

navien Condensing Combi Boiler

Installation & Operation Manual

Getting Service

If your boiler requires service, you have several options for getting service:

- Contact an official Technical Assistance Service (TAS) at 0344 332 2323 or go to the website (www.navien.co.uk).
For warranty service, always contact an official Technical Assistance Service (TAS) first.
- Contact the technician or professional who installed your boiler.
- Contact a Gas Safe Registered engineer.

When contacting an official Technical Assistance Service (TAS), please have the following information available:

- Model number
- Serial number
- Date purchased
- Installation location and type
- Error code, if any appears on the front panel display

Version: 1.1(October, 2024)



Navien LTD

Building 2, Guildford Business Park, Guildford, GU2 8XH
TEL 0344 332 2323 www.navien.co.uk

navien Condensing Combi Boiler

Installation & Operation Manual



- These appliances are for use with natural gas or LPG. (An LPG conversion kit is included with the boiler.)
- Type: B23-C13-C33-C53-C83

Gas	Model	GC Number
Natural Gas	NCB300-28K	47-709-09
	NCB300-30K	47-709-17
	NCB300-37K	47-709-10
	NCB300-41K	47-709-11
LPG	NCB300-28K	47-709-09
	NCB300-30K	47-709-17
	NCB300-37K	47-709-10
	NCB300-41K	47-709-11

Keep this manual near this boiler for future reference whenever maintenance or service is required.

WARNING

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

- **Do not store or use petrol or other flammable vapours and liquids in the vicinity of this or any other appliance.**
- **WHAT TO DO IF YOU SMELL GAS**
 - Do not try to light any appliances.
 - Do not touch any electrical switch; do not use any phone in your building.
 - Immediately call the National Gas Emergency Helpline on (Freephone) 0800 111999 or your gas supplier from a neighbour's phone. Follow the instructions received.
- **Installation and service must be performed by a Gas Safe registered installer, service agency or the gas supplier.**



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1. Safety Information

The following safety symbols are used in this manual. Read and follow all safety instructions in this manual precisely to avoid unsafe operating conditions, fire, explosion, property damage or personal injury.

DANGER

Indicates an imminently hazardous situation which, if not avoided, could result in severe injury or death.

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in injury or death.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, could result in property damage.

DANGER



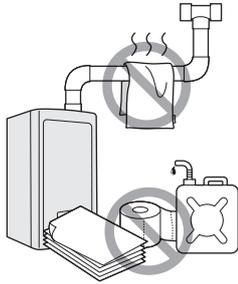
If you smell gas:

- Do not try to light any appliances.
- Do not touch any electrical switches or use landline phones.
- From a neighbour's phone, call your gas provider and follow their instructions.
- If you cannot reach your gas provider, call the fire department.
- Do not return to your home until authorised by your gas supplier or the fire department.

Do not use or store flammable products, such as petrol, solvents, or adhesives in the same room or area as the boiler.

- The boiler has a main burner flame that can turn on at any time and can ignite flammable vapours. Vapours from flammable liquids can explode and catch fire, causing severe burns.
- Vapours cannot be seen and are heavier than air. They can travel long distances along the ground and can be carried from other rooms to the boiler's main burner flame by air current.
- Keep all flammable products far away from the boiler and store them in approved containers. Keep the containers closed tightly and out of the reach of children and pets.

WARNING



- **Do not store or use petrol or other flammable liquids near this boiler.**
Doing so may result in fire or explosion.
- **Do not place combustibles, such as newspapers or laundry, near the boiler or flue system.**
Doing so may result in a fire.
- **Do not place or use hair sprays, spray paints, or any other compressed gases near the boiler or flue system, including the flue termination.**
Doing so may result in fire or explosion.
- **Do not operate the boiler with the front cover opened.**
Doing so may result in fire or carbon monoxide (CO) poisoning, which may result in property damage or personal injury.
- **Do not operate this boiler without proper flue system.**
Doing so may result in fire or carbon monoxide (CO) poisoning, which may result in property damage or personal injury.
- **Do not touch the power cord or internal components of the boiler with wet hands.**
Doing so may result in electric shock.

WARNING

This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved. Children shall not play with the appliance. Cleaning and user maintenance shall not be made by children without supervision.

⚠ CAUTION

- **Do not turn on the boiler unless the water and gas supplies are fully opened.**
Doing so may damage the boiler.
- **Do not turn on the water if the cold water supply shut-off valve is closed.**
Doing so may damage the boiler.
- **Do not use this boiler for anything other than its intended purpose, as described in this manual.**
- **Do not remove the front cover unless the power to the boiler is turned off or disconnected.**
Failure to do so may result in electric shock.
- **When servicing the controls, label all wires prior to disconnecting them.**
Failure to do so may result in wiring errors, which can lead to improper or dangerous operation. Verify proper operation after servicing.
- **Do not use unapproved replacement or accessory parts.**
Doing so may result in improper or dangerous operation and will void the manufacturer's warranty.
- **Do not place anything in or around the flue terminals, such as a clothes line, that could obstruct the air flow in or out of the boiler.**
- **This boiler has been approved for use the UK and Ireland only.**
Using the boiler in any other country will void the manufacturer's warranty.

⚠ DANGER



To prevent burns:

- Use the lowest operating temperature setting necessary to provide comfortably hot water.
- If your household has children or elderly or disabled residents, consider using a lower temperature setting.
- Read all the instructions in this manual carefully before changing the temperature setting.
- Feel the water before using it on children, the elderly, or the disabled.

⚠ DANGER

This boiler's water temperature is set to 50°C at the factory for your safety and comfort. Increasing the temperature increases the risk of accidental scalding. Water temperatures at or above 52°C can cause instant scalding or severe burns. Before you decide to change the temperature setting, read the following charts carefully.

Water Temperature	Time in which a young child can suffer a full thickness (3rd degree) burn
70°C	Less than 1 second
60°C	1 second
55°C	10 seconds
49°C	10 minutes
37°C	Very low scald risk

General Installation Guidelines

Navien ensures that this product contains no harmful substances and that no harmful materials have been used in its manufacture.

Current legislation must be taken into account on installing this appliance, and it must be installed in a place with suitable ventilation.

The boiler must be installed by an installer authorised by the Ministry of Industry and it must be started up by an Official Technical Assistance Service authorised by Navien.

The requirements included in the following regulations must be observed on installing the boiler:

- The Gas Installation Regulation.
- The Technical Building Code.
- The Regulation for Heating Installations in Building.
- The Low Voltage Regulation.

Installation in hard water areas

- In areas with hard water (hardness exceeding 200 ppm), it is important to install a scale reducer.
The advice of the local water authority should be sought.

Installing the system piping

- The boiler is equipped with an internal relief valve. All systems must be capable of sustaining pressure of up to 3 bar.
- The air vent is required in the system during filling.

CAUTION

The boiler is equipped with an internal bypass valve. The internal bypass valve is not intended to replace an external bypass valve. An external automatic bypass valve is required if a zone valve has been connected to the system.

Gas Conversion

The boiler is configured for natural gas. If LPG conversion is required, use the conversion kit supplied with the boiler and attach the identification 'LPG converted label' (included in the kit).

The Codes of good practice and regulations refer to the latest versions of the same.

The installation must also comply with the following European Standards:

Standard	Description
UNE-EN 13831:2008	Closed expansion vessels with diaphragm.
UNE-EN 1856	Metal chimneys
UNE-EN 13384	Chimneys
UNE-EN 13779	Ventilation
UNE-EN ISO 16484	Building control systems.
UNE-EN 14336	Heating systems in buildings.
UNE-EN 15502-1	Gas-fired heating boilers Part 1: General Requirements and tests
UNE-EN 15502-2-1	Gas-fired heating boilers Part 2-1: Specific standard for type C appliances and type B2, B3 and B5 appliances of a nominal heat input not exceeding 1000 kW
UNE-EN 13203:2007	Domestic Hot Water
UNE-EN 303-7:2008	Heating boilers.

UKCA/EC Conformity Declaration



Navien, hereby declares that the boiler models:

NCB300-28K, NCB300-30K, NCB300-37K, NCB300-41K

to which this declaration refers, conform to and comply with the essential requirements of the following applicable European Standards and Directives.

Gas appliances: Regulation (EU) 2016/426
Standards EN15502-1, EN15502-2-1 and EN437

Boiler Efficiency: Directive 92/42/EEC
Regulation (EU) No.813/2013
Standards EN15502-1, EN15502-2-1

Low voltage: Directive 2014/35/EU and
Standards EN 60335-1, EN 60335-2-102

Electro-magnetic Compatibility: Directive 2014/30/EU
Standards EN 55014

Pressure Vessels: Directive 2014/68/EU

Navien, manufactures its products using a Quality Assurance system in compliance with Standard EN-ISO 9001:2015.

The Benchmark Scheme



Benchmark places responsibilities on both manufacturers and installers. The purpose is to ensure that customers are provided with the correct equipment for their needs, that it is installed, commissioned and serviced in accordance with the manufacturer's instructions by competent persons and that it meets the requirements of the appropriate Building Regulations. The Benchmark Checklist can be used to demonstrate compliance with Building Regulations and should be provided to the customer for future reference.

Installers are required to carry out installation, commissioning and servicing work in accordance with the Benchmark Code of Practice which is available from the Heating and Hotwater Industry Council who manage and promote the Scheme. Visit www.centralheating.co.uk for more information.

Disposal of the Product

This product should be handed in at a designated collection point, e.g. by handing it in at a duly authorised reseller when purchasing a similar product, or at an authorised collection site for recycling products which contains electrical and electronic equipment (EEE) and batteries and accumulators. Because of the potentially hazardous substances that usually accompany EEE, improper handling of this type of waste could have a possible impact on the environment and human health.

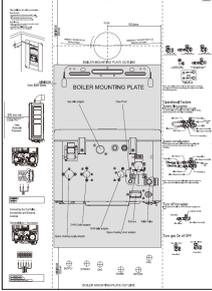
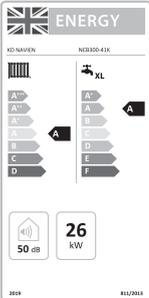
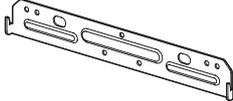
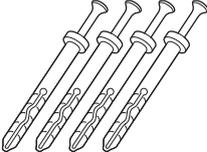
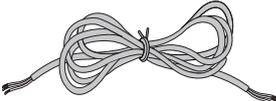
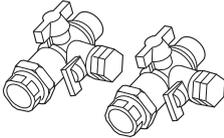
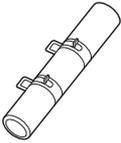
Your cooperation in the proper disposal of this product will contribute to the effective usage of natural resources.

For more information on recycling this product, please contact your city office, local waste disposal facilities, official service for chemical waste or landfill site.

2. About the Boiler

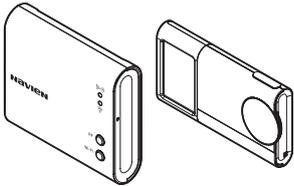
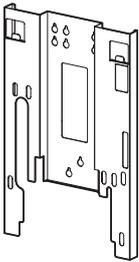
2.1 Items Included

When you open the box, you will find the following items with the boiler. Check the box for each of the following items before installing the boiler. If it seems like there is a problem, do not use the boiler. Contact your supplier. Keep the included items out of the reach of children, as they can be dangerous. When you no longer wish to use the boiler, disable any parts that could be potentially hazardous.

			
<p>Installation & Operation Manual, User's Information Manual</p>	<p>Boiler mounting template</p>	<p>ErP Label</p>	<p>Wall mounting bracket</p>
			
<p>Tapping screws & anchors</p>	<p>Propane gas changing kit</p>	<p>Electric cord</p>	<p>Pre-plumbing Kit</p>
			
<p>Condensate trap hose</p>			

2.2 Accessories

The following optional accessories are available for the boiler:

		
<p>Smart Room Controller (Smart Plus)</p>	<p>Pipe Cover</p>	<p>Stand off KIT</p>

2.3 Technical Data

The following table lists the general specifications for the boiler.

Specifications		Unit	NCB300-28K	NCB300-30K	NCB300-37K	NCB300-41K
Heat input range (Net)	Natural gas	kW	24.7/4.3	24.7/4.3	26.8/4.6	26.8/4.6
	20% H ₂ Blended gas	kW	23.2/4.3	23.2/4.3	25.5/4.3	25.5/4.3
DHW heat input range (Net)	Natural gas	kW	28.0/4.3	30.0/4.3	37.0/4.6	41.0/4.6
	20% H ₂ Blended gas	kW	26.3/4.3	28.1/4.3	34.5/4.3	37.3/4.3
Heat output range @ 80/60°C		kW	24.0/4.2	24.0/4.2	26.0/4.5	26.0/4.5
DHW output range		kW	28.0/4.3	30.0/4.3	37.0/4.6	41.0/4.6
Condensing heat output range @ 50/30°C		kW	25.8/4.5	25.8/4.5	28.2/4.8	28.2/4.8
Full load efficiency at Max. output @ 80/60°C		%	88.4	88.4	88.4	88.4
Full load efficiency at Max. output @ 50/30°C (Condensing)		%	106.5	106.5	106.5	106.5
Partial load (30%) efficiency with 30°C return temp.		%	108.5	108.5	108.5	108.5
Heat loss through the case with burner switched on		%	0.1			
Seasonal efficiency rate (SEDBUK 2009)		-	88.9	88.9	89.0	89.0
NO _x Classification		-	Class 6			
Category		-	II2HY203P			
Type		-	Heating and instantaneous hot water production			
Heat output adjustment		-	Adjustable over entire Max./Min. output range			
Type of heating installation		-	Close circuit			
Max. heating operation pressure		bar	2.5			
Max. heating temperature		°C	90			
Adjustable heating temperature range		°C	40-90			
Expansion vessel volume		L	6			
Expansion vessel pre-charged pressure		bar	1.0			
Min. DHW working pressure		bar	0.7	0.9	0.7	1.1
Min. DHW working flow		l/min	2			
Max. DHW working pressure		bar	10			
Adjustable DHW temperature range		°C	30-65			
DHW flow rate @ 25°C temp. rise.		l/min	16.1	17.2	21.3	23.6
DHW flow rate @ 35°C temp. rise.		l/min	11.5	12.3	15.2	16.8
DHW flow rate for kitchen @ 45°C temp. rise.		l/min	9.0	9.6	11.8	13.1
Max. gas flow rate @15°C/1013mbar	Natural gas	m ³ /h	2.96	3.18	3.92	4.34
	20% H ₂ Blended gas	m ³ /h	3.28	3.51	4.33	4.80
Min. gas flow rate @15°C/1013mbar	Natural gas	m ³ /h	0.46	0.46	0.49	0.49
	20% H ₂ Blended gas	m ³ /h	0.50	0.50	0.54	0.54

Specifications		Unit	NCB300-28K	NCB300-30K	NCB300-37K	NCB300-41K
Electrical power supply		-	230V/50Hz			
Nominal current		A	0.6	0.6	0.6	0.6
Max. power consumption		W	130	140	130	130
Appliance protection rating		-	IPX4D			
Boiler mounting system type		-	Wall-mounted			
Flue exhaust/Air intake system types		-	B23-C13-C33-C53-C83			
Flue exhaust/Air intake system diameters		mm	Coaxial Ø60/100 and Ø80/125–Dual duct Ø80/80			
Max. gas pipe pressure drop		Pa	167	167	294	294
Max. horizontal coaxial length Ø60/100		m	8			
Max. vertical coaxial length Ø60/100		m	8			
Equivalent elbow length @ 90° Ø60/100		m	1.3			
Equivalent elbow length @ 45° Ø60/100		m	1.0			
Max. horizontal coaxial length Ø80/125		m	27			
Max. vertical coaxial length Ø80/125		m	28			
Equivalent elbow length @ 90° Ø80/125		m	2.2			
Equivalent elbow length @ 45° Ø80/125		m	1.0			
Equivalent length of adapter Ø60/100 => Ø80/125		m	0.5			
Max. dual duct length Ø80/80		m	9			
Equivalent elbow length @ 90° Ø80		m	2.2			
Equivalent elbow length @ 45° Ø80		m	1.4			
Hydraulic connection diameter	Central Heating	mm	22			
	DHW	mm	15			
	Gas supply	mm	22			
Dimensions (Width x Depth x Height)		mm	395 x 283 x 680			
Total boiler weight (lift weight)		kg	29	29	33	33

The following table lists the product information requirements (EU regulation No 811/2013 and No 813/2013)

Specifications		Unit	NCB300-28K	NCB300-30K	NCB300-37K	NCB300-41K
Condensing boiler			YES	YES	YES	YES
Low-temperature (**) boiler			NO	NO	NO	NO
B1 boiler			NO	NO	NO	NO
Cogeneration space heater			NO	NO	NO	NO
Combination heater			YES	YES	YES	YES
Rated heat output	P_{rated}	kW	24	24	26	26
Seasonal space heating energy efficiency	η_s	%	93	93	93	93
Useful heat output						
At rated heat output and high-temperature regime (*)	P_4	kW	23.7	23.7	26.1	26.1
At 30 % of rated heat output and low-temperature regime (**)	P_1	kW	8.4	8.4	8.5	8.5
Useful efficiency						
At rated heat output and high-temperature regime (*)	η_4	%	88.3	88.3	88.4	88.4
At 30 % of rated heat output and low-temperature regime (**)	η_1	%	97.8	97.8	97.6	97.6
Auxiliary electricity consumption						
At full load	el_{max}	kW	0.039	0.039	0.034	0.034
At part load	el_{min}	kW	0.017	0.017	0.016	0.016
In standby mode	P_{SB}	kW	0.003	0.003	0.003	0.003
Other items						
Standby heat loss	P_{stby}	kW	0.078	0.078	0.078	0.078
Ignition burner power consumption	P_{ign}	kW	0	0	0	0
Annual energy consumption	Q_{HE}	GJ	43.2	43.2	48.0	48.0
Sound power level, indoors	L_{WA}	dB	52	52	47	47
Emissions of nitrogen oxides	NO_x	mg/kWh	32.9	32.9	24.0	24.0
For combination heaters						
Declared load profile			XL	XL	XL	XL
Daily electricity consumption	Q_{elec}	kWh	0.183	0.194	0.168	0.182
Annual electricity consumption	AEC	kWh	39	42	36	39
Water heating energy efficiency	η_{wh}	%	84.1	83.0	83.9	83.1
Daily fuel consumption	Q_{fuel}	kWh	23.2	23.5	23.3	23.5
Annual fuel consumption	AFC	GJ	18	18	18	18
Contact details	Navien LTD, Building 2, Guildford Business Park, Guildford, GU2 8XH					

(*) High-temperature regime means 60 °C return temperature at heater inlet and 80 °C feed temperature at heater outlet.

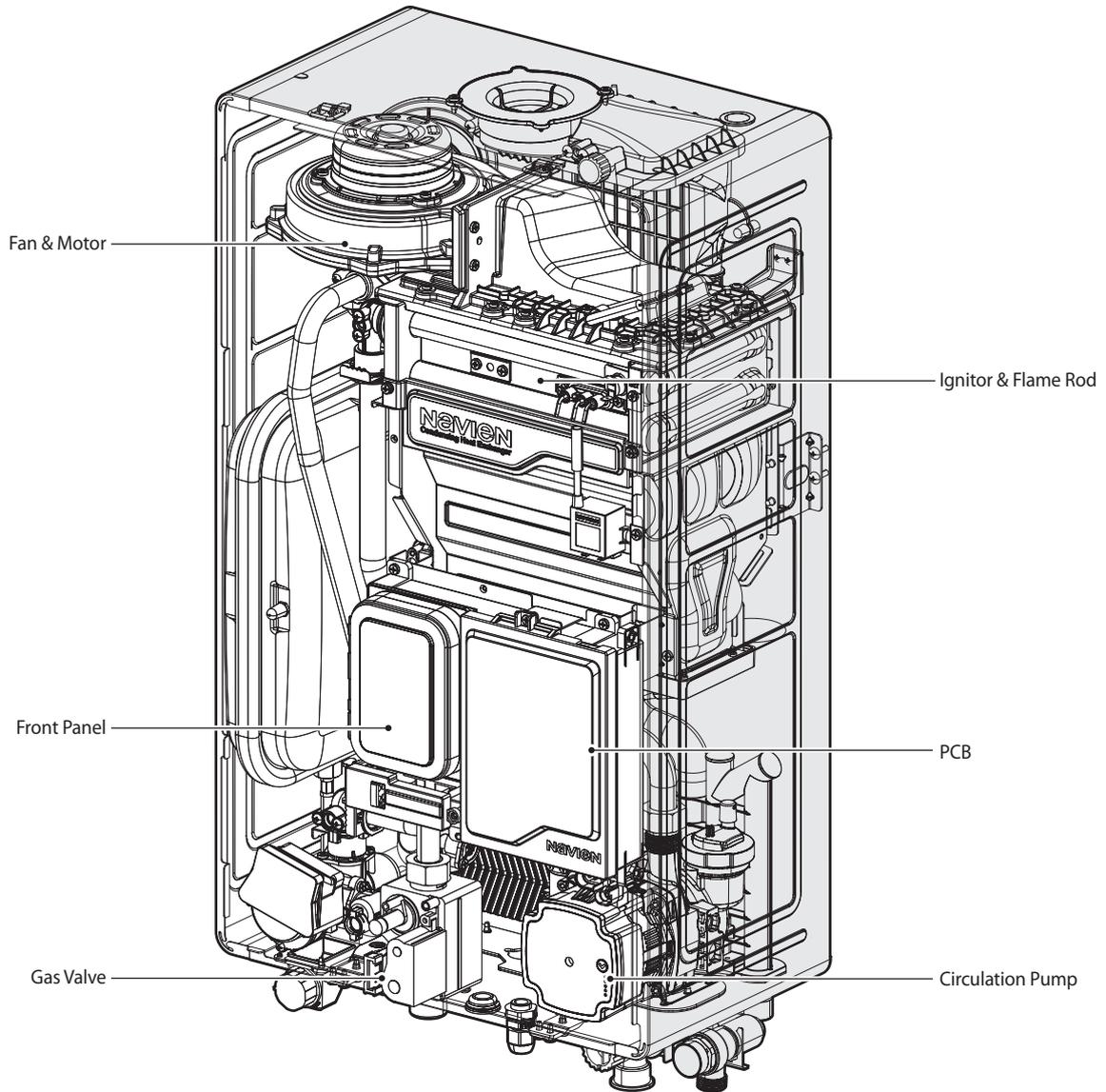
(**) Low temperature means for condensing boilers 30 °C, for low-temperature boilers 37 °C and for other heaters 50 °C return temperature (at heater inlet).

Specific precautions

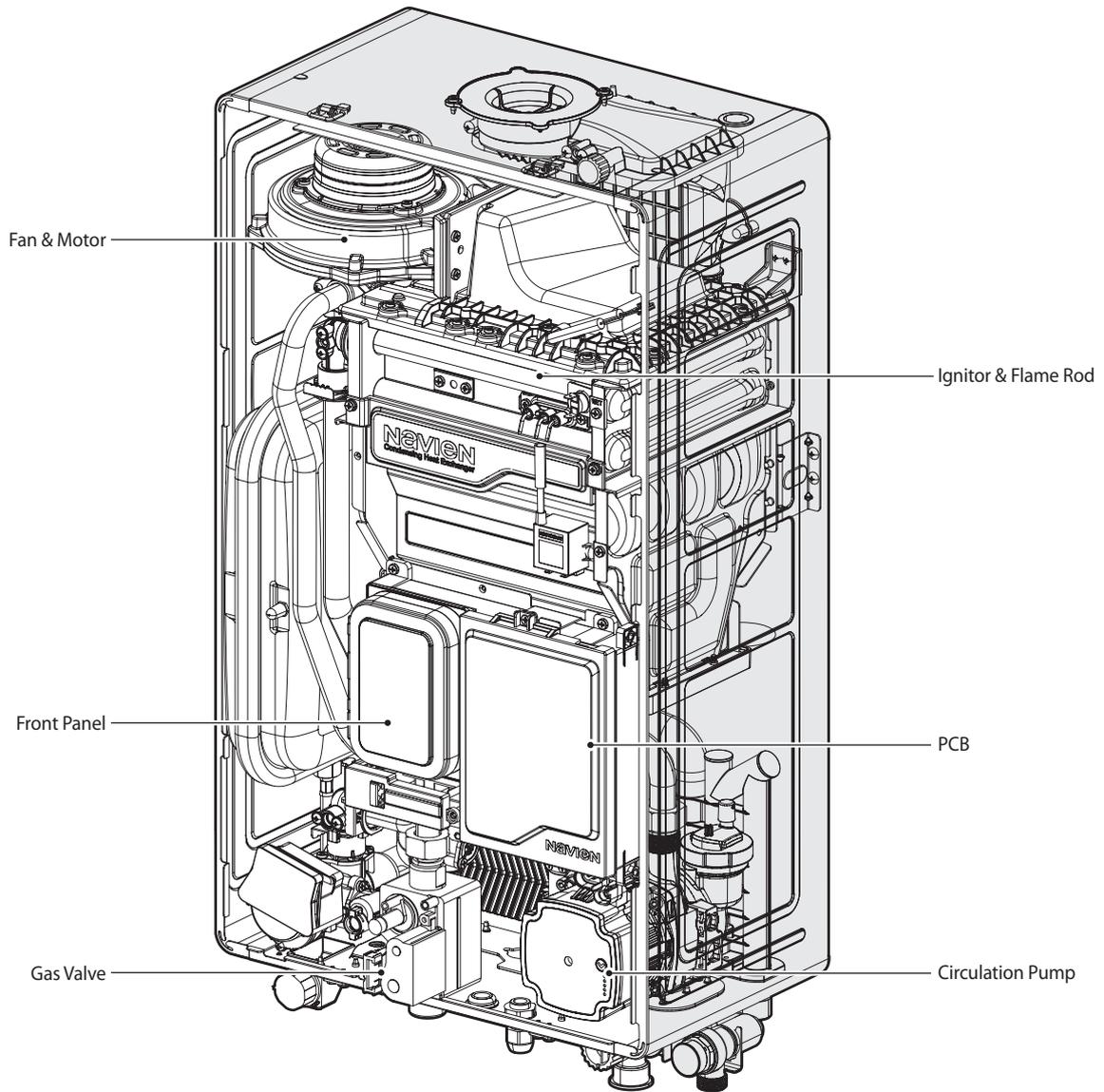
Read the user's information and installation manual before the application is assembled, installed or maintained.

