# VARMAX

## GAS CONDENSING BOILER

## 120 to 450 kW

## with modulating burner
## for natural gas and propane gas


COLLECTIVE PRODUCT

CE

Document No. 00BNO9061-L / 18.04.16

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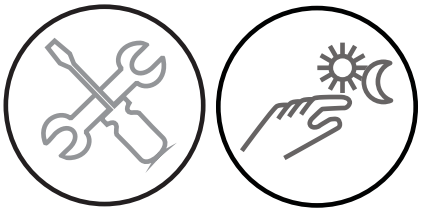

# Installation, use and maintenance instructions

**MANUFACTURER:**

GROUPE ATLANTIC

SITE DE PONT-DE-VAUX

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FR - 01190 PONT-DE-VAUX

# CONTENTS

# 1. WARNINGS AND RECOMMENDATIONS

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

**INFORMATION:** **VARMAX boilers are available with 2/3 tappings or 4 tappings. It is not possible to transform a version with 2/3 tappings into a version with 4 tappings and vice versa.**

## 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/CE)**

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)**

**- Efficiency (92/42/CEE) until 26/09/2015**

**- Eco-design (2009/125/EC): from 26/09/2015**

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.

## 2.3. Gas category

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

**INFORMATION: Any work on a sealed element leads to loss of warranty.**

| | | Category | |
|---|---|---|---|
| | | **DK, EE, FI, HU, LV, NO, SE, TR** | **CZ, GR, GB, IE, LT, RO, SI, SK** |
| **VARMAX 120 to 225** | **B23 - B23 P** | $I_{2H}$ | $II_{2H3P}$ |
| | **C13 - C33 - C53** | | $I_{2H}$ |
| **VARMAX 275 to 320** | **B23 - B23 P** | $I_{2H}$ | $II_{2H3P}$ |
| | **C53** | | $I_{2H}$ |
| **VARMAX 390 to 450** | **B23 - B23 P** | $I_{2H}$ | $I_{2H}$ |
| | **C53** | | |

## 2.4. Gas supply pressures

**INFORMATION:** **The pressures given below must be read at the gas valve inlet.**

| | **Natural gas H G20**<br>20 mbar | **G31 Propane gas**<br>(for relevant models and countries only) |
|---|---|---|
| **Nominal pressure (mbar)** | 20 | 37 |
| **Minimum pressure (mbar)** | 17 | 25 |
| **Maximum pressure (mbar)** | 25 | 45 |

# 3. TECHNICAL SPECIFICATIONS

## 3.1. Dimensions

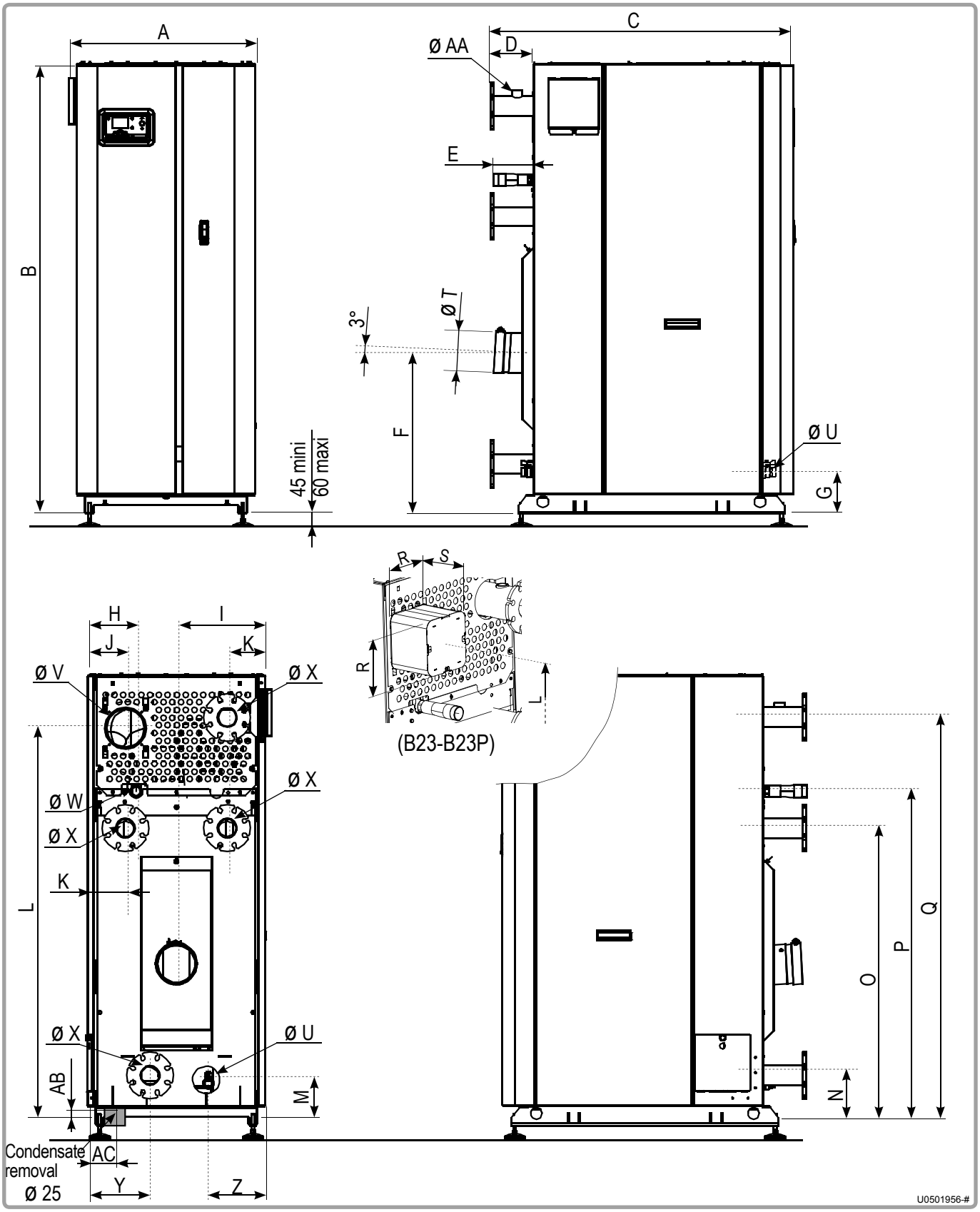



***figure 1 - Dimensions***

| | | MODELS | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | **120** | **140** | **180** | **225** | **275** | **320** | **390** | **450** |
| **A** | **(mm)** | 734 | | 734 | | 812 | | 912 | |
| **B** | **(mm)** | 1530 | | 1780 | | 1877 | | 2023 | |
| **C** | **(mm)** | 1189 | | 1218 | | 1341 | | 1392 | |
| **D** | **(mm)** | 148 | | 169 | | 169 | | 168 | |
| **E** | **(mm)** | 103 | | 150 | | 109 | | 92 | |
| **F** | **(mm)** | 510 | | 630 | | 680 | | 750 | |
| **G** | **(mm)** | 138,5 | | 138,5 | | 138,5 | | 138,5 | |
| **H** | **(mm)** | 115 | | 192 | | 241 | | 274,5 | |
| **I** | **(mm)** | 350,5 | | 350,5 | | 399,5 | | 449,5 | |
| **J** | **(mm)** | 150,5 | | 150,5 | | 200 | | 209,5 | |
| **K** | **(mm)** | 166,5 | | 150,5 | | 179 | | 192 | |
| **L** | **(mm)** | 1256 | | 1564 | | 1672 | | 1874 | |
| **M** | **(mm)** | 165 | | 165 | | 165 | | 165 | |
| **N** | **(mm)** | 182 | | 197,5 | | 196,5 | | 206,5 | |
| **O** | **(mm)** | 926 | | 1171 | | 1265 | | 1402 | |
| **P** | **(mm)** | 1062 | | 1315 | | 1413 | | 1577,5 | |
| **Q** | **(mm)** | 1298 | | 1606 | | 1661 | | 1933 | |
| **R** | **(mm)** | 212 | | 212 | | 244 | | 244 | |
| **S** | **(mm)** | 163 | | 163 | | 163 | | 183 | |
| **Ø T(*): Smoke outlet** | **(mm)** | 150 | | 150 | | 180 | | 200 | |
| **Ø U: Purge connecting sleeve** | | 1 " | | 1 " | | 1 " | | 1 " | |
| **Ø V(*): Air inlet** | **(mm)** | 150 | | 150 | | 180 | | 180 | |
| **Ø W: Gas connecting sleeve** | **G20** | 1 " 1/4 | | 1 " 1/2 | | 2 " | | 2 " | |
| | **G31** | 1 " 1/4 | | 1 " 1/2 | | 2 " | | -- | |
| **Ø X: Out / In connecting sleeve** | | Mail thread 2 " | | Flange PN16 DN 65 | | Flange PN16 DN 80 | | Flange PN16 DN 80 | |
| **Y** | **(mm)** | 250,5 | | 247 | | 276 | | 289,5 | |
| **Z** | **(mm)** | 237 | | 224,5 | | 270,5 | | 283,5 | |
| **Ø AA: Valve connecting sleeve** | | 1 " | | 1 " | | 1 " 1/4 | | 1 " 1/4 | |
| **AB** | **(mm)** | ≈ 130 | | ≈ 130 | | ≈ 130 | | ≈ 130 | |
| **AC** | **(mm)** | ≈ 110 | | ≈ 110 | | ≈ 110 | | ≈ 120 | |

(*) The diameter indicated is the inside diameter (only for Ø T and Ø V).

## 3.2. Doorways

VARMAX 120 to 225 boilers fit through doors 700 mm wide with the casing on (boiler with doors and side jackets).

VARMAX 275 to 320 boilers fit through doors 735 mm wide without the casing on (boiler without doors, without side jackets and without side insulating panels).
However, it is possible to pass through the 700 mm doors if the following parts are removed, in addition to the parts mentioned above:

- the two inspection doors with their 16 fastening clamps,
- the two lower hinge lugs of the front housing doors (with the step),
- the two upper hinge lugs of the front housing doors (with the step),
- all the cable clamps at the inlet of the high- and low- current wiring gutter.

VARMAX 390 to 450 boilers fit through doors 800 mm wide without the casing on, which means that the following parts must be removed:

- the two front housing doors,
- the side insulating jackets,
- the side insulating panels
- the two lower hinge lugs of the front housing doors (with the step),
- the two upper hinge lugs of the front housing doors (with the step),
- all the cable clamps at the inlet of the high- and low- current wiring gutter.

