



## TURBO CONDENSING OIL BOILER

## INSTALLATION & USER MANUAL



### Types

TURBO CONDENSING - 13

TURBO CONDENSING - 17

TURBO CONDENSING - 21

# OIL CONDENSING BOILER INSTALLATION AND USER MANUAL

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## **Introduction**

Dear Customers;

Thank you very much for selecting out condensing oil boiler.

Designed and manufactured with advanced technology of Kiturami Boiler, top quality stainless steel parts, the product ensures a long life cycle. Specially designed Hi-Fin structure reduced burner load by about one half with higher thermal efficiency.

**Please read this manual carefully to operate the product at highest design performance to achieve optimal heating performance.**

Please keep children away from the product while it is in operation, and abide by the maintenance instructions described in this manual. Once again, we would like to express our thanks to you!

## **Modification of the document**

The content of this document is subject to change without written prior notice to improve the product. It is prohibited by the Intellectual Properties Law to copy or reproduce all or a part of this document without prior written consent.

## **Using this manual**

Please keep this manual at a safe and easily accessible place.

If this manual is lost, damaged or become illegible, request a new one to your local agency or dealer of the product.

In this manual, the important information which requires special caution is printed in bold type. The descriptions indicating cautious reference to other paragraph or additional information are printed in *Italic type*.

## Symbols used in this document



Failure to comply the instruction marked with this symbol can lead to serious personal injuries or even death, or damage to the product. Please read the message carefully and observe the instruction.



This symbol underlines the information important for proper operation of the boiler. Failure to comply the instruction can lead to malfunction or deteriorated performance.



Matters must be observed.

## Other special symbols



Caution for electric shock



Don't touch



No heat source



The system must be grounded (earthed).

## **Features**

### **Energy saving function**

The room temperature controller is built-in with the digital control functions including At Home, Reservation, Outing and Bathing for the operation modes optimized for the purpose. This function improves energy efficiency.



### **Self diagnosis function**

Problem or failure of function will be notified by flickering check lamp and the failure code (figure) displayed on the screen.



### **Ultra-high efficiency boiler**

Specially designed Hi-Fin structure reduced burner load by about one half, and condensing technology provides higher thermal efficiency.



### **Automatic control system**

All the basic functions including At Home, Reservation, Outing and Bathing modes, fault diagnosis, anti-freezing, and circulation pump seizure prevention are automatically controlled.



### **Condensate neutralizer**

The condensate generated during operation has to be neutralized before entering drainage. This product neutralizes condensate to pH 4~6.

### **High quality stainless steel material**

Major parts are made of high quality stainless steel to provide durability against seawater and oceanic climate.

## **1. Warranty terms and conditions**

### **1.1. General precautions**



- **Installation, electric wiring, commissioning and maintenance works must be carried out by qualified personnel.**
- **Boiler installation work must be carried out in compliance with the national or regional laws and regulations.**
- **This manual provides for the installation, setting, operation and maintenance of the product in addition to basic information.**
- **It is prohibited to operate this product by any person who comes under any one of the followings: children having limited physical, sensible or mental capacity, persons without knowledge about the product and not trained to operate the point of departure form a safety supervisor.**
- The instructions provided in this manual must be observed to use the product and installed electronic devices correctively and to prevent safety accident.
- Please read and understand this manual carefully before operating the product.
- The boiler must not be used for any other purpose than the intended purpose. Operating the boiler for an unintended purpose may lead to dangerous situation.
- Do not step on the boiler or use the boiler as a support.
- Do not hang out wash near the boiler or flue for drying. Wash hangers or similar devices must be kept away from the boiler by an appropriate distance. **Otherwise, fire may break out.**
- The user shall take all the responsibilities for appropriate use of the product. The manufacturer does not take any responsibilities neither civil nor penal.
- Unauthorized modification is prohibited. Failure of using genuine parts can lead to dangerous situation for the user. This company does not take any responsibilities neither civil nor penal.
- The boiler flue tubes are very hot. Do not touch the flue tubes before the boiler has been cooled down sufficiently or without wearing safe, insulating gloves.
- Do not touch the boiler with wet hands, since it is an electrical equipment. Disconnect power supply cable before doing any work with the boiler.
- Turn off main power switch or disconnect power cord before conducting a maintenance work.
- The boiler must be grounded with an effective conductor.

- The boiler must be supplied with electric power with appropriate voltage and capacity.
- Inappropriate installation or maintenance, not in compliance with the instruction of this manual can lead to personal injuries and/or loss of properties. In such case, this company does not take any responsibilities neither civil nor penal.
- **The appliance is not to be used by children or persons with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction.**
- **children being supervised not to play with the appliance.**
- **If the supply cord is damaged, it must be replaced by the manufacturer. its service agent or similarly qualified persons in order to avoid a hazard.**

## 1.2. Precautions for operation



- **The product must be operated in compliance with the applicable laws and regulations of the nation or region, in addition to the applicable EU standards.**
- Use only the fuel recommended by the boiler manufacturer. Check that the fuel feed valve is open before starting the boiler. If fuel is not supplied, the boiler will not start up and an alarm will be triggered.
- Check that the boiler is filled up with boiler water. If the boiler water level is lower than the sensor level, the check lamp will be lit and ignition will fail.
- Open at least one of the hot water distributor valves while operating the boiler. If all the valves of the distributor are closed during operation, the boiler can be damaged or catch fire due to overheating.
- Check if the flue tubes are not properly connected, or any joint is damaged by condensate or cracked. If the flue tubes are not properly connected and sealed, the exhaust gas could penetrate into the room and cause suffocation by carbon monoxide (CO).
- Store the boiler at a dry place, avoiding extremely low temperature.
- It is not recommended to install the boiler contacting the floor or ground. The floor made with a combustible material must be insulated properly.
- Do not store portable gas container, thinner, oil, or other inflammable materials in the boiler room. **Otherwise, fire may break out.** (Inflammable materials: methane, acetylene, propane, hydrogen sulfide, water gas, coal gas, gasoline, acetone, toluene, and other combustible liquids whose flash point is below 30°C).
- Check that the power supply complies with the rated voltage (AC 230V 50Hz) in the name plate. Check that the hot water circulation water has sufficient capacity.



### **1.3. Precautions for boiler operation**



- Shut down the boiler in case of failure or malfunction.
- Lightning can damage the boiler. Pull out power cord plug if lightning strikes, for safety.
- Do not wash the inside of the boiler with water. Water in boiler can cause short-circuit resulting in electric shock.
- Do not install other device such as heater wire or heater rod in the boiler pipeline to prevent freezing. **Such additional device can cause injury to the user or damage to properties.**
- If you leave home for a long time in winter, the boiler may be damaged by freezing. So, keep the boiler power ON. The pipes exposed to cold weather may freeze, damaging the boiler. Exposed pipes must be insulated in cold regions/climate.
- Do not clean the boiler and room temperature controller with wet cloth. Otherwise, electric shock may occur, or internal parts may be deteriorated or failed due to the infiltration of moisture.
- Do not contact the flue tube or pipeline during operation because they are very hot. **Failure to comply with this can lead to burn of the user.**
- Be cautious when opening the hot water tap, as the water is very hot. Especially, children or the old whose skin is liable to burn must not use the hot water without help of a guardian.
- Do not disassemble/assemble the boiler. Otherwise, the boiler may get out of order, or electric shock, fire, or gas accident may occur. Furthermore, thermal efficiency may be deteriorated and fuel consumption may be increased due to incomplete combustion. Please contact a service center if repair is necessary.
- For safe and trouble-free operation of the boiler, ask your nearest A/S center for regular inspection at least once a year.

## **1.4. Warranty terms and conditions**

KITURAMI guarantees the boiler, excluding the components which are subject to normal, for a period of 1 years from the date of purchase, as proved by a supporting document which gives the name of the vendor and the date on which the sale took place. The warranty is based on the filled-in Warranty Card and applicable to the product returned within 8day form the date of selling, on the condition that the product is installed and tested by a skilled expert in accordance with the detailed description in the manual supplied wit the product. The term "Warranty" means replacement or repair provided free of charge for the part(s) recognized to be defective at the earlier stage of use and the defect was caused in the course of manufacturing.

### **1.4.1. Limitation**

The warranty term, as stated earlier, is not applicable to the electric and electronic parts and components after one 1 year from the date of purchase. The warranty terms and conditions are not applicable to the consumable parts, such as gaskets and glass, and the removable parts in combustion chamber. Replaceable parts are guaranteed for the remaining period beginning from the date of purchase.

### **1.4.2. Exemption**

Discoloration or crack in the coating of the painted parts or ceramic parts are inherent characteristics of the materials, therefore, such minor defects do not form the basis for claim. This company does not take any responsibilities for the problems caused by negligence, mistake, inappropriate maintenance, and installation works not in compliance with the instructions specified by this company. Please refer to the pertinent descriptions in this manual. This company does not take any responsibilities for any direct or indirect loss, damage or injuries to people, animal, or properties of the user caused by failure to comply with the instructions, especially, cautions for installation, operation and maintenance provided in this manual. If the performance of the product does not meet your expectation, please contact your local dealer or importer: The losses or damages caused by careless handling or in the course of transportation are excluded from the scope of warranty. Please refer to and observe the instructions related to the installation and p[n of the product. Any losses caused by product modification, force majeure, electric spark, fire, or defective electric devices, or by insufficient or incorrect instruction provided by the manufacturer on the product maintenance are excluded from the scope of warranty.

## **Claims**

**Any claim raised in compliance with the warranty terms and conditions must be transmitted to the technical service team via your dealer. This company does not take any responsibilities for any damage or loss caused by incorrect use of the product or accessories or by unauthorized modification. Use only genuine spare parts.**

## 2. Product Structure

### 2.1. Appearance and components

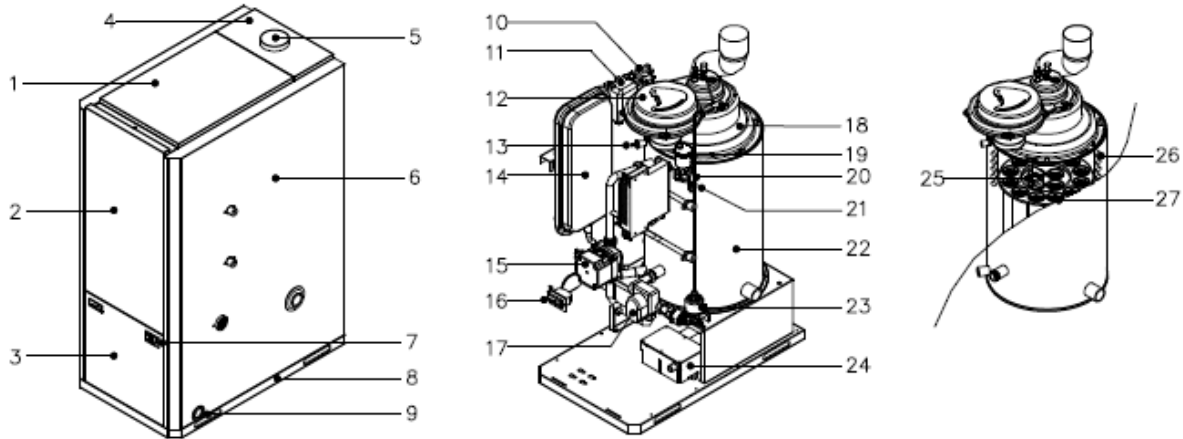


Fig. 2.1 Front view of the boiler

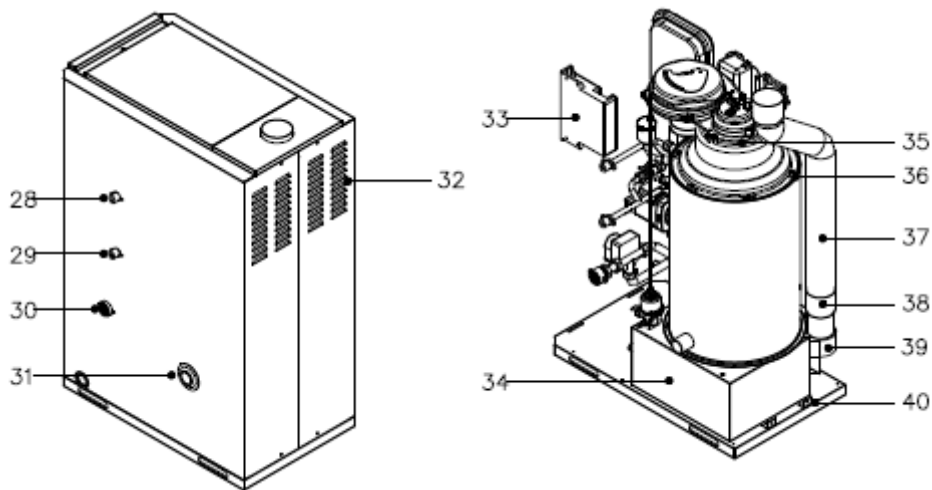


Fig. 2.2 Rear view of the boiler

1	A/S cover	12	Oil burner	22	Heat exchanger	33	Control unit
2	Front casing (upper)	13	Low water level	23	Oil pump	34	Heat exchanger
3	Front casing (lower)		Sensor	24	Neutralizer		support
4	Upper cover	14	Expansion tank	25	Baffle plate	35	Burner gasket
5	Exhaust flue connector	15	Circulating pump	26	Hot water coil	36	Hood packing
6	Side/rear casing	16	Pressure gauge	27	HI-Fin flue pipe	37	Exhaust tube
7	Power switch	17	3Way valve	28	Hot water outlet	38	Flue O-ring
8	Bottom casing	18	Upper hood	29	Hot water inlet	39	Condensate drainage
9	Condensate drain hole	19	Air vent	30	Heating outlet	40	Casing bracket
10	Air pressure switch	20	Thermostat	31	Heating return		
11	Ignition transformer	21	Water temp. sensor	32	Air frill		

