VF SERIES

GAS CONDENSING BOILER

INSTALLATION & MAINTENANCE MANUAL

MODELS 40 - 60 - 80 - 100

ATLANTIC BOILERS

HIGH EFFICIENCY BOILER-PLANT

ATLANTIC 2000 - boilerplant sales ACM ATLANTIC - commissioning and maintenance ATLANTIC 4422 – spares
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1. WARNINGS AND RECOMMENDATIONS

PLEASE READ THIS MANUAL CAREFULLY BEFORE INSTALLING, CARRYING OUT MAINTENANCE AND USING THE BOILER. IT CONTAINS IMPORTANT SAFETY INFORMATION.

1.1. Transport and storage

The boiler:

- must be stored vertically in an environment where the temperature is between -20°C and +55°C, and where relative humidity is between 5% and 95%;
- must not be stacked,
- must be protected from humidity.

1.2. Symbols used in this document.

	**INFORMATION:**	This symbol draws attention to comments.
	**WARNING:**	Not following these instructions may lead to damage when installing or to other objects.
	**DANGER:**	Not following these instructions may cause injuries and serious material damage.
	**DANGER:**	Not following these instructions may cause electrocution.

1.3. Qualification of personnel for installing, adjusting, using and maintaining the equipment

Boiler installation, adjustment and maintenance operations must be conducted by a qualified and approved professional in accordance with prevailing local and national regulations. These operations may require work to be carried out with the power turned on and the casing doors (on the front of the boiler) open.
Basic utilisation operations must be carried out with the casing doors closed.

1.4. Safety instructions

- Always switch the boiler off and shut off the general gas supply before carrying out any work on the boiler.
- After performing work on the boiler (maintenance or breakdown), check that there are no gas leaks from the installation.

DANGER:

If you smell gas:
- **Do not use a naked flame, do not smoke, do not turn on electrical contacts or switches.**
- **Cut off the gas supply.**
- **Air the premises.**
- **Look for the leak and repair it.**

DANGER:

If you see smoke:
- **Switch off the boiler.**
- **Air the premises.**
- **Look for the leak and repair it.**

DANGER:

This boiler's earth bonding is ensured with connecting cables (green/yellow) and specific attachment screws. During any dismantling work, make sure you reconnect the cables concerned; it is IMPERATIVE to reuse the original attachment screws.

1.5. Water characteristics

The following rules apply as soon as the boiler is commissioned and remain valid until the product's end-of-life.

DANGER: **It is forbidden to use water containing glycol.**

1.5.1. Preparation of the water circuit before commissioning the boiler

For all installation work (new or renovation), the water network pipes must be meticulously cleaned. The purpose of cleaning prior to commissioning is to remove germs and residues which are the cause of deposits.
In new installations in particular, residue from grease, oxidised metal and even copper micro deposits must be removed.
In renovated installations, cleaning should focus on removing sludge and the products of corrosion formed when the unit was last in operation.
There are two types of methods for cleaning and removing sludge: a high intensity approach that takes a few hours and a slower, more gradual approach that takes several weeks. This first type of cleaning must be done before connecting the new boiler, and with the second type, a filter should be

installed on the back of the boiler to capture loosened deposits.
Cleaning prior to commissioning helps to improve the equipment's performance, reduce energy consumption and fight against scaling and corrosion. This operation must be done by a professional (water treatment).

1.5.2. Protecting the unit against scaling

Water naturally contains dissolved calcium ions and carbonates that cause scaling (calcium carbonate) to form. To prevent excessive deposits, take precautions with regard to the water used to fill the unit **TH < 10°f**

Water must be added during the life of the boiler. The new water adds scaling to the water system. The amount of fill water and the amount of make-up water added throughout the unit's lifecycle must not be more than three times the water capacity of the heating system. Also, the hardness of the make-up water must be controlled. Make-up water: **TH < 5°f**

Adding a large amount of untreated water always contributes a significant amount of scaling. To monitor this and to detect problems, a system water meter must be installed.
Failure to comply with these guidelines (such that the fill water plus the make-up water is more than three times the water capacity of the heating system) requires a full cleaning (to remove sludge and scaling) to be performed.

Additional precautions are required for operation:

- When the unit has a water softener, the equipment must be inspected on a regular basis in order to ensure that it is not outputting chloride-rich water into the system. The concentration of chlorides must always remain below 50 mg/litre.
- To prevent the build-up of calcium deposits (such as on exchange surfaces), the unit should be brought into service slowly, starting by operating at a low power with high primary water flow.
- When the tap water lacks the desired qualities (e.g. high level of hardness), water treatment is required. The fill water must be treated, and whenever new water is added, the make-up water must also be treated.
- Installations with multiple boilers require all of the boilers to be started simultaneously at minimal power. Doing this prevents the calcium in the water from depositing on the exchange surfaces of the first boiler.
- When working on the unit, avoid draining it completely; only the required parts of the system are to be drained.

The rules listed above are designed to minimise scaling on the exchange surfaces and thus to increase the life of the boilers.
To optimise the equipment's operation, remove lime scale deposits. This must be done by a specialised company. Also, before putting the unit into service, verify that the heating system is not damaged (e.g. leaks). If it has excessive scaling, the unit's settings for operation and for water treatment must be adjusted.

1.5.3. Protecting steel and stainless steel boilers against corrosion

Corrosion can affect the iron components used in boilers and heating systems, which is directly related to the presence of oxygen in the water heater's water. Dissolved oxygen that enters the unit when it is being filled

for the first time reacts with the equipment materials and quickly disappears. Without refreshing the oxygen through significant contributions of water, the unit might not experience any damage whatsoever.
However, it is important to follow the sizing rules and installation guidelines in order to prevent oxygen from continuously flowing into the heating water. These rules include:

- Opt for an expansion vessel with a membrane rather than an open expansion vessel that allows direct passage.
- Make sure pressure in the equipment is more than 1 bar when cold.
- Remove non-gas-tight components (permeable) and use gas-tight equipment instead.

If the guidelines above are followed, the unit's system water has the proper characteristics to last a long time: 8.2 < pH < 9.5 and concentration in dissolved oxygen < 0.1 mg/litre.

If there is a chance that oxygen could enter the unit, you must take additional precautions. Adding an oxygen scavenger (e.g. sodium sulphite) is highly recommended. We recommend you contact specialised companies for water treatment issues, which will be able to suggest:

- the appropriate treatment based on the characteristics of the installation,
- a monitoring and performance warranty contract.

For units in which the water comes into contact with heterogeneous materials, such as copper or aluminium, appropriate treatment is recommended in order to ensure that the unit will last. In most cases, this consists of adding corrosion inhibitors (in the form of chemical solutions) to the unit. It is recommended to contact water treatment specialists.

1.5.4. Unit monitoring

If the above recommendations are followed (new installation or renovation), it should be sufficient to:

- check the amount of make-up water (fill water volume + make-up water volume < 3 times the unit volume.
- check the pH level (stable or slightly increasing).
- check the TH (stable or slightly decreasing).

We recommend these checks are carried out 2 to 3 times a year. Note that monitoring the quantity of make-up water is critical to the long life of the unit. If any of these three parameters deviates from the above recommendations, refer to a water treatment specialist to correct the problem.

1.5.5. Installation of the plate exchanger

If the recommendations above cannot be met, you can set up a plate exchanger to separate the primary system from the secondary system, which protects the boiler from undesirable effects.

1.5.6. Installation of a filtration system

A filtration system (filter, sediment well, etc.) on the back of the boiler is recommended in order to remove suspended particles from the unit.

2. APPROVALS

2.1. Compliance with European Directives

- Low voltage (2006/95/EC)

This appliance is not intended for use by persons (including children) whose physical, sensory or mental abilities are reduced, or persons without experience or knowledge, unless they have been able to benefit, through someone responsible for their safety, from supervision or prior instruction concerning the use of the appliance.

Children must be supervised to ensure they do not play with the appliance.

- Electromagnetic compatibility (2004/108/CEE)

- Gas appliances (2009/142/CE)

- Energy labelling (2010/30/EU):

In application of the directive and according to the requirements of the EU regulation No. 811/2013 of 18 February 2013, the information on condensation boilers with a power of less than or equal to 70 kW is available in appendix A.

- Eco-design (2009/125/EC):

In application of the directive and according to the requirements of the EU regulation No. 813/2013 of 02 August 2013, the technical parameters of condensation boilers with a power of less than or equal to 400 kW are available in appendix A.

2.2. Regulatory installation conditions

The appliance must be installed by an approved professional in accordance with regulations and current professional practices.

1.6. Gas category

This boiler has been adjusted in the factory to work with **group H natural gas (type G20) with a supply pressure of 20 mbar**.
See chapter 4.4 for how to change the gas, and use a qualified professional.

INFORMATION: **Any work on a sealed component will lead to loss of the guarantee.**

VARFREE	CATEGORY	
	AT - CH - CZ - GR - LT - PT - RO - SI - SK	DK - EE - FI - LV - NO - SE
40 - 60 - 70 - 80 - 100 kW	II_{2H3P}	I_{2H}
120 kW	I_{2H}	I_{2H}

1.7. Gas supply pressures

INFORMATION: **The pressures given below should be measured at the input to the gas valve.**

	H G20 natural gas	G31 propane
Nominal pressure (mbar)	20	37
Minimum pressure (mbar)	17	25
Maximum pressure (mbar)	25	45