2.4 Components

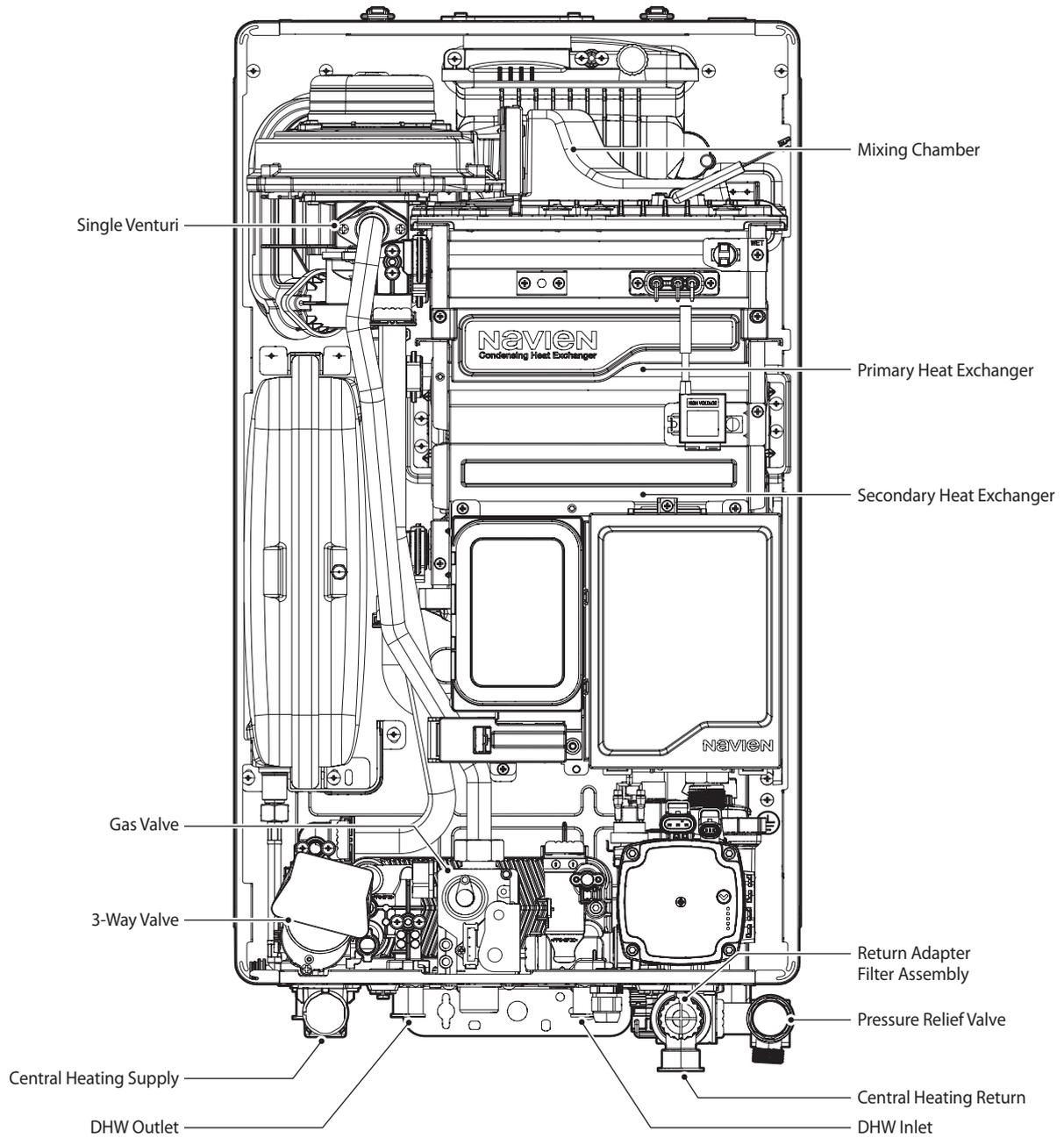
The following diagram shows the key components of the boiler. Component assembly diagrams and particular parts lists are included in the Appendices.



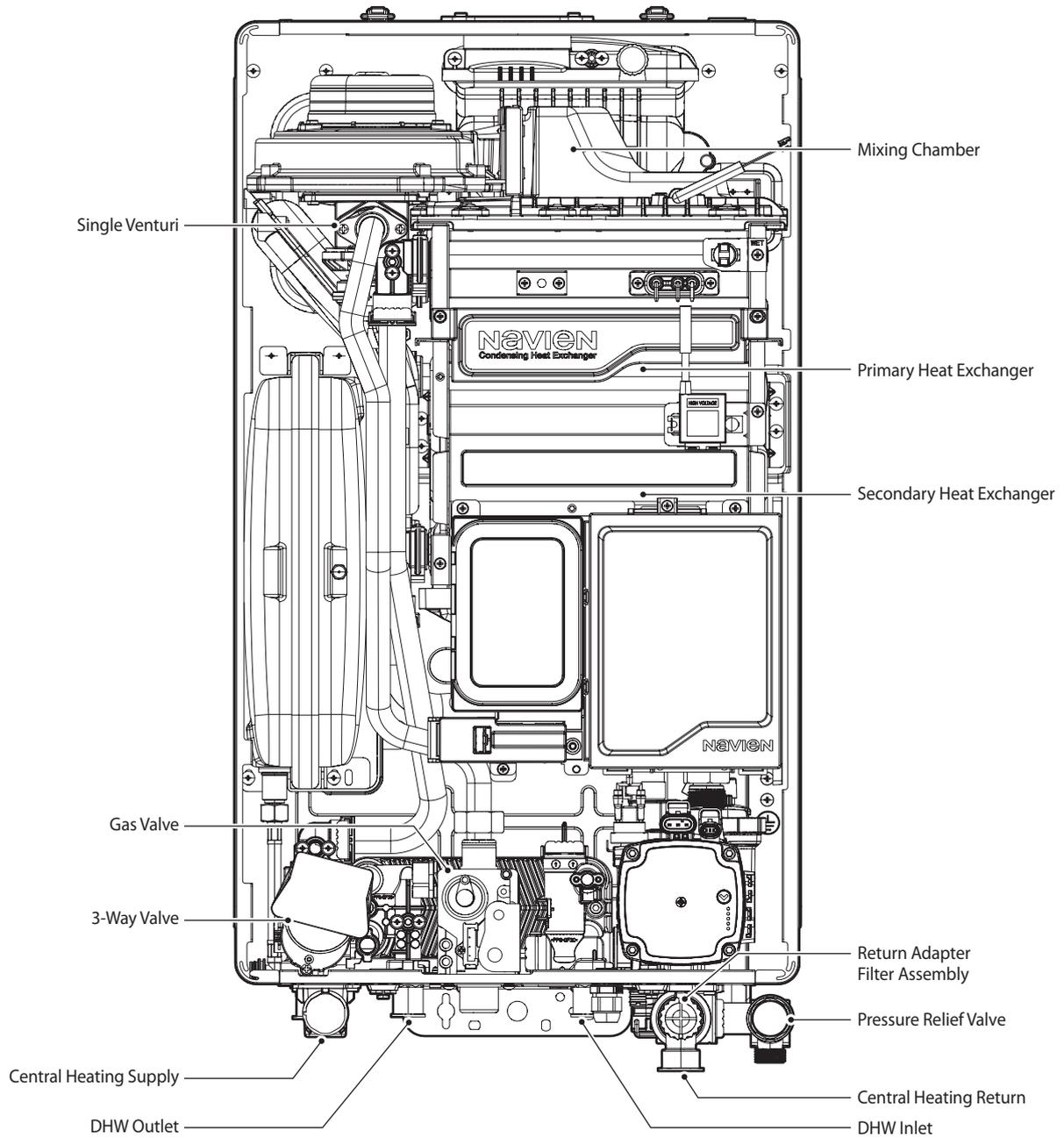
NCB300-28K
NCB300-30K



NCB300-37K
NCB300-41K



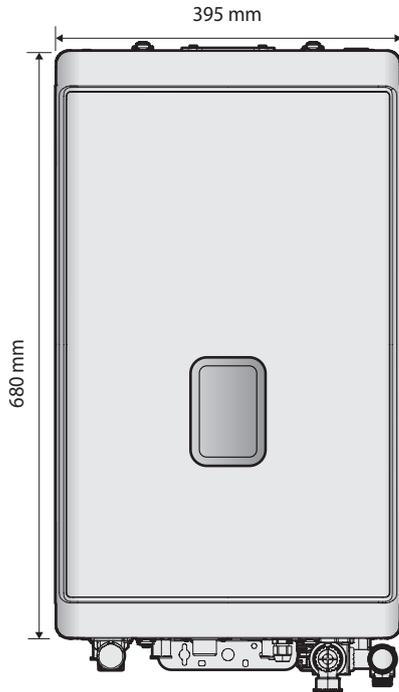
NCB300-28K
NCB300-30K



NCB300-37K
NCB300-41K

2.5 Dimensions

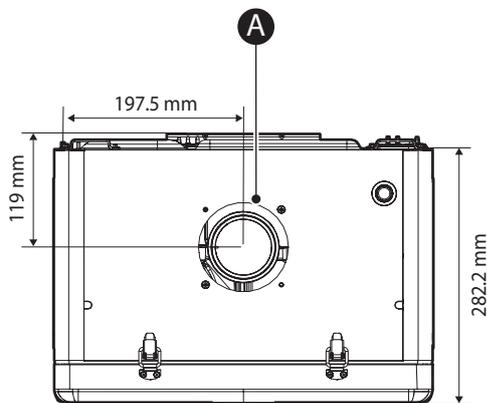
The following diagrams show the dimensions of the boiler and the table lists the supply connections.



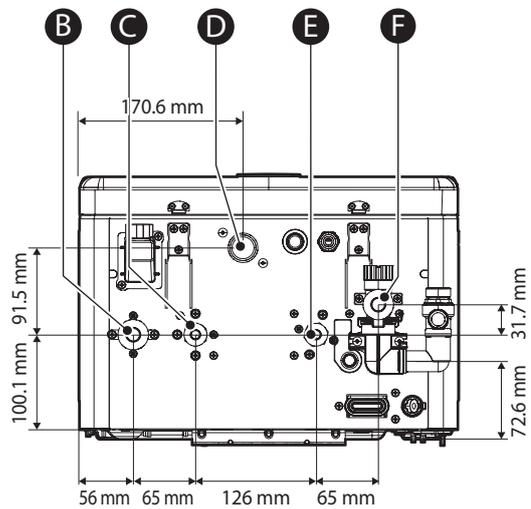
Supply Connections

	Description	Diameter
A	Flue exhaust/Air intake	Ø60/100, Ø80/125
B	Central heating supply	22 mm
C	Hot water outlet (DHW)	15 mm
D	Gas supply inlet	22 mm
E	Cold water inlet (DHW)	15 mm
F	Central heating return	22 mm

Overhead View



Bottom View



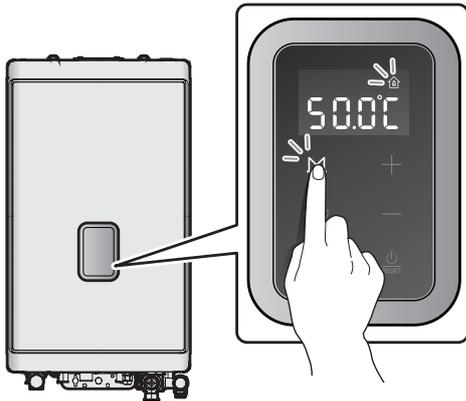
NCB300-28K
 NCB300-30K
 NCB300-37K
 NCB300-41K

2.6 Operating Modes

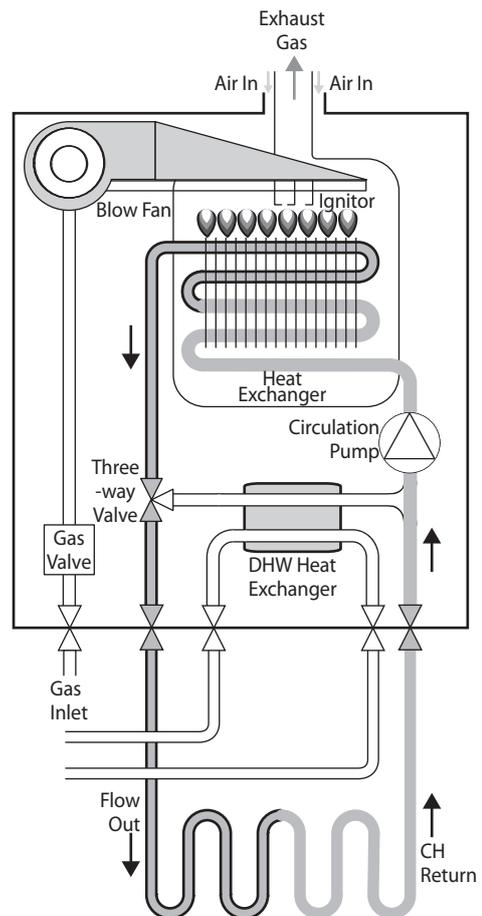
2.6.1 Operating in Central Heating Mode

To operate the central heating mode:

1. Press the Menu button (M) to access the CH temperature setting mode.



2. Select a heating temperature setpoint higher than current heating temperature.
 - When the boiler detects a request for heating production (from the installation's room thermostat, for example), the 3-way valve goes to heating position and the circulating pump starts up.
 - If the boiler water temperature is lower than the desired temperature setpoint, the boiler ignites and heats up the heating installation until the selected boiler temperature is reached. The boiler's electronic control modulates the burner output to adapt to the installation's heat requirements at all times and so that the installation's water temperature remains constant. This prevents the installation from overheating and reduces heat loss as much as possible.
 - When there is no further heating demand (e.g. when the desired ambient temperature selected on the room thermostat is reached), the burner is extinguished (if it was ignited) and the circulation pump continues to run during the post-circulation time (minimum 3 minutes), to protect the boiler from overheating due to thermal inertia in the installation.



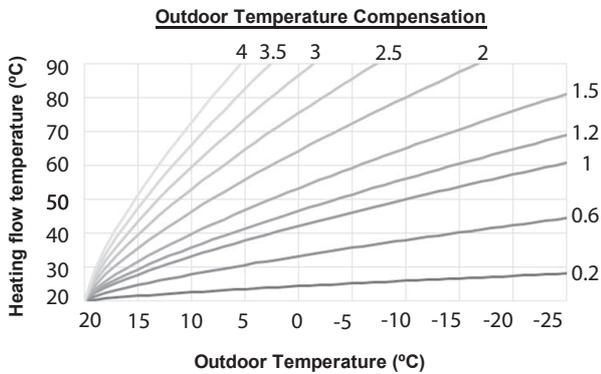
2.6.2 Operating According to Outdoor Temperature Conditions

The Outdoor Reset Control feature may be used to enhance energy efficiency while maintaining optimal heating performance. With the Outdoor Reset Control, the central heating temperature setting automatically changes according to the outdoor temperature and the K-Factor setting.

You can configure the Outdoor Reset Control settings on the front panel in the Central Htg Operation menu. Refer to "10.6.2 Setting the Central Heating Temperature" on page 52.

Note The Outdoor Reset Control feature requires installation of an outdoor temperature sensor, and it only works when the boiler is running in the normal operation mode. It does not work when the boiler's front panel displays a fault.

The following table lists the central heating temperature range by k-factor setting value and the applicable outdoor temperature range.

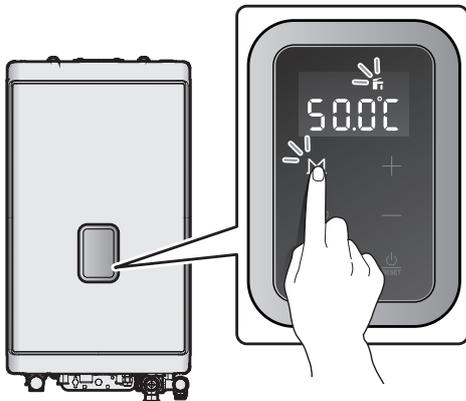


Note To connect the outdoor temperature sensor to the boiler, carefully follow the connection instructions provided in the "12.4 Outdoor Temperature Sensor (Optional)" on page 76.

2.6.3 Operating in DHW Mode

To operate the DHW mode:

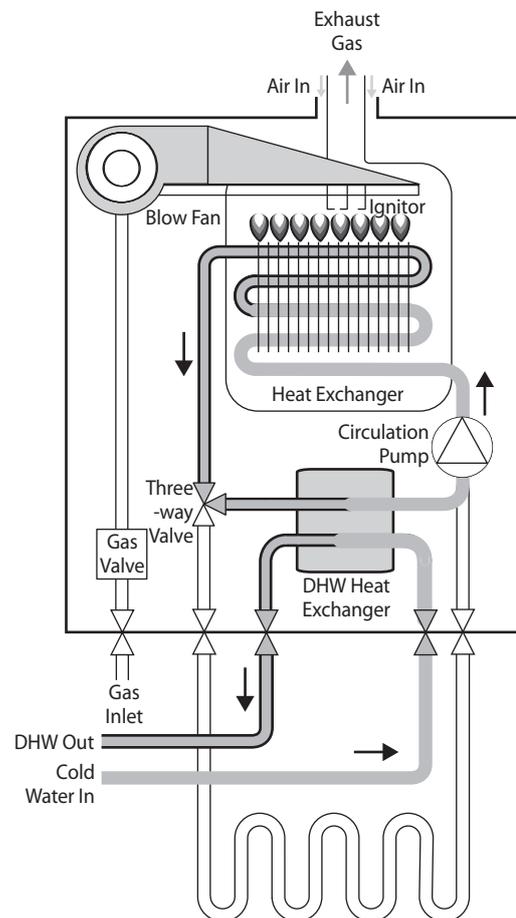
1. Press the menu button (M) twice to access the DHW temperature setting mode.



2. In the DHW Operation menu, select "1. DHW Set Temp" and select a DHW temperature setpoint higher than current DHW temperature.
 - When a hot water tap is turned on in the home, the boiler flow meter detects DHW demand, the 3-way valve goes to DHW mode and the circulation pump starts up, which makes the water in the boiler primary circuit flow through the DHW heat exchanger, producing instant hot water.
 - The electronic control modulates the burner output in order to constantly produce hot water at the temperature required.

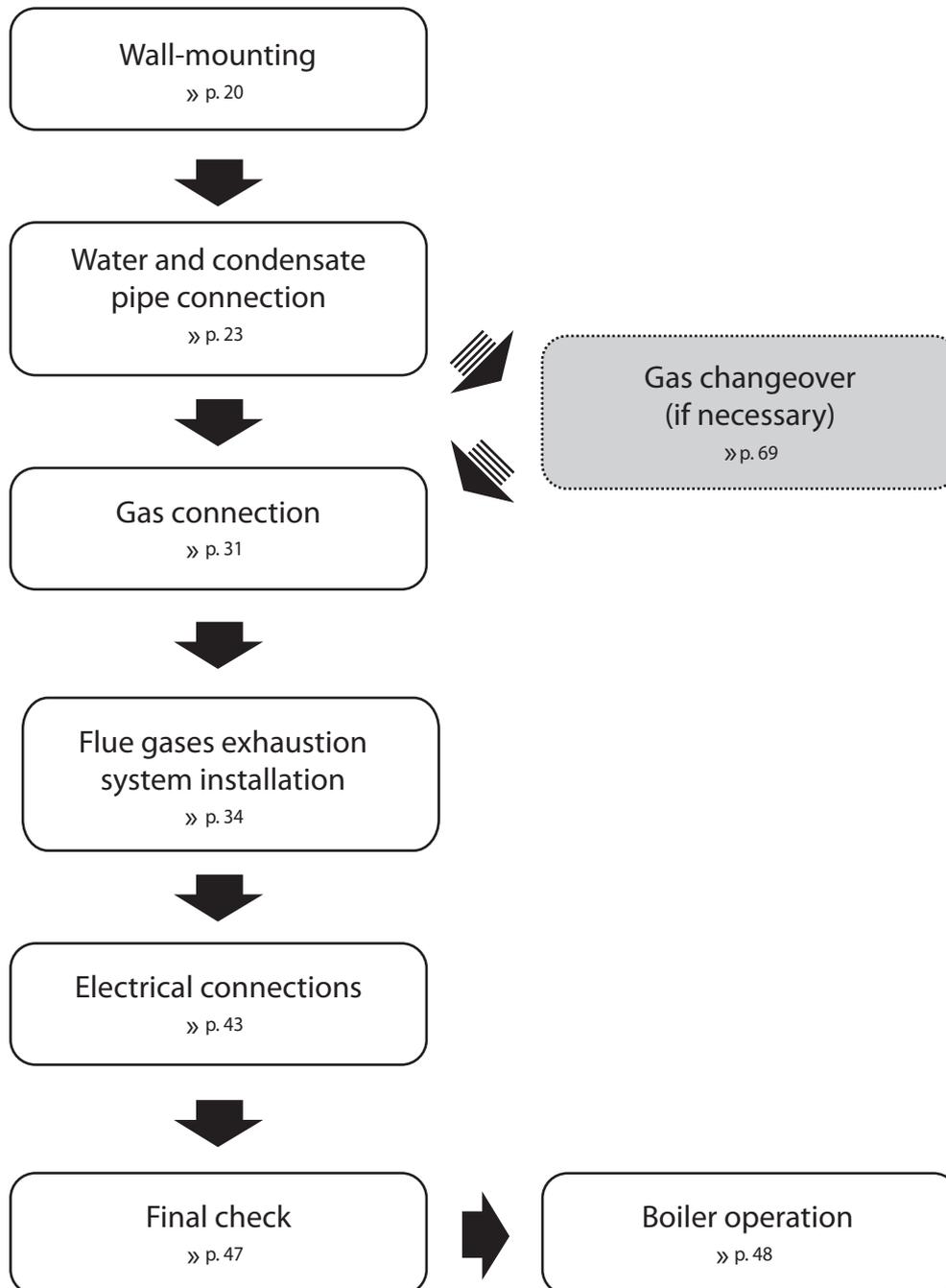
- When there is no further DHW demand, the burner switches off and the 3-way valve remains in DHW mode position during a wait time (5 minutes by default), so that it can work more efficiently and provide more flexibility if the taps are continuously turned on and off.
- When the wait time has elapsed, the 3-way valve returns to the Heating mode position and the boiler is ready to provide heating.

- Note**
- DHW priority: Whenever a hot water tap is turned on in the home, the boiler begins to run in DHW mode and the heating function is deactivated until all the taps are turned off again.
 - When the boiler water pressure drops below 0.4 bar, follow the instruction "4.6 Filling the System" to fill the boiler system.



2.7 Installation Procedure

The flow diagram below provides a step-by-step description of the recommended procedure for clear, easy installation of the NCB300 boiler in its final location. A detailed description is given of the procedure in the sequenced sections below:



3. Installing the Boiler

3.1 Choosing an Installation Location

When choosing an installation location, you must ensure that the location provides adequate clearance for the boiler, adequate flue and drainage options, and sufficient access to gas, water, and electrical supplies.

Carefully consider the following factors when choosing an installation location:

Compliance Requirements

This boiler must be installed by qualified personnel in compliance with the applicable Laws and Regulations. In general, these Laws and Regulations are the Basic Gas Installation Standards, the Heating, Air Conditioning and Domestic Water Installation Regulation and all other local regulations.

Access to Utilities

- Water—the installation location should be near where the domestic water supply enters the building.
- Gas—the installation location should be near where the gas supply enters the building.
- Electricity—the installation location should be near where the electrical supply enters the building.

Humidity and Contact with Water

When installing the boiler, avoid places with excessive humidity. The boiler has electric gas ignition components. Water spray or droppings can get inside the boiler and damage the ignition system. The boiler must be installed in a way to ensure that the gas ignition system components are protected from water (dripping, spraying, rain, etc.) during operation and service.

If the boiler is installed in a very humid room (a shower room or bathroom, for example), the Low Voltage regulation and the Technical Building Code must be observed for correct installation.

Proximity to Fixtures and Appliances

Install the boiler near fixtures that deliver or use hot water, such as bathroom, kitchen, and laundry room taps. Select a location that minimises the water piping required between major fixtures. If the distances are long or if the user requires “instant” hot water, installation of a recirculation line which circulates domestic hot water back to the boiler from the furthest fixture is recommended. Insulate as much of the hot water supply and recirculation lines as possible. For more information about the water supply, refer to “4.2 Installing a Domestic Hot Water (DHW) System” on page 24.

Adequate Drainage

The boiler produces a significant amount of condensate during operation. This condensate must be removed from the boiler, and suitably treated if national legislation so requires. The boiler should be located near a suitable drain and where damage from a possible leak will be minimal. Installing the boiler in a location without a drain will void the warranty and Navien will not be responsible for water damage that occur as a result. For more information about condensate drainage, refer to “4.3 Connecting the Condensate Drain Line” on page 25.

The boiler must be located in an area where leakage of the unit or connections will not result in damage to the area adjacent to the appliance or to lower floors of the structure. When such locations cannot be found, installation of an adequately drained drain pan under the boiler is highly recommended. When installing the drain pan, ensure that the installation does not restrict combustion air flow.

Adequate Flue and Ventilation

No specific ventilation is required in the room the boiler is installed in. If it is installed in a cupboard or compartment, no specific ventilation is required, providing the aforementioned dimensions are observed. Therefore, the requirements of BS5440:2 may be disregarded.

Select a location that requires minimal flue. Consider flue restrictions caused by windows, doors, air intakes, gas meters, foliage, and other buildings. For more information about flue system, refer to “6. Flue System” on page 34.

To ensure adequate flue and ventilation, follow these guidelines:

- Maintain proper clearances from any openings in the building.
- Install the boiler with a minimum clearance of 300 mm above an exterior grade or as required by local codes.
- Do not enclose the flue termination.
- Install the exhaust flue in an area that is free from any obstructions, where the exhaust will not accumulate.
- Do not install the boiler where moisture from the exhaust may discolour or damage walls.

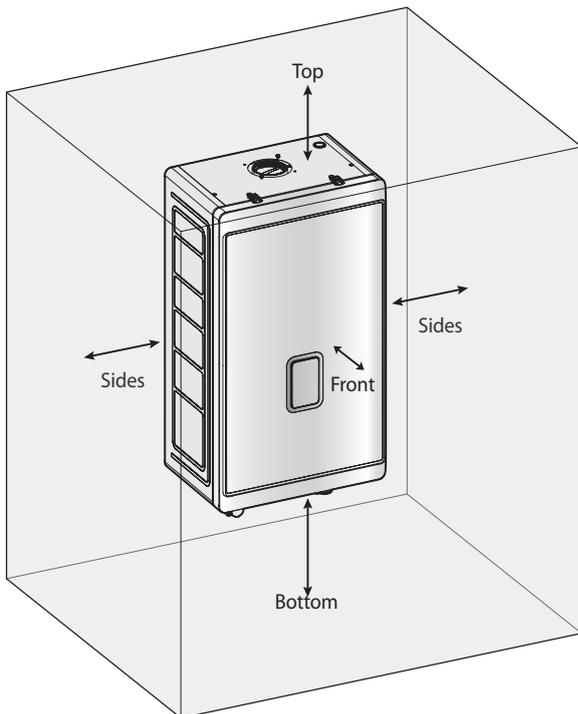
The flue gas outlet and air supply installation must comply with the current regulation requirements in accordance with BS:5440 Part 1 and 2.