## 3.3. Combustion at 15°C and 1013 mbar

### *3.3.1. G20 Natural Gas*

| | | MODELS | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | **120** | **140** | **180** | **225** | **275** | **320** | **390** | **450** |
| **Nominal power Pn (80/60°C)** | kW | 117 | 136 | 175 | 219 | 268 | 312 | 381 | 439 |
| **Nominal power when condensing P (50/30°C)** | kW | 127 | 148 | 191 | 238 | 290 | 338 | 415 | 478 |
| **Nominal heat input Qn** | kW | 120 | 140 | 180 | 225 | 275 | 320 | 390 | 450 |
| **Minimum heat input Qmin** | kW | 28 | 28 | 43 | 43 | 66 | 66 | 87 | 87 |
| **Gas flow rate at Pn** | $m^3/h$ | 12,7 | 14,81 | 19,05 | 23,81 | 29,1 | 33,86 | 41,3 | 47,6 |
| **$CO_2$ value ranges** | % | Qmin : 8,3 % < $CO_2$ < 8,7 %<br>Qmax : 8,8 % < $CO_2$ < 9,2 % | | | | | | | |
| **Flue-gas mass flow rate at Qn / Qmin (80/60°C)** | g/s | 52,8 / 13 | 61,3 / 13,1 | 80,4 / 20,8 | 99,5 / 21,1 | 113,9 / 26,9 | 133,2 / 29,1 | 169 / 39,2 | 200,7 / 35,6 |
| **Flue-gas mass flow rate at Qn / Qmin (50/30°C)** | g/s | 49,1 / 12,3 | 57,6 / 12,2 | 75,9 / 19,5 | 93,0 / 19,5 | 108,7 / 17,1 | 126,3 / 27,1 | 159,6 / 36,7 | 191 / 33,4 |
| **Flue-gas temperature at Qn / Qmin (80/60°C)** | °C | 60,8 / 56,9 | 62,1 / 57,3 | 61,0 / 56,6 | 62,3 / 57,7 | 61,7 / 58,3 | 63,4 / 57,2 | 62,5 / 57,4 | 64,8 / 57,1 |
| **Flue-gas temperature at Qn / Qmin (50/30°C)** | °C | 35,7 / 28,8 | 37,7 / 30,2 | 33,7 / 30,0 | 36,9 / 30,2 | 36,3 / 29,8 | 36,2 / 28,3 | 36,7 / 30 | 41,7 / 30,2 |
| **Appliance pressure at nominal Qcal (B23)** | Pa | 88 | 108 | 103 | 147 | 132 | 162 | 152 | 203 |
| **Inside diameter of flue-gas output** | mm | 150 | 150 | 150 | 150 | 180 | 180 | 200 | 200 |
| **Maximum allowable nozzle pressure (B23P) at Qn / Qmin (80/60°C)** | Pa | 200 / 5 | 200 / 5 | 115 / 5 | 165 / 5 | 122 / 5 | 176 / 5 | 180 / 5 | 193 / 5 |
| **Maximum allowable nozzle pressure (B23P) at Qn / Qmin (50/30°C)** | Pa | 166 / 5 | 164 / 5 | 92 / 5 | 128 / 5 | 97 / 5 | 145 / 5 | 155 / 5 | 173 / 5 |
| **Combustion air flow rate at Qn** | $m^3/h$ | 153,8 | 179,4 | 230,7 | 288,3 | 352,4 | 410,1 | 499,8 | 576,7 |
| **NOx class** | | 6 | | | | | | | |
| **Flue-gas removal and air inlet type classifications** | | B23, B23P<br>C13, C33, C53 | | | | B23, B23P<br>C53 | | | |

### *3.3.2. G31 Propane Gas (for relevant models and destination countries)*

| | | MODELS | | | | | |
|---|---|---|---|---|---|---|---|
| | | **120** | **140** | **180** | **225** | **275** | **320** |
| **Nominal power Pn (80/60°C)** | kW | 117 | 136 | 175 | 219 | 268 | 312 |
| **Nominal power when condensing P (50/30°C)** | kW | 127 | 148 | 191 | 238 | 290 | 338 |
| **Nominal heat input Qn** | kW | 120 | 140 | 180 | 225 | 275 | 320 |
| **Minimum heat input Qmin** | kW | 39 | 39 | 63 | 63 | 90 | 90 |
| **Gas flow rate at Pn** | $m^3/h$ | 4,91 | 5,73 | 7,36 | 9,21 | 11,25 | 13,09 |
| **$CO_2$ value ranges** | % | Qmin : 9,8 % < $CO_2$ < 10,2 %<br>Qmax : 10,4 % < $CO_2$ < 10,8 % | | | | | |
| **Flue-gas mass flow rate at Qn / Qmin (80/60°C)** | g/s | 53 / 18,3 | 61,8 / 18,3 | 80 / 29 | 100 / 29 | 122 / 42 | 142 / 42 |
| **Flue-gas mass flow rate at Qn / Qmin (50/30°C)** | g/s | 50,2 / 17,3 | 58,7 / 17,3 | 80 / 28 | 96 / 28 | 117 / 39 | 136 / 40 |
| **Flue-gas temperature at Qn / Qmin (80/60°C)** | °C | 60,3 / 56,7 | 62,6 / 56,7 | 60,3 / 57,1 | 62,2 / 57,6 | 63 / 58 | 65,4 / 58,4 |
| **Flue-gas temperature at Qn / Qmin (50/30°C)** | °C | 34,6 / 30,6 | 37,1 / 28,9 | 37,1 / 31 | 37 / 29,4 | 40 / 29 | 41,4 / 31,3 |
| **Appliance pressure at nominal Qcal (B23)** | Pa | 68 | 95 | 102 | 140 | 123 | 165 |
| **Inside diameter of flue-gas output** | mm | 150 | 150 | 150 | 150 | 180 | 180 |
| **Maximum allowable nozzle pressure (B23P) at Qn / Qmin (80/60°C)** | Pa | 167 / 12 | 200 / 8 | 103 / 4 | 136 / 7 | 118 / 11 | 157 / 11 |
| **Maximum allowable nozzle pressure (B23P) at Qn / Qmin (50/30°C)** | Pa | 140 / 16 | 169 / 11 | 66 / 7 | 104 / 7 | 104 / 16 | 138 / 13 |
| **Combustion air flow rate at Qn** | $m^3/h$ | 153,8 | 179,4 | 230,7 | 288,3 | 352,4 | 410,1 |
| **NOx class** | | 6 | | | | | |
| **Flue-gas removal and air inlet type classifications** | | B23, B23P | | | | | |

## 3.4. Conditions of use

| | | MODELS | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | **120** | **140** | **180** | **225** | **275** | **320** | **390** | **450** |
| **Maximum start setting temperature** | °C | 85 | | | | | | | |
| **Start maximum temperature** | °C | 88 | | | | | | | |
| **Safety temperature** | °C | 110 | | | | | | | |
| **Maximum service pressure** | hPa (bar) | 6000 (6) | | | | | | | |
| **Minimum cold pressure** | hPa (bar) | 1000 (1) | | | | | | | |
| **Hydraulic pressure loss at ΔT20** | | | | | | | | | |
| **version with 2 or 3 tappings** | daPa | 600 | 750 | 570 | 810 | 820 | 1185 | 770 | 970 |
| **version with 4 tappings** | | | | | | | | | |
| **Main exchanger** | | 500 | 650 | 440 | 660 | 790 | 1060 | 660 | 840 |
| **Condenser** | | 110 | 120 | 55 | 75 | 50 | 65 | 190 | 230 |
| **Nominal water flow rate (P/20)** | $m^3/h$ | 5,0 | 5,8 | 7,5 | 9,4 | 11,5 | 13,4 | 16,4 | 18,9 |
| **Maximal water flow rate (P/10)** | $m^3/h$ | 10,0 | 11,6 | 15,0 | 18,8 | 23,0 | 26,8 | 32,8 | 37,8 |
| **Water content** | L | 116 | 116 | 151 | 151 | 239 | 239 | 287 | 287 |
| **Weight without water** | kg | 340 | 340 | 393 | 393 | 502 | 502 | 592 | 592 |
| **Sound power at $P_{max}$ (Lw) *** | dB(A) | 80 | | 76 | | 77 | | 84 | |
| **Sound pressure at 1 m at $P_{max}$ (Lp)** | dB(A) | 65 | | 61 | | 61 | | 68 | |
| **Temperature of installation room (min. / max.)** | **°C** | 5 / 45 | | | | | | | |
| **Relative humidity of installation room** | | between 5% and 95% | | | | | | | |
| **Protection level** | | IP20 | | | | | | | |
| **Maximum altitude of installation** | **m** | 2000 | | | | | | | |

* The sound power level is a laboratory measurement of the emitted sound power but contrary to the noise level, it doesn't correspond to the perceived measurement.

## 3.5. Electrical connection

| | | MODELS | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | **120** | **140** | **180** | **225** | **275** | **320** | **390** | **450** |
| **Electrical supply** | V | 230 V AC (+10% -15%), 50Hz | | | | | | | |
| **Electrical power consumption at Qn (without accessories)** | W | 204 | 311 | 179 | 320 | 238 | 352 | 480 | 660 |
| **Electrical power consumption in standby mode** | W | 5 | | | | | | | |
| **Max length of sensor cables** | m | DHW sensor: 10<br>External sensor: 40 in 0.5 mm² (120 in 1.5 mm²)<br>Ambient thermostat: 200 in 1.5 mm²<br>Ambient sensor: 200 in 1.5 mm² | | | | | | | |
| **Power terminal output** | V | 230V AC (+10%, -15%) | | | | | | | |
| | A | 5 mA - 1A | | | | | | | |

# 4. INSTALLATION

**DANGER:** **Manipulation of the boiler using a hoist requires the use of a frame (not supplied). This is COMPULSORY. Refer to the label stuck onto the boiler's packaging.**

## 4.1. Installation of the air filter and filter matting

**WARNING:** **If connecting CHIMNEY B23 or B23P, it is COMPULSORY to fit the air filter supplied with the boiler.**

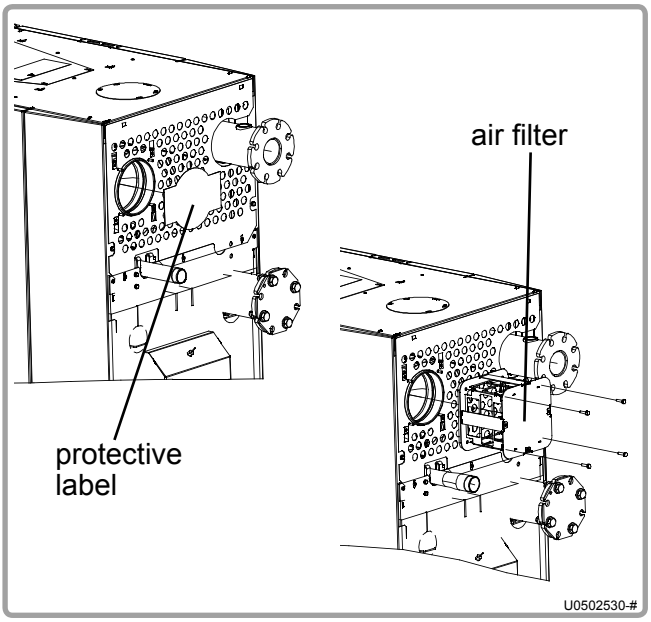



***figure 2 - Air filter***

- Remove the protective "air intake" label.
- Insert the air filter and attach it to the boiler using the 4 screws supplied with the filter.

