing faucet which is located in the farthest position and gradually increase the flow rate as water starts flowing continuously.

NOTE: Since the water heater and piping system still have much air left after they are drained, a flash flow of water may be caused by such air pressure when re-supplying water through them. First open the valve carefully and gradually increase its opening to "Full Open" when the water flow becomes stable. When air bubbles disappear in the water, fully open the valve for hot and cold mixing faucet.

7. Also flow water through other hot and cold mixing faucets by the procedure of item 6 above.
8. Fully open the feed fuel valve for the fuel tank.
9. Connect the power supply cord.
10. Press the the "POWER SWITCH" to "ON" position.
11. Next open the valve for hot and cold mixing faucet, so hot water will flow out.

### **Operation start of the water heater in a cold region:**

Before start the water heater, open a valve for a hot and cold mixing faucet to make sure that water flows out. Neither water flow nor smooth water flow occurs when the water heater and piping system are frozen. If this happens, wait until such frozen water is melted and re-start the operation of the water heater when water flows properly.

## **LONG TERM INACTIVITY**

When leaving the unit unused over a long period of time, drain the heat exchanger and pipes thoroughly and disconnect the electrical cord.

## SECTION E: ROUTINE MAINTENANCE

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### INSPECTION AND MAINTENANCE

**WARNING:** RISK OF INJURY FROM MOVING PARTS AND ELECTRICAL SHOCK.  
Disconnect the power supply cord before inspecting and servicing unit. All repairs should be left to professionals.  
RISK OF BACKFIRE AND INDOOR POLLUTION. Before operation make sure the exhaust pipe is free of snow, icing, leaves, bird's nest or strong drafts.

**CAUTION:** RISK OF BURN INJURY. Do not touch the exhaust pipe top and the exhaust pipe.

When inspecting, ALWAYS do the following.

- a. Press the power switch to OFF position.
- b. Disconnect the power plug from the receptacle.
- c. Close the fuel feed valve.

When inspecting, NEVER do the following.

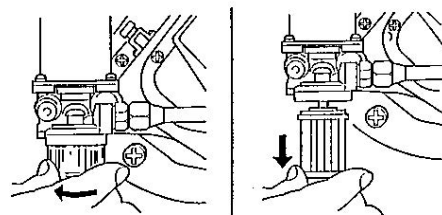
- a. Do not remove the thermistor.
- b. Do not adjust the pressure of the fuel pump.

#### **SPECIAL CAUTION:**

If the carbonate calcium has accumulated in the heat exchanger, put the vinegar into the heat exchanger from the water supply inlet. And then after 30 minutes drain the water from the heat exchanger.

### INSPECTION AND MAINTENANCE ITEMS

1. FLAMMABLE IN THE ENVIRONMENT (REGULARLY)  
Remove all flammable material from the area.
2. FUEL LEAKS (REGULARLY)  
Always check for fuel leaks. Clean off spilled fuel thoroughly when lubricating fuel. If a leak is found, shut down the unit until the problem is corrected.
3. FUEL PIPE INSPECTION (REGULARLY)  
Check for fuel leaks from the fuel pipe. Replace it if any cracks or leaks are found.
4. WATER LEAKS (REGULARLY)  
Check the heat exchanger for water leaks. Always correct if found.
5. ODOR OR SOOT (REGULARLY)  
Check the exhaust pipe top for abnormal odor and accumulated soot. Consult your dealer if it is found.
6. DUST (ONCE A MONTH)  
Check for dust inside of the unit and the bottom (base).
7. WATER INSIDE THE FUEL TANK (ONCE A MONTH)  
Remove any water or waste particles that accumulate inside the fuel tank.
8. FUEL STRAINER (ONCE A MONTH)  
Vibration, noise, ignition and combustion failure could be caused by water or waste particles in the fuel strainer. Clean the fuel strainer by kerosene once a month.

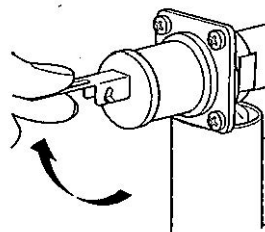


9. EXHAUST PIPE (ONCE A YEAR)

A clogged exhaust pipe will cause improper combustion. Inspect for any clogging or soot accumulation should be done at least once every year. Make sure not to place combustibles in the exhaust pipe area.

10. PRESSURE RELIEF VALVE (ONCE A MONTH)

The pressure relief valve may become immovable at times due to corrosion of pipes or mineral deposits in the pipes. Pull up the lever of the pressure relief valve every month and make sure the valve is movable.



11. PLUG AND RECEPTACLE (ONCE A MONTH)

Make sure the plug is free of dust. Be sure plug fits receptacle securely.

12. BURNER INSPECTION (ONCE SIX MONTHS)

Check the burner and combustion area for soot. Clean if found.

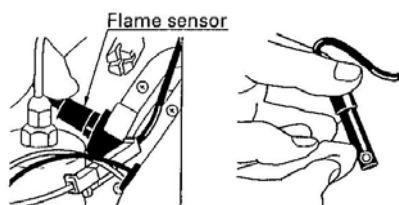
13. GASKETS AND WASHERS (ONCE SIX MONTHS)

Check for water leaks caused by improper sealing of the water pipe. If there are leaks, gaskets or sealant must be replaced.

14. FLAME SENSOR (PHOTOELECTRIC CELL)

(ONCE SIX MONTHS)

- a. Take out the flame sensor which is located to the left of the burner inside the cabinet.
- b. If the receiving surface of the flame sensor becomes dirty or contaminated, the unit will not operate properly. The receiving surface should be wiped with a soft cloth every 6 months.



15. BLOWER MOTOR (ONCE SIX MONTHS)

Make sure there is no dust on the blower motor fan.

