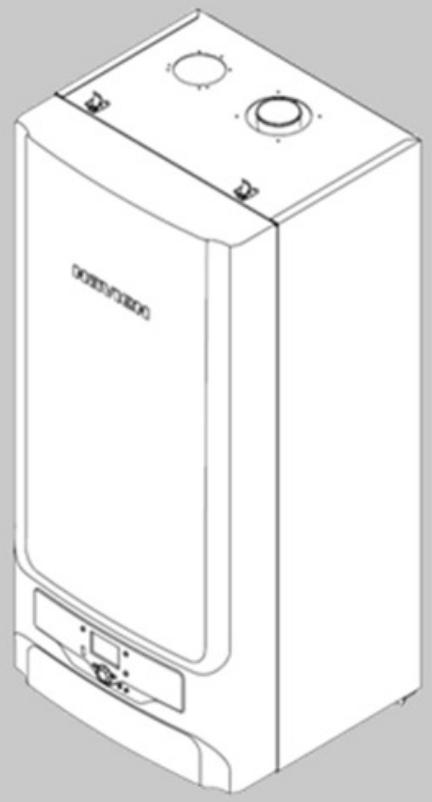
Installation Instructions For Registered Installers

Gas Fired wall Mounted Stirling Engine m-CHP



MODEL **NCM-1130HH**

Keep the instructions near the Navien Stirling Engine m-CHP for future reference whenever matintainance or service is required. Leave the instructions with the user.

Country of destination : GB

NAVIEN

Safety Definitions

All safety messages will refer to potential hazards. Precisely follow the Instructions to avoid the risk of injury.

This is the safety alert symbol. It is used to alert you of potential personal injury hazards.
Adhere to all safety messages that follow this symbol to avoid possible injury or death.

List of safety symbols in the instructions

DANGER

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

WARNING

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

CAUTION

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

CAUTION

Used without the safety alert symbol indicates a potential hazardous situation which, if not avoided, could result in property damage.

Sysmbols Used in the Instructions

The following symbols are used throughout the instructions to bring attention to the important information concerning the appliance.

Important

Warns of a risk of material loss and environmental pollution.

Note

Indicates additional information that is important but not related to personal injury or property damage

Important Safety Precautions

DANGER

If you can smell gas
Gas Leaks can cause explosions, which may lead to serious injury.

Do not smoke. Prevent open flames and sparks.
Do not operate light switches or electrical equipment switches.
Open the windows and doors.
Close the gas shutoff valve.
Shut down the heating system.
Keep people away from the danger zone.
Observe the safety regulations of your local gas supplier, found on the gas meter.
Notify your heating contractor from the outside of the building.

Flue gas may lead to life-threatening poisoning.

Shut down the heating system.
Ventilate the location.
Close all doors leading to lining spaces.
Do not operate electrical switches.

CAUTION

Working on the heating system

Isolate the system from the main electrical power supply, e.g.by removing a separate fuse or by means of a main electrical isolator, and check that it is no longer "live".

Isolate the gas supply and safeguard it from unauthorized reopening.

For propane appliances

Purging the liquid gas tank when installing the system:

Before installing the appliance make sure that the gas tank has been purged. The liquid gas supplier is responsible for properly purging the tank. Ignition problems may occur if the tank is not bled properly. In such cases, first contact the person in charge of filling the tank.

Contents

1.0 General Information

1.1 Product description

The KD NAVIEN product is a fully automatic, wall mounted, pre-mix room sealed fan powered, balanced flue gas domestic combined heat and power unit for use with G25/G20 natural gas only. The product incorporates a Stirling engine delivering up to 1.1 kW of electrical power and a fully modulating gas control system with direct burner ignition.

The KD NAVIEN NCM-1130HH product has a 30kW heat output.

The product incorporates a stainless steel heat exchanger.

The product is designed for use with open vented primary fully pumped water systems and also sealed systems up to 3 bar, with an indirect hot water cylinder.

Note that if thermostatic radiator valves are installed, the thermostat must be in the same room as a lock shield radiator.

The product incorporates an electronic fault diagnosis system and display to facilitate rapid identification of any fault conditions. Incorrect use of this product constitutes a safety hazard. The product must at all times be operated in accordance with these and the KD NAVIEN NCM-1130HH User Instructions as well as any subsequent instructions issued by KD NAVIEN.

This product shall be installed by appropriately trained KD NAVIEN engineers and in accordance with the current Gas Safety (Installation and Use) Regulations (GSIUR) and also relevant Building Regulations (particularly Part P)

All installation electrical work must be carried out ONLY by a trained electrician to the requirements of the current edition IEE Requirements for Electrical Installation (BS 7671) and Engineering recommendation G83 /1 – for the connection of small-scale embedded generators (SSEG)(up to 16A per phase) in parallel with public low-voltage distribution networks.

In addition, all proposed work on the domestic mains electricity circuits in the users premises must be notified to KD NAVIEN before work commences for the entire period of the trial.

WARNING

Before commencing any electrical work in the property the product must be isolated at the securable isolator and the gas cock turned off

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1.2 Certification Details

This product is CE marked under the following regulations.

The product is certified to comply with the following requirements:

Directives	
Directive 2009/142/EC	The Gas Appliance Directive
Directive 2006/95/EC	The Low Voltage Directive
Directive 2004/108/EC	The Electromagnetic Compatibility Directive
The following main standards are applied to achieve the directives	
EN 483: 1999	Room sealed boilers $\leq$ 70kW
EN 677: 1998	Condensing boilers $\leq$ 70kW
EN 60335-2-102: 2006	Safety of household electrical products
EN 55014-1: 2006	EMC emissions of household equipment
EN 61000-3-2:2006	EMC limits for harmonic current emissions
EN 61000-3-3:2005	EMC limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems
EN 55014-2: 2001	EMC immunity of household equipment

1.2.1 Scope of certification

Products Covered	NCM-1130HH 30kW
Gas Categories	I_{2L}(G25) , I_{2H}(G20)
Gas Supply (G25)	Requires a governed gas supply at 20 mbar inlet pressure for I_{2H} (G20) and 25 mbar for I_{2L}(G25)
Flue Types	B23-B33-B53-C13-C33-C43-C53-C63-C83

1.3 Hazard

The appliance shall always be turned off by removing any heat demands.

Before working on the appliance ensures that the engine head temperature is below 150°C. This is to prevent any uncontrolled engine start which would constitute a hazardous situation and/or possible damage to the engine.

The engine head temperature can be found on the Fascia Controller, by following the procedure below;

1. Press 'OK' button
2. Then press 'I' button (between 1 and 3 seconds)
3. Select 'Engineer Level' using the setting knob and press 'OK'
4. Select 'Input/Output test' and press 'OK'
5. Select 'Head Control Temperature' and read temperature from display and note value
6. Confirm head temperature by selecting 'Head Limit Temperature' and read temperature from display and note value
7. Both readings should be within 50°C of each other

1.4 Control of Substances Hazardous to Health

Note the following information on substances hazardous to health.

Adhesives and Sealants

The NCM-1130HH product employs a range of adhesives and sealants in its construction. These substances are fully cured and give no known hazard in this state.

Insulation Pads, Fire Insulation

Refectory ceramic and ceramic fibre insulation is used in a number of places within the product. These materials can cause irritation to skin, eyes and the respiratory tract.

If you have a history of skin complaints you may be susceptible to irritation. High dust levels are usual only if the material is broken or handled.

In normal use of the product these materials are not accessible to the user and represent no hazard. For servicing and maintenance operations likely to disturb the ceramic fibre parts, the appropriate safety precautions should be taken before starting work.

If you do suffer irritation to the eyes or severe irritation to the skin, seek medical attention.

1.5 Maintenance and Servicing

Maintenance and servicing must only be carried out by KD NAVIEN trained persons. The product will require regular maintenance and periodical inspection. It is the responsibility of the user to ensure adequate access to the product by KD NAVIEN Service personnel to allow this maintenance to take place in a timely manner.

2.0 Technical Specifications

2.1 Performance data and General specifications

Specification Items		Unit	NCM - 1130HH
Engine Burner Heat Input (Min-Max)		kW	3.0-7.7
Supplmentary Burner Heat Input (Min-Max)		kW	5.4-22.4
Both Burner Heat Input (Min-Max) (60/80℃)		kW	30.2
Both Burner Heat output (Max) (50/30℃)		kW	31.2
Both Burner Heat output (Max) (60/80℃)		kW	27.4
ELECTRICAL POWER		kW	1.0
Useful Efficiency at Max Heating Output - Flow/Return (80/60℃)		%	97.4
Useful Efficiency at Max Heating Output - Flow/Return (50/30℃)		%	106.8
Useful Efficiency at 20% Max Heating Output – (Return 30℃)		%	107.0
NOx Class			5
Category			I_{2L}(G25) , I_{2H}(G20)
Max Heating Water Pressure		bar	3
Min Heating Water Pressure			0.8
Max Heating Temperature		℃	85
Adjustable Temperature Heating Setting		℃	30 – 85
Expansion Vessel Pre-charge		bar	1
Electrical Supply		V/Hz	230 / 50
Power Consumption		W	116
Electrical Protection			IPX4D
Intake/Exhaust Flue System Type			B23-B33-B53-C13-C33-C43-C53-C63-C83
Intake/Exhaust Flue Diameter		mm	Concentric 60/100 – Separate 80/80
Connecting Diameter	Heating Water Connection	Inch	PT 3/4
	Domestic Hot Water Connection	Inch	PT 3/4
	Gas Inlet Connection	Inch	PT 3/4
	Condendate connection	mm	22
Physical dimensions (Width x Depth x Height)		mm	480 x 430 x 1000
Weight		kg	115

Table 1. Performance data and General specifications

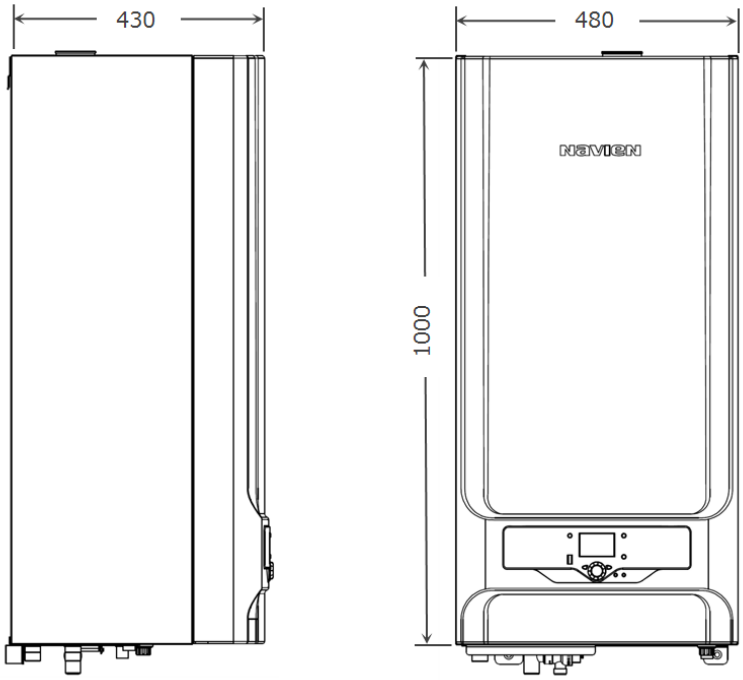
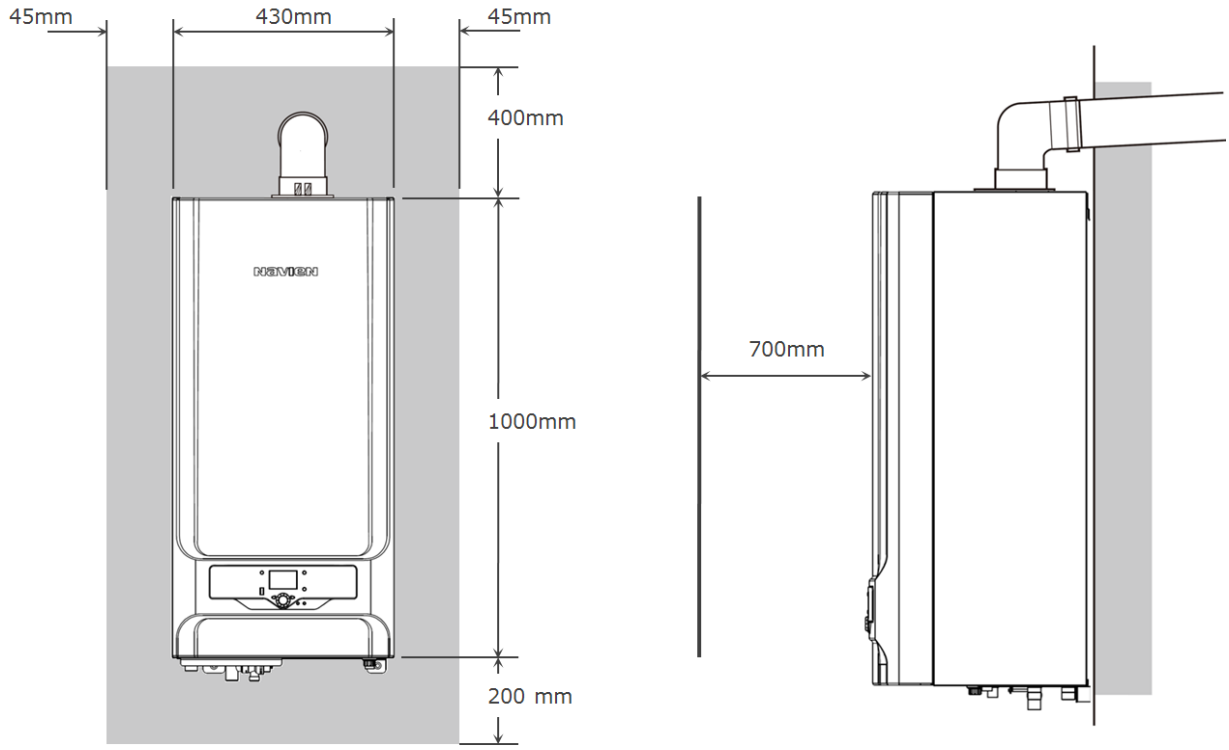


Diagram 2.1 Product dimensions

2.2 Minimum installation and service clearances

The product must not be installed in compartments or cupboards.



2.3 Flue system specifications

2.3.1 Coaxial Horizontal flue systems.

The product is supplied complete with a concentric turret assembly and standard concentric horizontal balanced flue terminal assembly suitable for flue lengths from 200mm to 10.5m (From flue turret to flue terminal end)

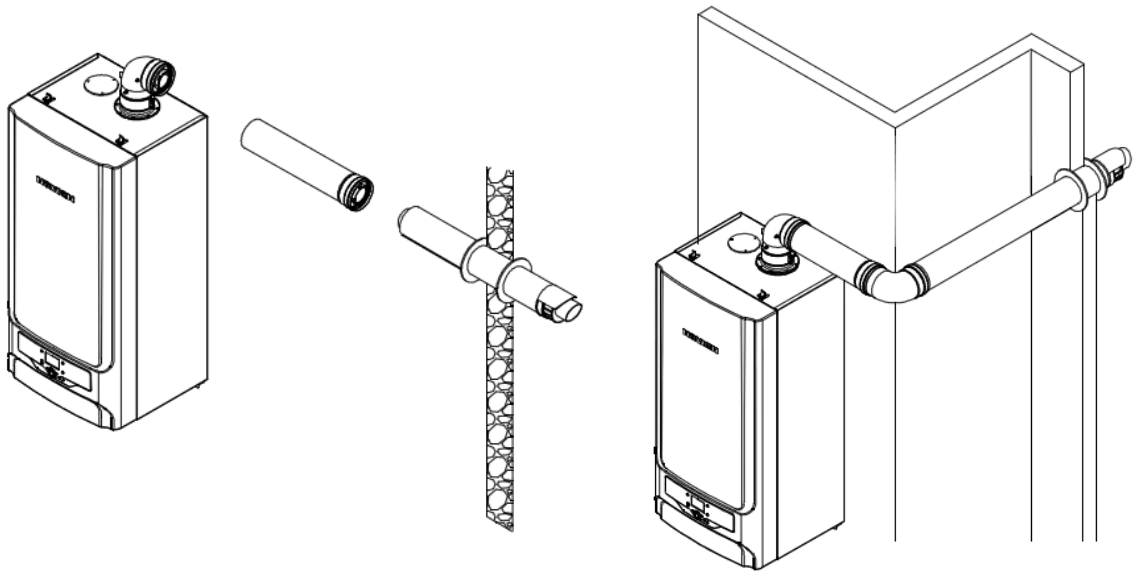


Diagram 2.2 Flue through wall

Additional components are available to extend the length of the flue ducts. These components are as follows:-

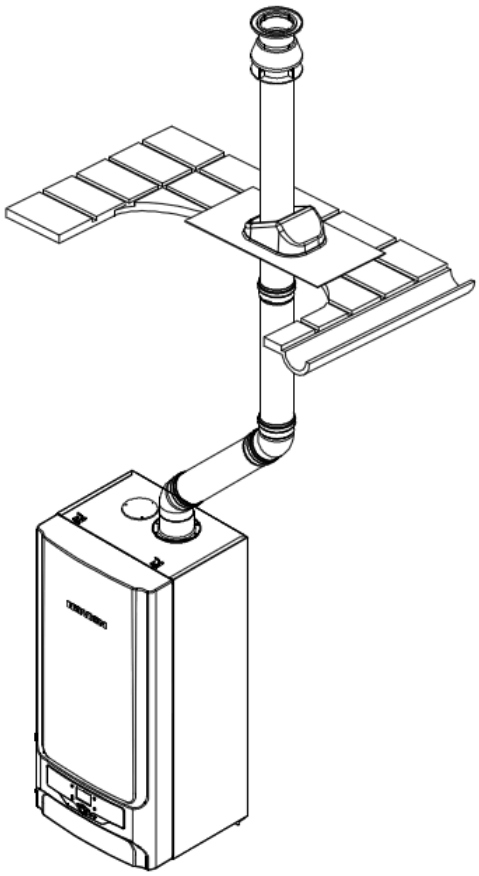
- 1000 mm straight concentric flue extension (Increases the length of flue by 960 mm).
- 500 mm straight concentric flue extension (Increases the length of flue by 460 mm).
- Air duct sealing collar (One required per joint).
- Flue weather proofing seal. (two per installation)

Extension ducts can be used to increase the straight flue length up to 10.5m, is measured between the end of the flue terminal to the turret outlet.

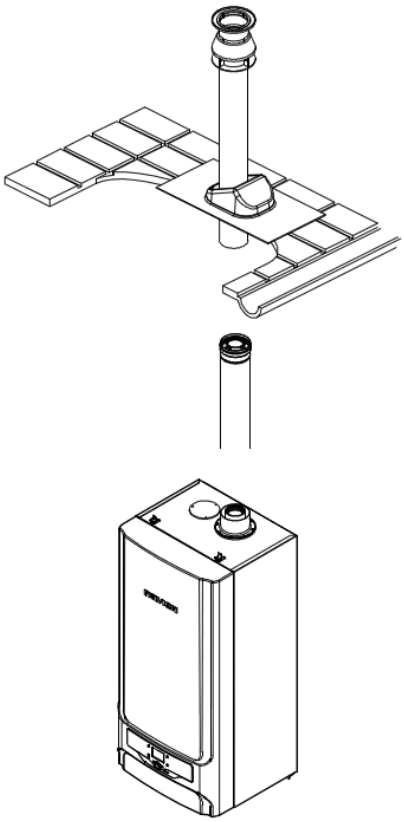
When measuring up for maximum flue lengths, it is generally considered that a 90^0 elbow is the equivalent to the frictional losses experienced on a 2m flue extension, for example if two 90^0 elbows are used in the flue run then the total straight flue run must not exceed 6.5m.

2.3.2 Coaxial Vertical flue systems

The kit is supplied as a concentric flue assembly complete with terminal, suitable for heights of up to 10.5m.



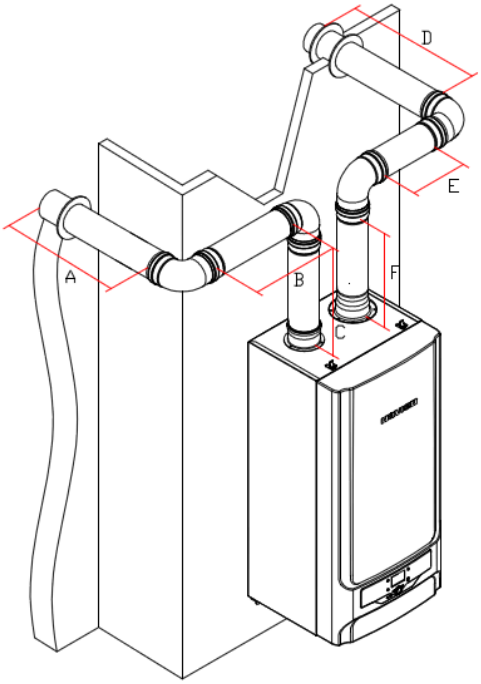
Vertical flue using 2 x 45° bends
Note: 45° bends = 1 of a metre resistance



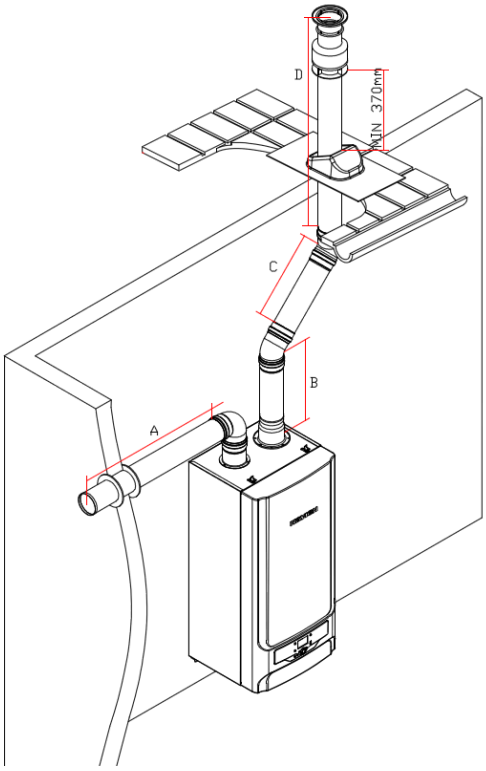
Vertical flue
Maximum length from the top of the flue connector to the underside of the terminal = 10.5m

Diagram 2.3 Optional vertical flue systems available for use with the appliance

2.3.3 Separate flue systems



Total flue length:
A + B + C + D + E + F – (4 x 90° elbow)=
20 – 4 x 3.5 = 6.5 m



Total flue length:
A + B + C + D – (2 x 45° elbow) = 20 – 2 x 1.4 = 17.2 m

Diagram 2.4 Optional separate flue systems available for use with the appliance

Diameter of Pipe [mm]	Max Flue Length [m]	Reduced Flue Length [m]	
Ø 80/100	10.5	45°	1.0
		90°	2
Ø 80/80	20	45°	1.4
		90°	3.5

Table 2. Reduction table

2.4 KD NAVIEN appliance internals

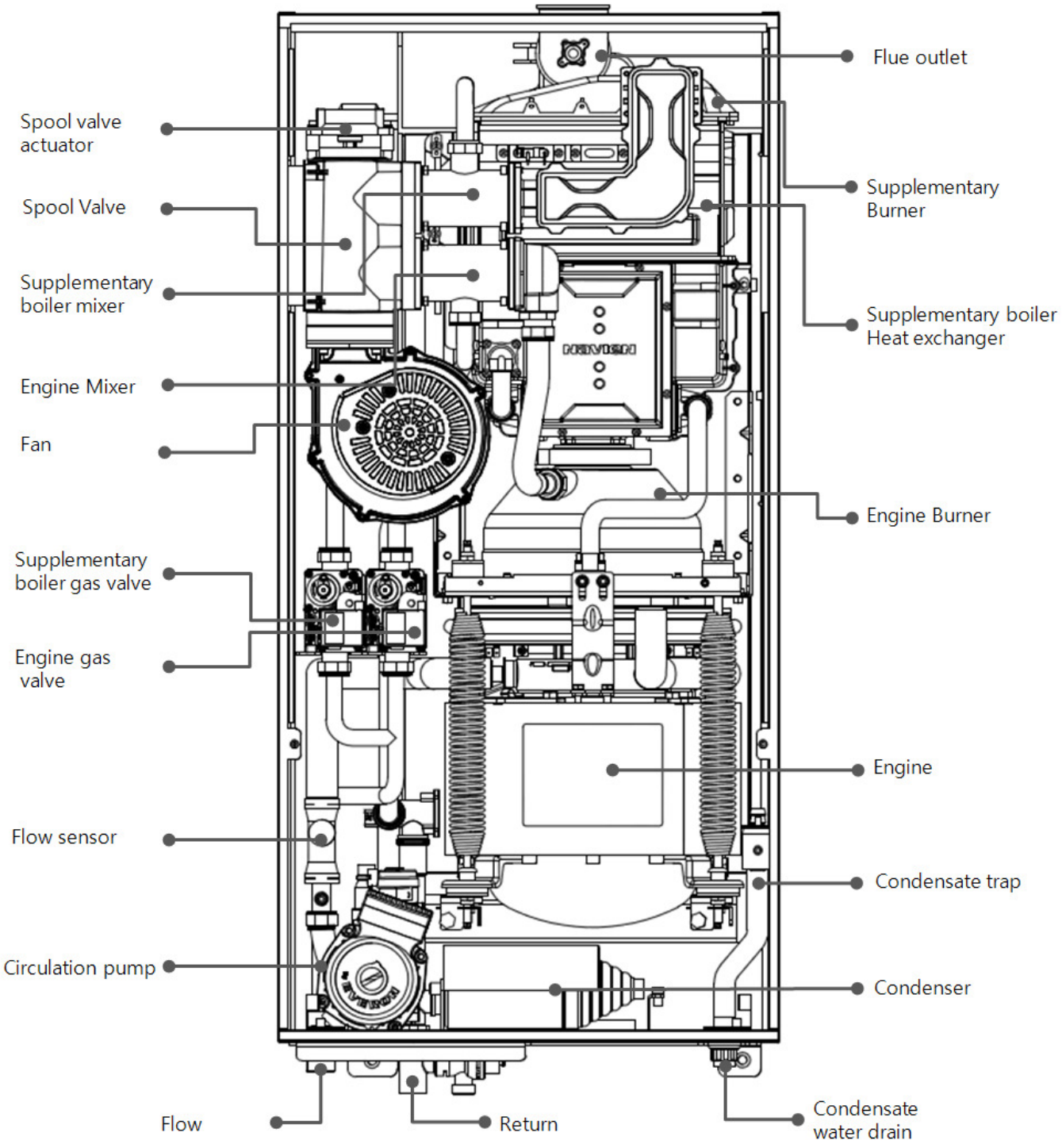


Diagram 2.5 Product Internals

3.0 Installation requirements

3.1 Statutory requirements

The installation of the product MUST be carried out by a competent person in accordance with the relevant requirements of the current issue of:

- Manufacturers Instructions Supplied
- Gas Safety (Installation and use) regulations
- CORGI
- Current IEE Wiring Requirements for Electrical Installation (BS 7671)
- The Building Standards (Scotland) (Consolidation) Regulations,
- Water bylaws
- Water Supply (Water Fittings) Regulations
- The Health and Safety at Work, Act
- The Electricity at Work Regulations
- Any applicable local regulations
- EN 50438 Requirements for the connection of micro-generators in parallel with public low-voltage distribution networks
- UK Engineering Recommendation G83/1 - for the connection of small-scale embedded generators (SSEG) (up to 16A per phase) in parallel with public low-voltage distribution networks.

