

Installation Manual

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This Installation Manual can be modified without any prior notice for product quality improvement purposes.

Installation Manual

1 Safety Warnings

 The cautions issued by this user's manual include critical information for the safety while using the product. When the user fails to adhere to the following requirements can cause death, serious damages, and a great property loss.

 For safety, according to the level of danger, we have indicated by '**Danger**', '**Warning**', '**Caution**' and the definitions for these terms are as follows :

 Danger	When the required terms are not followed, it indicates an urgent danger that may cause death or serious bodily injury.
 Warning	When the required terms are not followed, it indicates latent danger that may cause death or serious bodily injury.
 Caution	When the required terms are not followed, it indicates latent danger that may cause light injury or semi-serious injuries.
Caution	When the required terms are not followed, it indicates it may cause property damage, product malfunction or performance reduction.

1) The definitions of the symbols indicated on the product and installation manual are as follows:

 This symbol indicates "Caution" for bodily injury under particular conditions.

 This symbol indicates "Stop" for possible bodily injury or property damage.

 This symbol indicates a "Must" follow sign.

2) Since the specified warnings and cautions in the installation manual are not all the cautions for using the product, use more care for safety when using the product.

 Please read and understand this installation manual completely for safe use of this product.

 When disposing of the product, it must be done through the installer.

2

Safe and Correct Installation



This instruction booklet is considered an integral part of the product and must be delivered to the user together with the appliance.

It must follow the appliance also in every passage of property.

Store the booklet in a safe place and read it carefully before using the appliance as it contains important information to ensure safe installation, operation and maintenance.

This appliance must be installed following the National and the Local law and standard in force.

Installation and maintenance must be performed according to National and Local standard in force and according to the manufacturer's instruction and by qualified personnel skilled in the specific sector as foreseen by the law.

Incorrect installation can cause damage or physical injury and the manufacturer declines all liability for failure to observe instruction and standards.

In particular maintenance must be performed by qualified personnel.

In this case, an Authorized Manufacturer Service Centre represents a guarantee of professional and qualified services.

The appliance must be used according to the applications as specified in the design. Any other use has to be considered improper and therefore hazardous.

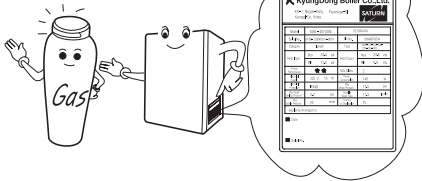
The manufacturer declines all contractual or not-contractual responsibility for damages caused by incorrect installation and incorrect operation and failure to observe the relative instructions.

Before Installation



Warning

Check the type of Gas used!



Please check the type of gas supplied at the installation location and the electrical lines before installation.

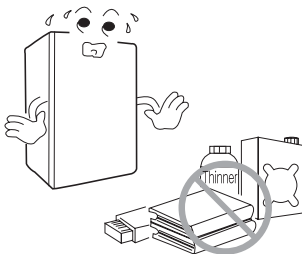
- Do not use any other type of gas than the one indicated on the boiler lower right hand corner rating plate. If such other type of gas is used, this may cause fire or explosion due to improper combustion.

Selection of Installation

When installing the unit, read the following items and install it according to designated method safely and correctly.



Warning

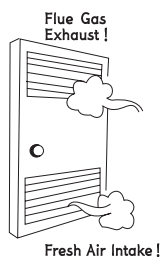


Please do not install in a location where there are flammable materials.

- There is a danger of a fire if you install this unit near any dangerous flammable materials such as gasoline, kerosene, benzene, or glue.



Warning



Ventilation!

When the boiler takes air from the place where it is installed, be sure that the opening ventilation are open.

- Any malfunction in the ventilation may cause improper combustion that may lead to Carbon Monoxide (CO) gas poisoning, a fire, or shorten product use life.

Please check to make sure that the location has sufficient space to prevent fire and the walls and ceiling are safe against fire.

- The unit should be installed near a non-combustible wall.(if combustible wall then install a heat-proof panels.)
- The side of the unit should be at least 150mm away from any inflammables.
- If right and left walls are non-combustibles then the unit should be at least 45mm from the walls.
- Heatproof panels (insulating plate should be at least 3mm of metal or other non-combustible materials.
- The top of the exhaust pipe should be at least 150mm from the ceiling.
- There is a danger of a fire if the above terms are not adhered.

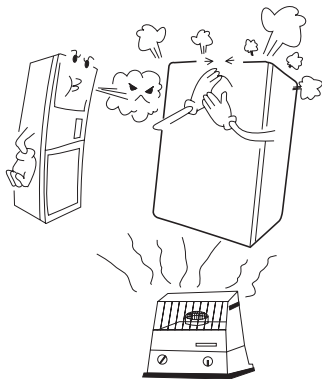


Please install the unit in a boiler room away from the effects of rain or wind.

- Any rain or rain may cause improper combustion causing exhaust fume poisoning.

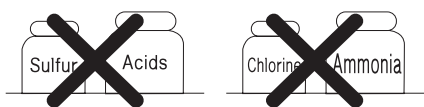


Warning



For B33 Type of installation. Please do not install the unit above any combusting appliance or near any air conditioning units.

- This may cause improper combustion causing CO poisoning.

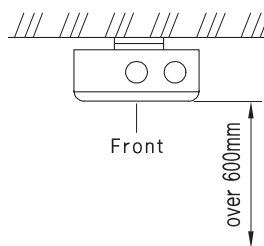
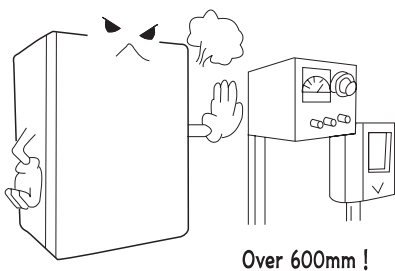


Please do not install the unit in a location where there are any corrosive materials such as ammonia, chlorine, sulfur, and acids.

- Boiler will be damaged quicker and cause improper combustion leading to CO poisoning.

Recommendations

- Install the unit by maintaining at least 600mm space between any electricity facility.



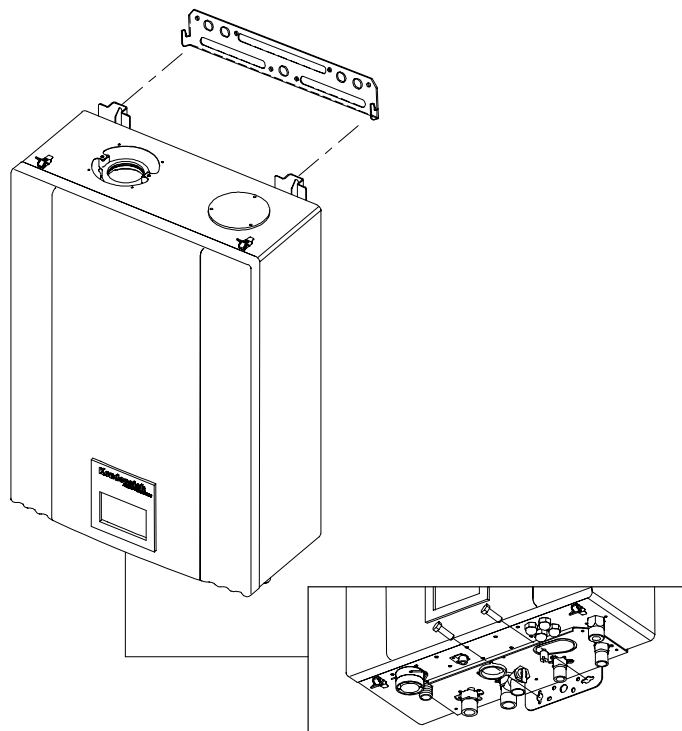
- Do not install near any location where there are many traffic of people.
- Do not install near any stairs or emergency exit.
- Ensure sufficient space for product inspection and repair.
- For repair and inspection, the front of the unit should have at least 600mm of space.



Please should be prepare water discharge hole (Device) at boiler installation.

Product Installation

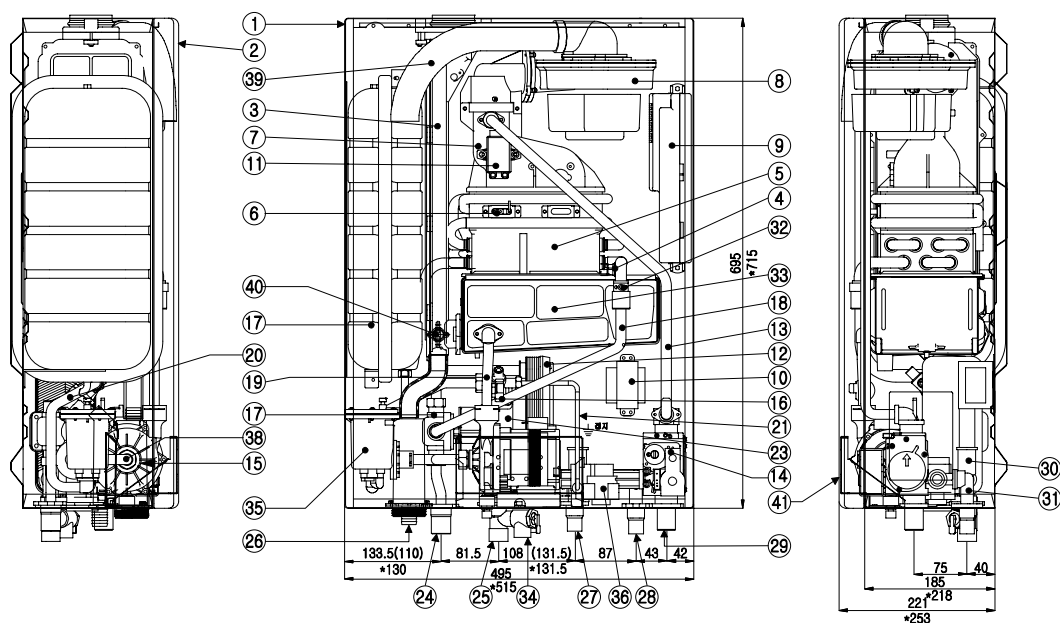
- Since about 35~45kg of weight will be placed, the installation wall should be reinforced if it lacks the capacity to endure such weight.
- Unit weight is specified in the product specification chart of this manual.
- When installing the unit, use the anchor bolt for firm installation to bear the unit weight.
- Fix the unit on the wall firmly to prevent any shaking during its operation.
(to prevent any noise, it is best to use buffer material such as rubber.)
- Gas boiler is for indoor use and should not be installed outside such as the place direct snow and rain. If it has to be installed outdoors then place sufficient guarding materials such as aluminum to prevent any affects of wind on the combustion and prevent any snow or rain from getting into the unit. Also, insulation must be done to prevent any freezing.



3

Boiler Size and Function Guide

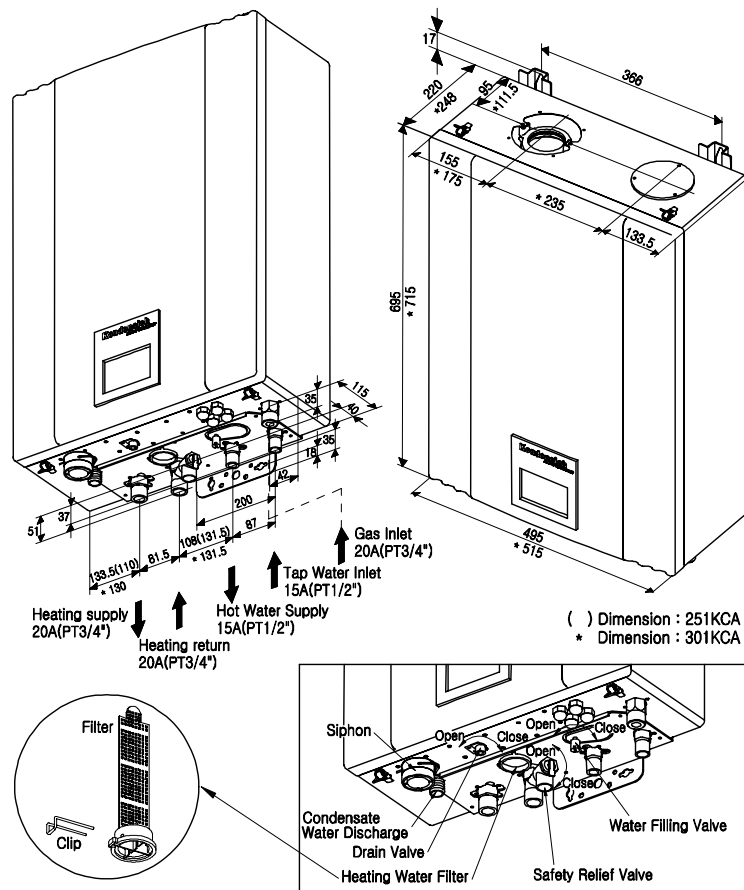
Boiler Schematic



() Dimension : 251KCA
 * Dimension : 301KCA

- | | |
|-------------------------------|----------------------------|
| 1. Cabinet | 21. Filling Pipe |
| 2. Cover | 22. 3-WAY Valve |
| 3. Exhaust Duct | 23. Strainer |
| 4. Safety Thermostat | 24. Heating Supply Adapter |
| 5. Copper H/E | 25. Heating Return Adapter |
| 6. Ignition & Flame Detection | 26. Siphon |
| 7. Mix Chamber | 27. DHW Outlet Adapter |
| 8. Fan | 28. DHW Inlet Adapter |
| 9. Main Controller | 29. Gas Inlet Adapter |
| 10. Transformer | 30. DHW Outlet Pipe |
| 11. Ignition | 31. DHW Inlet Pipe |
| 12. DHW H/E | 32. NTC Sensor |
| 13. Gas supply Pipe | 33. Stainless H/E |
| 14. Gas Valve | 34. Relief Valve |
| 15. Pump | 35. Auto Ait Vent |
| 16. Pressure Transducer | 36. DHW Flow Switch |
| 17. Expansion Tank | 37. Strainer Outlet Pipe |
| 18. H/E Outlet Pipe | 38. Pump Inlet Pipe |
| 19. H/E Inlet Pipe | 39. Inlet Tube |
| 20. Air Vent Outlet Pipe | 40. Safety Thermostat |
| | 41. Display Panel |