## 2.2. Burner construction

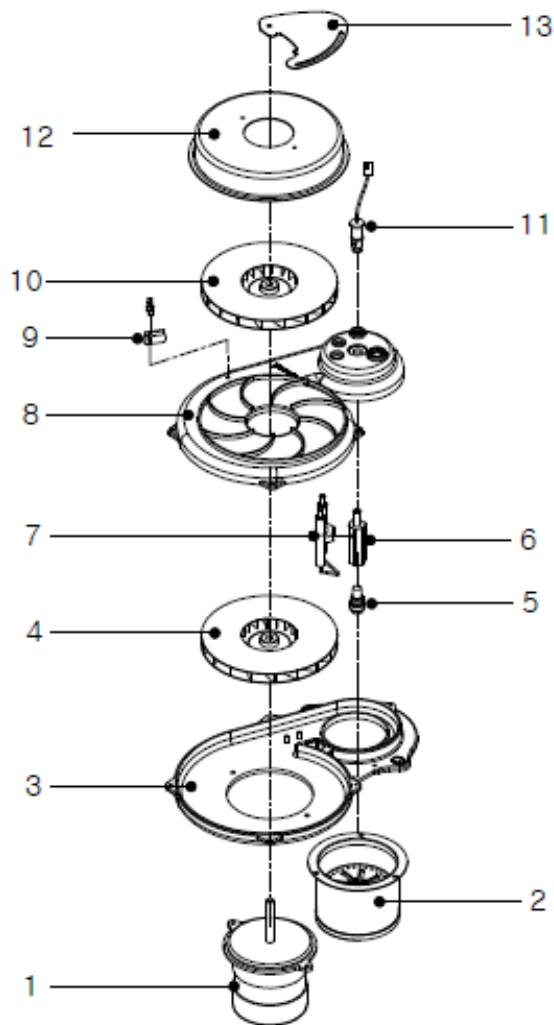


Fig. 2.3 Exploded view of burner

1	Burner motor	8	Burner upper casing
2	Burner tube	9	Venturi pipe
3	Burner lower casing	10	Primary fan
4	Secondary fan	11	Flame detector
5	Oil nozzle	12	Fan casing
6	Nozzle adapter	13	Air damper
7	Ignition rod		

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## 2.3. Other components

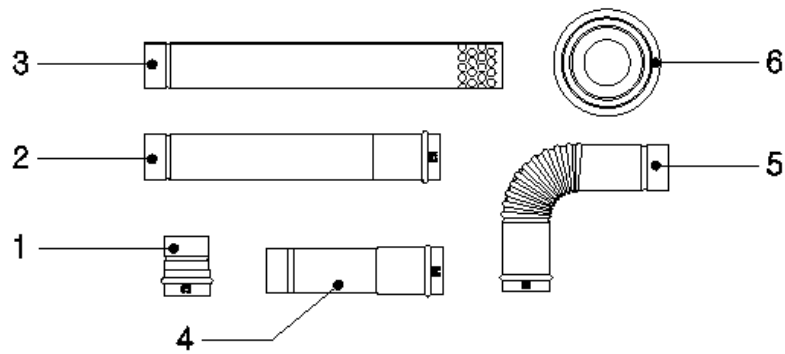


Fig. 2.4. Flue set components

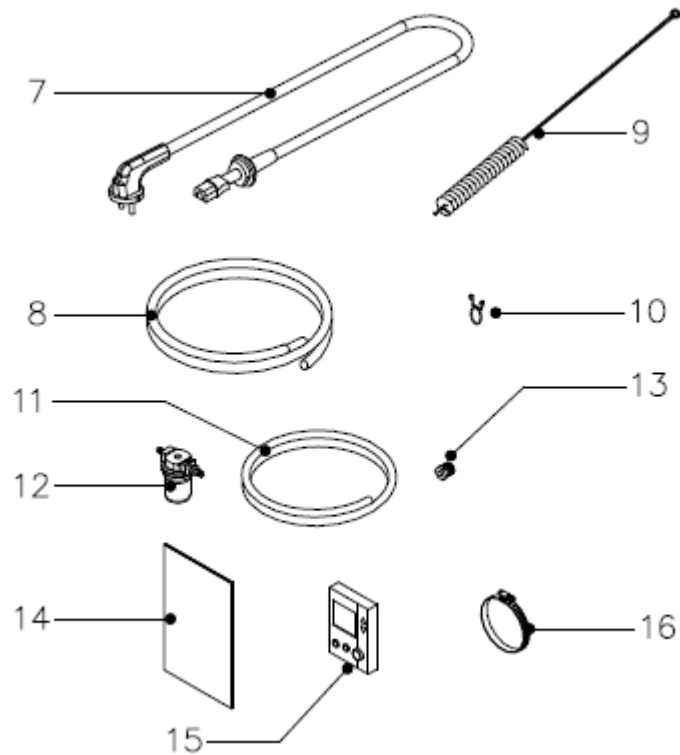


Fig. 2.5. Accessories

1	Flue adapter	7	Power cord	13	Oil hose bushing
2	Extending tube 500 mm	8	Condensate drain hose	14	User's Manual
3	Exhaust flue	9	Cleaning brush	15	Room temperature controller
4	Extending tube 300 mm	10	Condensate hose clip	16	Flue tube band
5	Elbow	11	Oil hose		
6	Finish material	12	Oil filter		

## 3. Product Installation

### 3.1. Location



- It is recommended to install the product in a boiler room to prevent exhaust gas from penetrating into the house.



- Secure sufficient space around the product to enable service and maintenance work.



- Secure at least 60cm and 40cm of clearance from the wall and ceiling, respectively.
- If the boiler cannot but be installed outdoor, provide a shelter and heat insulation for freeze protection.
- Avoid outdoor installation which may cause freezing and/or bad combustion due to wind or rainfall.
- Avoid the cold/hot air outlet of cooler/heater
- Air intake and exhaust tube (flue) must be provided for uninterrupted air feed and exhaust.
- The floor under the boiler must be built with incombustible materials.

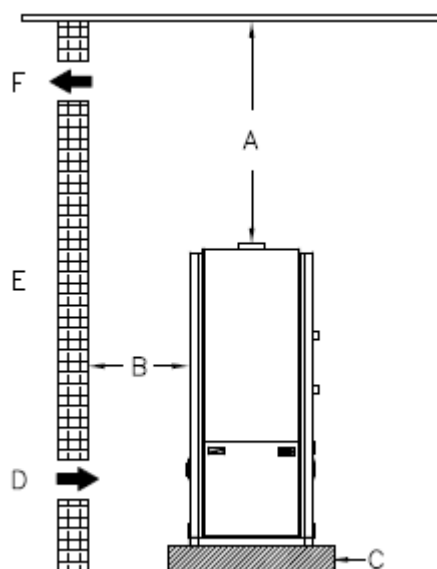


Fig. 3.1. Schematic view of boiler location

<b>A</b> Min. 60 cm from the ceiling	<b>D</b> Boiler room air inlet
<b>B</b> Min. 40 cm from the wall	<b>E</b> Boiler room wall
<b>C</b> Min. 5 cm of support (incombustible material)	<b>F</b> Boiler room vent

### 3.2. General cautions for piping



- Connect the pipes with unions or flanges for easy replacement or maintenance, or line modification in the future.
- Apply thermal insulation to feed water line, hot water line, heating water line, distributor, and check valve.
- Piping materials must satisfy applicable standard.
- Before connecting the heating and hot water line to the boiler, flush the lines to remove foreign matters in the lines (thorough cleaning).



- Do not use underground water as the heating water. If using underground water in the heating system is unavoidable, clean up the pipeline thoroughly.
- Arrange the exposed pipeline in good order and apply thermal insulation. Vertical lines must be fixed to prevent displacement.
- The foreign matters in the pipeline reduce system efficiency and cause failures.
- Air inside pipeline must be thoroughly removed.
- If the boiler feed water line is connected directly to city water line, install a filter, pressure regulator valve, check valve, safety valve, and closed type expansion tank in the incoming line.
- The safety valve and closed expansion tank must have sufficient capacities.
- The hot water line pipes must be coated product or stainless steel products.
- The capacity of the circulation pump must be sufficient for the hot water return line, and provided with a drain valve.
- Install a water feed (cut off) valve in the feed water line.
- If the feed water pressure is too high, install a pressure reducing valve.
- The feed line pipe and return line pipe must be of the same size.
- Install a drain valve at the lowest point of pipeline. Arrange the line so that all the heating line can be thoroughly drained when necessary.
- Generally, the atmosphere open (downward) model boilers are installed on the same floor with the heating line.
- If the heating line is on a higher floor than that of the boiler, the boiler must be an atmosphere isolated (bottom-top) type.



Make sure to conduct leakage test.

Flush and vent air from the heating pipeline. Replace the pipeline when aged and deteriorated.