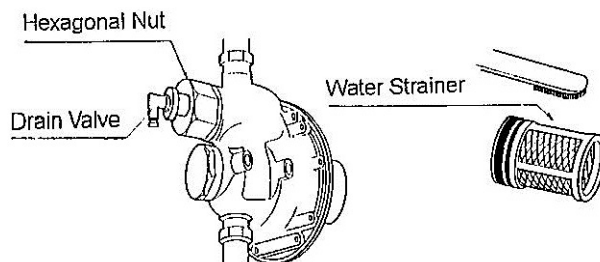
16. HEAT EXCHANGER (ONCE A YEAR)

Open the drain valve at least once a year to drain the heat exchanger. Pull up the lever of the pressure relief valve to allow air to enter the heat exchanger.

17. WATER STRAINER OF PRESSURE REDUCING VALVE (ONCE A YEAR)

When the waste particles accumulate in the water strainer, water may not run properly from the faucet. Remove the water strainer of the pressure reducing valve for cleaning.

- a. Drain the water inside of the heat exchanger by the draining method specified under "PREVENTING FREEZE UP".
- b. Remove the cover of pressure reducing valve on the left side of the unit.
- c. Remove the hexagonal nut of the drain valve part by turning to the left and pull out the water strainer from the inside.
- d. Wash the water strainer with a soft brush.
- e. Make sure there are no leaks after reinstalling the water strainer.



## SECTION F: TROUBLESHOOTING

**WARNING:** RISK OF INJURY FROM MOVING PARTS AND ELECTRIC SHOCK.

Disconnect the power supply cord before servicing unit. All repairs should be left to professionals.

Do not re-use the unit until the cause of the problems have been determined.

**CAUTION:** RISK OF BURN INJURY. Do not touch the unit and the heat exchanger while in hot.

If there is any abnormality, determine for the causes from the list below and perform the specified measure. Consult your dealer if problems cannot be corrected from this chart.

PROBLEM	CAUSE	SOLUTION
POWER LAMP FAILS TO TURN ON	Disconnected power supply cord Bi-metal switch activated	Connect power supply cord. Consult your dealer
WARNING LAMP LIGHTS AFTER TURNING ON.	Thermistor malfunction Out of water in heat exchanger Flame sensor malfunction Light is received on the receiving surface of photoelectric cell	Consult your dealer. Supply water. Consult your dealer. Consult your dealer.
BLOWER MOTOR OPERATES BUT IGNITION FAILS.	Abnormal location and adjustment of electrode Igniter malfunction. Abnormal lowering of electrical voltage Out of fuel  Air pocket in fuel pipe. Clogged fuel strainer Circuit board malfunction	Consult your dealer.  Consult your dealer. Contact electricians.  Check fuel gauge on fuel tank; refuel. Remove air pocket. Clean strainer. Consult your dealer
EXTINGUISHED AFTER IGNITION	Stained beam receiving surface of flame sensor Flame sensor malfunction Air pocket in fuel pipe	Consult your dealer. Replace it. Remove air pocket completely.
NOISE FROM FUEL PUMP	Air lock in fuel line Clogged intake line and pump	Remove air. Consult your dealer.
NOISY COMBUSTION	Fuel flow too much Fuel flow too little Fuel nozzle malfunction Improper installation of exhaust pipe	Consult your dealer. Consult your dealer. Replace it. Re-install properly.
NOISE FROM		
HOT WATER TEMP TOO LOW	Thermistor malfunction Hot water supply beyond capacity	Consult your dealer. Close hot water faucet partially.
SOOT ACCUMULATION	Dusty blower motor fan Improper installation of flue pipe Fuel flow too much Fuel nozzle malfunction	Consult your dealer. Re-install properly. Consult your dealer. Replace it.
FUEL LEAKAGE FROM FUEL PIPE	Loose connection of fuel pipes	Consult your dealer.
WATER LEAKAGE	Water leakage from heat exchanger (Heat exchanger malfunction) Gasket malfunction	Consult your dealer.  Replace it.

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Printed in Japan





## Kerosene-Fired Water Heater

# Installation Manual

### MODEL BS-35(F)

#### **IMPORTANT**

THIS APPLIANCE SHOULD BE INSTALLED BY A LICENSED, AUTHORIZED PERSON(S) DUE TO THE NECESSITY OF MAKING ELECTRICAL, WATER AND FUEL CONNECTIONS. RETAIN THIS MANUAL FOR FUTURE REFERENCE. CHECK LOCAL CODES AND ORDINANCES FOR PERMITTED USE.

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## **SECTION A: SAFETY TIPS FOR INSTALLATION**

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### **WARNING**

1. Never use any fuel other than water-clear kerosene. NEVER USE GASOLINE! Use of such fuels can result in an explosion and/or fire and cause injury.
2. Improper installation, adjustment, modification, service and maintenance by unauthorized person may cause **SERIOUS UNIT DAMAGE, BODILY INJURY, HAZARD OR PROPERTY DAMAGE**. This unit should be installed by a licensed, authorized person(s) due to the necessity of making electrical, water and fuel connections. Refer to the installation manual and the operation and maintenance instructions for assistance, or consult your dealer for further information.
3. **HAZARD OF ELECTRICAL SHOCK!** Before removing any access panels of water heater for service, make sure the electrical supply to the water heater is shut off. Failure to do this may result in **HAZARD, SERIOUS BODILY INJURY, OR PROPERTY DAMAGE**.
4. Check and comply with all state and local codes that may apply to water heater(s) before beginning the installation.
5. This unit is designed to be used no more than 1,300 m above sea level. The water heater may have a failure of combustion at a high altitude. **ASK** your local dealer about using at altitudes higher than 1,000 m ~ 1,300 m above sea level.
6. **RISK OF INDOOR AIR POLLUTION AND FIRE.** Be sure the exhaust pipe is properly installed and connected. Aluminum tape provided may be used for sealing exhaust pipe connections.