KDB -181/201/251/301KCA



- Condensed Water Discharge : Location where the condensed water is discharged (connect the discharge hose).
- Water Drain : Location where the water inside the boiler is discharged to prevent freezing in case of there is overflow of water or in case of long-term outing.
- Heating Water Filter(Strainer) : Improve the heating function by removing the contaminants inside the heating pipes using an inside filter. When heating is not done properly, remove the clip and clean the filter.
- Heating Water Filter(Strainer) : Filter is built-in to catch any contaminants inside the heating pipes to improve heating efficiency. When there is a problem with heating, remove the clip and clean the filter.
- Condensed water exit : Any condensed water is excreted from this part. (connect the draining hose)

Standard Piping Diagram



- All pipes should be inspected for leaks after assembly is completed to prevent any defects or leaks.
- All pipes other than the gas pipes should be insulated for prevention against freezing after assembly is completed.
- When connecting the pipes, after fixing the connections using the spanner, etc., connect it to the pipes.
- Distributor Specifications
 - Less than 5 holes : Inner diameter of over 36mm
 - Over 6 holes : Inner diameter of over 44mm
- Distributor material
 - Please use non-Corrosive material
 - Do not use aluminum, carbon steel pipes, cast iron materials since they are easily corroded.
- Gas Meter Specifications
 - 20,000 kcal/h or less : Over 3 level
 - 25,000~35,000 kcal/h : Over 5 level

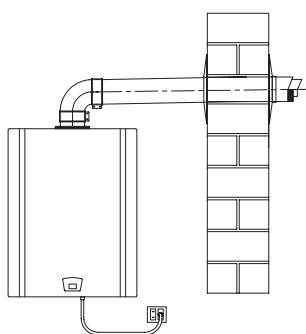
4

Electricity Line Construction



Warning

Electrical connection.



The Boiler has to be connected to the electrical installation by an "X" type power cable without plug.

The power cable must be connected to a 230V~50Hz main supply correct sequence Line-Neutral-Earth.

The main power supply must be also equipped with a multi-pole circuit switch, with a contact opening gap of at least 3 mm.

The electrical safety of the unit is guaranteed when correctly connected to an effective and efficient earth system as specified in the current safety standard.

The boiler is designed with IPX4d protection rating.

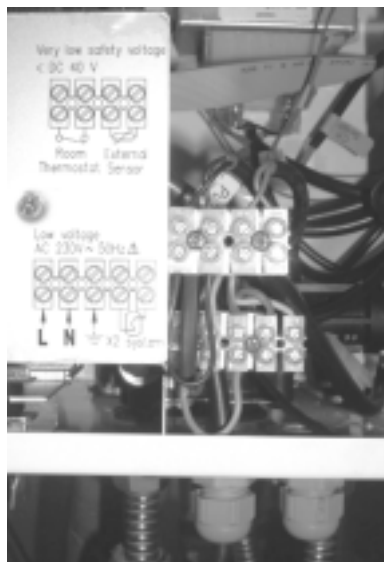
The power cable must be laid as shown in the figures.

For safety reason, please take the earth cable at least 2 cm longer than the Line and Neutral cable.

In the event of power cable replacement, please contact a qualified electrical technicians.

At the end of any cable installation or substitution, please squeeze the press cable in the boiler.

For the main power supply of the boiler, never use plugs, adapters, multiple sockets or extension leads.

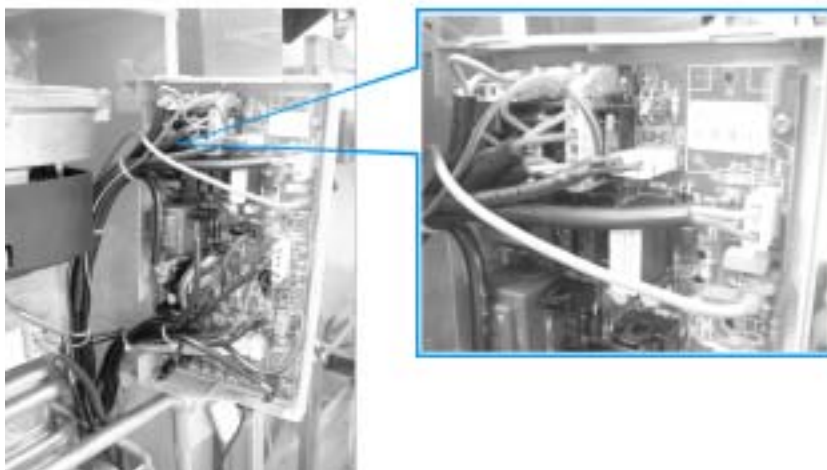


CAUTION

Boiler pipes must never be used to earth the electrical or telephone lines.

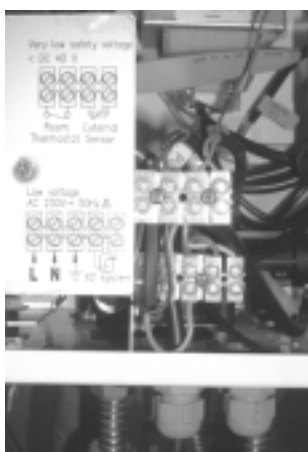


Warning



Fuse substitution

- In the event of mains fuse replacement on the PCB, please use a 2A quick blow fuse.
- Please switch-off the main switch upstream the boiler.
- Take away the plastic box containing the main PCB.
- Open the cover of the plastic box.
- Look and substitute the fuse in the upper side of PCB.



Room thermostat connection

External probe sensor connection

External tank storage thermostat connection

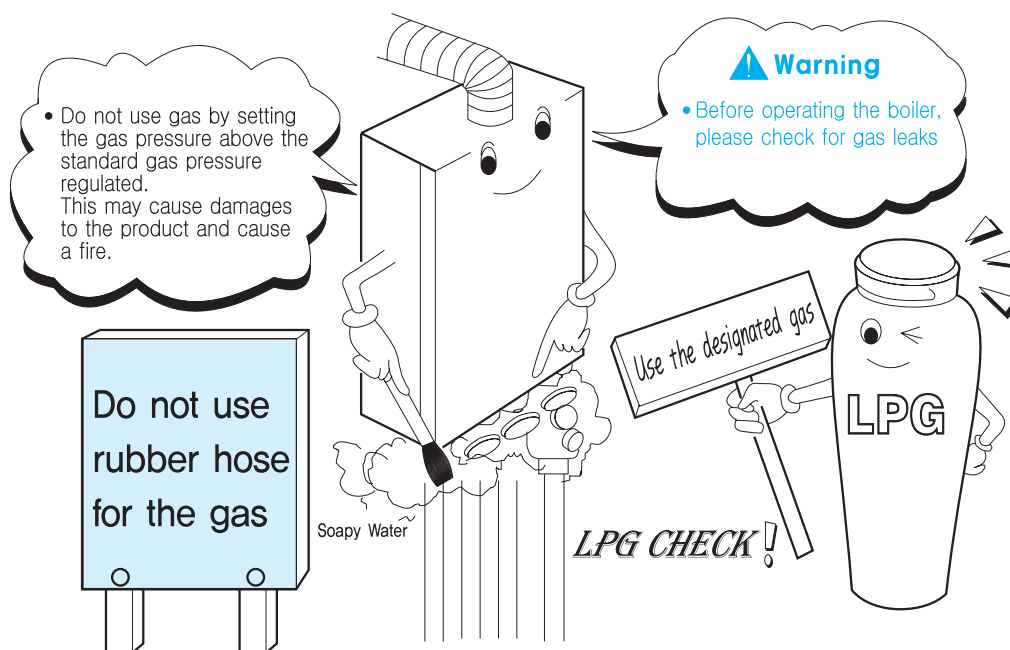
- The boiler is designed to be connected to a clean contact of a room thermostat. Please remove the jump from the terminal block N°3 and 4 and connect the cable coming from the free contact of the room thermostat.
- The boiler is designed to be connected to an external probe sensor for external environmental temperature checking. Please, connect it to the terminal block N°5 and 6 as showed in the figure.
- The boiler is designed to be connected to a free contact of an external storage tank thermostat. Please, connect it to the terminal block N°1 and 2 as showed in the figure.

CAUTION

The voltage of this connection is 230V
Finally squeeze the press cable in the boiler

5 Gas Pipe Construction

Gas pipe construction must be done by gas dealer or gas pipe installation dealer.



1 The diameter of the gas pipes for this unit is 15A (PT 1/2") or 20A(PT 3/4") for each model. See specification in this manual

2 Gas pipes must be metal flexible pipes that were approved by metal pipe or gas part inspection testing. When using LP gas, do not install the fuse cork and a middle gas shut-off valve must be installed.(installing fuse cork can cause malfunctions.)

3 When using LP gas, use caution of the following items :

- LP gas governor should be household low pressure governor that is proper for gas usage indicated.

- LP gas container should be 50kg and use two or more containers. (connect a twin valve to supply gas from the two containers simultaneously.)

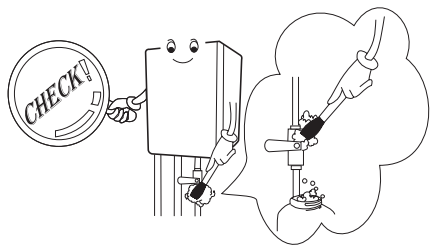
In case the container capacity is small, evaporation capacity is small that it may cause gas waste and normal operation may be hindered.

4 Boiler gas pipe must be directly connected to the main pipe and do not connect it along with other gas appliances.

CAUTION

In every case for gas pipes connection, please follows National and Local laws and roles.

! Danger

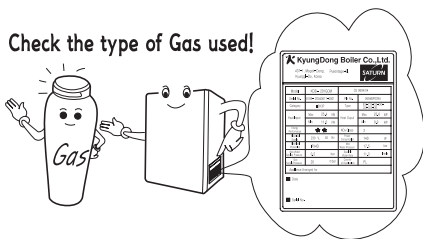


After gas pipe construction, a gas leak check must be done.

- In case of gas leak, it may cause an explosion that induces serious bodily harm or property damage.

! Warning

Check the type of Gas used!



Please complete the gas pipe construction after checking the required gas for the unit.

- If you use gas other than the one specified in the boiler lower right hand rating plate, it may cause incomplete combustion that can cause a fire or an explosive ignition.



When using a gas container, place the container in the cool shady place away from direct sunlight in the outdoors and fix the container properly to prevent tipping.

- An explosion may occur.

Pipe Material

! Pipe material should adhere to the KS standards.

Gas Pipe	Carbon steel pipe for pipe usage, copper or copper alloy pipe, metal flexible pipe approved by gas component part inspection testing.
Heating Pipe	Copper pipe or copper alloy + insulator, XLPE pipe + insulator
Hot Water Pipe	Copper or copper alloy + insulator, XLPE pipe + insulator

! Gas meter, at least 3 level for below 20,000kcal/h and at least 5 level for over 25,000kcal/h.

6

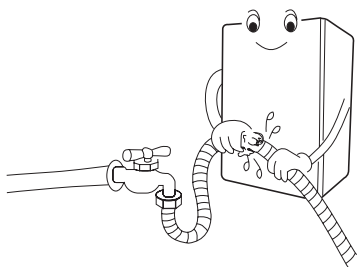
Heating and Hot Water Pipe Construction

Caution



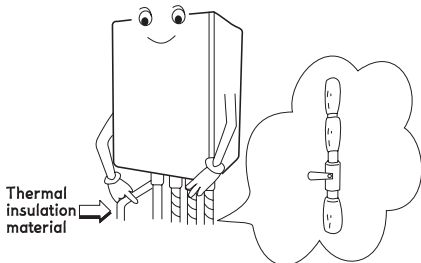
Do not add anti-freezing liquid to the heating pipes.