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## 3.3. Product dimensions and pipeline size

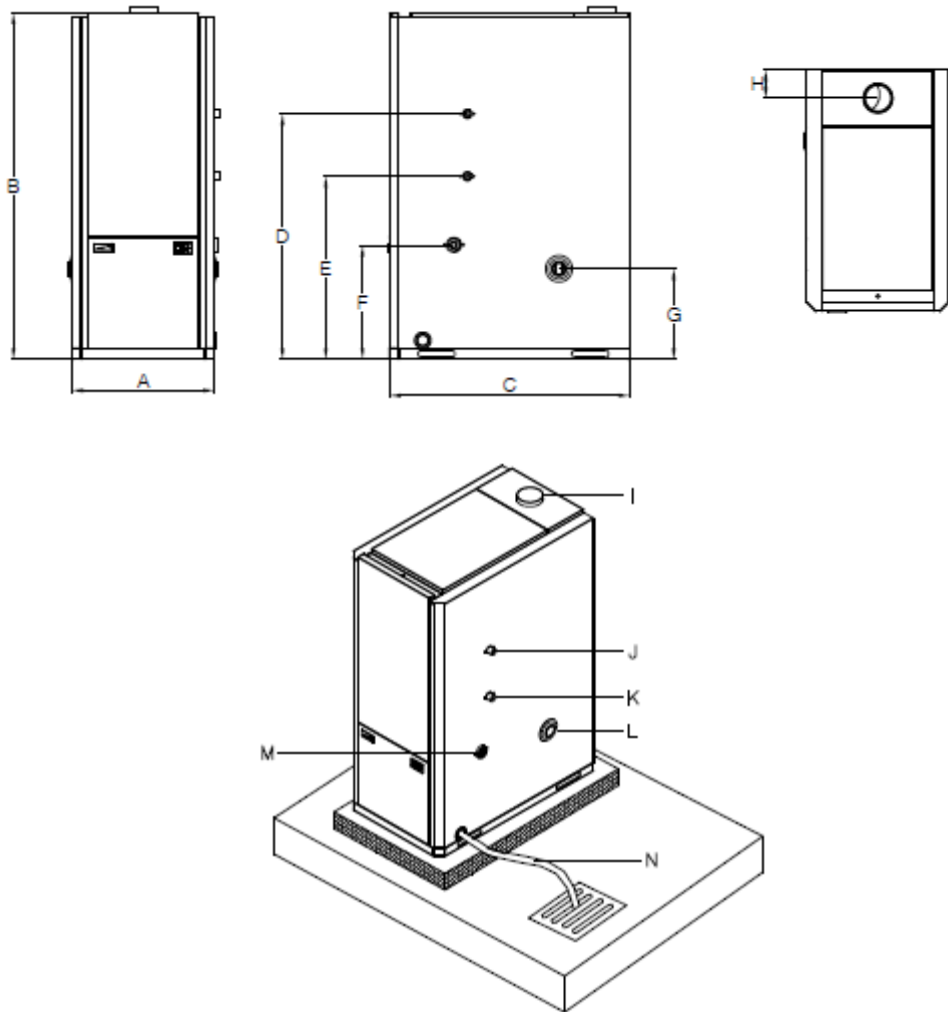


Fig. 3.2. Boiler dimensions

(Unit: mm)

Item	Size	Item	Size
A	385 ± 5	H	77 ± 5
B	933 ± 5	I	Flue dia. DN 77
C	650 ± 5	J	Hot water outlet G 1/2"
D	661 ± 5	K	Hot water inlet G 1/2"
E	493 ± 5	L	Heating return/drain G1"
F	308 ± 5	M	Heating water outlet G1"
G	244 ± 5	N	Condensate drain hose DN 16.5



### 3.4. Piping

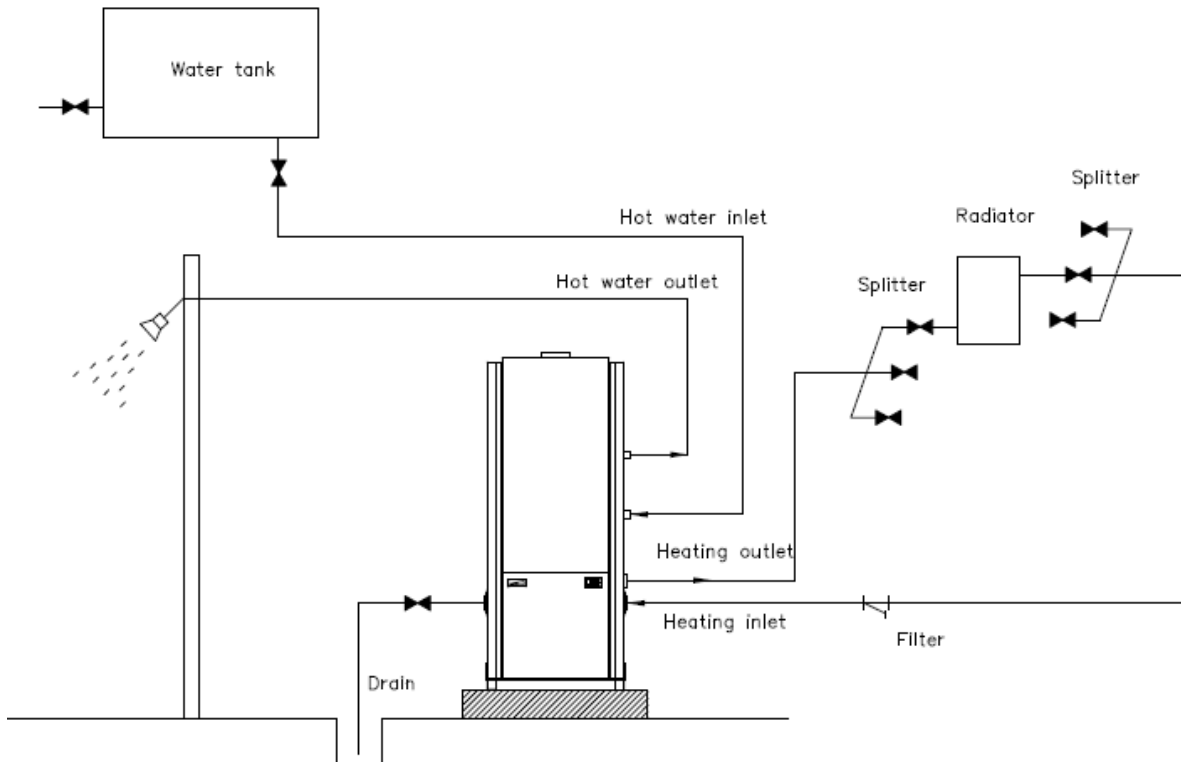


Fig. 3.3. Piping system



- Please observe the cautions for piping.
- The splitters (distributor, manipulator) must be provided with air vent valves.
- The feed water line must be provided with a filter unit to remove metal and other foreign matter in the water.
- The hot water line pipes must be coated product or stainless steel products.

### 3.5. Flue installation

#### 3.5.1. General method for flue installation

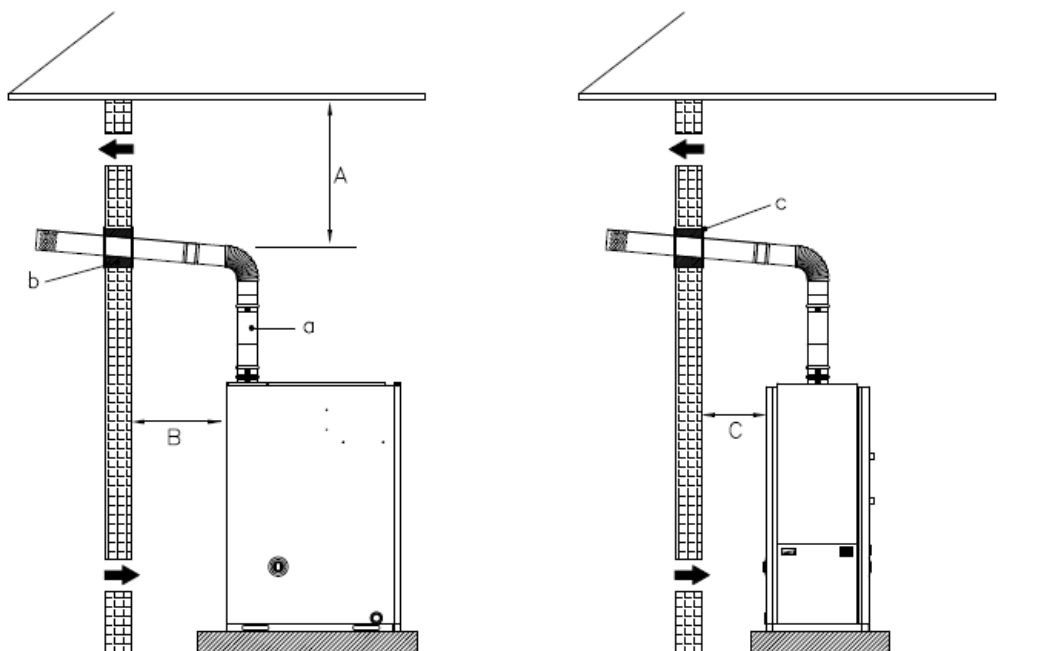


Fig. 3.4. Flue installation method

**A** Min. 15 cm from the ceiling

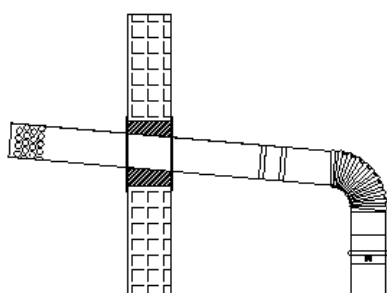
**B** Min. 40 cm from the wall

**C** Min. 40 cm from the wall

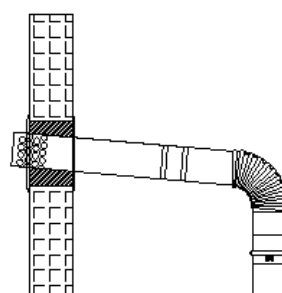
**a** Boiler flue tube (supplied)

**b** Incombustible material

**c** Flue tube finish material (supplied)



(O)



(X)

Fig. 3.5. Correct installation of the flue tune



Do not install the exhaust end of flue inside the wall.

The flue tube must be protruded into outdoor sufficiently for smooth exhaustion.

### 3.5.2 Installation in the ceiling

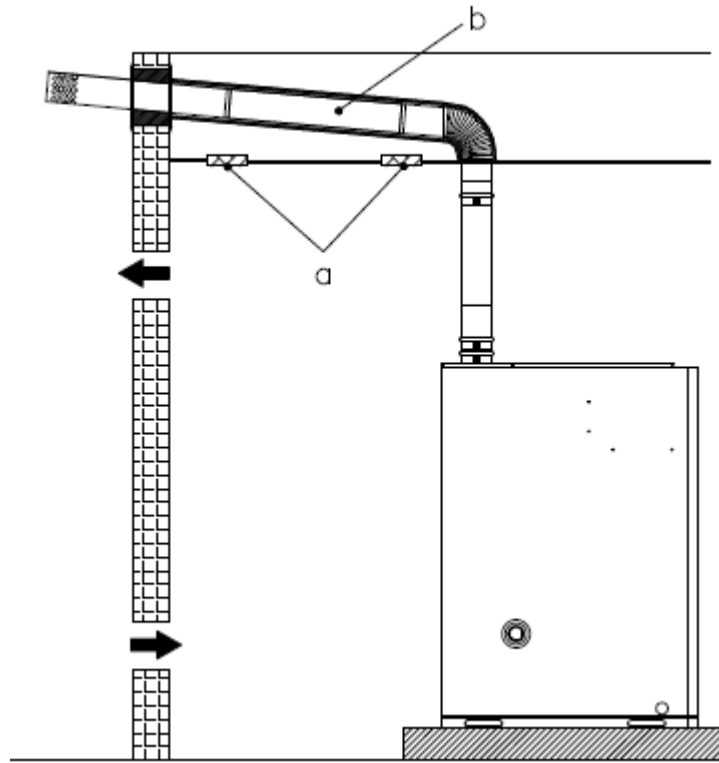


Fig. 3.6. Installation in the ceiling

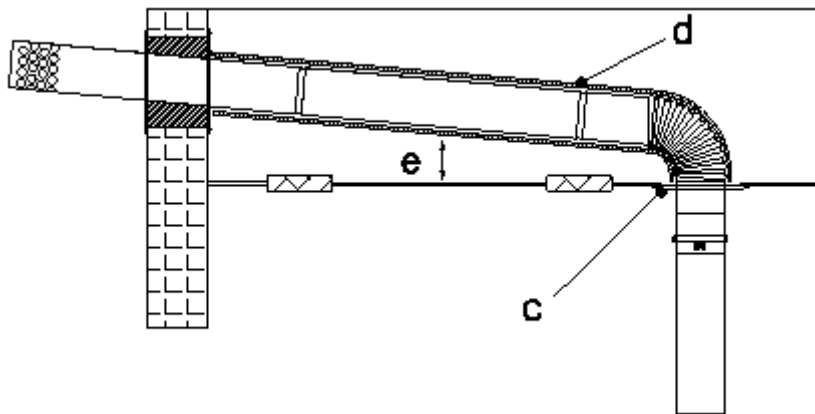


Fig. 3.7. Detailed view in the ceiling

- |                                  |                                  |
|----------------------------------|----------------------------------|
| a Inspection hole                | d Insulation 20 mm or more thick |
| b Exhaust pipe                   | e Min 50 mm from the ceiling     |
| c Cover (incombustible material) |                                  |

### 3.5.3 General instructions for flue installation

- Use the flue tubes supplied with the boiler.  
(To prevent corrosion by condensate.)
- The horizontal portion of the flue should be sloped upwards by about 5°.
- The end of the flue may discharge condensate of form icicles, which may fall on the passengers on the road. Avoid the places where people or vehicles pass.