### **CAUTION**

1. Keep the area around the unit clean and free of flammable materials.
2. **RISK OF FIRE AND ELECTRIC SHOCK.** Do not apply any excessive force or pressure to the power supply cord. Make sure the plug is free of dust. Be sure plug fits receptacle securely.

## SECTION B: UNPACKING

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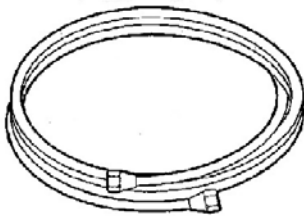
### UNPACKING

1. Unpack the unit carefully.
2. Check to see if there are any loose screws that may have occurred in transit.
3. Take accessories and the instruction manual out of the carton.

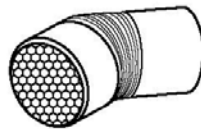
### STANDARD INSTALLATION PARTS

The following standard installation parts are enclosed with unit. For alternate installation methods, you may need to purchase additional accessories which are available from your dealer.

1. Exhaust Pipe Top (1 pc.)
2. Aluminum Tape (1 pc.)
3. Metal Fuel Pipe (Copper Pipe) (1 pc.)
4. Fuel Pipe Joint (1 pc.)
5. Pressure Reducing Valve (1 pc.)
6. Pressure Relief Valve (1 pc.)
7. Remote Control (1 pc.)
8. Extension cord for Remote Control (8 m)
9. Silensor (1 pc.)
10. Exhaust Pipe Elbow (1 pc.)



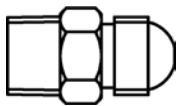
**Metal Fuel Pipe (1 pc.)  
(Copper Pipe)**



**Exhaust Pipe Top (1 pc.)**



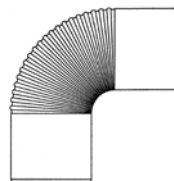
**Aluminum Tape (1 pc.)**



**Fuel Pipe Joint**



**Silensor**

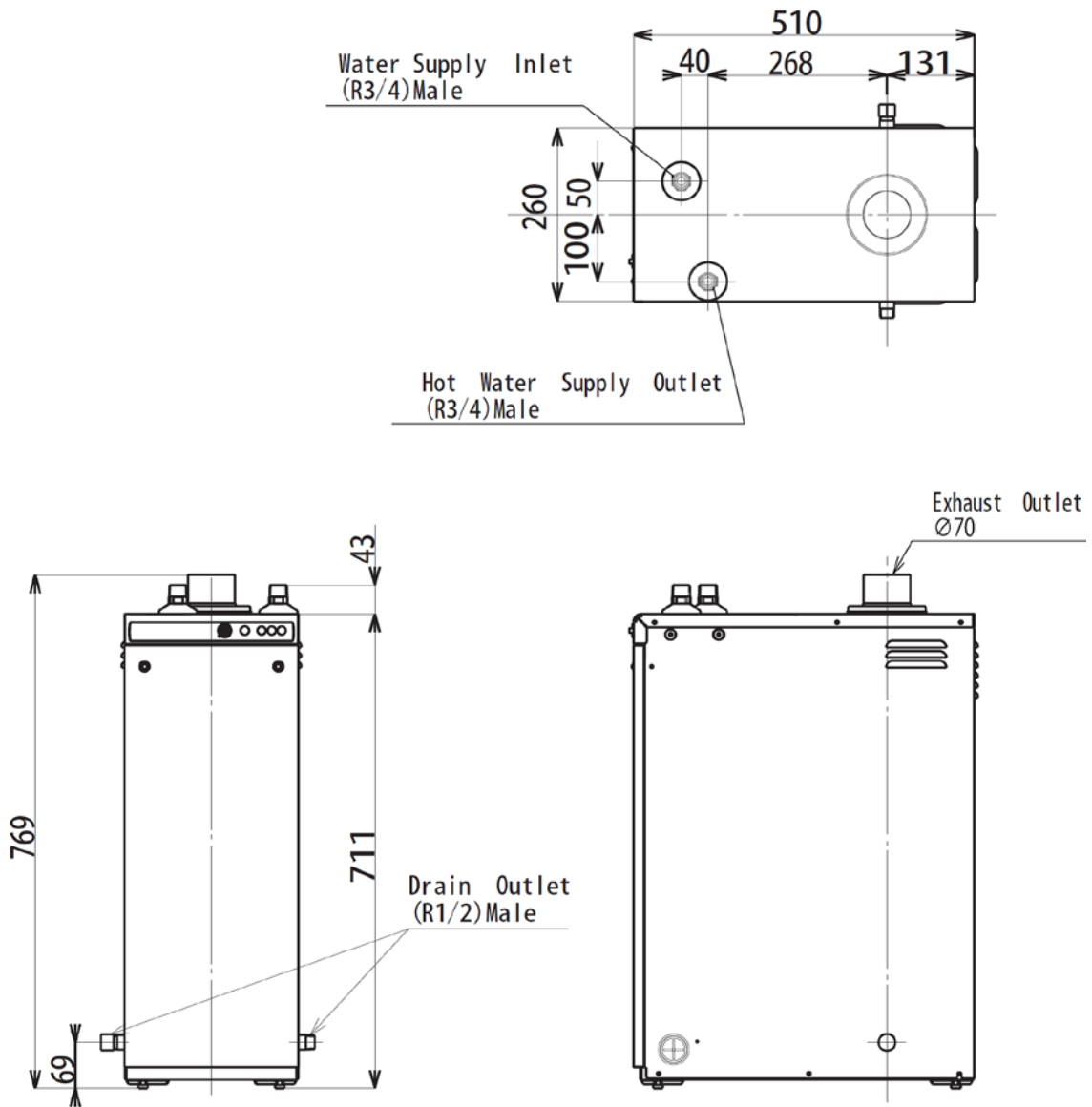


**Exhaust Pipe Elbow**



**Remote Control**

# DIMENSIONAL OUTLINE



## SECTION C: INSTALLATION

---

**WARNING:** This unit must be installed in accordance with these instructions, local codes, ordinance and/or in the absence of local codes, the latest edition of the national fire protection association code.