- This may shorten use life of the unit and cause malfunctions.



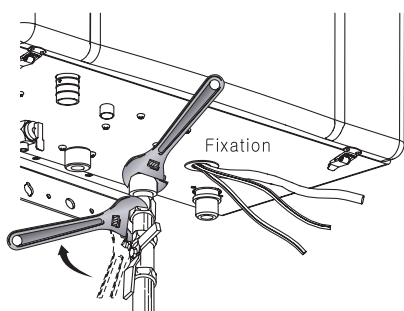
After completely cleaning out the pipes, then complete pipe construction.

- Any contaminant inside the pipes may reduce the heating and hot water efficiency as well as cause malfunctions.



Any exposed pipes must be insulated with insulation material.

- There may be freezing during the winter months.
- Since hot water cannot be used in case of supply water pipe freezes and when there is insufficient water inside the heating pipes, the water cannot be replenished making normal operation of the boiler impossible.



When completing the pipe connection construction, it should be done after tightening the boiler pipe adaptor with a tool such as a spanner.

- Do not use excessive force to connect the pipes or it may cause a leak due to damages to the external parts.



Distributor must be non-corrosive material.

Do not use aluminum, carbon steel pipes, and cast iron material since they are easily corroded.

Water Supply Construction

- The contact diameter of the water supply pipes of this unit is 15A (PT 1/2").
- In the entrance of the water supply, install water supply middle valve.
- To use this unit it's always necessary to have more than 0,5 bar inlet pressure for the filling of the installation and for domestic hot water production too.
- When sending hot water to the second floor, more than 98kPa {1,0 bar / 1,0kgf/cm²} water pressure is necessary.
- In the region where the water pressure is low, please install a pressure pump on the water supply pipe. (except, when in use, please use a pump that is not affected by the capacity.)
- Before connecting the water supply pipe and the unit, open the water supply valve to remove any excesses and sand from the pipes.
- When the water pressure is over 980kPa (10kgf/cm²) then install a pressure reducer valve.

Hot Water Pipe Construction

- The contact diameter of the hot water pipe of this unit is 15A (PT 1/2").
- Hot water pipe should be as short as possible.
- Water supply and hot water pipe should all be insulated.
- Please do not use allophone metals if possible and avoid any complex pipes.
- Please maintain at least 1/200~1/300 upward incline for proper drainage.
- Please connect the pipes in a way to avoid any collection of air inside the pipes.

Heating Pipe Construction

- The contact diameter of the heating pipes of this unit is 20A (PT 3/4").
- The diameters of the supply pipe and the circulation pipe should be the same.
- The pipe length should be as short as possible and any curvature or connections should be minimized.
- Connect a hose to the overflow hose connection hole to drain the water to the sewage.
- When connecting to the radiator, please install manual or automatic air vent on the top of the radiator to prevent any collection of air or steam inside.
- In case of any renovation / repair installation of the coal or oil boilers, please clean the pipes before connecting the unit to the pipe.
- For freezing guard, the exposed pipes must be insulated with insulation material.
- For Air Open Type model, the boiler and the heating pipes must be installed on the same floor.
- When the heating pipe is installed on the floor above the boiler (first floor), Air Closed Type model should be installed.
- For distributor, less than 5 holes must be over 36 mm and more than 6 holes must use over 44mm of diameters.

KyungDong Gas Boiler



After pipe construction is completed, you must check for leaks.



When modifying the central heating system apartment to individual heating, since there is possible flood due to excessive water storage and air residuals in the pipes with the existing pipes, complete a contaminant cleaning and air release from within the heating pipes and if the pipes are old, make sure you replace the heating pipes.

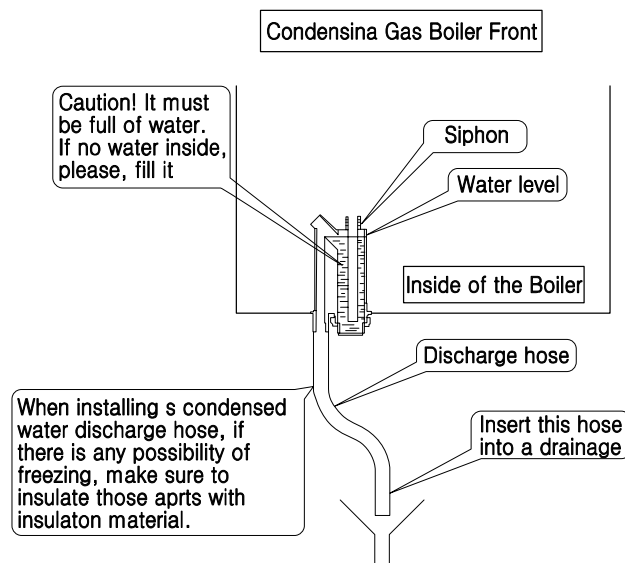


When installing condensed water discharge hoses, make sure the pipes where they can be frozen must be insulated.

Condensed Water Discharge

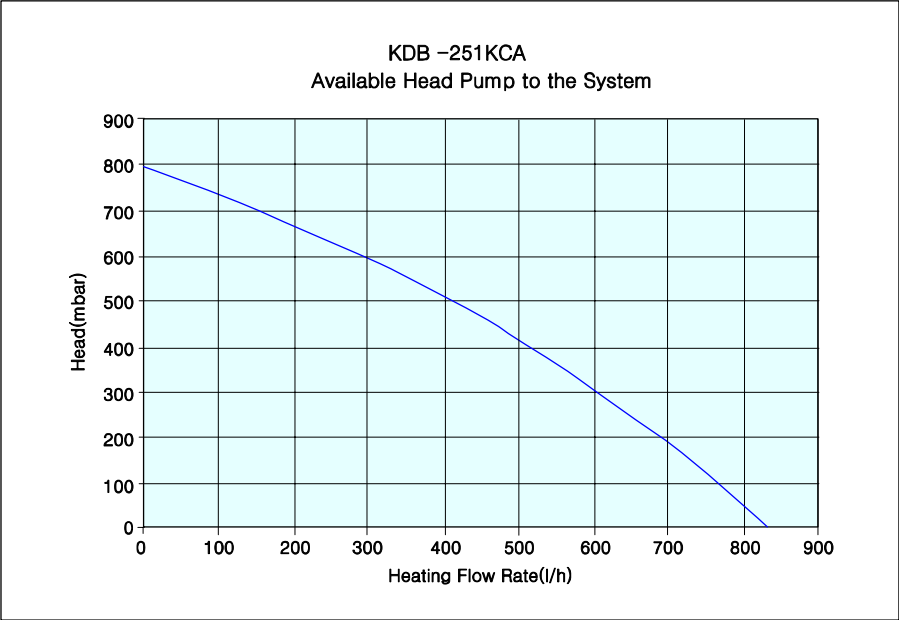
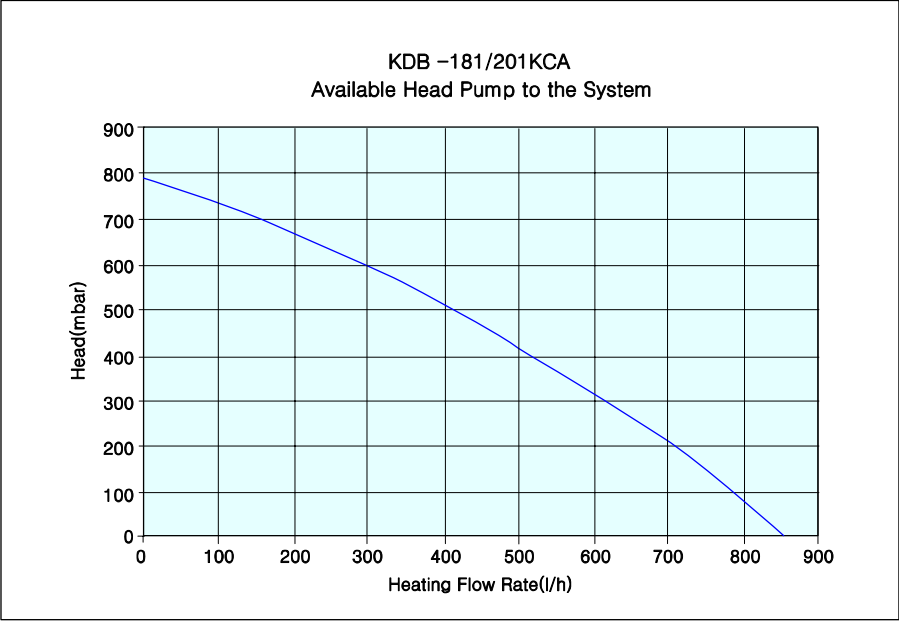
Gas Boiler KCA Model

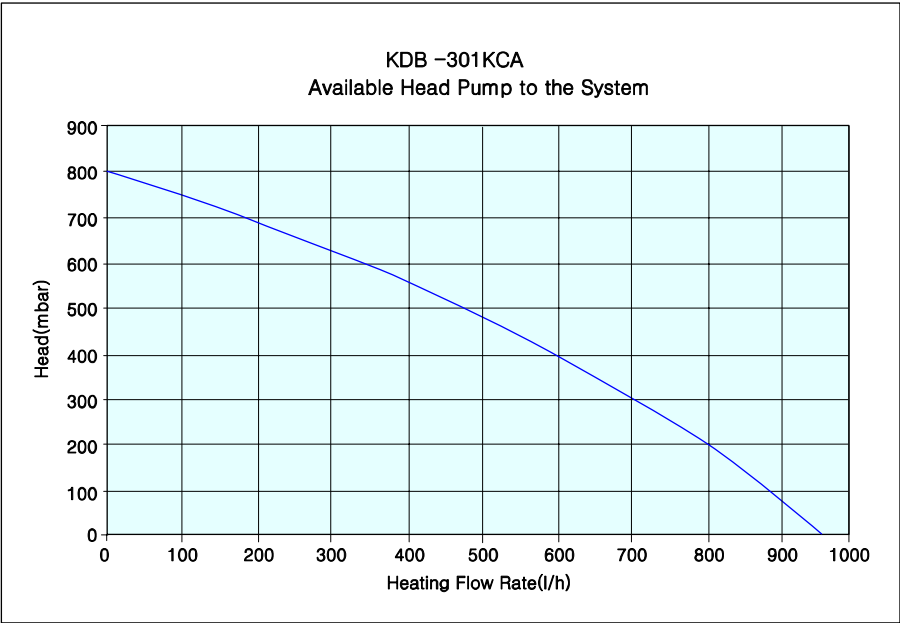
- Condensing boiler needs a release device since condensation occurs inside the boiler.
 - Connect the included condensed water discharge hose to the siphon exit at the bottom of the boiler and the end of the release hose must be connected to the sewage or the water conduit.
 - When using a separate release hose, use vinyl or plastic hose with more than 13 mm in diameter.
 - The siphon inside the boiler must be always full of water and if there is no water, fill it with water through the exhaust duct.
 - Condensed water should not be used for drinking water.
 - In case of a blockage due to contaminants inside the siphon, the condensed water cannot be released and the boiler goes in lock-out condition. Thus, please clean out the siphon at least once a year. (Cleaning Method : removed the clip the cup in the bottom side of the siphon).
- ! Be careful because of the siphon is full of condense. Then, please collect condensate water with a basin under the siphon





Available Head to the System





Anti - Freezing

- If unit is connected to the pipe and the pipe is not completely full of water, plug the power cord and in case of much bubbles inside the pipes, if you start the freezing guard function with less than sufficient number of pipes then this may cause the unit to rotate without operating normally, overheating the pump or induce malfunctions. Thus, make sure to release the air inside the pipes and check the water level.
- Pipes must be completely insulated.
- Please do necessary measures to ensure freezing guard in locations where it is extremely cold such as covering the exposed pipes with insulation heater. (It is also proper to insulate by constructing the pipes next to the heating pipes.)
- If any freezing may occur, condensed water discharge hose must be completely insulated with insulation material.
- When not using the boiler for a long time, completely drain the unit of water to prevent freezing and close the gas shut-off valve and unplug the unit.
- The exposed parts must be protected from freezing by covering with at least 25mm of insulation material. (Colder locations it should be at least 50mm.)

Recommendations

<General Cautionary Items in Pipe Construction>

- Each connection part must be tightened with union or nut.
- Water supply pipe, hot water pipe, heating pipe, distributor, and check valve must be insulated to prevent freezing.
- Pipe materials must be national or local standard materials.
- Before connecting the heating and hot water pipes to the boiler joint, please remove any iron shavings that were produced during the pipe construction or any contaminants inside the pipes. (Complete Cleaning of the Pipes)
- Please do not use any well water for heating. If it is unavoidable that you must use well water then please remove any contaminants from the pipes.
- Do not connect to the pipes (particularly the metal pipes) that were used for coal or oil boilers if at all possible. (This may cause malfunction or shorten its use life.) If unavoidable, please remove any contaminants from the pipes.
- Any contaminants inside the pipes reduce heating and hot water efficiency and causes malfunctions.
- Please completely remove any air from each of the pipes.