3. TECHNICAL SPECIFICATIONS

3.1. Dimensions

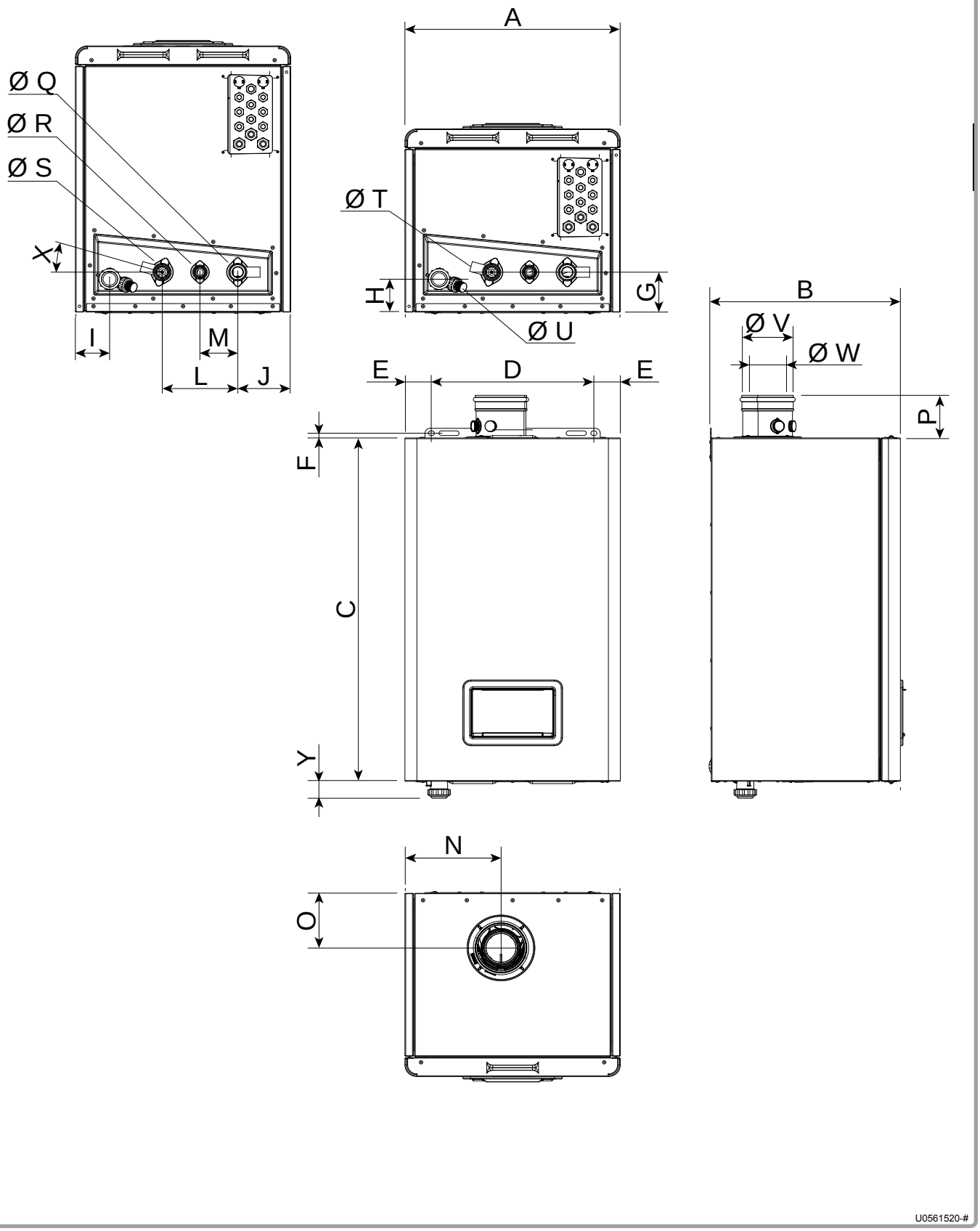


figure 1 - Dimensional characteristics

			MODELS				
			40 kW	60 kW	80 kW	100 kW	120 kW
A		**(mm)**	541				
B		**(mm)**	477		574		692
C		**(mm)**	890				
D		**(mm)**	408				
E		**(mm)**	66,5				
F		**(mm)**	12,3				
G		**(mm)**	103,5				
H		**(mm)**	85,5				
I		**(mm)**	86				
J		**(mm)**	133				
L		**(mm)**	190				
M		**(mm)**	95				
N		**(mm)**	241		242,5		
O		**(mm)**	143,5		120		
P		**(mm)**	86		111		
Ø Q	Heating return connection		G 1"1/4				
Ø R	Gas supply		G 1"				
Ø S	Heating outlet connection		G 1"1/4				
Ø T	Safety valve connection		G 1/2" (female)				
Ø U	Condensate evacuation	**(mm)**	24				
Ø V	Air inlet	**(mm)**	125		150		
Ø W	Fume duct	**(mm)**	80		100		
X	Valve angle		16°				
Y		**(mm)**	45				

3.2. Boiler components

1 Gas valve
2 Fan
3 Ionisation electrode
4 Ignition electrode
5 Ignition transformer
6 Fume temperature sensor
7 Bleed valve
8 Water return temperature sensor
9 Flowmeter
10 Water outlet temperature sensor
11 Pressure sensor
12 Anti-return flap
13 Condensate siphon (supplied unmounted)
14 User interface control panel
15 NAVISTEM B3000 unit
16 Air pressure switch
17 Safety thermostat

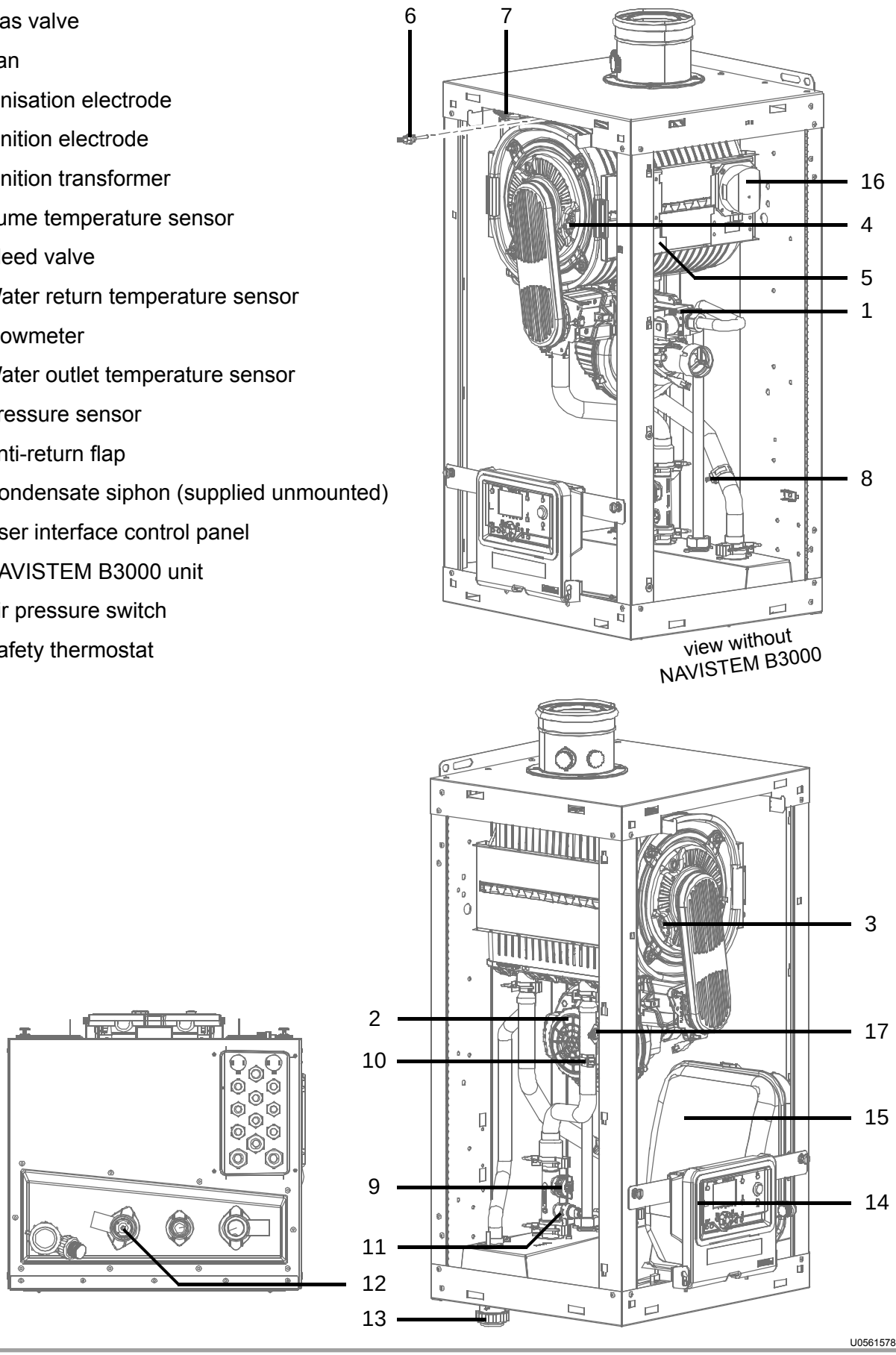


figure 2 - Boiler components for 40 and 60 kW models

1 Gas valve
2 Fan
3 Ionisation electrode
4 Ignition electrode
5 Ignition transformer
6 Fume temperature sensor
7 Bleed valve
8 Water return temperature sensor
9 Flowmeter
10 Water outlet temperature sensor
11 Pressure sensor
12 Anti-return flap
13 Condensate siphon (supplied unmounted)
14 User interface control panel
15 NAVISTEM B3000 unit
16 Air pressure switch
17 Safety thermostat
18 CEM filter (VARFREE 120 kW)