**WARNING:** Check and comply with all state and local codes that may apply to water heater(s) before beginning the installation.  
This unit should be installed by a licensed, authorized person(s) due to the necessity of making electrical, water and fuel connections.

### SELECTING A LOCATION

Select a place to install the water heater where water pipes, electric supply, and surrounding surfaces will be at safe and noise prevention distances.

1. Select a place which is free of moisture, water spills, pools or snow.
2. Select a place which draining can be done easily.
3. Select a place which the fuel tank can be installed safely.
4. Select a place which is free of combustible substances.
5. The surrounding walls should be finished with noncombustible materials (concrete block, mortar, on plaster are allowable).
6. The floor on which the water heater is installed must prevent intensive vibrations or shock and resist must be strong enough to bear the weight of the water heater.
7. Select a place where proper maintenance and control can be provided for the unit after installation.
8. Select a place sheltered from weather.
9. Install the unit on a noncombustible surface in a stable position. If installation on combustible floor, the unit should be raised off floor to prevent contact with combustible materials.
10. It is important to keep enough clearance for the purpose of maintenance, repair and possible servicing.
11. The exhaust pipe is free of snow, icing, leaves, bird's nest or strong drafts.
12. Before making a hole in your wall for the exhaust pipe, make sure the area is free of electrical wires, gas pipes and other obstacles.
13. Select a place that can draw in sufficient air for combustion. The air intake hole should be placed in a spot can draw in outside air near the floor.

Effective hole area	450 cm <sup>2</sup> x 2 locations
---------------------	-----------------------------------

Type of ventilation hole	Aperture factor	Existing ventilation hole area
Metal ventilation hole	50%	900 cm <sup>2</sup>
Wooden ventilation hole	40%	1125 cm <sup>2</sup>

14. Select a place which maintain sufficient clearance to prevent fire. The clearance between the water heater and combustible objects should be maintained as illustrated in the figure.

## FUEL TANK INSTALLATION

The fuel tank must be purchased separately and installed by a qualified fuel supply technician.

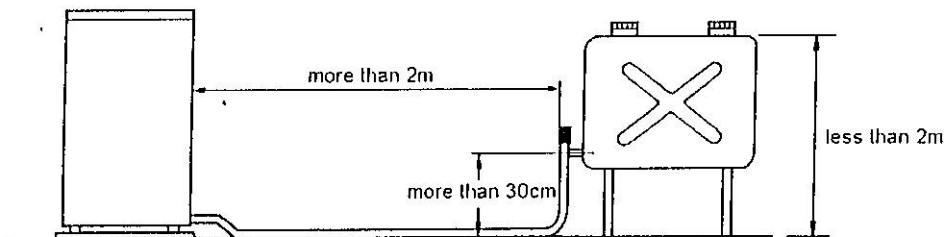
NOTE: Fuel tank installation must comply with locally applicable codes. Check with local building officials.

NOTE: Keep the fuel tank away from direct sunlight, high temperature, dust, rain and fire, and take preventive measures against falling during an earthquake.

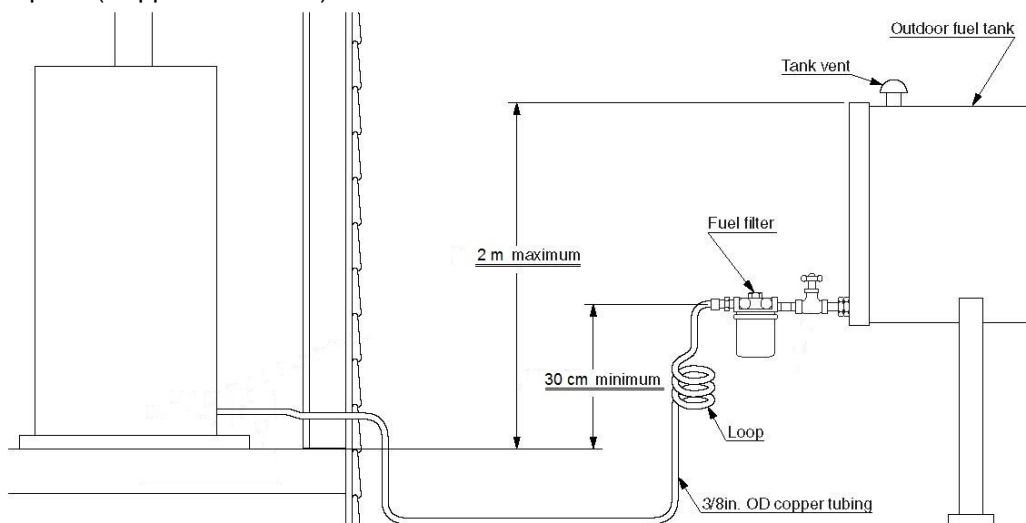
NOTE: The fuel tank should be installed on non-flammable objects, and kept level to prevent the unit from falling or shaking.

NOTE: The fuel tank should be installed on a base finished with non-flammable objects (concrete, mortar or block). The legs of fuel tank should be secured with anchor bolts (4 locations) to prevent falling or shaking.

Example 1 (Rubber Fuel Hose):



Example 2 (Copper Fuel Tube):



## FUEL PIPE INSTALLATION

Insert the rubber fuel hose to the fuel valve connected with the fuel tank, and tighten by the hose band.

NOTE: Do not apply heavy pressure on the fuel hose. To prevent an air lock in the fuel line, the fuel line should not be deformed.