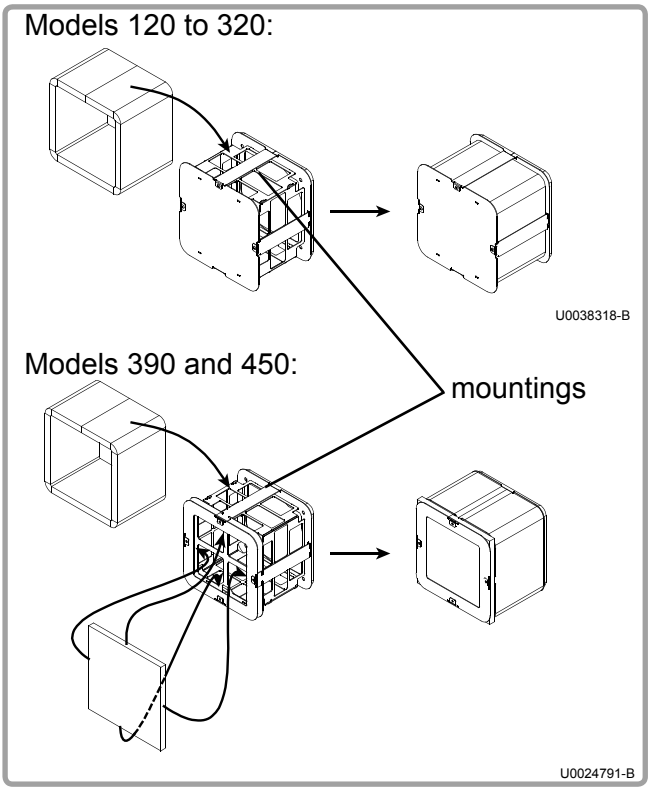



***figure 3 - Filter matting***

All models:

- Insert the rectangular filter matting between the filter's protective grille and the mounting (see opposite).

  **Ensure that the link between both ends of the matting is under one of the mountings.**

Models 390 and 450:

- Insert the square filter cloth on the back gate of the filter.

## 4.2. Installing the boiler

VARMAX boilers must not be installed on an inflammable surface (wooden floor, plastic floor covering, etc.).

**Recommended distances from walls and the floor:**
Ensure there is sufficient clearance so that work may be carried out easily on the boilers.
The **minimum** values (in mm) are indicated in figure 4 and in the table below.

| MODELS | A | B | C | D | H |
|---|---|---|---|---|---|
| **120** | 450 | | 500 | | 150 |
| **140** | 450 | | 500 | | 150 |
| **180** | 450 | | 500 | | 320 |
| **225** | 450 | | 500 | | 320 |
| **275** | 450 | | 600 | 500 | 263 |
| **320** | 450 | | 600 | 500 | 263 |
| **390** | 450 | | 700 | 500 | 427 |
| **450** | 450 | | 700 | 500 | 427 |

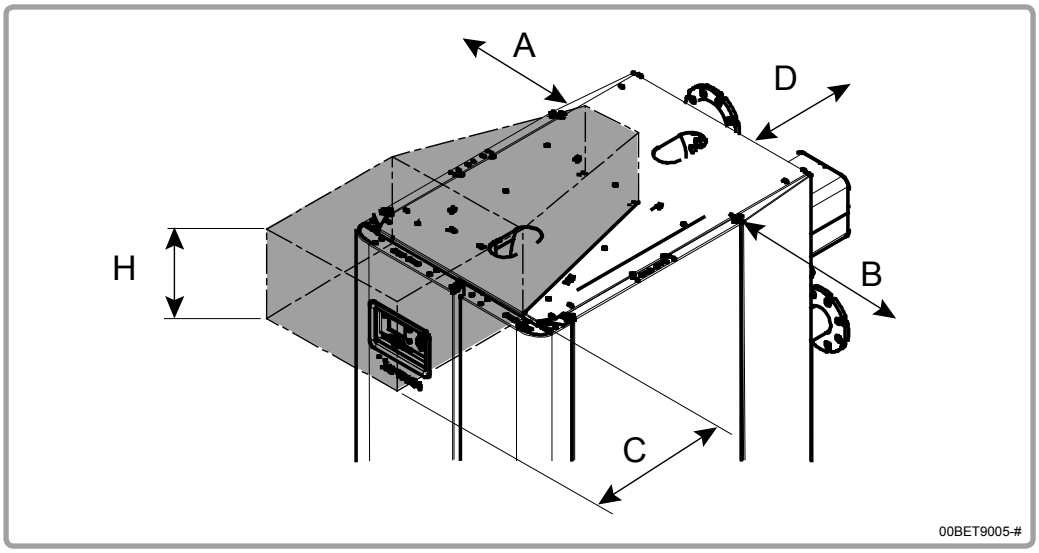



***figure 4 - Peripheral clearance***

**The hashed zone above the boiler must remain free of obstacles to allow for inspections and cleaning of the burner.**

**WARNING:** **A 2 cm free space must also be left above the side panels to allow for their disassembly and reassembly.**

**These values cannot be replaced by specific regulatory requirements.**

**WARNING:** **The boiler must be positioned horizontally using a spirit level to promote effective ventilation of the heat exchanger (use the base as a reference surface).**

To adjust the level, screw or unscrew the 4 adjustable feet as required using a 17 mm wrench.

## 4.3. Opening / closing of casing doors

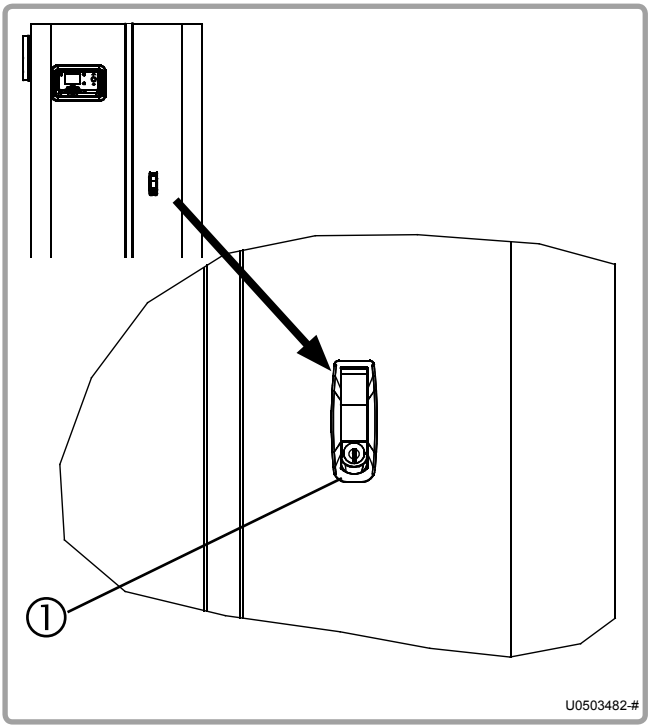



***figure 5 - Opening casing doors***

**Opening:**

Put the handle locking system in a horizontal position (mark 1) then press down on it.

The handle is released from its housing; you can now open the right-hand door, followed by the left-hand door.

**Closing:**

Close the left-hand door, followed by the right-hand door.

Press the door's lever.

Put the handle locking system in a vertical position (mark 1).

## 4.4. Removing the control panel (MMI)

The control panel (MMI: Man Machine Interface) may be removed from the casing door to:
- remove the left-hand casing door;
- view the display when setting or carrying out maintenance work on the boiler;

Open the casing doors.

Remove the locking screw ① accessible on the back of the left-hand casing door.

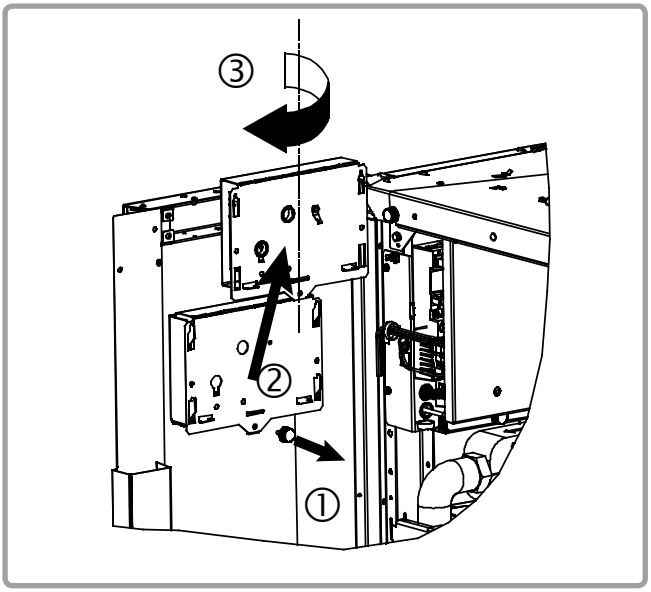



***figure 6 - Unlocking the control panel***

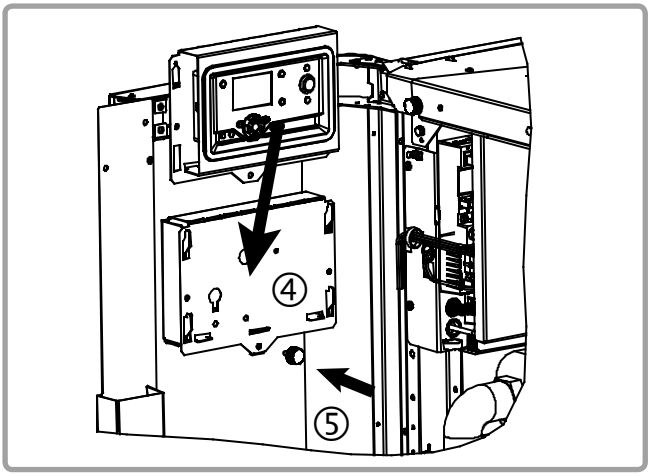



***figure 7 - Positions of the control panel***

You can:

- put the control panel back ②-③ in its place ④-⑤(to view data displayed when adjusting or carrying out maintenance), or
- fit the control panel to the boiler (see opposite, so that the left-hand casing door can be removed without any risk to the control panel).

## 4.5. Removing / refitting the casing doors

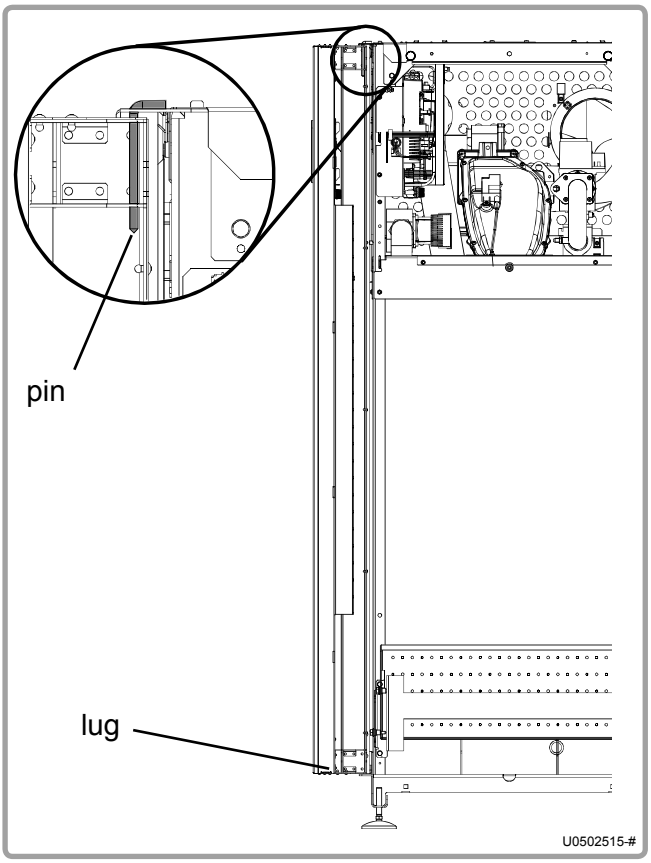



***figure 8 - Removing casing doors***

With the doors open, remove the pin on the top of the door to be removed.