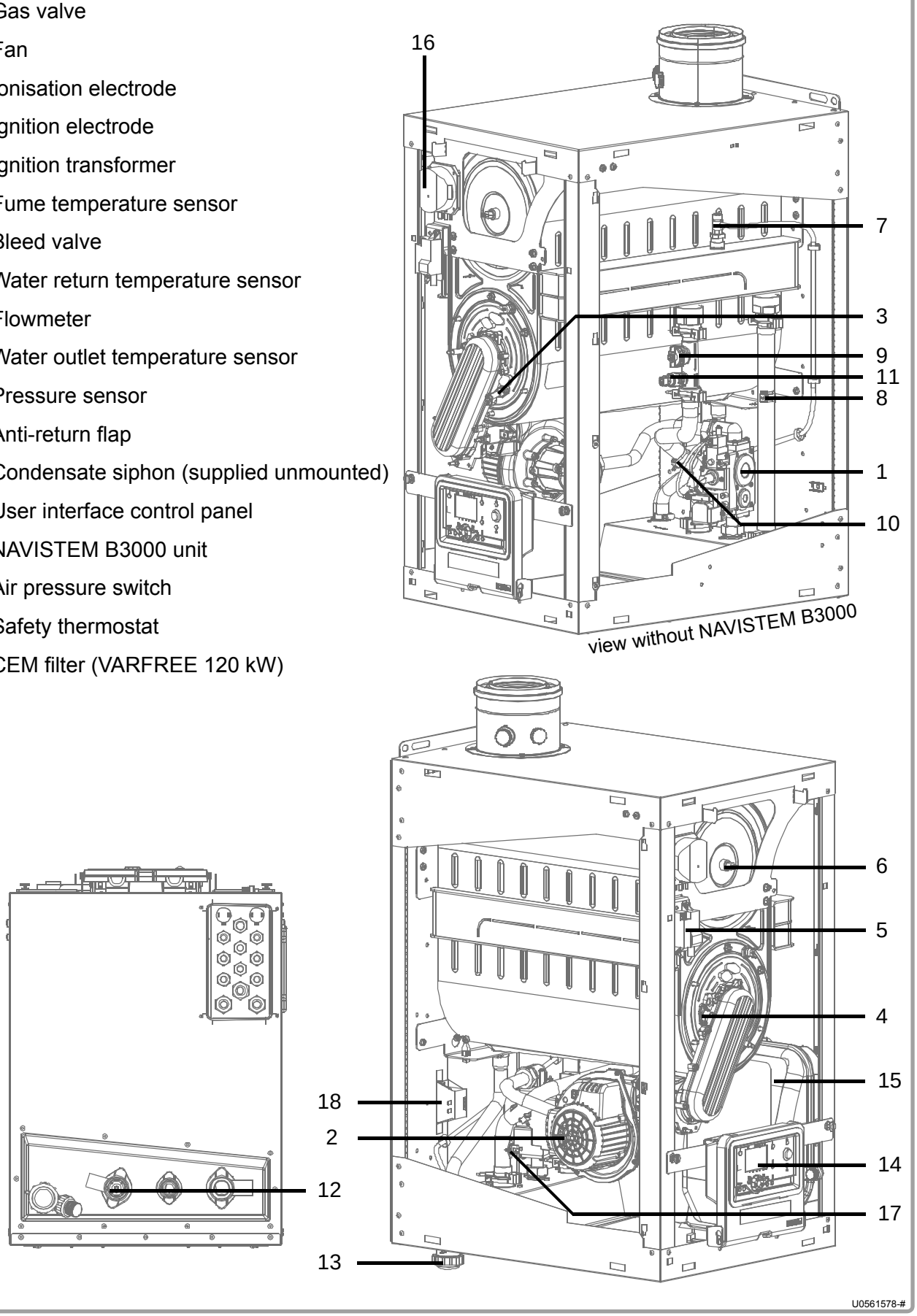


figure 3 - Boiler components for 80 to 120 kW models

3.3. Combustion at 15°C and 1013 mbar

3.3.1. G20 natural gas

			MODELS				
			40 kW	**60 kW**	**80 kW**	**100 kW**	**120 kW**
Nominal power Pn (80/60°C)		kW	40,0	56,4	79,8	95,7	119,5
Nominal power when condensing P (50/30°C)		kW	43,0	61,0	87,5	104,5	129,5
Minimal power Pn (80/60°C)		kW	8,3	11,5	17,1	19,0	23,9
Nominal heat input Qn		kW	41,2	58,0	82,3	98,5	123,0
Ignition heat input Qall		kW	21,8	23,5	26,1	30,5	39,0
Minimum heat input Qmin		kW	8,5	11,8	17,6	19,6	24,6
Gas flow rate at Pn		m^3/h	4,4	6,1	8,7	10,4	13,0
CO_2 value ranges		%	at Qmin: 8,7 % < CO_2 < 8,9 % at Qmax: 9,1 % < CO_2 < 9,3 %				
Flue-gas mass flow rate (80/60°C)	Qn Qall Qmin	g/s	18,4 9,8 3,8	26,0 10,5 5,3	36,9 11,7 7,7	44,1 13,7 8,8	55,1 17,5 11,0
Flue-gas mass flow rate (50/30°C)	Qn Qall Qmin	g/s	17,5 9,3 3,5	25,0 10,1 5,1	35,6 11,2 7,5	42,7 13,3 8,5	52,5 16,7 10,2
Flue-gas temperature (80/60°C)	Qn Qall Qmin	°C	80 65 61	76 63 62	74 58 57	76 61 62	70 56 56
Flue-gas temperature (50/30°C)	Qn Qall Qmin	°C	62 42 39	60 39 38	53 33 34	57 38 38	52 31 32
Inside diameter of flue-gas output		mm	80	80	100	100	100
Maximum allowable nozzle pressure (B23P) (80/60°C)	Qn Qall Qmin	Pa	156 33 20	200 31 20	179 15 15	187 17 17	200 32 20
Maximum allowable nozzle pressure (B23P) (50/30°C)	Qn Qall Qmin	Pa	122 27 20	174 27 20	149 14 14	159 17 17	200 31 20
Combustion air flow rate at Qn		m^3/h	51,8	72,8	103,4	123,7	154,5
NOx class			6				
Flue-gas removal and air inlet type classifications			B23, B23P C13, C33, C53				

3.3.2. G31 Propane Gas (for relevant models)

			MODELS			
			40 kW	**60 kW**	**80 kW**	**100 kW**
Nominal power Pn (80/60°C)		kW	40,0	56,4	79,8	95,7
Nominal power when condensing P (50/30°C)		kW	42,1	59,7	85,6	102,3
Minimal power Pn (80/60°C)		kW	8,3	11,5	31,9	33,5
Nominal heat input Qn		kW	41,2	58,0	82,3	98,5
Ignition heat input Qall		kW	21,8	18,0	32,9	34,5
Minimum heat input Qmin		kW	8,5	11,8	32,9	34,5
Gas flow rate at Pn		m^3/h	1,7	2,4	3,4	4,0
CO_2 value ranges		%	at Qmin : 9,9 % < CO_2 < 10,1 % at Qmax : 10,3 % < CO_2 < 10,5 %			
Flue-gas mass flow rate (80/60°C)	Qn Qall Qmin	g/s	18,5 9,8 3,8	26,0 8,1 5,3	36,8 14,8 14,8	44,1 15,5 15,5
Flue-gas mass flow rate (50/30°C)	Qn Qall Qmin	g/s	18,3 9,6 3,7	25,7 7,9 5,2	35,3 14,6 14,6	44,0 15,3 15,3
Flue-gas temperature (80/60°C)	Qn Qall Qmin	°C	81 66 62	78 64 63	73 60 60	75 60 60
Flue-gas temperature (50/30°C)	Qn Qall Qmin	°C	65 44 40	60 42 40	52 34 34	56 34 34
Inside diameter of flue-gas output		mm	80	80	100	100
Maximum allowable nozzle pressure (B23P) (80/60°C)	Qn Qall Qmin	Pa	126 29 20	200 19 19	150 24 24	138 20 20
Maximum allowable nozzle pressure (B23P) (50/30°C)	Qn Qall Qmin	Pa	112 24 20	177 16 16	129 22 22	129 20 20
Combustion air flow rate at Qn		m^3/h	51,8	73,0	103,5	123,9
NOx class			6			
Flue-gas removal and air inlet type classifications			B23, B23P C13, C33, C53			

3.4. Conditions of use

		MODELS				
		40 kW	60 kW	80 kW	100 kW	120 kW
Maximum start setting temperature	°C	85				
Safety temperature	°C	105				
Maximum service pressure	hPa (bar)	4000 (4)				
Minimum cold pressure	hPa (bar)	1000 (1)				
Nominal water flow rate	m^3/h	1,7	2,4	3,4	4,1	5,1
Minimal water flow rate	m^3/h	1,4	1,9	2,7	3,3	4,1
Water content	l	3,6	5	9	10,2	12,8
Weight without water	kg	50	60	90	95	100
Temperature of installation room (min. / max.)	°C	5 / 45				
Relative humidity of installation room		between 5% and 95%				
Protection level		IP24D				
Maximum altitude of installation	m	2000				

3.5. Electrical connection

		MODELS				
		40 kW	60 kW	80 kW	100 kW	120 kW
Electrical supply	V	230 V AC (+10% -15%), 50Hz				
Electrical power consumption at Qn (without accessories)	W	68	138	141	160	206
Electrical power consumption at Qn (without accessories)	W	113	194	196	268	348
Electrical power consumption in standby mode	W	3				
Max length of sensor cables	m	DHW sensor: 10 External sensor: 40 in 0.5 mm² (120 in 1.5 mm²) Ambient thermostat: 200 in 1.5 mm² Ambient sensor: 200 in 1.5 mm²				
Power terminal output	V A	230V AC (+10%, -15%) 5 mA - 1A				

4. INSTALLATION

IMPORTANT: **The boiler must not bear the weight of the accessories and connections (hydraulics, gas, exhaust system, etc.).**

4.1. Installing the boiler

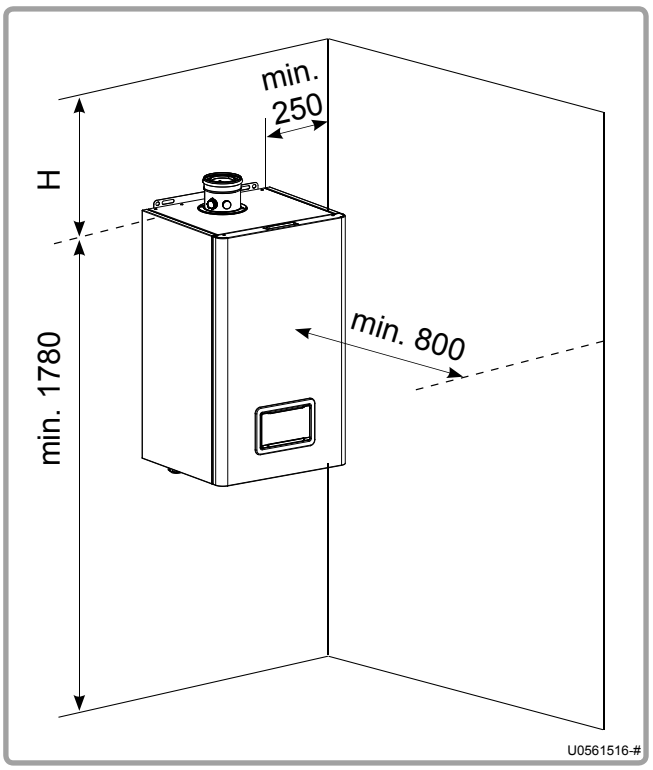


figure 4 - Clearances

VARFREE boilers must not be mounted on a wall covered with an inflammable material: plastic, wood, etc.

The combustion air must be free of agents containing chlorine, ammonia, fluorine and alkaline. These compounds are found in aerosols, paints, cleaning products, washing powder, detergents, glue, snow-clearing salt, etc.
Do draw in the air that is evacuated from places where these products are used - swimming pools, laundries, hair dressing salons, cold rooms - as one or more of these compounds could be introduced into the combustion air.

Recommended distances relative to walls:
Sufficient clearances must be provided to permit easy maintenance operations on the boilers. The **minimum** values (in mm) are indicated in the diagram opposite and table below:

These values cannot be substituted for the specific regulatory requirements.

	B23 / B23P					C13		C33		C53	
	40 kW and 60 kW		80 kW to 120 kW			40 kW and 60 kW	80 kW to 120 kW	40 kW and 60 kW	80 kW to 120 kW	40 kW and 60 kW	80 kW to 120 kW
	ø80	ø125	ø110	ø125	ø160	ø80/125	ø100/150	ø80/125	ø100/150	ø80/80	ø100/100
H* (mm)	280	360	310	430	450	290	350	140	170	510	570

*The minimum value of H corresponds to the spare required to install the exhaust system accessories. It takes account of the dimensions of the 87° angle of a horizontal duct, independently of the length and gradient of the latter.

IMPORTANT: **The boiler must be positioned horizontally using a spirit level to promote effective ventilation of the boiler body (use the roof as a reference surface).**

IMPORTANT: **The front and side jackets are held in place by clips. Remove the jackets before handling the boiler (risk of falling).**

4.2. Removing / installing the front panels

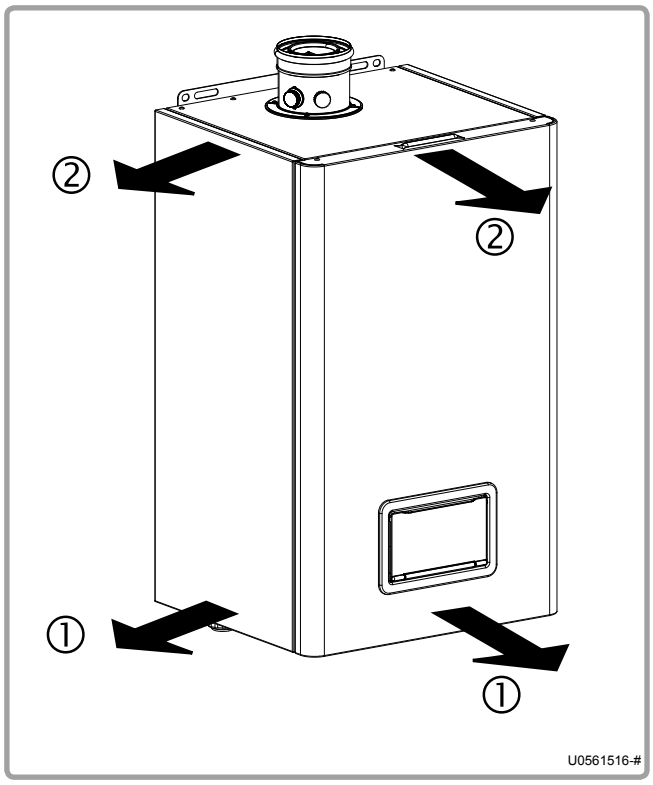


figure 5 - Removing the trim doors

① Pull the bottom of the panel forwards to release.

② Pull the top of the panel forwards to release.

Remove the panel.

Do the opposite to install the panel.