NOTE: Only regular pipe should be used as a fuel pipe.

NOTE: To install a rubber fuel hose, if the bending radius is too small, cracks will occur in a short time because of stress on the inside of the rubber, and an oil leakage may occur. Be sure to maintain a bending radius more than 100 mm, and avoid torsion.

NOTE: Select a place protected from direct sunlight. When the rubber fuel hose is exposed to UV rays, degradation will be accelerated.

NOTE: For outdoor installation, be sure to use a metal pipe (copper pipe with an external diameter of 3/8 in.) as a fuel pipe.

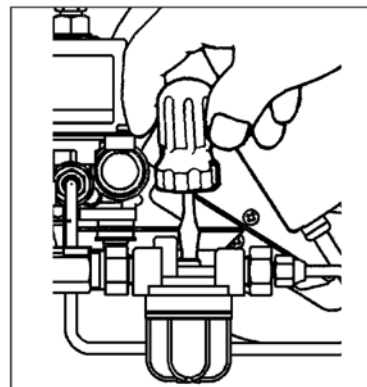
**CAUTION:** If metal fuel pipe is laid-out, be sure to clear away scraps or chips from the pipe which are produced during cutting or assembling. Leaving these scraps in the pipe may cause problem in the fuel pump.

## REMOVING AIR TRAP

When operating for the first time or when refueling an empty tank, air may be trapped in the fuel line, making ignition difficult. In this situation, follow the procedure below:

1. Press "POWER SWITCH" to "OFF" position. Disconnect the power supply cord.
2. To catch the fuel which will drain out, put a small container under the strainer.
3. Loosen the screw on top of the strainer. Immediately wipe off any spilled fuel.
4. Remove the trapped air thoroughly. Failure to remove all the air will cause improper ignition and may extinguish the unit.
5. Tighten the screw after removing trapped air.
6. Plug into the receptacle. Press "POWER SWITCH" to "ON" position.

Note: In the event of an ignition failure, press "POWER SWITCH" to "OFF" position and after 10 seconds press "POWER SWITCH" to "ON" position once again.



## PLUMBING

**WARNING:** Plumbing should conform to proper plumbing methods, and in conformance with the local codes or regulations. A licensed plumber familiar with local codes and ordinances should install the water heater.

**CAUTION: INSTALLATION OF PRESSURE RELIEF VALVE AND PRESSURE REDUCING VALVE IS REQUIRED.**

At the time of installation, a pressure relief valve shall be installed in the threaded opening provided on the water heater and also pressure reducing valve shall be installed. Local codes should govern the installation of the relief devices.

Specifications required of these valves are as follows:

Pressure relief valve

Inlet (male): 3/4 in.

Pressure relief setting: 0.19 Mpa

Pressure reducing valve

Inlet (female): 3/4 in.

Pressure setting: 0.17 MPa

Pressure relief valve:

- (a) No other valve is placed between the relief valve and the water heater.
- (b) Discharge from the relief device is routed to a suitable place for disposal when relief occurs.
- (c) No reducing coupling or other restrictions are installed in discharge line.
- (d) Discharge line is installed to allow complete drainage for the device and line.

NOTE: Manual operation of pressure relief valves should be done at least once a year.

Pressure reducing valve:

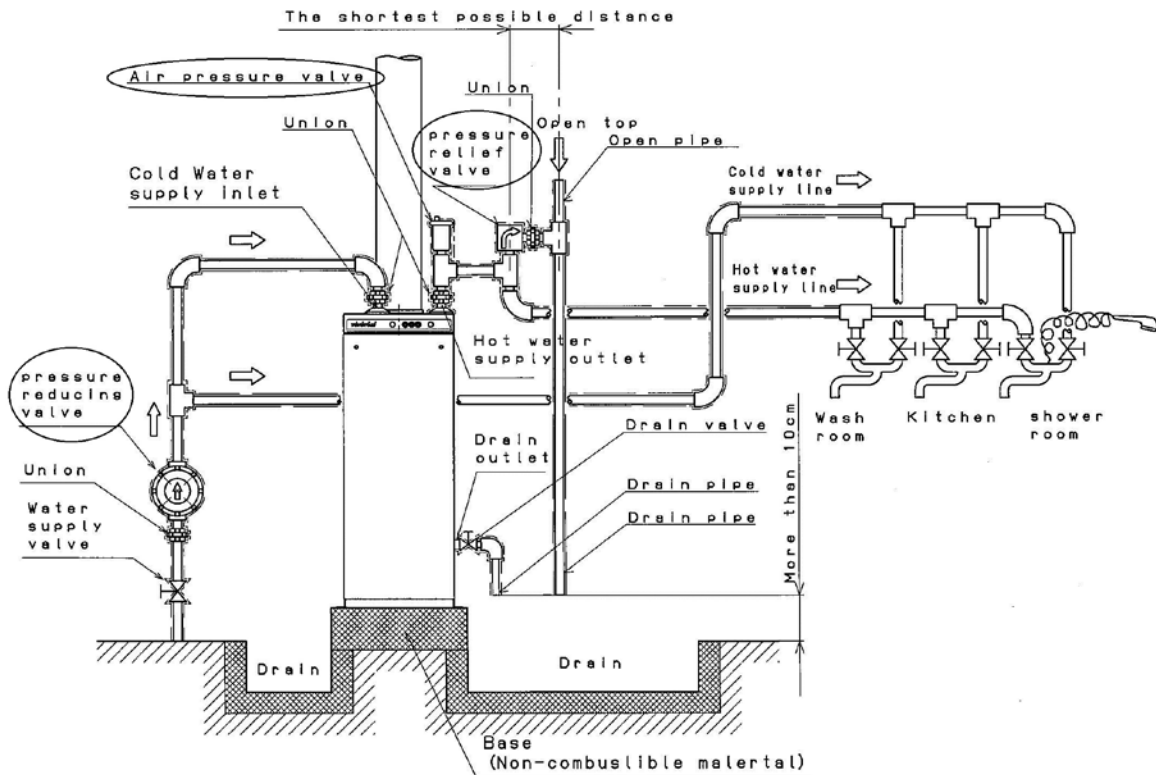
- (a) Make sure that pressure reducing valve is installed in the correct direction.
- (b) Use the packaging material (styrofoam) in order to prevent from the freezing.
- (c) Pressure reducing valve shall be installed palewise.