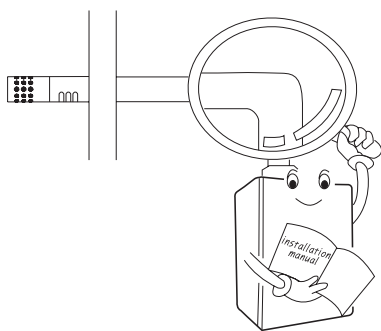
7

Intake / Exhaust Flue Construction

- Please use only the flue approved by our company with the gas boiler manufactured or sold by our company.
- If any malfunction or accidents occur by using flue that was not approved by our company, our company will not be held responsible.

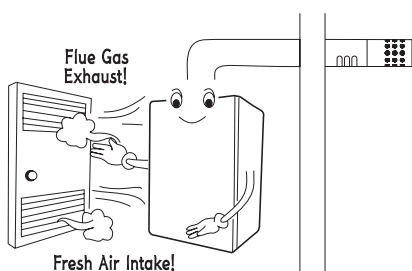


Warning



The exhaust and intake flue construction must be done according to the instructions given.

- If the intake and exhaust flue construction is done improperly, there is a possibility of exhaust gas poisoning and shorten the use life of the product.

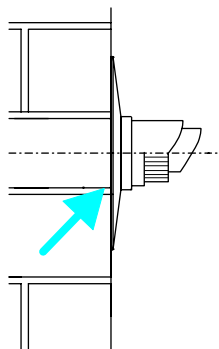


Intake or exhaust flue should be installed in a location where there is the good ventilation to the outside and there is no seepage of exhaust gas into the inside of the house.

- It is possible to cause incomplete combustion due to lack of oxygen and presence of exhaust gas and exhaust gas seepage may cause Carbon Monoxide poisoning.



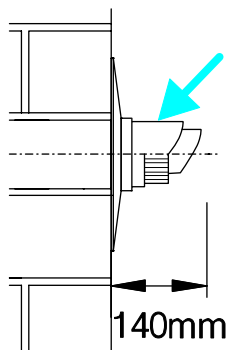
Warning



In the tunnel portion where the pipe goes through the wall, it must be completely airtight in order to prevent any exhaust gas from re-entering inside.

- If the exhaust gas enters inside, it may cause gas poisoning.

When the exhaust flue system goes through combustible wall, or ceiling, cover with at least 20mm of non-combustible materials and keep at least 50mm of space.

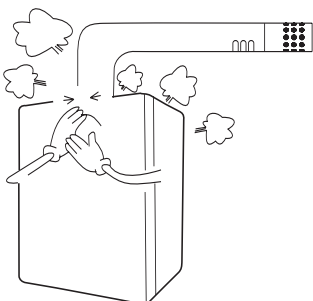


Please install so that the intake side or the exhaust side of the supply/exhaust pipes are not inside of the wall.

- If the intake/exhaust openings are inside of the wall, there are may be incomplete combustion due to lack of oxygen causing Carbon Monoxide poisoning.

Please install so that the rain cover protection is placed in the upper side.

- If the cover is not correctly placed, the rain can enter in to the boiler through the boiler flue system.

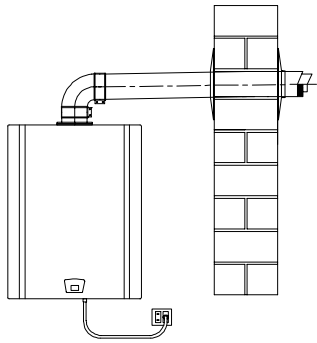


The connection portion of the exhaust pipe must be completely airtight.

- In case of leaks, exhaust gas leakage may cause carbon monoxide poisoning.

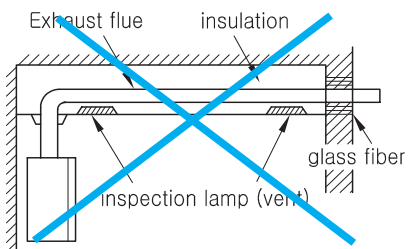


Warning



The flat portion of the flue should be installed upward at about 3° to prevent any discharge of the condensate away from the wall.

- Using proper, approved flue system and following the producer's instruction it's possible to prevent any discharge of condensate away from the wall and avoid reenter of rain in to the flue system.



The flue system has to be installed in view.

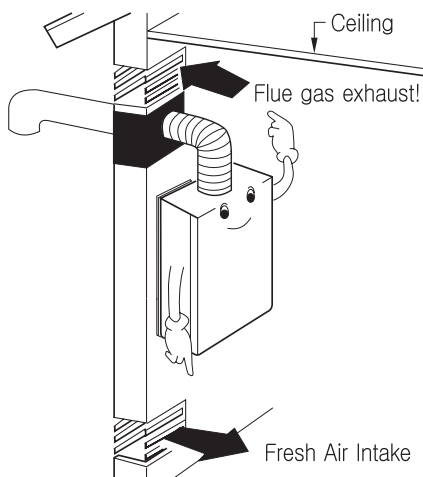
- The flue system have to be installed in view for a easy control and in order to avoid that any kind of exhaust leak may spread through the hid.

Forced Exhaust(FE) Type Pipe Construction, Type B33

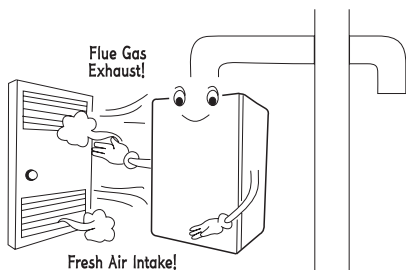


Warning

Please install supply ventilation and ventilation.



- Lack of ventilation may cause incomplete combustion due to oxygen shortage and if the ventilation fan malfunctions, incomplete combustion may result and exhaust gas may seep into the inside causing carbon monoxide poisoning.
- The basic criteria to follow is to have an opening of at least 6 square centimeter per each kW of input capacity.
- For the choice of the correct dimension of the holes of ventilation please follow the national and the local laws and standards.



For B33 installation type, intake or exhaust flue should be installed in a location where there is a good ventilation from the outside and there is no seepage of exhaust gas into the inside of the house.

- Please follow the instruction supplied in the following paragraph.
- It is possible to cause incomplete combustion due to lack of oxygen and presence of exhaust gas and exhaust gas seepage may cause Carbon Monoxide poisoning.

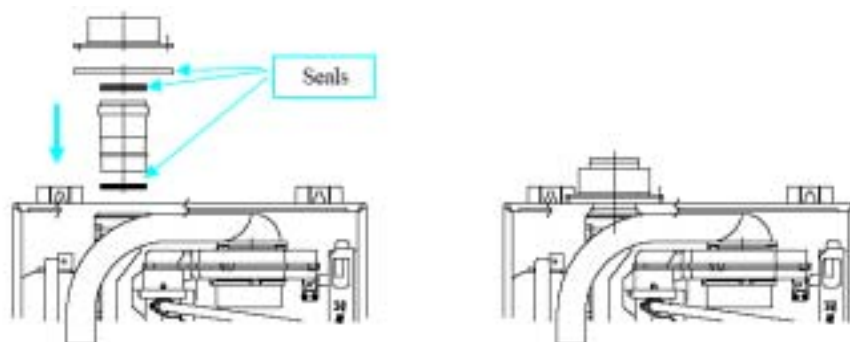
Forced Draught Balanced Flue Construction Type C13 – C33 – C43 – C53 – C63 – C83

KCA Family boilers may installed with many different flue type system ;

B33 – C13 – C33 – C43 – C53 – C63 – C83

For the installation of the different kind of flue system, please follow carefully the following instructions.

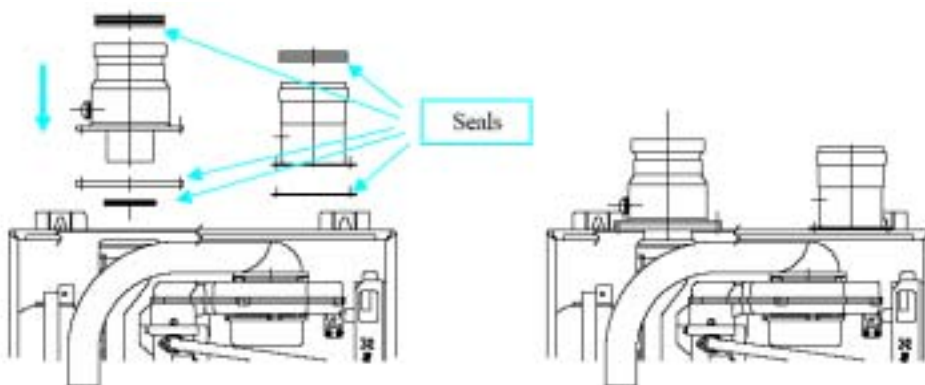
Flue Adapter for Concentric Flue System



Each concentric flue system kit includes an adapter, as showed in the figure, that permits to connect the boiler to the flue system.

Take care about the correct position of the components and of the seals as showed in the figure.

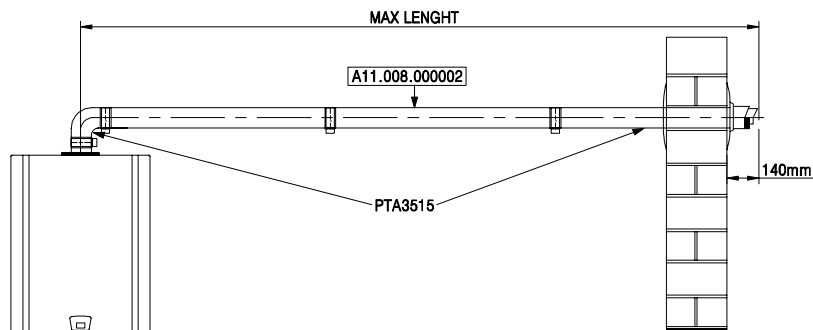
Flue Adapter for Separate Flue System



Each separate flue system kit includes an adapter, as showed in the figure, that permits to connect the boiler to the flue system.

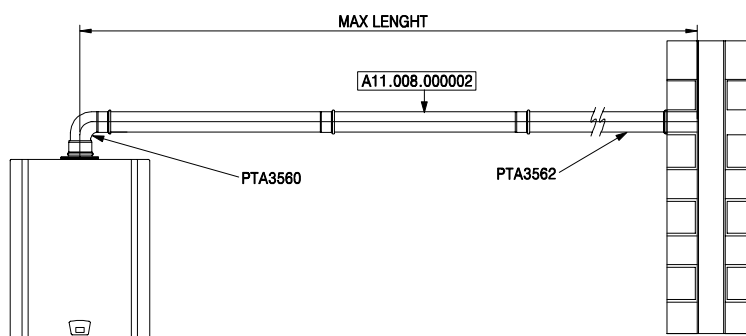
Take care about the correct position of the components and of the seals as showed in the figure.

Horizontal concentric flue system 60/100mm – Type C13



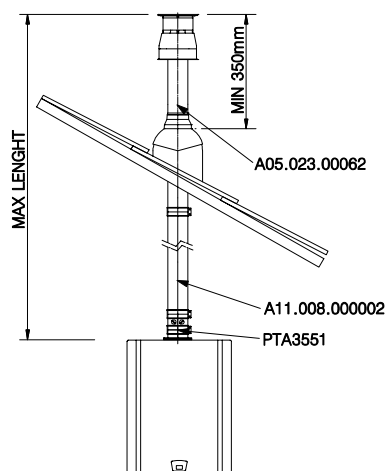
The MAXIMUM LENGTH of this configuration is 3,80m.

Horizontal concentric flue system 60/100mm – Type C43



The MAXIMUM LENGTH of this configuration is 3,80m.

Vertical concentric flue system 60/100mm – Type C33



The MAXIMUM LENGTH of this configuration is 3,80m.

Calculation of the maximum length with the concentric bend included in the flue system

These flue systems may be oriented in all the possible directions: front, back, right and left hand. They may also include some special components, like the concentric bends, in order to reach some particular position.