Detailed recommendations are contained in the current issue of the following British Standards and Codes of Practice.

- **BS5449** Specification for forced circulation hot water central heating systems for domestic premises
- **BS5546** Specification for installation of hot water supplies for domestic purposes , using gas-fired products of rated input not exceeding 70 kW
- **BS5440:1** Installation and maintenance of flues and ventilation for gas products of rated input not exceeding 70 kW (1^{st}, 2^{nd} and 3^{rd} family gases). Specification for installation and maintenance of flues.
- **BS5440:2** Installation of flues and ventilation for gas products of rated input not exceeding 60kW. (1^{st}, 2^{nd} and 3^{rd} family gases). Specification for installation of ventilation for gas products.
- **BS6798** Specification for installation of gas-fired boilers of rated input not exceeding 70kW
- **BS6891** Specification for installation of low pressure gas pipework of up to 28 mm (R1) in domestic premises (2^{nd} family gas)
- **BS EN 4814**
- **BS EN 7074:1** Code of practice for domestic hot water supply
- **BS EN 7074:2**
- **BS EN 7478**
- **BS EN 7593** Treatment of water in domestic hot water central heating systems

Important

Manufacturer's instructions must NOT be taken in any way as overriding statutory obligations.

3.2 Product position

Important

Before installation commences, the suitability and strength of the wall on which the product is to be mounted MUST be assessed by a competent person.

The following limitations **MUST** be observed when sitting the product:

a) The product is not suitable for installation in timber-framed buildings or in rooms containing a bath or shower.

b) The product is not suitable for installation in cupboards or compartments.

c) The product is not suitable for external installation.

d) This position MUST allow for supplied flue system and terminal position to be used. (Refer to sections 2.3 and 3.3)

e) The product must be installed on a flat vertical wall, which is capable of supporting the weight of the product and any ancillary equipment.

f) It is not necessary to provide an air vent in the room in which the KD NAVIEN product is installed

g) Do not position the appliance above an area likely to be occupied by a kettle or toaster.

3.3 Flue terminal location

The following are notes:

a) The product MUST be installed so that the flue terminal is exposed to external air.

b) It is important that the position of the terminal allows free passage of air across it at all times.

c) It is ESSENTIAL TO ENSURE that products of combustion discharging from the terminal cannot re-enter the building, or any other adjacent building, through ventilators, windows, doors, other sources of natural air infiltration, or forced ventilation / air conditioning.

d) The minimum acceptable dimensions from the terminal to obstructions and ventilation openings are specified in Table 3 and Diagram 3.1

e) If the terminal discharges into a pathway or passageway check that combustion products will not cause nuisance and that the terminal will not obstruct the passageway.

f) Should the lowest part of the terminal be fitted less than 2m above ground, a balcony, or a flat roof to which people have access then a terminal guard is required. The terminal guard specification should allow for the flue terminal to be entirely enclosed whilst providing a clearance of 50mm between the body of the flue terminal and the terminal guard casing.

g) Where a terminal is fitted less than 1m below a plastic gutter or less than 0.5m below painted eaves or any other painted surface then a suitable shield at least 1m long shall be fitted to protect the surface.

h) Noise and any discharge from the flue outlet must not cause a nuisance. Site flue terminal in a suitable location.

i) Flue terminal must be sited so that it does cause obstructions e.g. pathways, driveways

j) Flue gases from this appliance have a tendency to plume. This could be a nuisance, for example near security lighting. Site flue terminal in a suitable location.

k) The air inlet / flue outlet duct MUST NOT be closer than 25 mm to combustible material.

l) In certain weather conditions the terminal may emit a plume of water vapour. This is normal but positions where this would cause a nuisance should be avoided.

Description		Minimum Distace (cm)
A	From openings(e.g. doors, windows, ventilation tiles)	30(*1)
B	Below gullies, down-pipes, or drain pipes	7.5
C	Below gutters	20
D	Below balconies	20
E	From down pipes	2.5
F	From external and internal conrners	30
G	Above the ground, a roof or balconies	30
H	From the opposite wall of a carport(when another flue is not installed)	60
I	From a terminal, that is facing the terminal, on the opposite wall of a carport	120
J	Next to openings(e.g. doors, windows) within a carport	120
K	Vertically away from a terminal on the same wall	150
L	Horizontally away from a terminal on the same wall	30
M	From an addjacent vertical flue pipe	50
N	From openings is a directly opposing building	200(*2)

Table 3 Flue terminal Locations

Diagram 3.1: Acceptable terminal positions

CAUTION

Terminal guards must be provided for any terminals which are located less than 2 meters above a balcony, above a flat roof, or above ground which people can access.

Note

For vertical flue pipes, the terminal must not be within 60 cm of any openings

CAUTION

The wall on which the intake/exhaust flue is set must be made of incombustible interior materials and must connect to the outside. Dangerous materials or obstructions must not be near the intake/exhaust flue.

The exhaust flue should be covered with over 20 mm of incombustible material when it passes through a wall made of combustible material and must be kept at least 50 mm away from any combustible materials.

Connection parts of the exhaust flue must be properly connected by proper sealing gasket. Check for any exhaust gas leaks.

Before cleaning the intake/exhaust flue, turn off the appliance and wait until the pipes have cooled down.

Safeguard the flue terminals from snow buildup.

3.4 Central heating system

a) This product is designed for connection to open vented central heating water systems and also for sealed systems up to 3 bar. Refer to Diagram 3.3 for a typical 'open vented' system design and to diagram 3.4 for a typical sealed system design.

b) The flow and return connections from the top of the unit PT 3.4" Male.

c) It is recommended that copper pipes are used for the flow and return for at least 2m from the appliance.

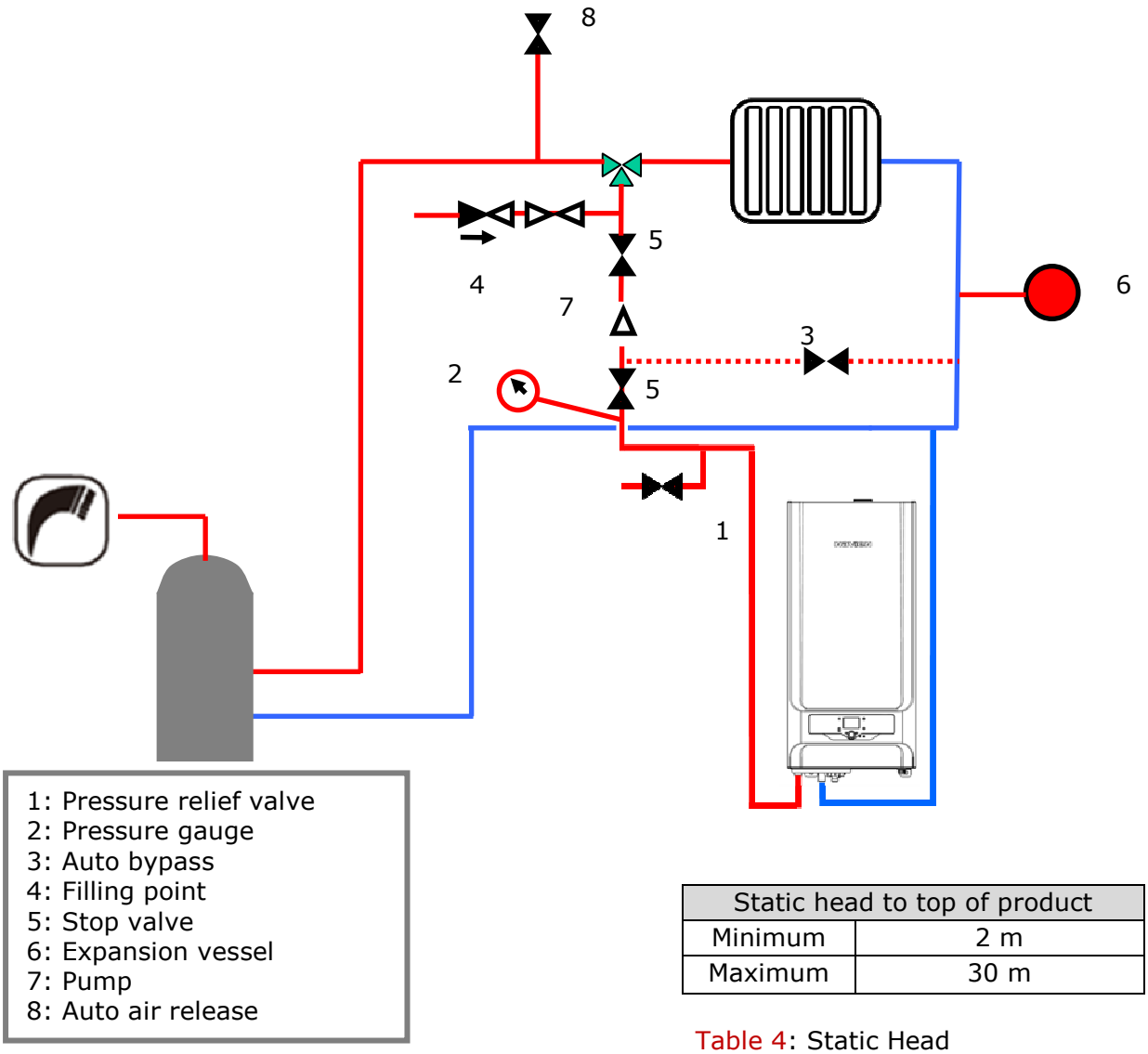
d) It is recommended that the system is power flushed prior to the installation of the appliance. Once the product has been installed, treat primary boiler circuit with a suitable corrosion inhibiter such as, Sentinel X100 inhibitor.

e) It is strongly recommended to install a filter in the system.

f) It is recommended that an automatic air vented is installed on the system at the highest point.

g) It is also recommended that, if not already installed on the heating system, an auto by-pass shall be installed.

h) To help manage the level of operating noise of the installation it is recommended to thoroughly purge air from the system, position pump in appropriate location, support pipe work effectively, always firmly secure cover on casing.



Static head to top of product	
Minimum	2 m
Maximum	30 m

Table 4: Static Head

Diagram 3.2 Typical sealed system design.

The product can be connected to a sealed system. Ensure the manufactures instructions are followed when connecting the product to the sealed system components. To appropriately size the expansion vessel please use table 9a;

Safety Valve Setting (bar)	3.0		
Vessel charge and initial system pressure (bar)	0.5	1.0	1.5
Total water content of system (litres)	Vessel Volume		
25	2.1	2.7	3.9
50	4.2	5.4	7.8
75	6.3	8.2	11.7
100	8.3	10.9	15.6
125	10.4	13.6	19.5
150	12.5	16.3	23.4

Table 4a: Expansion vessel table

3.4.1 Hydraulic resistance

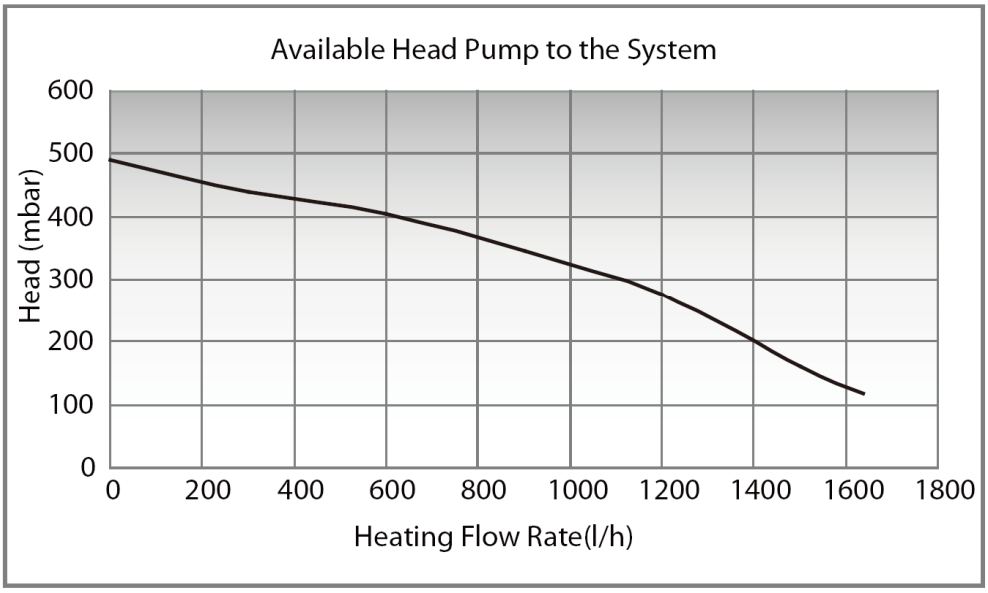


Diagram 3.3 Pressure Loss

3.4.2 Water treatment

The product incorporates a stainless steel heat exchanger.

Particularly where a new boiler is to be fitted to an existing system, it is good practice that the system is thoroughly cleansed. This cleansing should take place prior to the fitting of the new boiler and be in accordance with BS 7593.

In accordance with BS 7593 : 1992 a corrosion inhibitor such as Sentinel X100 should be used.

It is very important that the correct concentration of any additive is maintained at the level recommended by the manufacturer. In hard water areas lime scale treatment may be necessary.

WARNING

Artificially softened water not be be used.

3.5 Gas supply

a) Consult the gas supplier before attempting to install the appliance

b) The gas installation must be in accordance with the current issue of BS 6891

c) A minimum of 22mm diameter pipework is required to within 1 metre of the product and a pressure drop of no more than 1 millibar is permissible

c) Before any gas work commences, the gas pipework shall be tested for soundness.

d) The governor at the meter must give a constant outlet pressure of 25 mbar I_{2L}(G25)and 20 mbar I_{2H}(G20)
d) The gas supply line should be purged

e) The complete installation must be tested for gas soundness and paperwork completed.

WARNING

Before purging open all doors and windows, also extinguish any cigarettes, pipes, and any other naked lights.

3.6 Electricity supply

a) Wiring external to the product must be in accordance with BS 7671 for electrical installation and any local regulations which apply.

b) The requirements of EN50438 and National Standards shall be followed.

c) The point of isolation of the product from the mains should be readily accessible to the user.

3.7 Condensate drain

A plastic drain pipe(or drain hose which is contained in the appliance package) must be installed to allow discharge of condensate to a drain.

Condensate should be discharged into the internal household draining system. If this is not possible, external pipework is acceptable, see section 4.4 for more details.

4.0 Installation Procedure

4.1 Unpacking

The product will come in a wooden package. Unpack and check the contents against the Installation Preparation Checklist provided. A copy of which is shown overleaf

Any damage noticed to equipment shall be reported immediately to KD NAVIEN (**82-2-3489-2326**)

CAUTION

The appliance may be damaged if it is not properly transported.

• Transport the appliance using the right transportation equipment, such as a hand truck with a fastening belt or special equipment for maneuvering steps.

• Protect all parts against impact when they are transported.

• Observe the transportation markings on the packaging.

Packaged appliances must always be lifted and carried to their destination by two people, or you must use a hand truck or special equipment to transport them to their destination.

4.2 Preparing the wall for installation

Important

Before installing the product, check that the chosen position is suitable **(Section 3.0),** adequate installation clearances are available ***(*Section 2.2*)*** and that the requirements for flue terminal position ***(*Section 2.3*)***, are satisfied.

The wall structure intended for the KD NAVIEN appliance must be of suitable construction, load bearing and have a flat surface.

Important

If you are in doubt that the wall is capable of adequately supporting the weight of the appliance and any ancillary equipment you MUST arrange for an assessment of structural strength by a competent person. Stud / partition walls are NOT suitable

4.2.1 Fitting the wall mounting template.

1) Tape the paper template to the wall, ensure it is square.

2) Mark positions of four fixing holes as close as possible to the corners of the plate in the top and bottom rows in secure positions on the wall, see diagram 4.1

3) Mark the position of the flue hole.

Note

Horizontal flue – Take into account a 3° slope downwards in the flue to the boiler.

4) Remove the template from the wall.

5) Cut the flue hole, preferably with a core-boring tool.

Important

Ensure that during the cutting operation, masonry falling outside of the building does not cause damage or personal injury.

6) It is absolutely essential that the KD NAVIEN appliance is installed vertically. If the wall is bowed or not plum, then spacers must be inserted between the back plate and the wall such that the back plate is accurately vertical.

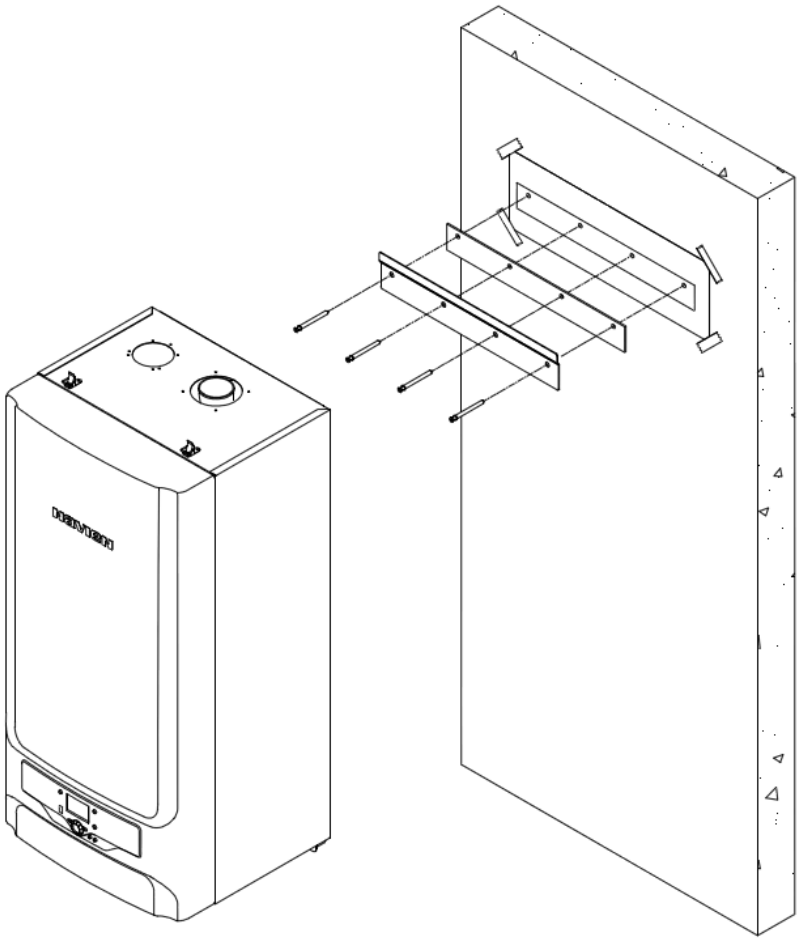


Diagram 4.1 Diagram showing cut away wall with m-CHP mounted

7) The Fischer Rawl bolts currently supplied by KD NAVIEN to secure the wall mounting bracket to the wall **must be used in all cases**

8) Set drill stop at depth of 90mm

9) Drill an 8mm diameter hole into the wall, using rotary hammer drill in conjunction with SDS drill bit.

10) Thoroughly clean the hole of dust and drill debris

11) Push the FUR 8X80 T frame fixing into the hole through wall mounting bracket and make sure that the collar of the nylon plug is flush with wall mounting bracket.

12) Tighten the coach screw with T30 screw driver bit

4.3 Mounting the appliance

Note

This step can be delayed until immediately prior to system commissioning if site security cannot be guaranteed. If this option is required, isolate the service connections and continue with the system installation procedure described in the following sections, then return to this section later.

Important

Carefully check the security of the wall mounting plate before proceeding further.

4.3.1 Lifting Equipment

Before lifting work is processed, following requirement should be ensured.

1. Ensure that a visual inspection is carried out to asses for any obvious defects (such as worn tyres, dents in equipment – noted by broken paintwork)
2. Check and remove any obstacles along the routes from where the appliance is, to where it is to be installed.
3. Ensure all involved in the installation are aware that the lifting equipment is being used.
4. The height that the lifting kit raises the appliance must be kept to a minimum, only when the back plate is ready should the appliance be raised on the lifting equipment.
5. Any house thresholds will need appropriate temporary ramps in place.

Lifting Equipment should comply with the following requirement.

- Weight allowed for lifting process should be at least + 200Kg
- The wheels must be locked during lifting process
- Ensure that balance is being sustained when carrying

4.3.1.1 Use of Lifting Gear

This process describes removing an NCM-1130HH appliance from a packaging box to the wall.

1) When you lift the appliance, do not get rid of the EPP bottom base.
2) Installation should be carried out by 2 people.

4.4 Condensate Drain

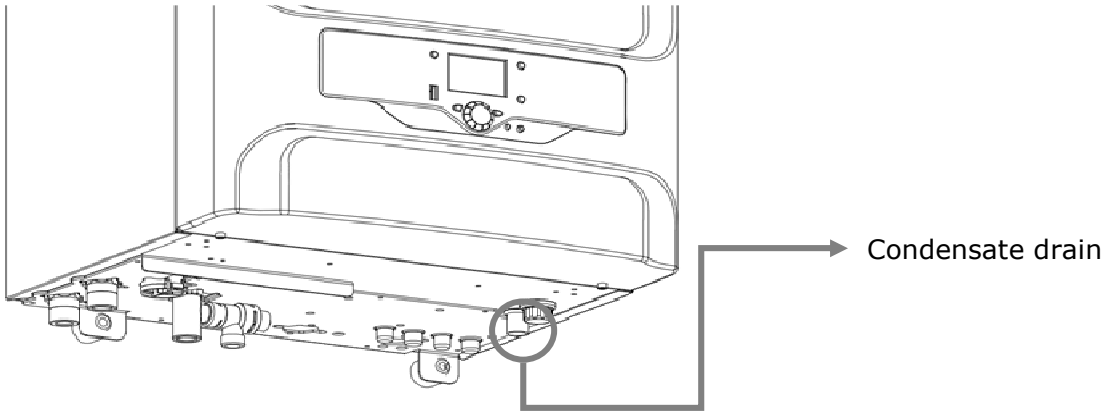


Diagram 4.2 Condensate drain connection

The condensate drain connection is at the bottom of the product, see Diagram 4.2. Connect the product condensate drain to the condensate drain hose which is contained in package box. The condensate drain hose is 20mm internal diameter (22mm external diameter for any pipework installed external to the property) and is made of a suitable acid resistant material.
The discharge pipe from the boiler condensate drain must have a continuous fall (45mm per meter) away from the product and preferably be installed and terminated within the building to prevent freezing.

The condensate discharge pipe must terminate in a suitable position, e.g.:

a) Preferably the condensate pipe should be run and terminate internally to the house soil and vent stack (at least 450mm above the invert of the stack). A trap giving a water seal of at least 75mm should be incorporated into the pipe run, and there must be an air break in the discharge pipe upstream of the trap. This should be designed so that the condensate cannot be discharged into the house if the condensate pipe becomes blocked.

b) Connecting into the internal discharge branch (e.g. sink waste or washing machine) with an external termination, the condensate discharge pipe should have a minimum diameter of 22mm with no length restriction and should incorporate a trap with a 75mm seal. The connection should preferably be made down stream of the sink waste trap. If the connection is only possible upstream, then an air break is needed between the two traps. This is normally provided by the sink waste.

c) Terminating in a gully below grid level and above the water level. The external pipe length should be kept a short as possible to minimize the risk of freezing and should not be more than 3m.

f) At a condensate absorption point (soakaway). The external pipe length should not be more than 3m

g) The disposal of condensate liquid must comply with local Water Authority rules and regulations.