4.3. Exhaust connection

You must comply with the regulatory texts and rules of the art that apply in the country where the boiler will be installed.

The exhaust extraction ducts must be made in a material resistant to the condensate that can form when the boiler is operating. These materials must also be capable of supporting flue gas temperatures up to 120°C.
One exhaust temperature sensor guarantees the protection of the type B and C combustion product evacuation ducts.

VARFREE boilers are approved to be connected to:

- a B23 or B23P flue
- a C13, C33 or C53 suction pipe

IMPORTANT: **The boiler must not be made to support the exhaust duct's weight.**

4.3.1. Connection to a B23 chimney

B23 type connection:
Air from the installation premises, gas evacuation through the roof via a natural draft pipe.

IMPORTANT: **Check that the boiler installation premises have high and low ventilation, that it conforms to current regulations and that it is not obstructed.**

For the **VARFREE 40 kW and 60 kW**, the use of the Ø125 Chimney Adaptor accessory (code 040940) is mandatory to connect the boiler to a B23 chimney duct. This kit is suitable for Ø 125 external ducts.

For the **VARFREE 80 kW to 120 kW**, the use of the Ø160 Chimney Adaptor accessory (code 041050) is mandatory to connect the boiler to a B23 chimney duct. This kit is suitable for Ø 160 external ducts.

IMPORTANT: **Under no circumstances is use of these mandatory accessories a substitute for checking the dimensioning of the chimney ducts (given a combustion gas pressure at the boiler outlet equal to 0 Pa).**

VARFREE boilers are high performance boilers with very low exhaust temperatures; consequently to retain a favourable draft the ducts must run upwards from the boiler outlet.
Horizontal duct runs must be avoided so as to limit condensate retention. To do this use a minimum slope of 3 % towards the boiler in the horizontal parts.

WARNING: **If several boilers are connected to one flue, check by calculation that the flue is not pressurised when all the boilers are operating at Qn.**

Ø duct	VARFREE	Accessory part number	Min. A (mm)	A (mm)
Ø 125	40 kW and 60 kW	040940	2090	310
Ø 160	80 kW to 120 kW	041050	2170	390

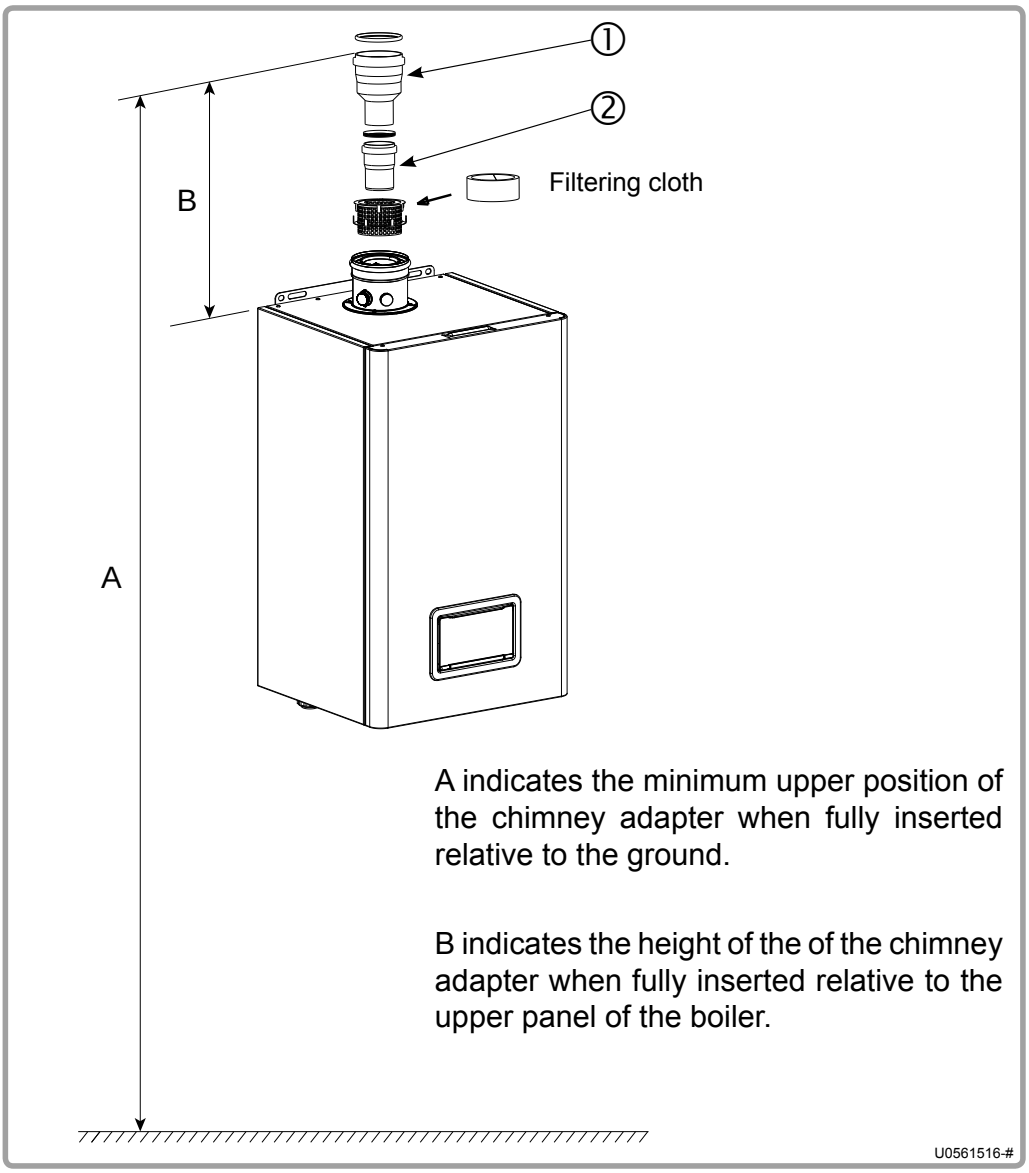


figure 6 - Sizing recommendations

4.3.2. Connection to a B23P chimney

B23P type connection:
Air from the installation premises, gas evacuation through the roof via a pressurised duct.

IMPORTANT:	**Check that the boiler installation premises have high and low ventilation, that it conforms to current regulations and that it is not obstructed.**

IMPORTANT:	**The use of the "Chimney Adaptor" accessory is mandatory to connect a VARFREE boiler to a B23 chimney duct. The table below represents the accessories available for each boiler type.**

IMPORTANT:

The combustion product extraction duct must be dimensioned by using the parameters set out in the table in chapter 3.3.

Depending on the actual configuration of the duct, a calculation is required to check that the pressures at the boiler outlet at Qmin, Qall and Qn do not exceed the maximum allowable values in this table.

Values corresponding to the 50/30°C regime are to be used for this calculation.

IMPORTANT:

If several boilers are connected to the same flue, check the following by calculation:

- **<u>One boiler at Qmin and the others at Qmax</u>: The outlet pressure of the boiler at Qmin must be lower than the permissible pressure specified in the table in Chapter 3.3.**
- **<u>One boiler at Qall and the others at Qmax</u>: The outlet pressure of the boiler at Qmin must be lower than the permissible pressure specified in the table in Chapter 3.3.**
- **<u>All the boilers at Qmax</u>: The outlet pressure of the four boilers must be lower than the permissible pressure specified in the table in Chapter 3.3.**

Ø duct	VARFREE	Accessory part number	Min. A (mm)	A (mm)
Ø 80	40 kW and 60 kW	040945 (contains part ②) *	2000	220
Ø 110	80 kW to 120 kW	041052 (contains part ②) *	2040	260
Ø 125	40 kW and 60 kW	040940 (contains parts ①+②) *	2090	310
	80 kW to 120 kW	041051 (contains parts ①+②) *	2155	375
Ø 160	80 kW to 120 kW	041050 (contains parts ①+②) *	2170	390

* : See figure 6.

IMPORTANT:

For this type of configuration, it is imperative to use an exhaust system with technical evaluation document (ducts under pressure)

The 80 Chimney Adaptor accessory (code 040945) has an Ø80, 500 mm long straight component that can be cut to the desired dimension (195 mm min).

The Ø 110 (code 041052), Ø 125 (codes 040940 and 041051) and Ø 160 (code 041050) chimney adapter have an outlet that cannot be cut.

A purge tee is not necessary, because condensate recovery is incorporated in the boiler. To do this use a minimum slope of 3 % towards the boiler in the horizontal parts.

To ease fitting coat the joints with liquid soap or an appropriate grease.

4.3.3. Connection to a C13 or C33 suction pipe

C13 type connection:
Air inlet and gas evacuation through concentric ducts connected to a horizontal concentric terminal (suction pipe).

C33 type connection:
Air inlet and gas evacuation through concentric ducts connected to a vertical concentric terminal.

WARNING:

The use of the "Horizontal suction pipe" accessory is mandatory to connect the boiler to a C13 concentric suction pipe.
The use of the "Vertical black suction pipe" or "Vertical ochre suction pipe" accessory is mandatory to connect the boiler to a C33 concentric suction pipe.

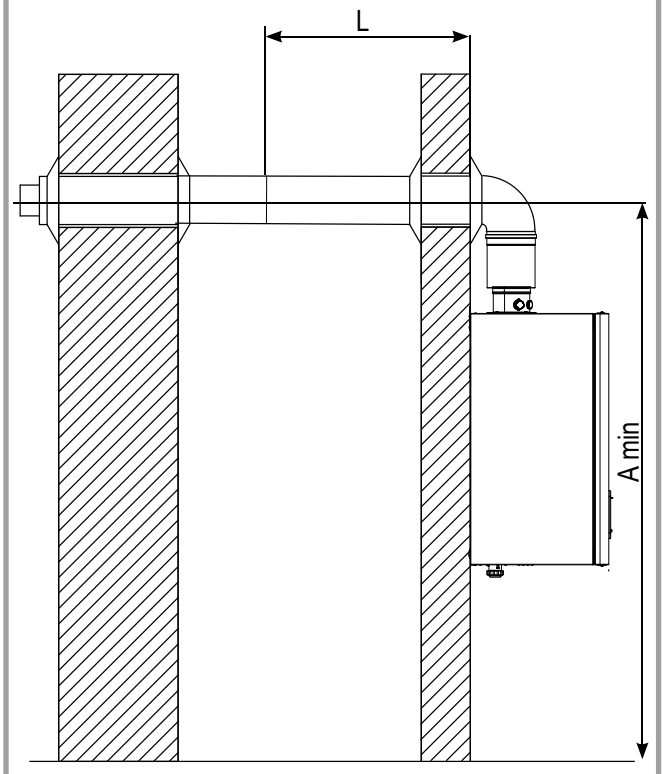
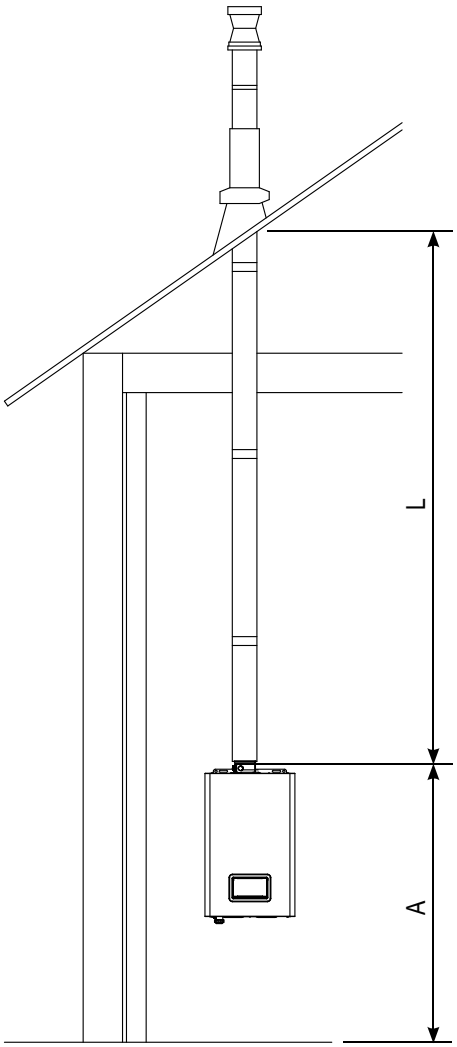


figure 7 - C13 type connection



A indicates the upper position of the boiler gas outlet.

figure 8 - C33 type connection

			VARFREE				
			40 kW	60 kW	80 kW	100 kW	120 kW
Suction pipe horizontal type C13	Terminal C13		040946		040987		
	Ø duct		Concentric 80/125		Concentric 100/150		
	A min (mm)		1948		1995		
	Lmax (m)	G20	15	10	10	10	8
		G31	15	8	10	10	--
Suction pipe vertical type C33	Terminal C33 black		040947		040988		
	Terminal C33 ochre		040948				
	Ø duct		Concentric 80/125		Concentric 100/150		
	A min (mm)		1865		1890		
	Lmax (m)	G20	15	10	10	10	8
		G31	15	8	10	10	--

The Lmax lengths are the lengths excluding the terminal and 90° elbow for the type C13 and excluding the terminal for the type C33.