**Support the door during this operation because once the pin has been removed, the door is no longer attached to the boiler.**

When refitting, firstly position the bottom of the door on the lug, and then the top, making sure to fully insert the pin into its housing.

**WARNING:** **Before removing the left-side casing door, do not forget to remove the control panel (see next paragraph).**

## 4.6. Removing / refitting side panels

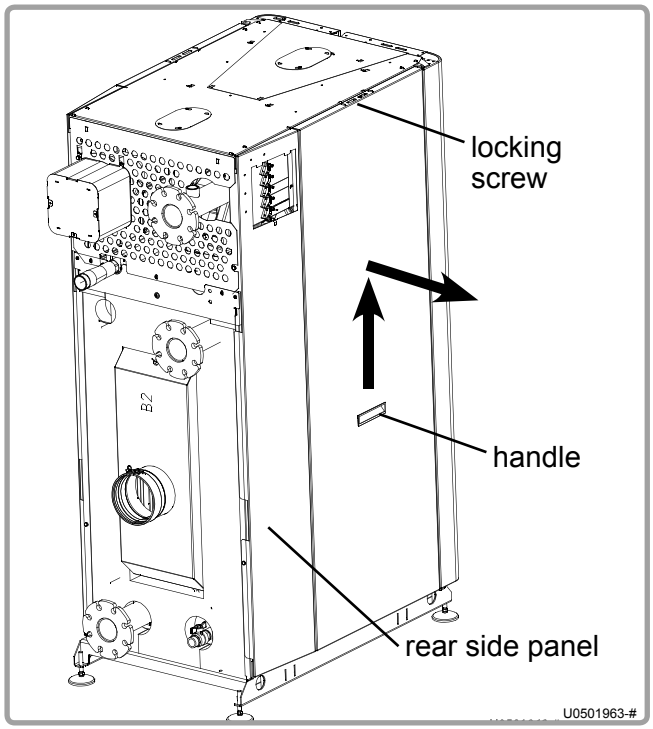



***figure 9 - Removing side panels***

Open the casing doors.

Remove the locking screw accessible via the inside of the boiler.

Use the handle in the centre of the panel for this.

Lift up the panel vertically and remove.

When refitting, re-fasten the locking screws from inside the boiler after fitting the panels.

Note: It may be necessary to remove the rear side panels in order to fit through doors. To do this, unscrew the fixing screws which hold the panel onto the boiler's structure and remove the panel.

## 4.7. Removing / refitting the top panel

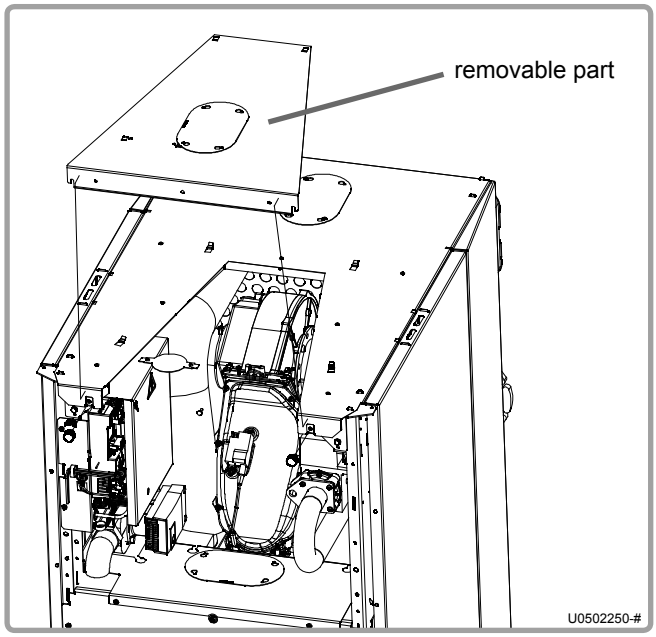



***figure 10 - Removing the upper panel***

Open the casing doors.

Loosen the 2 thumbscrews on the top of the boiler (1 or 2 turns will be enough. It is not necessary or recommended to unscrew them completely).

Slightly lift up the panel and remove it from the front.

To refit it, follow the procedure in reverse.

## 4.8. Step

**WARNING:** **The step is a means to access the burner. It cannot be used as a work platform.**

There are steps on models 180 and above.

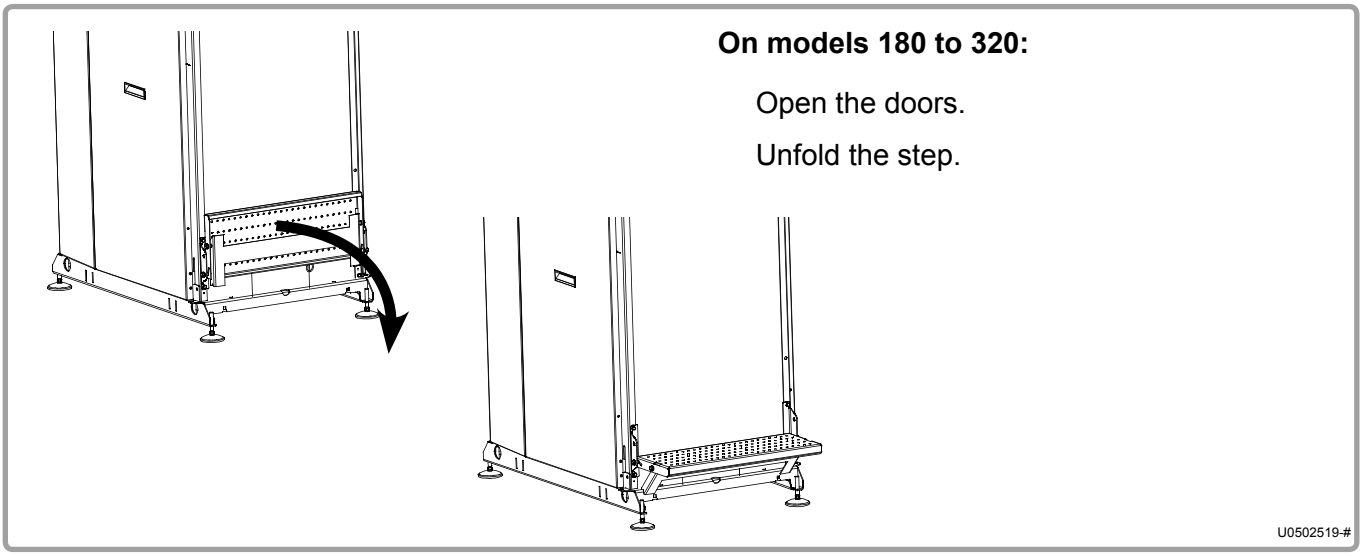



*figure 12 - Installing the step on models 180-320*

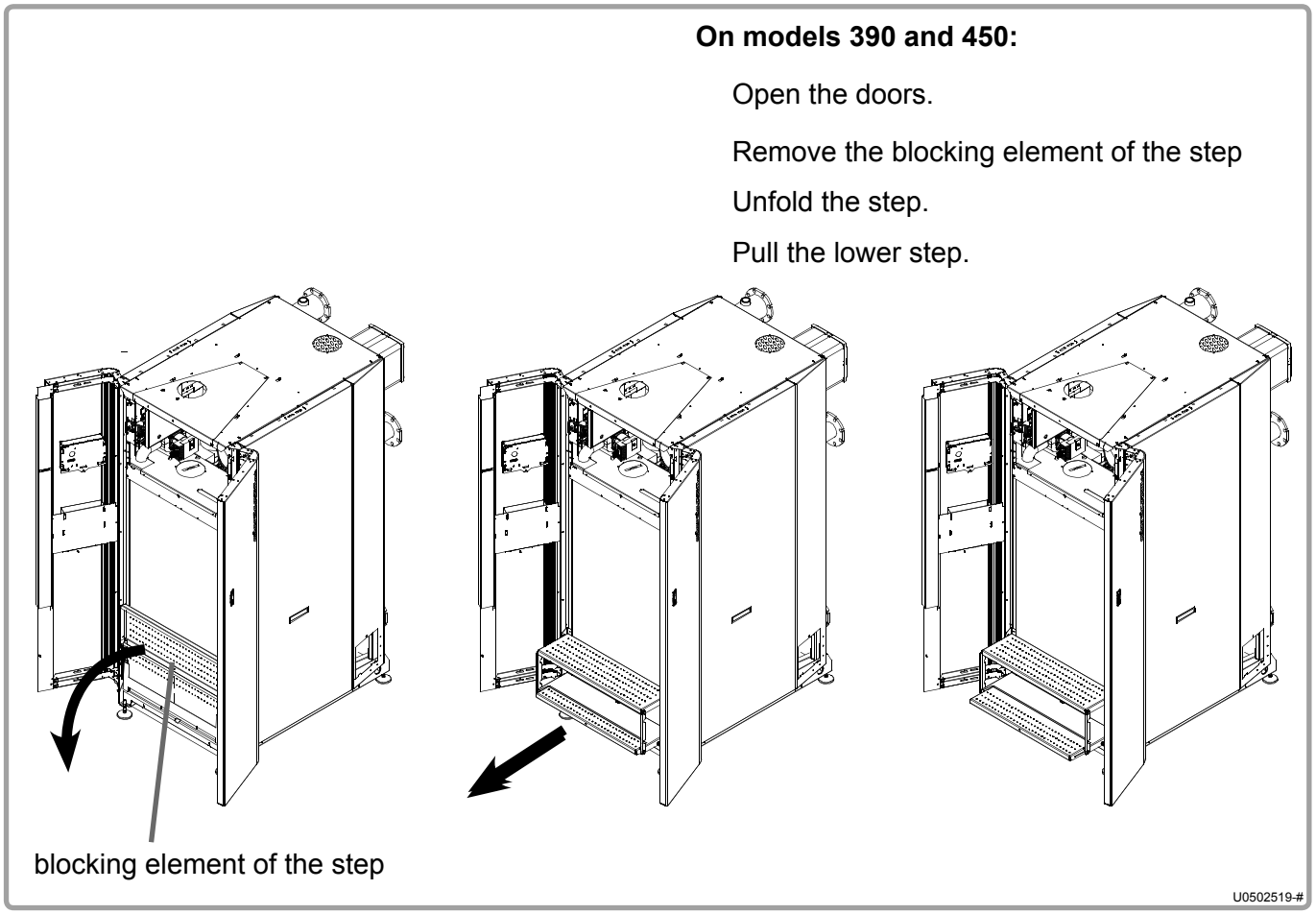



*figure 13 - Installing the step on models 390 and 450*

## 4.9. Changing the gas type *(G20 to G31)*

**INFORMATION:** **The boiler has been adjusted in the factory to work with group H (type G20) natural gas with a supply pressure of 20 mbar.**
**Its adaptation to suit any other type of gas must take place in compliance with the regulations in effect in the country in which the appliance is installed.**

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

**WARNING:** **ONLY for relevant boilers (see paragraph 2.6, page 13) and boilers connected to B23 and B23P.**

### *4.9.1. Changing prepurging, ignition, 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.

Access the ***Settings*** menu.