Note

If it is necessary to install any condensate discharge pipework externally, then it should be kept as short as possible to a maximum length of 3m, be insulated with waterproof insulation and have a continuous fall of a least 2.5° (i.e. 45mm for every metre length).

The diagrams below show acceptable means of condensate drain connection

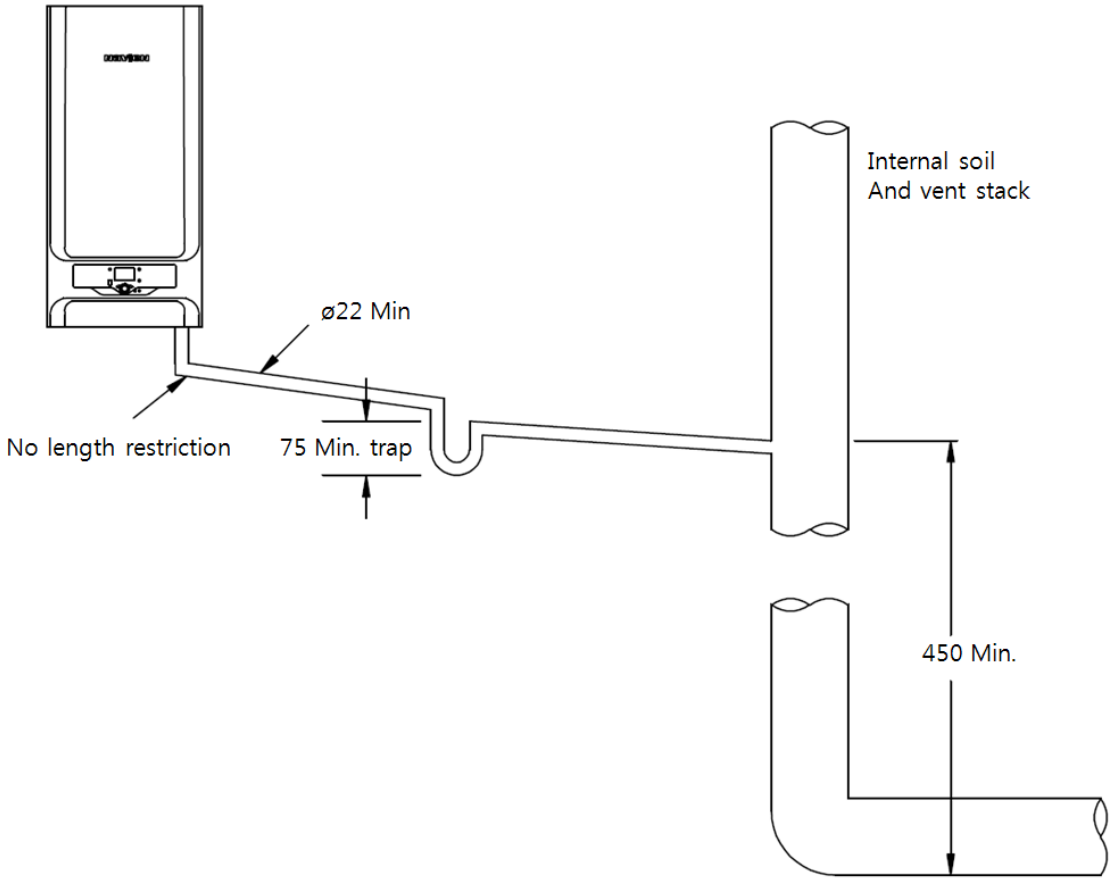


Diagram 4.2a Internal termination of condensate drain to internal stack

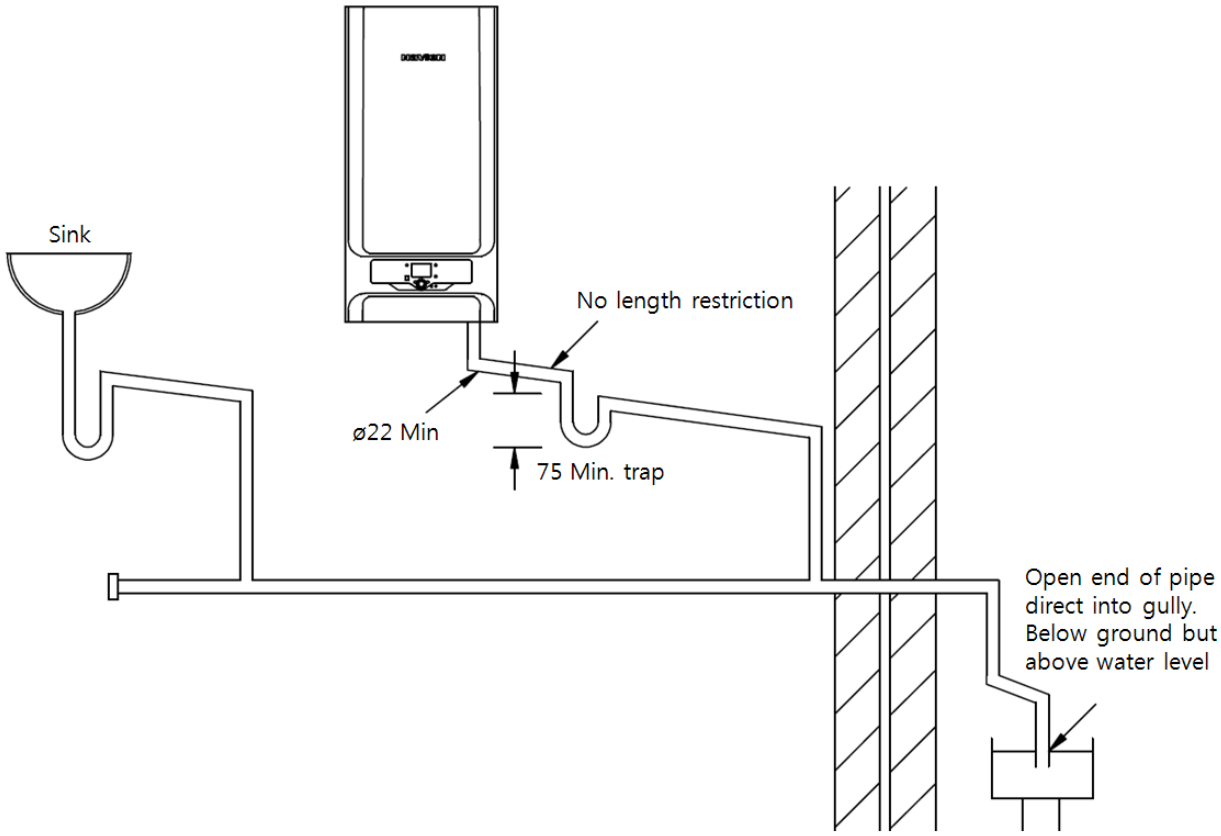


Diagram 4.2b External termination of condensate drain via internal discharge branch (i.e sinks) and condensate siphon

4.5 Gas Connection

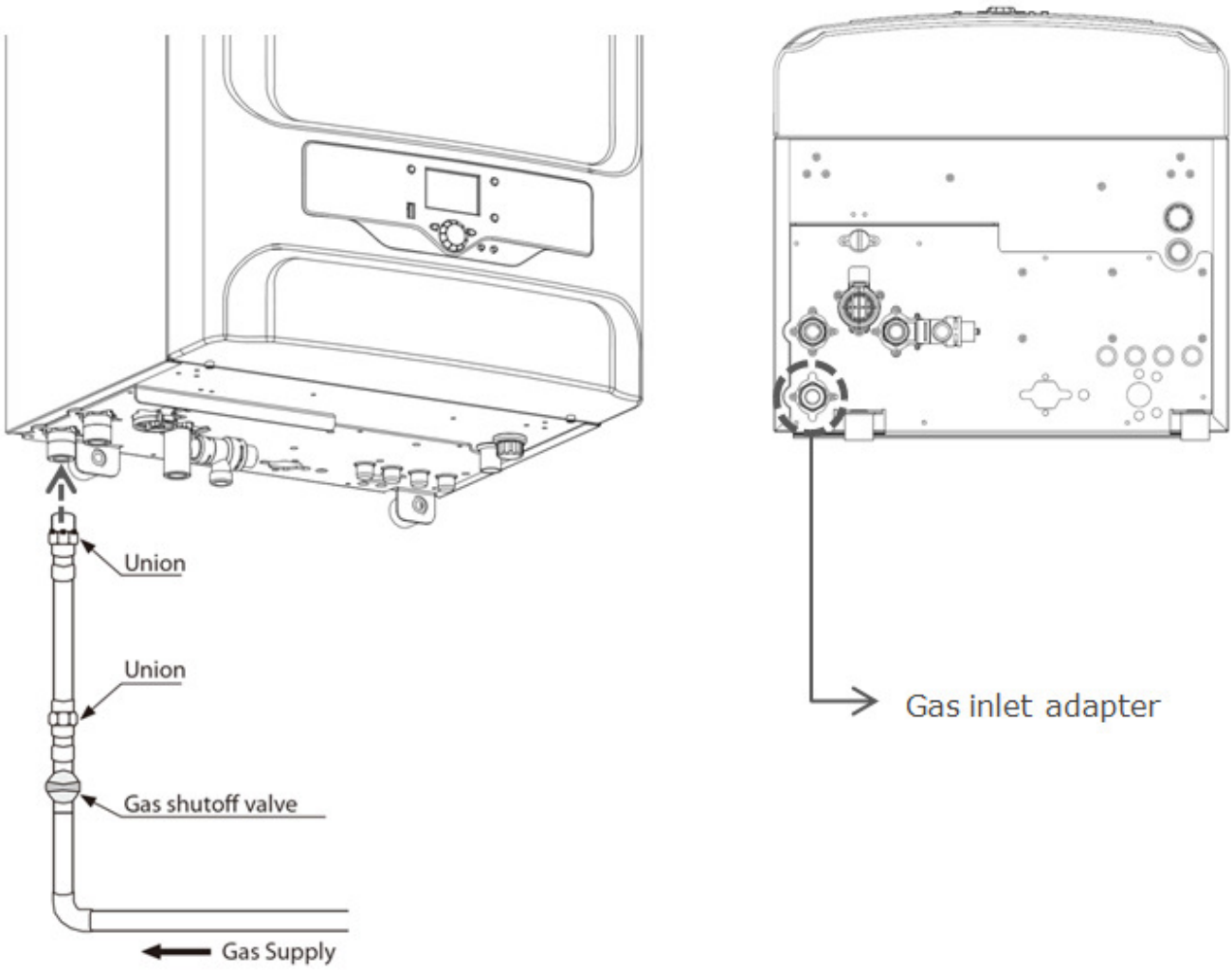


Diagram 4.3 Gas connection

A working gas pressure of 25 mbar inlet pressure for I_{2L}(G25) and 20 mbar for I_{2H}(G20)should be available at the product inlet with the product firing at full rate.

1. Connect the gas supply pipe to the gas inlet adapter located at the bottom of the appliance.

2. Check for gas leaks.

3. Valve kit for external connections. Each boiler is supplied with an Navien Valve Kit for each external connection. Please refer to the installation instructions within the valve kit packaging.

WARNING

After completing installation, the gas pipes must be checked for leaks and purged as described in the standards. Gas leaks may cause an explosion that induces serious harm or property damage. When purging, open all doors and windows, and extinguish cigarettes, pipes or any other naked lights.

4.6 Heating system connection

This product is designed for connection to open vented wet central heating systems and sealed systems in accordance with the manufactures specification.

The flow connection is situated at the bottom side of the unit. The return connection is situated to the right of the flow connection. Refer to Diagram 4.4

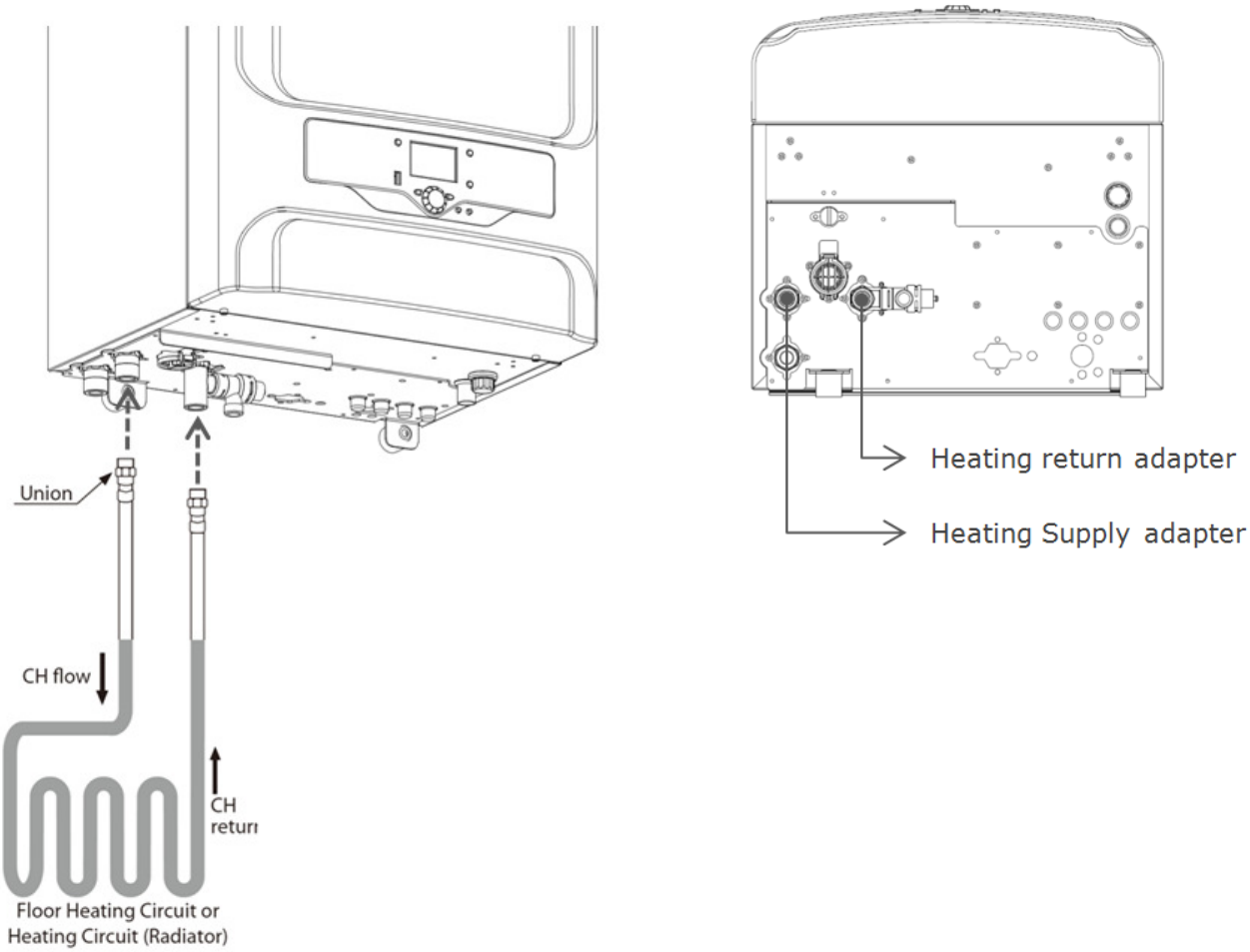


Diagram 4.4: Flow and Return connections

4.7 Pressure Reilef Valve

The pressure relief valve is set at 3 bars, therefore all pipe work, fittings, etc. Should be suitable for pessures over 3 bars and temperature in excess 100℃

The pressure relieve valve connects to 15 mm copper pipe. It should run continuously downward, and discharge outside the building preferably over drains. It should be routed in such a manner that no hazard occurs to occupanents or causes damage to wiring or elecerical components. The end of the pipe should terminate facing down and towards the wall.

The discharge must not be above a window, entrance or other pubic access. Consideration must be given to the possibility that boilng water/steam could discharge from the pipe.

4.8 Flue system preparation

Adapter or connection methods vary depending on the type of flue system (concentric type or separate type). Follow the following instructions carefully.

4.8.1 For a concentric flue system

Each concentric flue system kit includes an adapter, as shown in the figure, which helps connect the appliance to the flue system.

Assemble the components and seals as shown in the figure.

1. Connect the flue adapter to the appliance.
2, Connect the flue of the flue system side to installed adapter.

4.8.2 For a separate flue system

Each separate flue system kit includes an adapter, as shown in the figure, which helps connect the appliance to the flue system.

Assemble the components and seals as shown in the figure.

· Flue Outlet

1. Install the flue adapter to the appliance.
2. Connect the flue bend to the adapter and seal.

· Air Intake

1. Remove the blanking plate.
2. Connect the flue adapter to appliance. (The adapter comes with this appliance,)
3. Connect the flue bend to the adapter and seal.

WARNING

The exhaust gas ducts must not come in to contact with or be located close to combustible materials and must not pass through building structures or walls made of combustible materials.

When replacing an old appliance, the flue system must be changed.

Important

Before fitting the flue turret fill the condensate trap within the product by pouring a large cupful of water into the flue outlet. Take care to ensure that the water is only poured into the flue outlet and does not spill into the product casing.

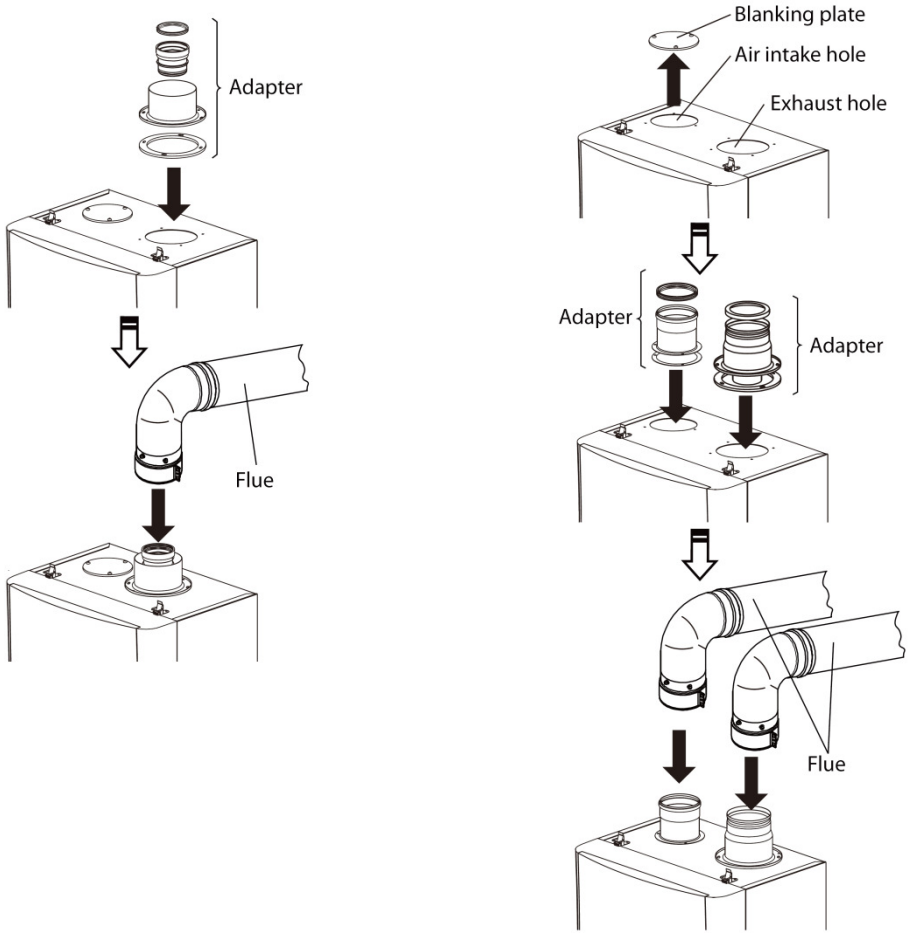


Diagram 4.5 Flue Assembly

4.9 Electrical Connection

4.9.1 General

The product must be installed by a competent KD NAVIEN trained electrician.

1) The fuse rating of the securable isolator shall be 13A

2) A mains supply of 230 V ~ 50 Hz is required.

3) All proprietary external controls and mains wiring must be suitable for mains voltage.

4) Wiring from the securable isolator to the product shall be 3 core PVC insulated flexible cord not less than 1.5 mm^2 .

5) The electrical connection to the appliance shall be provided by means of a dual pole (live and neutral) 30mA RCD protected supply. Where available the appliance shall be installed on a spare way in the RCD protected side of the consumer unit.

6) Mains wiring external to the product must be in accordance with the current BS 7671 Requirements for Electrical Installation (Wiring Regulations) and any local regulations.

7) Connection must be made in a way that allows complete isolation of the electricity supply – a double pole switch having a 3 mm contact separation in both poles serving only the product and system controls. The manual isolation switch shall be capable of being secured in the 'off' (isolated) position; this switch is to be located in an accessible position within the Customer's installation.

8) Connection to the mains MUST be made in accordance with EN50438 and National Regulations such as 'ER G83/1 – Recommendations for the connection of Small-Scale Embedded Generators (SSEG) in parallel with public low-voltage distribution networks'.

9) The Distribution Network Operator (DNO) must be provided with information regarding the SEG ESQS Guidance notes, installation on the day of commissioning – An example of the SSEG Installation and commissioning confirmation form is shown in Table 11

10) The following information shall be displayed at the point of interconnection with the DNO's Network;

    a. A circuit diagram showing the circuit wiring, including all protective devices, between the product and the DNO's fused Cut-Out. This diagram should also show by whom all apparatus is owned and maintained.
    b. A summary of the protection settings incorporated within the equipment. This can be found in the KD NAVIEN Installers Paperwork Pack.

11) The installer shall provide labelling at the Supply Terminals (Fused Cut-Out), meter position, consumer unit and at all points of isolation within the Users premises to indicate the presence of a micro-CHP unit. An example of the warning label to be left on site is shown is Diagram 4.6.

For indication of the required method of connection, refer to Diagram 4.7 – product connection to the LV system through a dedicated radial final circuit.