(Any loss caused by inadequate installation of flue tubes is not covered by the Warranty.)



- There must be no obstacles within 1.5 m from the end of the flue. There must be no opening which may allow the entry of exhaust gas.
- If the exhaust flue passes through a wall made of inflammable material, insulate the through part with heat resistant silicone or other incombustible material whose thickness is at least 20 mm.
- The joints of the exhaust stack shall be assembled with O-ring in sufficient depth to prevent leak or disconnection.
- Seal the joints with heat-proof aluminum tape or other flame retardant material (certified).
- The maximum length of the feed/exhaust air tube shall be 5 m or less, and 3 or less bends. The bend at the end of the exhaust tube top is not counted in the number of bends.  
(Resistance of one 90° elbow is equivalent to that of 2 m straight tube)
- Fix the middle part of the stack to prevent shaking by wind.
- It is recommended to provide independent flue for reach boiler set.
- There must be no obstacle within 60 cm from the end of the flue.
- Provide an inspection door for the embedded part in the ceiling.
- Extended exhaust smoke stack shall be supported with hangers at 900 mm intervals to prevent deflection.
- Install a bird netting at the end of flue which can prevent birds, rats and matters larger than 16 mm in diameter.

## 3.6. Condensate drainage

### 3.6.1 Connecting neutralizer

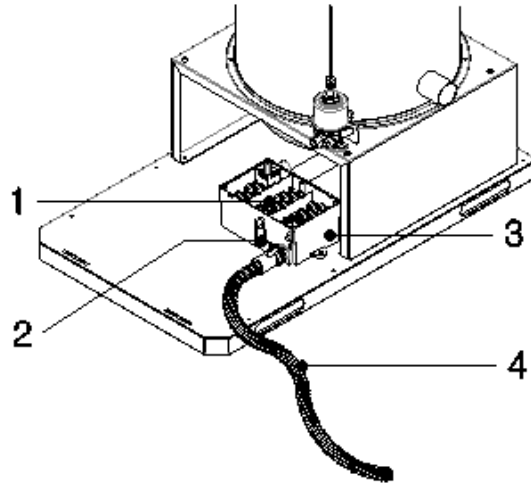


Fig. 3.8. Connecting a condensate drain hose

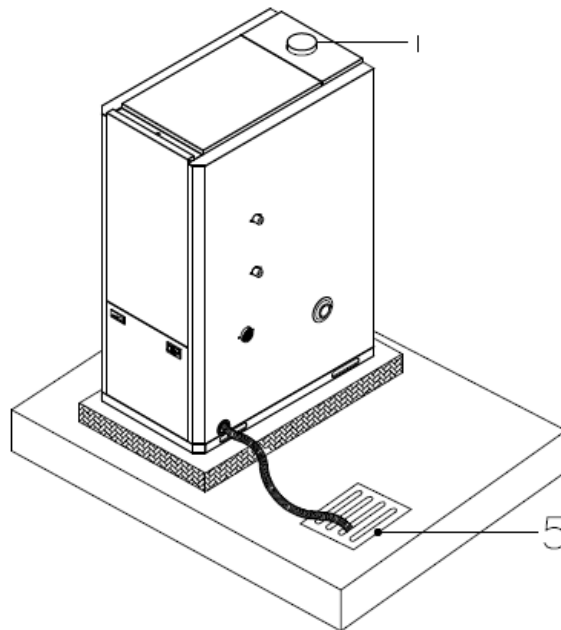


Fig. 3.9. Disposition of a condensate drain hose

- |   |                            |   |                                   |
|---|----------------------------|---|-----------------------------------|
| 1 | Neutralizing agent         | 4 | Condensate drain hose             |
| 2 | Condensate drain hose clip | 5 | Drainage (PVC or stainless steel) |
| 3 | Neutralizer                |   |                                   |

### 3.6.2 Replenishing water to neutralizer

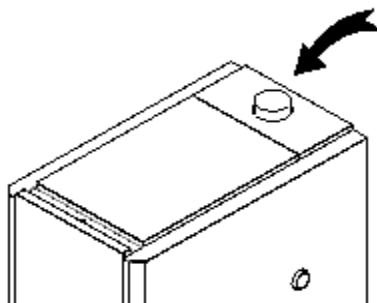


Fig. 3.10. Replenishing water to neutralizer



Pour slowly about one liter of water into the end of flue for easy water replenishing.

### 3.6.3 General cautions for condensate drainage



- Condensing boilers produce condensate inside the boiler, which must be drained.
- Connect the condensate drain hose supplied with the boiler to the condensate neutralizer outlet and tie it with a hose band.
- The condensate drain hose must be a plastic hose having 13 mm or greater diameter.
- Connect the other end of the drain hose to a PVC or stainless steel sewer.
- The condensate must be always filled with water from after the first installation. Replenish the water whenever necessary. Pour slowly about one liter of water into the end of flue for easy water replenishing.  
(if not filled with water, exhaust gas may enter the boiler which is dangerous.)
- The condensate water from the boiler system is not potable nor can be used for washing.
- If the condensate trap is clogged by foreign materials, condensate cannot be drained and the boiler may be damaged. Clean up the device at least once a year.
- The condensate drain hose can be frozen in cold weather, thus, must be insulated in cold climate regions.  
(Provide an anti-freezing device to the exit if it is liable to freezing.)
- Replace the neutralizing agent in the neutralizer once per 3~5 years.  
(Please contact a service center for replacing the neutralizer.)

## 3.7. Fuel line installation

### 3.7.1 Fuel tank installation

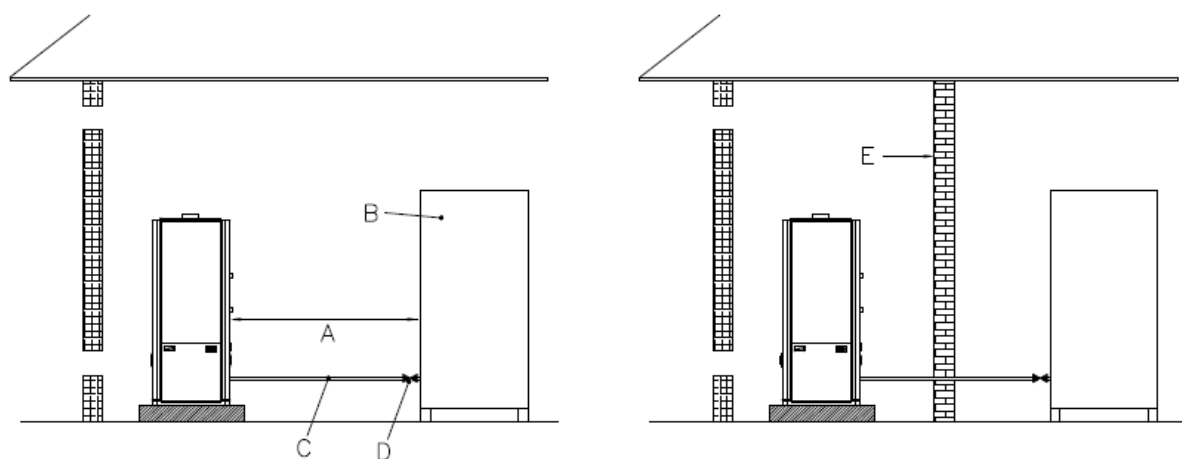


Fig. 3.11. Fuel tank installation

<b>A</b> Away from the boiler by 2 m or more	<b>D</b> Fuel valve (a must item)
<b>B</b> Fuel tank	<b>E</b> Fire wall
<b>C</b> Fuel line	



- Use a certified fuel tank.
- Install the tank at a place well-ventilated and safe from direct sunlight and rain.
- Keep a safety distance of about 2 m from the boiler, or construct a fire wall between the boiler and fuel tank.
- The fuel tank must be provided with a pressure escape tube and drain valve for safety.
- Fuel outlet must be provided with a fuel cut-off valve.
- Fix the fuel tank on the ground to prevent falling over, and horizontal on the ground.
- Height of the fuel tank must be within 2 m above and below the level of the burner. (If lower than the boiler, ignition may fail.)
- The fuel pipe must be exposed and fixed to the ground to prevent displacement.
- The fuel pipe must be made of an anti-corrosive material.

### 3.7.2 Oil filter and fuel line installation

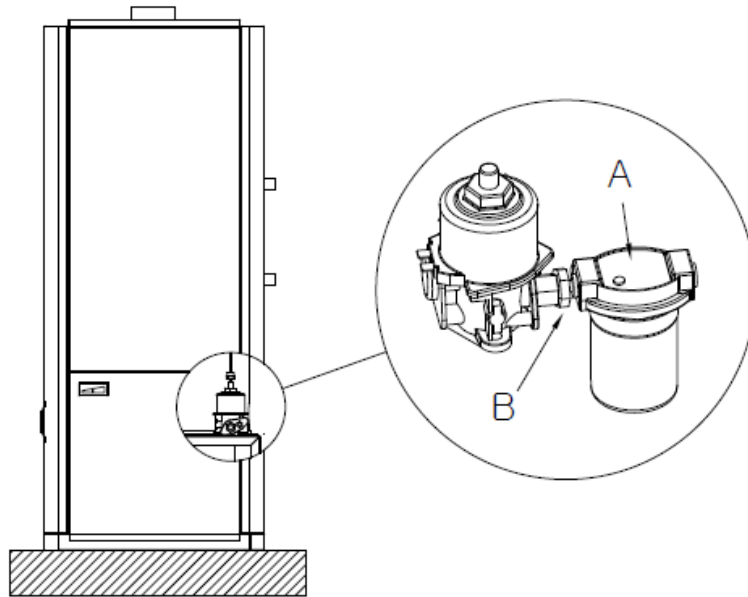


Fig. 3.12. Oil filter installation

- A Oil filter (supplied with the boiler)
- B Fasten clockwise using an appropriate tool.

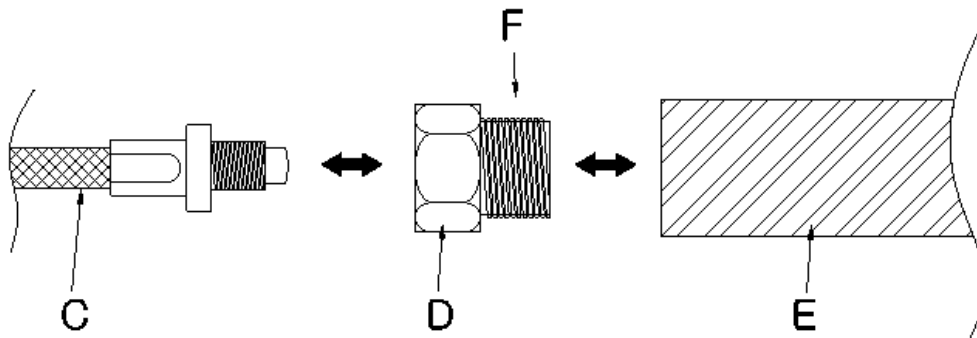


Fig. 3.13. Oil hose connection

- C Oil hose (supplied with the boiler)
- D Oil hose bushing (Supplied with the boiler)
- E Fuel pipe
- F Seal the joints to prevent leak



### 3.7.3 Fuel line air venting

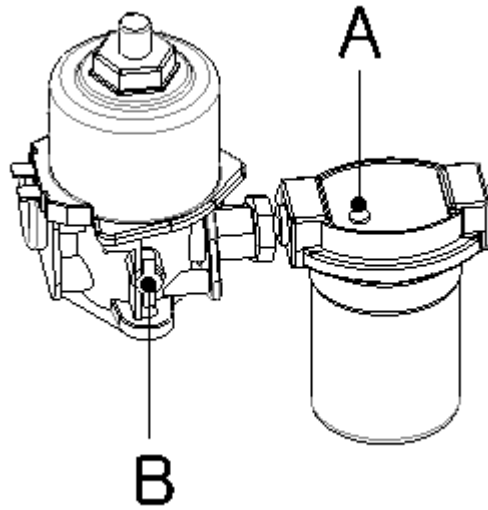


Fig. 3.14. Fuel line air venting

---

**A Fuel filter air vent screw**

**B Fuel pump air vent bolt**

- 1 Open the fuel line valve to feed fuel.
  - 2 Loosen the screw on fuel filter cap counterclockwise to remove air in the line. Tighten the screw when the fuel oil spills out.  
(This is applicable only when the fuel tank is higher than the fuel filter unit.)
  - 3 If the fuel tank is lower than the filter unit, air cannot be removed with this method. In such case, loosen the air vent bolt on the fuel pump and turn on boiler power supply.
  - 4 After about 6~7 seconds, the fuel pump discharges air with ticking sound. The LED lamp on the controller flashes and the boiler stops.
  - 5 Turn off and on the power supply to the controller. All the air has been removed and fuel will be fed smoothly. Then, close the air vent bolt and press Restart button to ignite the burner.
-

### **3.8. Electric wiring**

#### **3.8.1. 3.8.1 General cautions for electric wiring**



- Check that the power supply is in accordance with the specification on the name plate (AC230V/50Hz).