**CAUTION:** In order to prevent the water heater from being broken or caused with a leak, regardless of being used in a cold region or in a warm or hot region, the cold water supply piping, hot water supply piping, drain pipe, pressure relief valve and pressure reducing valve are to be protected with sufficient insulation materials (by wrapping with heat insulation or by equipping an freeze prevention heater).

1. A water softener is recommended in regions where hard water may be a concern.
2. Do not apply any heat to the unit nipples.
3. Use standard copper alloy unions and nipples for the connections to the unit.
4. Copper piping is recommended for the hot water supply line.  
Note: Refer to local codes when considering piping materials. Steel piping is not recommended as it may cause rust in the piping. Use NPT for piping of hot and cold water.
5. Connecting plumbing to the unit, hold unit fittings securely with a wrench to prevent damage to the unit.
6. Installation of a water strainer and the air release valve is recommended.
7. Connection between the water heater and places where hot water is used should be as short and direct as possible, and a uniform pipe size of sufficient diameter to carry the full capacity of hot water should be used.
8. Be sure to connect the water inlet and the hot water outlet as shown on the water heater. Reversing the two connections will damage the unit.
9. When hot water flows through the supply line there is an inevitable heat loss, regardless of type of water heater. Thus, insulation or protection of hot water piping is encouraged.
10. Flush the piping before connecting to the unit.

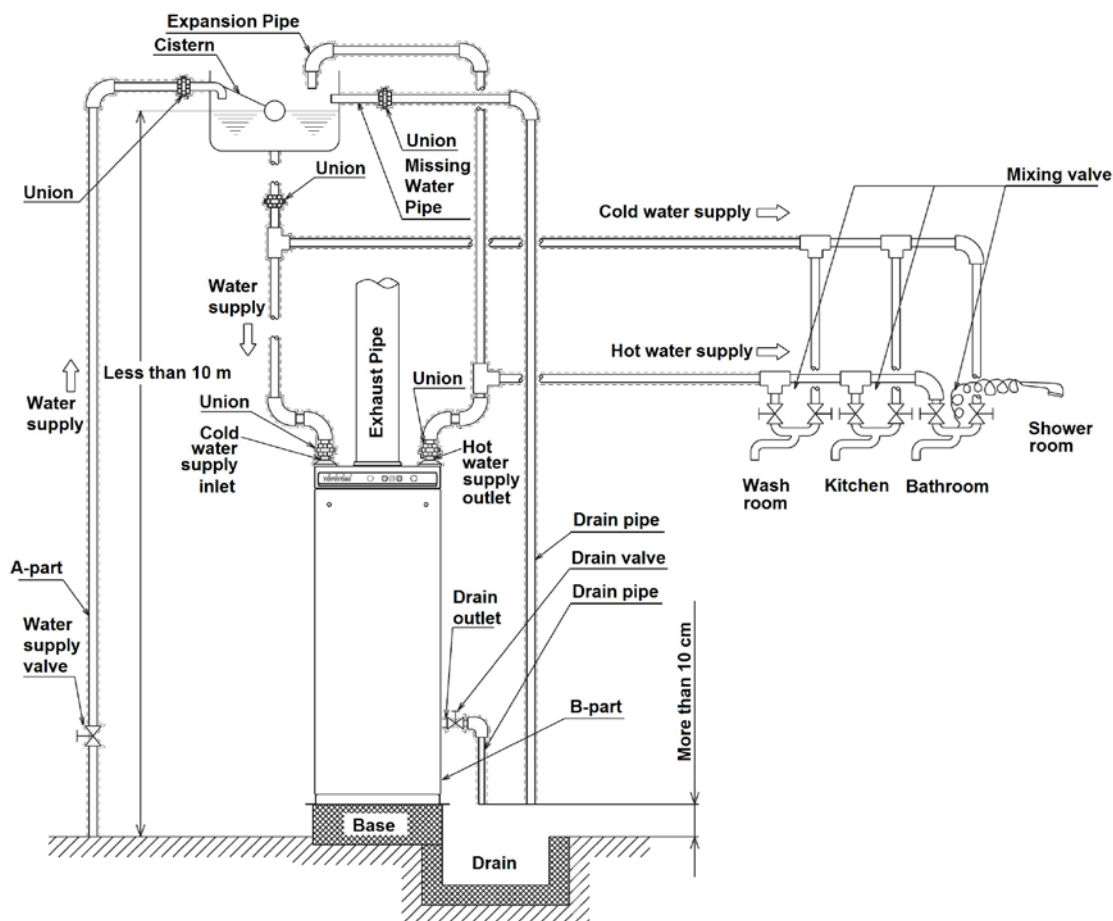
**Plumbing Example**

<Pressure Reducing Valve>





## <Cistern Tank>



**CAUTION:** Do not allow pipes or valve to freeze. See the instruction manual, “PREVENTING FREEZE UP” of the page 11. Do not use the unit as an auxiliary heat source for the solar hot water heater, nor hydronic heating.

## ELECTRICAL WIRING

**WARNING:** RISK OF FIRE AND ELECTRIC SHOCK. Make sure the power supply cord is disconnected to avoid any electric shock before servicing. Electric shock may cause serious injury. It is recommended that installation should be conducted by a licensed electrician.

**NOTE:** If the power receptacle is not installed at the proper position, then contact the appropriate electrical company.