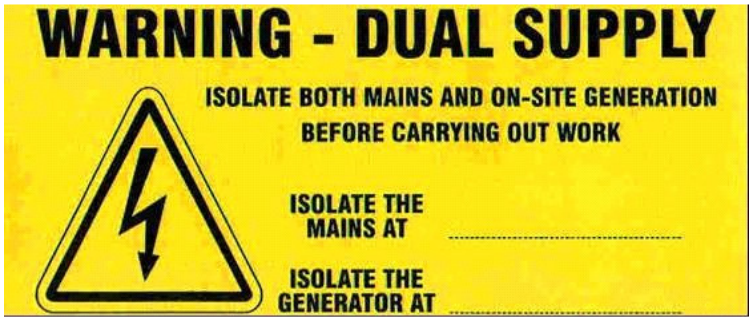


Diagram 4.6 Example of warning label for on-site generation

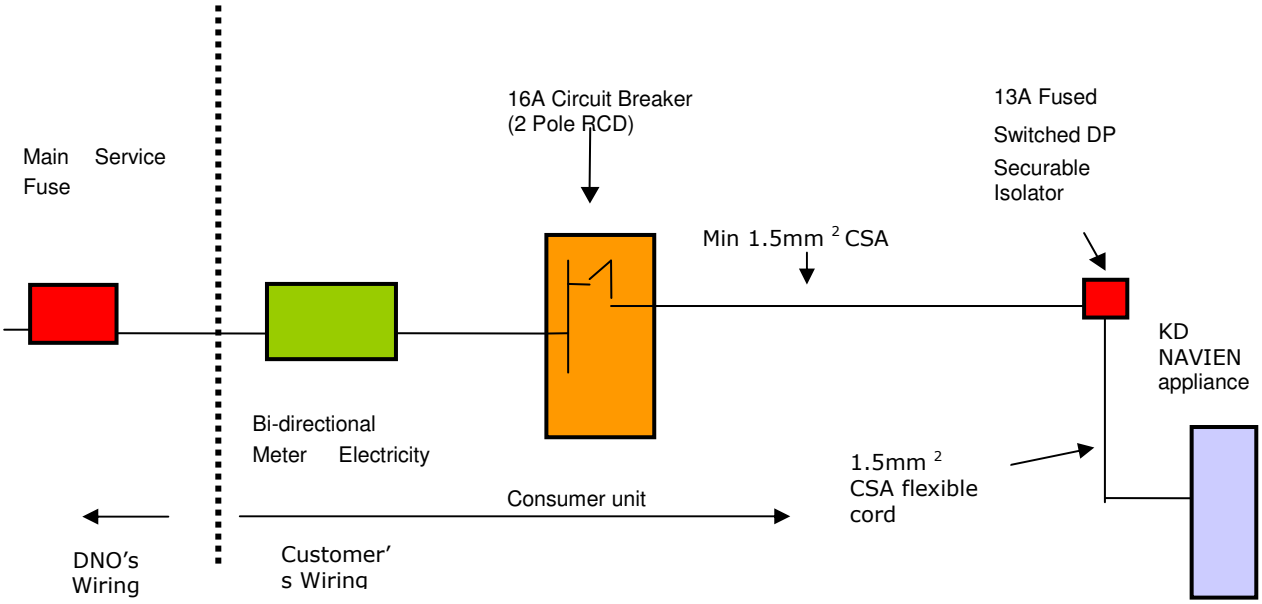


Diagram 4.7 KD NAVIEN product connection through a radial final circuit

4.9.2 Appliance Loom Schematic Diagram

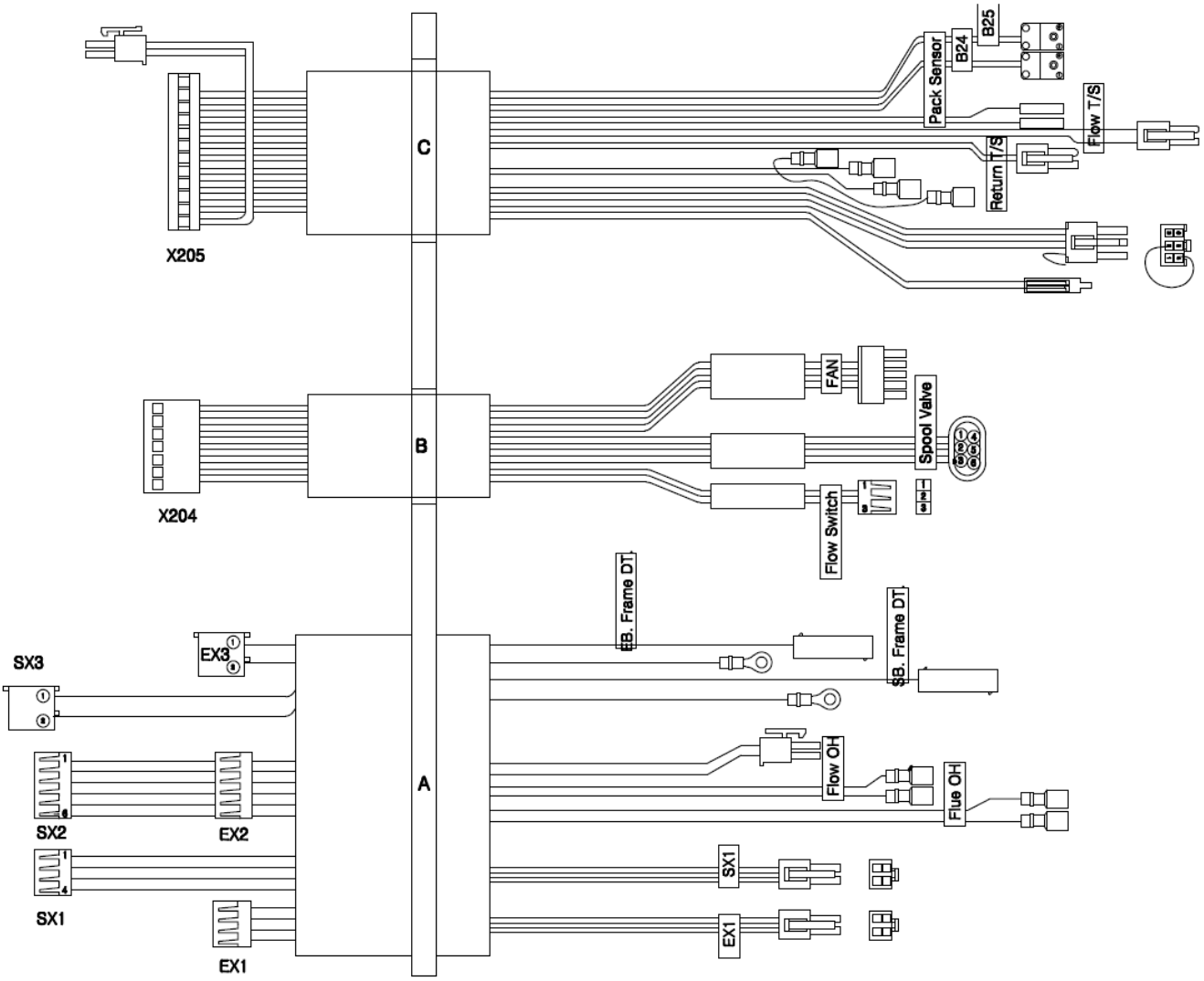


Diagram 4.8a: NCM-1130HH Loom Schematic Diagram

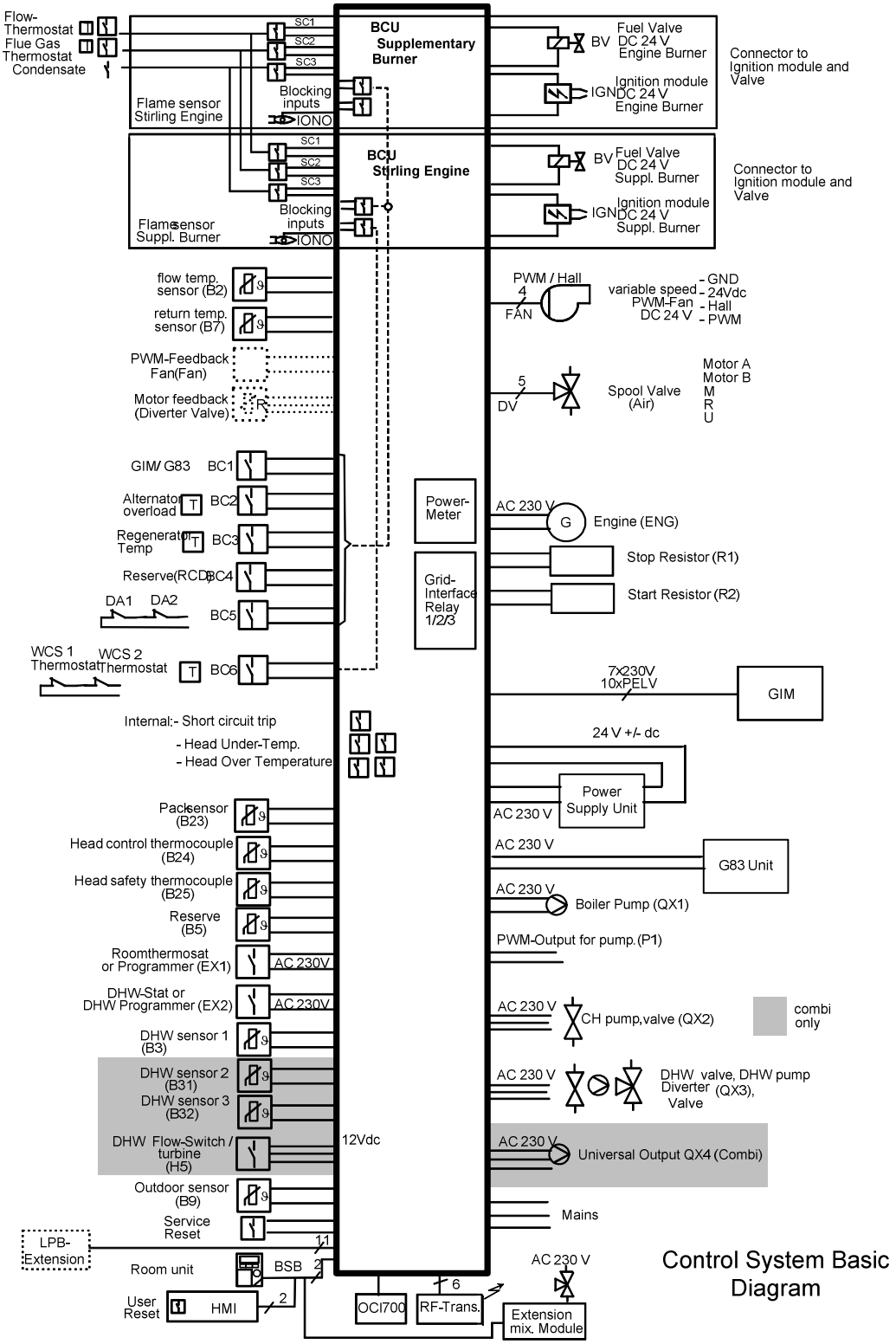
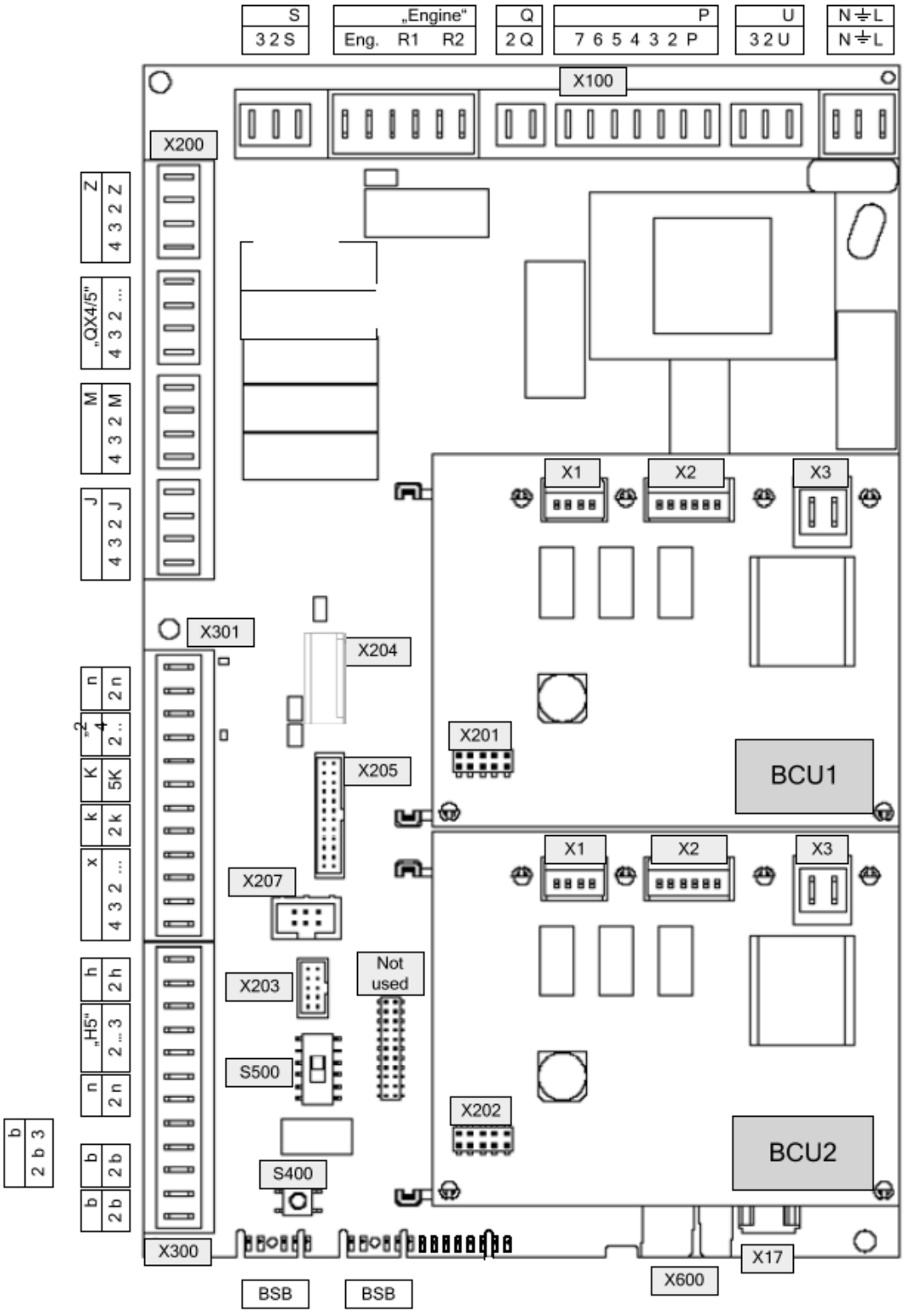


Diagram 4.8b: NCM-1130HH Loom Schematic Diagram



BCU1 Engine BCU
BCU2 Supplementary BCU

X 100

	Use	Terminal
L ⏚ N	Grid Line AC 230 V basic unit Grid Protective earth Grid Neutral conductor	L ⏚ N
N ⏚ L	G83 / ENS G83 / ENS Protective earth G83 / ENS	U 2 3
L ⏚ N L N ASP- ASP+	GIM Line GIM Protective earth GIM Neutral conductor GIM Islanded Line GIM Islanded Neutral conductor Alternator Start Pulse Ref. Alternator Start Pulse Signal	P 2 3 4 5 6 7
NA LA	Power Supply Unit Neutral conductor Power Supply Unit Line	Q 2
 R2 R1 Engine	Start Resistor 1 Start Resistor 2 Stop Resistor 1 Stop Resistor 2 Engine 1 Engine 2	"Engine" 2 3 4 5 6
N ⏚ QX1	Neutral conductor Protective earth Boiler pump	S 2 3

X200

	Use	Terminal
QX2a N ⏚ QX2b	1st heating pump / valve opening Neutral conductor Protective earth 1st heating circuit valve closing	Z 2 3 4
QX4a QX4b	Multifunction Output / valve opening Valve closing Don't connect Don't connect	F 2 3 4
QX3a N ⏚ QX3b	DHW charging pump / diverting valve Neutral conductor Protective earth diverting valve	M 2 3 4
EX1 La EX2 La	Input Programmer (230 V) Phase AC 230 V Input Programmer (230 V) Phase AC 230 V	J 2 3 4

X301

	Use	Terminal
M P1	Ground PWM output	n 2
M 24V	Ground DC 24 V Supply	"24" 2
AOL	Alternator Overload Ref. BC4 Alternator Overload Signal BC4	K 5
M B9	Ground Outside sensor	k 2
M BX4 (B31) M BX5 (B32)	Ground DHW sensor 2 Ground DHW sensor 3	x 2 3 4

X300

	Use	Terminal
M BX3(B3)	Ground DHW sensor 1	h 2
12V H4(H5) M	Sensor Supply DC 12 V Signal Input H4 (Flow Switch Signal) Sensor Ground	3 "H5" 2
M BX6(B5)	Ground Reserve sensor	N 2
G+ CL- CL+	Room unit power supply 12 V[1)] BSB ground BSB data	3 b 2
CL- CL+	BSB ground BSB data	b 2

	Use	Terminal
1A	24 VDC Permanent	X203
1B	24 VDC Switched / Charging	X203
2A	Battery switch on command	X203
2B	24 VDC GND	X203
3A	Customer Socket Enable	X203
3B	Grid Isolation Relay / AVC Enable	X203
4A	Alternator Start Pulse Enable	X203
4B	Black Start Button	X203
5A	Over Voltage Trip 24 V BC1 [Blocking Chain GIM]	X203
5B	Over Voltage Trip Signal (N/O) BC1 [Blocking Chain GIM]	X203
1A	Signal Input H1	X204
1B	Supply Sensor U12V (or 5V)	X204
2A	Signal GND	X204
2B	Signal Input H3 (Water pressure or Flow Switch[2)])	X204
3A	Spool Valve Feedback U	X204
3B	Spool Valve Feedback R	X204

	Use	Terminal
4A	Spool Valve Feedback M	X204
4B	Spool Valve Output DV1	X204
5A	<spare>	X204
5B	Spool Valve Output DV2	X204
6A	Variable Speed PWM Fan GND	X204
6B	Variable Speed PWM Fan Supply 24 VDC	X204
7A	Variable Speed PWM Fan, Hall Feedback	X204
7B	Variable Speed PWM Fan, PWM Output	X204
1A	Control Signal for Relay Contacts Signal BC1	X205
1B	{Blocking Chain G83/ ENS }	X205
2A	Control Signal for Relay Contacts Ref. BC1	X205
2B	{Blocking Chain G83/ ENS }	X205
3A	Engine Dome Overtemp. Ref. BC2	X205
3B	Engine Dome Overtemp. Signal BC2	X205
4A	Regenerator Temp. Ref. BC3	X205
4B	Regenerator Temp. Signal BC3	X205
5A	Dynamic Absorber 1+2 24 V BC5	X205
5B	Dynamic Absorber 1+2 Signal BC5	X205
6A	Water Cooled Seal 1+2 24 V BC6	X205
6B	Water Cooled Seal 1+2 Signal BC6	X205
7A	Engine Power On LED GND (Option)	X205
7B	Engine Power On LED (amber) (Option)	X205
8A	Return Temperature Sensor B7 GND	X205
8B	Return Temperature Sensor B7 Signal	X205
9A	Flow Temperature Sensor B2 GND	X205
9B	Flow Temperature Sensor B2 Signal	X205
10A	Pack Sensor GND BX7 (B23)	X205
10B	Pack Sensor Signal BX7 (B23)	X205
11A	Safety Thermocouple Signal B25	X205
11B	Control Thermocouple Signal B24	X205
12A	Safety Thermocouple Ref. B25	X205
12B	Control Thermocouple Ref. B24	X205
	Universal Sensor Input GND BX2	
	Universal Sensor Input Signal BX2	
1	GND	X207
2	VCC / U_IN	X207
3	TXD / RXD	X207
4	RXD / Data	X207
5	LED	X207
6	Service / Button	X207
1	BSB Power supply 12 V	X600
2	BSB data	X600
3	BSB ground	X600
4	BSB Service Ident Pin	X600
1	BSB GND (HMI)	-
2	BSB Signal	-
3	BSB Supply 12 VDC	-
4	BSB Service Ident	-
5	BSB n.c.	--

	Use	Terminal
1	Gas Valve Signal 24 V	X1
2	Gas Valve GND	X1
3	Ignitor GND	X1
4	Ignitor Signal 24 V	X1
1	Condensate Ref.	X2
2	Condensate Signal	X2
3	Flow OH, Combi OH Ref.	X2
4	Flow OH, Combi OH Signal	X2
5	Flue OH Ref.	X2
6	Flue OH Signal	X2
1	Ionisation GND	X3
2	Ionisation Signal	X3

Diagram 4.8c: NCM-1130HH Loom Schematic Diagram

4.9.3 Accessing the Controller Assembly

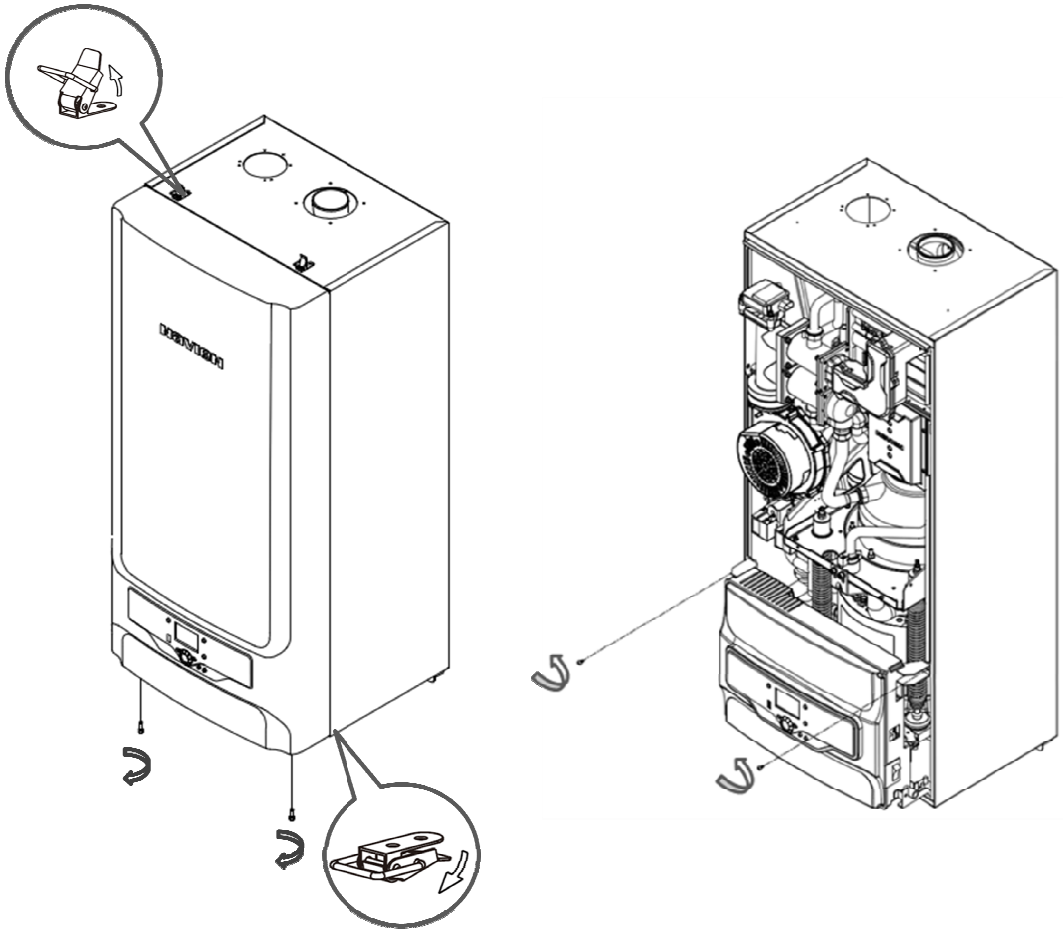
1. Remove the 2 screws from the bottom of the appliance.

2. Unlatch all the clips, and pull up the hooks (2 on the top and 2 on the bottom of the appliance).

3. Lift off the front panel from the wall mounted unit.

4. Remove the 3 screws on the underside of the controller assmbly, then pull the controller assmbly downward.

5. Remove the screw on the controller cover.
   Before removing the controller cover, disconnect white edge connector socket of the FASCIA CONTROLLER on the edge of the FASCIA CONTROLLER PCB inside the controller cover and sliding it off the PCB by hand. Push the connector away from the PCB edge to release it.



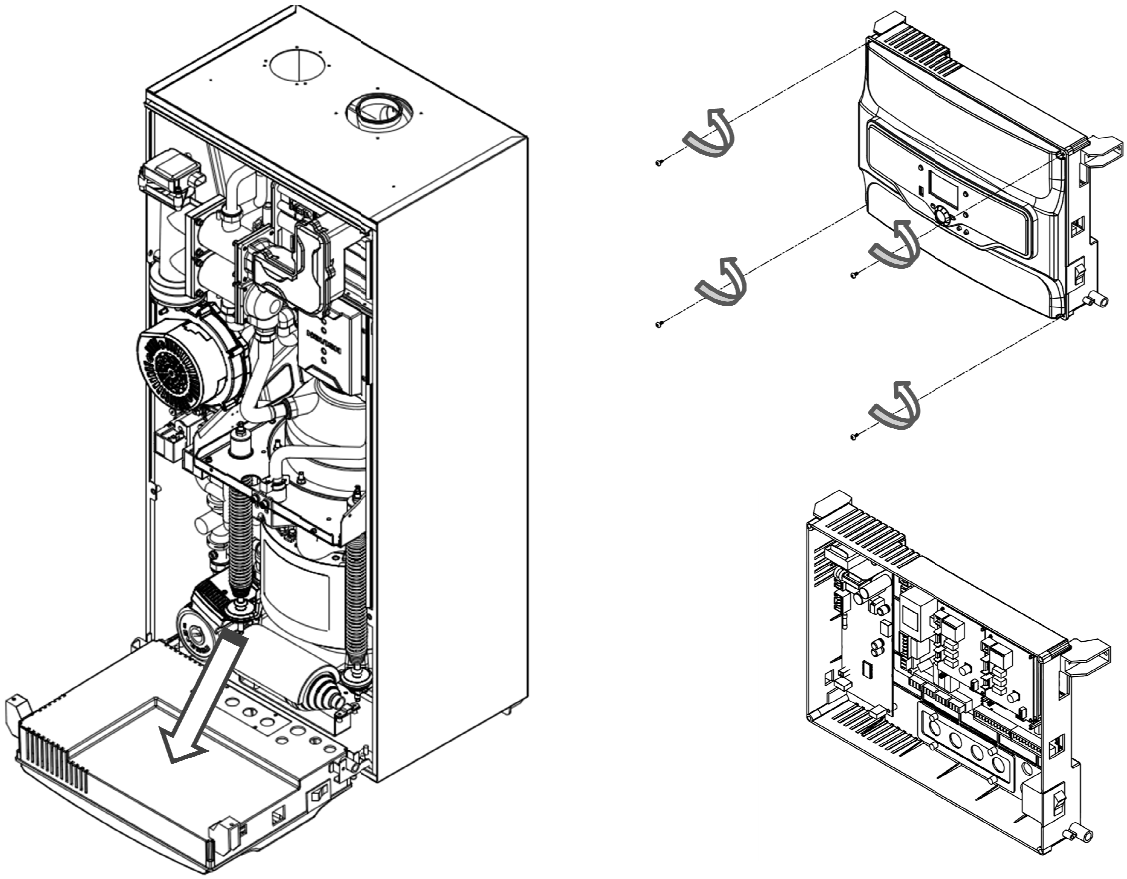


Diagram 4.9 Accessing the Controller Assembly

4.9.4 Accessing All the Electricity Connections

DANGER

Isolate the main electrical supply before starting any work and check all relevant safety precautions

Note

Short circuiting risk: When connecting the cables, ensure that no pieces of cable fall into the electrical and electronic connections.

1. Release cap "A" of the grand cable which is located at the bottom of the appliance.

2. Remove the black silicone tube "B" from the cable gland.

3. Insert wire "C" into cap "A" and the silicone tube "B".

4. Insert the prepared cable into the cable gland, put the cap back on, and secure

Important

· Please ensure the all eletrical connections are tight and secure.

· This unit must be earthed.