Incorrect supply voltage can cause fire.



- Use an independent power receptacle, safe from rain and moisture.
- Do not connect ground cable to a lightening arrestor or fuel pipe. Otherwise, the product may fail or even exploded.



- Boilers must be grounded to prevent electric shock or other accident by leakage current.



- For the 230V power supply, grounding and cable works, observe the applicable laws and regulations.
- If the 230V power supply is obtained by individual voltage raise in a 110V region, make sure to provide a ground connection.  
In this case, the capacity of the voltage step up transformer must be at least 1kW.
- Power receptacle must be away from the boiler by at least 300 mm.
- The grounding point must be at 300 mm or deeper in the ground.

# OIL CONDENSING BOILER INSTALLATION AND USER MANUAL

## 3.8.2 Wiring diagram

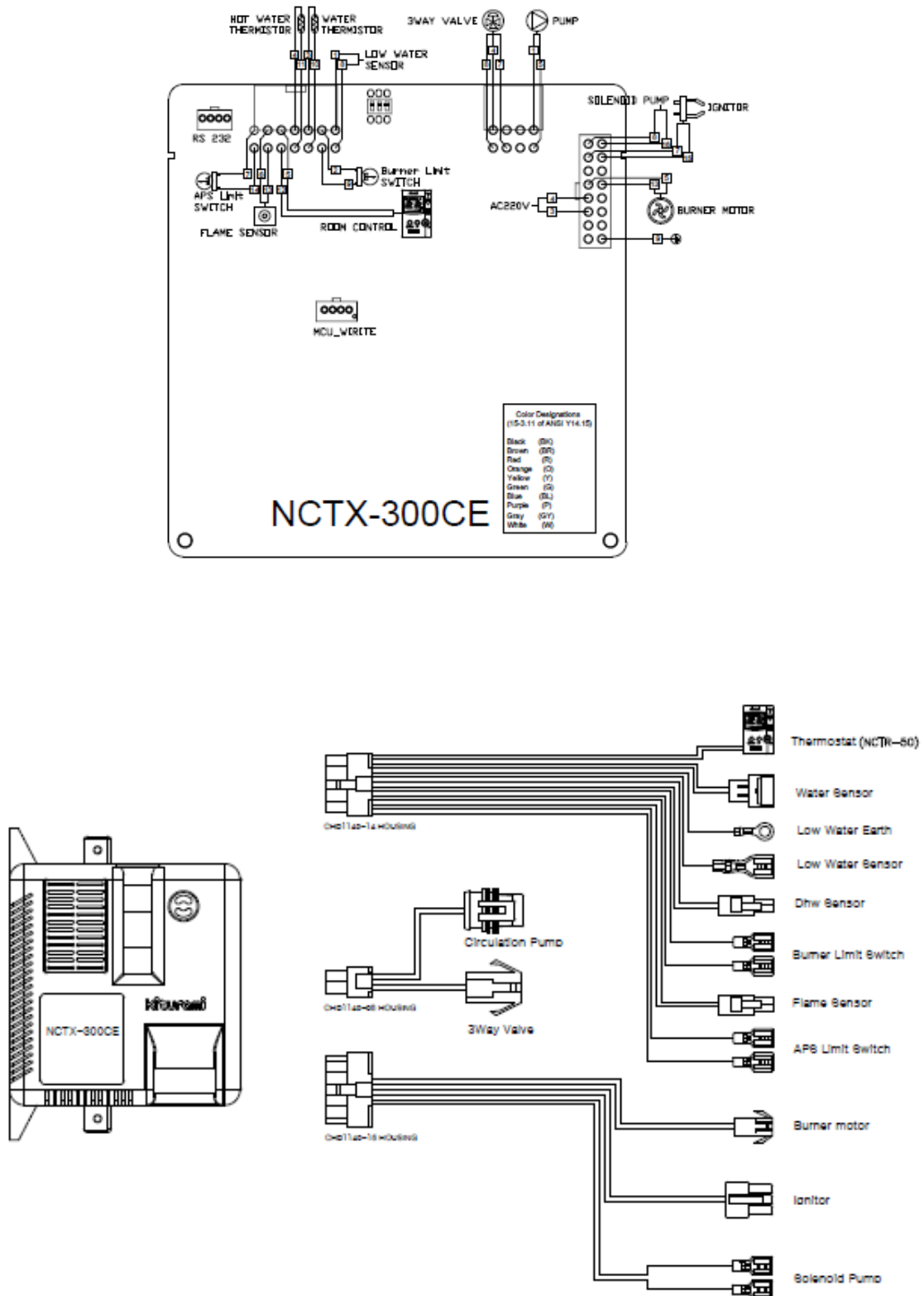


Fig. 3.15. Wiring diagram

# OIL CONDENSING BOILER INSTALLATION AND USER MANUAL

## 3.8.3 Connector cable structure

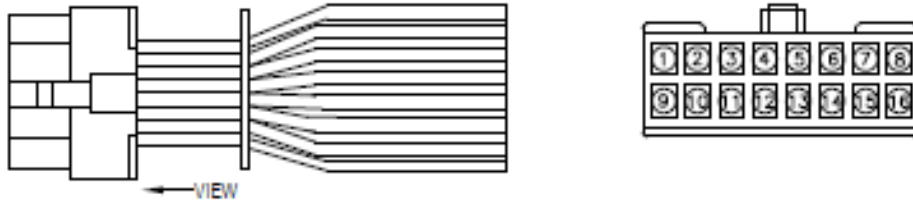


Fig. 3.16 16 Pin connector

Terminal No.	Classification	Color
1	-	-
2	-	-
3	AC 230V COM	White
4	AC 230V	Sky / Black
5	Burner motor	Yellow
6	-	-
7	Ignition transformer	Red
8	Fuel pump	Blue
9	Earth	Yellow / Green
10	-	-
11	-	-
12	-	-
13	Burner motor COM	Yellow
14	-	-
15	Ignition transformer COM	Red
16	Fuel pump COM	Blue

# OIL CONDENSING BOILER INSTALLATION AND USER MANUAL

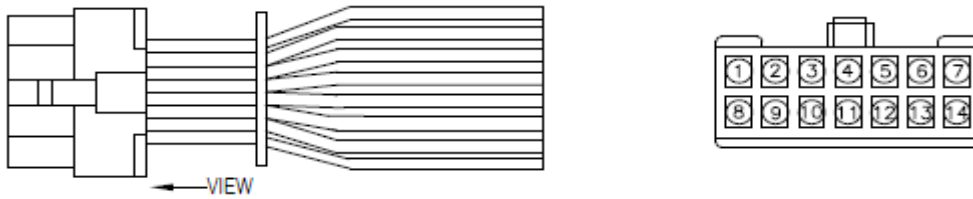


Fig. 3.17. 14 Pin connector

Terminal No.	Classification	Color
1	Low water level sensor	Red
2	DC 12V	Red
3	GND	Gray
4	GND	Blue
5	GND	White
6	GND	Black
7	DC 12V	Yellow
8	Low water level sensor COM	Yellow/Green
9	Bimetal Thermostat	Red
10	Temperature sensor	Gray
11	Hot water sensor	White
12	Room temperature controller	Red
13	Flame detector	Yellow
14	Air pressure switch	Yellow

# OIL CONDENSING BOILER INSTALLATION AND USER MANUAL

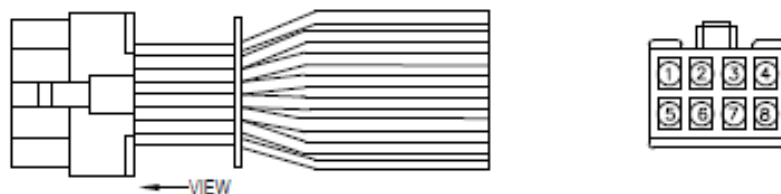


Fig. 3.18. 8 Pin connector

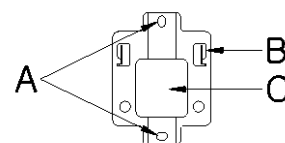
Terminal No.	Classification	Color
1	Circulation pump	Yellow
2	-	-
3	3Way valve - Heating	Red
4	3Way valve - Hot water	Blue
5	Circulation pump COM	Green
6	-	-
7	3Way valve COM	Black
8	-	-

### 3.9. Room temperature controller installation

**1**

Install the controller mounting plate in a place convenient for operation, where the temperature varies by relatively smaller, where there is no obstacle, at 1.2m ~ 1.5m above the floor.

(Avoid the places close to frequently open/closed door, cold draft, direct sunlight, within the reach of children.)



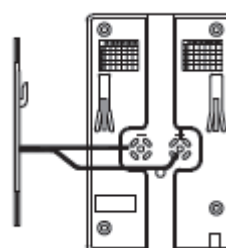
A Screws

B Hook

C Cable hole

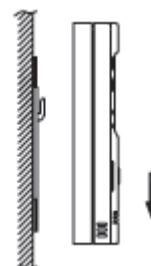
**2**

Connect cable to the terminal block on the backside of the room temperature controller.



**3**

Match the hook of the controller and the ring of the mounting plate, pull down the controller while pressing towards the wall.



- Do not lay under the floor, or in the same conduit with electric cable. Otherwise, the signals may become instable which can cause boiler malfunction. In addition, when the sheath of the cable is aged, the wires can cause short-circuit due to leakage current or moisture.

### **3.10. Checklist after installation**



- ☐ Is there any leak of water or fuel?
- ☐ Is the boiler installed at the designated location and leveled?
- ☐ Is there any inflammable material near the boiler?
- ☐ Is the flue correctly installed?
- ☐ Was the air in the fuel line removed?
- ☐ Was the air in the hot water line removed?
- ☐ Are the hot and low water lines separated?
- ☐ Is the feed water line correctly installed?
- ☐ Are the pipelines and flue properly insulated?
- ☐ Is the power supply AC230V/50Hz?
- ☐ Is the neutralizer filled up with water?
- ☐ Is the fuel valve operation and no fuel leakage?

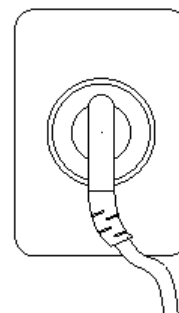
**All above questions must be answered with YES to start up the boiler.**



### 3.11. Boiler commissioning

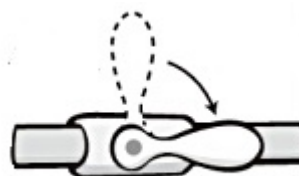
**1**

Connect power supply. (AC230V / 50Hz)



**2**

Open the fuel line valve to feed fuel.  
(Vent the air in the fuel line first.)

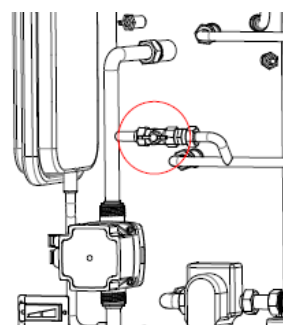


**3**

Turn on power by pressing the power switch of the controlled inside of the boiler.  
And turn on the power button of the room temperature controller.  
If the boiler is not filled with water, Error 95 is displayed.

**4**

Open the feed water valve to replenish water.  
After water refill, 95 error is released.  
Close the feed water valve when the pressure 1.5kgf/cm<sup>2</sup>.  
(Feed water pressure must be lower than the max allowable operation pressure.)



**5**

Set up the room temperature controller to a desired temperature. After temperature and reservation function setting, the operation lamp turns on or off, and the respective functions are executed.  
If ignition fails, press the power button on the room temperature controller for a restarting.