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

| Models | Gas | 9504 | 9512 | 9524 | 9529 |
|---|---|---|---|---|---|
| **120** | G20 | | | 1690 | 6490 |
| | G31 | | | 2040 | 5800 |
| **140** | G20 | | | 1690 | 7460 |
| | G31 | | | 2040 | 6800 |
| **180** | G20 | 2390 | 2390 | 1280 | 4410 |
| | G31 | 2575 | 2575 | 1640 | 4240 |
| **225** | G20 | 2390 | 2390 | 1280 | 5400 |
| | G31 | 2575 | 2575 | 1640 | 5060 |
| **275** | G20 | | | 1360 | 4620 |
| | G31 | | | 1700 | 4500 |
| **320** | G20 | | | 1360 | 5450 |
| | G31 | | | 1700 | 5300 |

### *4.9.2. On VARMAX 120, 140, 275 and 320*

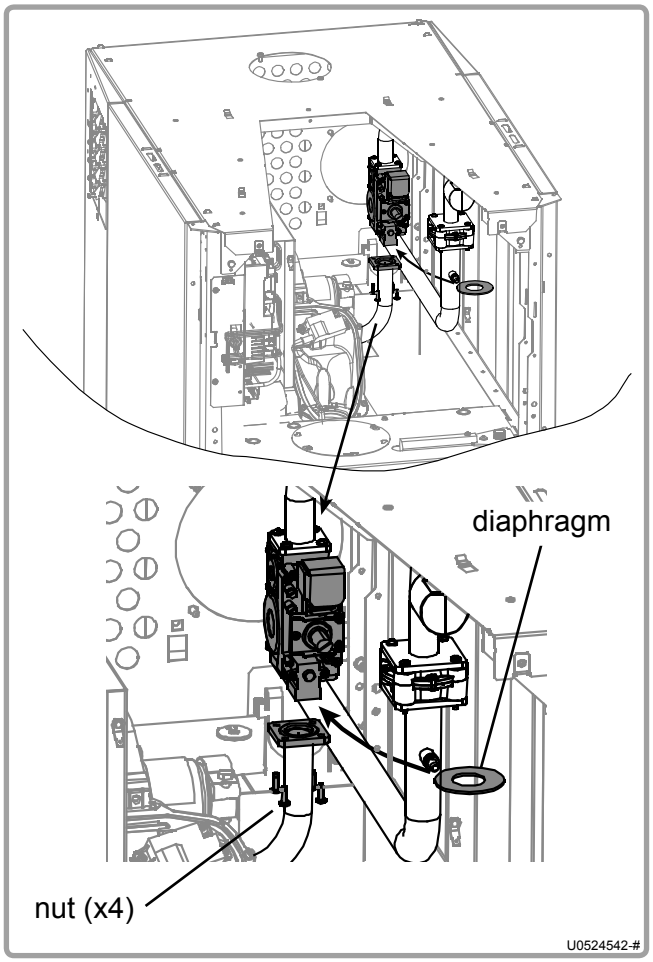



*figure 14 - Diaphragm (120 and 140 models)*

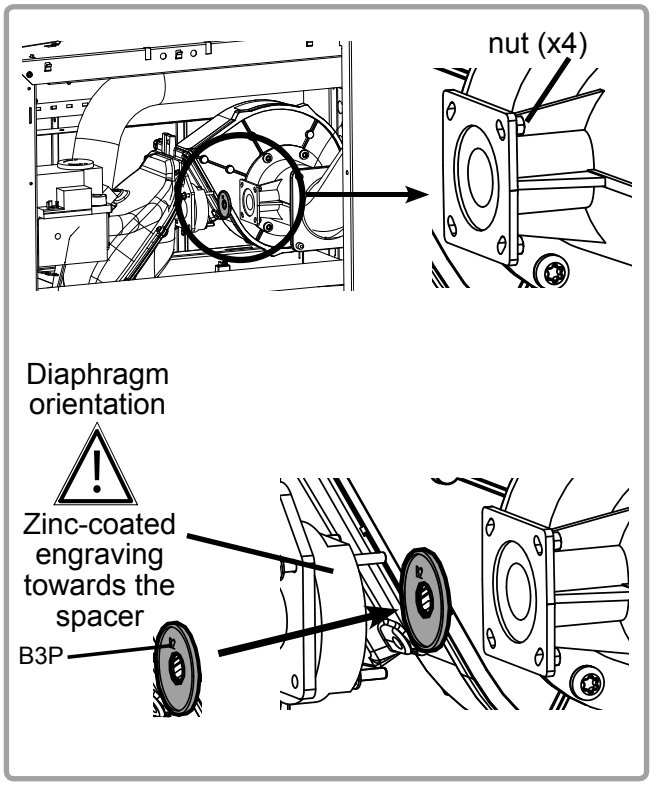



*figure 15 - Diaphragm (275 and 320 models)*

The type of gas is changed by installing the diaphragm (brass part) provided with the boiler (engraved B1P for 120 and 140 models or engraved B3P for 275 and 320 models).

Unscrew the 4 nuts or screws depending on the model (see opposite).
Install the diaphragm provided.
Screw the 4 nuts back in place.

Check the $CO_2$ settings (see § 7.7, page 52).

**After changing the type of gas:**
- **Check the sealing of the gas line.**
- **Stick the label provided in place of the original label (G20).**

Note:
In order to facilitate the operation, the mounting flange located at the entrance to the gas line (on the side nearest the network connection) may require unscrewing.

### *4.9.3. On VARMAX 180 and 225*

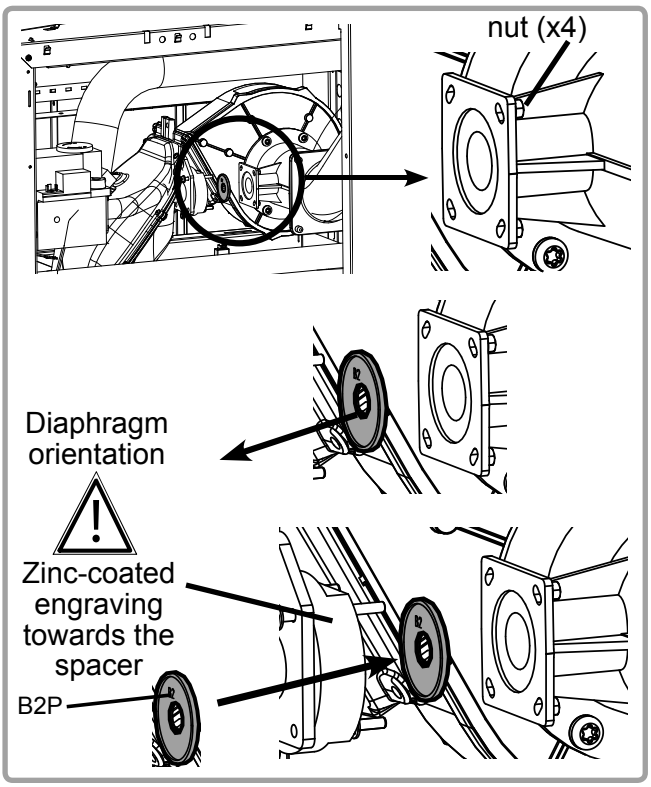



***figure 16 - Diaphragm***

The type of gas is changed by replacing the diaphragm located on the gas line.

Unscrew the 4 nuts (see opposite), then remove the diaphragm in place (brass part).
Replace this with that provided with the boiler (engraved B2P).
Screw the 4 nuts back in place.

Check the $CO_2$ settings (see § 7.7, page 52).

**After changing the type of gas:**
- **Check the sealing of the gas line.**
- **Stick the label provided in place of the original label (G20).**

Note:
In order to facilitate the operation, the mounting flange located at the entrance to the gas line (on the side nearest the network connection) may require unscrewing.

## 4.10. Exhaust connection

Exhaust system works and national and prefectoral regulations must be complied with.

A smoke temperature sensor guarantees the protection of exhaust ducts for type B and C combustion products.

VARMAX boilers are approved to be connected to:
- a B23 chimney (all models)
- a B23P chimney (all models)
- a C13 air vent (models 120 to 225) except for propane gas (G31)
- a C33 air vent (models 120 to 225) except for propane gas (G31)
- a C53 air vent (all models) except for propane gas (G31)

**INFORMATION:** The lengths of the ducts provided below are in linear metres (lm). The total length of all ducts is reduced to a straight length (elbows having a straight equivalence).

### *4.10.1. Connection to a B23 chimney*

**Type B23 connection:**
Air from the unit's premises, extraction of gases through the roof via a flue with natural ventilation.

**WARNING:** **Check that there are top and bottom ventilations in the boiler premises, that they comply with applicable regulations and that they are not obstructed.**

Chimney flues must be dimensioned considering the combustible gas pressure at the boiler outlet of 0 Pa (see table § 3.3, page 15).

**The flue-gas 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 temperatures up to 120°C. Horizontal duct runs must be avoided so as not to cause condensate retention.

Check that the fuel gas is extracted via a gas-tight duct.

**VARMAX boilers are efficient boilers with very low flue-gas temperatures; as a result, to maintain favourable ventilation, the ducts must run upwards from the boiler outlet.**

**IMPORTANT:**

**If several boilers are connected to a single flue, check:**

1. **that the flue is not under pressure when all the boilers are in operation.**
2. **If one of the boilers is operating at minimum power, that the others do not discharge into it.**