In addition, in calculating the duct length, take the following equivalences into account:

- 90° elbow = 1 m of straight duct
- 45° elbow = 0.5 m of straight duct

Use a minimum slope of 3% towards the boiler.

For type C13, drill a 150mm hole in the wall for the 80/125 terminal and a 180 diameter hole for the 100/150 terminal. Seal the air vent terminal into the wall with polyurethane foam to allow for removal if necessary.

To ease fitting coat the joints with liquid soap or an appropriate grease.

4.3.4. Connection to a C53 suction pipe

C53 type connection:
Air inlet and gas evacuation through two separate ducts.

WARNING: **The use of the "Vertical black separate suction pipe" or "Vertical ochre separate suction pipe" accessory is mandatory to connect the boiler to a C53 separate suction pipe.**

The table below represents the accessories available for each boiler type.

	VARFREE				
	40 kW	60 kW	80 kW	100 kW	120 kW
C53 black	040951		040999		
C53 ochre	040952				

The approved ducts are Ubbink Rolux Separate Condensation 80/80 ducts for 40 kW and 60 kW kW models and Ubbink Rolux Separate Condensation 100/100 ducts for S2-70 to 120 kW models.

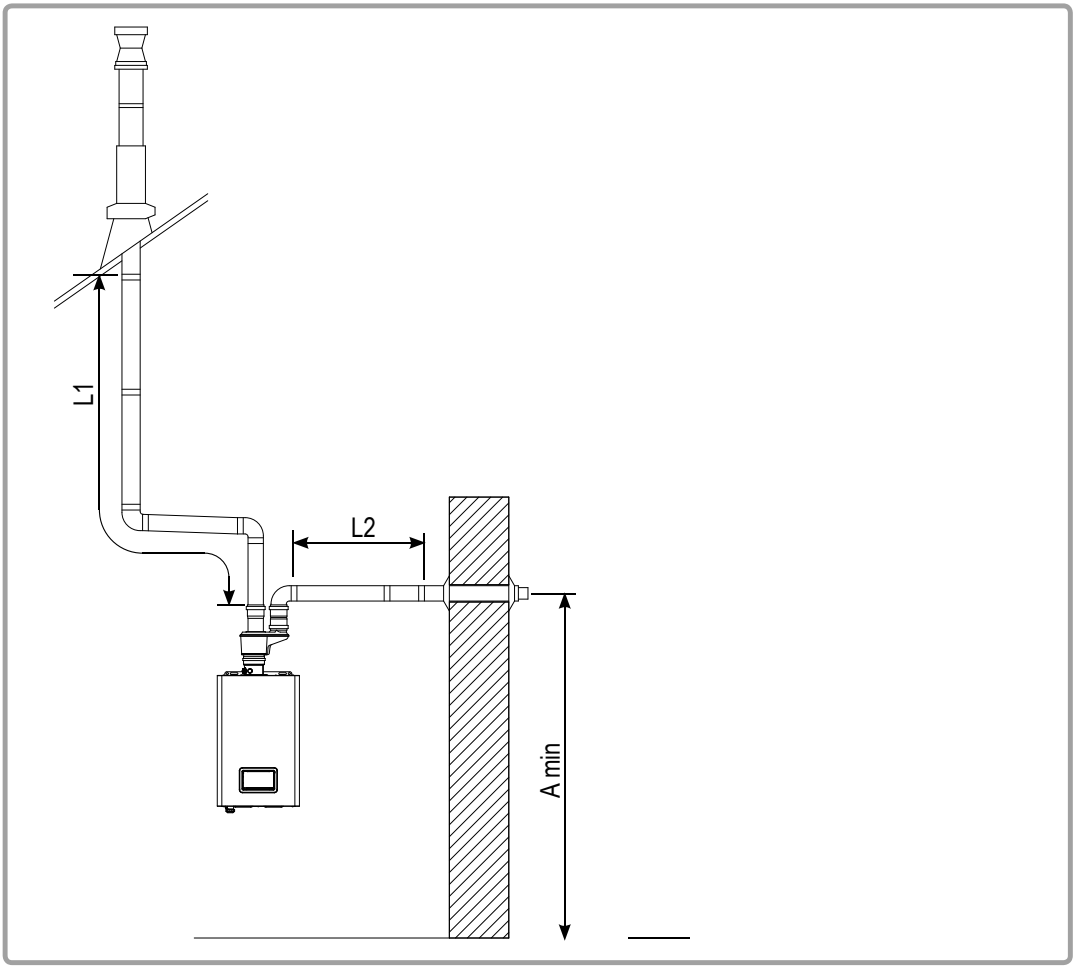


figure 9 - C53 type connection

			VARFREE				
			40 kW	60 kW	80 kW	100 kW	120 kW
Ø duct			Separeted 80/80		Separeted 100/100		
A min (mm)			2194		2240		
Max lengths (m)	G20	Gas (L1)	17	15	15	15	14
		Air (L2)	20	15	20	20	10
	G31	Gas (L1)	17	15	15	15	--
		Air (L2)	20	15	20	20	--

In calculating the duct length take the following rules into account:
- 90° elbow = 1 m of straight duct
- 45° elbow = 0.5 m of straight duct

For the gas duct, use a minimum slope of 3% towards the boiler in the horizontal parts.

To ease fitting coat the joints with liquid soap or an appropriate grease.

4.3.5. Condensate removal

Removal to the drains, via a drain hopper, using a P.V.C tube (minimum diameter 32 mm) is mandatory because the condensates are acid and thus aggressive (pH between 3 and 5).
Use a sufficient slope of the order of 3% to ensure correct flow of the condensates.

IMPORTANT: **Neutralise these condensates before removal according to the current regulations.**

4.4. Gas connection

Before installing the boiler, clean the interior of the gas line, which must be free of metal particles and welding debris. This will lengthen the lifespan of the product.
Before starting up for the first time, check that the pressure of the natural gas supply corresponds to the nominal boiler pressure, stated on the name plate.

The gas valve is fitted with an integrated filter (125µm), but this is not able to retain all the impurities contained in the gas and in the mains pipes. To avoid any malfunction of the gas valve, we advise the fitting of a suitable filter to the boiler gas supply (50µm).
Before feeding gas to the installation, ensure that the different connections are correctly made and gas tight.

In particular check the presence of a removable connector between the isolating valve and the boiler gas supply tapping.
The value before the gas valve must be within the limits shown in the table in chapter 2.5, page 9 for the type of gas.

IMPORTANT:
Before connecting the gas line, check whether the boiler uses G20 or G31 gas. If it uses G31, make the changes described in chapter 4.5, page 27.
The gas line must not be subject to any mechanical stress (risk of loss of gas tightness of the gas valve).
Check that the natural gas supply corresponds to the nominal boiler pressure, stated on the name plate.

4.5. Gas change (G20 to G31, only 40 kW to 100 kW)

This VARFREE boiler has been adjusted in the factory to work with group H (type G20) natural gas with a supply pressure of 20 mbar.

IMPORTANT: **Any operations involving changing the type of gas used must be performed by a qualified professional.**

Any operation involving a change of gas type must be done by a qualified professional. To change gas type, use the operation mode "Manual power adjustment" (see point 3.3.4 in the instructions for the Navistem B3000 boiler controller) which enables the user to switch straight to the minimum or maximum setpoint value (i.e. to zero or full power).

IMPORTANT: **The settings have been approved for the gas supply pressures at the valve inlet (measured on the pressure meter before the gas valve and with the burner working) in the following tables.**

IMPORTANT: **Since the combustion is adjusted with the door open, check that the combustion is clean after installing the front door.**

4.5.1. Installing the propane injector

IMPORTANT: **ONLY 80 kW and 100 kW model boilers.**

Change the type of gas by installing an injector at the gas valve inlet.
Close the gas feed valve and switch off the electric power supply.
Disconnect the electric cable and connect on the gas valve.

Undo the two nuts before and after the valve (see figure below) and remove the valve from the boiler.

Undo the four screws (see below).

Install the injector.

Install the assembly.

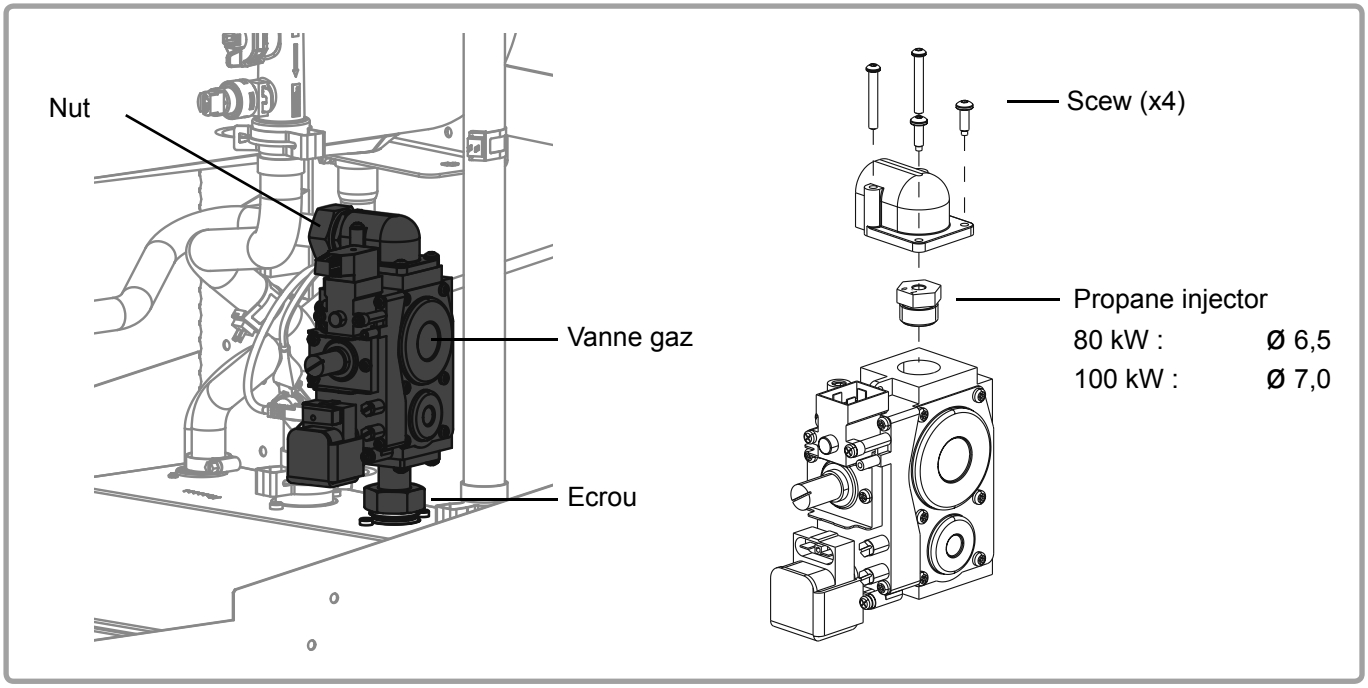


figure 10 - Installing the propane injector

IMPORTANT: **Always replace the washers on the two nuts.**
Check the seals.