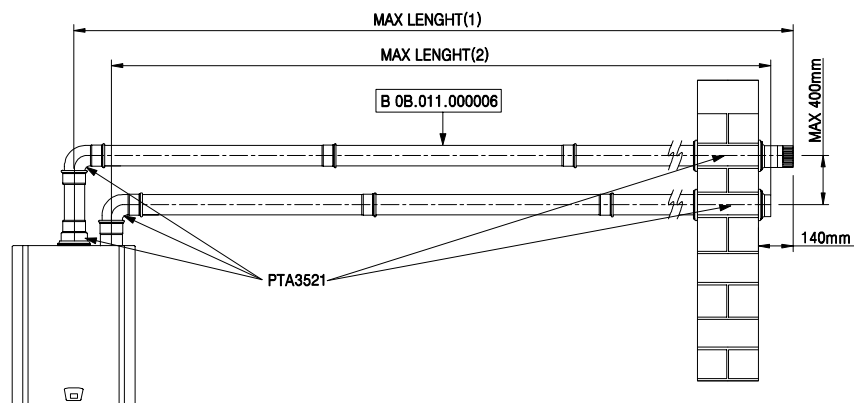
If it is necessary to insert some concentric bends, please consider that each of them has a resistance corresponding to the following linear length:

Equivalent resistance - Reduction of length		
Bend 60/100 mm	 90° Cod. A 11.008.000008	1,3 m
	 45° Cod. A 11.002.000057	1,0 m

Then, if it's necessary, for example, to insert one 90° bend in the 60/100 flue system type C13, the total length that the horizontal flue system may reach is not 3,80m but not more than 2,50m

If it's necessary to insert two 45° bends in the 60/100 vertical flue system type C33, the total high that the vertical flue system may reach is not 5,00m but not more than 3,50m.

Horizontal separate flue system 80/80 mm – Type C13



The MAXIMUM LENGTH of this configuration is 5,50m.

In order to considered C13 type, the terminals for the air intake and for the exhaust outlet have to be included in a square of 50cm.

It is also possible to install the terminal at a longer distance than this or on a different wall.

In order to avoid the look out of the boiler, it's forbidden to install the intake and the outlet of the flue system on the wall placed to the opposite side of the house.

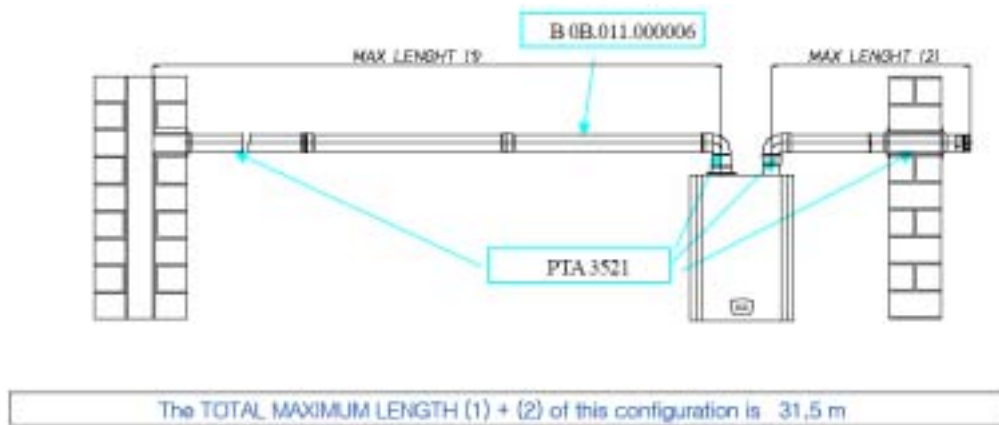


Warning

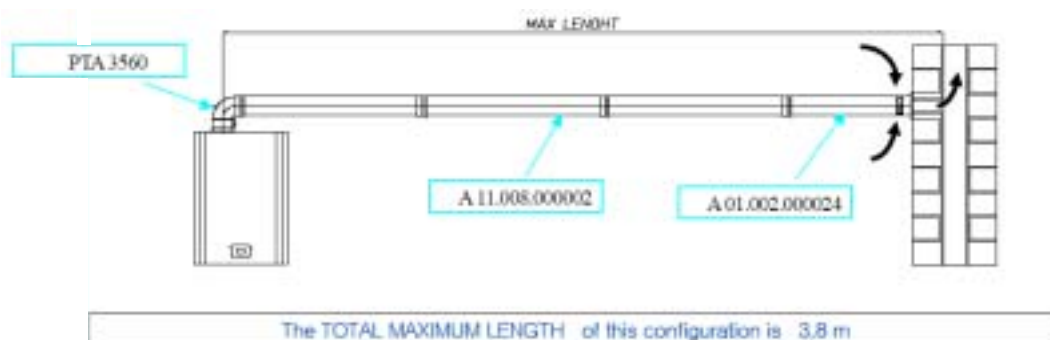
With the above C13 flue system type (80/80 separate and 60/100 concentric) please **NEVER** close the terminal part with any object (like, for example, plastic bag or other devices during the painting of the external side of the wall) that may force the exhausts to return in to the air duct.

On the contrary it exist the concrete risk of explosion of the sealed chamber of the boiler.

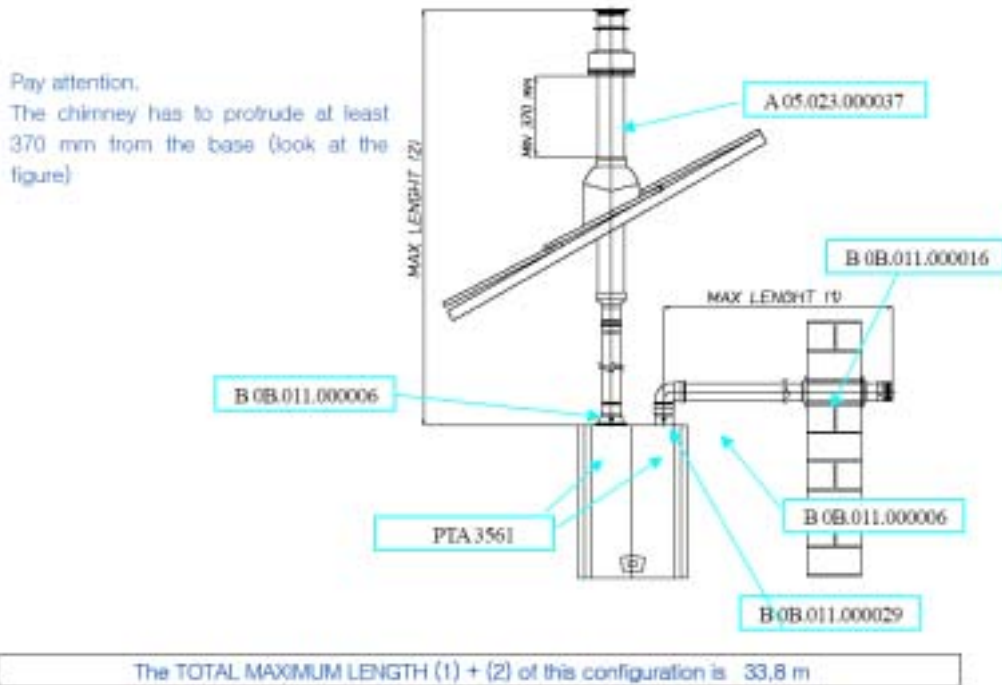
Horizontal separate flue system 80/80 mm – Type C83



Horizontal separate flue system 80/80 mm – Type B33



Horizontal/Vertical separate flue system 80/80 mm – Type C53



Calculation of the maximum length with the concentric bend included in the flue system

These flue systems may be oriented in all the possible directions: front, back, right and left hand. They may also include some special components, like the concentric bends, in order to reach some particular position.

If it is necessary to insert some concentric bends, please consider that each of them has a resistance corresponding to the following linear length:

Equivalent Resistance – Reduction of Length		
Bend 80 mm	 90° Cod. B 0B.011.000029	2,2 m
	 45° Cod. B 0B.011.000030	1,4 m

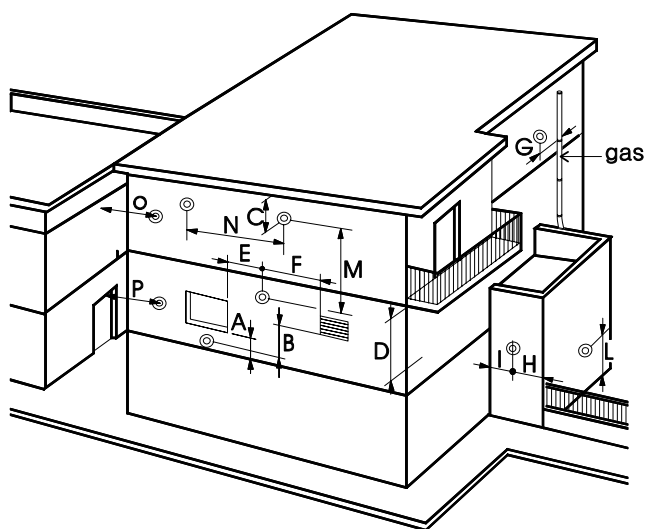
Then, if it's necessary, for example, to insert others N°2 90° bend in the flue system type C53, the total length that the flue system may reach is not 33,70m but not more than 29,30m

Calculation of the maximum length with the concentric bend included in the flue system

For this arguments, please, follows the instructions contained in the previous paragraph.

Position of the terminal for the exhausts

The terminals for the exhaust have to respect certain minimum distances from the elements of the building as showed in the following prospect.



DESCRIPTION		mm
Under the window	A	600
Under an air opening	B	600
Under a eaves	C	300
Under a balcony	D	300
From a near window	E	400
From a near air opening	F	600
From a discharge tube	G	300
From a building corner	H	300
From a recess	I	300
From the ground or other floor	L	2,500
Between two terminal in vertical	M	1,500
Between two terminal in horizontal	N	1,000
From a facing wall without any air opening or any other terminal in a radius of 3m	O	2,000
From a facing wall with air opening or other terminal in a radius of 3m	P	3,000

Cautions for Installation

- Intake/exhaust flue must be placed on the wall that connects to the outside.
- There should be no dangerous materials or obstructions near intake/exhaust flue.
- The wall where intake/exhaust flue are placed should be incombustible interior material.
- The connection part of the exhaust flue must be airtight by inserting its proper sealing gasket ; then sufficiently pushing it through. Please check for any exhaust gas leaks.
- When the exhaust flue goes through the combustible wall(including the flue), it should be insulated with over 20mm of incombustible material and keep at least 50mm from any combustible materials.
- In the exhaust flue or exhaust elbow connection portion, insert its proper sealing gasket and connect it so that it does not disconnect and allow any exhaust gas leaks.
- Cleaning of the Intake/exhaust flue should be done after turning off the boiler and cooling the pipes.

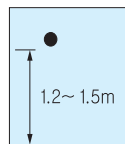
8

Thermostat Installation Construction

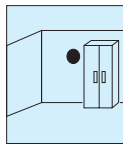
Installation Location

- Install on a wall where the heating occurs such as the bedroom.
The installation location should be at least 1.2 ~ 1.5m from the floor where there is plenty of ventilation.
- Do not install in a location where it is close to the common door, where there is cold draft, where there is direct sunlight, where a child may reach it.

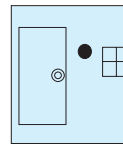
Examples of Installation location (○ : thermostat)



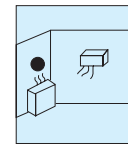
(O) Well-ventilated room where the heat of the heater does not reach directly.



(X) Where there is no ventilation



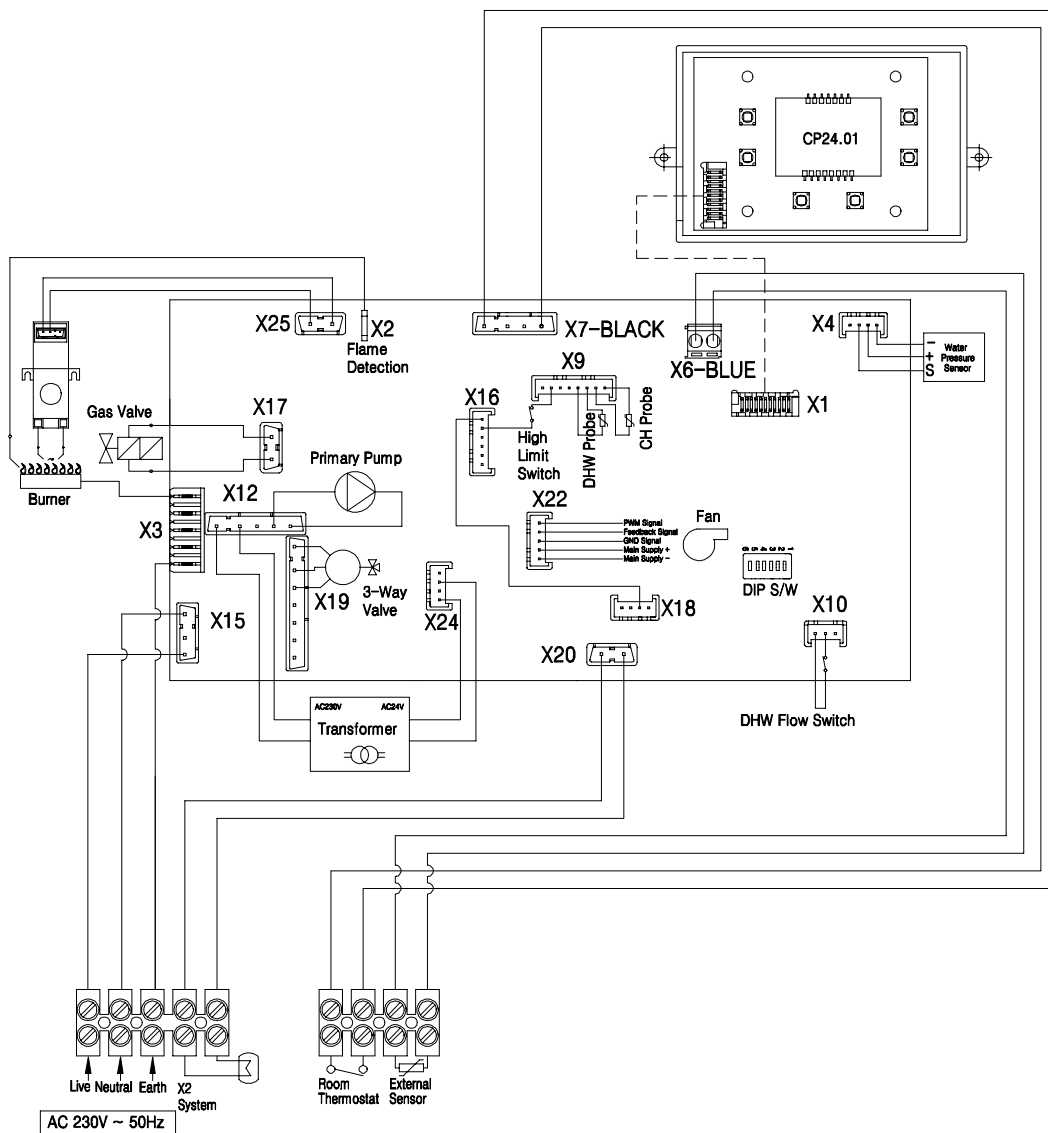
(X) Where there is cold draft such as near the door or window