Adequate installation clearances

CAUTION

Do not install the boiler on carpeting.

Install the boiler in an area that allows for service and maintenance access to utility connections, piping, filters, and traps. Based on the installation location, ensure that the following clearances are maintained:



Clearance from:	Indoor Installation
Top	250 mm minimum
Front	600 mm minimum
Bottom	200 mm minimum
Sides	5 mm minimum

Note The minimum clearance in front with cupboard door closed must be 5 mm.

Clean, debris and chemical-free combustion air

- Do not install the boiler in areas where dust and debris may accumulate or where hair sprays, spray detergents, chlorine, or similar chemicals are used.
- Do not install the boiler in areas where petrol or other flammables are used or stored.
- Ensure that combustible materials are stored away from the boiler and that hanging laundry or similar items do not obstruct access to the boiler or its flue system.

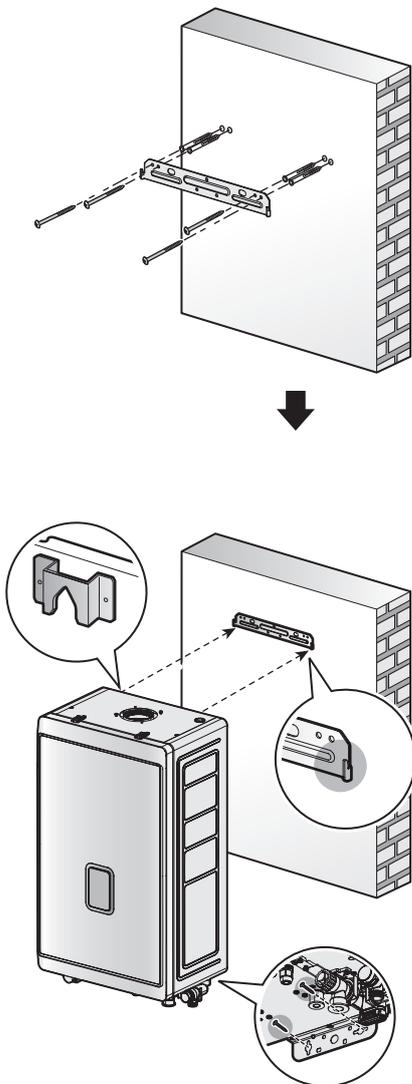
3.2 Mounting the Boiler to the Wall

Navien NCB300 boilers come with an upper mounting bracket that is pre-drilled for easy installation on a standard wall. If the strength of the wall is insufficient or if the framing is non-standard or uneven, reinforce the area before installing the boiler. Avoid installation on party walls as the unit will make some operational noises while it is running.

To mount the boiler to the wall:

1. Affix the bracket securely to the wall and ensure that it is level and that it can support the weight of the boiler.
2. Align the grooves on the back of the boiler with the tongues on the mounting bracket and hang the boiler on the bracket.

When mounted with the mounting bracket, the boiler will have a 16 mm clearance from the back of the wall.



WARNING

- The boiler is heavy. Always lift the unit with assistance. Be careful not to drop the boiler while lifting or handling it to avoid bodily injury or damage to the unit.
- Do not rest the boiler on the bottom end after removing it from the shipping carton. Doing so may result in excessive pressure on protruding pipes and result in product damage. If you must put the boiler down, lay it on its back or put it inside the protective shipping base.

DANGER

- The boiler must be mounted on a suitable wall that can support its weight and prevent explosion or fire.
- Do not install the boiler near paper or other flammable objects.
- Do not install the boiler near domestic waste.

- Note**
- You need to install a Stand Off Kit to pipe up the back of boiler.
 - Refer to the instruction manual provided with Stand Off Kit.

4. Installing the System Piping

The installation must be made by sufficiently qualified technicians, authorised to do so. For correct installation, the water mains installation must comply with the Water Supply (Water Fittings) Regulations and Scottish Water Byelaws, together with all other national and/or local regulations applicable at the time of installation. However, the following recommendations must be complied with:

- Before connecting the boiler hydraulically, the inside of the pipes must be thoroughly cleaned, removing all sediment of any type which could cause oxidation or damage to the heat exchanger.
- It is recommended to fit full bore shut-off valves to the heating installation output and return pipes, to avoid having to drain the installation when maintenance work is carried out on the boiler.
- Bleed the air from the boiler and heating installation. Ensure there is no air in the heating circuit.
- The NCB300 boiler is a condensing boiler, and it is therefore essential for the condensate outlet to lead to a drain, in compliance with all applicable national and/or local regulations to this respect.
- The boiler drain must not be located above a window, entry door or other public point of access. Bear in mind that boiling water or steam could come out when draining.
- Draining must be done in a downward direction and towards the walls.
- When connecting or using an underfloor heating system, designed with plastic pipes, or plastic pipes are used elsewhere in the installation, one should ensure that the plastic pipes used comply with the DIN 4726/4729 standard. It is set out in this standard that the pipes may not have oxygen permeability higher than $0.1 \text{ g/m}^3 \cdot \text{d}$ at 40°C . If the system does not comply with this DIN standard, the underfloor heating component will have to be separated from the central heating appliance by means of a plate exchanger.

WARNING

- Tighten the boiler water connections, taking care not to damage them. Do not force the tube connections excessively, as this could damage the connections and cause leaks.
- Any dirt in the tubes could reduce boiler efficiency and cause it to malfunction.
- Any pipes exposed to the elements or which could freeze in winter must be insulated with suitable insulating material.

CAUTION

Failure to follow the instructions provided in this section will void the warranty and may result in property damage, fire or serious injury.

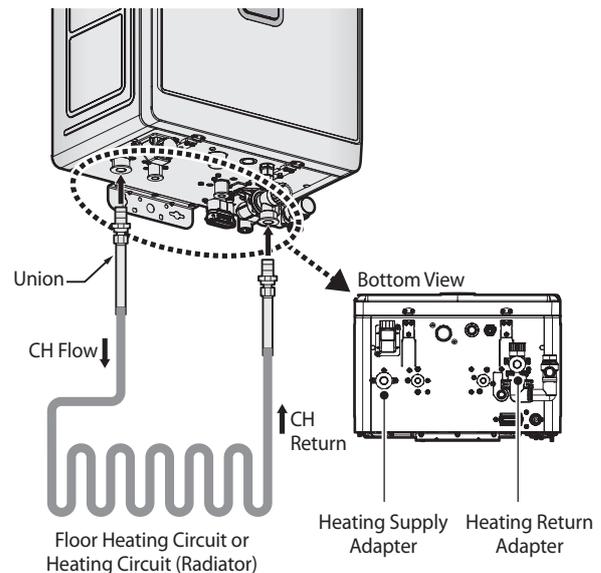
4.1 Installing a Central Heating System

The primary and secondary heat exchangers of the Navien NCB300 boiler are designed to attain the highest level of heat transfer in a compact design. To accomplish this, the heating water flows through a series of tubes (secondary heat exchanger) and finned tubes (primary heat exchanger), designed to maximise the heat transfer area. To maintain the efficient and reliable operation of the heat exchangers, and to avoid heat exchanger failure, it is critical to ensure the rules and guidelines in this section are followed.

CAUTION

- The installation must be made by sufficiently qualified technicians, authorised to do so.
- For correct installation, connect the central heating system according to the current regulations together with all other national and/or local regulations applicable at the time of installation.

Refer to the following illustration for a typical DHW piping example for the boiler.



When connecting the central heating system, follow these guidelines:

- Tighten the connection valves with care to avoid damage.
- Test the boiler for proper central heating flow and inspect for leaks.

4.2 Installing a Domestic Hot Water (DHW) System

The water mains installation must comply with the Water Supply (Water Fittings) Regulations and Scottish Water Byelaws.

The NCB300 is fitted with a stainless steel plate heat exchanger for producing domestic hot water. The boiler does not have a hot water store and in case of a demand for hot water the boiler will heat the domestic water flowing through the plate heat exchanger up to 65°C (adjustable) instantaneous.

In regions with a water hardness value higher than 200 ppm (2.67 mmol/l), calcium deposits should be removed from the plate heat exchanger on a regular basis. If problems occur when using sanitary water with a chlorine content higher than 150 mg/l, no recourse can be made to the terms of the warranty.

In order to prevent calcification Navien recommends applying a water softener.

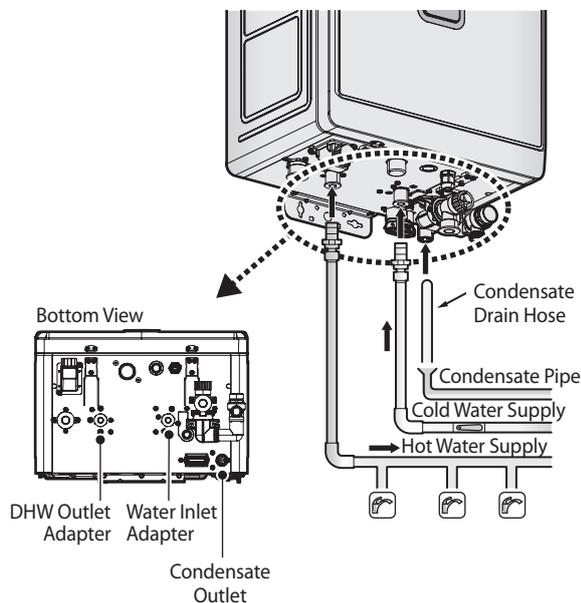
The hardness of the water is variable in the United Kingdom and other countries. The water company can provide exact information about this. The domestic water installation can be connected to the boiler by means of 15 mm compression fittings.

If the mains supply is fitted with water meter, check valves or loose jumper stop cock, then a DHW expansion device must be fitted.

! CAUTION

- The installation must be made by sufficiently qualified technicians, authorised to do so.
- For correct installation, connect the central heating system according to the current regulations together with all other national and/or local regulations applicable at the time of installation.

Refer to the following illustration for a typical DHW piping example for the boiler.



When installing the DHW system, follow these guidelines:

- Use only pipes, fittings, valves, and other components (such as solder), that are approved for use in potable water systems.
- Tighten the connection valves with care to avoid damage.
- Keep the hot water piping system as short as possible, to deliver hot water to the fixtures more quickly.
- After installing the boiler, clean the cold water inlet filter. Then, test the boiler for proper DHW supply and inspect for leaks.
- If the mains supply is fitted with water meter, check valves or loose jumper stop cock, then a DHW expansion device must be fitted.

About the DHW Quality

Proper maintenance of the boiler is required when water quality does not meet European standards. Damage caused by poor water quality is not covered under warranty. The following table shows the maximum contaminant levels allowed, based on the European drinking water guideline: 98/83/EG dated 3 November 1998. If you suspect that your water is contaminated in any way, discontinue use of the DHW and contact an authorised technician or licensed professional.

DHW Quality

Parameter	Value
Water type	Potable water
pH	7.0-9.5
Conductivity (at 20°C in µS/cm)	Max. 2500
Chloride (ppm)	Max. 150
Iron (ppm)	Max. 0.2
Hardness (°dH / ppm)	1-12 °dH / 17-224 ppm
Number of bacterial colonies at 22°C (number/ml), pr EN ISO 6222	Max. 100

Navien is not responsible for performance issues of the domestic system by scaling or accumulation of dirt; suitable steps shall be taken by the installer and user to avoid water quality related issues.

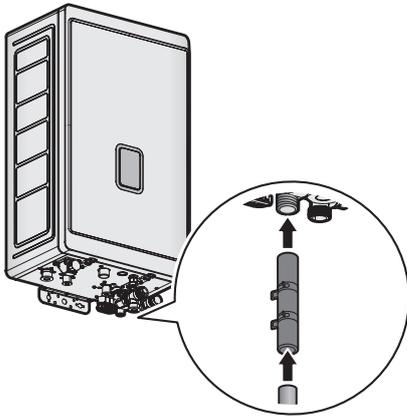
Connection of the drinking water installation should be done according to the Water Supply (Water Fittings) Regulations and Scottish Water Byelaws.

4.3 Connecting the Condensate Drain Line

The Navien NCB300 boiler creates condensation when it operates. This condensation has an acidic pH of 3-5. Follow all local codes and regulations when disposing of condensate from the boiler (BS 6798).

CAUTION

- Do not cap or plug the integrated condensate line. If prevented from draining, condensate can damage the boiler.
- The condensate line must have a continuous fall downwards to drain correctly.



The drain line can be connected to the condensate trap using a condensate trap hose. The hose connection must be secured with a hose clip.

Note This hose is supplied along with the boiler.

Before putting the boiler into operation water must be poured into the exhaust connection to fill the condensate trap.

Condensate Pipework

For correct condensate pipework installation, the tube must have a minimum diameter 19 mm ID (Typically 22 mm OD).

The condensate pipework must be made of a material that can withstand corrosion, e.g. PVC, PVC-U, ABS, PVC-C or PP. It must not be made of metal.

For safety reasons, the end of the condensate pipework must be as close as possible to the draining point.

Routing of Pipework

The condensate pipework must fall at least 50mm per metre away from the boiler, taking the shortest practical route to the termination point.

Support the pipe at least every 50 cm for near horizontal sections and 1 metre for vertical sections.

Wherever possible, the condensate pipework should be routed internally to prevent freezing. In order to minimise the risk of freezing during prolonged very cold spells, one of the following methods of terminating condensate drainage pipe should be adopted.

Internal Pipework

Wherever possible, the condensate drainage pipe should be terminated at a suitable internal foul water discharge point such as (a) an internal soil and vent stack or (b) an internal kitchen or bathroom waste pipe, washing machine waste pipe etc. A suitable permanent connection to the foul waste pipe should be used.

The possibility of waste pipes freezing downstream of the connection point should be considered when determining a suitable connection point - e.g. a slightly longer pipe run to an internal soil stack may be preferable to a shorter run connecting into a kitchen waste pipe discharging directly through the wall to an external drain.

Where "gravity discharge" to an internal termination is not physically possible (e.g. the discharge point is above the appliance location, or access is obstructed by a doorway), or where very long internal pipe runs would be required to reach a suitable discharge point, the following measures may be adopted.

Use of a Condensate Pump

Condensate can be removed using a condensate pump, of a specification recommended by the pump manufacturer.

The pump outlet should discharge to a suitable internal foul water discharge point, such as (a) an internal soil and vent stack or (b) an internal kitchen or bathroom waste pipe, washing machine waste pipe etc.

A suitable permanent connection to the foul waste pipe should be used and the manufacturer's detailed installation instructions for the pump should be followed.

If you are using a condensate pump, ensure that the pump allows for up to 3.78 LPH of drainage for each boiler in the system.

External Pipework

The use of an externally-run condensate drainage pipe, terminating at a suitable foul water discharge point or purpose-designed soakaway, may be also considered; however if this termination method is chosen then the following measures should be adopted.

- The pipe should be run internally as far as possible before going externally and the pipe diameter should be increased to a minimum of 30 mm ID (typically 32 mm OD) before it passes through the wall.
- The external run should be kept as short as possible, taking the most direct and “most vertical” route possible to the discharge point, with no horizontal sections in which condensate might collect. Do not exceed 3 metres outside the dwelling.
- The external pipe should be insulated using suitable waterproof and weatherproof insulation (“Class O” pipe insulation is suitable for this purpose).
- The use of fittings, elbows etc should be kept to a minimum and any internal “burrs” on cut pipework should be removed so that the internal pipe section is as smooth as possible.

The customer/householder should be advised that even with the above measures this type of installation could freeze, and that if this were to occur then boiler shutdown could result, requiring remedial action - possibly involving a chargeable engineer call-out.

All other relevant guidance on condensate drainage pipe installation should also be followed.

When a rain water downpipe is used as the termination (NB only permissible if this downpipe passes to a combined foul and rainwater drainage system) an air break must be installed between the condensate drainage pipe and the downpipe to avoid reverse flow of rainwater into the boiler should the downpipe itself become flooded or frozen.

Where the condensate drainage pipe is terminated over an open foul drain or gully, the pipe should terminate below the grating level, but above water level, in order to minimise “wind chill” at the open end. Pipe drainage will be improved if the end is cut at 45° as opposed to a straight cut. The use of a drain cover (such as those used to prevent blockage by leaves) may offer further protection from wind chill.

Where the condensate drain pipe terminates in a purpose-designed soakaway (see BS 6798 or boiler installation manual for soakaway design requirements) any above-ground section of condensate drainage pipe should be run and insulated as described above.

Unheated Internal Areas

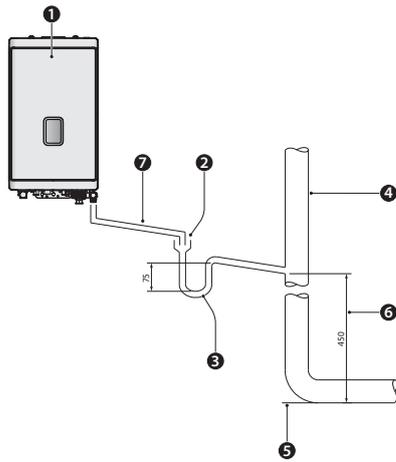
Internal condensate drainage pipes run in unheated areas such as lofts, basements and garages should be treated as external pipe.

Neutralizing Agent

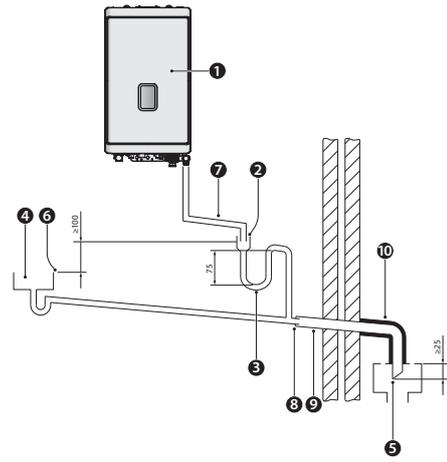
From the boiler, through a neutralizing agent, and then into an external drain.

Note

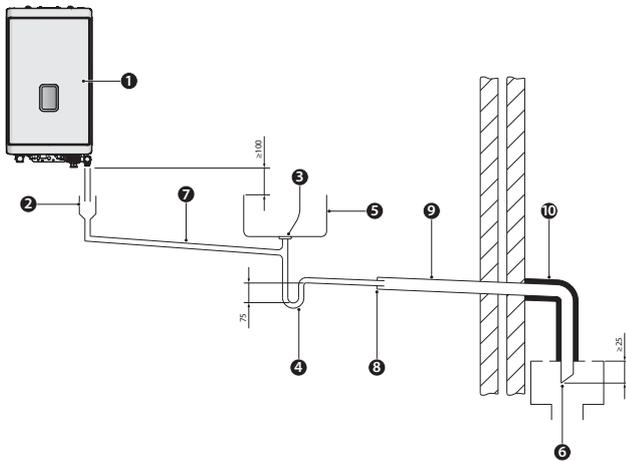
If you choose this option, the neutralizing agent must be replaced periodically. Depletion of the neutralising agent will vary, based on the usage rate of the boiler. During the first year of operation, the neutraliser should be checked every few months for depletion and replaced as needed.



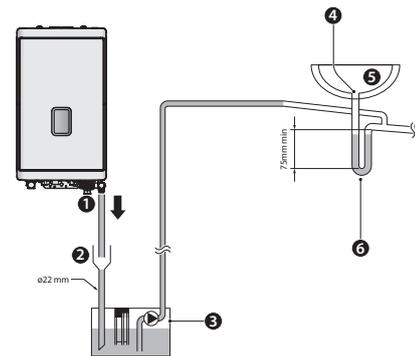
#	Description
1	Boiler
2	Visible air break
3	75 mm trap
4	Soil and vent stack
5	Invert
6	450 mm minimum up to three storeys
7	Minimum internal diameter 19 mm (fall at least 45 mm per meter)



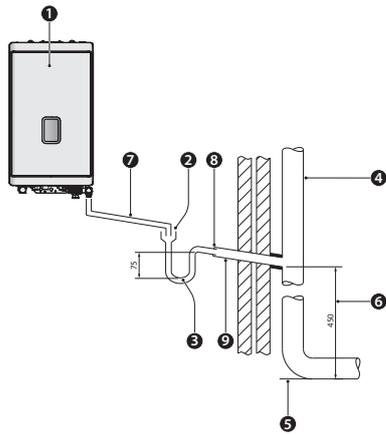
#	Description
1	Boiler
2	Visible air break
3	75 mm trap
4	Sink, basin, bath or shower
5	Open end of condensate drainage pipe direct into gully 25 mm min below grating but above water level; end cut at 45°
6	Sink lip
7	Minimum internal diameter 19 mm (fall at least 45 mm per meter)
8	Pipe size transition
9	Minimum internal diameter 30 mm
10	Water/weather proof insulation



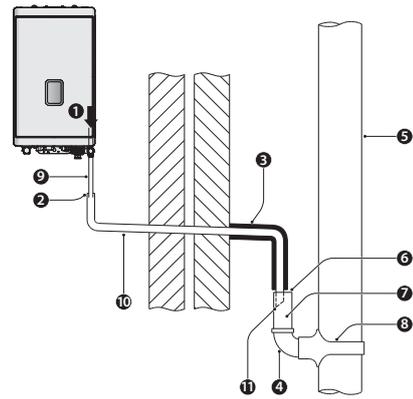
#	Description
1	Boiler
2	Visible air break
3	Visible air break at plug-hole
4	75 mm sink, basin, bath or shower waste trap
5	Sink, basin, bath or shower with integral overflow
6	Open end of condensate drainage pipe direct into gully 25mm min below grating but above water level; end cut at 45°
7	Minimum internal diameter 19 mm (fall at least 45 mm per meter)
8	Pipe size transition
9	Minimum internal diameter 30 mm
10	Water/weather proof insulation



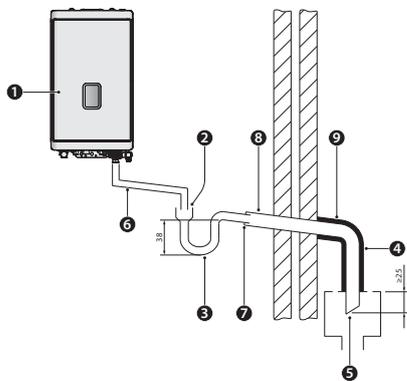
#	Description
1	Condensate discharge from boiler
2	Visible air break
3	Condensate pump
4	Visible air break at plug hole
5	Sink or basin with integrated overflow
6	75 mm sink waste trap



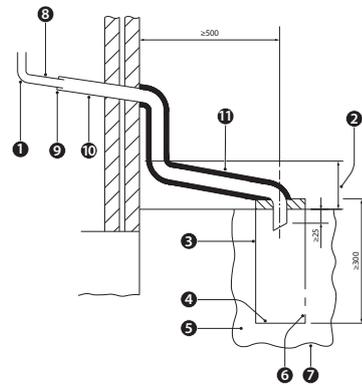
#	Description
1	Boiler
2	Visible air break
3	75 mm trap
4	Soil and vent stack
5	Invert
6	450 mm minimum up to three storeys
7	Minimum internal diameter 19 mm (fall at least 45 mm per meter)
8	Pipe size transition
9	Minimum internal diameter 30 mm
10	Water/weather proof insulation



#	Description
1	Condensate discharge pipe from boiler
2	Pipe size transition point
3	Water/weather proof insulation
4	43 mm 90° male/female bend
5	External rain water pipe into foul water
6	External air break
7	Air gap
8	68 mm ø PVCu strap-on fitting
9	Minimum internal diameter 19 mm
10	Minimum internal diameter 30 mm
11	End cut at 45°



#	Description
1	Boiler
2	Visible air break
3	38 mm minimum trap
4	External length of pipe 3 m maximum
5	Open end of condensate drainage pipe direct into gully 25 mm min below grating but above water level; end cut at 45°
6	Minimum internal diameter 19 mm (fall at least 45 mm per meter)
7	Pipe size transition point
8	Minimum internal diameter 30 mm
9	Water/weather proof insulation



#	Description
1	Condensate discharge pipe from boiler
2	Ground (this section of the condensate drainage pipe may be run either above or below ground level); End cut at 45°
3	Diameter 100 mm minimum plastic tube
4	Bottom of tube sealed
5	Limestone chippings
6	Two rows of three 12 mm holes at 25 mm centres, 50 mm from bottom of tube and facing away from house
7	Hole depth 400 mm minimum by 300 mm diameter
8	Minimum internal diameter 19 mm (fall at least 45 mm per meter)
9	Pipe size transition point
10	Minimum internal diameter 30 mm
11	Water/weather proof insulation

4.4 Pipe Dimensions and Water Pressure

The requirements recommended for the pipe dimensions and water pressure are as follows:

- The connection diameter for the domestic cold water inlet must be at least $\text{Ø}15$ mm.
- If a shut-off valve is fitted at the domestic cold water inlet, it must have a safety valve incorporated, calibrated to 9 bar.
- For DHW production installation, the inlet pressure must be over 0.5 bar.
- For hot water supply to the second floor of a building, the minimum pressure required is 1.0 bar.
- The pipe diameter is not determined by the boiler connection but must be calculated in accordance with its length and consequent pressure drop.

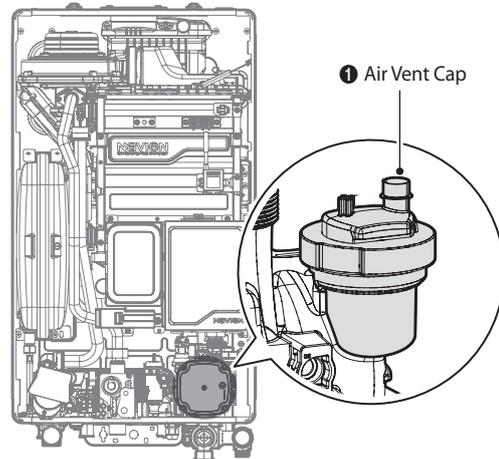
4.5 Pressure Relief Valve

The requirements recommended for the pressure relief valve are as follows:

- The pressure relief valve is calibrated to be activated at a maximum pressure of 3 bar, and all the pipes and connections must therefore be able to withstand pressures of up to 3 bar.
- Connect the pressure relief valve drain to a tube with a diameter of at least $\text{Ø}15$ mm. It must tilt in a downstream direction throughout its entire length, and the water must run off to a suitable drain. It must be positioned so as not to cause damage to cabling, electrical equipment or persons.
- The drain must not be located above a window, entry door or any other public access point. Bear in mind that boiling water or steam could come out when draining.

4.6 Filling the System

Before filling the boiler pipes, unscrew the air vent cap (1) to allow the pipes to fill properly. Screw up the cap when the pipes are full.



Note

- Ensure that the air vent cap is fitted before testing or operating the system.
- To perform an air purge after initially filling the boiler pipes, the pump will run for 5 minutes and 20 seconds. The boiler will operate normally after performing an air purge.