**Sizing recommendations based on a POUJOULAT system (Condensor type):**

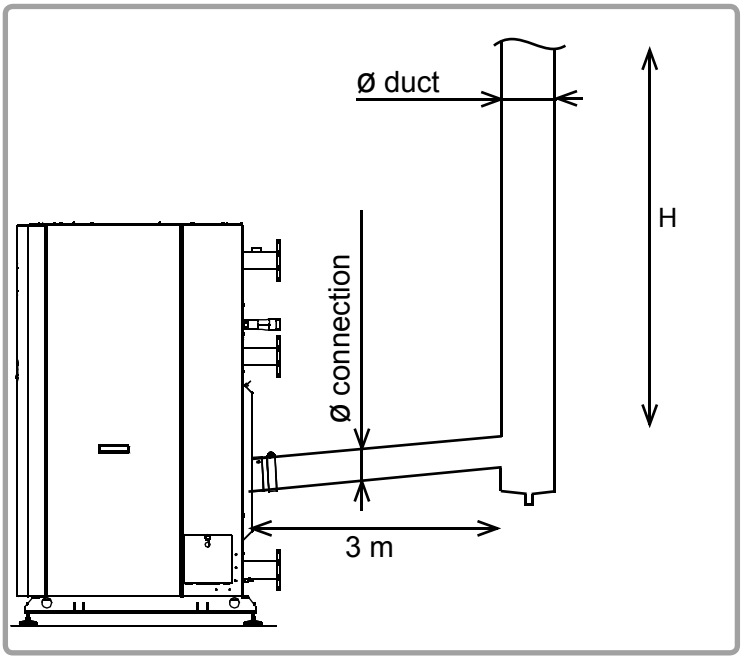



***figure 17 - B23 sizing recommendations***

**Height of flue-gas duct H** in linear metres (lm)
(operating at 50/30°C)

| | Ø connection | 150 mm | | | | | | 180 mm | | 200 mm | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ø duct | 180 mm | | 200 mm | | 250 mm | | 250 mm | | 300 mm | |
| | Type of gas | G20 | G31 | G20 | G31 | G20 | G31 | G20 | G31 | G20 | G31 |
| MODELS | 120 | 2 to 52 | -- | -- | 3 to 39 | -- | -- | -- | -- | -- | -- |
| | 140 | 7 to 39 | -- | 3 to 94 | 4 to 38 | -- | -- | -- | -- | -- | -- |
| | 180 | -- | -- | 10 to 29 | -- | 1 to 100 | 4 to 73 | -- | -- | -- | -- |
| | 225 | -- | -- | -- | -- | 1 to 100 | 3 to 65 | -- | -- | -- | -- |
| | 275 | -- | -- | -- | -- | -- | -- | 4 to 99 | 4 to 61 | -- | -- |
| | 320 | -- | -- | -- | -- | -- | -- | 5 to 81 | 6 to 53 | -- | -- |
| | 390 | -- | -- | -- | -- | -- | -- | -- | -- | 2 to 100 | -- |
| | 450 | -- | -- | -- | -- | -- | -- | -- | -- | 2 to 100 | -- |

**IMPORTANT:** **The above values are provided for information purposes only. It is important to check them with a calculation.**

**IMPORTANT:** **The weight of flue-gas ducts must not be supported by the part connecting to the boiler.**

### *4.10.2. Connection to a B23P chimney*

**Type B23P connection:**
Air coming from the boiler premises, extraction of gases through the roof via a pressurised duct.

**WARNING:** **Check that there are top and bottom ventilations in the boiler premises, that they comply with applicable regulations and that they are not obstructed.**

**IMPORTANT:** **For the B23P type connection, it is MANDATORY to use ducts which have pressurised duct certification, such as CONDENSOR (Poujoulat) or rigid or flexible CHEMILUX CONDENSATION (Ubbink).**

**IMPORTANT:** **The duct extracting combustion products must be sized using the parameters provided in the table in paragraph 3.3.**
**Depending on the duct's actual configuration, a calculation is necessary to check that the pressures at the boiler outlet do not exceed the maximum normative values authorised (200 Pa).**
**Values corresponding to the 50/30°C regime are to be used for this calculation.**

***Cascade installation case***

In this case, where boilers with different powers are connected, the most powerful models must be closest to the chimney.

The boiler is equipped with an internal check valve smoke diverter, replacing any other external and functionally identical system.

**Sizing recommendations on the basis of a POUJOULAT system (Condensor type):**

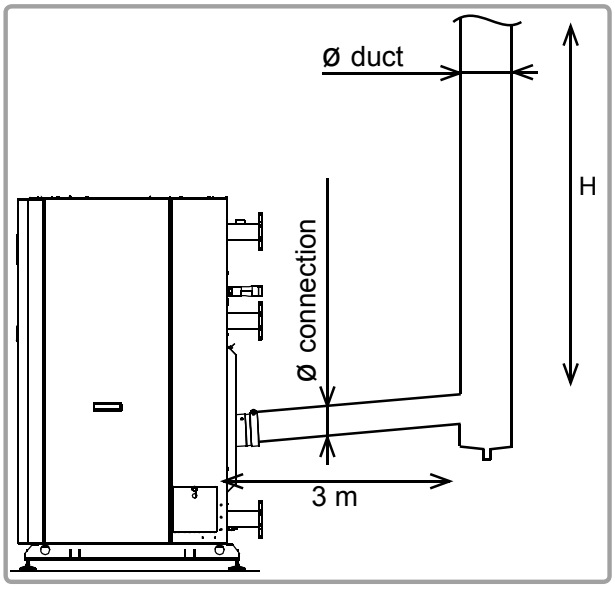



***figure 18 - B23P (Poujoulat) sizing recommendations***

**Height of flue-gas duct H** in linear metres (lm)
(operating at 50/30°C)

| Ø connection | | **150 mm** | | | | **180 mm** | | **200 mm** | |
|---|---|---|---|---|---|---|---|---|---|
| Ø duct | | **130 mm** | | **150 mm** | | **180 mm** | | **200 mm** | |
| | **Type of gas** | G20 | G31 | G20 | G31 | G20 | G31 | G20 | G31 |
| **MODELS** | **120** | 79 | 60 | -- | -- | -- | -- | -- | -- |
| | **140** | 87 | 39 | -- | -- | -- | -- | -- | -- |
| | **180** | -- | -- | 74 | 23 | -- | -- | -- | -- |
| | **225** | -- | -- | 69 | 20 | -- | -- | -- | -- |
| | **275** | -- | -- | -- | -- | 100 | 73 | -- | -- |
| | **320** | -- | -- | -- | -- | 100 | 64 | -- | -- |
| | **390** | -- | -- | -- | -- | -- | -- | 100 | -- |
| | **450** | -- | -- | -- | -- | -- | -- | 100 | -- |

**IMPORTANT:** **The above values are provided for information purposes only. It is important to check them with a calculation.**

**IMPORTANT:** **The weight of flue-gas ducts must not be supported by the boiler.**

**Sizing recommendations on the basis of a UBBINK system:**

Using a Ubbink duct in PPTL Ø160 requires a Male 150 / Female 160 adaptor (reference 041432) at the boiler outlet.

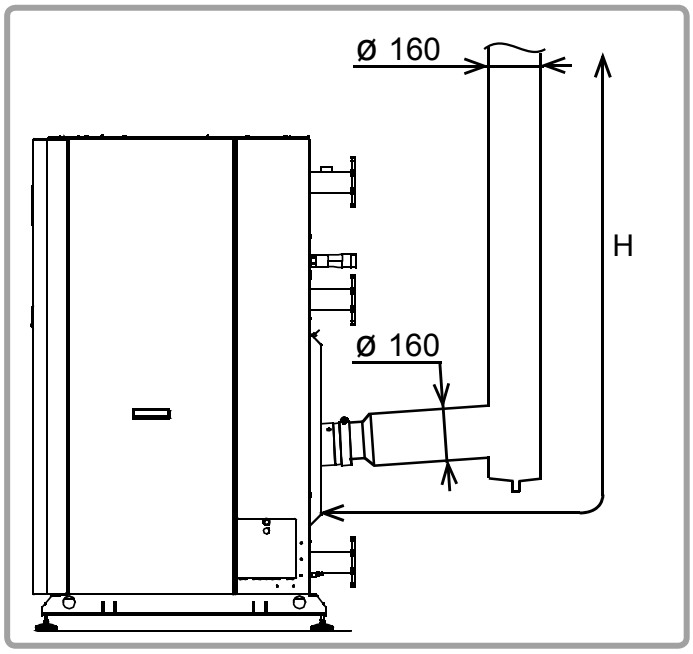



***figure 19 - B23P (Ubbink) sizing recommendations***

**Height of flue-gas duct H** in linear metres (lm)
(operating at 50/30°C)

| | duct | Ø 160 mm | | | |
|---|---|---|---|---|---|
| | | rigid | | flexible | |
| | **Type of gas** | G20 | G31 | G20 | G31 |
| **MODELS** | **120** | 100 | 100 | 100 | 86 |
| | **140** | 100 | 100 | 86 | 65 |
| | **180** | 64 | 32 | 30 | -- |
| | **225** | 58 | 40 | 28 | -- |

**IMPORTANT:** **The above values are provided for information purposes only. It is important to check them with a calculation.**

### *4.10.3. Rules for installing air vent terminals*

Please refer to national standards and regulations.

### *4.10.4. Connection to a C13 or C33 air vent*

**Type C13 connection:**
Air inlet and gas extraction via separate ducts connected to a horizontal concentric terminal (air vent).

**Type C33 connection:**
Air inlet and gas extraction via separate ducts connected to a vertical concentric terminal.

**IMPORTANT:** Connecting a VARMAX boiler in C13 or C33 configuration requires use of the "Terminal kit" comprising a terminal, a dual-flow adaptor and a male adaptor Ø150 / female adaptor Ø160 (reference 041421).

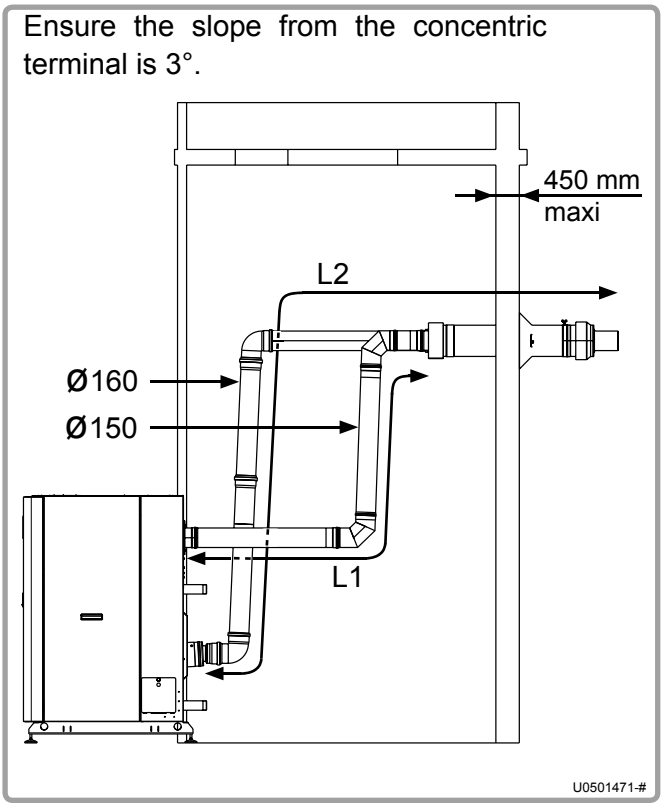



*figure 20 - Type C13 connection*

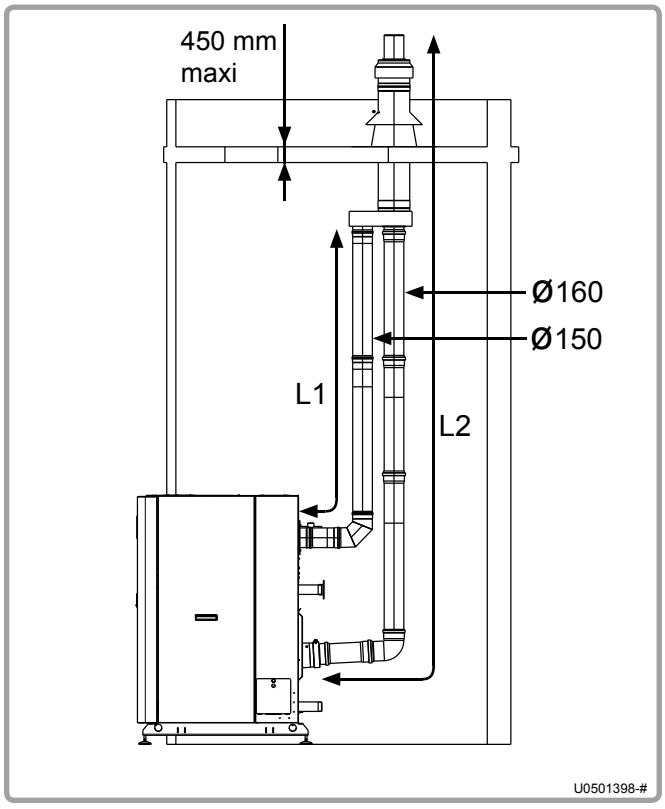



*figure 21 - Type C33 connection*

The table below shows the maximum straight lengths authorised for air and flue-gas ducts.

| | MODELS | | | |
|---|---|---|---|---|
| | **120** | **140** | **180** | **225** |
| **L1 (air)** | 16.5 lm | | 13.5 lm | |
| **L2 (flue-gases)** | 17.5 lm | | 14.5 lm | |

The lengths indicated include the lengths of the concentric terminal.