Note

· The appliance is designed with an IPX4D protection rating.

· The main supply to the boiler must be connected through a double pole isolator situated local to the appliance. The isolator must have a minimum contact separation of 3mm acros all poles.

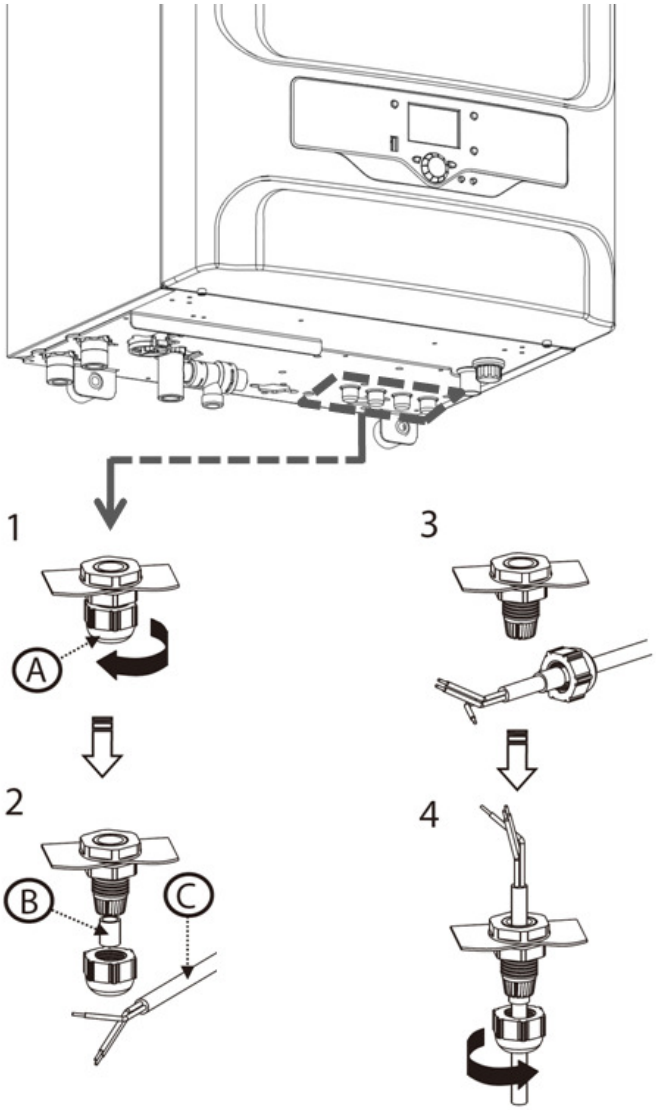


Diagram 4.10 Accessing the electricity Connections

4.9.5 KD NAVIEN external control options

The KD NAVIEN appliance may be configured for use with wired and wireless external controls which are manufactured by SIEMENS.

The wired option requires connections to be made inside the appliance controls enclosure for each wired device. Wired devices take their power from the appliance.

The wireless option requires only a single transceiver to be wired into the controls enclosure. External wireless control devices communicate with the transceiver by radio and are either powered from batteries or separate low voltage power adapters.

For some installations a combination of wired and wireless devices may be appropriate.

The list below details the external control devices available. Further technical details of each device may be found in the appendices and on the information sheets supplied in the device packaging.

Note
It is recommended that you familiarise yourself with the capabilities of the control devices prior to installing and configuring the control options.

Select one of the following room comfort control options:

a) Wired basic room temperature controller QAA55.110

b) Wired sophisticated room unit QAA75.610 (unlit) or QAA75.611 (with backlight)

c) Wireless sophisticated room unit (remote control)* QAA78.610
The room unit is powered by three 1.5 V batteries type AA (LR06)

Select additional control options as required:
d) Wired additional heating zone extension module AVS75.390
e) Wired outside temperature sensor QAC34
f) Wired DHW temperature sensor(s) QAD36 (strap-on) or QAZ36 (immersion)
g) Wireless outside temperature sensor * AVS13.399
Power is supplied by two 1.5 V batteries type AAA (LR03).

* If you use any of the wireless remote control options you will also need to fit a transceiver AVS71.390 to the appliance controls. If you intend to use wireless devices over extended distances from the appliance then you may also need to install a wireless repeater unit AVS14.390 which is powered from a power adapter AVS16.290.

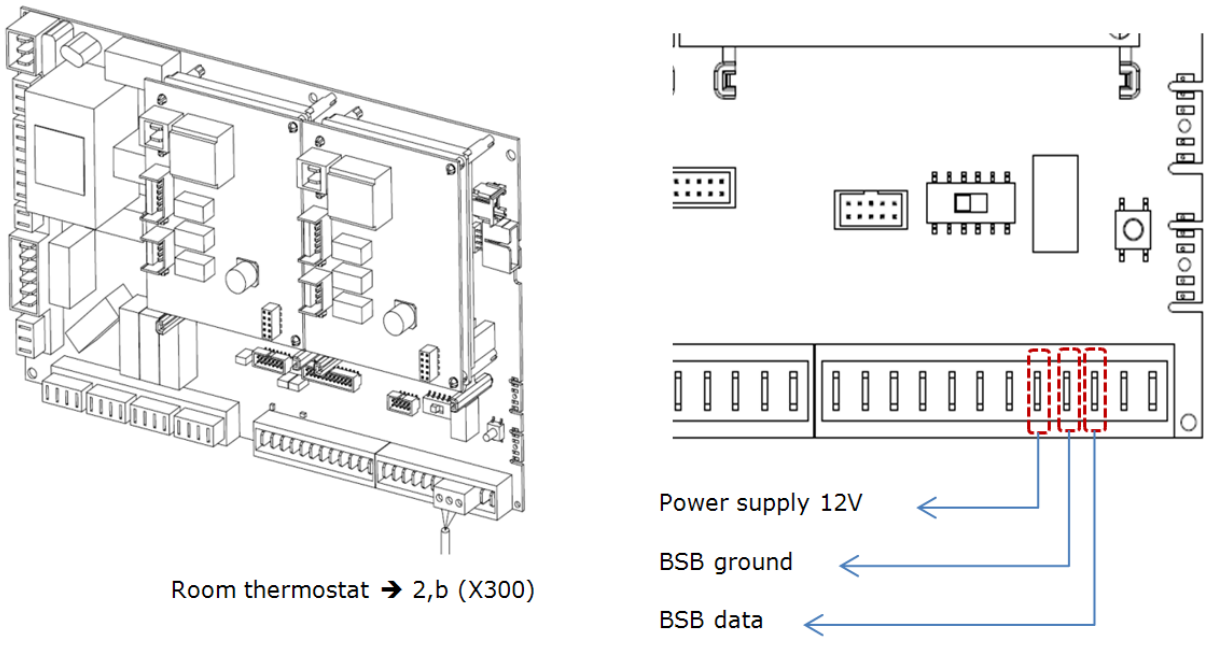


Diagram 4.10 Room thermostat conncetion

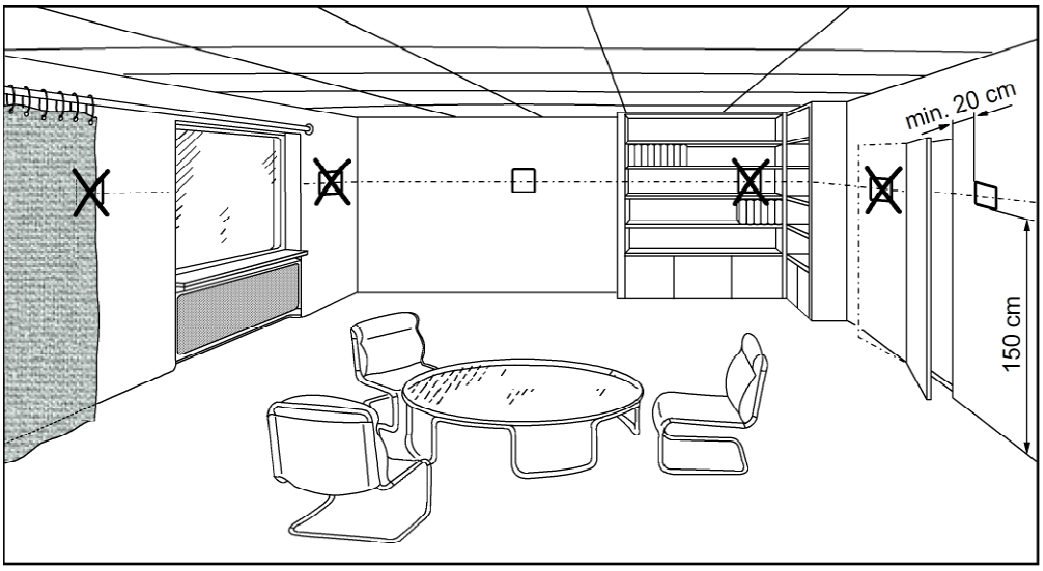


Diagram 4.11 Room thermostat location

4.9.6 Connecting external valve and sensors

The control cables to external 3 way valve and sensors can be connected directly to the appliance.

The appliance is designed to be connected to an outdoor temperature sensor. Connect the cable to 2,k terminals of X301 terminal block.

Important

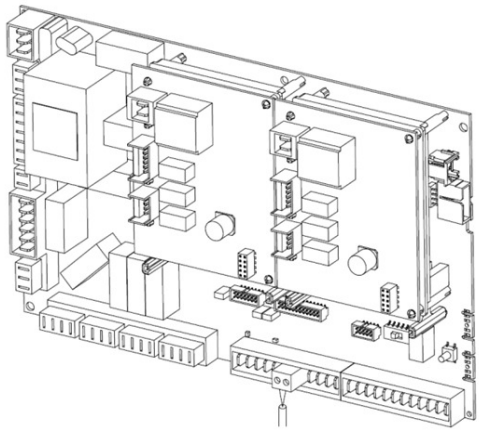
If you use the outdoor temperature sensor, change the parameter No. 750 value to '0'

Connect the external 3way valve (230V/50Hz) to M,2,3 terminals of X200 terminal block and DHW temperature sensor(Resistance of 12kΩ sensor) to 2,n terminals of X300 terminal block.

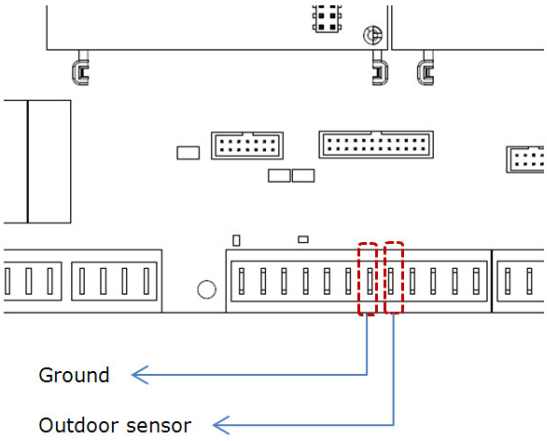
Important

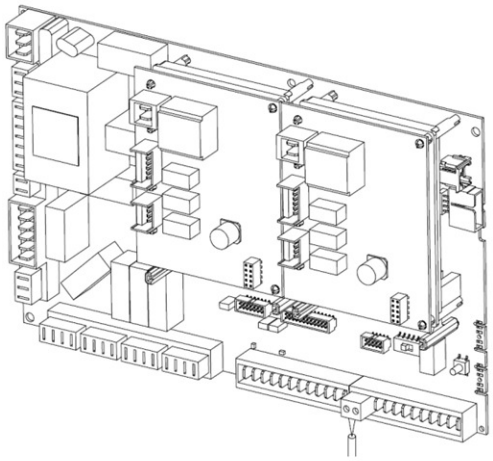
Check the fallowing parameters.

1) Parameter No. 5702 is 'w-plan'
2) Parameter No. 5773 is '3'

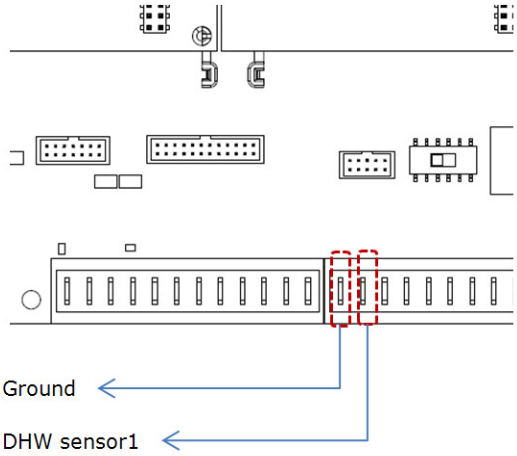


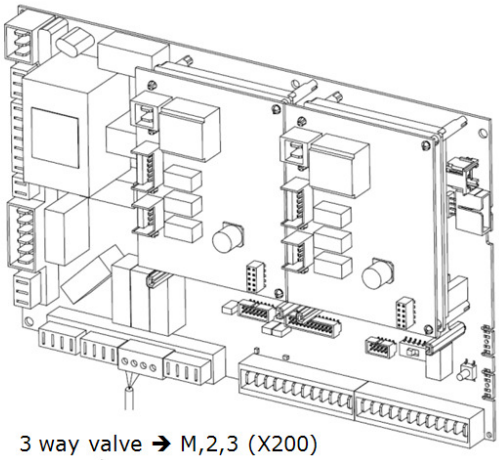
Outdoor sensor ➔ 2,k (X301)





DHW Sensor ➔ 2,h (X300)





3 way valve ➔ M,2,3 (X200)

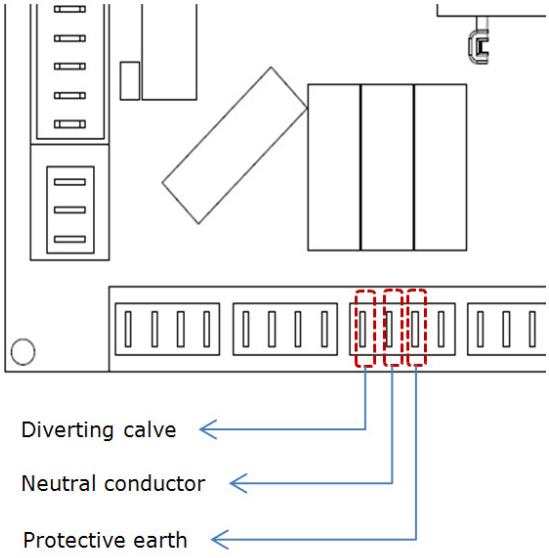


Diagram 4.12: Connecting external valve and sensors

5.0 Commissioning and testing

5.1 Engine Transit Brackets

1) Before commissioning, ensure the transit brackets for the engine should be removed (see Diagram 5.1)
2) Remove the 3 **RED** transit brackets from each side of the engine and from the front
3) All brackets and bolts must be placed safely to one side, as they will be required when the appliance is removed
4) Replace cover.

Note
When removing brackets, additional personal care should be taken.

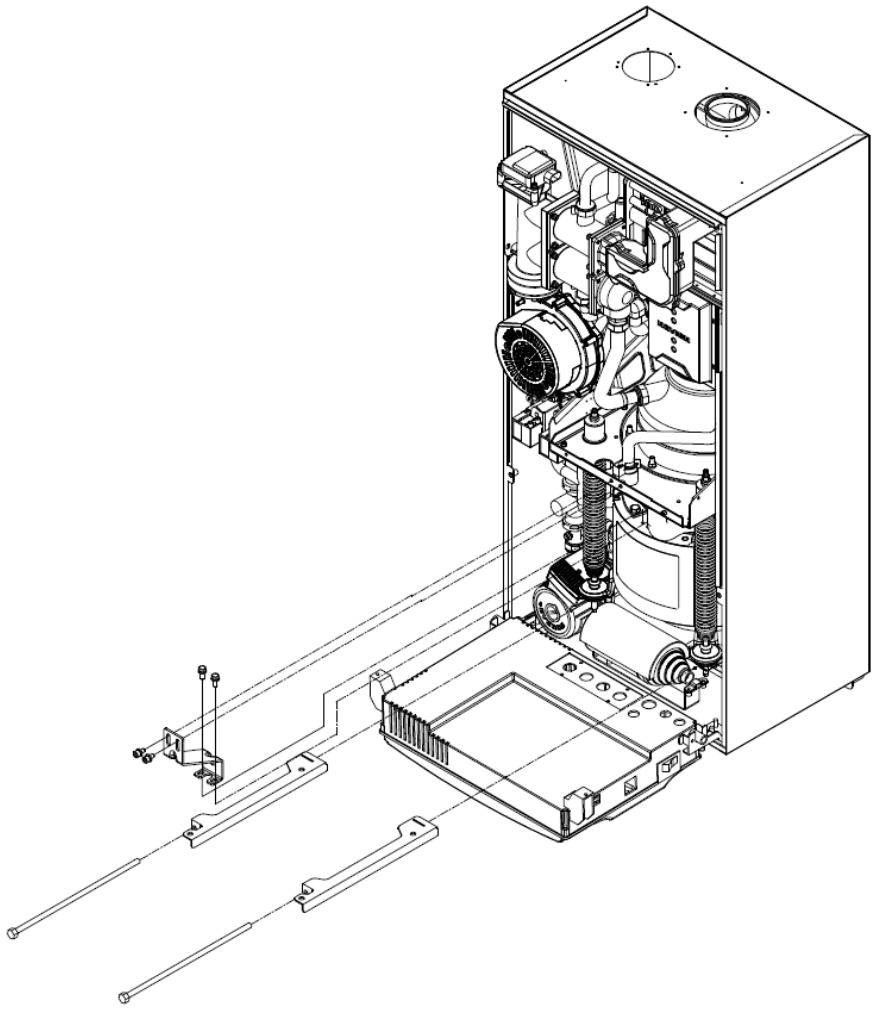


Diagram 5.1 Two side transit bracket (one each side of engine) & one in front

5.2 Electrical Installation

1) Checks to ensure electrical safety should be carried out by a competent trained KD NAVIEN engineer.

2) Always carry out the preliminary electrical system checks i.e. earth continuity, polarity, resistance to earth and short circuit, using a suitable test meter.

3) Complete any local or regulatory requirements such as ER G83/1 Commissioning pro-forma and submit on day of commissioning, an example is shown in table 5.

Table 5 Installation, Commissioning, Confirmation Form (G83/1)

Site Details	
Site address (inc. post code)	
Telephone number	
Customer supply number	
Distribution network operator (DNO)	
Contact Details	
SSEG owner	
Contact person	
Contact telephone number	
Serial number / version numbers of software (where appropriate)	
SSEG rating (A) and power factor (under normal running conditions)	
Maximum peak short circuit and fuel source	
Location of prime mover and fuel source	
Location of SSEG unit	
Location of multi pole isolator	
Installer Details	
Installer	
Accreditation / Qualification	
Address (inc post code)	
Contact person	
Telephone number	
Fax number	
E-mail address	

Information to be Enclosed	
Final copy of system schematic	
SSEG Test Report (Appendix 4) or web address if appropriate	
Computer print out (where possible or other schedule of protection settings	
Electricity meter make and model	
Declaration – to be completed by Installer	
The SSEG installation complies with the relevant sections of Engineering Recommendation G83/1.	
Protection settings have been set to comply with Engineering Recommendation G83 or EN 50438	
The protection settings are protected from alteration except by prior written agreement between the DNO and the Customer or his agent.	
Safety labels have been fitted in accordance with section 6.1 of Engineering Recommendations G83/1.	
The SSEG installation complies with the relevant sections of BS 7671 and an installation test certificate is attached.	
Comments (continue of separate sheet if necessary).	

Name:	**Signature:**	**Date:**

5.3 Gas Installation

1) The whole of the gas installation, including the meter, should be inspected and tested for soundness and purged in accordance with the current regulations and recommendations.

WARNING

Whilst affecting the gas soundness test and purging air from the gas installation to a safe location, extinguish naked lights and do not smoke.

5.4 Filling the central heating circuit.

1) The instructions below relate to open vented systems, for sealed systems refer to the sealed system manufacturing instructions

2) Ensure that all system valves are open.

3) Fill and vent the system and product. An air vent is fitted to the supplementary heat exchanger flow pipe. Use the vent hose enclosed appliance package.

WARNING

WHEN VENTING THE PRODUCT USING THE AIR VENT ON SUPPLEMENTARY HEAT EXHANGE ENSURE THAT SUITABLE CARE IS TAKEN SO THAT WATER DOES NOT FALL ONTO THE PRODUCT OR CONTROLS.

4) Check for water soundness.

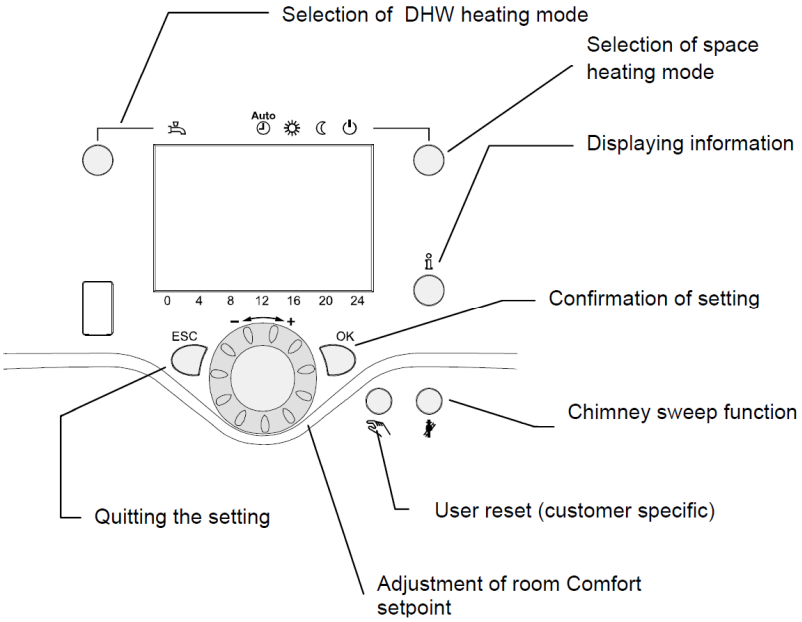
5) Initial system flush ('cold'). The whole of the heating system must be flushed out at least twice: once cold, and once hot.

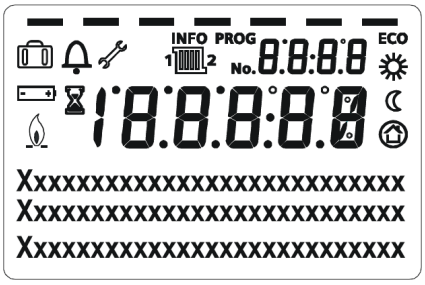
6) Open all radiator or heating valves and the boiler CH service valves and drain the heating system and boiler completely from the lowest points of the system via drain taps (opened full bore to remove any installation debris prior to lighting the boiler).

7) Refill the heating system

5.5 Commissioning the appliance

Photo 5.1 – Facia Control panel (Embedded in appliance front)





- Heating to Comfort setpoint
- Heating to Reduced setpoint
- Heating to frost protection setpoint
- Process running – please wait
- Change battery
- Burner operating (only oil / gas boiler)

- INFO — Info level activated
- PROG — Programming activated
- ECO — Heating temporarily switched off / ECO function active
- Holiday function active
- Reference to heating circuit
- Maintenance / special operation
- Error messages

5.5.1 Starting the appliance

1) Check that all heating system drain cocks are closed and any valves in the flow and return are open.

2) Check that the gas valve is open.

3) Check that the electrical supply is OFF at the securable isolator and the consumer unit.

4) Carry out gas soundness tests on the product

5) Turn on the appliance and use the commissioning function on the programmer. The flue gas sampling point is shown in diagram 5.3

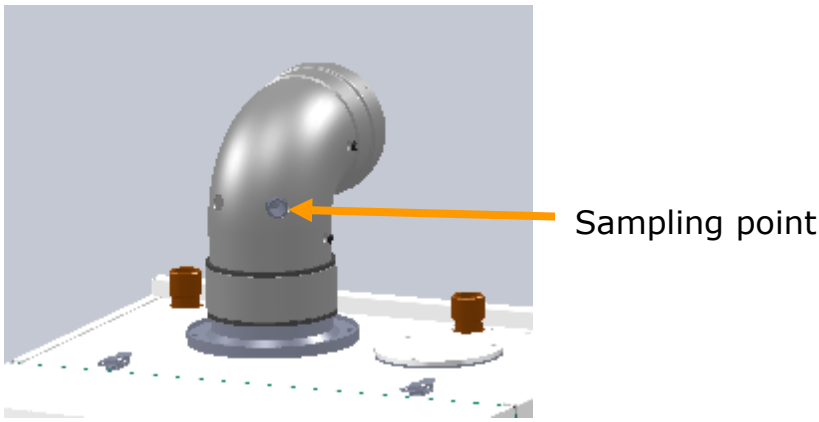
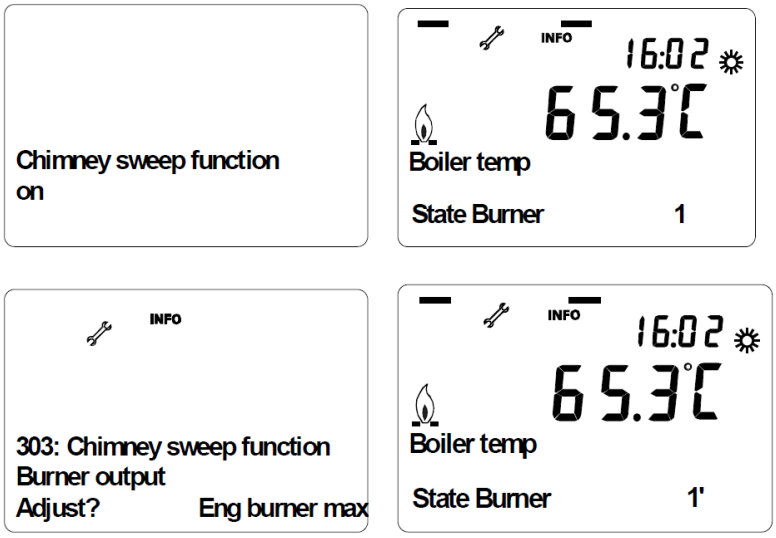


Diagram 5.3 Flue sampling point

5.5.2 Commissioning the burners

Line no.	Operating line
7130	**Chimney sweep function**

If the chimney sweep function is pressed for more than 3 seconds, the controller changes into chimney sweep function mode. The "special mode" symbol appears in the display. Adjustment of the burner output power and selection of burner is possible in the Information-Level.