4.7 Testing the Water System



WARNING

Ensure that the boiler is full of water before firing the burner. Operating the unit without filling it will damage the boiler. Such damage is not covered by the warranty, and may result in property damage or severe personal injury.

Perform a fill test after installing the boiler's water system to make sure that the system has been installed properly. Follow the instructions below to perform a fill test on the water system.

1. Close the manual air vents and the boiler drain valve.
2. Fill the boiler. The correct pressure will vary with each application.
3. If the pressure is lower than the minimum pressure set (1 bar by default), error code E302 will appear on the display.
4. Fill the boiler with more water until the error message disappears.
5. At initial fill and during boiler start-up and testing, check the system thoroughly for leaks. Repair any leaks before proceeding further.



WARNING

Eliminate all system leaks. The continual introduction of fresh makeup water will reduce boiler life. Minerals can build up in the heat exchanger, reducing heat transfer, overheating the heat exchanger and causing heat exchanger failure.



CAUTION

Before operating the boiler for the first time, ensure that the boiler system is filled with water. Purge the air inside the system to avoid damage to the boiler.

5. Connecting the Gas Supply

WARNING

- If a gas type other than the one specified on the boiler reference plate is used, it could cause a fire or even an explosion.
- It is important to ensure that the gas supply is suitable for the type and capacity of the boiler.
- Thoroughly check the seal and draining of the entire installation, as a gas leak could cause serious damage.

DANGER

- Gas leaks can cause explosions resulting in serious personal and material damage.
- Keep all doors and windows open while you are bleeding the gas pipes and put out any cigarettes, flames or other possible source of ignition.

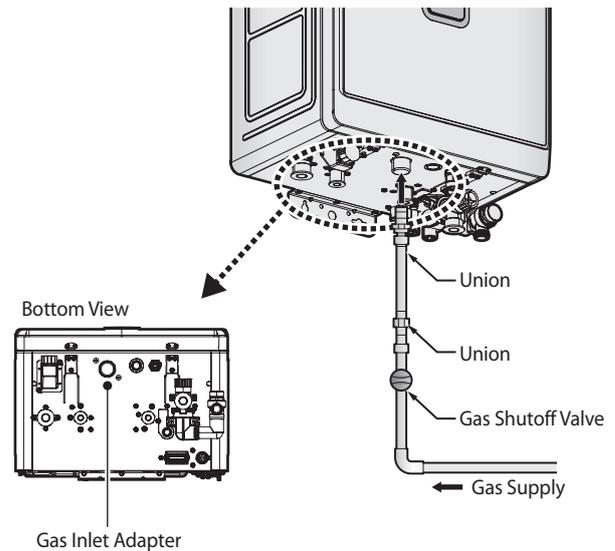
For the installation of any type of gas, the installer must be suitably qualified and the gas supply must comply to the current Gas Safety (Installation and Use) Regulations, in accordance with BS 6891.

However, the following recommendations must be complied with, at the least:

- Before installing the gas pipes, check the type of gas is compatible with the boiler.
- Check that the gas meter in the home can measure the rate of gas supply required.
- The gas pipe diameter is not determined by the boiler connection. It should be calculated in accordance with its length and consequently its pressure drop.
- Check there are no leaks from the installation.

To connect the gas supply:

1. Connect the gas supply pipe to the connection located on the underside of the appliance.
2. After completing the gas installation, check there are no leaks and purge the air from all the pipes, following the procedures described in the applicable standards to this respect.



5.1 Gas Pipe Material

WARNING

The boiler must be left running for 10 minutes before checking the gas pressure, to obtain thermal equilibrium.

The gas installation pipes must be made of suitable materials and comply with the applicable legislation to this respect.

The gas connection must be made using a rigid pipe, inserting a shut-off valve between the boiler and the pressure regulator.

All the pipes must be suitably fixed in place.

5.2 Propane Gas Installations (LPG)

DANGER

- Thoroughly check the seal and the drainage of the entire installation, as a gas leak could cause serious damage.
- If a propane-fired boiler is installed in an interior room or compartment underground, one side of the building must be open to the exterior.
- If a gas tank is used, it must be installed in a cool, shaded place away from direct sunlight. It must also be thoroughly secured to prevent it from tipping over, which could cause an explosion.

If the boiler is used with propane, a gas regulator suitable for this type of gas must be installed. The connection and installation must be made in accordance with the applicable regulations and standards at the time of installation.

Note The output pressure of the pressure regulator must be in accordance with Standard EN 437.

5.3 Measuring the Inlet Gas Pressure

WARNING

The boiler cannot function properly without sufficient inlet gas pressure. Measuring the inlet gas pressure should be performed by a licensed professional only.

Natural Gas Connection

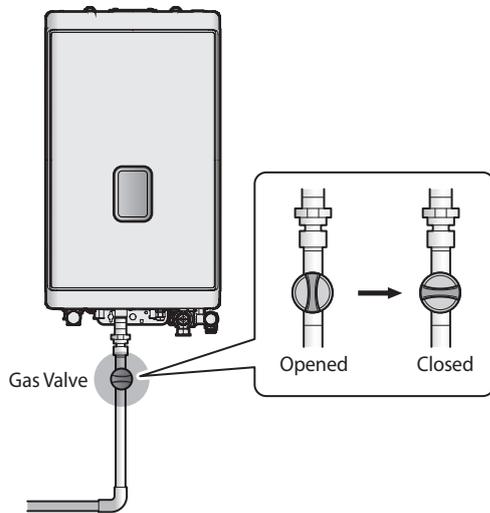
- The gas supply must comply to the current Gas Safety (Installation and Use) Regulations, in accordance with BS 6891.
- The nominal inlet working gas pressure measured at the appliance should be 21 mbar +/- 2 mbar for Natural gas (G20). Allowing for the acceptable pressure loss of 1 mbar across the installation pipework, it can be assumed that a minimum permitted operating pressure of 18 mbar will be delivered to the inlet of the appliance. (Reference BS 6400-1 Clause 6.2 Pressure Absorption).
- When tested at the gas valve, the pressure drop from the meter to the gas valve must not be more than 3 mbar.

Propane Gas Connection (LPG)

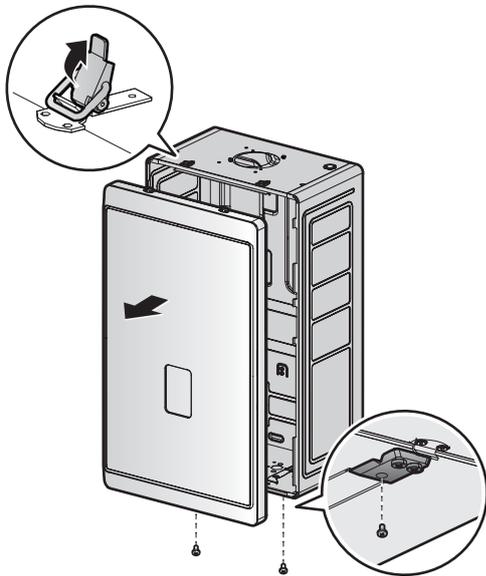
- For use with propane gas, the LPG conversion kit has to be installed, see separate conversion instructions.
- The LPG installation must comply to the current Gas Safety (Installation and Use) Regulations, in accordance with BS 6891.
- Installing of a LPG installation should only be done by a registered LPG installer.
- The tank must be provided with a high pressure regulator with a minimum capacity of 24 kg/h to reduce the tank pressure from 5 to 1.5 bar. The 1.5 bar high pressure gas line should have a minimum diameter of 15 mm. In the high pressure gas line a house pressure regulator must be installed.
- When tested at the gas valve, the pressure drop from the pressure regulator to the gas valve must not be more than 2 mbar.
- Each gas appliance which is connected to the propane installation must be provided with its own house pressure regulator. The house pressure regulator is a third party part. The house pressure regulator must have a minimum capacity of 10 kg/h/37 mbar and a CE certification.

To measure the inlet gas pressure:

1. Shut off the manual gas valve on the gas supply line pipe.



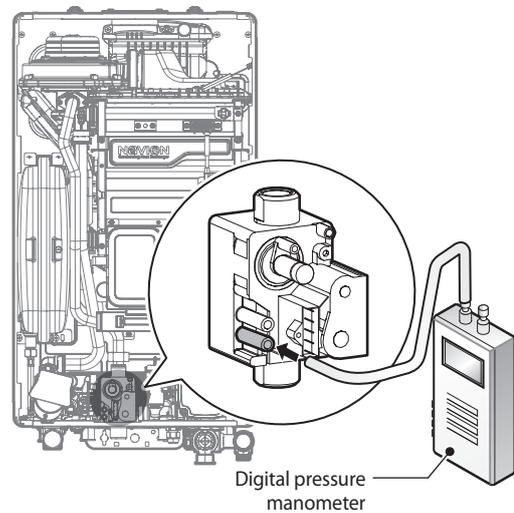
2. Open a hot water tap. The boiler should turn on and the gas in the gas supply line will be purged.
3. Leave the tap on until the boiler shuts down due to a lack of gas supply, and then turn off the hot water tap.
4. Unfasten the 2 latches (at the top) and remove 2 screws (at the bottom) to remove the front cover and gain access to the internal components.



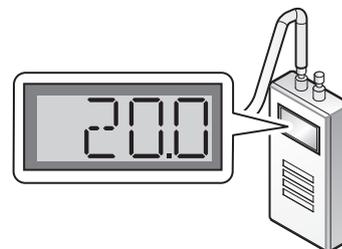
! CAUTION

Ensure that no cables are in the way before folding down the PCB assembly. If the assembly is stuck, do not force it. Doing so may damage the cables and result in serious malfunctions. Check again to ensure that no cables or any other parts are in the way before you proceed.

5. Loosen the screws indicated in the figure below and connect a manometer to the pressure port. Reset the manometer to zero before use.



6. Re-open the manual gas valve and check for leaks.
7. Open multiple fixtures that have high flow rates, such as bathtub and shower taps, to ramp the boiler up to its maximum firing rate.
8. When the boiler reaches its maximum firing rate, check the inlet gas pressure reading on the manometer. The gas pressure must fall within the ranges specified on page 9.



6. Flue System



WARNING

Improper flue of the boiler can result in excessive levels of carbon monoxide, which can lead to severe personal injury. Flue should be performed only by a licensed professional.

No specific ventilation is required in the room the boiler is installed in. If it is installed in a cupboard or compartment, no specific ventilation is required, providing the aforementioned dimensions are observed. The flue gas outlet and air supply installation must comply with the current regulation requirements in accordance with BS 5440 Part 1 and 2, and any other applicable legislation in this field must be observed.

6.1 Flue Terminal Positions



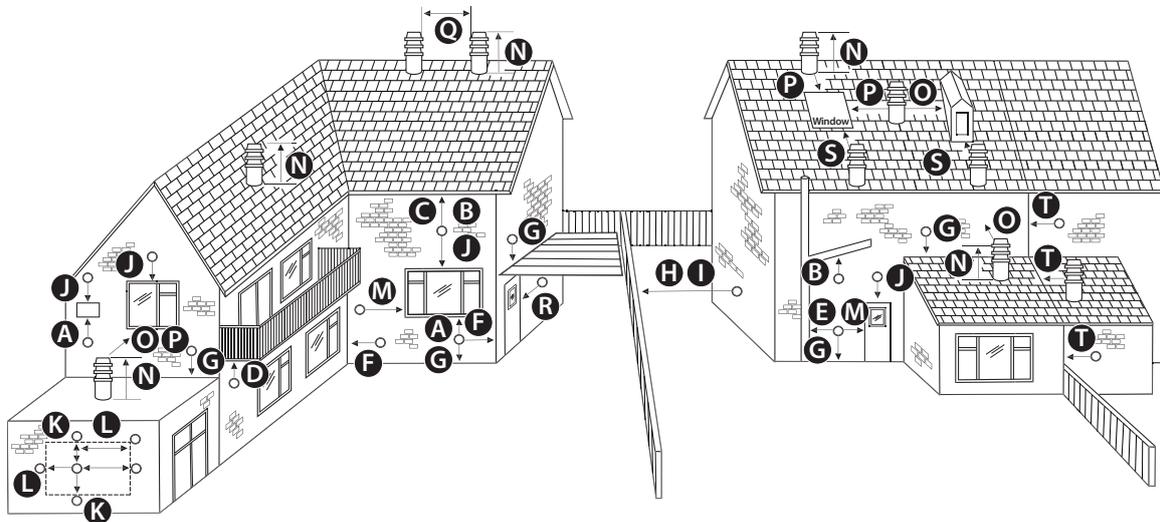
CAUTION

- The terminal must be fitted with suitable protection if it is less than 2 m from a balcony, on a flat roof or surface that could be accessed by people.
- If the outlet passes through a wall made of combustible material the end terminal must be covered with at least 20 mm of incombustible material and must maintain a distance of at least 50 mm from any flammable material.
- The parts connecting the flue outlet must be correctly joined using sealing gaskets. Ensure that there are no leaks from any part of the removal circuit.
- Switch off the boiler and wait for the pipes to cool down before cleaning the gas removal and air intake ducts.
- The gas removal and air intake ducts must be protected from snow accumulation.

The installation of the flue exhaust and combustion air intake system must be calculated and installed by a sufficiently qualified person. On designing and mounting the installation, the flue gas exhaust outlet and air supply installation must comply with the current regulation requirements in accordance with BS 5440, any other applicable legislation and stipulations applicable at the time of installation must be taken into account.

The minimum distances between the flue exhaust terminal and the building elements must comply with those shown in the following table:

Flue outlet positions

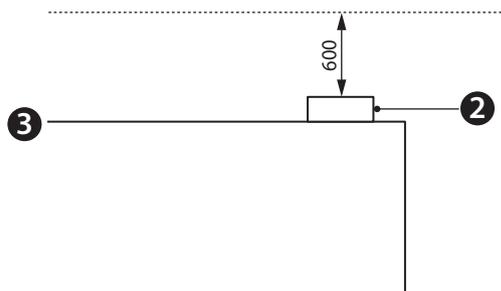


Terminal Position	Min. distance (mm)	
A	Directly below an opening, air brick, windows, etc.	300*
B	Below gutters, soil pipes or drain pipes	75***
C	Below eaves	200***
D	Below balconies	200***
E	From a vertical drain pipe or soil pipe	150***
F	From an internal or external corner	300**
G	Above ground, roof or balcony level	300
H	From a surface or boundary facing the terminal	600****
I	From a terminal facing the terminal	1200
J	Above an opening, air brick, window etc.	300*
K	Vertically from a terminal on the same wall	1500
L	Horizontally from a terminal on the same wall	300
M	Horizontally from an opening, air brick, window etc.	300*
N	Minimum protrusion through a roof	300
O	From a vertical obstruction	300
P	From an openable window	600
Q	From an adjacent vertical terminal	600
R	From an opening in the car port (e.g. door, window) into the dwelling	1200
S	Below a roof window	2000
T	Terminal parallel to a boundary	300

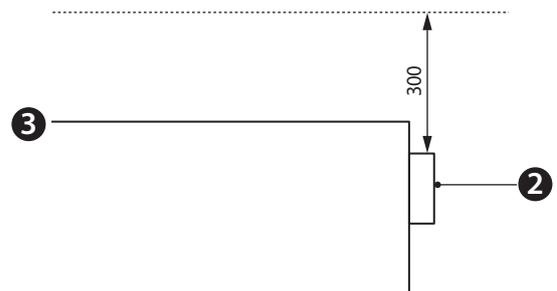
* In addition, the terminal should not be nearer than 150 mm to the framework of an opening into the building, i.e. a window surround or door surround.
 ** This clearance may be reduced to 25 mm without effecting the performance of the boiler. However, to ensure the condensate plume does not affect adjacent surfaces a clearance of 300 mm is preferable.
 *** These clearances may be reduced to 25 mm without effecting the performance of the boiler. However, to ensure the condensate plume does not affect adjacent surfaces the terminal can be extended beyond gutters, pipes, eaves, balconies etc.
 **** To reduce the possibility of nuisance to neighbouring buildings etc. it is recommended the terminal should not be less than 2500 mm from car parking spaces, building boundary walls, fences etc.

- Note**
- A terminal must not be sited under a car port roof.
 - In certain weather conditions the terminal will emit a plume of steam. If possible avoid positioning the terminal where this may cause a nuisance, i.e. positions A, D, G, H, J or M.
 - The flue terminal must be exposed to the external air and the position must allow the free passage of air across it at all times.
 - A terminal must not be sited below 2 m where people have access to, such as public footpaths, access routes, patios etc. However, If the terminal is fitted less than 2 m above a surface where there is no public access, the terminal must be protected by a terminal guard.

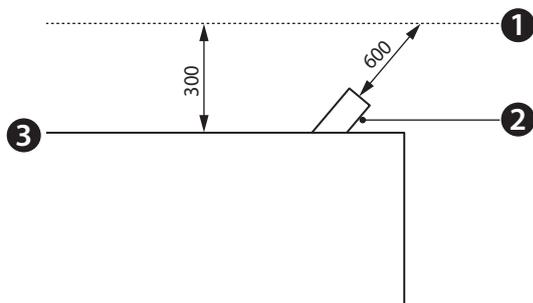
Proximity of Flue Duct Outlet to a Boundary



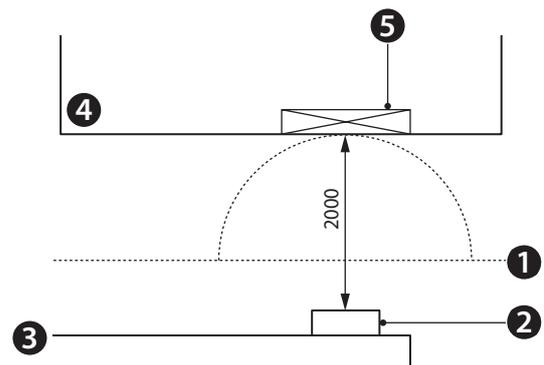
a) Facing the boundary



b) Parallel to the boundary



c) At an angle to the boundary



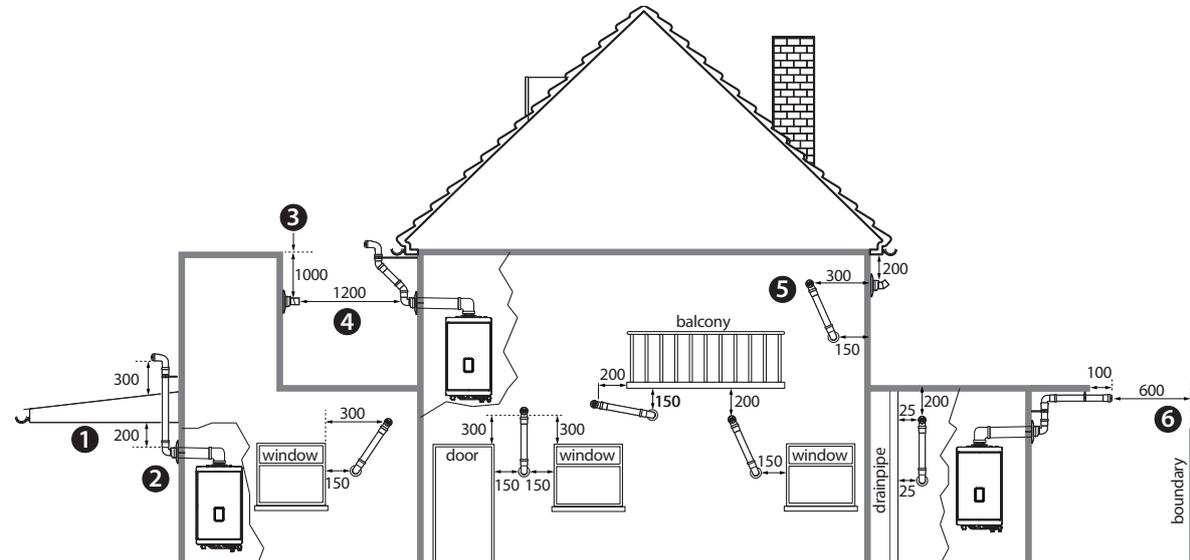
d) Opening in adjacent building

#	Description
1	Boundary
2	Terminal
3	Building
4	Adjacent building
5	Window

Plume Management

The appliance produces a plume of condensate, which can be seen in colder weather. This plume of condensation is harmless, but can be unattractive, particularly in the case of outlets on outside walls.

For wall terminals a plume management kit is available as an option.



Terminal position Plume Management Kit (mm)	
1	Clearance no less than 200 mm from the lowest point of the balcony or overhang.
2	1200 mm from an opening in a car port on the same wall i.e. door or window leading into dwelling.
3	The flue cannot be lower than 1000 mm from the top of the light well due to the build up of combustion products.
4	1200 mm between air intake and facing terminal.
5	Internal/external corners. The air intake clearance can be reduced to 150 mm providing the flue exhaust outlet has a 300 mm clearance.
6	600 mm distance to a boundary or surface facing a boundary, unless it will cause a nuisance. BS 5440: Part 1 recommends that care is taken when siting terminals in relation to boundaries.

6.2 Flue Installation

WARNING

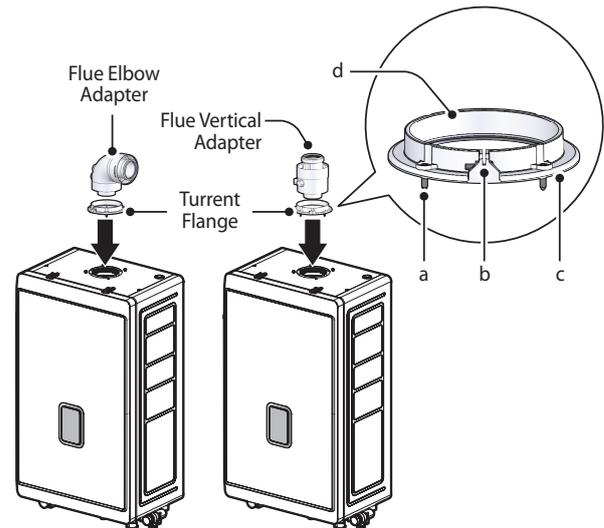
- If the flue passes through a wall made of combustible material the end terminal must be covered with at least 20 mm of incombustible material and must maintain a distance of at least 50 mm from any flammable material.
- If you replace the boiler, the old gas removal system must be replaced by a new one.
- For a horizontal flue terminal through the wall it must be installed horizontal and level. The internal flue pipe inside the horizontal flue terminal is fitted in a 3° fall to ensure the condensation water can run back to the boiler.
- For longer horizontal flue extensions, those flue sections must always be fitted on an incline ($52 \text{ mm/m} = 3^\circ$) sloping down towards the boiler so that no condensation water is able to accumulate in the outlet system.
- The Navien flue system used is a push fit flue system, which does not require screws to be fitted at each flue joint. **Screws must not be used.**
- The flue system must be adequately supported at regular intervals between brackets of no more than 1 m for horizontal sections and no more than 2 m for vertical sections.

The fume extraction connection depends on the type of installation. Carefully follow the instructions given below:

Coaxial System

For coaxial flue adapter, fit the components as shown in the figure:

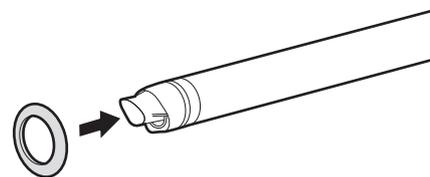
Fit the turret flange (comes with horizontal flue kit or vertical adapter) to the top of the boiler with four screws supplied with the black foam seal in between the flange and the top of the boiler. Fully push to engage and clamp around the flue elbow or vertical adapter.



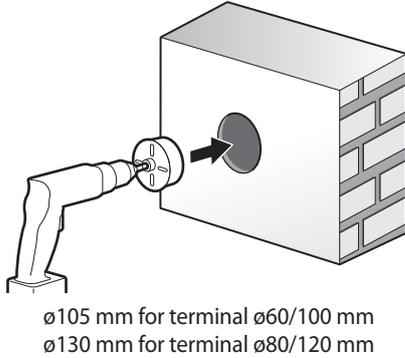
#	Description
a	Flange to case screws
b	Clamp nut and bolt
c	Black foam seal
d	Flue clamp position

When installing the wall terminal horizontally through the wall, see the following as shown in the figure:

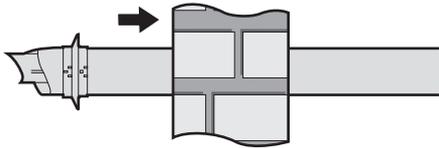
1. A flue terminal weather seal (black) can be fitted on the external flue terminal end.



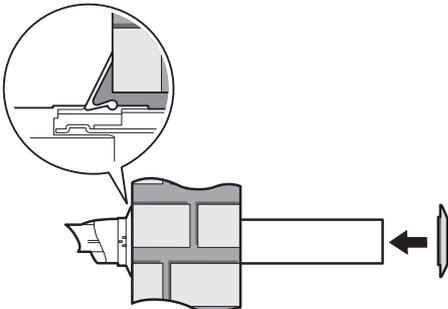
- Cut the hole for the flue ensuring the hole is horizontal and level. The horizontal flue length must be installer level as the flue pipe inside the terminal is fitted in a 3° fall back to the boiler.



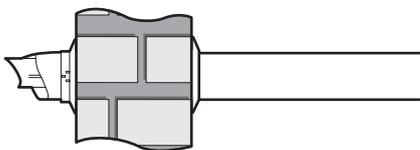
- Install the flue horizontally through the wall.



- Ensure flue weather seal is fitted correctly to ensure a good weathered seal. Then the internal (white) decorative weather seal can be fitted.

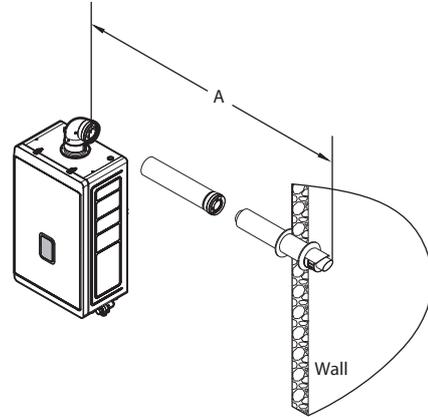


- Although weather seals can be used, the flue must be installed that prevents lateral movement. The use of sand and cement to seal the flue to the fabric opening of the building would secure the flue as required. The seals can be put over the securing sand and cement as a decorative weather seals.