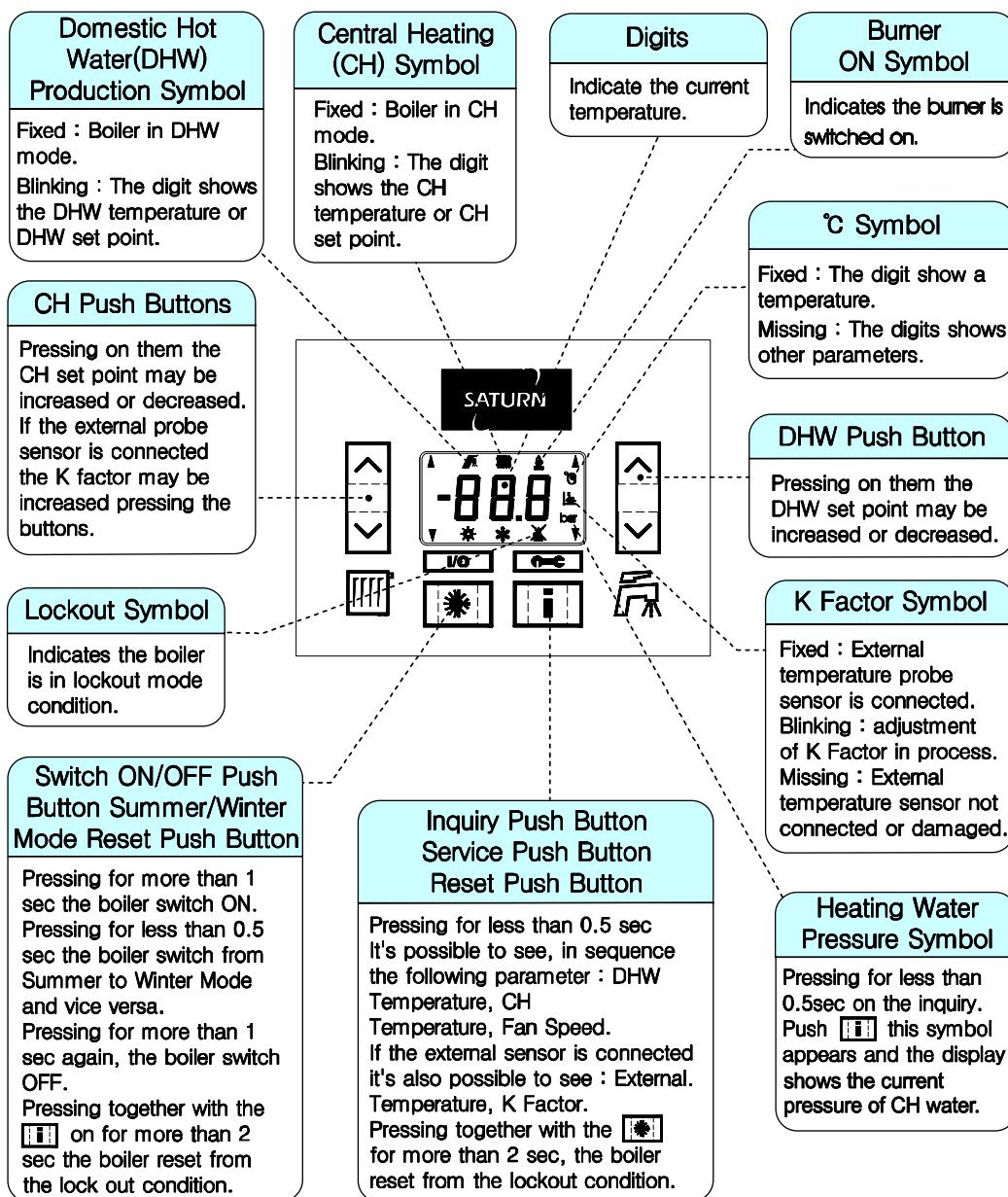
(X) Where there is direct heat from heater or other heat sources

9 Wiring Diagram

Wiring Connecting Diagram



10 Display Interface



Fault Codes

- The most important fault are detected by the PCB and showed through the display interface.
- When a fault occur, the digits start to blink.
- The left digit shows the E letter (As Error Code).
- The 2nd and 3rd right digits show one of the following numbers :

Error Code	Problems
E02	NO water circulation inside the boiler
E03	Lockout for ignition failure
E05	Heating sensor interrupted
E06	Heating sensor short circuit
E07	Domestic hot water sensor interrupted
E08	Domestic hot water sensor short circuit
E09	Fan failure
E10	Heating water pressure under the allowable minimum Heating pressure transducer short circuit (signal->earth)
E13	Heating water pressure over the allowable minimum Heating pressure transducer short circuit (signal->+)
E15	Main supply frequency error (~50Hz)
E16	Lockout for high limit switch Lock out for chimney thermostat intervention
E20	High Limit Switch or Chimney Limit Switch intervention during a stand-by condition
E21	Tension falling of the main supply during last 24 hours

Serviceman menu (Synthesis)

- When the boiler is in working mode, pressing the  button and the left side  button contemporaneously for at least 10 seconds it's possible to enter in the serviceman menu and to set some parameters as follows.
- A complete explanation of the serviceman menu procedure is written in the following chapters.

No.	Parameter	Range	Corresponding Parameter	Default
0	Ignition capacity	28~38	Min ~ Max input	33
1	Pump heating overrun	0~100	0 ~ 2,000 sec	50
2	Anti fast cycling timer	0~100	0 ~ 600 sec	50
3	Domestic Hot Water pump overrun	0~100	0 ~ 30 sec	50
4	Central heating set point range	0 - 1	0 ; 40 ~ 80 1 ; 30 ~ 50	0

User menu (Synthesis)

- When the boiler is in working mode ON, pressing the  button for less than 0.5 seconds it's possible to look, on the display, at the following parameters in sequence :

No.	Parameter	Display
1 st	Heating water pressure	 digits
2 nd	Domestic hot water temperature	 °C digits
3 rd	Central heating temperature	 °C digits
4 th	External temperature ⁽¹⁾	 °C digits
5 th	K factor ⁽¹⁾	 digits
6 th	Fan speed (rpmx10)	digits
7 th	Tension falling during last 24 hours	E21 (if exist)
	Return to the standard visualization	

(1) The external temperature and the K factor are shown if the external sensor is present. A complete explanation of the user procedure is written in the “user manual” chapter.

11 Change of Gas

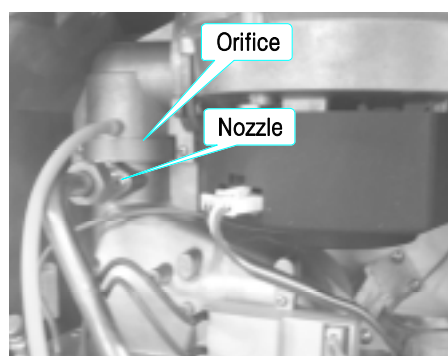
Gas Type Conversion

If it's necessary to convert the boiler for different type of gas than what specified on the data plate, the specific "gas kit conversion" must be requested for a quick and easy conversion.

Conversion of the gas type must be done by a very skilled engineer authorized by the manufacturer.

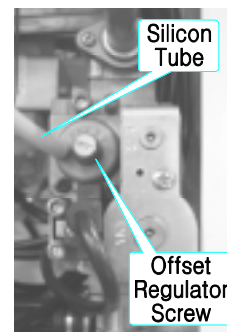
The gas conversion may be done following these operations :

- Remove the front panel of the boiler.
- Replace the gas nozzle located in the front side of the mix chamber and the air orifice located on the top side of the mix chamber, between the fan adapter and the mix chamber, respecting the data listed in the following table.



Nozzles and Orifices					
		181KCA	201KCA	251KCA	301KCA
G20	Ø nozzle	5,55	6,80	5,95	6,70
	Ø orifice	24,5	28,0	25,5	29,0
G25	Ø nozzle	6,30	7,90	6,75	8,05
	Ø orifice	24,5	28,0	25,5	29,0
G27	Ø nozzle	6,65	8,40	7,00	8,20
	Ø orifice	24,5	28,0	25,5	29,0
G30	Ø nozzle	3,65	4,20	3,95	4,40
	Ø orifice	22,0	24,5	23,0	25,5
G31	Ø nozzle	4,25	5,15	4,55	5,15
	Ø orifice	24,5	28,0	25,5	29,0

- Insert the probe of the combustion analyzer in to the exhaust proving device of the flue system.
- Check the CO₂ level at the maximum output.
- Check the CO₂ level at the minimum output.
- Insert the probe the micro-manometer in the silicone tube connecting the gas valve to the fan adapter (by means, for example, an additional "T" inserted the silicone tube)
- Verify that the values of CO₂ and the values of the nozzle pressure are according with the following tables. Take care about the difference of the CO₂ level existing from the max output the min output. This difference must be respected.



KyungDong Gas Boiler

- Take care over all about, the CO₂ level to the min. output, if it's not correct, adjust it turning the screw located in to the gas valve. Turning the right CO₂ level will increase. After this adjustment, check one more time the CO₂ level to the MAX output.

Gas Nozzle Pressure – Gas Flow Rate														
Gas Category				G20 Natural Gas		G25		G27		G30 Butane		G31 Propane		
Item	Output			Input	Nozzle Press.	Gas Flow Rate	Nozzle Press.	Gas Flow Rate	Nozzle Press.	Gas Flow Rate	Nozzle Press.	Gas Flow Rate	Nozzle Press.	Gas Flow Rate
Model	load	(Kcal/h)	(kW)	(kW)	(mbar)	(m³/h)	(mbar)	(m³/h)	(mbar)	(m³/h)	(mbar)	(m³/h)	(mbar)	(m³/h)
181KCA	MAX	17,962	20,9	21,4	6,3	2,27	6,5	2,63	6,3	2,69	6,5	1,69	6,4	1,66
	MIN	8,597	10,0	10,2	1,5	1,08	1,5	1,26	1,5	1,28	1,6	0,80	1,6	0,79
201KCA	MAX	20,000	23,3	23,9	6,4	2,53	6,6	2,94	6,6	3,00	6,6	1,88	6,3	1,86
	MIN	9,741	11,3	11,5	1,5	1,22	1,6	1,42	1,6	1,44	1,6	0,91	1,6	0,89
251KCA	MAX	24,383	28,4	29,2	8,8	3,09	8,9	3,59	8,9	3,67	9,5	2,30	8,9	2,27
	MIN	9,796	11,4	11,6	1,5	1,23	1,5	1,43	1,5	1,46	1,5	0,91	1,5	0,90
301KCA	MAX	29,083	33,8	34,9	6,9	3,69	6,9	4,30	7,0	4,38	7,9	2,75	6,9	2,71
	MIN	12,765	14,8	15,1	1,4	1,60	1,4	1,86	1,4	1,90	1,4	1,19	1,4	1,17

Pressure tolerance : $\pm 2,0$ mbar

CO ₂ Level					
		G20/G25/G27	G30	G31	
	Output	CO ₂ (%)	CO ₂ (%)	CO ₂ (%)	Tolerance (%)
All Boiler	MAX	9,3	12,5	10,6	$\pm 0,3$
	MIN	8,9	12,0	10,1	$\pm 0,3$

Fan Speed					
Output	181KCA	201KCA	251KCA	301KCA	Tolerance (rpm)
MAX	4,550	4,550	5,300	4,980	± 50
MIN	2,250	2,250	2,250	2,250	± 50
Ignition output	3,300	3,300	3,300	3,300	± 50

- Close and seal, for example by paint, the exhaust proving device, the silicone tube connected to the gas valve, and the offset regulation screw.
- Stick a new data plate on the boiler, over the old one, with the correct the gas and the correct inlet pressure.