The burner output power may be adjusted:

- Engine burner minimum firing rate
- Engine burner maximum firing rate
- Supplementary burner minimum firing rate
- Supplementary burner maximum firing rate
- Engine- and Supplementary burner minimum firing rate
- Engine- and Supplementary burner maximum firing rate

The burner will start like in commissioning mode. The head temperature will be controlled to nominal head temperature and the boiler flow temperature will be limited to boiler temperature set point maximum. If the burner output power is limited either by head temperature or boiler flow temperature, this will be indicated with a * next to the burner state indication (e.g.1*)

The engine grid connection functionality may prevent starting of the engine burner. E.g. if the head temperature is too high, it may be necessary to cool down the head before the engine burner is enabled to start.

After 60 minutes, a time out will terminate the chimney sweeper function, it the function is not already terminated by pressing the chimney sweeper button.

1) Using a flue gas analyser, check the products of combustion and ensure they are within the limits stated below;

	Emissions Check	Values
Engine Burner	CO/ CO_2 Ratio	Less than 0.002
Supplementary Burner	CO/ CO_2 Ratio	Less than 0.002

Table 12 CO/ CO_2 ratios

2) If the rates are outside the above details then proceed with the service procedures listed In sections 5.5.3

3) Once service procedures have been completed, re-measure using the procedure as defined in section 5.5.2

4) If CO/ CO_2 ratio is still outside the limits then replace the gas valve with the factory set gas valve.

Note

For more information on the function of the control system please refer to the SIEMENS Controls Manual (RVC32.410 user manual)

5.5.3 Adjusting gas valve for combustion specification

As described on the data plate, this appliance is set for naturnal gas by default. Furthemore, this appliance can be used without adjusting the CO_2.

Subject to the WEBBER INDEX, the CO_2 value fluctuates between 8.7% and 9.3%. The CO_2 value can be measure at the boiler flue adapter test point.

If the actual CO_2 value deviates from the stated ranges by more than 0.5%, check the balanced flue system for leaks.

Check the discharge amount, and adjust the CO_2 value using the following procedures.

1. Connect a flue gas analyzer probe at the flues gas connector on the flue outlet.

2. Open the gas shutoff valve, commission the appliance.

3. Select the minimum rate at Line No. 7211(Engine) and 7216(Supplementary) or Chimney sweep function (see the section 5.5.2). The burners are now set to the minimum rated input. Make sure that you do not operate both Engine and Supplementary burners at the same time when you adjust gas valve.

4. Check the CO_2 value.
   - If the actual value deviates more than 0.5% from the above range, check the seals in the balanced flue system.
   - If the measured CO_2 value is not correct, adjust the gas-air ratio adjustment screw "C" on the gas control valve arter removing the cap on the gas-air ratio adjustment screw "C". Turn it to the right to increase the CO_2 level and turn it to the left to decrease it.

5. Enter actual values in the service report.

6. The following mentioned items are done in conjunction with the checking and adjusting of the CO_2 level.
   6-1. prepare the water column meter or manometer like the figure on the left.

6-2. Wait for around 30 seconds.
6-3. Read the gas-air ratio.

If the gas/air ratio is not between in 0 to -0.1 mbar, you should adjust the adjustment screw "C" on the gas valve.

Note
Maintain the appliance at the minimum rated output while chechking the gas-air ratio with a water column meter or manometer.

7. Select the minimum rate at Line No. 7211(Engine burner), 7216(Supplementary burner) or Chimney sweep function (see the section 5.5.2).
The burners are now set to the maximum rated input.

8. Check the CO_2 value.

Note
If the actual value deviates more than 0.5% from the above range, check the seals in the flue system.

9. Enter the actual values in the service report.

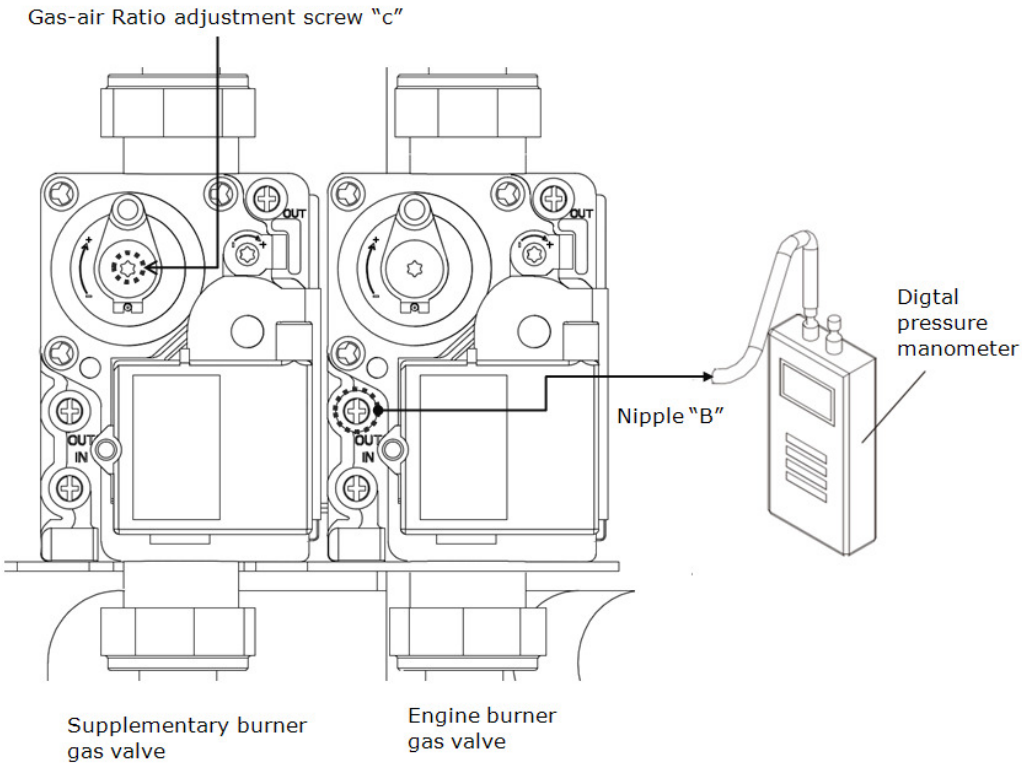


Diagram 5.4 Adjusting the CO_2 Value

5.6 Final checks

5.6.1 Fitting the product casing

1) Engage the casing onto the top panel and fasten the two clamps on the top panel together with clamp.
   Take care not to trap any cables. Secure with the bolts.

2) Remember to plug the facia control lead into the controls enclosure.

5.6.2 General Checks

Make the following checks for correct operation.

1) Turn the product thermostat or controller ON and OFF to check that the burners are lit and extinguished.

2) Check that the programmer and all other system controls function correctly. Operate each control separately and check that the burners respond.

3) Using a suitable analyser check the $C0_2$ level in the air duct. If this exceeds 0.002% check the soundness of the flue seals.

4) Water circulation system.

   a) With the system HOT examine all water connections for soundness.

   b) With the system still HOT turn off the gas, water and electricity supplies to the product and drain down in order to complete the flushing process. This is the final system flush 'Hot'

   c) Refill and vent the system, clear all air locks and again check for water soundness.

WARNING
When venting the product using the air vent on supplementary heat exchanger ensure that suitable care is taken so that water does not fall onto the product or controls.

   d) Balance the system.

5) Complete the KD NAVIEN commissioning form

6) Finally, set the controls to the User's requirements.

5.6.3 Product programmer unit operation

5.6.3.1 General description

The appliance features a control set (AVS37.294) embedded within the case. This is used to set the requirements for the room temperature, central heating flow temperature programmed on and off times for central heating and hot water. The programmer also incorporates controls designed to enhance the efficient use of both the engine and the system.

There are three options to the room thermostat and also an outside temperature sensor;

1) Room Unit QAA55.110 – This is the basic room thermostat and is limited in function.

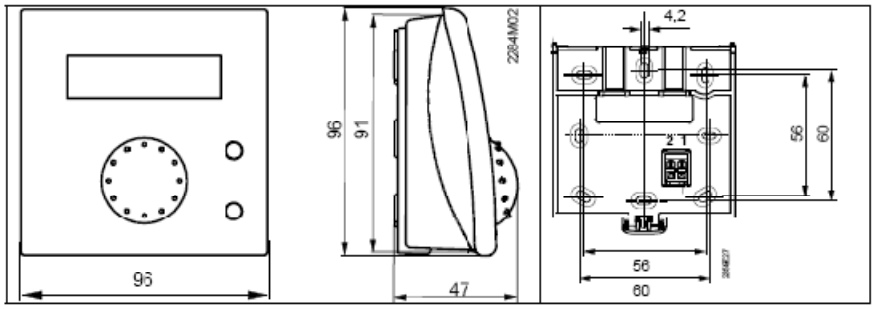


Diagram 5.6.1 Dimensions of room unit QAA55.110

2) Room Unit QAA75 – This is a hard wired fully functional controller and will carry out the same functions as the controller on the front of the appliance.

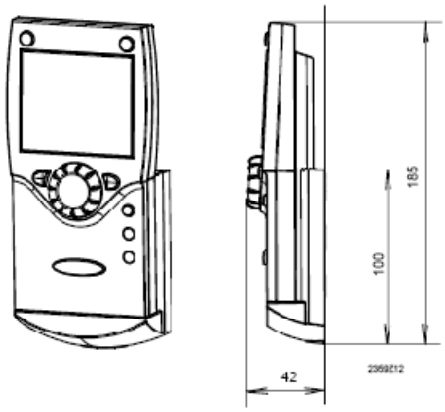


Diagram 5.6.2 Dimensions of room unit QAA75

3) Room Unit QAA78 – This is the wireless option which carries out the same function as unit QAA75. To enable the wireless unit to be received by the KD NAVIEN, the appliance requires a radio module AVS71 connected to the appliance (see diagram 5.6.4)

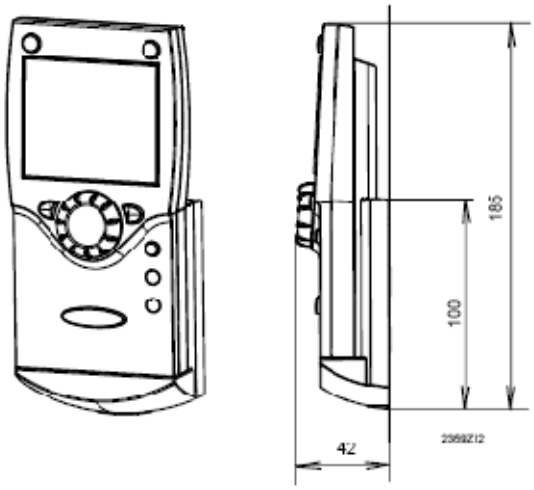


Diagram 5.6.3 Dimensions of room unit QAA78

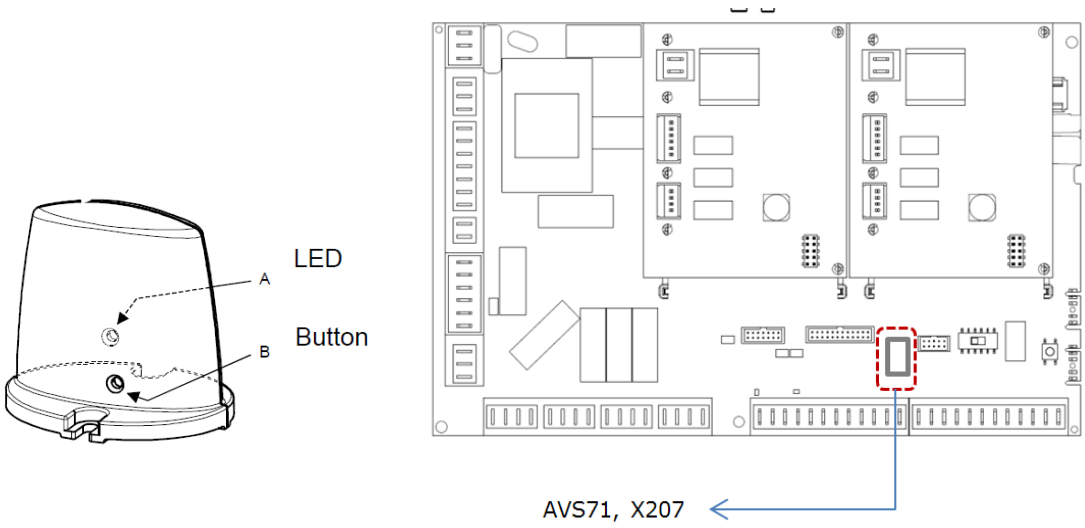
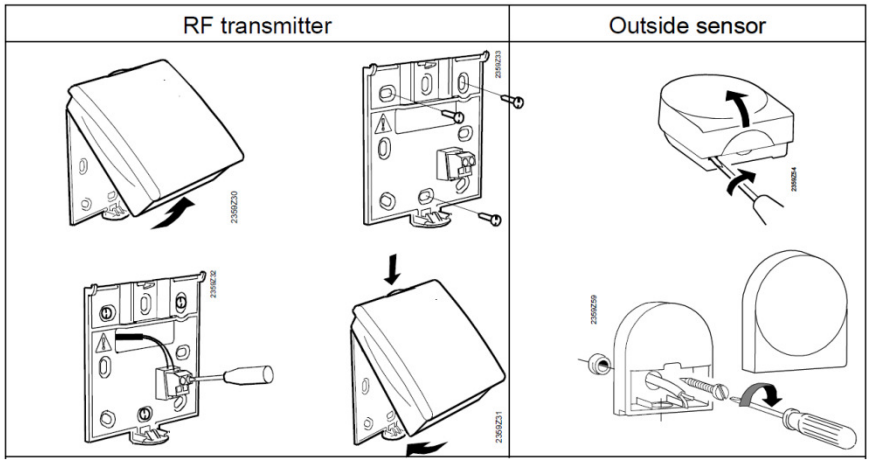


Diagram 5.6.4 Radio transmitter AVS71

4) Wireless outside sensor AVS13.399 – In conjunction with the room unit an outside sensor can be utilised. If required a radio repeater AVS14.390 can be used to relay the signal.



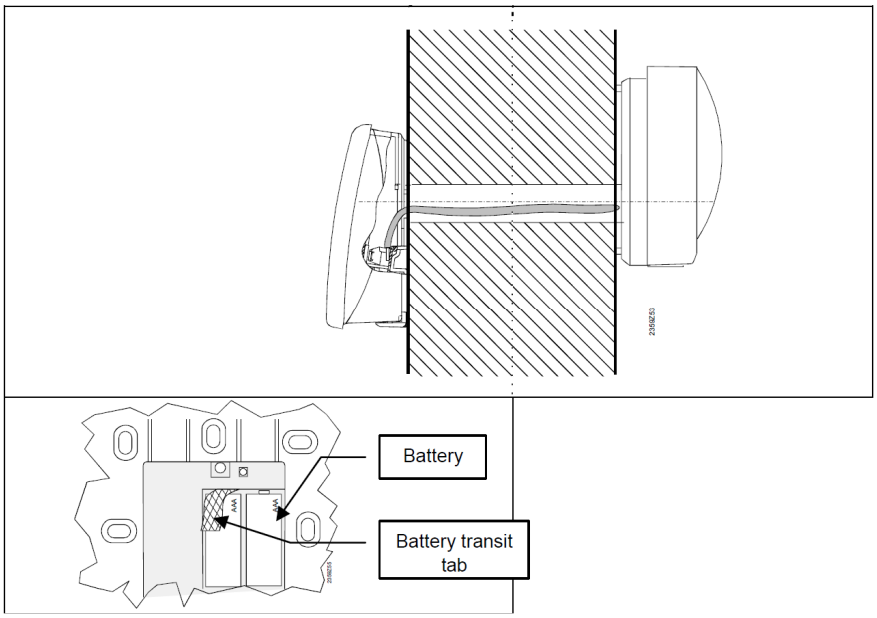


Diagram 5.6.5 Wireless outside sensor AVS13.399

5.6.3.2 Setting time and day

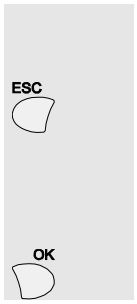
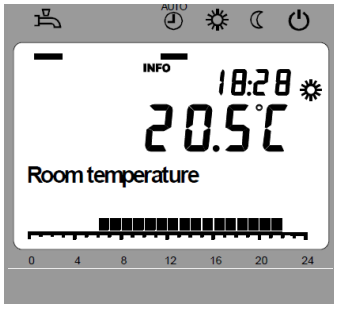
Setting principle

Settings that cannot be made directly with the help of operating elements are made through programming. For this purpose, the individual settings are structured in the form of operating pages and operating lines, thus forming practical groups of settings.
The following example which shows the setting of the time of day and date shall explain this.

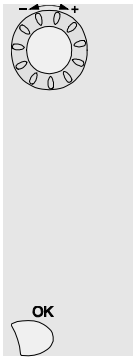
Example "Setting the time of day"

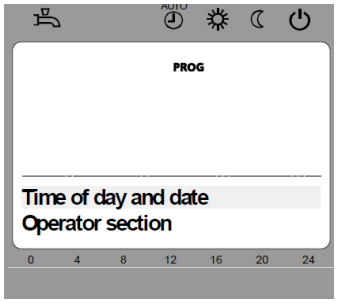
Note

- When pressing the ESC button, you go one step back; adjusted values will not be adopted
- If no setting is made for 8 minutes, the unit will automatically return to the basic display
- Operating lines may be hidden, depending on the type of unit, the configuration and user level

	Operation	Display example	Description
1			The basic display is shown. If the basic display is not selected, press the ESC button. Press the OK button

2

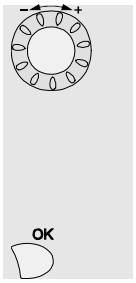




The bottom section of the display shows a number of operating pages.
Turn the setting knob until operating page "Time of day and date" appears.

To confirm, press the OK button.

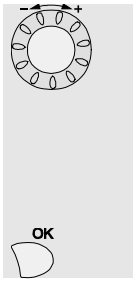
3

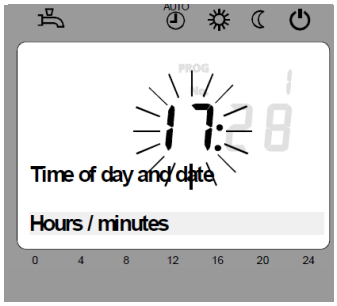


In the bottom section of the display, the first operating line of operating page "Time of day and date" appears.
Turn the setting knob until operating line "Hours / minutes" appears.

To confirm, press the OK button.

4

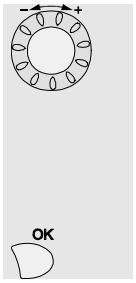


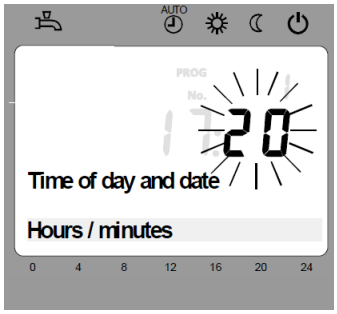


The display shows the hours flashing.
Turn the setting knob until the hours of the time of day are correct.

To confirm, press the OK button.

5

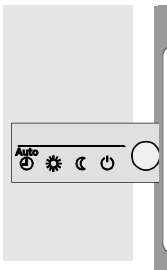


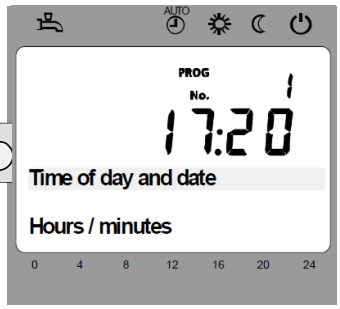


The display shows the minutes flashing.
Turn the setting knob until the minutes of the time of day are correct.

To confirm, press the OK button.

6

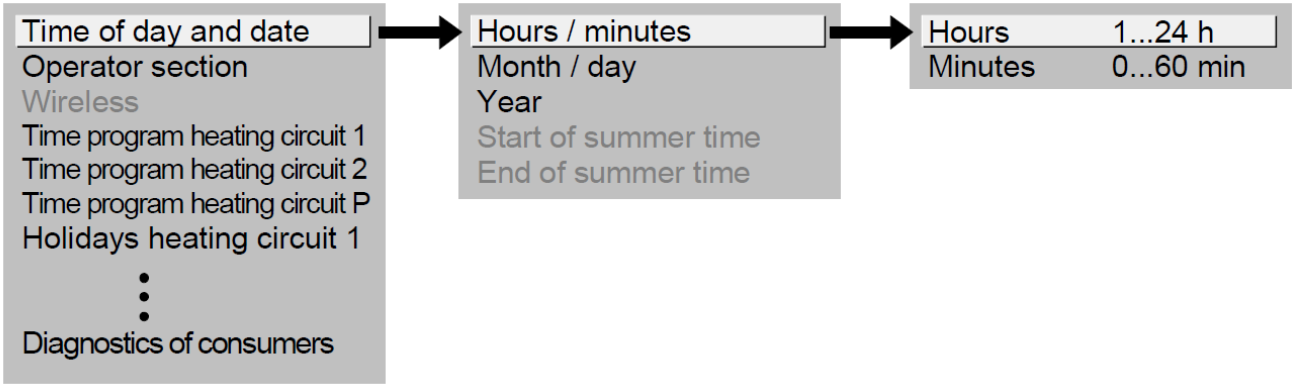




The settings are saved, the displays stops flashing.
You can continue to make other settings, or
you press the operating mode button to return to the basic display.

7

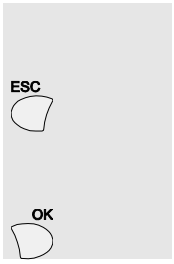
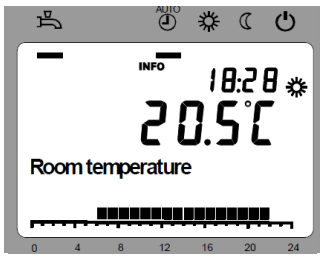
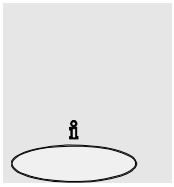
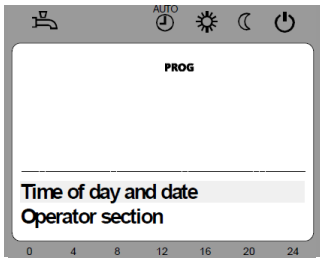
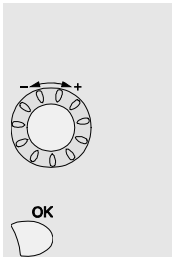
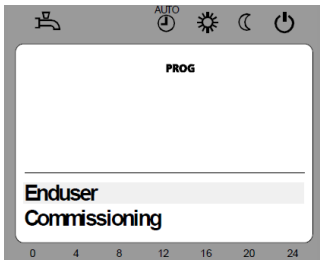
Now, you have returned to the basic display.



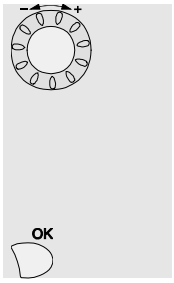
Example of menu structure

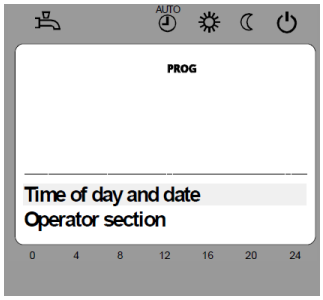
5.6.3.2 User Levels

Certain user levels only allow certain user groups to make settings. To reach the required user level, proceed as follows:

	Operation	Display example	Description
1			You see the basic display. If the basic display is not shown, press the ESC button to return to it. Press the OK button:
2			You are on user level "Enduser". Press the Info button for 3 seconds.
			You are given a choice of user levels. Turn the setting knob until the required user level is reached. Press the OK button.