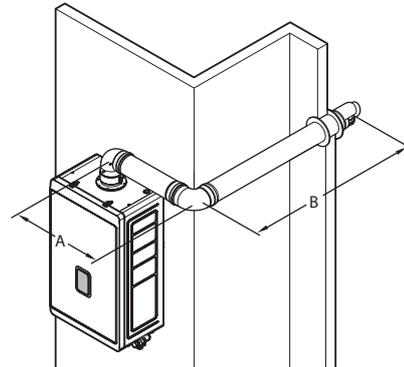
6.2.1 Horizontal Coaxial Removal (Type C₁₃)

Standard Removal System

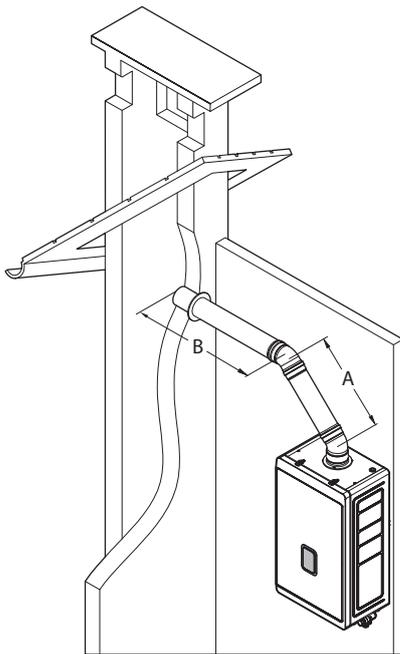


$\varnothing 60/100 \Rightarrow$ Max. length: A = 8 m
 $\varnothing 80/125 \Rightarrow$ Max. length: A = 27 m

Extended Removal System



$\varnothing 60/100 \Rightarrow$ Max. length: $A+B-(1 \times 90^\circ \text{elbow}) = 8-1.3 = 6.7$ m
 $\varnothing 80/125 \Rightarrow$ Max. length: $A+B-(1 \times 90^\circ \text{elbow}) = 27-2.2 = 24.8$ m

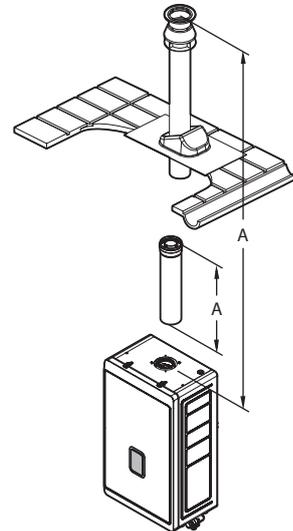


$\text{Ø}60/100 \Rightarrow \text{Max. length: } A+B-(1 \times 45^\circ \text{elbow}) = 8-1 = 7 \text{ m}$
 $\text{Ø}80/125 \Rightarrow \text{Max. length: } A+B-(1 \times 45^\circ \text{elbow}) = 27-1 = 26 \text{ m}$

Pipe Diameter (mm)	Maximum Length (m)	Elbow	Equivalent Length (m)
Ø60/100	8	45°	1.0
		90°	1.3
Ø80/125	27	45°	1.0
		90°	2.2

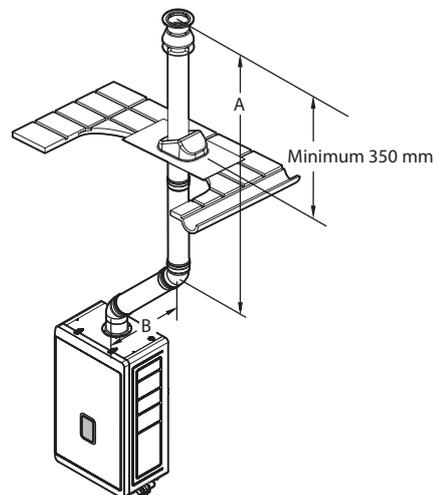
6.2.2 Vertical Coaxial Removal (Type C₃₃)

Standard Removal System



$\text{Ø}60/100 \Rightarrow \text{Max. length: } A = 8 \text{ m}$
 $\text{Ø}80/125 \Rightarrow \text{Max. length: } A = 28 \text{ m}$

Extended Removal System



$\text{Ø}60/100 \Rightarrow \text{Max. length: } A+B-(1 \times 45^\circ \text{elbow}) = 8-1 = 7 \text{ m}$
 $\text{Ø}80/125 \Rightarrow \text{Max. length: } A+B-(1 \times 45^\circ \text{elbow}) = 28-1 = 27 \text{ m}$

Pipe Diameter (mm)	Maximum Length (m)	Elbow	Equivalent Length (m)
Ø60/100	8	45°	1.0
Ø80/125	28		

6.3 Measuring Flue Length

The gas removal and air intake systems may be oriented in any direction (north, south, east or west). Some special components such as elbows are used to help reach certain positions. Each removal terminal kit includes an adapter for connection to the boiler and a removal terminal.

The total length of the flue must not exceed the maximum value defined. If the flue installation includes elbows while calculating the total length you must take into account that each elbow has a resistance equal to a specific linear Leq equivalent length (see table).

There are two different types of terminals (horizontal and vertical), for the coaxial flue system.

Carefully study the diagrams representing the different types of removal and select the one that best suits the conditions of your installation. To choose the removal accessories required for each installation, see the list of accessories on the NAVIEN price list.

Maximum Total Length

Type	Pipe Diameter (mm)	Orientation	Maximum Length (m)
Coaxial	Ø60/100	Horizontal	8
		Vertical	8
	Ø80/125	Horizontal	27
		Vertical	28

Equivalent Length of Elbows and Adapters

Type	Pipe Diameter (mm)	Elbow	Equivalent Length (m)
Coaxial	Adapter Ø60/100 -> Ø80/125	-	0.5
		45°	1.0
	Ø60/100	90°	1.3
		45°	1.0
	Ø80/125	90°	2.2

6.4 Terminating the Flue

Before installing the boiler, determine what type of flue termination is appropriate for the installation location and situation. The subsections that follow describe some typical flue configurations.

CAUTION

Minimum Clearance to Metering devices and Relief equipment. Maintain a minimum horizontal clearance of 1.22 m from electric meters, gas meters, regulators, and relief equipment. Do not install the boiler above or below electric meters, gas meters, regulators, or relief equipment unless a 1.22 m horizontal clearance is maintained.

7. Setting the DIP Switches

CAUTION

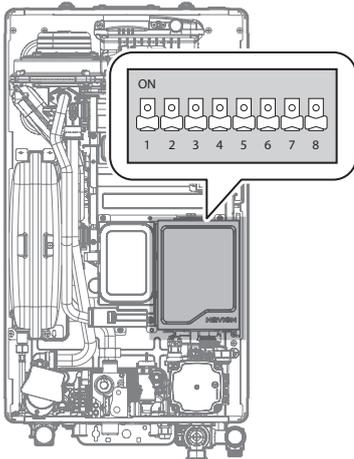
Do not remove the front cover unless the power to the boiler is turned off or disconnected. Failure to do so may result in electric shock.

The boiler has 2 sets of DIP switches on the main circuit board (PCB) and 2 sets of DIP switches on the front panel. DIP switches are used to control the functionality of the boiler. Set the DIP switches appropriately, based on the installation environment.

7.1 PCB DIP Switches

Dip Switch (Set of 8)

The DIP SW 1 on the circuit board configures boiler type, capacity, burner type, country, and discharge of condensate function.



DIP SW1

Switch	Function	Setting	
1	Boiler Type	SOLO	ON
		COMBI	OFF
2&3&4	Capacity	28kW	2-OFF, 3-OFF, 4-OFF
		30kW	2-ON, 3-OFF, 4-ON
		37kW	2-OFF, 3-ON, 4-OFF
		41kW	2-OFF, 3-OFF, 4-ON
5&6	Country	UK	5-OFF, 6-OFF
		Not Used	5-ON, 6-OFF
		Not Used	5-OFF, 6-ON
		Not Used	5-ON, 6-ON
7&8	Boiler Model	NCB300	7-OFF, 8-OFF

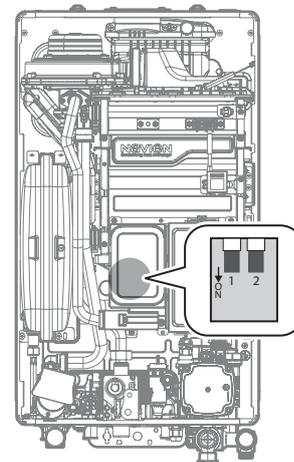
DIP SW2

Switch	Function	Setting	
1	Reserve		
3	Reserve		
4	Reserve		
5&6	Country		

7.2 Front Panel DIP Switches

Dip Switch (Set of 2)

The DIP SW on the front panel configures the fuel selection.



Switch	Function	Setting	
1 & 2	Fuel selection	LNG(G20)	1-OFF, 2-OFF
		Not Used	1-OFF, 2-ON
		LPG(G30) Not in UK	1-ON, 2-OFF
		LPG(G31)	1-ON, 2-ON

8. Connecting Electrical Supplies

WARNING

Improperly connecting the electrical supplies can result in electrical shock and electrocution. Follow all applicable electrical codes of the local authority having jurisdiction. Connecting the electrical components should be performed only by a licensed professional.

DANGER

- You must ensure that the boiler is disconnected from the electrical supply before carrying out any servicing inside the boiler and, particularly, on the electric terminal strips.
- If the electrical supply is connected electrical contact could occur, causing serious damage due to electrocution.

CAUTION

Label all wires before disconnecting them when you work on the controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

The boiler electrical connections must be made by sufficiently qualified staff in strict compliance with the sections below and with any electrical safety regulations applicable at the time of installation.

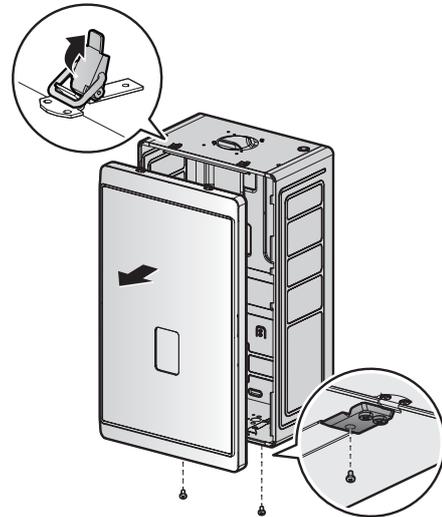
Note The NCB300 boiler has an electrical protection degree of IPX4D. The electrical connection must be made via a bipolar switch located on the same premises as the boiler. The switch must have a minimum pole separation of 3 mm.

8.1 Accessing the Terminal Strips

To access the PCB where the terminal strips are located, carefully follow the steps below:

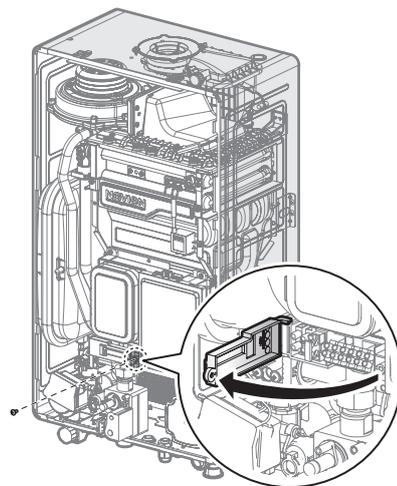
1. Turn off the power supply to the boiler.

2. Unfasten the 2 latches (at the top) and remove 2 screws (at the bottom) to remove the front cover and gain access to the internal components.



- Note**
- Before connecting the cables to the corresponding connector terminals, it is essential to thread them through the cable glands located on the underside of the boiler.
 - While threading the cables and making the connections, take special care that no pieces of cable fall onto the electrical connections or electronic cards.
 - Make sure you have tightened the cables sufficiently. It is essential for the boiler to be grounded.

3. Remove the screw and pull the cover downwards before connecting the power supply, room thermostat, OpenTherm, and the outdoor temperature sensor.



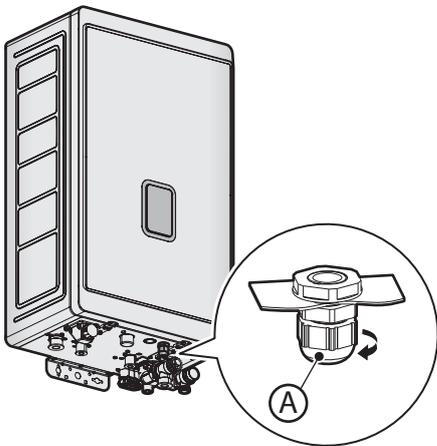
8.2 Connecting the Power Supply Cables

To correctly establish the boiler's electrical connection, follow the indications given in the figure and the indications on the identification label for the terminal strip connections.

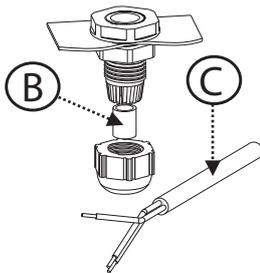
DANGER

Disconnect the main electrical supply before beginning any work and make sure all the necessary safety precautions are taken into account.

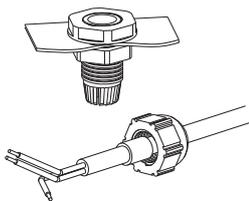
1. Remove the cap "A" from the cable gland on the underside of the boiler.



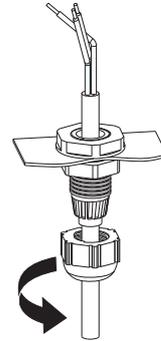
2. Remove the black silicon seal "B" from the cable gland and thread it onto cable "C".



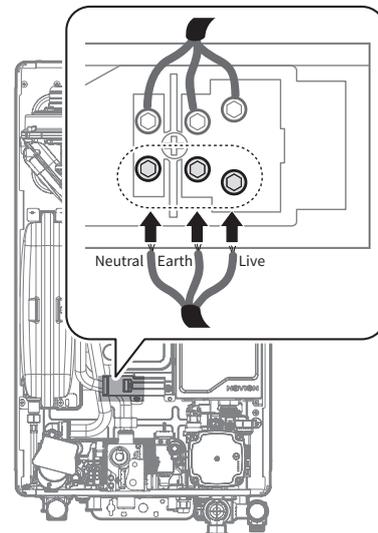
3. Insert cable "C" into the lid "A" together with the seal "B".



4. Insert all these elements in the cable gland and press on the lid "A" until the cable is sufficiently fixed in place and the unit is sealed.



Note The boiler must be connected to the supply terminals, which are clearly indicated on the left side of the PCB, via the cable supplied with the boiler for this purpose.



Note

- Fuse Size: 5 mm x 20 mm
- Fuse Rating: 250 V, 3.15 A

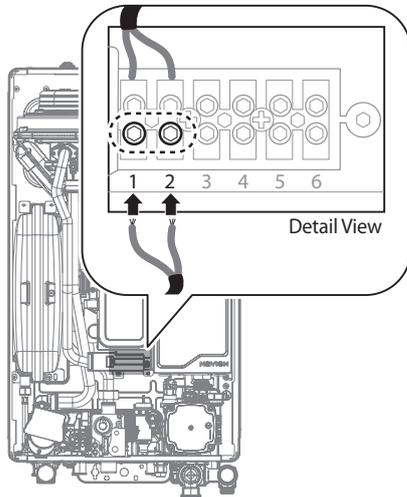
DANGER

This appliance must be earthed. Electrocutation caused by touching live parts can be fatal. Before working on the appliance, turn off the power supply and secure against restart.

Note The boiler must be earthed. Connection of the whole electrical system of the boiler, including any heating system to the electrical supply must be through one common isolator and must be fused 3.15 A maximum.

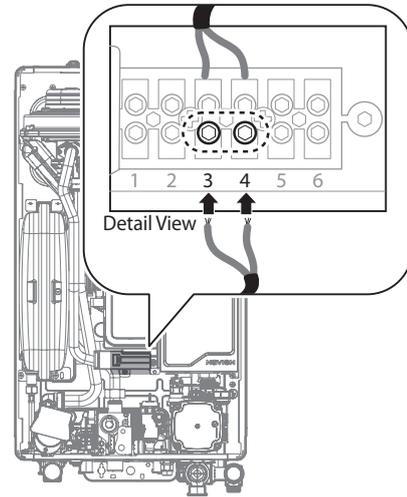
8.3 Connecting the Switched Live (230V)

The boiler is designed to be connected to a switched live. The switched live cables are to be connected to terminals 1 (AC Live Out) and 2 (Switched Live In) of the boiler terminal strip.



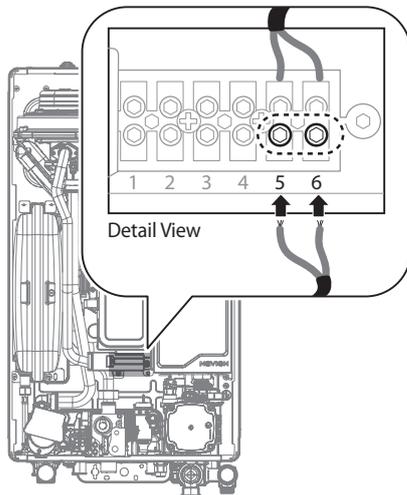
8.5 Connecting the Outdoor Temperature Sensor

The boiler is designed to be able to function with an outdoor temperature sensor. The sensor cables are to be connected to terminals 3 and 4 of the boiler terminal strip.



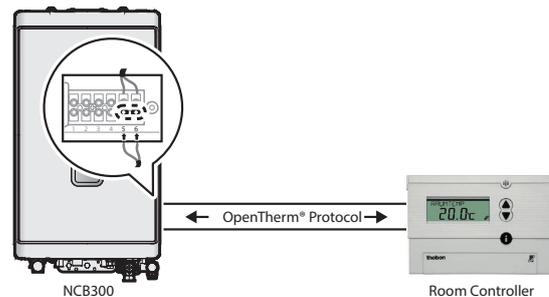
8.4 Connecting the Room Stat or OpenTherm

The boiler is designed to be connected to a Room Stat (volt free) or OpenTherm. The Room Stat or OpenTherm cables are to be connected to terminals 5 and 6 of the boiler terminal strip.



8.6 OpenTherm® Protocol

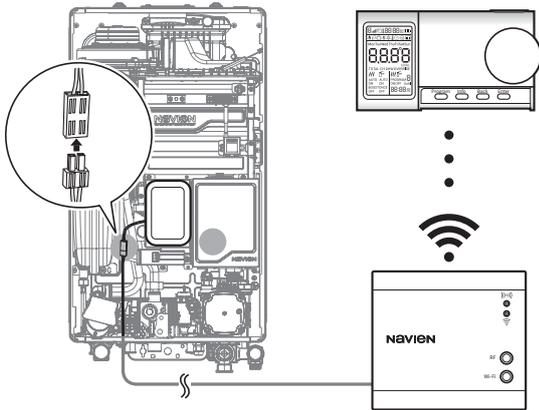
OpenTherm® is an industry standard modulating control available from several control manufacturers and the NCB300 boiler has an OpenTherm® interface. This enables our modulating range of OpenTherm® room controls to be connected without any further modifications.



8.7 Connecting the Navien Smart Room Controller (Optional)

Instead of using your boiler with a generic room thermostat, you can connect the Navien Smart Room Controller to the boiler and benefit from various additional features and more efficient control of the heating system using a mobile device.

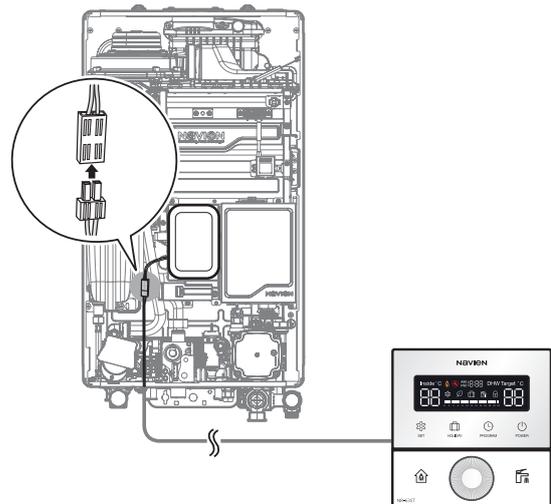
As the Navien NCB300 boiler has a dedicated connector for the Navien Smart Room Controller (NRC-10R) on the back of the front panel, terminal connection at the terminal block is not required. Simply connect the Navien Smart Room Controller cable to the 2-pin connector.



8.8 Connecting the Navien Room Controller (Optional)

Instead of using your boiler with a generic room thermostat, you can connect the Navien Room Controller to the boiler.

As the Navien NCB300 Boiler has a dedicated connector for the Navien Room Controller (NR-63ST) on the back of the front panel, terminal connection at the terminal block is not required. Simply connect the Navien Room controller cable to the 2-Pin connector.



Note

- You need to install an app on your mobile device to control the boiler from your mobile device.
- Refer to the instruction manual that is provided with the Navien Smart Room Controller about the additional features available with the controller.

9. Installation Check list

After installing the boiler, review the following checklist. Complete the boiler start-up process by carrying out the checks listed in the table below.

If you have additional questions or need assistance with installation, contact an official Technical Assistance Service (TAS), or refer to the technical support section of Navien's website (www.navien.co.uk).

Check	Value measured	Notes
Check that the boiler is filled with water and check for any leaks in the heating installation.		
Check the gas type. If the reference label is changed on gas type changeover, check the gas inlet pressure.		
Check that the gas circuit is hermetically sealed.		
Check that the control panel is working correctly. <ul style="list-style-type: none">• Check that it functions normally when the boiler is switched on.• Check that the heating system water pressure is correct.• Check that the heating temperature indicated is correct.• Check that the DHW temperature indicated is correct.• Check that the reset operation is performed correctly.• Check that the parameters on the technical menu are correctly adjusted.		
Measure the CO ₂ values.		
Check that the boiler works correctly with the outdoor temperature sensor, if it has a sensor connected.		
Check that the anti-frost function is working correctly.		
Check that the condensate drain pump is working, if the boiler has one.		

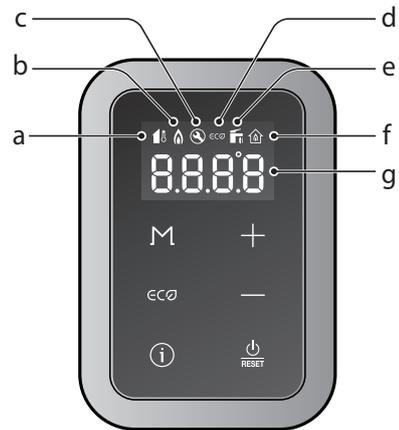
10. Operating the Boiler

10.1 Using the Front Panel

The front panel allows you to adjust the temperature and view the operating status or error codes. Remove the protective sheet from the front panel before using it.

10.1.1 Icons and Digital Display

The icons and digital display on the front panel provide important information required for the boiler's operation. Refer to the following table for detailed information.



a		Outdoor temperature compensation (OTC) Displayed when the outdoor temperature compensation (OTC) is enabled.	b		Combustion Displayed when the burner is combusting.
c		System fault Displayed when a system fault is detected.	d		DHW preheat <ul style="list-style-type: none"> ECO illuminated gives no DHW preheat. ECO not illuminated gives DHW preheat (boiler periodically cycles on and off).
e		DHW demand Indicates that DHW demand is present.	f		Central heating demand Indicates the central heating demand is present.

10.1.2 Buttons

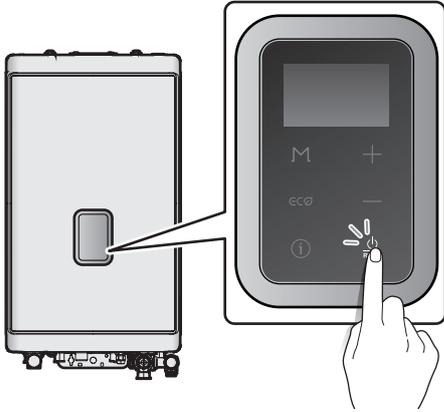
Using the buttons on the front panel, you can turn on or off the boiler, monitor the current operation status, and set the values required for the boiler's operation, such as central heating and DHW supply temperatures. Refer to the following table for detailed information.



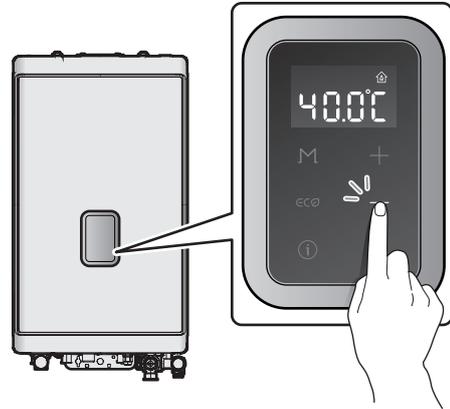
a		Menu button Access to the Main menu screen.	b		Plus button Increases the temperature setting, parameter or moves up.
c		Eco button Turn the boiler DHW preheat on or off.	d		Minus button Decreases the temperature setting, parameter or moves down.
e		Info button Access the boiler information.	f		Power button Turns the boiler on or off. Reset the boiler during an error.

10.2 Turning the Boiler On or Off

To turn the boiler on or off, press the Power button ().



2. Press the Plus button (+) or the Minus button (–) until desired temperature appears on the display. You can adjust the temperature while the display is flashing. Once the display stops flashing, the temperature setting is stored.

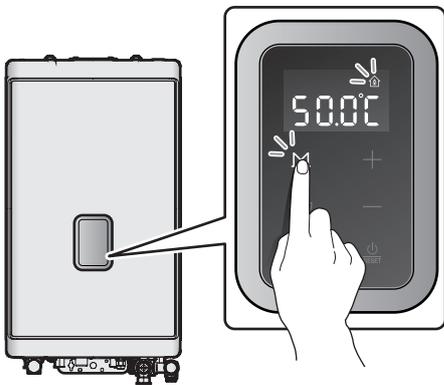


10.3 Adjusting the Temperature

10.3.1 Adjusting the Central Heating Temperature

To adjust the central heating temperature:

1. In normal operation mode, press the menu button (). The CH demand icon blinks on the screen.



Note

- Take note of the original heating temperature in case you want to restore it to the default.
- The default central heating supply water temperature range is 40°C (Absolute MIN) to 90°C (Absolute MAX).
- The central heating temperature cannot be adjusted when the Outdoor Reset Control is used.
- The central heating temperature cannot be adjusted, when the Heat Demand function is set to OpenTherm.

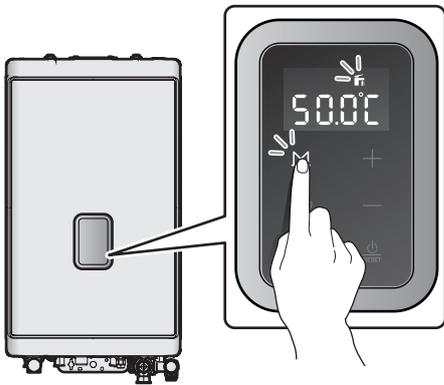
10.3.2 Adjusting the DHW Temperature

WARNING

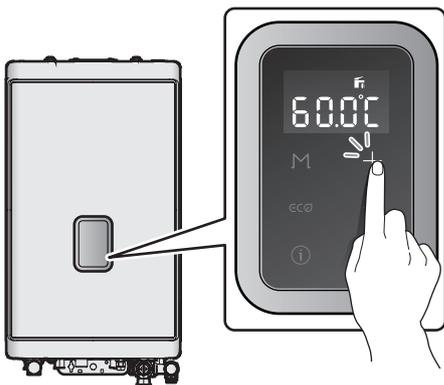
Before adjusting the water temperature, carefully read “To prevent burns:” on page 5. Water above 52°C can cause instant scalding or severe burns.