Checking after gas type

After ensuring the correct gas conversion with specified nozzles, orifices and checking the correct CO₂ level, please ensure that :

- There is no flame return in the combustion chamber
- All flame is not excessively high or detached from the burner
- All the probe used during the conversion are perfectly closed
- There are not leakages from the gas circuit

Controller DIP S/W setting

By the deep switch N°1 and N°2 located in to the Electric Board it's possible to select the correct fan speed suitable for the boiler according to the above table.

This regulation is done in the factory by the manufacturer.

But, anyway, if some doubt exist about the correct setting, please check the dip switch setting following this scheme.

DIP 1	DIP2	BOILER
OFF	OFF	181KCA
ON	OFF	201KCA
OFF	ON	251KCA
ON	ON	301KCA

12

Other functions and Adjustments

Adjustment of ignition capacity

The ignition capacity of the boiler is adjusted in the factory at the reference level corresponding to 3,300 rpm of the fan speed.

If necessary, for example in order to reduce some noise during the ignition stage, it's possible to adjust this value from the MAX corresponding to 3,800 rpm to a MIN corresponding to 2,800 rpm.

When necessary, please proceed as follow :

- Press the  and the left  button and for at least 10sec up the digits start to blink (or go directly to the following step if you come from the previous step)
- Press the  ,  button in the left side up to the number 0 appears in the left digits. A number 33 in the right digit (it represent the ignition fan speed expressed in rpm divided per 100: $3,300/100=33$)
- Press  ,  in the right side in order to arrange the ignition output up to the correct value reading the ignition in the combustion chamber. The adjustment may be done changing the fan speed from 2,800 to 3,800 rpm (the display will show the right digits changing from 28 to 38)

Adjustment of Pump Heating

The boiler has a function that permit to the pump to run, after each burner switching-off, for certain period of time (from 0 to 2,000 seconds) in order to have a uniform temperature inside the installation.

This value (normally adjusted in the factory around 1,000 seconds) is adjustable as follows :

- Press the  and the left  button and for at least 10sec up the digits start to blink.
- Press the  ,  button in the left side up to the number 1 appears in the left digits. A number included between 0 and 99 appears in the right digit.
- Press  ,  in the right side in order to arrange the overrun period time up to the value desired. The number included between 0 and 99, appearing in the right digits, represent the percentage of 2,000 seconds adjusted.

Adjustment of DHW Pump Overrun

The boiler has a function that permit to wait, after each burner switch off for heating demand, for certain period of time (from 0 to 600 seconds) in order to reduce noises for too much frequent burner switch on.

This value (normally adjusted in the factory around 300 seconds) is adjustable as follows:

- Press the  and the left  button and for at least 10 sec up the digits start to blink
- Press the ,  button in the left side up to the number 2 appears in the left digit. A number included between 0 to 99 appears in the right digits
- Press... ,  in the right side in order to arrange the AFCF up to the value desired. The number included between 0 to 99, appearing in the right digits, represent the percentage of 600 sec. adjusted.

Adjustment of Anti Fast Cycling Function - AFCT

The boiler has a function that permit to the pump to run, after each burner switch-off for Domestic Hot Water Production, for certain period of time (from 0 to 30 seconds) in order to have no risk of lockout for overheating of the heat exchanger.

This value (normally adjusted in the factory around 15 seconds) is adjustable as follows.

- Press the  and the left  button for at least 10 sec up the digits start to blink
- Press the ,  button in the left side up to the number 3 appears in the left digit. A number included between 0 to 99 appears in the right digits.
- Press... ,  in the right side in order to arrange the overrun period time up to the value desired. The number included between 0 to 99, appearing in the right digits, represent the percentage of 30 sec. adjusted.

Adjustment of Heating Temperature Range

The boiler has a function that permit to change the heating temperature range from 40 ~ 80 (standard setting for radiator heating system) to 30 ~ 50 (standard setting for floor heating system).

40 ~ 80 range is represented by the parameter 0.

30 ~ 50 range is represented by the parameter 1.

This setting (normally adjusted in the factory in the range 40 ~ 80) is adjustable as follow ;

- Press the  and the left  button and for at least 10 sec up the digits start to blink.
- Press the ,  button in the left side up to the number 4 appears in the left digit. A number 0 appears in the right digits.
- press ,  in the right side in order to change the parameter from 0 to 1 (or the opposite) moving from one temperature range to the other.

Primary Flow and Primary Pressure Checking

Primary water pressure is continuously checked; curing stand-by and during running condition. If the water pressure is or goes under 0,5 bar, the boiler is stopped and the fault code E10 appears on the display.

If the water flow pressure goes over 3,5 bar (for example because of a hydraulic safety valve blocking), the boiler is stopped and the fault code E13 appears on the display.

Every time the pump starts, water flow is checked monitoring the pressure increment obtained in the output of the pump. This increment must be at least 0,5 bar.

If, within 10 sec, this increment of pressure is not recognized, the burner doesn't switch-on and the pump is stopped for 10 sec.

After that time the pump runs again for a new attempts. After 5 attempt without success, the boiler is stopped and the fault code E02 appears on the display

In case of absence of circulation (for example for the closure of all the radiators thermostatic valves) the pump remains in ON condition, the burner ignition is avoided and the error code E02 is shown.

As soon as the circulation returns, the error disappears and the burner ignition is enabled. On the other side if, for example, the primary flow switch is broken because of electrical short circuit, the burner ignition is still avoided and the error code E13 is shown.

Temperature Probe Failure

If the primary temperature probe failure occurs (interruption and short circuit) the burner switch off and the fault code is displayed (E05, E06).

If a DHW temperature probe failure occurs (interruption and short circuit) the DHW service is avoided and the fault code is displayed (E07, E08).

The DHW temperature probe is not checked if the external water storage is set.

Lockout for High Limit Switch or for Chimney Thermostat

During a running condition (burner on), if the temperature in the heat exchanger overcome 95 °C, or, if the temperature in the exhaust duct overcome 95 °C, the boiler falls in a lock out condition and stay in that condition up to the reset of the boiler.

In the meantime the pump and the fan continue to run up to this temperature comes down under 65 °C. In order to reset the boiler is necessary to remove the cause of the overheating and to wait up to the temperature goes down under 65 °C.

During a stand-by condition (burner off), if the same problem occur, the error code E20 appears on the display up to this temperature comes down under 65 °C; in the meantime the pump and the fan continue to run. If during this time a request of injection occurs the boiler falls in a lock out condition and stay in that condition up to the reset of the boiler.

Frequency Supply Error

If the electrical supply is different from what the PCB is set, the boiler doesn't start and error code E15 appears on the display.

Serviceman Function

The boiler has a function that permit to force the boiler to run in Central Heating condition for 15 minutes without any gas modulation, in the following different conditions: max input, ignition input, minimum input.

This function is settable as follows:

- to make combustion and efficiency test , without any interference by the regulation system (still remaining in a safety condition), in the conditions: max input, ignition input, minimum input.
- to check the fan speed in the same three conditions.

This function is settable as follows:

Boiler forced to the max input,

- Press the  button for at least 10 sec up to the digits disappear.

Releasing the button the serviceman function starts

The digit in the right side show the number 01.

The burner is now set to the max. input.

After few seconds the two digits in the right side show the heating temperature in blinking mode.

Boiler forced to the ignition input,

- Starting from the previous condition press the  button palce on the right side of the display the number 01 appears in the right side digits.

Press the  button one more time in the right side the number 02 appears in the right side digits.

The burner is now set to the ignition input.

After few seconds the two digits in the right side show the heating temperature in blinking mode.

Boiler forced to the min. input,

- Starting from the previous condition press the  button palce on the right side of the display the number 02 appears in the right side digits.

Press the  button one more time in the right side the number 03 appears in the right side digits.

The burner is now set to the minimum input.

After few seconds the two digits in the right side show the heating temperature in blinking mode.

The boiler may be forced for 15 minutes in one of the three previous condition pressing the and the  button place on the left side of the display.

The serviceman function switch off automatically after 15 minutes of operation or switching off the boiler.

Fan Control

The control board devices the fan and read the fan speed by a signal coming from the fan (feed back). At each burner ignition request, the burner control sequence is enabled after that the fan reaches the correct ignition fan speed.

During the operation the fan speed must remain included in the prefixed range. If, for any reason, the fan speed stay outside this range, the burner is stopped and fault code E09 appears on the display.

The burner ignition is avoided until the fan speed come back into the correct range.

Anti Freeze Function

If the temperature detected by the primary temperature sensor falls down under 6 the pump is activated and the burner starts keeping the minimum capacity till the temperature 35 .

At this temperature the anti freezing function is disable and the pump runs for the "Ch" overrun time. Anti freezing function keeps operating in each working mode (also OFF mode). If the boiler is in the lock out condition only the pump is activated.

Anti Blocking Function

After 24 hours of inactivity the pump is energized for 30 sec in order to prevent the block. After 24 hours of inactivity the 3 way valve is energized for 10 sec in order to prevent the block.

If a request occurs during the anti blocking time, the anti blocking function is stopped. The function is active also in lockout condition or with the boiler in "OFF" position.

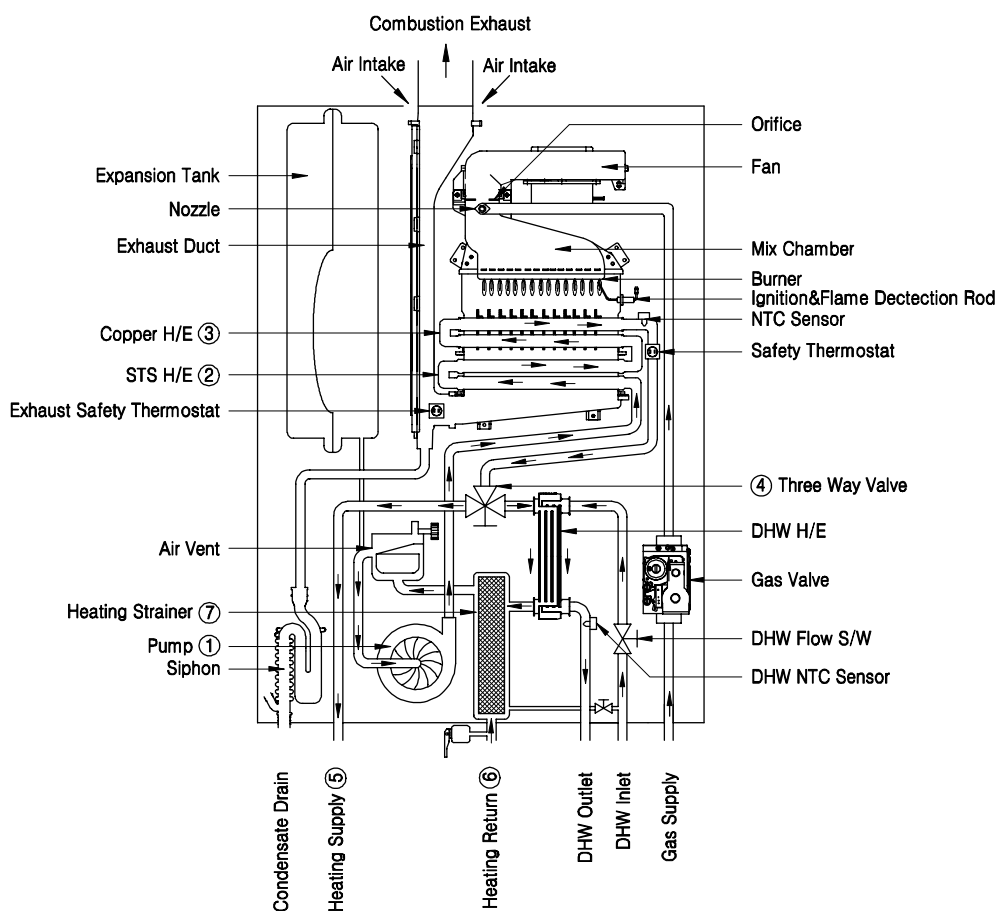
Voltage Main Supply Error

If the voltage supply falls down 180 ~ 190 Volts, the error code E21 appears on the display and the boiler goes in a stand-by condition.