4.5.2. Changing the ignition, pre-ventilation, minimum and maximum speeds

Place the boiler in standby mode (see § 3.3.1 of the NAVISTEM B3000 boiler command table instructions).

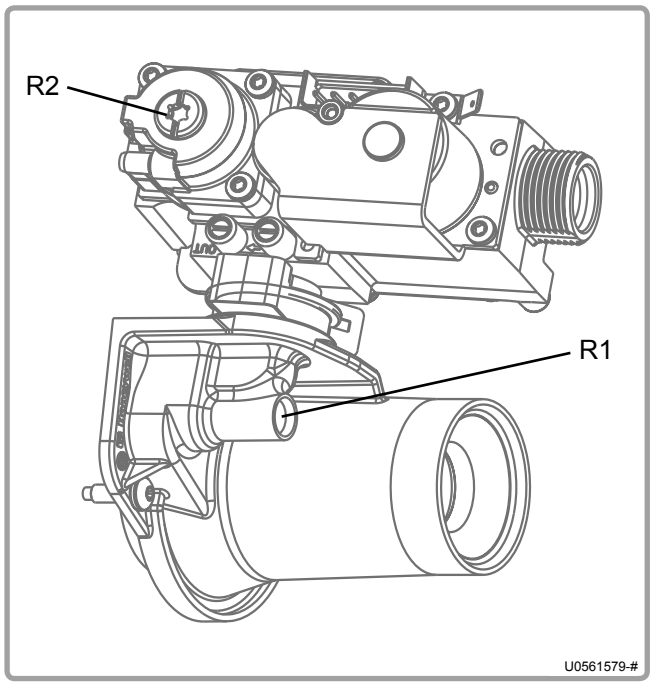
If necessary, press the ESC button to return to the main screen.

Open the ***Settings / Safety unit*** menu.

Adjust the pre-ventilation speed (9504), ignition speed (9512), minimum speed (9524) and maximum speed (9529) settings:

Models	Gas	9504	9512	9524	9529
40	G20	3380	3380	1780	6100
	G31	3250	3250	1690	5900
60	G20	3130	3130	1920	7250
	G31	2790	2470	1840	6900
70	G20	2450	2300	1760	5480
	G31	2770	2770	2770	5330
80	G20	2450	2300	1760	6240
	G31	2770	2770	2770	6100
100	G20	2750	2350	1750	6450
	G31	2750	2550	2550	6250

4.5.3. Adjustment of the gas valve



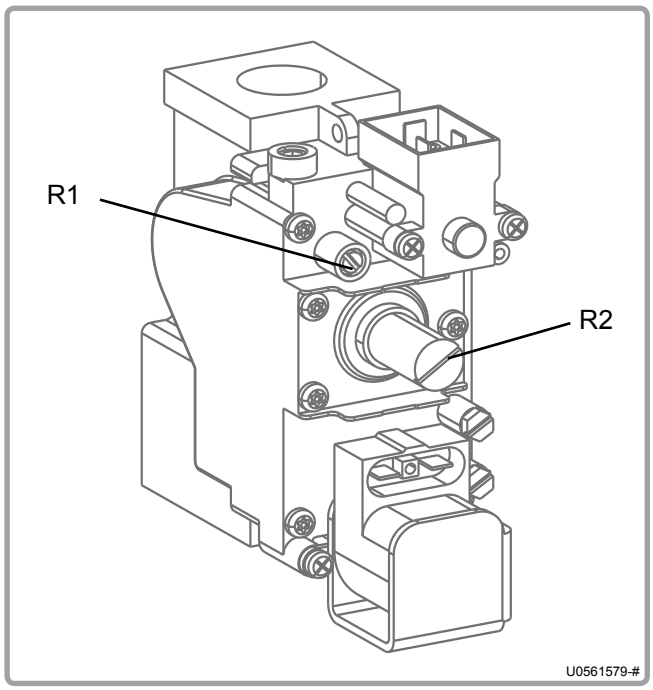


figure 11 - VARFREE S2-7 to 100 kW settings

- Before starting the burner, on the gas valve, preset the gas flow rate, using the gas flow rate adjustment screw R1, to the appropriate value given in the table below.
- Start the burner at maximum power.
- Using a combustion analyser, measure the CO_2 ratio in the exhaust gases: on the gas duct, remove the plug from the opening and insert the CO_2 measurement sensor into the centre of the flow in the exhaust duct.
- Check the CO_2 value at maximum power Qmax and, if necessary, adjust the gas flow screw R1 of the valve in order to obtain the CO_2 values in the table below.
- Change to minimum power Qmin and check that the CO_2 value is within the range in the table below. If necessary, use the setting adjustment screw R2.
- If the setting is adjusted at minimum power, go back to maximum power Qmax and recheck the CO_2 value. Repeat the operation until both values comply with the table below.
- Return to the standard operating mode.

After changing the type of gas:

- **Check the sealing of the gas line.**
- **Stick the G31 label provided in place of the original label (G20).**

			Door open pre-setting		**Checking the door closed settings**	
Model	**Gas**	**Pre-adjustment of the gas flow adjusting screw R1**	**CO_2 Pmax**	**Indicative CO_2 Pmin**	**CO_2 Pmax**	**Indicative CO_2 Pmin**
40 kW	G20	- -	9,0 - 9,2	8,5 - 8,7	9,1 - 9,3	8,7 - 8,9
	G31	Screw R1 2 turns 1/2 Screw R2 1/8 turn	10,2 - 10,4	9,7 - 9,9	10,3 - 10,5	9,9 - 10,1

			Door open pre-setting		Checking the door closed settings	
Model	**Gas**	**Pre-adjustment of the gas flow adjusting screw R1**	**CO_2 Pmax**	**Indicative CO_2 Pmin**	**CO_2 Pmax**	**Indicative CO_2 Pmin**
60 kW	G20	- -	9,0 - 9,2	8,6 - 8,8	9,1 - 9,3	8,7 - 8,9
	G31	Screw R1 3 turns 3/4 Screw R2 1/4 turn	10,2 - 10,4	9,8 - 10,0	10,3 - 10,5	9,9 - 10,1
80 kW	G20	- -	9,0 - 9,2	8,5 - 8,7	9,1 - 9,3	8,7 - 8,9
	G31	Screw R1 1/4 turn Unscrew R2 1/4 turn	10,2 - 10,4	9,7 - 9,9	10,3 - 10,5	9,9 - 10,1
100 kW	G20	- -	9,0 - 9,2	8,5 - 8,7	9,1 - 9,3	8,7 - 8,9
	G31	Don't touch R1 Unscrew R2 1/8 turn	10,2 - 10,4	9,7 - 9,9	10,3 - 10,5	9,9 - 10,1

4.6. Hydraulic connection

The boiler irrigation flow rate must be at least equal to Pinst/25 (Pinst = instantaneous power in Th/h - 1 Th/h = 1.163 kW).
The circulation pump must be sized according to the maximum power delivered.
In the exchanger, never exceed the flow rates specified in paragraph 3.4.

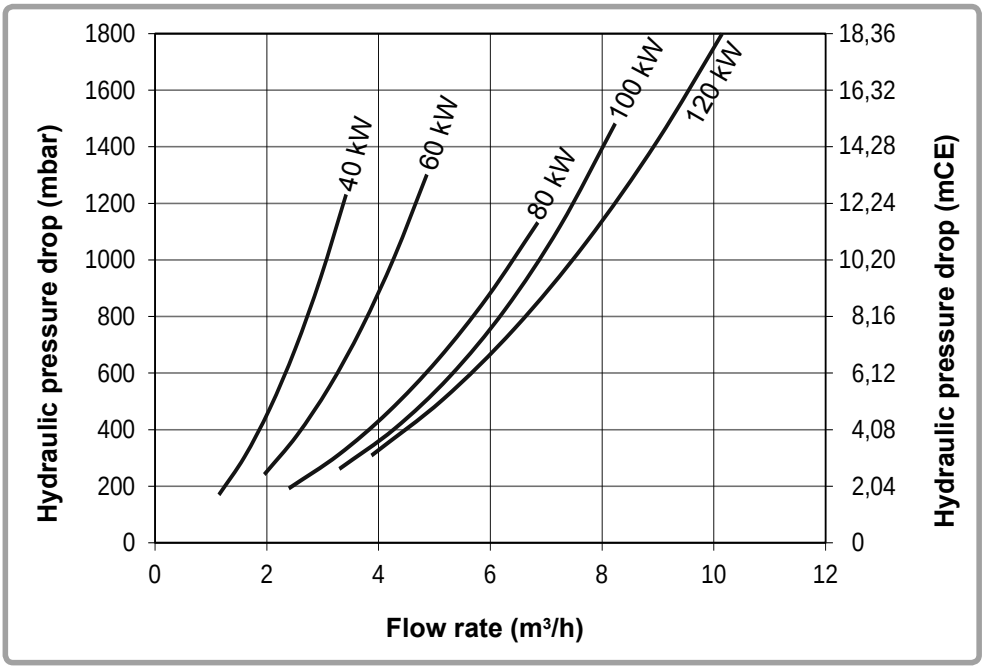


figure 13 - Pressure drop

The boilers are equipped with the following elements:

- an anti-return flap,
- a manual drain tap,
- a flow rate controller.

It is imperative to fit the boiler and its installation with the following components:

- isolating valves on the flow and return taps,
- an expansion tank,
- a safety valve rated at 4 bar max. (as close to the outlet as possible),
- an effective drain mechanism,
- a filling mechanism (to be installed on the return tap),
- a drain mechanism.