In addition, in the duct length calculation, the following equivalences must be used;

- 90° elbow = 1.5 m of straight duct
- 45° elbow = 0.8 m of straight duct

The terminal's installation must comply with the rules in § 4.10.3, page 30.

To facilitate mounting of flue-gas ducts (PPTL), coat the joints with liquid soap or a suitable grease (provided in the "terminal kit").

**IMPORTANT:** **The weight of the ducts (air and flue-gas) must not be supported by the boiler's connecting parts.**

### *4.10.5. Connection to a C53 air vent*

**Type C53 connection:**
Air inlet and gas extraction via 2 separate ducts.

**IMPORTANT:** Connecting a VARMAX boiler in a C53 configuration requires the use of accessory kits.

The table below gives the reference of the available kits depending on the boiler model and the maximum straight lengths authorised for the air and flue-gas ducts.

| | **MODELS** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **120** | **140** | **180** | **225** | **275** | **320** | **390** | **450** |
| **Accessory kit reference** | 041422 | | 041422 | | 041423 | | 041424 | |
| **L1 (air)** | 10 lm | | 8 lm | | 10 lm | | 10 lm | |
| **L2 (flue-gas)** | 40 lm | | 39 lm | | 40 lm | | 40 lm | |
| **Ø A (air duct)** | 150 mm | | 150 mm | | 180 mm | | 180 mm | |
| **Ø F (flue-gas duct)** | 160 mm | | 160 mm | | 180 mm | | 200 mm | |

The lengths given include the lengths of the flue-gas terminal but do not include the air terminal (measure taken on the outside of the wall).

In addition, in the duct length calculation, the following equivalences must be used;

***For ducts with diameters 150 mm and 160 mm:***

- 90° elbow = 1.5 m of straight duct
- 45° elbow = 0.8 m of straight duct

***For ducts with diameters 180 mm and 200 mm:***

- 90° elbow = 2 m of straight duct
- 45° elbow = 1.1 m of straight duct

The flue-gas terminal's installation must comply with rules in § 4.10.3, page 30.

Ensure the slope towards the boiler is at least 3° (flue-gas side). On the air duct side, adjust a slope to the outside to avoid the risk of rainwater in the boiler.

To facilitate mounting flue-gas ducts for models 120 to 225, coat the joints in liquid soap or a suitable grease (provided in the "terminal kit").

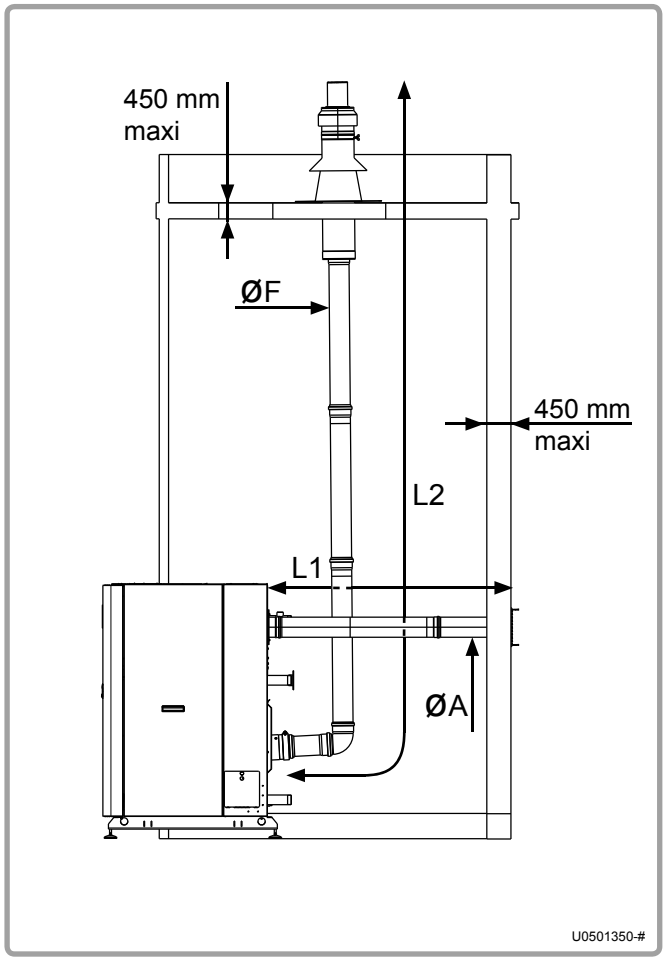



***figure 22 - Type C53 connection (VARMAX models 120 to 225)***

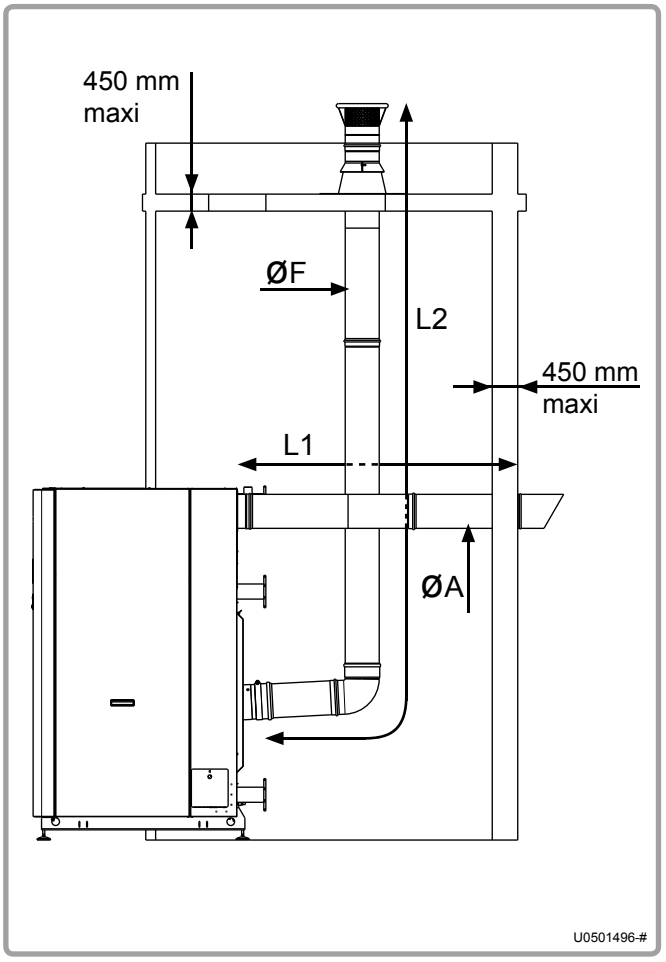



***figure 23 - Type C53 connection (VARMAX models 275 to 450)***

**IMPORTANT:** **The weight of flue-gas ducts must not be supported by the boiler.**

## 4.11. Hydraulic connection

**The presence of an integrated irrigation pump in the boiler and an intelligent control logic enables optimal operation up to IUP/30 (IUP = Instant Useful Power expressed in Th/h - 1Th/h = 1.163 kilowatts).**
**Below this throughput of IUP /30, the boiler will continue to operate, but will gradually lose power (boiler stops below IUP /46).**
**In connector sleeves 3 and 4, there is no minimum throughput constraint on the condenser.**
**In the main heat exchanger, as in the condenser, you must ensure that you never exceed the throughput prescribed in section 3.4 (boiler nominal useful power / 10).**

Sizing the pipes connecting the boiler to the installation must be done carefully, to minimise the pressure losses and so avoid oversized circulating pumps.
In some cases the diameter of the connection pipes will be greater than the diameter of the boiler tappings. The diameter can then be usefully increased after the union connectors, the stop valves, and/or the hydraulic balancing valves.
VARMAX boilers are equipped with the following elements:

- main exchanger drain valve,
- condenser drain valve.

It is mandatory to fit the boiler and its installation with the following elements:

- isolating valves on the flow and return tappings,
- an expansion vessel,
- an efficient bleed device,
- a safety valve set to 6 bar,
- A shut-off on the boiler's fill circuit in relation to the main supply.

**VARMAX boilers are available with 2/3 tappings or 4 tappings. It is not possible to transform a version with 2/3 tappings into a version with 4 tappings and vice versa.**

### *4.11.1. Boiler with 2 or 3 tappings*

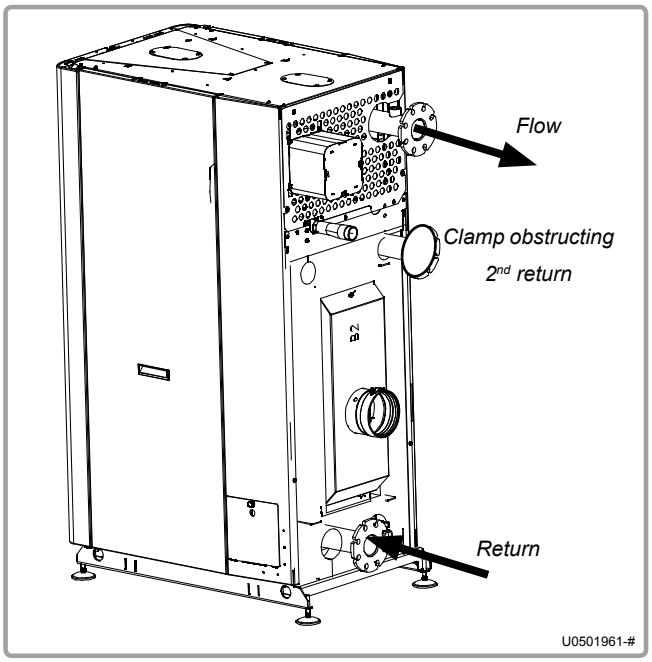



***figure 24 - Connection with 2 tappings***

2 tappings

If all the circuits have the same return temperatures, the return tapping located in the lower part must be used.