3



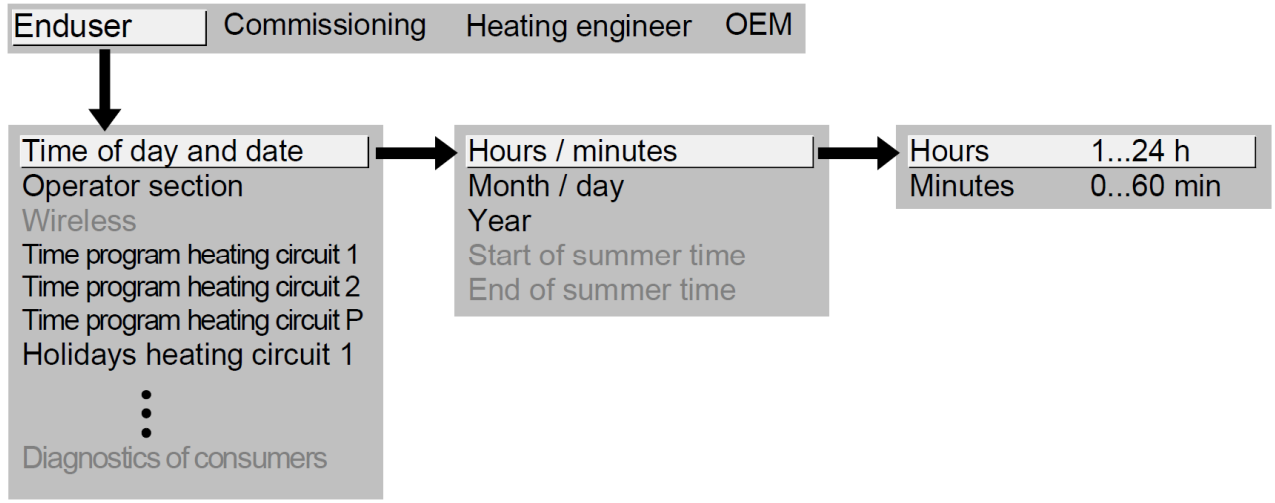


You are now on the required user level.

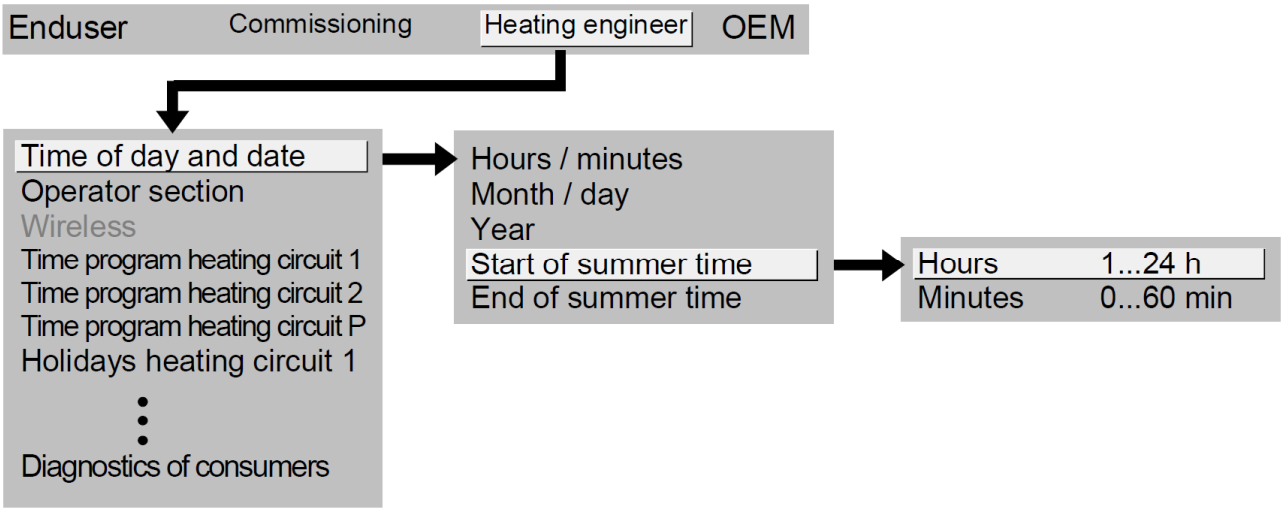
To reach the OEM level, enter the relevant code (this operation would only be carried out by KD NAVIEN Engineers)

structure for "Enduser"

The example given here shows that certain user levels do not allow certain settings to be made. The example shows them highlighted. On the unit, they are hidden.



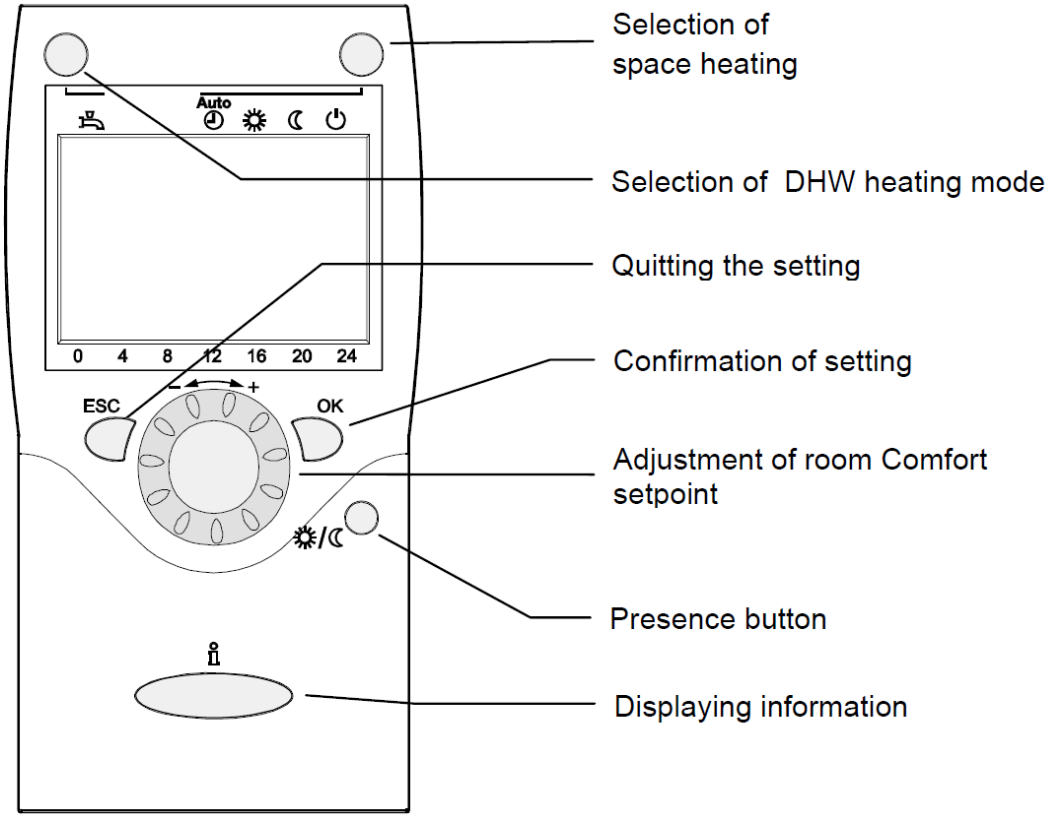
Setting structure for "Heating engineer"



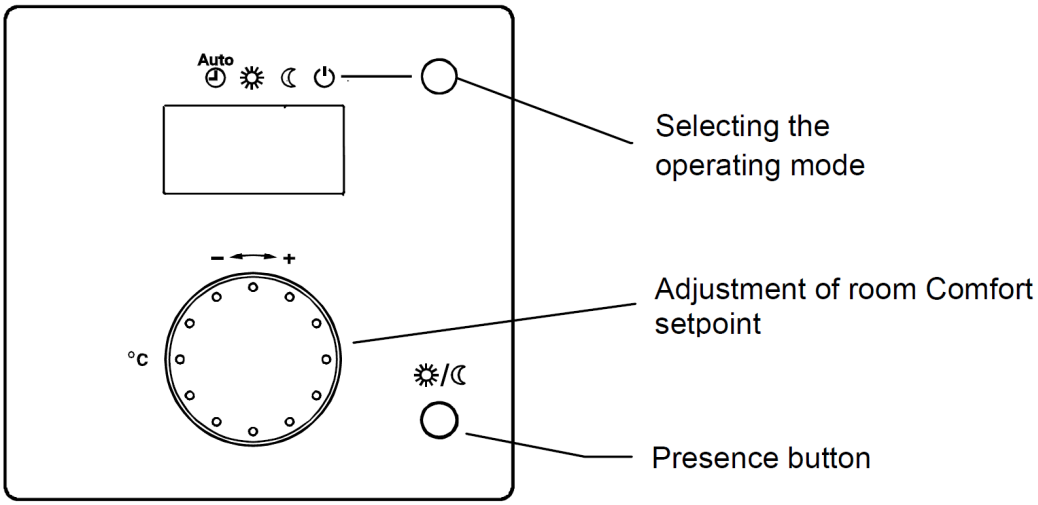
5.6.3.3 Programming the appliance

Operation

QAA7x

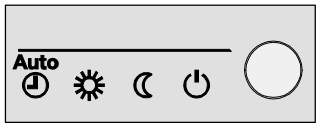


QAA55



5.6.3.4 Selecting heating mode

Press the button to switch between the different operating modes. The choice made is indicated by a bar which appears below the symbols.



Automatic operation AUTO
Automatic operation controls the room temperature according to the time program.

Characteristics of automatic operation:
Heating mode according to the time program

Temperature set points according to heating program "Comfort set point" ☼ or "Reduced set point" ☾
Protective functions active
Automatic summer / winter changeover (ECO functions)

Continuous operation ☼ or ☾
Continuous operation maintains the room temperature at the selected operating level.

☼ Heating to the Comfort set point

☾ Heating to the Reduced set point

Characteristics of continuous operation:
- Heating mode with no time program
- Protective functions active
- Automatic summer / winter changeover (ECO functions) and 24-hour heating limit inactive in the case of continuous operation with Comfort set point

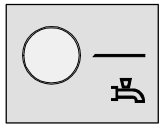
Protection ⏻
When using Protection, the heating system is off. But it remains protected against frost (frost protection temperature), provided there is no power failure.

Characteristics of Protection:
- Heating off
- Temperature according to frost protection
- Protective functions active
- Automatic summer / winter changeover (ECO functions) and automatic 24-hour heating limit active

Selecting DHW heating mode
The button is used to switch DHW heating mode on and off. The choice made is indicated by a bar which appears below the symbols.

DHW mode
- On

The DHW is heated according to the selected switching program.



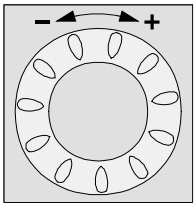
- Off

No DHW heating, the protective function is active.

5.6.3.5 Adjusting the room temperature set point

Turn the setting knob to increase or decrease the Comfort set point ☼ .

For the **Reduced set point** ☾
Press the OK button
Choose operating page "Heating circuit" and
Adjust the "Reduced set point"



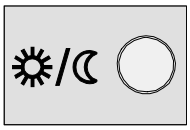
Note

Each time you make a readjustment, wait at least 2 hours, allowing the room temperature to adapt.

5.6.3.6 Occupancy Button

If the rooms are not used for a certain period of time, you can press the occupancy button to reduce the room temperature, thus saving heating energy.
When the rooms are occupied again, press again the occupancy button to resume heating operation.

☼ Heating to the Comfort set point
☾ Heating to the Reduced set point

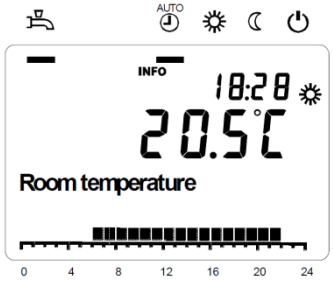


Note

- The occupancy button is only active in automatic mode
- The current selection is active until the next switching action according to the heating program occurs

5.6.3.7 Displaying information

The Info button is used to display information.

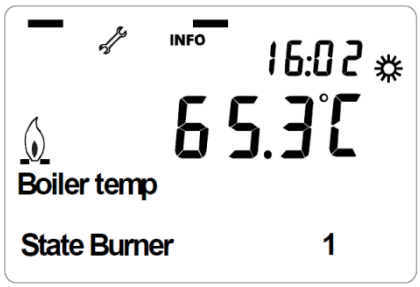


Available information Certain information lines are hidden, depending on the type of unit, unit

configuration and operating state.

Error message
Maintenance alarm
Special mode
Room temperature
Room temperature minimum
Room temperature maximum
Boiler temperature
Outside temperature
Outside temperature minimum
Outside temperature maximum
DHW temperature 1
State boiler
State solar
State DHW
State heating circuit 1
State heating circuit 2
State heating circuit P
Time of day / date
Telephone customer service

Default display operator unit



The default display of the operator unit shows the boiler (flow) temperature and the state of the burners.

State burner: Both off
1 Engine burner on
2 Supplementary burner on
1+2 Engine burner and supplementary burner on

5.7 Handing Over

After completing the installation, commissioning and testing of the system, hand over to the householder by the following actions.

1) Ensure the Installation and Service Instructions are left with the product.

2) Hand the User's Instructions to the householder and explain his or her responsibilities under the current Gas Safety (Installation and Use) Regulations or the rules in force.

3) Hand over contact card to the User.

4) Advise the householder of the Electricity Supplier's requirements with respect to Small-Scale Embedded Generators (SSEG) under National Regulations such as document ER G83/1.

5) Explain and demonstrate the lighting and shutting down procedures and the function and use of the product thermostat and controller.

6) Advise the householder on the efficient use of the system, including the use and adjustment of all system controls for both domestic hot water and central heating.

7) Advise the householder of the precautions necessary to prevent damage to the system and to the building, in the event of the system remaining inoperative during frosty conditions.

8) Explain the function of the product safety controls and how to reset them. Emphasise that if cut-out persists, the product should be turned off and a KD NAVIEN service engineer consulted.

9) Make sure all safety labels are correct and in place.

10) Clean and remove all debris from around the site.

11) Send installation documentation to KD NAVIEN

6.0 Fault finding

Any/all service work must be earned out by a KD NAVIEN trained Engineer.

WARNING

Electrical capacitors can remain charged for long periods after disconnection from the mains supply. Extreme caution must be exercised at all times when working on this product

6.1 General

Before looking for a fault condition, check that:

- Mains electrical supply is turned on.
- The product programmer with integral room thermostat Is calling for heat.
- The gas service cock Is open.

Note

If the cover has to be removed, ensure that the engine head temperature is below 150 °C, see note under section 6.0

On completion of any service or fault finding operation involving making or breaking electrical connections always check for **EARTH CONTINUITY, POLARITY and RESISTANCE TO EARTH**.

Note

The product control unit includes a communications port via which the KD NAVIEN service engineer can communicate with the product. Functions include fault diagnostics and parameter management

6.2 Error Display

When a fault is pending, an error message can be displayed on the info level by pressing the Info button. The display describes the cause of the fault or warning.

6.2.1 Error Code Subsystem

Line no.	Operating line
6707	**Error Code Subsystem**
Line no.	Operating line

Acknowledgements

Line no.	Operating line
6710	**Reset alarm relay**

When a fault is pending, an alarm can be triggered via relay QX... The QX... relay must be appropriately configured.
When using this setting, pending alarms are reset.

Error history

Line no.	Operating line
6800…6819	**History…**

The basic unit stores the last 10 faults in non-volatile memory. Any additional entry deletes the oldest in the memory. For each error entry, error code and time of occurrence will be saved.

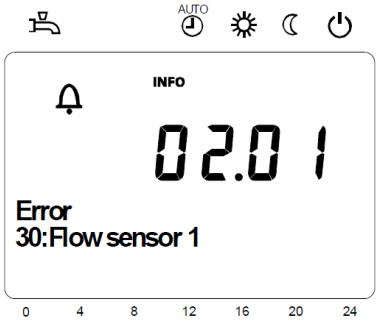
Reset history

Line no.	Operating line
6800…6819	**History…**

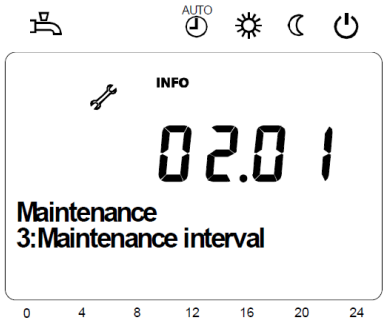
6.3 Resets and Lockouts

In exceptional cases, the display shows one of the following symbols:

Error messages
If this symbol appears, a plant fault occurred. In that case, press the Info button to obtain more information.

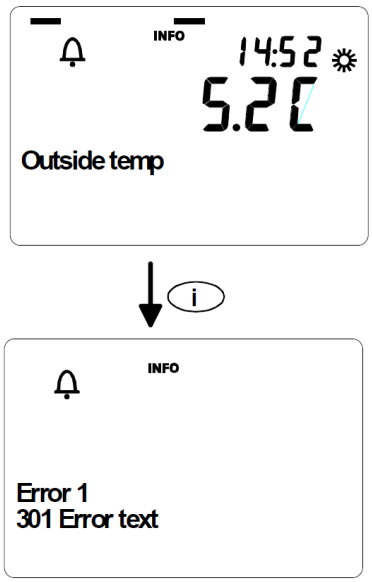


Maintenance or special mode
If this symbol appears, a maintenance alarm is delivered or the plant has changed to special mode. In that case, press the Info button to obtain more information.



Note
A list of possible displays is given in section 6.4

Error with Automatic Reset

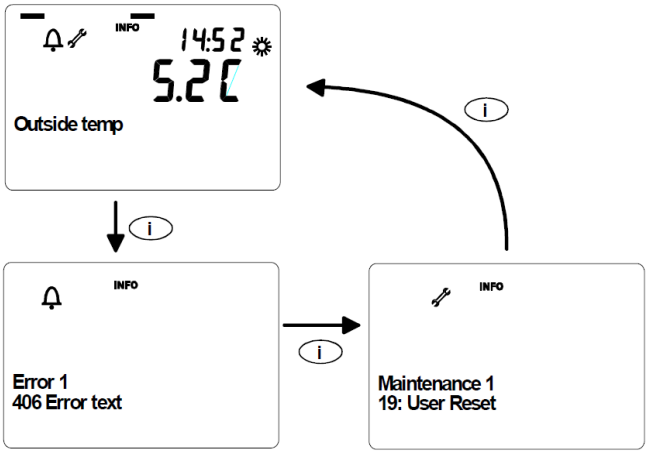


If an error occurs which will be reset automatically after the fault is eliminated, this will be displayed with a bell in the display.
By pressing the Info button, the type of error will be displayed with an error code number and a short error text.

Error with User Reset

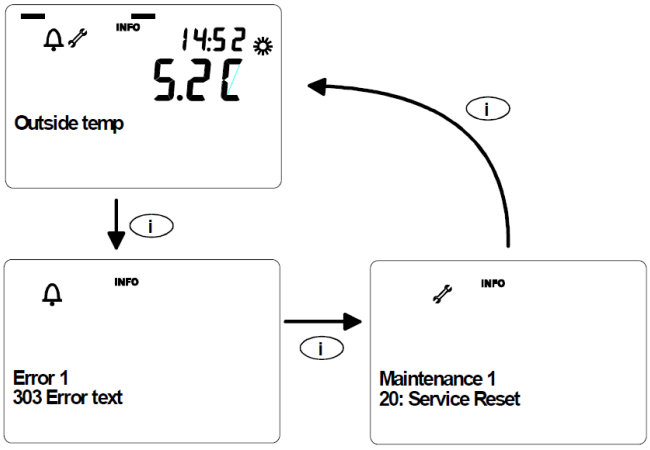
User Reset

Press the User Reset Button for more the 3 seconds



If an error occurs which requires a User Reset, this will be displayed with a bell and a screw wrench in the display.
By pressing the Info button, the type of error will be displayed with an error code number and a short error text.
By pressing the Info button once again, the next display will display which type of Reset (User Reset or Service Reset) is required. A User Reset may be done on the operator unit.

Error with Service Reset



If an error occurs which requires a Service Reset, this will be displayed with a bell and a screw wrench in the display.
By pressing the Info button, the type of error will be displayed with an error code number and a short error text.
By pressing the Info button once again, the next display will display which type of Reset (User Reset or Service Reset) is required. The service reset button is shown in photo 5.5 (below)

Note

The number of User or Service Resets is limited to 5 Resets per 15 minutes.
If no Reset was done for more than 15 minutes, the Reset credit counter will be 5.
This is the maximum credit number. With each Reset, the credit will be decremented.
If the credit is 0, it is not possible to activate a Reset.
Each 3 minutes, the credit will be increased by +1 up to the **maximum of 5 credits.**

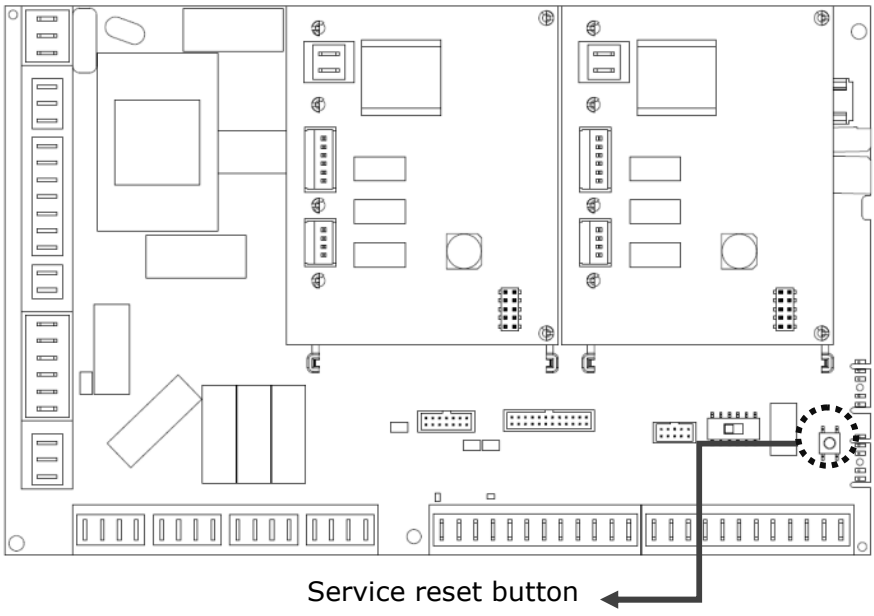


Diagram 6.1 Service re-set button (remove controller casing first)

6.4 Error Codes

Error Codes

UR = User Reset / SR = Service Reset / AR= Automatic Reset," ARP= Automatic Reset after Power down

NorSd: Normal shutdown, EmSd: Emergency Shutdown
Automatic reset is only done if the fault condition is eliminated
Sensor fault: short circuit or no connection
Reaction describes the reactions concerning Engine and Supplementary burner.
(X) means, these Errors are managed by the RESET-Manager

Error Code	System Error Code	Display	Description	Block-ing/ Reset	Re-action	Prio	Shutdown		Lockout	
							Eng	Sup	Eng	Sup
0	0	0:No error				0				
10	10	10:Outside sensor	Fault outside temp sensor		DefVal, AR	6				
20	20	20:Boiler sensor 1	Fault boiler flow temp sensor	BSCM	NorSd	9	X	X	AR	AR
30	30	30:Flow sensor 1	Fault flow temp sensor hc 1			6				
32	32	32:Flow sensor	Fault flow temp sensor hc 2			6				
40	40	40:Return sensor 1	Fault return temp sensor boiler			6				
50	50	50:DHW sensor 1	Fault DHW1 sensor			6				
52	52	52:DHW sensor 2	Fault DHW 2 sensor			6				
54	54	54:DHW flow sensor	Fault DHW flow temp sensor			6				
60	60	60:Room sensor 1	Fault room temp sensor hc1			6				
65	65	65:Room sensor 2	Fault room temp sensor hc2			6				
68	68	68:Room sensor P	Fault room temp sensor HcP			6				
78	78	78:Water pressure sensor	Pressure sensor fault			6				
83	83	83:BSB short-circuit	Boiler system bus short-circuit			8				
84	84	84:BSB address collision	More than 1 room units are assigned to the same HC Assign one of them to HC2 or assign QAA7x not as room unit			3				
85	85	85:Radio communication	Communication to radio device interrupted			8				
91	91	91:Data loss in EEPROM	Failure in Class B-SW: Irreparable data loss in EEPROM			9	X	X	NRP	NRP

Error Code	System Error Code	Display	Description	Block-ing/ Reset	Re-action	Prio	Shutdown		Lockout	
							Eng	Sup	Eng	Sup
92	92	92:Device electronics error	RAM failure, HBC processor register failure, blocking chain undefined (toggling), safety chain discrepancy. Reset: Press Service Reset within 20 seconds after Power up	Reset-Manager		9	X	X	NPR	NPR
95	95	95:Time of day invalid				3				
96	96	96:Minor SW failure	Failure in Class B-SW which causes AUTO-Reset	Reset-Manager		9	X	X	AR	AR
97	97	97:SW or HW failure	Failure in Class B-SW which causes locking of the board	Reset-Manager		9	X	X	NPR	NPR
98	98	98:Extension module 1	Fault extension module 1			8				
99	99	99:Extension module 2	Fault extension module 2			8				
100	100	100:2 clock time masters	Several clock time masters in the system Assign HMI and room units as clock time salves			3				
102	102	102:Clock without backup	The charging of the clock backup run out			6				
114	114	114:Shutd flue gas thermo	Shutdown due to flue gas thermostat of safety chain	E-BCUS-BCU	NorSd	9	(X)	(X)	SR	SR
116	116	116:Shutd flue gas sensor	Shutdown due to flue gas sensor	E-BCUS-BCU	NorSd	9	(X)	(X)	SR	SR
117	117	117: Water pressure too high	Dry fire protection: Water pressure too high			9	(X)	(X)	AR	AR
118	118	118:Water pressure too low	Dry fire protection: Water pressure too low			9	(X)	(X)	AR	AR
121	121	121:Flow temp HC1	Flow temperature set point hc1 not reached			6				
122	122	122:Flow temp HC2	Flow temperature set point hc2 not reached			6				
127	127	127:Legionella temperature	Legionella temperature not achieved within 48 hours			6				
157	157	157:Boiler Flow thermostat	Boiler flow thermostat opened	E-BCUS-BCU	NorSd	9	(X)	(X)	UR	UR
158	158	158:Condensate	Condensate switch opened	E-BCUS-BCU	NorSd	9	(X)	(X)	UR	UR
164	164	164: Flow press switch HC	Flow-/Pressure sensor error			6			AR	AR
187	187	187:Config Failure	Configuration isn't consistent			6				
253	253	253: ambiguous err cause	Cause of error is ambiguous after power up. BCU or EGC-Subsystem will have reported a problem before or during power up.			9	X		SR	SR
253	253	253: ambiguous err cause	Cause of error is ambiguous after power up. BCU or EGC-Subsystem will have reported a problem before or during power up.			9	X		UR	UR