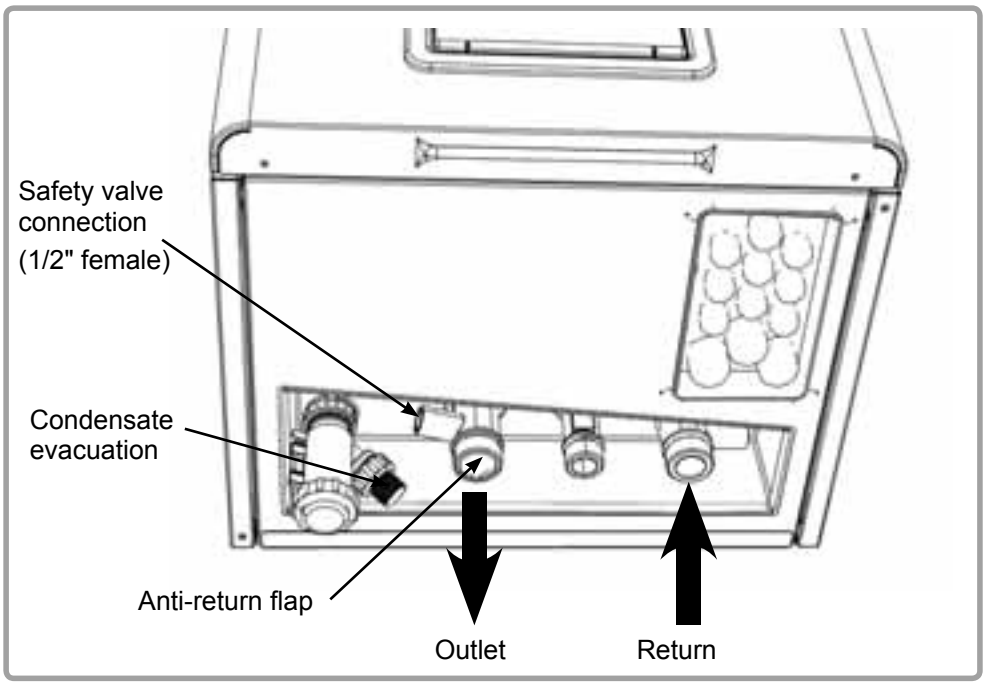


figure 14 - Elements

Filling the installation:

The network must be properly drained. This will be more effective if the boiler is filled slowly, while keeping:

- the manual drain of the exchanger open,
- the safety valve open.

When these two parts discharge a continuous flow of water that is free of bubble, close them and stop filling.

After filling with water:

- Check the water pressure on the pressure gauge (not included). This must be a maximum of 4 bar when hot and a **minimum of 1 bar when cold**.
- Check that the boiler and its installation are completely bled (check the boiler levelling with a spirit level).

Condensate removal:

Removal to the drains, via a drain hopper, using a P.V.C tube (minimum diameter 32 mm) is mandatory because the condensates are acid and thus aggressive (pH between 3 and 5).

Use a sufficient slope of the order of 3% to ensure correct flow of the condensates.

IMPORTANT: **Neutralise these condensates before removal according to the current regulations.**

4.7. Electrical connection

WARNING: **Always check that the electric power supply is switched off before working on the boiler.**

IMPORTANT:

It is mandatory to connect this boiler correctly to earth and to comply with standard for low-voltage electrical installations.
Provide a two-pole circuit breaker upstream of the boiler (distance between contacts: 3.5 mm minimum).
Fitting the electrical installation with a 30 mA differential protective device is strongly advised.

Please refer to the installation and user manuals of the NAVISTEM B3000 boiler controller for more information about the electrical connections on the control panel (characteristics of the electric power supply, cable cross-sections and connections to the terminals).

4.7.1. Control panel

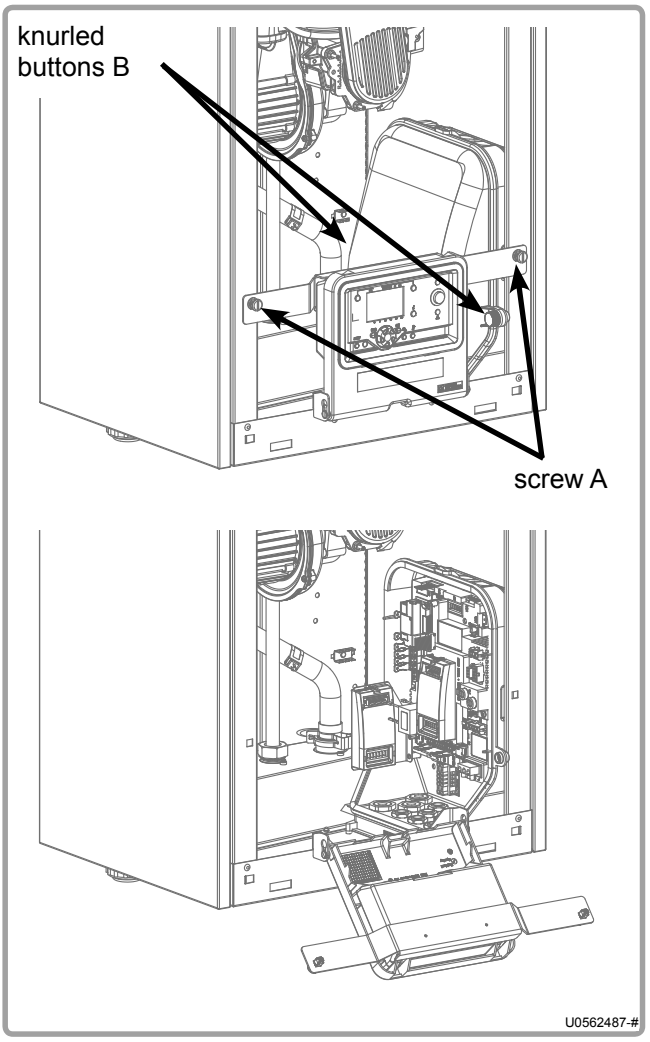


figure 15 - Access to the NAVISTEM B3000

Remove the front panel of the boiler in order to gain access to the control panel.

The panel is located in the lower right-hand part of the boiler.

Loosen the screws A (see opposite) by a quarter turn and tilt the display forwards.

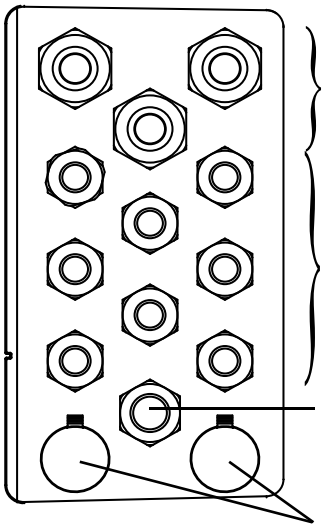
The cover of the panel is secured by two knurled buttons B. Undo them and remove the cover.

4.7.2. Cable ways

Use the packing glands beneath the boiler to pass the cables to the various terminals of the NAVISTEM B3000.

View from inside the control panel

Rear of the boiler



Three packing glands for the **signal connections** (sensors, communications bus, etc.).

Eight packing glands for the **power connections** (alarm reports, heating circuit circulation pumps, domestic hot water circulation pump, mixer valves, etc.).

Packing glands for the **electric power supply of the boiler**

Two plugs for the **boiler circulation pump option** (electric power supply and control)

Front of the boiler

4.7.3. Wiring diagram

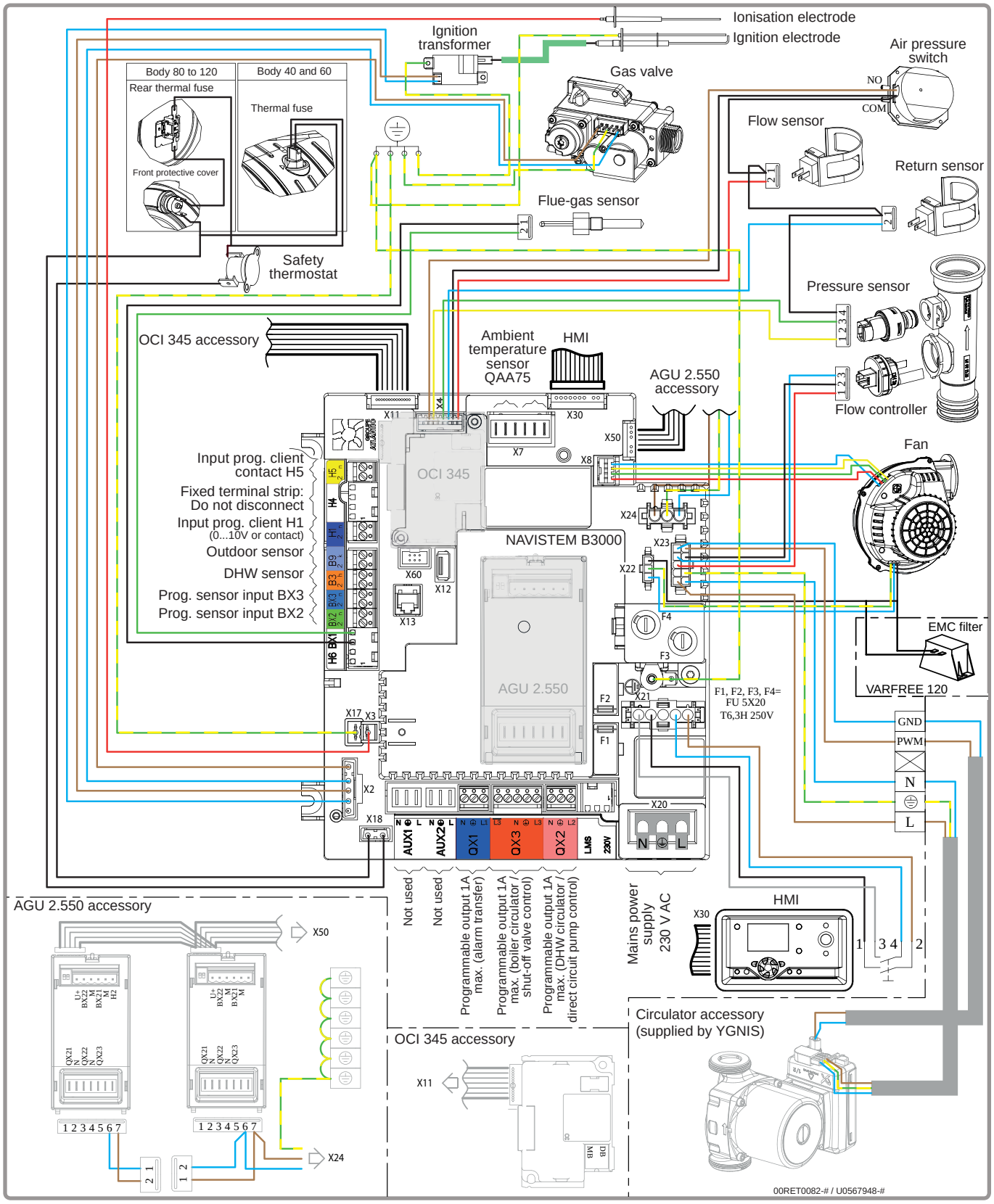


figure 17 - Wiring diagram

4.7.4. Connection to the terminals of the NAVISTEM B3000 boiler controller

To connect the NAVISTEM B3000 boiler controller, please refer to the installation and user manual.

4.7.5. Connection of the boiler circulation pump (compulsory accessory)

4.7.5.1. Accessory supplied by YGNIS

If the accessory is supplied by YGNIS, please refer to the installation manual for the connection of the boiler circulation pump.

4.7.5.2. Accessory supplied by the customer

The circulation pump is controlled by a 230 VAC (1A max.) output on the NAVISTEM B3000 panel.

This output is active when a request for heat is in progress on the boiler.

If the circulation pump does not have a control switch:

Directly wire the power supply of the circulation pump (230 VAC - 1A max.) to the terminal QX3 (contacts L3, N and ⏚) on the NAVISTEM B3000 panel. If the circulation pump consumes more than 1A, the power supply must be relayed.

If the circulation pump is equipped with a dry-contact On / Off control:

Connect the power supply of the circulation pump directly from your electric panel.