## 4. Product Operation Method

### 4.1. Room Indoor temperature controller components

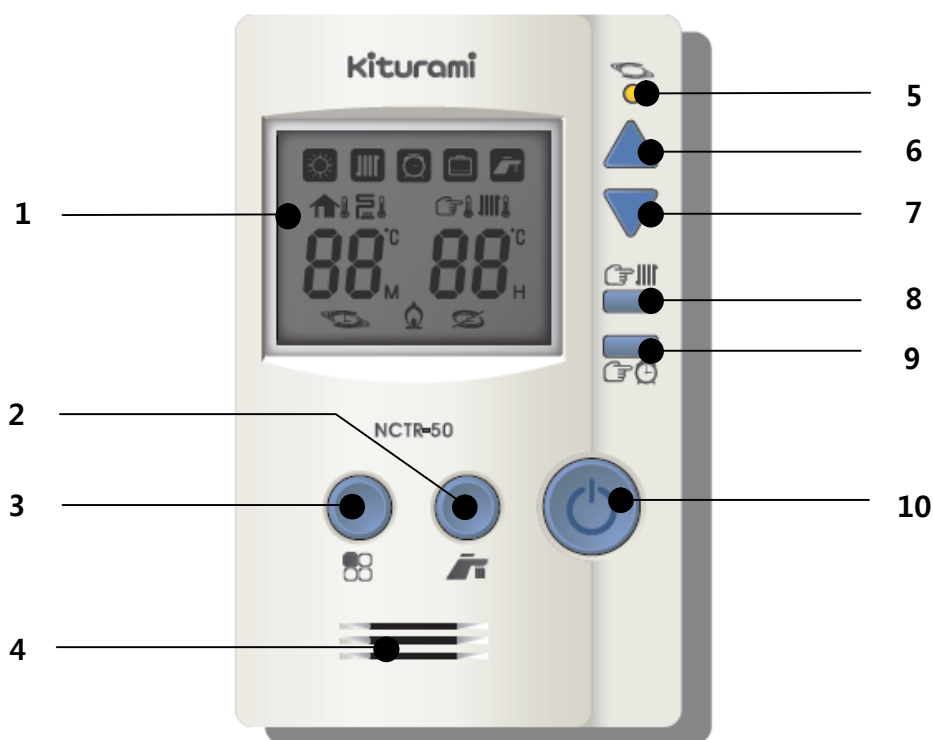


Fig. 4.1. Room temperature controller NCTR-50

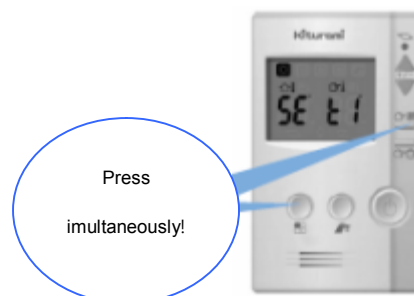
1	Display	Shows current/set-up temperature, water temperature, combustion status, error code, and other conditions of the boiler.	6	UP button	Used to edit setting values.
2	Bath button	Use this button to select bathing function.	7	Down button	Used to edit setting values.
3	Function button	AT Home, Reservation, Outing function selector button	8	Hot water temperature button	Use this button to set up heating water temperature.
4	Room temperature sensor	Measures room temperature	9	Reservation setting button	Use this button for reserved start up and shut down timer setting.
5	LED indicator lamp	Shows current function while the boiler is in operation.	10	Power button	Turns power ON/OFF. Use this button to restart the boiler after power-off or troubleshooting.

## 4.2 Heating function

### 4.2.1 Operation modes

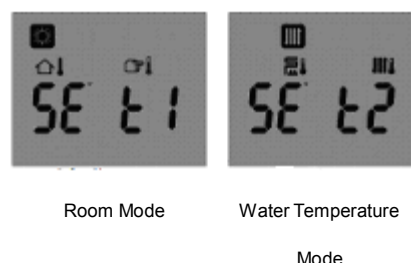
**1**

With the room temperature controller power off, press Heating/Water Temperature buttons simultaneously to display modes.



**2**

Set up the desired operating mode using the UP (▲)/Down (▼) buttons



**3**

After setting up a desired operating mode, press the Function button to finish setting and return to the previous function.



#### What is Operating Modes?



Heating mode can be classified into Room mode and Water Temperature mode

Room mode: the boiler operates by comparing the current temperature and set-up temperature of the room temperature controller.

Water Temperature mode: the boiler operates by comparing the heating water temperature of the room temperature controller and actual boiler water temperature.

#### 4.2.2 Room mode operation

- 1** Set up the room temperature at desired level using the UP (▲)/ Down (▼) buttons. (Temperature display flashes.)
- 2** The desired room temperature can be set up between 10 °C~45 °C at 1 °C unit.
- 3** After selecting the desired room temperature, the setting will be entered and effective after about 10 seconds.



#### 4.2.3 Water Temperature mode operation

- 1** Heating water temperature display will flash when the heating water temperature setting key is pressed.
- 2** While the display is flashing, set up the heating water temperature at desired level using the UP (▲)/ Down (▼) buttons
- 3** The heating water temperature can be set up between 50 °C~85 °C at 1 °C unit.  
(Default setting: 80 °C)
- 4** After selecting the desired room temperature, the setting will be entered and effective after about 10 seconds.



## 4.3 Reservation function

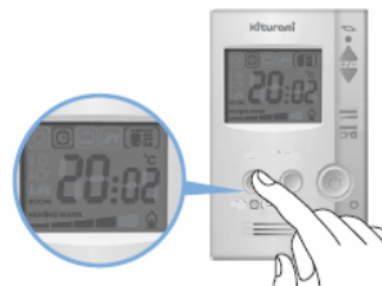
### 4.3.1 Execute reservation function

**1**

Select Reservation using the [At-Home, Reservation, Outing] button. "Reservation" will appear in the display.

(The operation lamp will be ON according to the preset time, and Reserved run will be activated with priority.)

► Example: The boiler will run for 20 minutes, stop for 2 hours, and run for 20 minutes, and so on.



### 4.3.2 Setting up timer function (min)

**1**

Select the Reservation function.

Set up the desired operating time (min) using the UP (▲)/ Down (▼) buttons

When the setting is finished at this step, the reserved stop time will apply first.

**2**

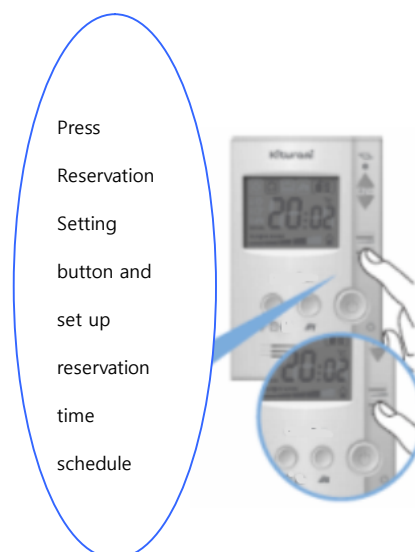
To change reserved stop time, press the Reservation Setting button once again.

With the Up (▲)/ Down (▼) buttons, you can adjust the time (minutes), when the Reserved Stop time flashes.

When the setting is finished at this step, the reserved stop time will apply first.

**3**

To change reserved starting time, press the Reservation Setting button once again.



### Using the Reservation function



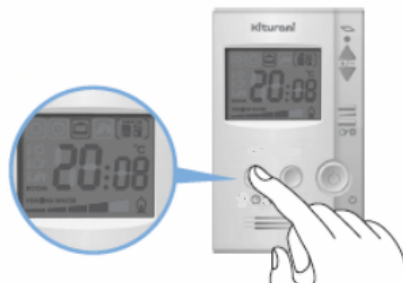
By setting-up reserved operation appropriately to run the boiler for the desired time, fuel cost can be saved. (You can set up reserved run and stop time according to the season and the thermal insulation condition of the house.)

## 4.4 Outing function

### 4.4.1 Enable leave function

**1**

Select Outing using the [At-Home, Reservation, Outing] button. "Outing" will appear in the display. (The Outing function maintains room temperature at minimum level for freeze protection of the boiler system.)



**2**

Press the power button, the boiler will be shut down.



---

### What is anti-freezing function?



Anti-freezing (freeze protection) function maintains the boiler system, floor heating pipeline, and connecting lines at appropriate temperature to prevent damage by freezing.

When you leave home in winter, the power of the boiler system must be ON and the fuel supply valve must be open for freeze protection.

In extremely cold weather, set the room temperature at about 10~15 °C to prevent freezing in a long leave.

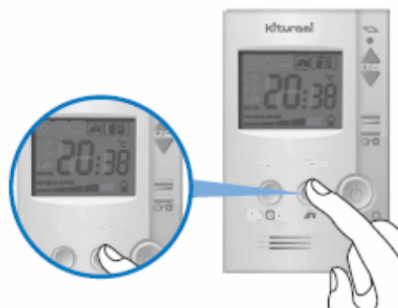
► In the situation which falls under anyone below, the freeze protection function does not work.

- Power failure or boiler power cord is unplugged
- Fuel supply valve is closed, or fuel supply is cut off.
- Water feed pipe or other exposed pipe is not properly heat insulated

## 4.5 Bathing function

### 4.5.1 Execute bathing function

- 1** To use a large volume of hot water, select the Bath mode.
- 2** After 2 hours and 30 minutes after Bath setting, the setting will be reset and the system will return to the previous function.



### 4.5.2 Setting up bath water temperature

- 1** Press Bath button to enter Bath mode.
- 2** In this mode, press the Bath button for 5 sec. The display will flash as shown in the figure.
- 3** Bath water temperature can be set up between 41 °C~85 °C, at 1 °C unit
- 4** The setting will be entered and effective after about 10 seconds, if without any button input.
- 5** After setting, press the Function or Bath button to complete the setting and enter the respective function or Bath function.



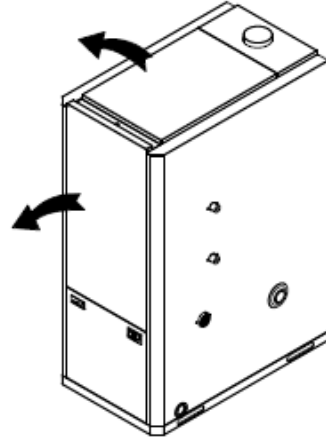
- Take care of burn injury when using hot water.
- When using hot water, very hot water may come out of the hot water faucet. Take special care for children and senior people.
- The water from the boiler system is not potable.
- After a long time of using hot water in heating mode, the water temperature may be reduced.
- If the power turns Off and On in bath mode, the system will return to the mode prior to bath.

## 5. Product Maintenance

### 5.1. Boiler cleaning

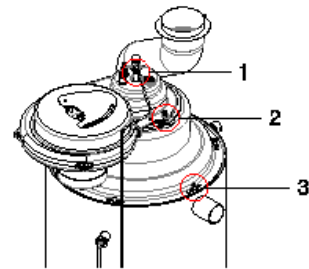
**1**

Turn boiler power off and wait until the system is cooled down sufficiently.  
Close the fuel supply valve to cut off fuel feed.  
Remove the A/S cover and front casing.



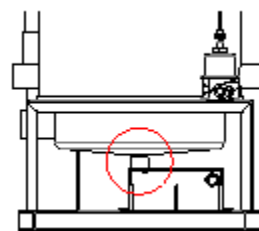
**2**

First, disconnect all the cables from the burner.  
1. Disconnect copper fuel pipe from the burner nozzle adapter using a tool.  
2. Remove two fixing nuts on both sides of the burner.  
3. Remove 6 nuts on the hood and heat exchanger.



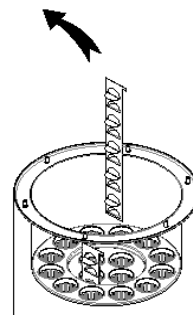
**3**

Disconnect the hose from the neutralizer at the bottom of the boiler.  
The hose is joined with a clip.



**4**

Remove the exhaust hood and the baffle plates in the fire (smoke) tubes.