1. Power source: 220V AC, 50Hz single phase
2. Use or install a power receptacle that is rated for this power supply.
3. A receptacle equipped with a grounded breaker should be used to supply the power. If a grounded breaker is not equipped, then contact the appropriate electrical company.
4. For a receptacle that is not the rainproof type, install it within the shaded area in the figure, or prepare a device to keep out the rain.
5. The length of the power cord is 2 m. The power cord should be free from damage, bundling, and sharp bends and not placed under a heavy object. If the power cord is installed outdoors, then select a place sheltered from rain water, and pass it through a conduit.

## INSTALLATION OF EXHAUST PIPE AND EXHAUST PIPE TOP

**WARNING:** Make sure that exhaust pipe and exhaust pipe top are properly connected. If it is disconnected, exhaust gas leak indoor during operation which may cause danger.

### INSTALLATION OF EXHAUST PIPE AND EXHAUST PIPE TOP

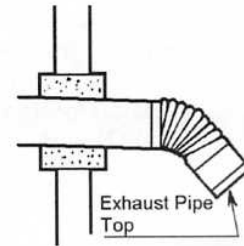
#### 1. Diameter of Exhaust Pipe

The diameter (internal) of the Exhaust Pipe for the Water Heater is 106 mm.

NOTE: The exhaust pipe is optional.

#### 2. Position of Exhaust Pipe and Exhaust Pipe Top

Install so that the end of the Exhaust Pipe and Exhaust Pipe Top will conform to the setting standard as shown in item 10.



#### 3. Exhaust Pipe Top

Be sure to install the attached Exhaust Pipe Top to the end of Exhaust Pipe.

#### 4. Limit of Exhaust Pipe extension

The length of the Exhaust Pipe should not be more than 3 m with less than 3 bends.

NOTE: The length of the Exhaust Pipe must comply with fire prevention measures, and be short as possible.

NOTE: The Exhaust Pipe should be laid down transversely at a downward slope (1/50) to the Exhaust Pipe Top.

#### 5. Clearance from combustible objects

Install the Exhaust Pipe and Exhaust Pipe Top in accordance with the installation standard shown in item 10.

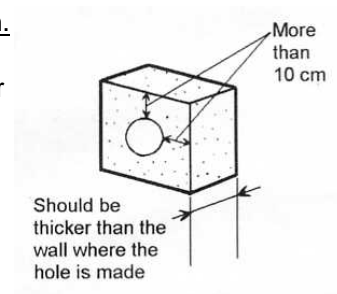
#### 6. Hole section in roof

1. Use a non-flammable and insulated material for the section.

2. Use non-flammable insulation around the part placed under the roof by using non-flammable materials except for metallic materials.

3. Do not connect the pipes around the section of flammable wall or ceiling where the Exhaust Pipe passes through.

4. Before making a hole in your wall or ceiling, make sure the area is free of electrical wires, gas and water pipes.



#### 7. Fixing the Exhaust Pipe and Exhaust Pipe Top

Fix the Exhaust Pipe by using a pipe bracket at intervals from 1.5 m to 2 m. Fix tightly the Exhaust Pipe Top by using a bracket and hung bracket so that it does not fall due to wind or vibration.

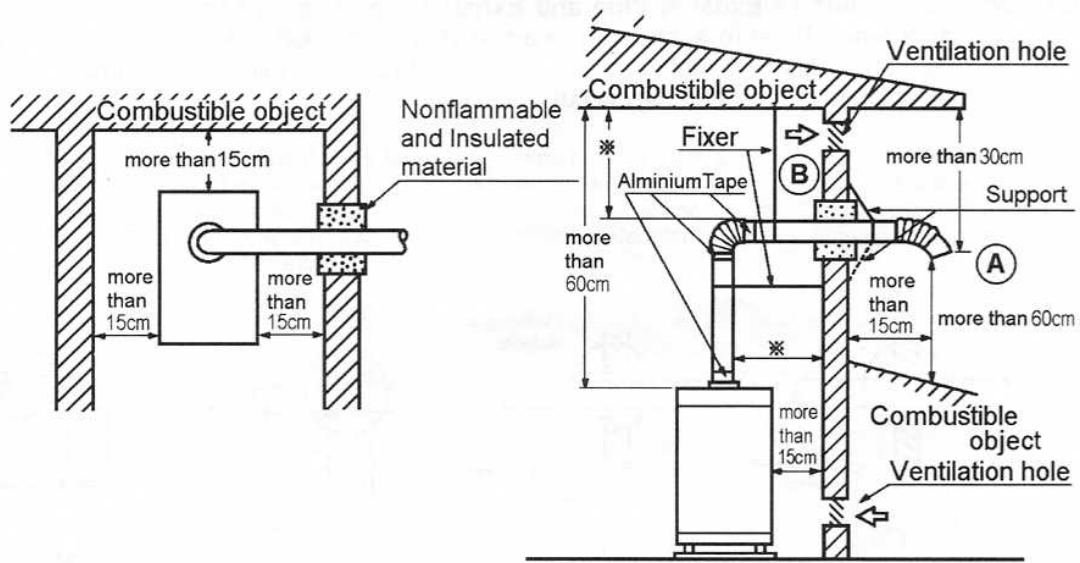
#### 8. Joint seal

Be sure to seal tightly the connection of the Exhaust Pipe and Exhaust Pipe Top by using the aluminum tape (local supply) to avoid exhaust gas leakage.