Error Code	System Error Code	Display	Description	Block-ing/ Reset	Re-action	Prio	Shutdown		Lockout	
							Eng	Sup	Eng	Sup
254	254	254:Unknown error code	Error code if an unknown error code is transmitted from the EGC, check SW-version of subsystem		NorSd	9	X		AR	
257	217	257:Pack sensor	Fault Pack temp sensor			3				
258	216	258:Pack over-temp	Pack over-temperature			9	X	X	AR	AR
259	217	259:CJC-Sensor	Cold Junction compensation error			9	X		SR	
260	217	260:Flow sensor 3	Fault flow temp sensor hc 3			6				
261	128	261:Loss of flame Eng bu	Loss of flame Engine burner	E-BCU Reset Mngr	NorSd	9	BCU		UR	
262	128	262:Loss of fl' Supp bu	Loss of flame Supplementary burner	S-BCU Reset Mngr	NorSd	9		BCU		UR
263	150	263:Eng bu BCU failure	1) Failure caused by BCU 2) BCU Communication Timeout			9	X		ARP AR	
264	150	264:Supp bu BCU failure	1) Failure caused by BCU 2) BCU Communication Timeout			9		X		ARP AR
265	150	265:BCU failure	BCU failure after power up		NorSd	9	X	X	SR	SR
266	215	266:Fan fault	Fan fault: The fan speed differs from its set point by more than 'LimitFanSpeedError' % of the actual set point for more than 30 seconds. The error condition disappears if the fan speed is very small or when the set point is changing.		NorSd	9	X	X	SR	SR
267	215	267:Fan calibration	Fan calibration error: After power-up the test threshold of 4700 rpm was not exceeded. Engine, BCU and reset treatment through error 266.			3				
268	215	268:Spool valve fault	Spool valve fault: feedback signal of spool valve did not reach tolerance band of ± 5% of rated value within detection time (typ. 60 sec.)		NorSd	9	X	X	SR	SR
269	215	269:Spool valve calib	Valve calibration failure: During start up the feedback signal of the spool valve did not exceed an upper test limit and/or did not go below a lower test limit.		NorSd	9	X	X	SR	SR
270	216	270:exc temp diff h'exch	Excessive max temperature difference across the heat exchanger during 5 minutes or excessive limit temperature difference. If temperature difference fell below (threshold - switching differential boiler): automatic reset - when the maximum setting was exceeded immediately - when the limit value was exceeded after 10 minutes			9	X	X	AR 10min	AR 10min

Error Code	System Error Code	Display	Description	Block-ing/ Reset	Re-action	Prio	Shutdown		Lockout	
							Eng	Sup	Eng	Sup
271	216	271:Diff pressure too high	Dry fire protection: Differential water pressure too high			9	(X)	(X)	UR	UR
272	216	272:Diff pressure too low	Dry fire protection: Differential water pressure too low			9	(X)	(X)	UR	UR
273	216	273:Conf fault pres sensor	Configuration fault pressure sensor			9	(X)	(X)	AR	AR
274	216	274:Dry fire prot	Dry fire test after de-aeration procedure failed			9	(X)	(X)	UR	UR
275	216	275:Zero flow de-aeration	Dry fire test after de-aeration procedure failed			9	(X)	(X)	UR	UR
276	216	276:Zero flow	Zero flow detected in heating mode, automatic reset after 10 minutes			6			AR 10min	AR 10min
277	216	277:Zero flow DHW	Zero flow detected in Combi DHW mode (after 5 retries)			9	(X)	(X)	UR	UR
278	216	278:Max Temp Rise	Maximum flow temperature rise exceeded, automatic reset after 10 minutes			6			AR 10min	AR 10min
280	213	280:Inner iron overtemp	Inner iron thermostat has operated.		EmSd	9	(X)		AR 3min	
281	213	281:Dyn absorber overtr	Dynamic absorber over-travel switches have been activated		EmSd	9	(X)		SR	
282	213	282:G83/ENS/GIM	G83/ENS module has detected an unhealthy mains condition. If a GIM is fitted, an over voltage event has occurred.		EmSd	9	X		AR 3min	
283	213	283:Altern' overload	Alternator overload protection thermostat has operated		EmSd	9	(X)		SR	
284	213	284:WCS overtemp	Water cooled seal thermostat has operated	E-BCU S-BCU	NorSd	9	(X)	(X)	SR	SR
285	213	285:Alternat SC	Power monitor IC has detected a short-circuit condition		EmSd	9	(X)		AR 3min	
286	213	286:Eng head overtemp	Engine head temperature thermocouple measurement exceeds 584 degrees C		NorSd	9	(X)		SR	
287	213	287:Eng head undertemp	Engine head temperature thermocouple measurement below 103 degrees C when the CX relay is energised		EmSd	9	(X)		AR 3min	
288	213	288:Regenerat overtemp	Regenerator protection thermal fuse has operated		EmSd	9	(X)		SR	
289	213	289:WCS overt + inner iron	Water cooled seal thermostat has operated and Inner iron thermostat has operated.		EmSd	9	(X)	(X)	SR	SR
290	213	290:WCS overt + DA	Water cooled seal thermostat has operated and dynamic absorber over-travel switches have been activated		EmSd	9	(X)	(X)	SR	SR

Error Code	System Error Code	Display	Description	Block-ing/ Reset	Re-action	Prio	Shutdown		Lockout	
							Eng	Sup	Eng	Sup
291	213	291:WCS overt + G83	Water cooled seal thermostat has operated and G83/ENS module has detected an unhealthy mains condition, or if GIM fitted, an over-voltage event has occurred		EmSd	9	(X)	(X)	SR	SR
292	213	292:WCS overt + Alt	Water cooled seal thermostat has operated and alternator overload protection has operated		EmSd	9	(X)	(X)	SR	SR
293	213	293:WCS overt + SC	Water cooled seal thermostat has operated and power monitor IC has detected a short-circuit condition		EmSd	9	(X)	(X)	SR	SR
294	213	294:WCS + eng head overt	Water cooled seal thermostat has operated and engine head temperature thermocouple measurement exceeds 584 degrees C		NorSd	9	(X)	(X)	SR	SR
295	213	295:WCS + eng head undert	Water cooled seal thermostat has operated and engine head temperature thermocouple measurement below 103 degrees C when the CX relay is energised		EmSd	9	(X)	(X)	SR	SR
296	213	296:WCS overt + Reg	Water cooled seal thermostat has operated and regenerator protection thermal fuse has operated		EmSd	9	(X)	(X)	SR	SR
298	154	298:false flame engine burner	Ionisation probe of engine burner detected false flame			6	BCU		AR	
299	154	299:false flame supplementary burner	Ionisation probe of supplementary burner detected false flame			6		BCU		AR
300	214	300:Eng head undert SW	Engine head control temperature less than TempHeadGridDisconnect degrees C when CX relay is energised. The default value of TempHeadGridDisconnect is 150°C.		EmSd	9	(X)		UR	
301	214	301:Eng head overt SW	Engine head control temperature greater than TempHeadOverTempOff. The default value of TempHeadOverTempOff is 540°C.		NorSd	9	(X)		AR 3min	
302	214	302:Eng head t'couple diff	Magnitude of the difference between the engine head control and limit thermocouples is greater than 100°C		NorSd	9	X		UR	
303	214	303:Eng head t' couple cont	A failure of the engine head control thermocouple was detected.		EmSd	9	X		UR	
304	214	304:Eng head t' couple lim	A failure of the engine head limit thermocouple was detected.		EmSd	9	X		UR	

Error Code	System Error Code	Display	Description	Block-ing/ Reset	Re-action	Prio	Shutdown		Lockout	
							Eng	Sup	Eng	Sup
305	214	305:Eng under current	Engine connectivity test failed. This test lasts for at most one minute following the start of engine operation. Measured current must be greater than 100 mA for 10 seconds to pass the test.		EmSd	9	X		UR	
306	214	306:Black start failure	No power meter communications following start pulse application.		NorSd	9	X		AR 1min	
307	214	307:Engine stall	Power meter communications timeout during grid independent operation.		NorSd	9	X		AR 1min	
308	214	308:Stop resistor integrity	The resistor integrity check has failed. • The start and/or stop resistor may be open-circuit. • Power meter IC not started up correctly		EmSd	9	X		SR	
309	214	309:Power fail detection	A power failure condition has been detected by the microcontroller supervisor.		EmSd	9	X		AR 1min	
310	212	310:Power mon comm fail	• Ten consecutive corrupted messages were received from the power meter IC. • No data was received from the power meter IC for at least ten seconds.		NorSd	9	X		AR 1min	
311	212	311:EGC comm failure	• No valid data was received from the external processor for over 60 seconds. Reported only. • No data was transmitted to the external processor for over 30 seconds. Reported only.		None	3	BCU		AR	
319	146	319:Check configuration	Controller Stopp after HBC firmware update			9	X	X	UR	UR
394	150	394:Eng Bu BCU Com fail	Loss of communication to Engine Burner BCU			9			AR	
395	150	395:Supp Bu BCU Com fail	Loss of communication to Supplementary Burner BCU			9				AR
396	214	396:Eng head t'c' cont integ	Head temp control TC connection to the MCB is open-circuit. This condition is activated if the head temperature meas. falls below 3°C.		EmSd	9	X		AR 5s	
397	214	397:Eng head t'c' cont rise	Head temp control TC integrity is in doubt. This condition is detected if the head temperature fails to rise by at least 30°C in one minute before grid connection.		EmSd	9	X		AR 20min	

7.0 Routine servicing

The appliance shall always be turned off by removing any heat demands.

Before working on the appliance ensure that the head temperature is below 150 °C. This is to prevent any uncontrolled engine start which would constitute a hazardous situation and/or possible damage to the engine.

The engine head temperature can be found on the Fascia Controller, by following the procedure below;

1. Press 'OK' button
2. Then press 'I' button (between 1 and 3 seconds)
3. Select 'Engineer Level' using the setting knob and press '0K'
4. Select 'Input/Output test' and press '0K'
S. Select 'Head Control Temperature' and read temperature from display and note value
6. Confirm head temperature by selecting 'Head Unit Temperature' and read temperature from display and note value
7. Both readings should be within 50° C of each other

To ensure continued efficient operation of the product, it is recommended that it is checked and serviced as necessary at regular intervals. The frequency of servicing will depend upon the particular installation conditions and usage, but In general once a year should be adequate. Any service work must be carried out by qualified KD NAVIEN trained personnel only.

The product incorporates a flue sampling point on top of the appliance. Do not forget to replace the screwed cap after use.

Refer to the Installation Manual for cover removal and replacement procedures.

Before commencing any internal service operation, ISOLATE the mains electrical supply, and TURN OFF the gas supply at the main service cock.

Service the appliance by following the procedure detailed below:

WARNING

Electrical capacitors can remain charged for long periods after disconnection from the mains supply. Extreme caution must be exercised at all times when working on this product.

When servicing the controls enclosure, before removing the cover, ensure a 5 minute waiting time is allowed for the enclosed capacitors to discharge.

7.1 Gas Emissions

1) Before carrying out any testing on the appliance ensure that a gas soundness test on the installation is carried out.
2) Check each burner individually, see below;

7.2 Chimney Sweep Function

See section 5.5.2.

7.3 General Inspections

1) Remove the appliance cover and place safely to one side.

2) Visually check the appliance for any signs of leaks or damage.

3) Ensure that the condensate trap is visually inspected to asses for any signs of blockage or build up of debris.

4) Replace cover.

If in any doubt contact KD NAVIEN or your supplier.

7.4 Servicing Supplementary Burner

1) Turn OFF the mains power supply.

2) Close the gas shut-off valve and safeguard against reopening

3) Remove the two screws at the bottom of the boiler with plus driver release 4 clips.

4) Pull out the hook up on the underside and topside of the boiler.

5) Pull out the front cover carefully and detach the connecter of HMI from the control Box.

6) Remove gas inlet manifold(A) release each 4 screws at the manifold from the mix chamber and spool valve assembly.

7) Release the igniter and frame detection probe.

8) Unplug the overheat sensor from exhaust duct.

9) Release the three screws on the top of mix chamber(B) and pull it out.

10) Check the burner(C) and mix chamber gasket(G) and EPDM sealing(F)for faulty parts and replace it if necessary.

11) Check the burner (C) after taking out from heat exchanger (E).

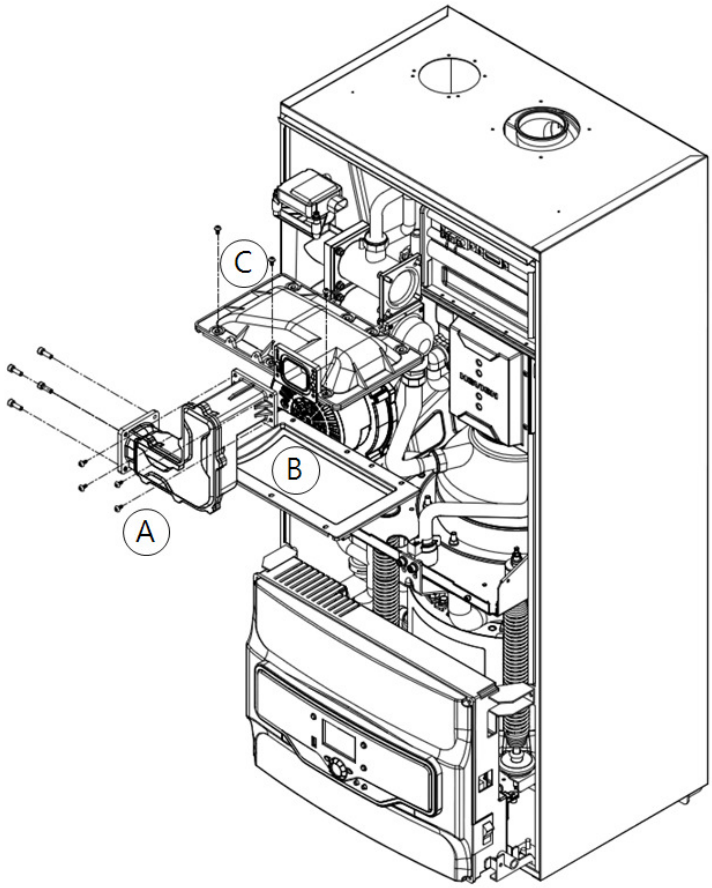


Diagram 7.1 Supplementary burner assembly removal

12) If the burner is not correct, for example it is damaged, replace the burner.

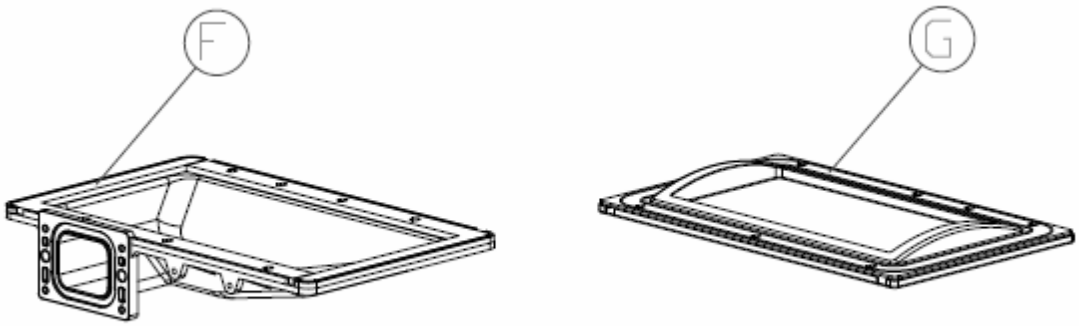


Diagram 7.2 Supplementary burner packing and mix chamber gasket

7.6 Checking & adjusting the ignition and ionization electrode

1) Remove the electrode (D).

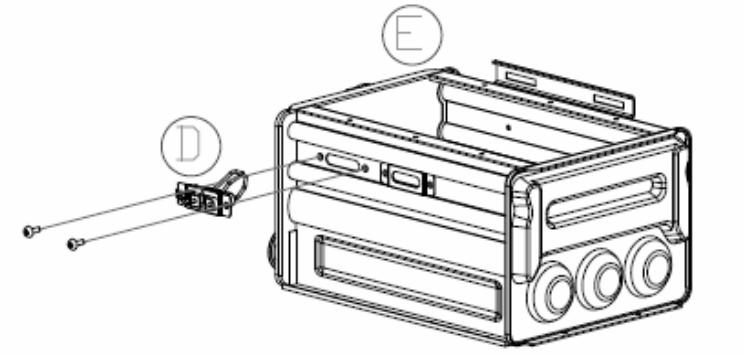


Diagram 7.3 Checking ignition electrode and ionization probe

2) Release two screws, and remove thermal insulation ceramic papers(G).

DANGER

Before touch the electrode, you should be checked surface temperature of electrode.

3) Check the electrode for wear and contamination.

4) Cleaning the electrode with a small brush (NOT with a steel wire brush) or detail emery paper.

5) Check all clearance. If the electrode gaps(4mm =/-0.5) are not as specified or the electrode is damaged, replace and align the electrode together with new ceramic paper gaskets. Replace and tighten the electrode with fixing screws.

7.7 Cleaning heat exchanger surfaces

During the burner inspection (with the burner removed), check through the heat exchanger(E).
A preliminary inspection should be enforced every 2 ~ 5 years for typical residential use, or 1 ~ 3 years for the commercial application
The heat exchanger surface can be cleaned with a brush or flush with water if required.

Important

Scratches on parts which in contact with flue gases can lead to corrosion.
One use plastic brushes and NOT steel wire brushes.

7.8 Condensate Trap

The condensate trap must be visually inspected for debris, if debris is found remove

condensate trap and clean (Do not pull apart the condensate trap system)

7.9 Engine burner

The engine burner is service and maintenance free and has no need for annual servicing The flame detection and ignition probes are listed as spares and can be changed if required.

The Engine contains a helium charge. Operation of the engine must be in accordance with the MEC Engine Operating Instructions (Doc ref PS-V1-01 MEC V1 Series LFPSE Micro CHP Integration OEM Manual and Instructions)

The NCM-1130HH engines may require check and top up of Helium on a regular basis; this shall be carried out by competent trained personnel in accordance with KD NAVIEN & MEC procedures.

7.10 Re-assembly

Reassemble all components in reverse order. Check that all joints and seals are correctly located and fitted,

7.11 Re-commissioning

Turn on the gas and electricity supplies and check the operation of the product as described in Section 5.4.

7.12 Final Checks

1) Return all product and external controls to their user required settings,

2) Check that the minimum product clearances are maintained.

3) Check that the flue terminal and if applicable the terminal guard, is tree from obstruction.

4) Ensure that the outer casing is correctly fitted.

The NCM-1130HH engines may require check and top up of Helium on a regular basis; this shall becarried out by competent trained personnel in accordance with KD NAVIEN & MEC procedures. (Not required for PM Engines)

8.0 Short Spare Parts

8.1 General

When replacing any KD NAVIEN product component;

1) Isolate the electricity supply at the local securable isolator and at the 16A circuit breaker in the consumer unit

2) Turn off the gas supply to the product at the product gas cock.

3) Ensure engine has cooled down sufficiently below 150 °C.

4) Remove the product casing - Refer to Installation Manual.

5) Condition of replacement parts shall be checked visually for damage.

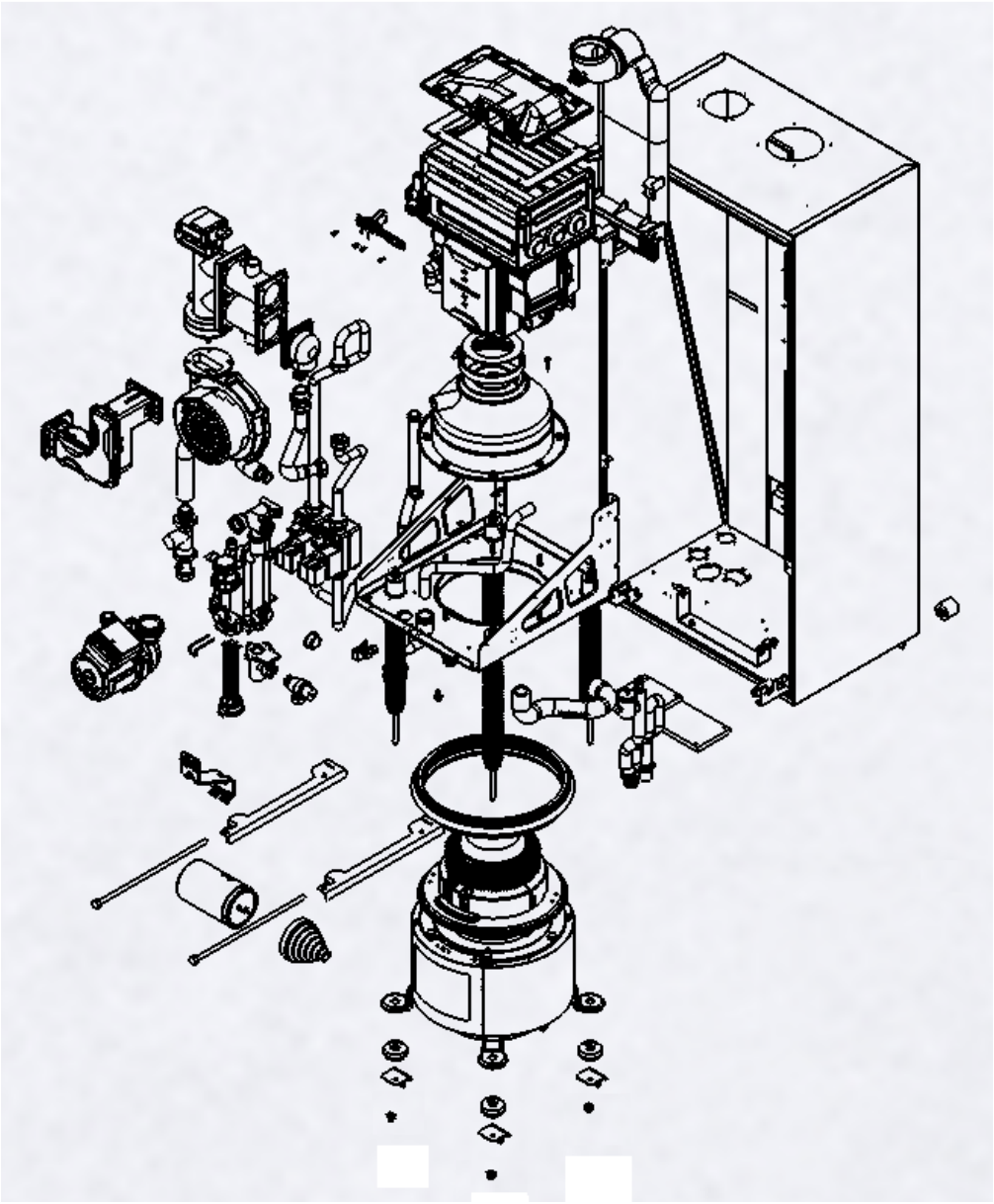
After replacing any components check the operation of the product including gas soundness, gas rate and combustion tests. When work is complete the casing must be correctly refitted ensuring that a good seal is made.

WARNING

Electrical capacitors can remain charged far long periods after disconnection from the mains supply.
Extreme caution must be exercised at all times when working on this product

8.2 Short Spare Parts List

The following list comprises parts commonly required as replacements, due to damage or wear.



Part	Part Number
Supplementary Ignition & Flame Detection Probe	BH25420006A
Supplementary burner	BH2501638A
Engine Ignition Probe	BHA4060100023
Engine Flame Detection Probe	BHA4060100023
Engine Flame Detection Probe Gasket	BHA4060100022
Pre-set Supplementary Gas Valve	BHA20408074
Pre-set Engine Gas Valve	BHA404010053
Spark Generators	BHA406010075
Fan	BHAB0F000072
Condensate trap	BHAB0F000044
Spool Valve Assembly	BHA406050001
Bosch Motor (spool valve)	BHA405030008
Controls Enclosure	BHA4060100021
Sophisticated room unit	BHABOF000059
Wireless sophisticated room unit	BHABOF000060
Simple room unit	BHABOF000062
Programmers (HMI)	BHABOF000063
Wireless outdoor sensor	BHABOF000064
Outdoor sensor	BHABOF000065
Wireless transceiver	BHABOF000066

NAVIEN

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