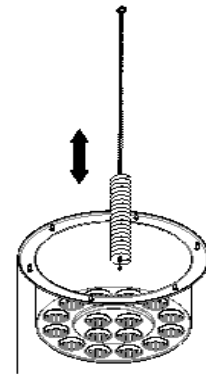




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5

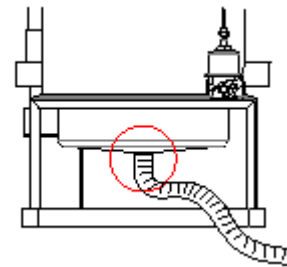
Clean the fire tubes in the boiler using the brush supplied with the boiler, by reciprocating 4~5 times up and down.



6

The soot and other contaminants in the fire tube fall down on the bottom. Pour wash water into the flue tube to wash the soot away.

Connect an extra hose to the condensate pan at the bottom of the boiler to help drain the wash water.



7

After cleaning, assemble the boiler in the reverse direction of disassembly.

8

Verify that the boiler is assembled correctly.

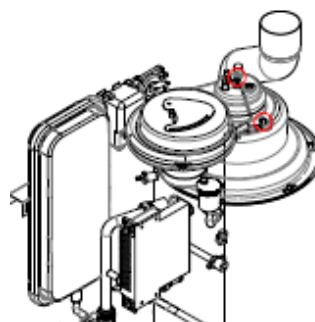


- Soot or foreign matter in the boiler can reduce life span and efficiency of the boiler, and can cause fire.
- Contact a nearby service center for cleaning by at least once a year.
- Cut off power supply before cleaning the boiler. Otherwise, the user may get electric shock.
- Cool down the boiler sufficiently before cleaning the boiler. Failure to comply with this can lead to burn of the user.
- Run the boiler from time to time in the rainy seasons to remove moisture which can cause corrosion.
- Learn and understand the boiler structure before cleaning the boiler.

## 5.2 Burner cleaning

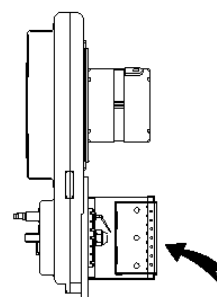
**1**

Remove the burner and carry it to a bright place.



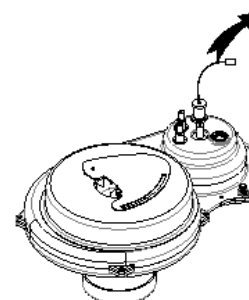
**2**

Wipe off soot, if any, from the burner tube with clean cloth.



**3**

Remove the flame detector by rotating it in counterclockwise. Wipe off soot, if any, from the detector with clean cloth.



**4**

After cleaning, assemble the boiler in the reverse direction of disassembly.

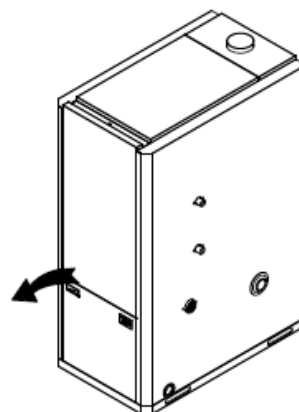


- Soot or other foreign matter on the burner tube and/or flame detector may lead to boiler failure.
- Contact a nearby service center for cleaning by at least once a year.
- Cut off power supply before cleaning the boiler. Otherwise, the user may get electric shock.
- Cool down the boiler sufficiently before cleaning the boiler. Failure to comply with this can lead to burn of the user.
- Take care not to allow soot or foreign matter enter the burner during cleaning.
- Do not attempt to disassemble or adjust other parts of the burner.

### 5.3 Cleaning neutralizer

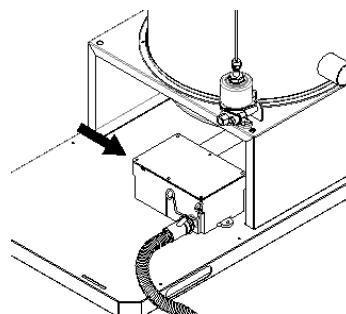
**1**

Turn off boiler power supply and remove front casing.



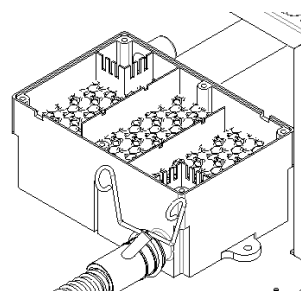
**2**

Remove all the screw bolts on top of the neutralizer and remove the cap.



**3**

Remove foreign matter, if any, in the neutralizer.  
Replace the neutralizing agent at every 3~5 years.



**4**

After cleaning, assemble the boiler in the reverse  
direction of disassembly.

Refill the neutralizer with water.



- Cool down the boiler sufficiently before cleaning the boiler.
- Contact a nearby service center for cleaning by at least once a year.
- Wear safety gloves when handling the neutralizing agent or condensate, and wash hands clean after handling.

## 6. Troubleshooting



If any abnormality is identified in the boiler during operation, do not take measures arbitrarily. Follow the procedure below.

The product flashes an error code on the room temperature controller display corresponding to the cause of problem.

If an abnormal phenomenon persists, contact a nearby service center.

### ► Power failure

- Check that the power cord is connected.
- Check if the power fuse has been blown. The power fuse is at the ignition transformer.
- Test utility power supply with other electric/electronic devices.

If the utility power supply is OK but the boiler fails to run, call your nearest dealer or A/S center.

### ► Power is ON, but the boiler fails to heat the room

- Check that the boiler is in normal operation.
- Boiler will not run if the setting temperature is lower than the actual room temperature.
- If the boiler has been shut down for a long time, the hot water circulation pump may have been seized. Try to rotate the shaft with screw driver or other tool.
- If the boiler still fails to heat the room, call your nearest dealer or A/S center.

### ► If a figure flashes on the room temperature controller

<b>01</b>	<ul style="list-style-type: none"> <li>• This means flame detection system failed and ignition prohibited, or ignited but immediately shut off for safety.</li> <li>• Check that the fuel valve is open and fuel feed is OK.</li> <li>• The fuel line may be blocked with air.</li> <li>• Check that the burner fan runs normally.</li> <li>• Check that the fuel pump runs normally.</li> <li>• If the problem persists, call your nearest dealer or A/S center for help.</li> </ul>
<b>02</b>	<ul style="list-style-type: none"> <li>• The flame detector has been activated before the burner ignition</li> <li>• Check if the flame detector is separated from the burner.</li> </ul>
<b>03</b>	<ul style="list-style-type: none"> <li>• The burner was ignited, but failed to produce normal flame.</li> <li>• Clean the flame detector sensor with clean cloth.</li> <li>• If the problem persists, call your nearest dealer or A/S center for help.</li> </ul>

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<b>04</b>	<ul style="list-style-type: none"> <li>• The boiler water temperature sensor has failed, including open cable.</li> <li>• Shut down the boiler, and call your nearest dealer or A/S center for help.</li> </ul>
<b>06</b>	<ul style="list-style-type: none"> <li>• APS Limit Switch open</li> <li>• Shut down the boiler, and call your nearest dealer or A/S center for help.</li> </ul>
<b>07</b>	<ul style="list-style-type: none"> <li>• APS Limit Switch short.</li> <li>• Shut down the boiler, and call your nearest dealer or A/S center for help</li> </ul>
<b>08</b>	<ul style="list-style-type: none"> <li>• The room temperature controller wire is too long (10m or longer), or it is contacted with high voltage line or telephone line.</li> <li>• Take care that cable cover is not damaged. Do not lay the wire together with AC 230V cable or in an underground cable conduit.</li> <li>• For a special case, reinstall with special cable</li> </ul>
<b>95</b>	<ul style="list-style-type: none"> <li>• This error code appears when the water level in the boiler is lower than the low limit.</li> <li>• Replenish water using the feed water valve, as necessary.</li> <li>• If water replenishment fails to solve the problem, check the connection of the low water level sensor and casing ground cable.</li> <li>• If the problem persists, call your nearest dealer or A/S center for help.</li> </ul>
<b>98</b>	<ul style="list-style-type: none"> <li>• When overheat bimetal switch is disconnected</li> <li>• If the problem persists, call your nearest dealer or A/S center for help.</li> </ul>
<b>99</b>	<ul style="list-style-type: none"> <li>• The heating water was overheated and the boiler was shut down automatically for safety.</li> <li>• The heating water circulation pump will start up and lower the water temperature.</li> <li>• If the problem persists, call your nearest dealer or A/S center for help.</li> </ul>

## Product Disposal



Observe the following regulations for product disposal.

- Shut down the boiler.
- Disconnect all the utility lines from the product.
- The product must be disposed of a qualified person.
- Follow the rules and regulations of the pertinent nation or region.



The waste from the product can be classified and recycled.

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## 8 Technical data

### 8.1. Basic specification

Item		Unit	TURBO CONDENSING-13	TURBO CONDENSING-17	TURBO CONDENSING-21
Thermal output	Condensing	kW(kcal/h)	15.1 (13,000)	19.8 (17,000)	24.4 (21,000)
	Normal	kW(kcal/h)	14.4 (12,400)	18.6 (16,000)	22.7 (19,500)
Hot water output		kW(kcal/h)	13.9 (12,000)	18.6 (16,000)	22.7 (19,500)
Fuel consumption		Liter/h	1.44~1.76	1.89~2.29	2.32~2.83
Maximum heat input		kW	15.58	20.97	26.36
Type	-	-	Floor installation, semi-closed, forced exhaust		
	ON/OFF Modulating multi stage	-	On/Off		
Fuel		-	Light Oil		
Heat transfer area		M2	1.26	1.26	1.43
Water volume		Liter	28	28	24.2
Heating efficiency	Condensing	%	100	99	98
	Normal	%	94	93	92
Hot water efficiency		%	94	93	92
Hot water heating type		-	Indirect heating		
Hot water supply capacity	ΔT=25°C	Liter/min	8.3	10.7	13.0
	ΔT=40°C	Liter/min	5.2	6.7	8.1
Max. pressure for heating		Bar	2.5		
Max. pressure for hot water		Bar	17.1		
Pipeline diameter	Heating	A	25		
	Hot Water	A	15		
	Flue	Φ	77		
	Drain	A	25		
Dimension		W * L * H	385 X 654 X 933		
Product weight		Kg	55	55	56
Power supply		-	AC 230V / 50Hz		

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Power Consumption	W	104	104	104
Standby power	W	5	5	5
Standby loss	W	0.111	0.111	0.111
Range of temperature control	°C	45~85		
Max Temperature range	°C	85		
Gas volume of the boiler	m³	0.00846	0.00846	0.00846
The required draught	mbar	0.1	0.1	0.1
Gas side resistance and combustion chamber pressure for boilers operating with positive pressure	mbar	0.2	0.2	0.2
Water resistance	mbar	10K : 380 / 20K : 480		

## 8.2. Combustion specifications

Item	Unit	TURBO CONDENSING-13	TURBO CONDENSING-17	TURBO CONDENSING-21
Thermal output (condensing)	kW	13.6~16.6	17.8~21.7	21.9~26.8
Thermal output (Normal)	kW	12.9~15.8	16.7~20.4	20.4~24.9
CO emission rating	Class	1	1	1
NOx emission rating	Class	1	1	1
Smoke level	No.	0	0	0
Exhaust gas temperature (Normal / Condensing)	°C	85/60	90/65	95 / 70
Exit flue gas mass flow	kg/s	0.0069	0.0093	0.0117

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### 8.3. Major components of the product

Item	TURBO CONDENSING-13	TURBO CONDENSING-17	TURBO CONDENSING-21
Controller	NCTX-300CE		
Indoor temperature controller	NCTR-50		
Burner motor	KM-061-E (1.5μF)		
Oil nozzle	Danfoss 0.4×80°H	Danfoss 0.5×80°H	Danfoss 0.6×80°H
Fuel pump	K-TAISAN MP35SLR-S E.P 0.5G * 8.5K	K-TAISAN MP35SLR-S E.P 0.5G * 10K	
Flame detector	RS-500		
Temperature sensor	SD-450		
Low level sensor	WL-100		
Ignition transformer	EI-2P-C30		
Inner circulation pump	GRUNDFOS UPM3 FLEX AS 15-70 130 AZJ		



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## 8.4. Standard resistance of temperature sensors