To adjust the water temperature:

1. In normal operation mode, press the menu button (M) twice.
The DHW demand icon blinks on the screen.



2. Press the Plus button (+) or the Minus button (–) until desired temperature appears on the display. You can adjust the temperature while the display is flashing. Once the display stops flashing, the temperature setting is stored.

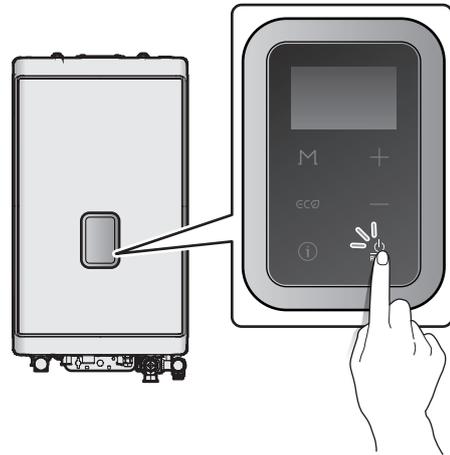


Note

- Take note of the original water temperature in case you want to restore it to the default.
- The default DHW temperature range is 30°C to 65°C.
- The boiler will retain your settings during a power outage.
- The DHW temperature cannot be adjusted, when the Heat Demand function is set to OpenTherm.

10.4 Resetting the Boiler

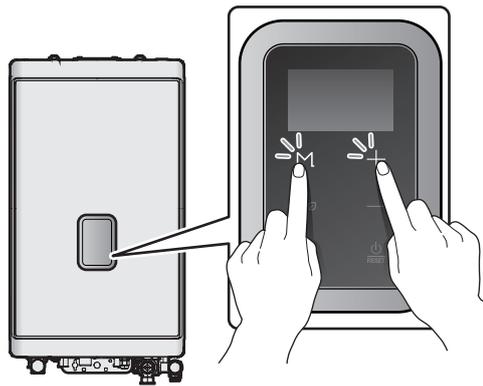
If an error message appears, you can try resetting the boiler to resolve the problem. To reset the boiler, press the Power button (RESET).



If resetting the boiler does not solve the problem, refer to the Troubleshooting section of this manual or contact a Technical Assistance Service.

10.5 Setting the CH Heat Demand

To set the boiler's CH Heat Demand, press the Menu button (M) and the Plus button (+) simultaneously for 5 seconds. “dmnd” will be displayed for 2 seconds, and CH Heat Demand setting mode will begin.



Press the ECO button (ECO). The CH Heat Demand blinks on the screen. Then, press the Plus button (+) or the Minus button (–) to set the CH Heat Demand. Press the ECO button (ECO) to save the value.

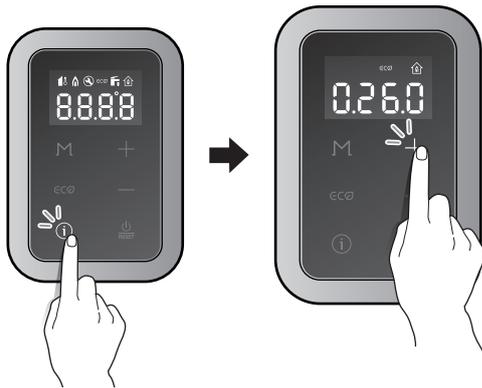
1. Navien Thermostat
2. Panel
3. OpenTherm
4. CH thermostat
5. Switched Live

10.6 Accessing Basic Menu Items

In the Main Menu screen, you can view the boiler's operating conditions, configure the central heating and DHW temperatures, and review error history. Press the Info button (i).

10.6.1 Viewing Basic Information

To view information about the boiler, press the Info button (i).

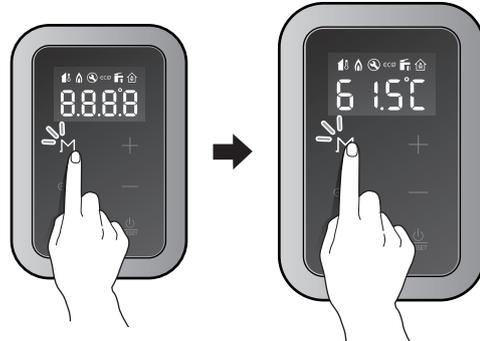


Press the Plus button (+) or the Minus button (-) to switch between the information items.

Item	Description
0. Supply Temp	Heating supply temperature
1. Return Temp	Boiler return temperature (Not Used)
2. DHW Temp	DHW temperature
3. Water Flow	DHW Water Flow ON/OFF
4. Outdoor Temp	Outdoor temperature
5. K-Factor	K-Factor valve
6. WWSD Temp	Warm Weather Shut Down setting temp
7. WWSD On Diff	Warm Weather Shut Down On Differential temperature

10.6.2 Setting the Central Heating Temperature

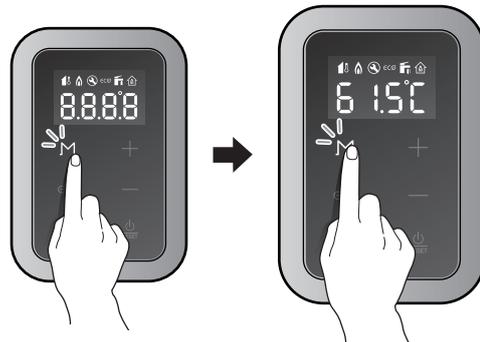
To set the boiler's central heating operation, press the Menu button (M).



Press the Plus button (+) or the Minus button (-) to switch between the list items or to increase/decrease setting values.

10.6.3 Setting the DHW Temperature

To set the boiler's DHW operation, press the Menu button (M) twice.



Press the Plus button (+) or the Minus button (-) to switch between the list items or to increase/decrease setting values.

- Setting range: 30 – 65°C
- Default: 50°C

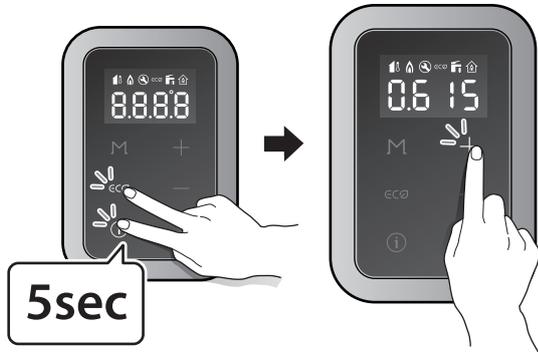
10.6.4 Setting the ECO Mode

To set the boiler's ECO Mode, press ECO button (eco). The ECO icon (eco) turns on when the ECO Mode is selected.

Item	Description
1. ECO Mode (illuminated)	Do not DHW Preheat
2. Non ECO Mode (Not illuminated)	Always DHW Preheat (boiler periodically cycles on and off)

10.6.5 Viewing Error History

To view the error history, press the Info button (i) and the ECO button (ECO) simultaneously for 5 seconds.



A list of 10 recent errors are displayed on the screen, with the most recent error displayed.



Press the Plus button (+) or the Minus button (-) to switch between the list of Errors. Press the ECO button (ECO) to select an error to view the elapsed time since the last error occurred.



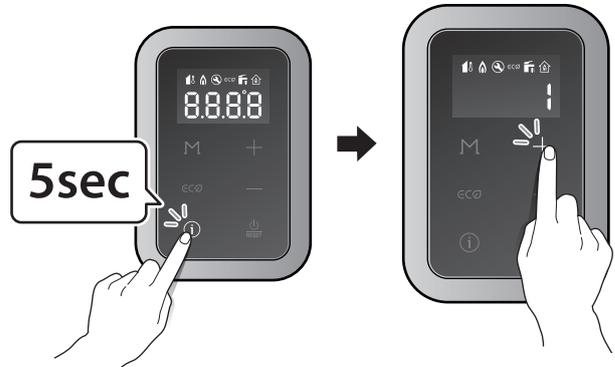
Press the ECO button (ECO) twice to select an error and view the sub error code.



Press the Info button (i) to return to the previous screen or menu.

10.6.6 Viewing Service Information

To view the miscellaneous system information, press the Info button (i) for 5 seconds.



Press the Plus button (+) or the Minus button (-) to switch between the information items.

Press the Info button (i) to return to the previous screen or menu.

Item	Description
0. Supply Temp	Heating supply temperature
1. Return Temp	Boiler return temperature (Not Used)
2. DHW Temp	DHW temperature
3. Water Flow	DHW Water Flow ON/OFF
4. Outdoor Temp	Outdoor temperature
5. K-Factor	K-Factor valve
6. WWSD Temp	Warm Weather Shut Down setting temp
7. WWSD On Diff	Warm Weather Shut Down On Differential temperature
8. Heat Capacity	Heat capacity (%)
9. Flame state	Flame detector AD value <ul style="list-style-type: none"> • Flame On: 8bit AD values equal to or lower than 70 • Flame Off: 8bit AD values equal to or higher than 175
10. Target RPM	Fan target speed (RPM)
11. Current RPM	Fan speed (RPM)
12. Target APS	Fan target speed (APS) (Not Used)
13. Current APS	Fan speed (APS) (Not Used)
14. Inlet Temp	Inlet temperature (°C)
15. Exhaust Temp	Exhaust temperature (°C)
16. Model Capacity	Model capacity (kW)

Item	Description
17. Gas Type	Fuel Type (LNG G20/LPG G30/LPG G31)
18. Elapse time after install	Elapsed time since installation
19. Num of CH Operation	View the number of times the central heating operation function has been used.
20. Num of DHW Operation	View the number of times the DHW operation function has been used.
21. Num of Preheat Operation	View the number of times the preheat operation function has been used.
22. Flame Loss – Num of time	Number of times a flame loss/misfire has occurred
23. 2nd Ignition – Num of time	Number of second ignition attempts
24. 3rd Ignition – Num of time	Number of third ignition attempts
25. 4th Ignition – Num of time	Number of fourth ignition attempts
26. 5th Ignition – Num of time	Number of fifth ignition attempts

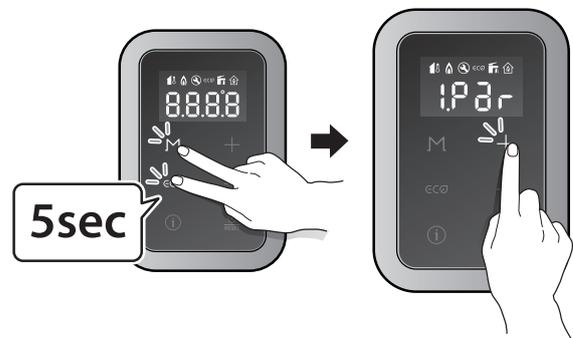
10.7 Accessing Advanced Menu Items

10.7.1 Setting the Operation Parameters

To Set the boiler's operation parameters, press the ECO button (€€) and Menu button (M) simultaneously 5 seconds, and then select "1. Par"

CAUTION

Parameters must be set by a qualified professional with an extensive understanding of the boiler system. Setting parameters improperly may lead to property damage or injury.



Press ECO button to enter parameters, 'PASS', press ECO again to get to the 4 digit code password screen.

In the password screen, press the Plus button (+) or the Minus button (–) to change numbers and 'M' to go to the next places, and press the ECO button (€€) to enter the password.

The factory default password is "1234".



After entering the parameter setting screen, press the Plus button (+) or the Minus button (–) to switch between the parameters or to increase/decrease setting values. Press the ECO button (€€) to select a parameter or to confirm after making changes.

Press the Info button (i) to return to the previous screen or menu.

Item	Description
A. Supply MIN Set-point	Set the central heating supply minimum temperature. <ul style="list-style-type: none"> Setting range: 25°C – [MAX Set-point – 20°C] Default: 40°C
B. Supply MAX Set-point	Set the central heating supply maximum temperature. <ul style="list-style-type: none"> Setting range: [MIN Set-point + 20°C] – 90°C Default: 85°C
C. CH Burner Off Diff	Set the temperature range to turn off central heating. <ul style="list-style-type: none"> Setting range: 0°C – 30°C Default: 2°C
D. CH Burner On Diff	Set the temperature range to turn on central heating. <ul style="list-style-type: none"> Setting range: 1°C – 30°C Default: 3°C
E. Anti Fast Cycling Time*	Set the anti-fast cycling time. <ul style="list-style-type: none"> Setting range: 0 – 20 min Default: 3 min
F. Freeze protection	Set the pump freeze protection temperature. <ul style="list-style-type: none"> Setting range: 6°C – 10°C Default: 10°C <p>Note The system freeze protection temperature is set based on the pump freeze protection temperature.</p>
G. Boiler Pump Delay	Set the boiler pump off delay time. <ul style="list-style-type: none"> Setting range: 30 – 40 min Default: 40 min
H. CH Min Limit	Set the central heating minimum heat capacity limit. <ul style="list-style-type: none"> Setting range: Default value to 80% <p>Note The minimum heat capacity will always be at least 20% lower than the maximum heat capacity.</p> <ul style="list-style-type: none"> Default: Boiler's minimum heat capacity (28kW: 15%, 30kW: 14%, 37kW: 12%, 41kW: 11%)

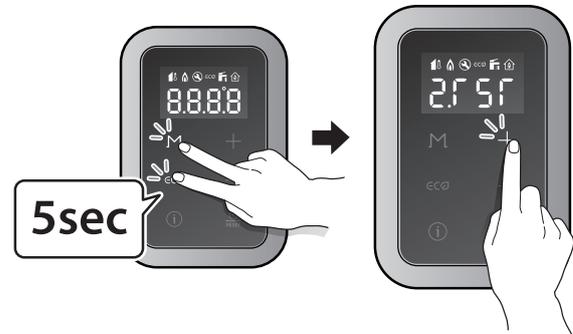
Item	Description
I. CH Max Limit	Set the central heating maximum heat capacity limit. <ul style="list-style-type: none"> Setting range: (Minimum heat capacity value + 20%) to 100% <p>Note The maximum heat capacity will always be at least 20% higher than the minimum heat capacity.</p> <ul style="list-style-type: none"> Default: 100%
J. DHW Min Limit	Set the DHW supply minimum heat capacity limit. <ul style="list-style-type: none"> Setting range: Default value to 80% <p>Note The minimum heat capacity will always be at least 20% lower than the maximum heat capacity.</p> <ul style="list-style-type: none"> Default: Boiler's minimum heat capacity (28kW: 15%, 30kW: 14%, 37kW: 12%, 41kW: 11%)
K. DHW Max Limit	Set the DHW supply maximum heat capacity limit. <ul style="list-style-type: none"> Setting range: (Minimum heat capacity value + 20%) to 100% <p>Note The maximum heat capacity will always be at least 20% higher than the minimum heat capacity.</p> <ul style="list-style-type: none"> Default: 100%
L. DHW Wait Time	Set the DHW wait time. <ul style="list-style-type: none"> Setting range: 0 – 20 min Default: 3 min
M. CH Min Burning Time	Set the low-load combustion time at initial operation. <ul style="list-style-type: none"> Setting range: 0 – 20 min Default: 1 min
N. Burning Acceleration Time	Set the time to reach the maximum central heating capacity after initial operation. <ul style="list-style-type: none"> Setting range: 0 – 20 min Default: 1 min
O. OTC ON/OFF	Enable or disable the outdoor temperature compensation control option. <ul style="list-style-type: none"> Setting range: ON/OFF Default: OFF

Item	Description
P. K-Factor*	K-Factor for the central heating
Q. WWSD Temp	Set the Warm Weather Shutdown temperature. <ul style="list-style-type: none"> Setting range: 10°C – 40°C Default: OFF
R. WWSD On Diff	Set the differential temperature to deactivate the Warm Weather Shutdown. <ul style="list-style-type: none"> Setting range: 1°C – 20°C Default: OFF
S. CH Heat Demand	Set the CH heat demand control type. <ol style="list-style-type: none"> Navien Thermostat (Default) panel Opentherm CH Thermostat Switched Live
T. Supply Boost Time	Set the time that the burner(CH) boost supply set temperature. <ul style="list-style-type: none"> Setting range: OFF, 30–120 min Default: OFF
U. Flow Detection Delay Time	Set the time that delays flow detection sequence. <ul style="list-style-type: none"> Setting range: 0–20 sec Default: 0 sec
V. Gas Use Compensation setting	Adjust the gas usage estimates to improve accuracy. <ul style="list-style-type: none"> Setting range: -25–+25% Default: 0.0%
W. Parameter All Clear	All parameter setting to factory default.
X. P/W Change	Change the parameter setting password. Press the Plus button (+) or the Minus button (–) to change numbers and places, and press the ECO button (ECO) to save the new password.

* When the boiler is connected to an outdoor temperature sensor (optional), functioning may be activated according to outdoor temperature conditions and K-factor values using the parameters.

10.7.2 Diagnosing the Boiler System

To Set the boiler's operation parameters, press the ECO button (ECO) and Menu button (M) simultaneously 5 seconds, and then select "2. TST"



Press the Plus button (+) or the Minus button (–) to switch between the test procedures. Press the ECO button (ECO) to run a test procedure.

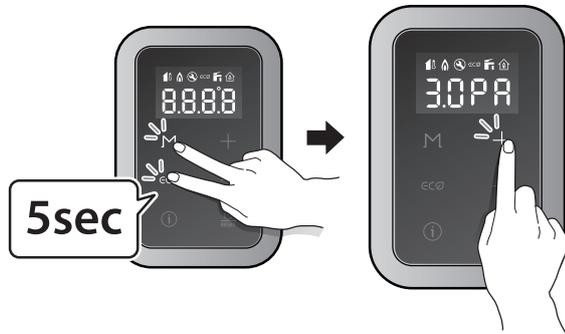
Note During the test mode, the boiler stops combustion.

Press the Info button (i) to return to the previous screen or menu.

Item	Description
1. Fan Motor	Test the fan operation. From a stopped state, the fan speed gradually increases and reaches the maximum speed at 6500 RPM, and then the fan speed decreases until the fan stops operating. Note Except for the Power button (POWER), the buttons do not work during fan motor test mode.
2. Boiler Pump	Test the boiler pump operation. On (10 seconds) -> Off (5 seconds) -> On (10 seconds) for 5 boiler pump operation cycles Note Except for the Power button (POWER), the buttons do not work during boiler pump test mode.
3. 3 Way Valve	Test the 3 way valve operation. <ul style="list-style-type: none"> The 3 way valve is turned on as soon as you enter the test mode. Press the Plus button (+) or the Minus button (–) to toggle the valve operation [On (DHW) -> Off (CH)/Off (CH) -> On (DHW)].

10.7.3 Setting the Special Operation Modes

To Set the boiler's operation parameters, press the ECO button (ECO) and Menu button (M) simultaneously 5 seconds, and then select "3. OPR"



Press the Plus button (+) or the Minus button (−) to switch between the operation modes. Press the ECO button (ECO) to select an operation mode.

The boiler resumes operation in normal operation mode if no input is detected for 3 hours.

Press the Info button (i) to return to the previous screen or menu.

Item	Description
oPE.0 (Normal)	Set the boiler to run in normal operation mode.
oPE.1 (Min)	Set the boiler to run in minimum operation mode.
oPE.2 (CH MAX)	Set the boiler to run in central heating maximum operation mode.
oPE.3 (DHW MAX)	Set the boiler to run in DHW maximum operation mode.

10.8 Error Codes

When an error code appears on the front panel, refer to the following chart for a definition and possible remedy for the situation.

Item	Error Code	Description	Reset
Combustion	E001	Overheating of heat exchanger	Manual
	E003	Ignition failure	Manual
	E004	False flame detection	Auto
	E012	Flame loss	Manual
	E016	Heat exchanger overheat	Manual
	E030	Abnormal exhaust temperature	Manual
	E031	Burner overheat	Manual
	E046	Abnormal operation: Heat exchanger overheating sensor	Auto
	E047	Abnormal operation: Exhaust thermostat	Manual/Auto
Air Circulation	E109	Abnormal operation: Fan	Manual
Central Heating Circulation	E205	Heating supply thermistor open or short circuit	Auto
Water Supply	E302	Low water pressure	Auto
DHW Circulation	E407	DHW Outlet thermistor Open or Short Circuit	Alarm
Controller (PCB)	E515	Abnormal operation: Relay feedback (PCB)	Manual
	E517	Abnormal operation: DIP switch setting (PCB)	Manual
	E594	Abnormal operation: EEPROM (PCB)	Alarm/Manual
	E598	Abnormal operation: Panel real time clock	Alarm
Controller (MCU)	E615	Abnormal operation: Input and memory (MCU)	Manual
Installation	E740	Abnormal operation: Outdoor temperature sensor	Auto
	E782	Abnormal operation: Main panel communication	Auto
	E783	Abnormal operation: OpenTherm remote control	Auto
	E787	Abnormal operation: Reset device	Manual/Power Reset
	E788	Abnormal operation: Gas type settings	Manual

If the error code is not cleared by resetting the boiler functioning (see "10.4 Resetting the Boiler") or if it occurs repeatedly, call the nearest official Technical Assistance Service (TAS), indicating the number of the error code appearing on the front panel.

11. Maintaining the Boiler

11.1 Cleaning the Boiler

! CAUTION

Make sure the boiler is turned off and the power supply is disconnected before cleaning the boiler. The boiler may remain hot for several minutes after it is turned off. To prevent burns, wait until the boiler has cooled down before cleaning.

To clean the boiler, wipe the outside with a damp cloth. Use a non-acidic, non-abrasive cleaner to remove any surface stains. The front panel is moisture resistant, but it is not waterproof. Keep it as dry as possible.

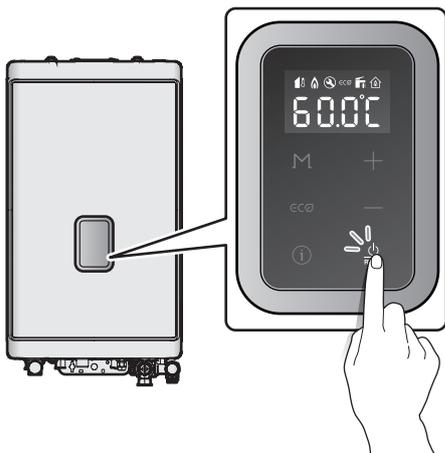
11.2 Draining the Boiler

You will need to drain either both the central heating side and domestic hot water (DHW) side, or one side only before performing maintenance tasks, such as cleaning the adapter filter, or to prevent the boiler from freezing when it will not be used for an extended period.

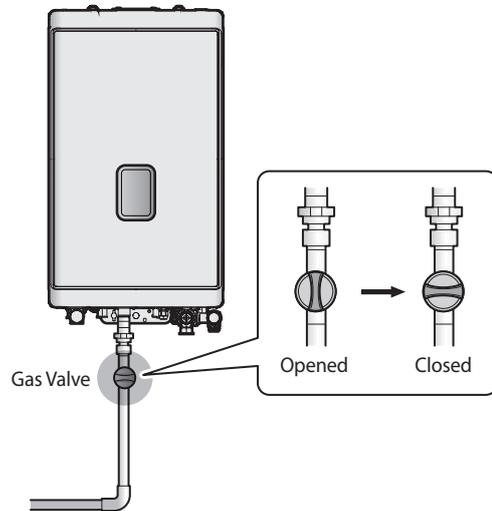
Refer to the "2.5 Dimensions" on page 16 for details about part locations.

To drain the boiler:

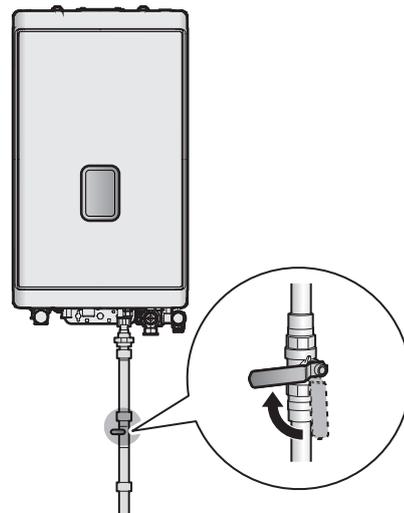
1. Place a bucket under the boiler, to collect the residual water inside the boiler.
2. Press the Power button () on the front panel to turn off the boiler.



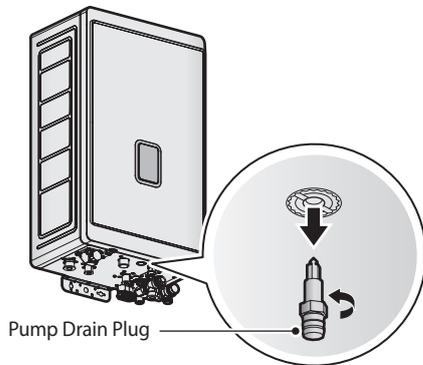
3. Disconnect the power supply from the boiler.
4. Close the gas valve.



5. Close the water supply valve on the inlet to the boiler. If there is no valve, turn off the water supply at the water main.



- Close off any heating zones that do not require draining and open a purge valve to drain the central heating side. Open all domestic hot water taps completely to drain the water heating side. The water that remains in the plumbing lines will drain out.

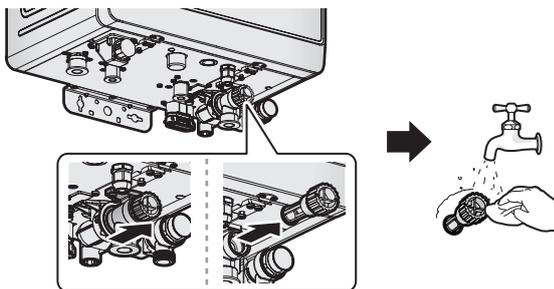


- Open the pump drain plug.
- Allow the residual water to drain from the boiler.
- When the water is completely drained, reinsert the return adapter filter and close the pump drain plug.
- To refill the boiler follow the steps of "Draining the Boiler" in reverse.

11.3 Cleaning the Return Adapter Filter

To clean the filter:

- Drain the boiler. Refer to "11.2 Draining the Boiler" on page 59.
- Remove the filter and rinse it with clean running water (cold). If necessary, scrub it clean with a brush.



- Reinsert and tighten the filter.
- Fill the boiler and check for proper operation.

11.4 Protecting the Boiler from Freezing

CAUTION

Damage due to freezing is not covered by the Navien limited warranty.

If the boiler is connected to a circuit that could freeze, the circuit pipes must be suitably insulated. All pipes installed outdoors must be insulated according to applicable legislation.

The boiler electronic control includes a freeze protection function that prevents the boiler from freezing in very cold weather. It remains on standby and takes priority over all other boiler functions while the boiler is connected to the electrical mains and gas supply, i.e. it remains enabled even when the boiler is in standby position.