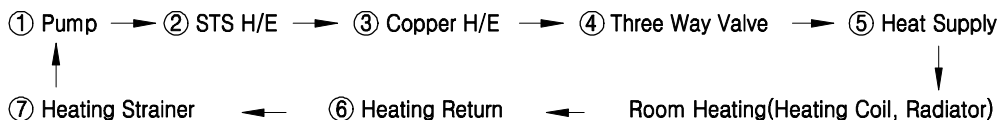
When the tension goes over time limit the boiler will run again. Error code E21 is stored for 24 hours in the boiler memory and may be checked by the inauiry push button (look at the "User's Manual").

13 Working Mode

Schematic Diagram for heating Operating Mode



Heating Water Supply



Domestic Hot Water (DHW) Production – Instantaneous

- When the DHW flows, the DHW flow switch close the contact and the DHW Production mode begins.
- The pump switch on (if it was off), the fan is energized and, after checking the primary circuit water flow and the fan speed suitable for a correct burner ignition, the burner control is enabled.
- Passed one 1 sec from the flame detection the flame modulation phase begins with a proper action until the achievement of the DHW set point temperature.
- DHW Production Mode ends when the DHW flow stops.
- During the DHW phase two thermostat check the temperatures sensed by the DHW and the CH probes.
- If the temperature exceeds the respective switch off points, the burner is stopped and the fan continues to run up the post purge time.
- The burner starts again when the temperature falls under the respective switch on points.
- After the end of the DHW demand, the pump stops and the fan continues to run till the post purge timing ends.
- DHW Production Mode has the priority over heating mode in case of concurrent requests.
- During DHW Production Mode the 3 way valve relay is switched off.

Domestic Hot Water (DHW) Production – External Storage

- This mode allow to use an external tank storage with the thermostat and an external 3 way valve.
- When the thermostat close the contact, the boiler starts: the 3 way valve is moved to CH position and the circulator and the fan are energized.
- After checking the precense of primary flow and the fan reaches the ingnition speed, the burner control working is enabled.
- Passed one 1 sec from the flame detection the flame modulation phase begins with a PID type action until the achivement of the set primary temperature.
- During the DHW phase, a thermostat function checks the primary temperature.
- If it rises over 86 °C, the burner is stopped and the fan continues to run up for other 30 sec.
- The burner starts when the temperature falls under 80 °C.
- Working phase in DHW mode ends when tank storage thermostat opens the contacts
- After the end of the water storage request, the fan continues to run for 30 sec and the pump continue to run for the "DHW pump overrun".
- When the overrun timing end, the pump is stopped and the 3 way valve moves in DHW position.
- This mode has priority over heating mode in case of concurrent requests.

Central Heating (CH) Mode

- The CH Mode phase begins when the heating demand comes from the room thermostat; under the condition the boiler is set in "winter" condition.
- If the room thermostat is not connected the CH mode phase begins as soon as the boiler is set in "winter" condition.
- The 3 way valve relay is switched on (CH position), the circulator and the fan are energized and, after checking the fan speed suitable for a correct burner ignition, the burner control working is enabled.
- Passed 2 seconds from the flame detection, the capacity rise to the maximum with a ramp of 50 seconds maximum.
- If the flame modulation point is reached the rising ramp is stopped and the control passes to the modulating mode to achieve the central heating set point.
- In case of the temperature exceed the temperature set in CH mode the burner switch off and the anti fast cycling timer is loaded.
- The burner restart when the primary temperature falls under the temperature set in CH mode and if the anti fast cycling time is finished.
- The anti fast cycling timing finished also in case of opening and closing of the room thermostat or in case of DHW demand.
- By the opening of the room thermostat contacts or if the working mode is changed to "summer" condition, the CH phase ends and the pump continues to work for the "pump heating overrun time".
- After passing the CH overrun time the 3 way valve is moved in DHW position.

14

Maintenance

Yearly Appliance Check and Maintenance

The followings checks and maintenance activity should be performed at least one time per year :

- Cleaning of the flue side of the heat exchanger
- Cleaning of the burner
- Visual inspection of the exhaust duct for wear or corrosion checking
- Correct ignition and detection
- Correct burner setting in heating and domestic hot water production
- Correct operation of the main switch upstream the boiler
- Correct operation and adjustment of the boiler regarding :
 - Activation of the heating control system
 - Activation of the domestic hot water production system
- Gastight of the intake gas circuit; insert a "U" or digital type pressure gauge in the inlet gas valve socket and, subsequently, close the gas shut-off valve (coke) and close the gas valve; no pressure variation must occur in the next five minutes on the pressure gauge.
- Checking of the correct activation of the detection control system; its activation must be shorter than 5 seconds.
- Watertight of the boiler heating and domestic hot water production circuit; no leakage or water oxidation have to appear around the coupling.
- Visual Checking that the outlet of the pressure relive valve is not blocked.
- Checking that the expansion vessel charge, after having discharged the installation up to zero pressure, is around 0,8 bar (never less than 0,5 bar); checking that the pressure inside the boiler, in cold condition and after having re-filled the boiler, is around 1,0~1,2 bar.
- Visual checking that the safety and control devices have not been tampered or short-circuited; in particular:
 - Temperature safety limit thermostat
 - Heating flow switch
 - Air flow switch
- Visual checking of the electrical system; in particular:
 - Electrical power cable must be no damaged and properly blocked.
 - No trace of blackening or burning must be exist anywhere.

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Specifications

Technical Specification		Model	KDB-181KCA					KDB-201KCA					KDB-251KCA					KDB-301KCA				
Heating Input (Max-Min)		kW (kcal/h)	21,4 ~ 10,2 (18.404 ~ 8.772)					23,9 ~ 11,5 (20.555 ~ 9.889)					29,2 ~ 11,6 (25.111 ~ 9.976)					34,9 ~ 15,1 (30.015 ~ 12.986)				
Heating Output (Max-Min) (Flow/Return 80/60)		kW (kcal/h)	20,9 ~ 10,0 (17.962 ~ 8.597)					23,3 ~ 11,3 (20.000 ~ 9.741)					28,4 ~ 11,4 (24.383 ~ 9.796)					33,8 ~ 14,8 (29.083 ~ 12.765)				
Condensing Heating Output (Max-Min) (Flow/Return 50/30)		kW (kcal/h)	22,8 ~ 10,9 (19.637 ~ 9.368)					25,3 ~ 12,2 (21.767 ~ 10.522)					30,6 ~ 12,4 (26.317 ~ 10.674)					36,5 ~ 16,1 (31.426 ~ 13.882)				
Useful Efficiency at Max – Min Heating Output (Flow/Return 80/60)		%	97,6 ~ 98,0					97,3 ~ 98,5					97,1 ~ 98,2					96,9 ~ 98,3				
Useful Efficiency at Max – Min Heating Output (Flow/Return 50/30)		%	106,7 ~ 107,0					105,9 ~ 106,4					104,8 ~ 107,0					104,7 ~ 106,9				
Useful Efficiency at 30% Max Heating Output (Return 47)		%	102,4					102,3					102,9					103,2				
Useful Efficiency at 30% Max Heating Output (Return 30)		%	108,2					108,0					108,3					108,8				
Heat Loss through the Case with Burner ON			0,2					0,5					0,4					0,7				
Heat Loss through the Chimney with Burner ON			2,2					2,2					2,5					2,4				
Energy Performance																						
NOx Class			5					5					5					5				
Gas Type			G20	G25	G27	G30	G31	G20	G25	G27	G30	G31	G20	G25	G27	G30	G31	G20	G25	G27	G30	G31
Nozzle Diameter		mm	5,55	6,30	6,65	3,65	4,25	6,80	7,90	8,40	4,20	5,15	5,95	6,75	7,00	3,95	4,55	6,70	8,05	8,20	4,40	5,15
Diaphragm Diameter		mm	24,5	24,5	24,5	22,0	24,5	28,0	28,0	28,0	24,5	28,0	25,5	25,5	25,5	29,0	25,5	29,0	29,0	29,0	25,5	29,0
Gas Supply Pressure		mbar (mmH ₂ O)	20	20	20	30	37	20	20	20	30	37	20	20	20	30	37	20	20	20	30	37
			(204)	(204)	(204)	(306)	(377)	(204)	(204)	(204)	(306)	(377)	(204)	(204)	(204)	(306)	(377)	(204)	(204)	(204)	(306)	(377)
Purpose			Heating and Domestic Hot Water Production																			
Heating Water Circulation Method			Air Close Type																			
Max Heating Water Pressure		bar	3,0																			
Max Heating Temperature			85																			
Adjustable Temperature Heating			30 ~ 50 : 40 ~ 80																			
Total Volume Expansion Tank		L	7,0															10,0				
Expansion Tank Pre Charge		bar	1,0																			
Domestic Hot Water Output		kW (kcal/h)	20,9 ~ 10,0 (17.962 ~ 8.596)					23,3 ~ 11,3 (20.000 ~ 9.741)					28,4 ~ 11,4 (24.383 ~ 9.796)					33,8 ~ 14,8 (29.083 ~ 12.765)				
Min. Dynamic Dom. Hot Water Pressure		bar	0,2																			
Min. Domestic Water Flow Rate		l/min	2,3																			
Max. Domestic Water Pressure		bar	17,5																			
Adjustable Domestic Hot Water Temperature			35 ~ 60																			
Specific Domestic Hot Water		T = 30	10,0					11,1					13,6					16,2				
Other Domestic Hot Water Rate		T = 25	12,0					13,3					16,3					19,4				
Other Domestic Hot Water Rate		T = 40	7,5					8,3					10,2					12,1				
Electric Supply		V/Hz	230V~ / 50																			
Nominal Absorption		A	0,6																			
Power Consumption		W	145																			
Electric Protection			IPX4D																			
Installation Type			Wall Mounting Type																			
Intake/Exhaust Flue System Type		mm	B33 – C13 – C33 – C43 – C53 – C63 – C83																			
Intake/Exhaust Flue Diameter		mm	Concentric 60/100 , Separate 80/80																			
Connecting Diameter	Heating Water Connection	"	3/4																			
	Domestic Hot Water Connection	"	1/2																			
	Gas Connection	"	3/4																			
Physical Dimension		WxDxH(mm)	495x216x695															515x243x715				
Weight		kg	34					34					36					38				
Gas Type			G20					G20					G20					G20				
Exhaust Mass Flow Rate at Max Heating Output		kg/h	34					38					46					56				
Exhaust Mass Flow Rate at Min Heating Output		kg/h	17					19					19					25				
CO ₂ at Max Output		%	9,3					9,3					9,4					9,2				
CO ₂ at Min Output		%	9,0					9,0					8,9					8,8				
CO(0%O ₂) at Max Output		ppm	140					151					163					172				
CO(0%O ₂) at Min Output		ppm	43					55					40					43				
NOx(0%O ₂) at Max Output		ppm	34					35					38					41				
NOx(0%O ₂) at Min Output		ppm	26					26					30					35				
Exhaust Temperature at Max Output			67					70					71					70				
Exhaust Temperature at Min Output			56					59					62					61				

WARRANTY

Product		Purchase date	Year/date	Repair	Name of the repair person	Verification
Model		Date				
Manufacture No.						
Dealer	Dealer Name					
	Telephone					
	Address					

■ Product Warranty Guide

① For free warranty

Any malfunction that occurs within the free warranty period calculated from the date of purchase: if the following occurs, the total cost of labor, repair, and component parts will not be charged. Thus, if any manufacturer's defect is detected from the initial installation or when malfunction occurs during normal usage, we will not charge for any of the repairs.

② For charged repairs and component parts

- After the free warranty expires
- Malfunctions due to unforeseeable natural disasters
- Malfunctions caused by repairs done by someone other than approved dealer repair persons.
- Malfunctions caused by the purchaser (during transfer or improper usage)
- Malfunctions due to improper electrical capacity
- When there is no specification on the warranty or warranty is lost

■ Consumer Protection Regulations

Warranty Period	Consumer Damage Types	Compensation Standards	
		Repair	Exchange
Within one year from the date of installation of the unit	• Leaks in the unit (manufacturer defect) • Hot water or heating problems • Defective components (ignition device or thermostat) • Noise	Free	Unit (Free)
Within 3 months of the date of installation of the unit	• Damages (external)	Free	Unit (Free)
Damages compensation regulation after warranty expiration	• Same as above	Charge	Charge

■ How to receive service

① keep warranty

At the dealer where the purchase was made, please register the information and check the specifications then keep the warranty for safe keeping.

② Where to receive service?

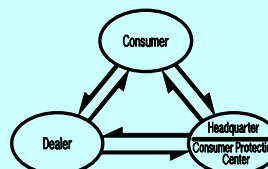
If there is any defect or malfunction in the unit, please contact the store where you purchased the unit, dealer, or Kyungdong Boiler Consumer Protection Center.

③ What information do I need?

When reporting, you must verify the model, manufacturer number, purchased store name, and the purchase date and specify the malfunction of the unit in detail.

④ What are the costs of repair and benefits?

For repairs, present the warrant to the Kyungdong Boiler service personnel when he or she visits your home for repairs to receive either free or charged repair benefits.



※ Dealers and Installer must complete the necessary items in the above chart on the Warranty.