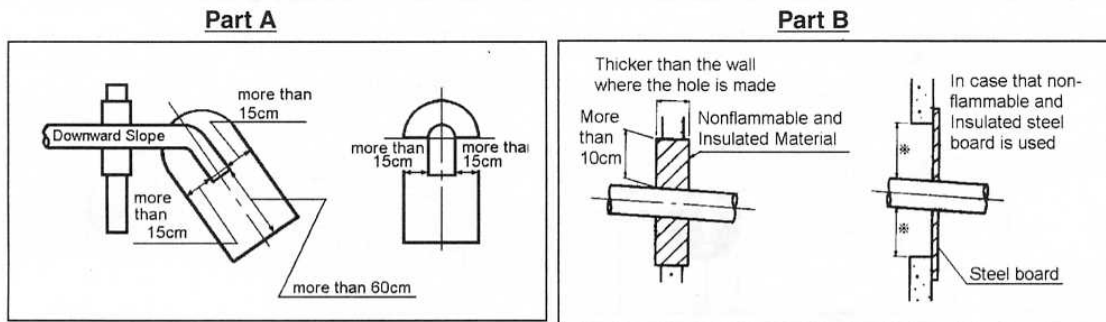
#### 9. Matters concerning the fire prevention code

Installation of the Exhaust Pipe and Exhaust Pipe Top must comply with the local code concerning fire prevention.

## 10. Securing diagram of Exhaust Pipe and Exhaust Pipe Top installation



NOTE: Put a semi-straight pipe or straight pipe in the Exhaust Pipe fitting hole at first, and lay transversely.



NOTE: Select a place which is clear of combustible objects within 15 cm around the Exhaust Pipe Top, and 60 cm in the exhaust direction. And any opening such as the window or ventilation hole which can blow exhaust gas back indoors is not allowed on the wall as shown above.

NOTE: Use corrosion and heat resistant steel.

## 11. Caution in areas of heavy snowfall

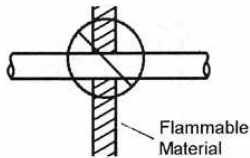
In a cold-district (heavy snowfall), select a place where the Exhaust Pipe Top is free from snow. In case the Exhaust Pipe Top is blocked or plugged, exhaust gas may leak indoors and cause a danger.

NOTE: Clearance between ground surface and Exhaust Pipe Top should be increased as far as possible to avoid blocking the Exhaust Pipe Top.

## CHECK FOR EXHAUST PIPE AND EXHAUST PIPE TOP

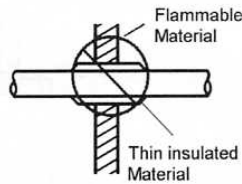
**WARNING:** Installation of Exhaust Pipe and Exhaust Top as shown below may cause an accident. Be sure to check once again after installation. Be sure to correct by following the installation presented below as an example in which a dangerous situation and incomplete combustion may occur.

1. Pass through a wall without non-flammable and insulated material.



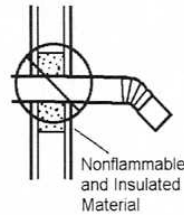
[Measure]  
Put in non-flammable and insulated material. thicker than the wall.

2. Pass through wall with thin non-flammable and insulated material.



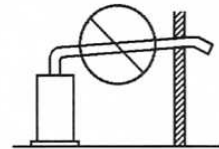
[Measure]  
Put in non-flammable and insulated Materials.

3. Even though non-flammable and insulated material is installed, Wall material surrounds the material



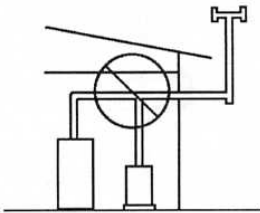
[Measure]  
Replace it with the non-flammable and insulated material.

4. Lay transversely with upward slope.



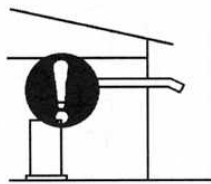
[Measure]  
Correct for downward slope.

5. Use an Exhaust Pipe with the heater And Bath Heater.



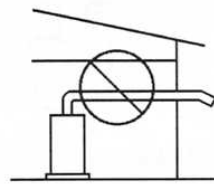
[Measure]  
Install exclusive Exhaust Pipe.

6. Bending, extension Exhaust Pipe



[Measure]  
Extension pipe should be 3 bends or less

7. Lay Exhaust Pipe transversely directly from fitting hole.



[Measure]  
More than one semi-straight or straight pipe.

8. Install Exhaust Pipe under the roof.



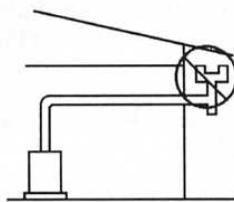
[Measure]  
Connect the pipe out on roof.

9. In close proximity to combustible object.



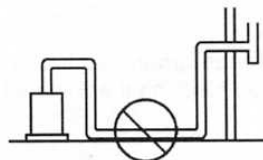
[Measure]  
Free from combustible objects

10. Top is stuck out. Top is under ledge of the floor.



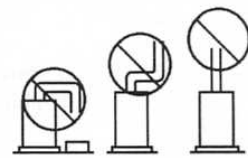
[Measure]  
Install top at 60 cm above ledge end.

11. Lay Exhaust Pipe on the floor or under.



[Measure]  
Modify correctly.

12. Use without Exhaust Pipe.



[Measure]  
Install correctly Exhaust Pipe to outdoors.

## **SECTION D: TEST RUN**

---

### **PREPARATION**

1. Make sure the exhaust pipe is installed properly.
2. Make sure the fuel tank is installed properly. Make sure there is no fuel leakage.
3. Make sure there is no water leaking from piping. (Plumbing)
4. Make sure electrical connections and grounding are wired properly.
5. Make sure the floor is stable and can withstand strong vibration and the weight of a full water heater.
6. Make sure the area is free of flammable materials.
7. Check for air trapped in fuel lines.

### **OPERATION**

1. Open the fuel tank valve.
2. Press the power switch on the control panel to turn on. "Operation" lamp goes on.
3. Open hot water faucet and unit will ignite in a few seconds.
4. Make sure that the unit works properly.

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