TEMP. (°C)	RESISTANCE (Ω)			TEMP. (°C)	RESISTANCE (Ω)		
	MIN	CENTER	MAX		MIN	CENTER	MAX
1	9,613	10,512	11,485	51	1,468	1,545	1,625
2	9,206	10,058	10,979	52	1,422	1,495	1,571
3	8,818	9,626	10,498	53	1,377	1,447	1,519
4	8,449	9,215	10,041	54	1,333	1,400	1,469
5	8,097	8,824	9,606	55	1,291	1,356	1,422
6	7,762	8,451	9,193	56	1,251	1,312	1,375
7	7,443	8,097	8,800	57	1,212	1,271	1,331
8	7,139	7,759	8,426	58	1,175	1,231	1,288
9	6,849	7,438	8,070	59	1,139	1,192	1,247
10	6,572	7,131	7,731	60	1,104	1,155	1,208
11	6,308	6,839	7,408	61	1,071	1,120	1,170
12	6,056	6,561	7,100	62	1,038	1,085	1,133
13	5,816	6,295	6,807	63	1,007	1,052	1,097
14	5,586	6,042	6,528	64	977	1,020	1,063
15	5,367	5,800	6,262	65	948	989	1,030
16	5,158	5,569	6,008	66	920	959	999
17	4,958	5,349	5,765	67	893	930	968
18	4,767	5,139	5,534	68	867	902	939
19	4,584	4,938	5,314	69	842	876	910
20	4,410	4,746	5,103	70	817	850	883
21	4,242	4,562	4,902	71	794	825	856
22	4,083	4,387	4,710	72	771	801	831
23	3,930	4,220	4,527	73	749	777	806
24	3,783	4,059	4,351	74	728	755	782
25	3,643	3,906	4,184	75	707	733	760
26	3,509	3,759	4,024	76	687	712	737
27	3,381	3,619	3,870	77	668	692	716
28	3,258	3,485	3,724	78	650	672	695
29	3,140	3,356	3,584	79	632	653	675
30	3,027	3,233	3,450	80	614	635	656
31	2,919	3,115	3,321	81	597	617	637
32	2,815	3,002	3,198	82	581	600	619
33	2,715	2,894	3,081	83	565	584	602
34	2,620	2,790	2,968	84	550	568	585
35	2,528	2,690	2,860	85	535	552	569
36	2,440	2,595	2,757	86	521	537	553
37	2,356	2,503	2,657	87	506	522	539
38	2,275	2,415	2,562	88	492	508	524
39	2,197	2,331	2,471	89	479	495	511
40	2,122	2,250	2,384	90	466	482	497
41	2,050	2,172	2,300	91	453	469	484
42	1,981	2,098	2,219	92	441	456	472
43	1,915	2,026	2,142	93	429	444	460
44	1,851	1,958	2,068	94	418	433	448
45	1,790	1,891	1,997	95	407	421	436
46	1,731	1,828	1,928	96	396	411	425
47	1,674	1,767	1,863	97	385	400	415
48	1,620	1,708	1,800	98	375	390	404
49	1,568	1,652	1,739	99	366	380	394
50	1,517	1,598	1,681	100	356	370	384



The actual water temperature and the water temperature display on the room temperature controller can be compared by measuring the resistance of the water temperature sensor.

## 8.5 Time chart

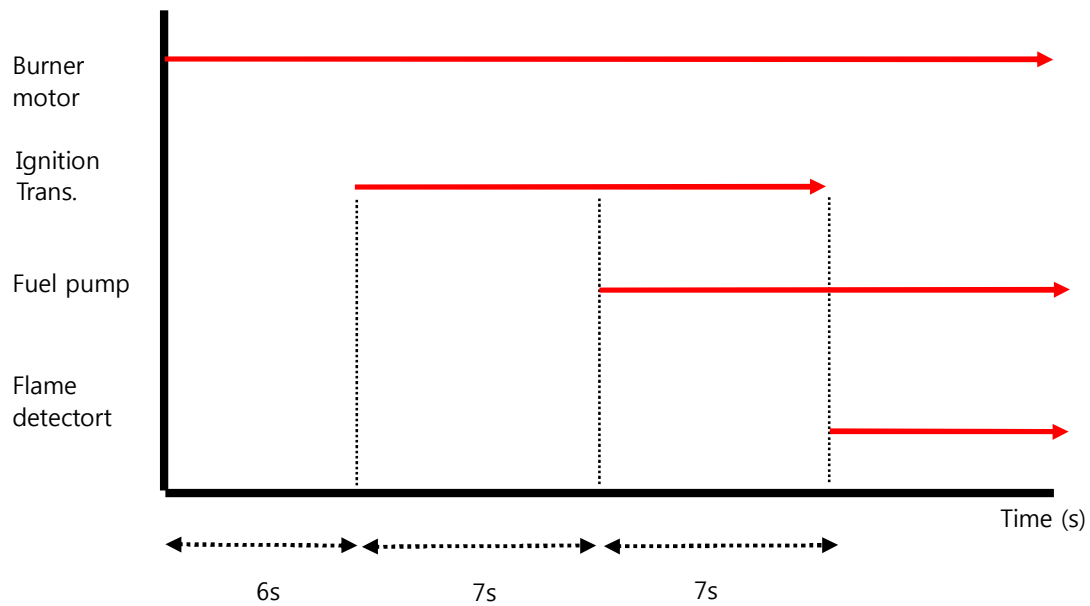


Fig. 8.1. Time chart for initial operation

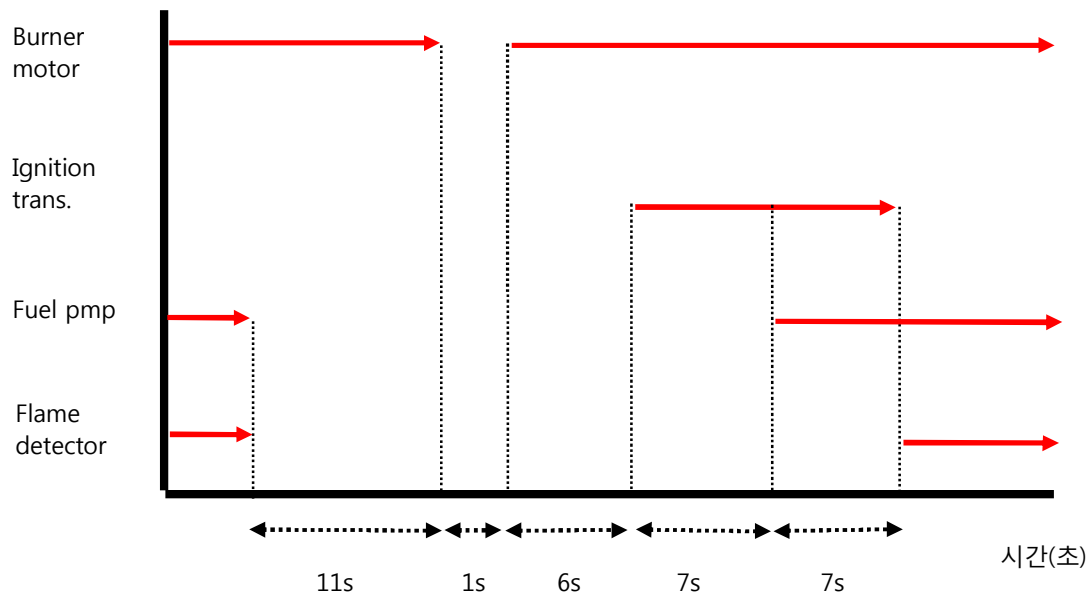


Fig. 8.2. Time chart in loss of flame during operation

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PRE PURGE TIME	6 ±1 s	Time for purging waste gas in the combustion chamber until ignition transformer is activated, for safety
PRE IGNITION TIME	7 ±1 s	Time interval for ignition transformer to operate before fuel injection to help ignition
POST IGNITION TIME	7 ±1 s	Time interval for ignition transformer to operate after ignition to prevent ignition failure caused by incomplete combustion and ensure stable combustion
POST PURGE TIME	11 ±1 s	Time for purging waste gas in the combustion chamber after burner off, for safety
BURNER SHUTDOWN TIME	1 s	Time from loss of flame to reignition

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## 8.6 Burner fan motor performance curve

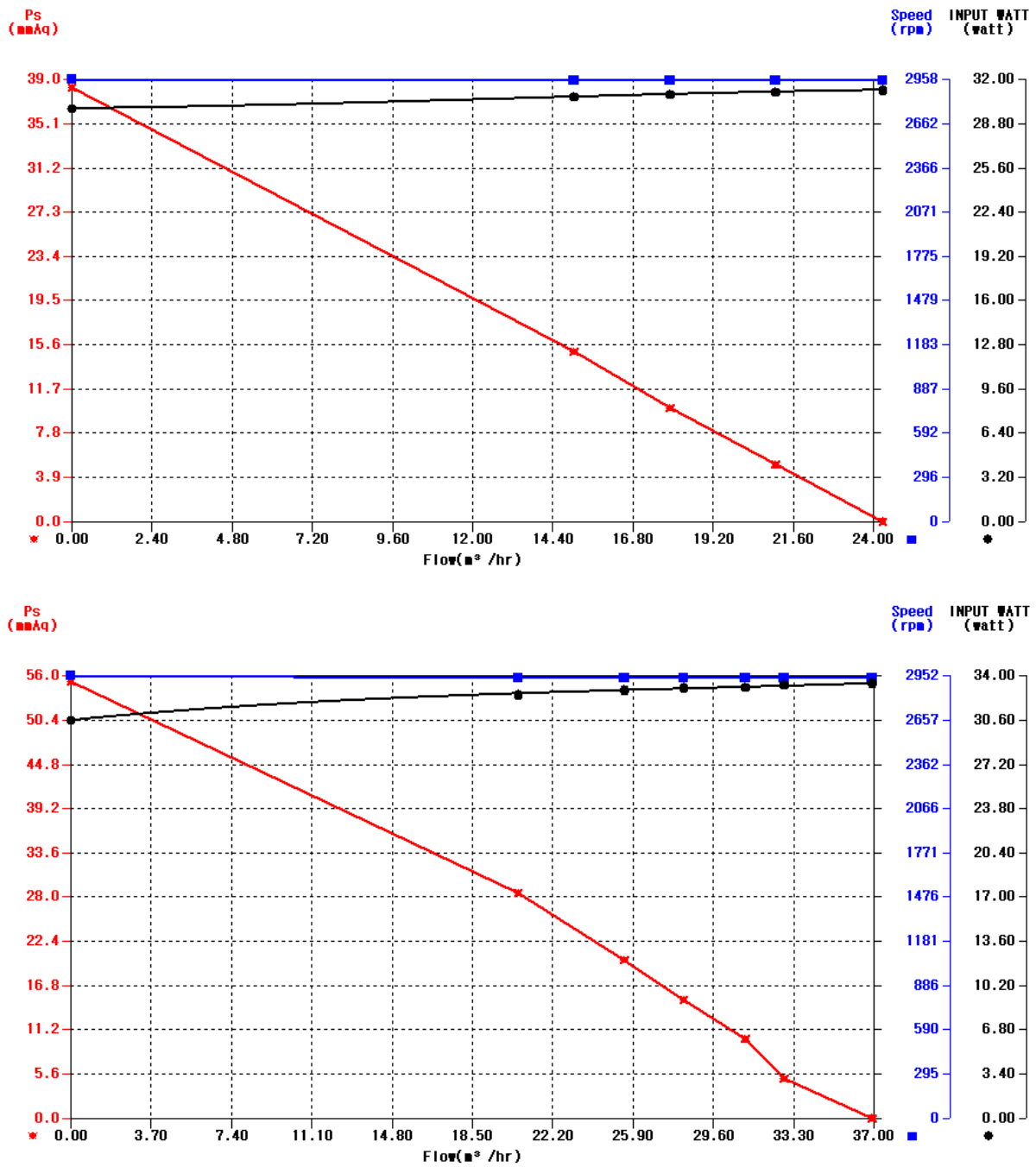


Fig. 8.3. Burner motor performance curve



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- ▶ The content of this manual may be subject to correction without prior notice for purposes of improving the appearance and capabilities of the product.
- ▶ This company shall not assume responsibility for any accident caused by the user's arbitrary modification of the product.