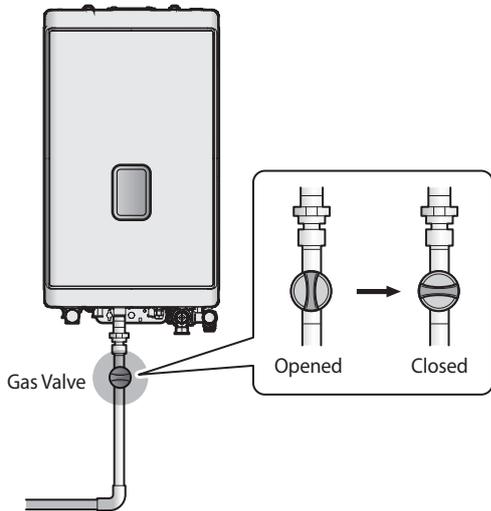
To ensure that the boiler does not freeze, follow these guidelines:

- Do not unplug the power supply cord**, except for routine maintenance. The boiler has a freeze protection function that requires electricity. The freeze protection function will operate regardless of whether or not the power is turned on or off, as long as the electric supply is still connected.
- Do not close the gas valve**, except for routine maintenance, as this will limit additional freeze protection.
- If the boiler will not be used for an extended period, drain the boiler.**

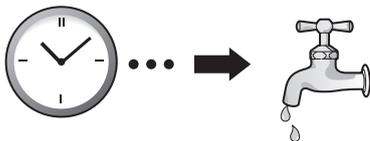
If the power or gas supplies must be disconnected for an extended period, drain the boiler. Freezing damage may occur if there is water remained in the boiler in cold weather.

If hot water will not flow and you suspect that the boiler is frozen, follow these steps:

1. Press the Power button () on the front panel to turn off the boiler.
2. Close the gas valve.



3. Open the hot water tap that is closest to the boiler.
4. Use a hair dryer or a portable electric heater to heat up both the primary and secondary heat exchangers.
5. Check every few minutes to see if water is running at the open tap.



6. When the water starts flowing again, check the boiler and piping for leaks. If you detect any leaks or the boiler is not operating properly, contact an authorised technician or licensed professional.

Note This boiler requires very little maintenance, however a qualified technician should inspect the boiler at the beginning of every heating season and/or when there is a problem.

11.5 Routine Servicing

Navien advises on an interim service inspection with a flue gas analyser. A full strip down service is recommended at regular intervals or where analyser readings are not within correct safety standards.

11.5.1 Interim Service

For reasons of safety and economy, it is recommended that the boiler is serviced annually. Servicing must be performed by a competent person in accordance with BS 7967. After servicing, complete the relevant Service Interval Record section of the Benchmark Checklist located on the inside back page of this document.

Service technician (See the following instructions)

Annual Start-up	General:
	<ul style="list-style-type: none"> • Address reported problems • Inspect interior; clean and vacuum if necessary • Clean condensate trap and fill with fresh water • Check for leaks (water, gas, flue, condensate) • Verify flue and air lines are in good condition and sealed tight • Check system piping • Check control settings • Check ignition and flame rod (clean and reposition) • Check wiring and connections • Flame inspection (stable, uniform) • Flame signal • Remove and clean return adapter filter • Servicing of the in-line magnetite filter • Check system inhibitor concentration and appropriate action taken, in accordance with BS 7593



WARNING

- Follow the service and maintenance procedures given throughout this manual and in component literature shipped with the boiler. Failure to perform the service and maintenance could result in damage to the boiler or system.
- Failure to follow the directions in this manual and component literature could result in severe personal injury or substantial property damage.
- The boiler should be inspected annually only by a qualified service technician. In addition, the maintenance and care of the boiler must be performed to assure maximum boiler efficiency and reliability. Failure to service and maintain the boiler and system could result in equipment failure.
- Electrical shock hazard – Turn off power to the boiler before any service operation on the boiler except as noted otherwise in this instruction manual. Failure to turn off electrical power could result in electrical shock, causing severe personal injury.

Addressing the Reported Problems

Inspect any problems reported by the owner and correct before proceeding.

Inspecting the Installation Area

1. Verify that boiler area is free of any combustible materials, petrol and other flammable vapours and liquids.
2. Verify that air intake area is free of any of the contaminants listed in Installation & Operation Manual. If any of these are present in the boiler intake air vicinity, they must be removed. If they cannot be removed, reinstall the air and flue lines per the Installation & Operation Manual.

Inspecting the Boiler Interior

1. Remove the front cover and inspect the interior of the boiler.
2. Vacuum any sediment from inside the boiler and components. Remove any obstructions.

Cleaning the Condensate Trap

1. Inspect the condensate drain line, condensate fittings, and condensate trap.
2. Remove any sediment from the trap.
3. Fill with fresh water until the water begins to pour out of the drain.

Checking all Piping for Leaks

Eliminate all system or boiler leaks. Continual fresh makeup water will reduce boiler life. Minerals can build up in sections, reducing heat transfer, overheating heat exchanger, and causing heat exchanger failure. Leaking water may also cause severe property damage.

1. Inspect all water and gas piping and verify to be leak free.
2. Look for signs of leaking lines and correct any problems found.

Checking the Flue System and Air Piping

1. Visually inspect the entire gas flue system for blockage, deterioration or leakage. Repair any joints that show signs of leakage. Verify that air inlet pipe is connected and properly sealed (if installed).
2. Verify that boiler flue discharge and air intake are clean and free of obstructions.



WARNING

Failure to inspect for the above conditions and have them repaired can result in severe personal injury.

Checking the Water System

1. Verify all system components are correctly installed and operational.
2. Check the cold fill pressure for the system. Verify it is correct (must be a minimum of 0.8 bar).
3. Watch the system pressure as the boiler heats up (during testing) to ensure pressure does not rise too high.

Note

- If the system contains glycol, test for proper concentration as recommended by manufacturer.
- Excessive pressure rise indicates expansion tank sizing or performance problem.

4. Inspect automatic air vents and air separators. Remove air vent caps and briefly press push valve to flush flue.
5. Replace caps. Make sure flues do not leak. Replace any leaking flues.

Inspecting the Ignition and Flame Detector Electrodes

1. Remove the ignition and flame detector electrodes from the boiler heat exchanger.
2. Remove any deposits accumulated on the ignition/flame detector electrode. If the electrodes cannot be cleaned satisfactorily, replace with new ones.
3. Replace ignition/flame detector electrode, making sure gasket is in good condition and correctly positioned.

Checking the Ignition Ground Wiring

1. Check that the ground wire is in good condition and securely attached to the boiler casing.
2. Check ground continuity of wiring using continuity meter.
3. Replace ground wires if ground continuity is not satisfactory.

Checking all Boiler Wiring

Inspect all boiler wiring, making sure wires are in good condition and securely attached.

Checking the Control Settings

Check settings of external limit controls (if any) and adjust if necessary.

Performing Start-up and Checks

1. Start boiler and make sure that the boiler is operating properly.
2. Verify cold fill pressure is correct and that operating pressure does not go too high.

Check the Burner Flame

1. Inspect flame through observation window.
2. If the flame is unsatisfactory at either high fire or low fire, check for obstructions in the flue.

Checking the CO₂

1. Check the CO₂ readings at full load and low load.
2. Check the CO readings and combustion performance (CO/CO₂ ratio).
3. Check the CO readings and combustion performance. For more information, refer to the 15th step in "12.1 Gas Conversion" on page 69. The combustion reading (CO/CO₂ ratio) must be less than 0.004.
4. If the combustion reading (CO/CO₂ ratio) is greater than this, and the integrity of the complete flue system and combustion circuit seals has been verified, and the inlet gas pressure and gas rate are satisfactory either:
 - Perform the full service. For more information, refer to "11.5.2 Full Service" on page 63.
 - Set the Gas Valve. For more information, refer to "5.3 Measuring the Inlet Gas Pressure" on page 32.

Review with the Owner

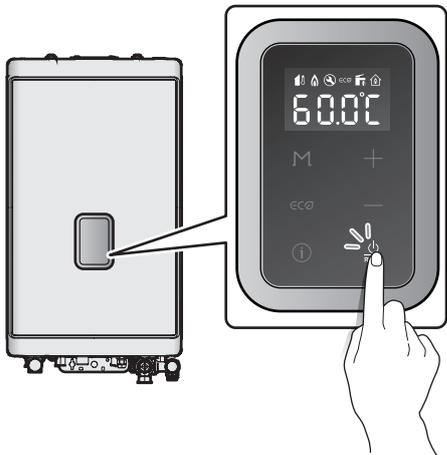
1. Review the User's Information Manual with the owner.
2. Emphasize the need to perform the maintenance schedule.
3. Remind the owner of the need to call a licensed contractor should the boiler or system exhibit any unusual behaviour.
4. Remind the owner to follow the proper shutdown procedure and to schedule an annual start-up at the beginning of the next heating season.
5. After servicing, complete the relevant Service Interval Record section of the Benchmark Checklist located on the inside back page of this document.

11.5.2 Full Service

For reasons of safety and economy, it is recommended that the boiler is serviced annually. Servicing must be performed by a competent person in accordance with BS 7967-4. After servicing, complete the relevant Service Interval Record section of the Benchmark Checklist located on the inside back page of this document.

Note Where a full service is required, refer to "11.5.1 Interim Service" on page 61.

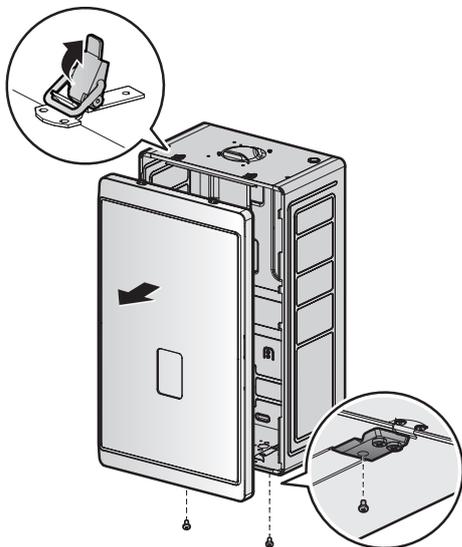
1. Press the Power button () on the front panel to turn off the boiler.



2. Disconnect the power supply to the boiler.
3. Turn off both gas and water supply to the boiler.

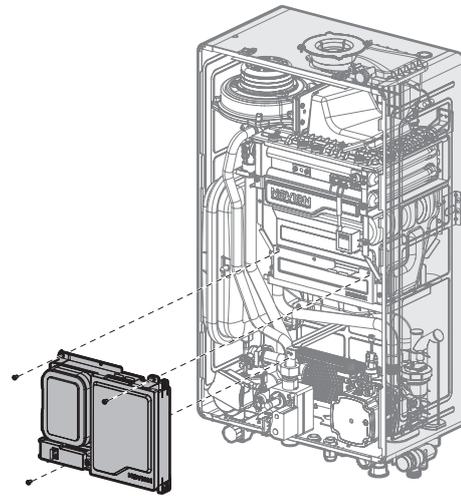
Note Wait at least 30 minutes for the heat exchanger to cool down.

4. Unfasten the 2 latches (at the top) and remove 2 screws (at the bottom) to remove the front cover to gain access to the internal components.



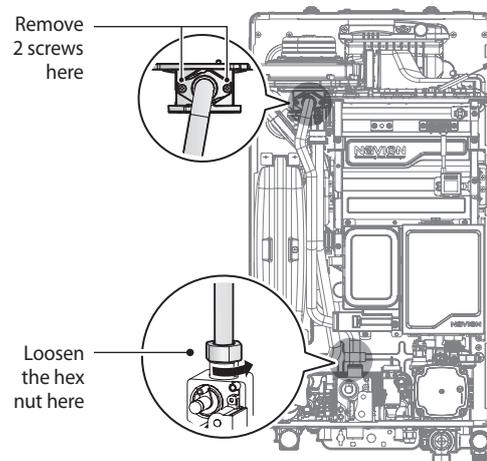
5. Once the front cover is removed, place it in a safe location to prevent accidental damage.

6. Loosen the three screws holding the front panel and remove the front panel.

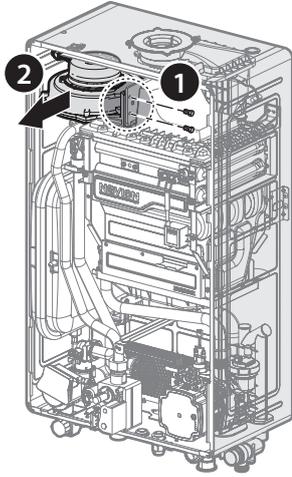


Note When removing the front panel, label all wires and make sure all wires are disconnected.

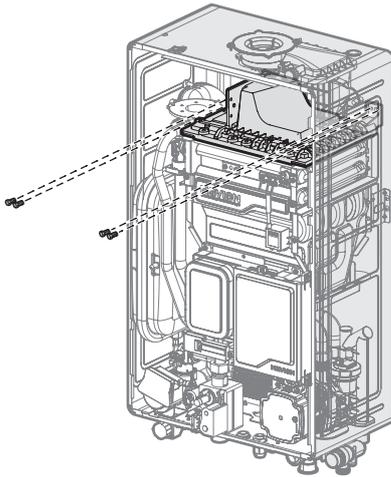
7. Use a Phillips screwdriver to remove the two screws where gas inlet pipe is attached to the fan motor assembly. Loosen the hex nut located above the gas valve and remove the gas pipe.



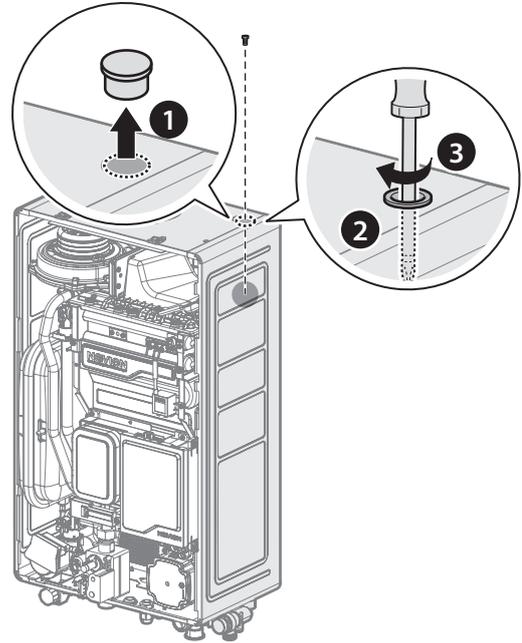
- Remove the screw connecting the fan motor assembly and the mixing chamber, and then remove the fan motor assembly.



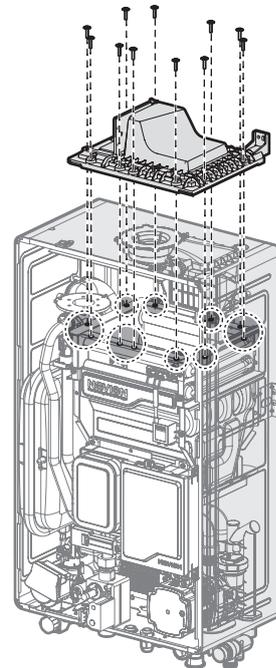
- Remove the four bolts securing the chamber brackets.



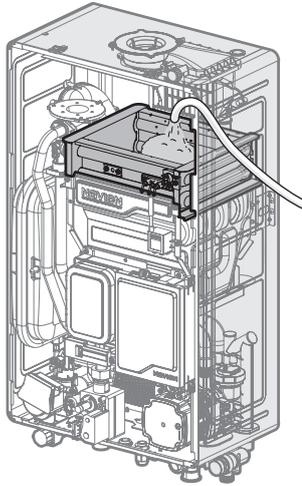
- Remove the rubber packing at the top of the cover and put a Phillips screwdriver into the hole, and then loosen the middle bolt located at the back of the burner.



- Remove the ten bolts connecting the mixing chamber and the heat exchanger, and then remove the mixing chamber, burner and the chamber bracket.



12. Use the brush to dislodge the debris and pour water down the channels to flush out the debris.



- Note**
- It is important to keep electric parts of the boiler safe from water.
 - Navien recommends to use a hose.
 - If the water pressure of the hose is too high, water may splash to other electric parts of the boiler. Keep the water pressure of the hose as low as it can.
 - If the boiler is installed in high area and you cannot see the inside of the heat exchanger, use a solid support and be careful not to fall.

13. As cleaning the heat exchanger is finished, reassemble the parts.
14. Check the CO₂. For more information on measuring the CO₂, refer to “Checking the CO₂” on page 63.

- Note** This boiler requires very little maintenance, however a qualified technician should inspect the boiler at the beginning of every heating season and/or when there is a problem.

11.5.3 CO and Combustion Checks

IMPORTANT PRELIMINARY INFORMATION ON CHECKS

- Note** The air gas ratio valve is factory set and must not be adjusted during commissioning unless this action is recommended following contact with the manufacturer.

- If any such adjustment is recommended and further checking of the boiler is required the installer/service engineer must be competent to carry out this work and to use the flue gas analyser accordingly.
- If the boiler requires conversion to operate with a different gas family (e.g. conversion from natural gas to LPG) separate guidance will be provided by the boiler manufacturer.
- The boiler manufacturer’s installation instructions should have been followed, gas type verified and gas supply pressure/rate checked as required prior to commissioning.
- As part of the installation process, **especially where a flue has been fitted by persons other than the boiler installer**, visually check the integrity of the whole flue system to confirm that all components are correctly assembled, fixed and supported. Check that manufacturer’s max. flue lengths have not been exceeded and all guidance has been followed (e.g. Gas Safe Technical Bulletin TB008 where chimney/flues are in voids).
- The Flue Gas Analyser should be of the correct type, as specified by BS 7967. Prior to its use, the flue gas analyser should have been maintained and calibrated as specified by the manufacturer. The installer must have the relevant competence for use of the analyser.
- Check and zero the analyser in fresh air as per analyser manufacturer’s instructions.
 - **CO**: carbon monoxide, **CO₂**: carbon dioxide, **O₂**: oxygen, **ppm**: parts per million
 - **Combustion ratio**: The CO reading measured in ppm divided by the CO₂ reading first converted to ppm
 - **GU(I&U)R**: Gas Safety (Installation and Use) Regulations

Start

SET BOILER TO MAXIMUM RATE

In accordance with boiler instructions, set boiler to operate at maximum rate (full load condition). Allow sufficient time for combustion to stabilise.

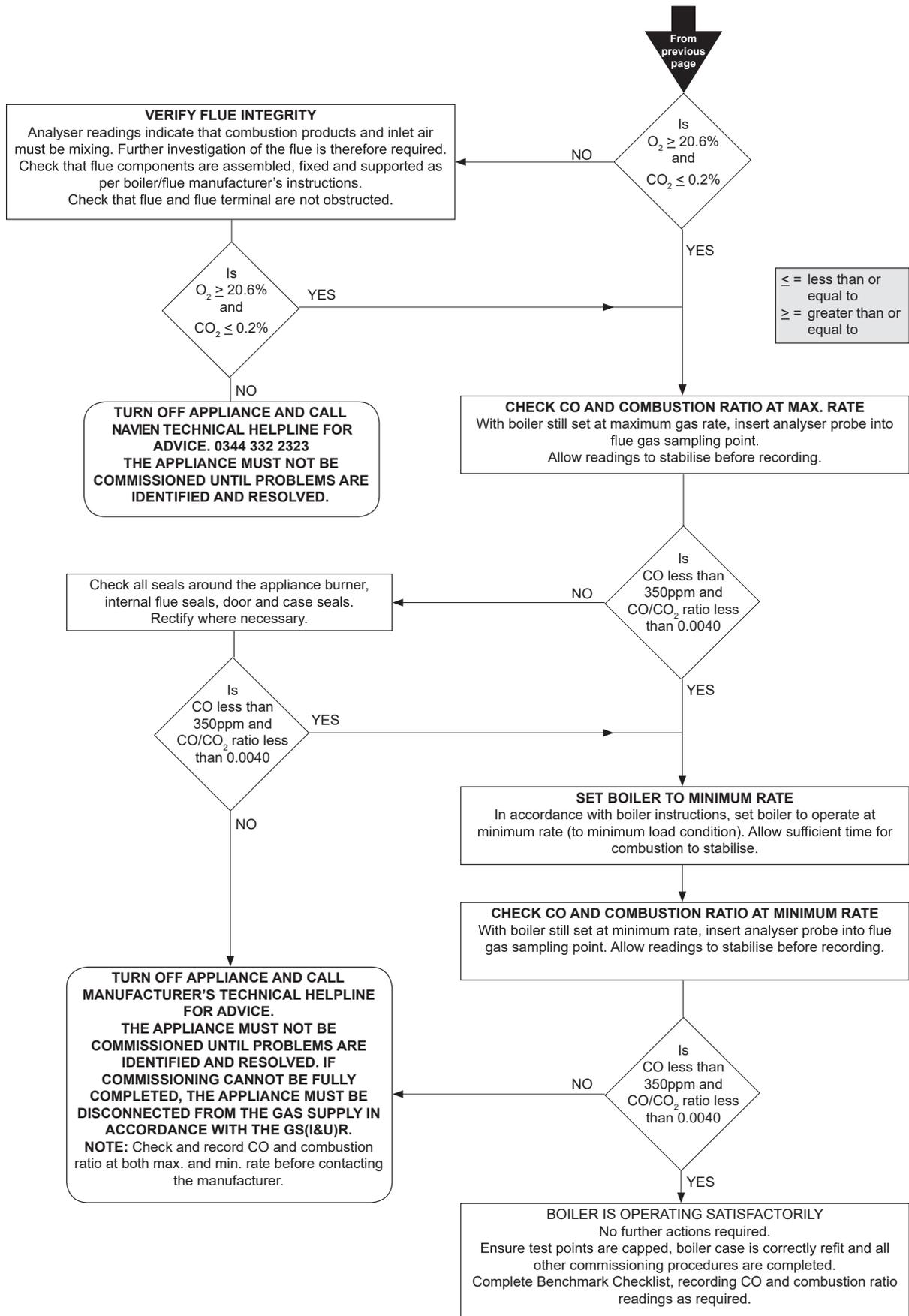
Note Do not insert analyser probe during this period to avoid possible "flooding" of sensor.

CARRY OUT FLUE INTEGRITY CHECK USING ANALYSER

Insert analyser probe into air inlet test point and allow readings to stabilise.

Note where no air inlet test point is provided then a flue integrity check with the analyser is not possible. The installer should verify that flue integrity has been visually checked in accordance with the yellow "Prior to CO and combustion ratio check" box above before proceeding to the "Check CO and combustion ratio at maximum rate" stage below.

To next page



12. Appendices

12.1 Gas Conversion

This boiler is configured for Natural Gas at the factory. If conversion to Propane Gas is required, use the conversion kit supplied with the boiler.

WARNING

This conversion kit must be installed by a qualified service agency* in accordance with all applicable codes and requirements of the authority having jurisdiction. The information in these instructions must be followed to minimise the risk of fire or explosion or to prevent property damage or personal injury. The qualified service agency is responsible for the proper installation of this kit. The installation is not proper and complete until the operation of the converted appliance is checked as specified in the manufacturer's instructions supplied with the kit.

* A qualified service agency is any individual, firm, corporation or company which either in person or through a representative is engaged in and is responsible for the connection, utilization, repair or servicing of gas utilization equipment or accessories; who is experienced in such work, familiar with all precautions required, and has complied with all of the requirements of the authority having jurisdiction.

Tools Required:

- Phillips Screwdriver
- Flathead Screwdriver
- T15 Hexalobular Wrench
- Combustion Analyser or Dual Port Manometer
- Gas Leak Detector

Included Items:

- Gas Orifice (refer to below table)

Model	G20	G31
NCB300-28K	Ø5.95	Ø4.75
NCB300-30K		
NCB300-37K	Ø6.35	Ø5.05
NCB300-41K		

Table 1. Orifice Size

- Gas Pressure and Conversion Kit Number Labels

Procedure:

1. Turn off both gas and water supply to the boiler.
2. Unfasten the 2 latches (at the top) and remove 2 screws (at the bottom) to remove the front cover to gain access to the internal components. See Figure 1 for illustration of the front cover on the unit.

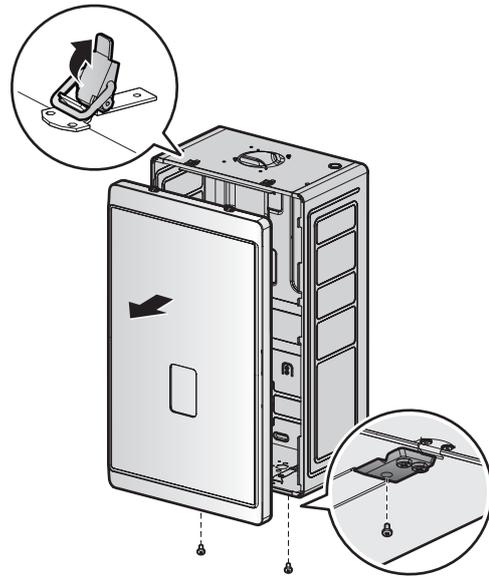
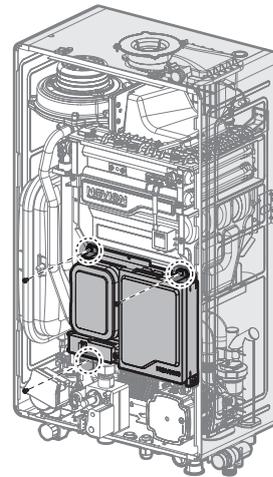
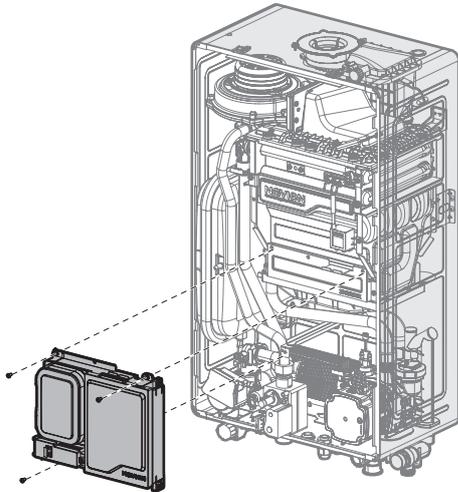


Figure 1. NCB300 Series Front cover

3. Remove the front cover and place it in a safe location to prevent accidental damage.
4. Label all the wires on the PCB.
5. Disconnect all the wires.
6. Loosen the five screws indicated in the figure.



- Remove the front panel assembly.



- With the internal components exposed, locate the gas inlet pipe and the gas valve in the middle of the unit, as shown in Figure 2.