Use the QX3 output (contacts L3 and N) on the NAVISTEM B3000 panel (230 VAC - 1 A max.) to wire the circulation pump relay control.

4.7.6. Connection of the OCI 345 module (optional accessory)

To install the OCI 345 module, please refer to the manual provided with the accessory.

4.7.7. Connection of the AGU 2.550 module(s) (optional accessory)

To install the AGU 2.550 module(s), please refer to the manual provided with the accessory.

4.7.8. Fuses

The VARFREE boiler is fitted with four fuses on the boiler controller (refer to the label on the protective cover for their positions and characteristics).

Three spare fuses are also provided on the boiler controller.

5. FIRST USE

5.1. Checks before first use

Check that the cold pressure is a minimum of 1 bar.
If this is a boiler house renovation, ensure that flushing and if necessary silt removal from the installation have been correctly done (see chapter 1.5, page 5 of this manual).
Verify the connecting of the gases according to the type of chimney.
Check that the pressure and the type of gas are adapted to the product.

WARNING: **The use of glycol water if forbidden.**

IMPORTANT: **The use of the connection accessories is mandatory to connect a STRATTON MK2 boiler to a B23 or B23P chimney duct.**

5.2. First use

Before packing all boilers are subjected to a factory test using group H (type G20) natural gas during which all the settings are done.

For first use perform the following operations:

1. Switch on the main circuit breaker.

2. Create a request for heat via the comfort mode using the customer interface (see the chapter "3 - Interface utilisateur" in the NAVISTEM B3000 boiler controller manual).

3. After starting the burner, check the gas tightness of the gas line connections using a foaming product. Check combustion health using an exhaust gas analyser.

4. Adjust the boiler setting (refer to the table summarising customer parameters at the end of this manual).

IMPORTANT: **Any work on a sealed component will lead to loss of the guarantee.**

6. CHECKS AFTER COMMISSIONING

6.1. Condensate removal

Check that the removal of condensates is not obstructed on either the boiler side or the pipe side.

6.2. Gas supply

Check that the gas pipe diameter is correctly sized:

It is necessary to stop all the boilers together abruptly using the boiler room main circuit breaker to check that the gas pressure regulator safety device is not triggered.

If this is triggered, the gas pipe is undersized. After this operation, re-engage the circuit breaker. The boilers should start automatically, if not, consult the supplier of the gas pressure regulator.

7. MAINTENANCE OPERATIONS

These operations must be carried out by a qualified professional.

Before performing the following operations:
- **Switch off the main circuit breaker.**
- **Close the gas supply isolation valve.**
- **Isolate the boiler hydraulically.**

Clean the exchanger (see details in the next chapter)
Check tube sooting visually. If necessary, clean the tubes with a **non-metal brush. Chemical cleaning is forbidden**.
Ignition / ionisation electrodes (see details in the next chapter)
Check the geometry of the ignition electrode (gap width) and the ionising electrode. If necessary, replace the electrodes.
Condensate removal siphon
Clean the removal siphon and check that the condensates flow correctly (replace the water after checking).
Check the gas valve and the differential air pressure switch. Check the connection of the pressure transfer pipe.
Carry out a combustion hygiene check.

7.1. Draining the boiler

- Hydraulically isolate the boiler (for installations with our cascade packs, the shut-off valves are on the collectors),
- Reduce the pressure by opening the boiler bleed valve,
- Open the drain valve of the installation or the valve supplied with our hydraulic packs,
- Complete the draining of the outlet pipe by actuating the safety valve.

7.2. Annual checks

- Switch off the electric power supply of the boiler,
- Close the gas supply,
- Remove the front panel (see § 4.2, page 16).

WARNING: **Protect all the electric connectors inside the control panel when working on the boiler hydraulics (risk of splashing).**

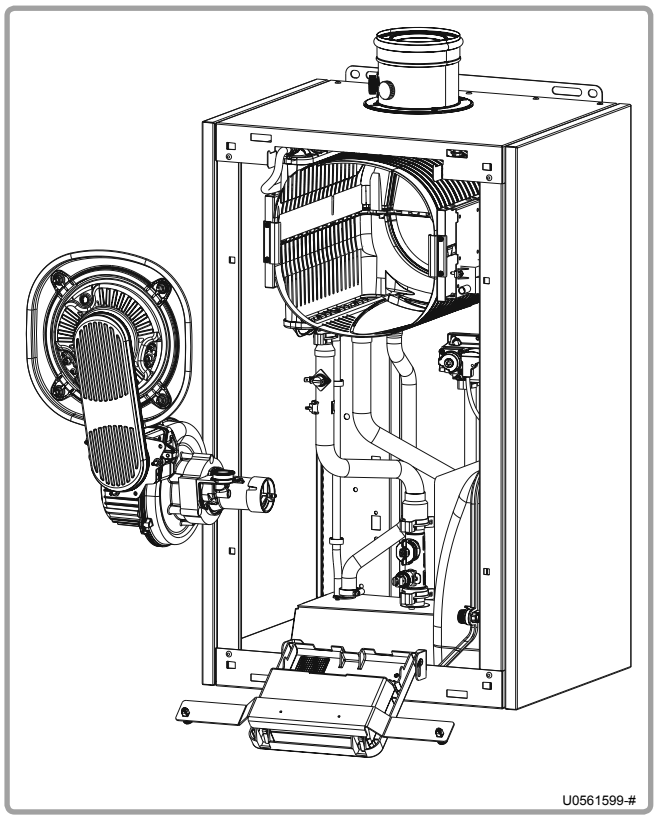


figure 18 - Open STRATTON MK2

- Disconnect the gas tube after the gas valve,
- Disconnect the electrodes, the fan and the air transfer pipe by the air pressure switch,
- Unscrew the M6 nuts attaching the door,
- Remove the burner support, fan and venturi assembly and carefully put it in a clean place.

- If there are any deposits in the combustion chamber, brush the tubes of the exchanger with a **non-metal brush. Chemical cleaning of the combustion chamber with an acid or alkaline product is forbidden**. Vacuum clean the deposits.
- If the refractory insulation at the bottom of the combustion chamber and of the burner support is damaged, then it must be replaced.
- If the level of condensates in the combustion chamber has risen due to poor evacuation, the refractory insulation at the bottom of the combustion chamber and of the burner holder must be replaced.
- Replace the seals on the burner holder if they are damaged.
- The burner rail does not require any maintenance. Replace it, if damaged.

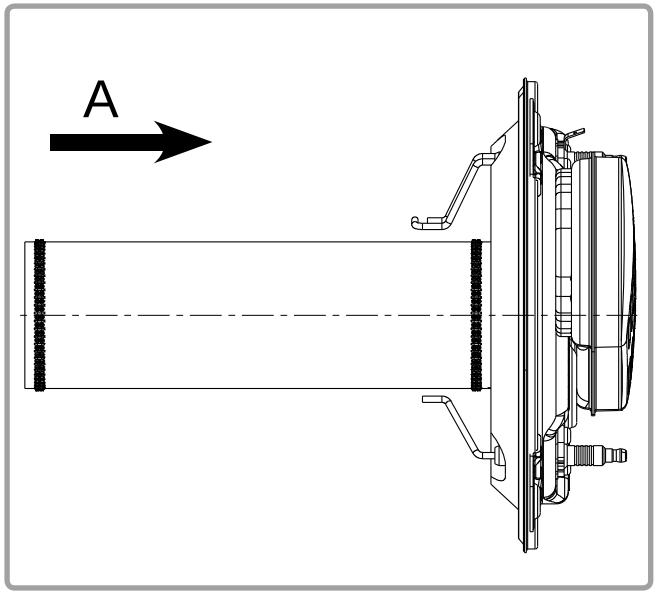


figure 19 - Side view of the burner

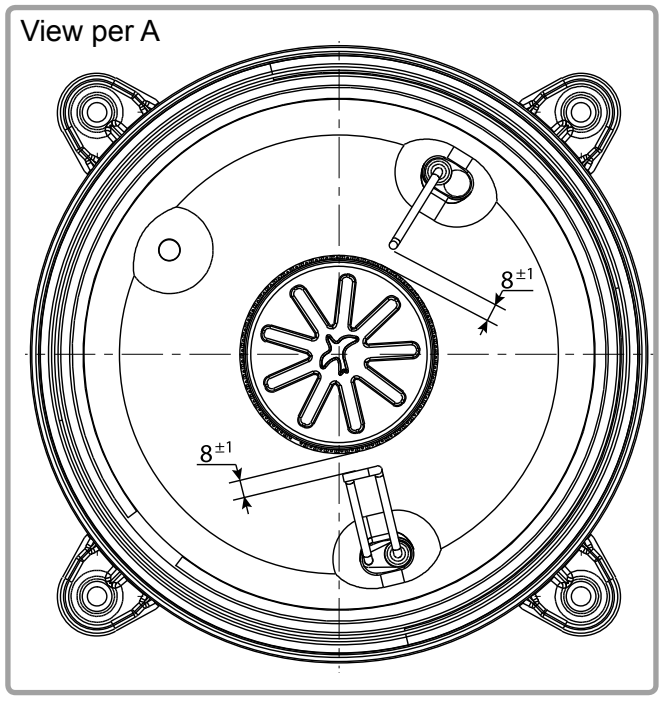


figure 20 - Position of the burner electrodes

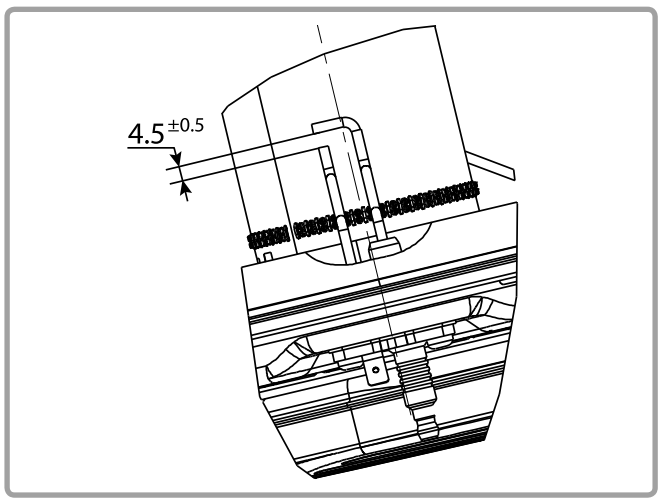


figure 21 - Geometry of the electrodes

- Check the geometry of the electrodes, alumina deposits and the appearance of the ceramic and the seals. Replace the electrodes and the seals if they are damaged.
- Clean the siphon and check that the condensate flows freely through it. The siphon must be filled after maintenance.

- Install the burner holder and tighten the M6 nuts crossways (four nuts on 40 kW and to 60 kW models, six nuts on 80 kW to 120 kW models). Maximum tightening torque: 5 Nm.
- Connect the gas supply.
- Check that the gas circuit is sealed with a foaming product.
- Install the control panel.

- Switch on the electric power supply.
- Start the boiler, check that the burner holder is properly sealed and check the hygiene of the combustion. The rate of CO_2 must comply with the values in the table in paragraph 4.5.
- Install the front panel and check the hygiene of the combustion with the door closed.

8. END-OF-LIFE CYCLE OF THE APPARATUS

Regulatory disposal and managed recycling of this product can prevent damage to the environment and health risks.

a) For the disposal of the product and the component parts, the services of an accredited waste disposal company should be used.

b) For more information on waste disposal/management, contact the Local Authority responsible for waste management or the point of sales where the product was purchased