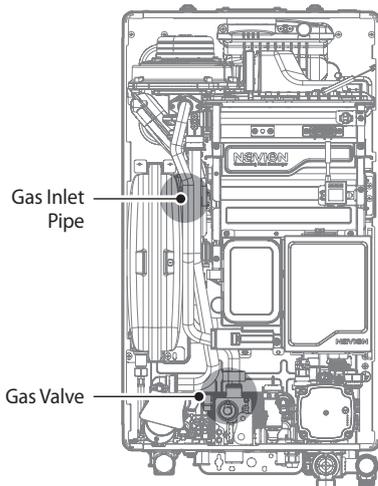


Figure 2. NCB300 Internal Components

- Loosen the hex nut at location A - the connection above the gas valve where it connects to the pipe. See Figure 3 for reference. Once the hex nut is loose, carefully separate the pipe from the gas valve.

- Once the gas inlet pipe is detached from the gas valve, find location B - the connection above the gas valve where it is attached to the fan motor assembly. Carefully remove the two screws by hand using a Phillips screwdriver and pull the gas inlet pipe away from the fan assembly to access the gas orifice.

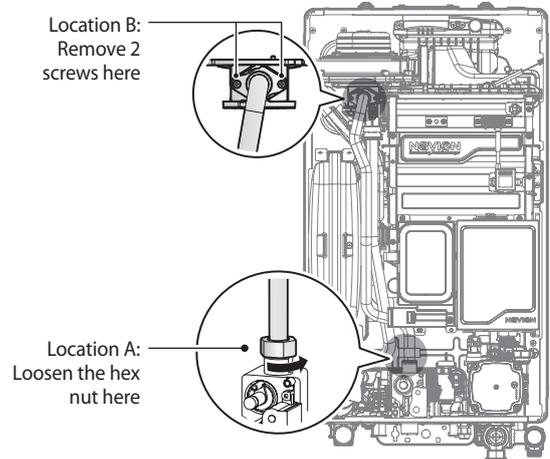


Figure 3. Detaching Gas Inlet Pipe from Gas Valve and Fan Motor Assembly

Once the Gas Orifice is exposed, remove the two screws that hold the part in place. Remove the Gas Orifice from its housing and prepare the new Gas Orifice for the LP conversion for installation.

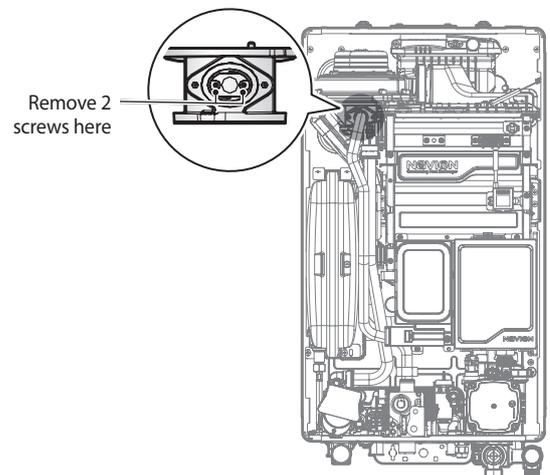


Figure 4. Access to Gas Orifice in Fan Assembly

! DANGER

A high voltage in the Fan Motor Assembly may cause an electrical shock resulting in severe injury or death.

WARNING

- Do not adjust or attempt to measure gas valve outlet pressure. The gas valve is factory-set for the correct outlet pressure. This setting is suitable for natural gas and propane, requiring no field adjustment.
- Attempting to alter or measure the gas valve outlet pressure could result in damage to the valve, causing potential severe personal injury or substantial property damage. Navien NCB300 boilers are shipped ready to fire natural gas only.

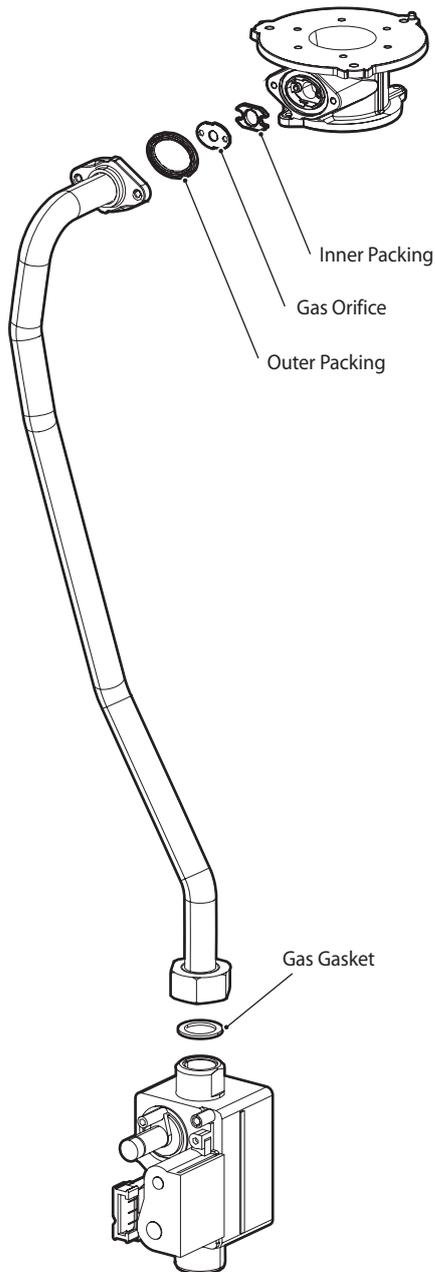


Figure 5.1. Exploded View of Gas Pipe Assembly (NCB300-28K, NCB300-30K)

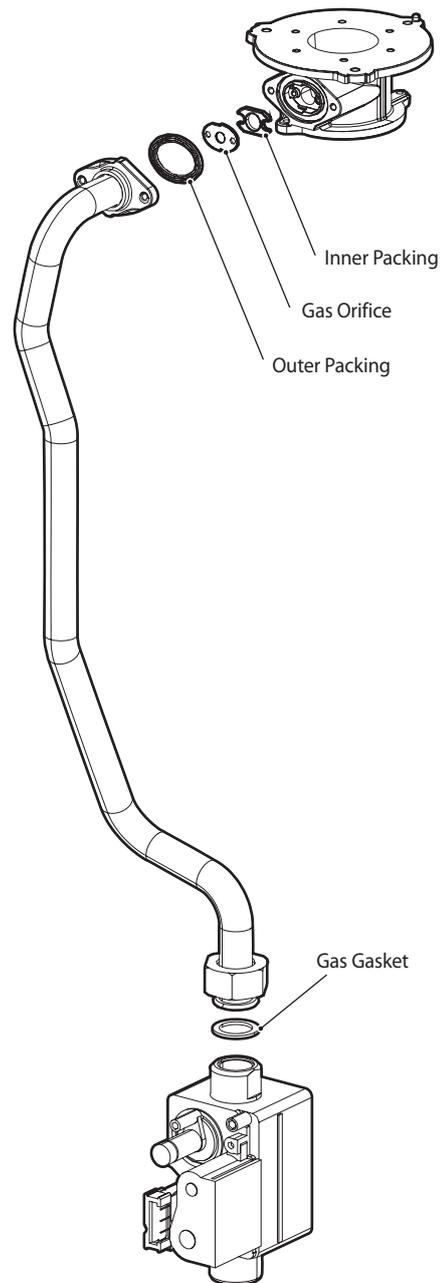


Figure 5.2. Exploded View of Gas Pipe Assembly (NCB300-37K, NCB300-41K)

! DANGER

See Figure 5. Inspect the Outer packing between the venturi and gas valve inlet adapter whenever they are disassembled. The Outer packing must be in good condition and must be installed. Failure to comply will cause a gas leak, resulting in severe personal injury.

Replace the old Orifice piece with the new part for use with LP gas. Ensure that the Orifice is properly seated inside the port before proceeding to the next step.

11. Replace the gas inlet pipe to its original position and use all screws to secure all connections.

Note Do not overtighten as this may damage or crack the components.

12. Check the labels carefully and then connect all the wires.
13. Set the front panel DIP Switch to change the gas type.

! WARNING

Ensure that you have turned off the power to the boiler before accessing the DIP switches.

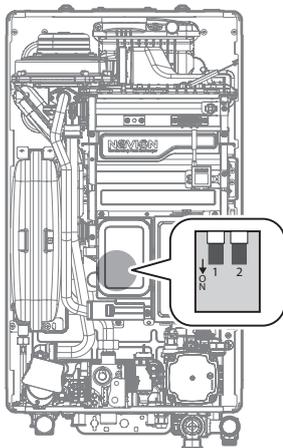


Figure 6. Set the DIP switches

Switch	Function	Setting	
1 & 2	Fuel Selection	G20 (LNG)	1-OFF, 2-OFF
		G30 (LPG) Not in UK	1-ON, 2-OFF
		G31 (LPG)	1-ON, 2-ON

Table 1. The DIP Switch Setting by Fuel Selection

! DANGER

- When conversion is required, be sure to set the front panel DIP switches according to the supply gas type.
- Failure to properly set the DIP switches could cause carbon monoxide poisoning, resulting in severe personal injury.

14. Turn on the gas and water supply to the boiler.
15. Measure and adjust the gas/air ratio.
 - a. Loosen the screw, rotate the plate and remove the gasket to access the emissions monitoring port as shown in Figure 7.
 - b. Insert the analyser into the port (Figure 7).

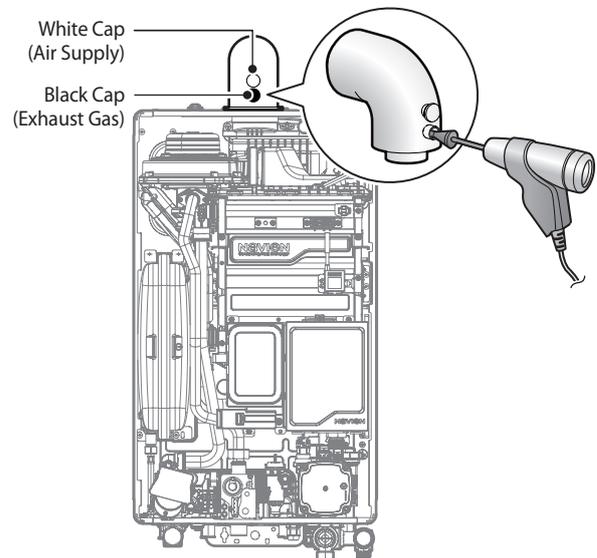


Figure 7. Insert the Analyser

Model	Gas Type	Max	Min
		%CO ₂	%CO ₂
NCB300	G20	8.80 %	8.35 %
	G31	10.25 %	10.10 %

Table 2. CO₂ Value
(CO₂ values for high fire must be within 0.5% and CO₂ values for low fire must be within 0.3% of the values listed.)

- c. Fully open several hot water fixtures and set the boiler to operate.
Measure the CO₂ value at low fire.
If the CO₂ value is not within 0.3% of the value listed in Table 2, the gas valve set screw will need to be adjusted. If adjustment is necessary, locate the set screw as shown in Figure 8. Using a T15 Hexalobular wrench, turn the set screw no more than 1/4 turn clockwise to raise or counterclockwise to lower the CO₂ value.

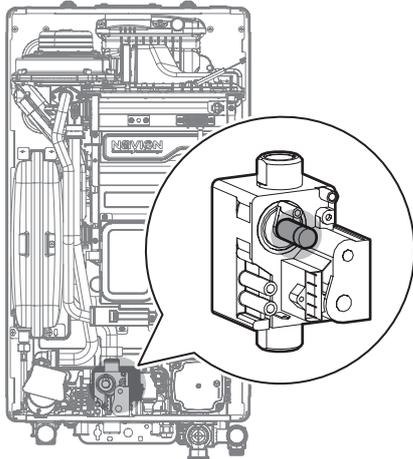


Figure 8. Set Screw Location

Note The set screw is located behind the screw-on cover. This must be removed first.

- d. After Gas Setup Wizard is done, operate at minimum mode.

Note For operation mode selection, refer to “10.7.3 Setting the Special Operation Modes” on page 57.

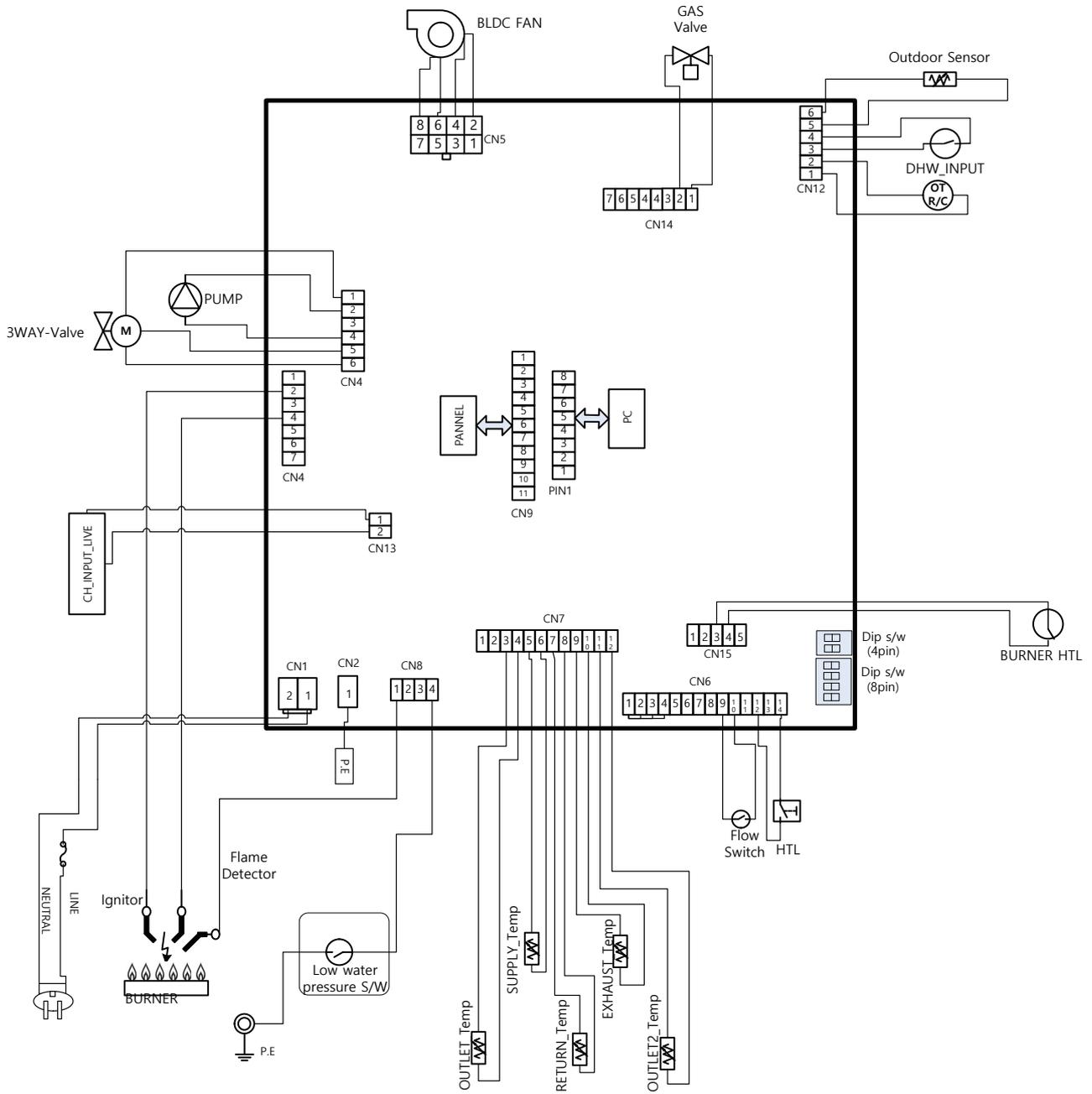
- e. Fully open several hot water fixtures and set the boiler to operate at DHW maximum mode (refer to “10.7.3 Setting the Special Operation Modes” on page 57). Measure the CO₂ value at high fire.
If the CO₂ values do not match Table 2 at high fire, do not adjust the gas valve. Check for the proper Gas Orifice.

! DANGER

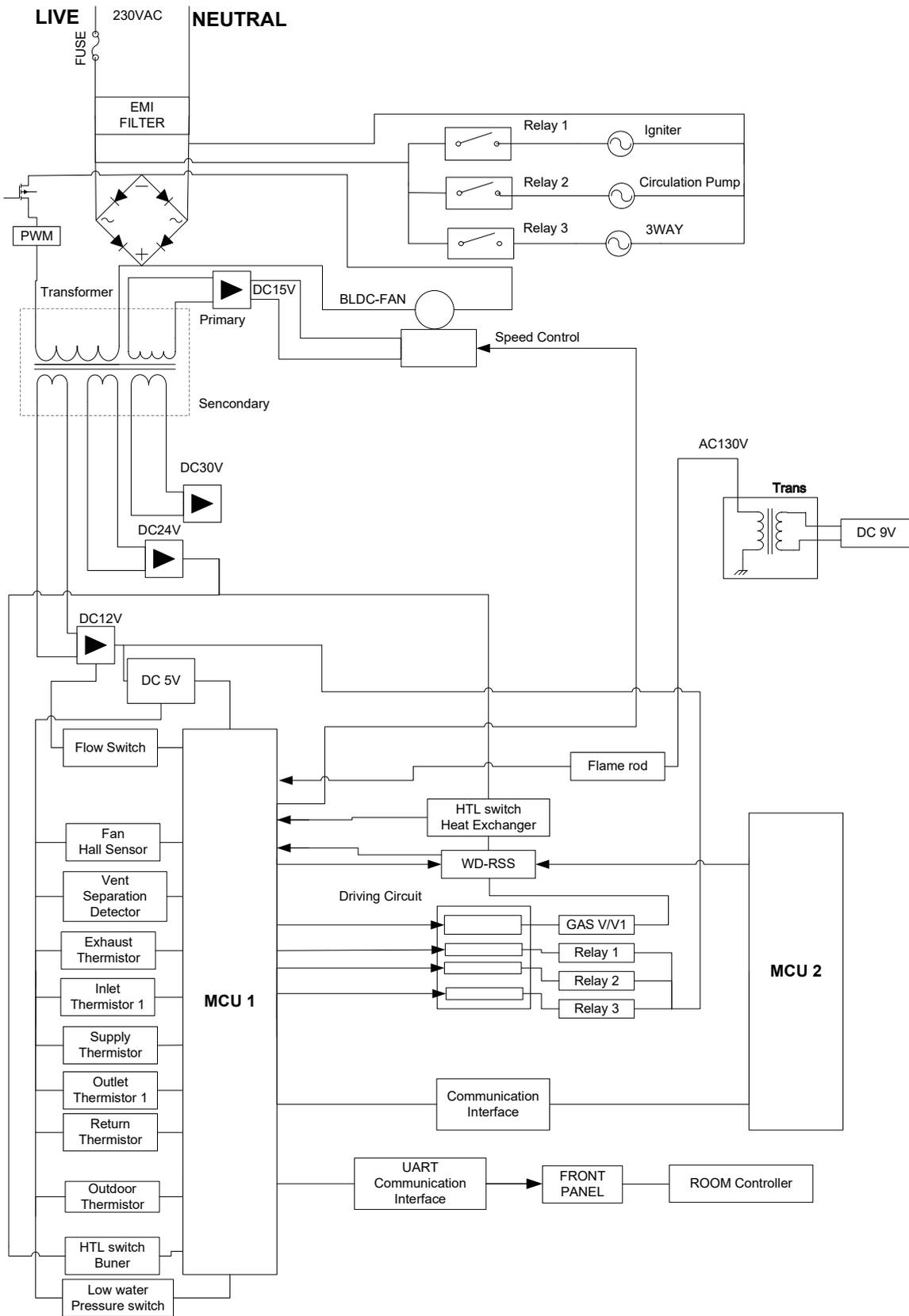
Improper gas valve settings can cause severe personal injury or substantial property damage.

Model	Max. Input (Net, kW)	Natural Gas	20% H ₂ Blended Gas
		Gas Flow Rate (m ³ /h)	Gas Flow Rate (m ³ /h)
NCB300-28K	28	2.96	3.28
NCB300-30K	30	3.18	3.51
NCB300-37K	37	3.92	4.33
NCB300-41K	41	4.34	4.80

12.2 Wiring Diagram



12.3 Ladder Diagram



12.4 Outdoor Temperature Sensor (Optional)

The boiler is designed to be able to function with an outdoor temperature sensor (10kΩ @ 25°C). Connect the sensor cables to the terminals 3 and 4 of the boiler terminal strip. For more information on the boiler terminal strip, refer to “8.5 Connecting the Outdoor Temperature Sensor” on page 45.

Outdoor Temperature Sensor Installation Guidelines

- Avoid areas with temperature fluctuations by direct sunlight, and where the temperature may not be representative of true outdoor temperature.
- Best location to install the temperature sensor is on a North or Northeast side of a structure under eaves where the sensor is shielded from direct sunlight.
- Avoid placing sensor in close proximity of heat sources that may affect correct temperature sensing. (fans, exhausts, flues, lights)
- Avoid installing the sensor in areas where the sensor is subjected to excessive moisture.
- Use 18 gauge wiring (thermostat wiring) with no splices. (except at the unit harness connection with yellow leader wire.)
- Caution should be taken to avoid potential electromagnetic interference (EMI) by routing separately from potential sources such as line voltage wiring. When necessary, shielded cable may be used.
- The sensor is a water resistant device.
- Any damage to the device may require the replacement of the entire component.

Benchmark Commissioning & Warranty Validation Service Record

It is a requirement that the boiler is installed and commissioned to the manufacturer's instructions and the data fields on the commissioning checklist completed in full.

To instigate the boiler warranty the boiler needs to be registered with the manufacturer within one month of the installation. The warranty rests with the end-user (consumer), and they should be made aware it is ultimately their responsibility to register with the manufacturer, within the allotted time period.

It is essential that the boiler is serviced in line with the manufacturer's recommendations, at least annually. This must be carried out by a competent Gas Safe registered engineer. The service details should be recorded on the Benchmark Service and Interim Boiler Work Record and left with the householder. Failure to comply with the manufacturers' servicing instructions and requirements will invalidate the warranty.



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This Commissioning Checklist is to be completed in full by the competent person who commissioned the boiler as a means of demonstrating compliance with the appropriate Building Regulations and then handed to the customer to keep for future reference.

Failure to install and commission according to the manufacturer's instructions and complete this Benchmark Commissioning Checklist will invalidate the warranty. This does not affect the customer's statutory rights.

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GAS BOILER SYSTEM COMMISSIONING CHECKLIST & WARRANTY VALIDATION RECORD

Customer name:													
Address:													
Boiler make and model:													
Boiler serial number:													
Commissioned by (PRINT NAME):						Gas Safe registration number:							
Company name:						Telephone number:							
Company email:						Company address:							
										Commissioning date:			
Heating and hot water system complies with the appropriate Building Regulations?											Yes		
Optional: Building Regulations Notification Number (if applicable):													
Time, temperature control and boiler interlock provided for central heating and hot water											Yes		
Boiler Plus requirements (tick the appropriate box(s))													
Boiler Plus option chosen for combination boiler in ENGLAND						Weather compensation			Smart thermostat with automisation and optimisation				
						Load compensation			Flue Gas Heat Recovery				
Time and temperature control to hot water			Cylinder thermostat and programmer/timer						Combination boiler				
Zone valves			pre-existing			Fitted			Not required				
Thermostatic radiator valves			pre-existing			Fitted			Not required				
Automatic bypass to system			pre-existing			Fitted			Not required				
Underfloor heating			pre-existing			Fitted			Not required				
Water quality													
The system has been flushed, cleaned and a suitable inhibitor applied upon final fill, in accordance with BS7593 and boiler manufacturer's instructions											Yes		
What system cleaner was used?						Brand:			Product:				
What inhibitor was used?						Brand:			Product:				
Primary water system filter			pre-existing			Fitted			Not required				
CENTRAL HEATING MODE measure and record (as appropriate)													
Gas rate (for combination boilers complete DHW mode gas rate)						m ³ /hr			or			ft ³ /hr	
Central heating output left at factory settings?						Yes			No				
If no, what is the maximum central heating output selected?												KW	
Dynamic gas inlet pressure												mbar	
Central heating flow temperature												°C	
Central heating return temperature												°C	
System correctly balanced/rebalanced?												Yes	
COMBINATION BOILERS ONLY													
Is the installation in a hard water area (above 200ppm)?						Yes			No				
Water scale reducer/softener			pre-existing			Fitted			Not required				
What type of scale reducer/softener has been fitted?						Brand:			Product:				
Water meter fitted?						Yes			No				
If yes- DHW expansion vessel			pre-existing			Fitted			Not required				
Pressure reducing valve			pre-existing			Fitted			Not required				
DOMESTIC HOT WATER MODE Measure and record													
Gas rate						m ³ /hr			or			ft ³ /hr	
Dynamic gas inlet pressure at maximum rate												mbar	
Cold water inlet temperature												°C	
Hot water has been checked at all outlets						Yes			Temperature			°C	
CONDENSATE DISPOSAL													
The condensate drain has been installed in accordance with the manufacturers instructions and/or BS5546/BS6798											Yes		
Point of termination						Internal			External (only where internal termination impractical)				
Method of disposal						Gravity			Pumped				
ALL INSTALLATIONS													
Record the following		At max rate:		CO ppm		CO ₂ %		CO/CO ₂		Ratio			
		At min rate (where possible)		CO ppm		CO ₂ %		CO/CO ₂		Ratio			
Where possible, has a flue integrity check been undertaken in accordance with manufacturers' instructions, and readings are correct?											Yes		
The operation of the boiler and system controls have been demonstrated to and understood by the customer											Yes		
The manufacturer's literature, including Benchmark Checklist and Service Record, has been explained and left with the customer											Yes		
Commissioning Engineer's signature													
Customer's signature (To confirm satisfactory demonstration and receipt of manufacturer's literature)													

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SERVICE & INTERIM BOILER WORK RECORD

It is recommended that your boiler and heating system are regularly serviced and maintained, in line with manufacturers' instructions, and that the appropriate service / interim work record is completed.

Service provider

When completing a service record (as below), please ensure you have carried out the service as described in the manufacturers' instructions. Always use the manufacturers specified spare parts.

SERVICE/INTERIM WORK ON BOILER <small>delete as appropriate</small>					Date:	
Engineer name:		Company name:				
Telephone No:		Gas Safe registration No:				
Max rate	CO	ppm	CO ₂	%	CO/CO ₂	
Min rate	CO	ppm	CO ₂	%	CO/CO ₂	
Where possible, has a flue integrity check been undertaken in accordance with manufacturers' instructions, and readings are correct?*					yes	
Gas rate:	m3/h	OR	ft3/h			
Were parts fitted? <small>delete as appropriate</small>		Yes	No			
Parts fitted:						
System inhibitor concentration has been checked and appropriate action taken, in accordance with BS 7593 and boiler manufacturers' instructions. *					yes	n/a
Comments:						
Signature:						

*A System inhibitor efficacy test is required on every annual service in accordance with the manufacturers instructions and BS 7593. It is only acceptable to not have undertaken this if the service engineers attendance visit was in between annual services to attend a non-water facing component.

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