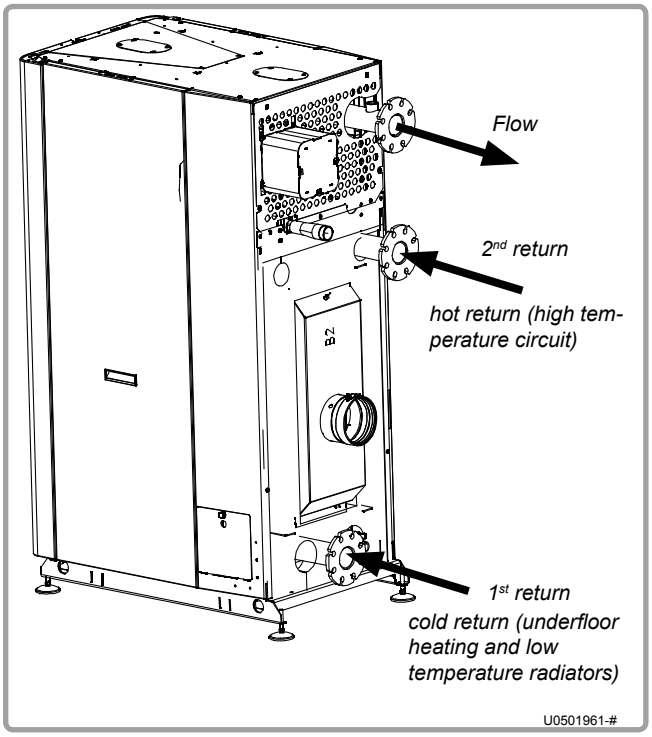



***figure 25 - Connection with 3 tappings***

3 tappings

VARMAX boilers are fitted with 2 returns and an optimised internal water circuit allowing effective separation of high temperature returns (coming from DHW preparation circuits, radiators, etc.) from low temperature circuits (underfloor heating circuits, low temperature radiator circuits, etc.).
This circuit separation encourages the condensation of flue-gases in the lower part of the condenser throughout the year, and therefore considerably increases the boiler's performance.

To use the 2nd return, the clamp obstructing the tapping must be removed.

## *4.11.2. Boiler with 4 tappings*

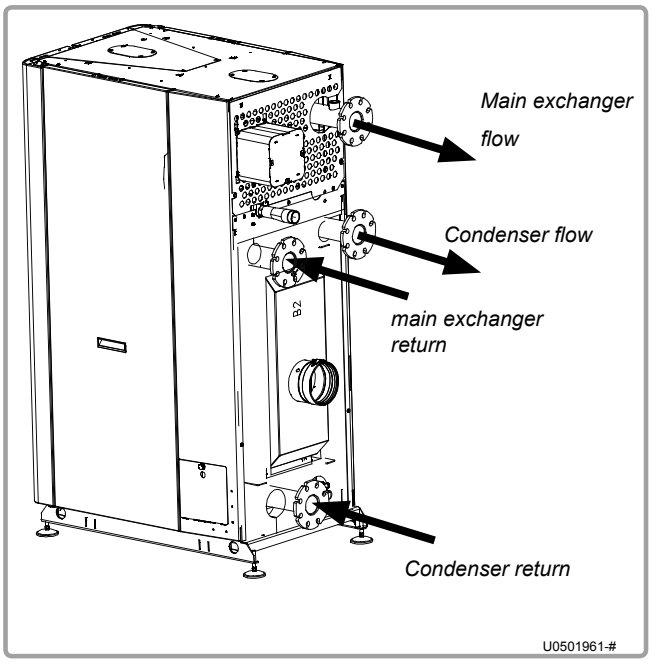



***figure 26 - Connection with 4 tappings***

VARMAX boilers are fitted with 2 internal water circuits allowing separation of high temperature returns (coming from DHW preparation circuits, radiators, etc.) from low temperature circuits (underfloor heating circuits, low temperature radiator circuits, etc.).

In some installations, additional improvement may be obtained using 4 tappings. This separates the condenser (low temperatures) from the main exchanger (high temperatures).

There are no throughput constraints regarding the condenser.

**WARNING:** **Do not connect DHW (domestic hot water) or swimming pool water to the condenser circuit.**

### *4.11.3. 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 acidic and thus aggressive (pH between 3 and 5).
Use a sufficient slope of 3% to ensure correct flow of the condensates.

**WARNING:** **Neutralise these condensates before removal according to regulations in force.**

## 4.12. Gas connection

Before installing the boiler, it is necessary to clean the inside of the installation's gas line (metallic particles, soldering residue, etc.). This helps to improve the product's longevity.
Before commissioning the boiler, check that the natural gas supply pressure corresponds to the boiler's nominal pressure mentioned on the identification plate.
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 read at the gas valve input must be between the limits indicated in the table in chapter 2.5, page 11 for the type of gas used.

**WARNING:** **The boiler's gas line connection 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 identification plate.**

## 4.13. Electrical connection

**DANGER:** **Ensure that the general electrical power supply has been cut off before starting any work.**

**WARNING:** **Observe the phase polarity - neutral for electrical connections.**

**WARNING:** **It is mandatory to connect this boiler correctly to earth and to comply with applicable standards for low voltage electrical installations in the United Kingdom.**
**Provide a two pole circuit breaker upstream of the boiler (distance between contacts: 3.5 mm minimum).**
**It is strongly recommended to fit the electrical installation with a 30 mA differential protection.**

Refer to the instructions of installation and use of the NAVISTEM B3000 boiler command table for information concerning electrical connections to the control panel (characteristics of the electrical power supply, cable section and connection to terminal blocks).

### *4.13.1. Control panel*

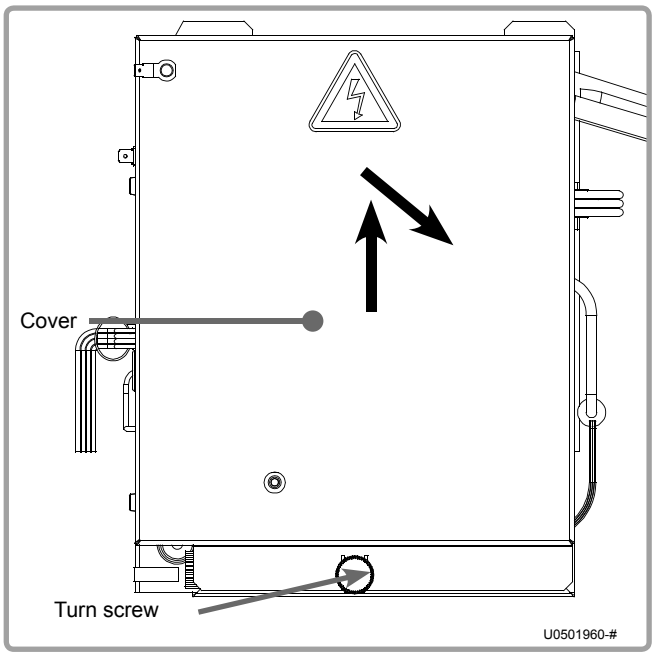



*figure 27 - Opening the electrical box*

To access the control panel, open the casing doors on the front of the boiler.

The control panel is on the upper front left of the boiler.

Unscrew the turn screw at the bottom of the cover.

Lift up the cover and pull backwards.

### *4.13.2. Cable bushing*

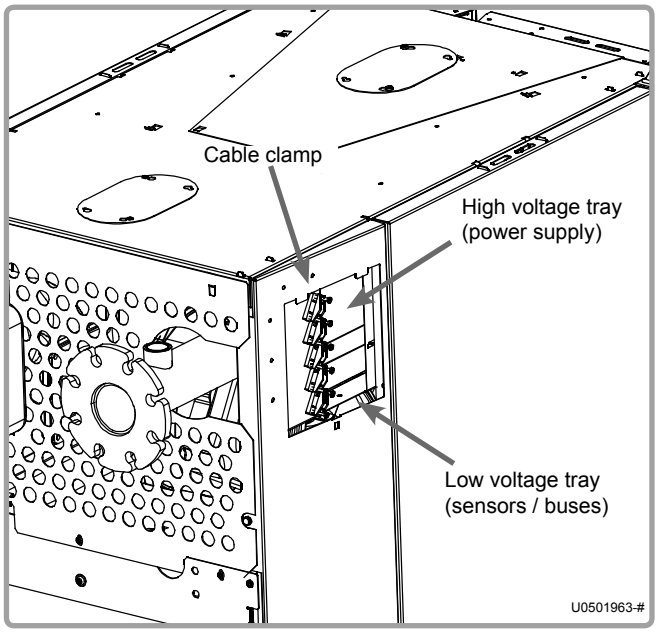



*figure 28 - Electrical cable bushing*

Use the cable trays located on the top left of the boiler to insert the connection cables:

- The **upper** tray must be reserved for the **power connections** (boiler power supply, alarm feedback or circulating pump control).
- The **lower** tray is dedicated to **signal connections** (sensors, communication bus, etc.).

Use the cable clamp located at the inputs to the trays to lock the cable mechanically.

### *4.13.3. Connection of the boiler command table to the terminal blocks*

To connect the boiler command table, refer to the relevant instructions of installation and use.

**ATTENTION :** **For connection, comply with the wiring diagram, in particular the phase, neutral and earth polarities.**

### *4.13.4. Connection of AVS75 extension module(s) (optional)*

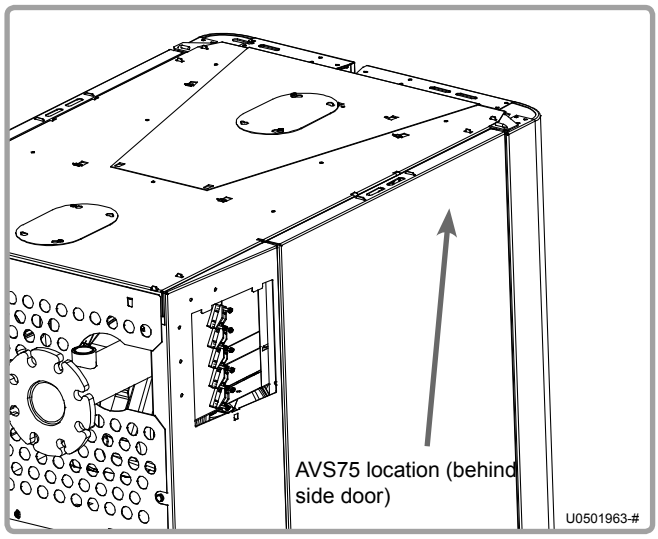



*figure 29 - AVS75 location*

To install AVS75 module(s) (3 max), refer to the instructions provided with the accessory (reference 059751).

### *4.13.5. Connection of OCI345 communication module (optional)*

To install the OCI345 module, refer to the instructions provided with the accessory (reference 059752).

### *4.13.6. Fuses*

The VARMAX boiler is fitted with 4 fuses on the boiler command table (refer to the sticker on the protective cover for their locations and characteristics).

3 spare fuses are also available on the boiler command table.

### *4.13.7. Electrical wiring diagram*

Refer to the paragraph 2.3 of the NAVISTEM B3000 manual should you require further information on the characteristics of borniers.

| | |
|---|---|
| | Cascade flow sensor |
| | Cascade return sensor |
| | DHW sensor |
| | External sensor |
| 0-10V | Input prog. client: 0...10V |
| | Input prog. client. contact |

| | |
|---|---|
| | Room sensor |
| | Boiler flow sensor |
| | Boiler return sensor |
| | Flue-gas sensor |
| | Alarm relay |

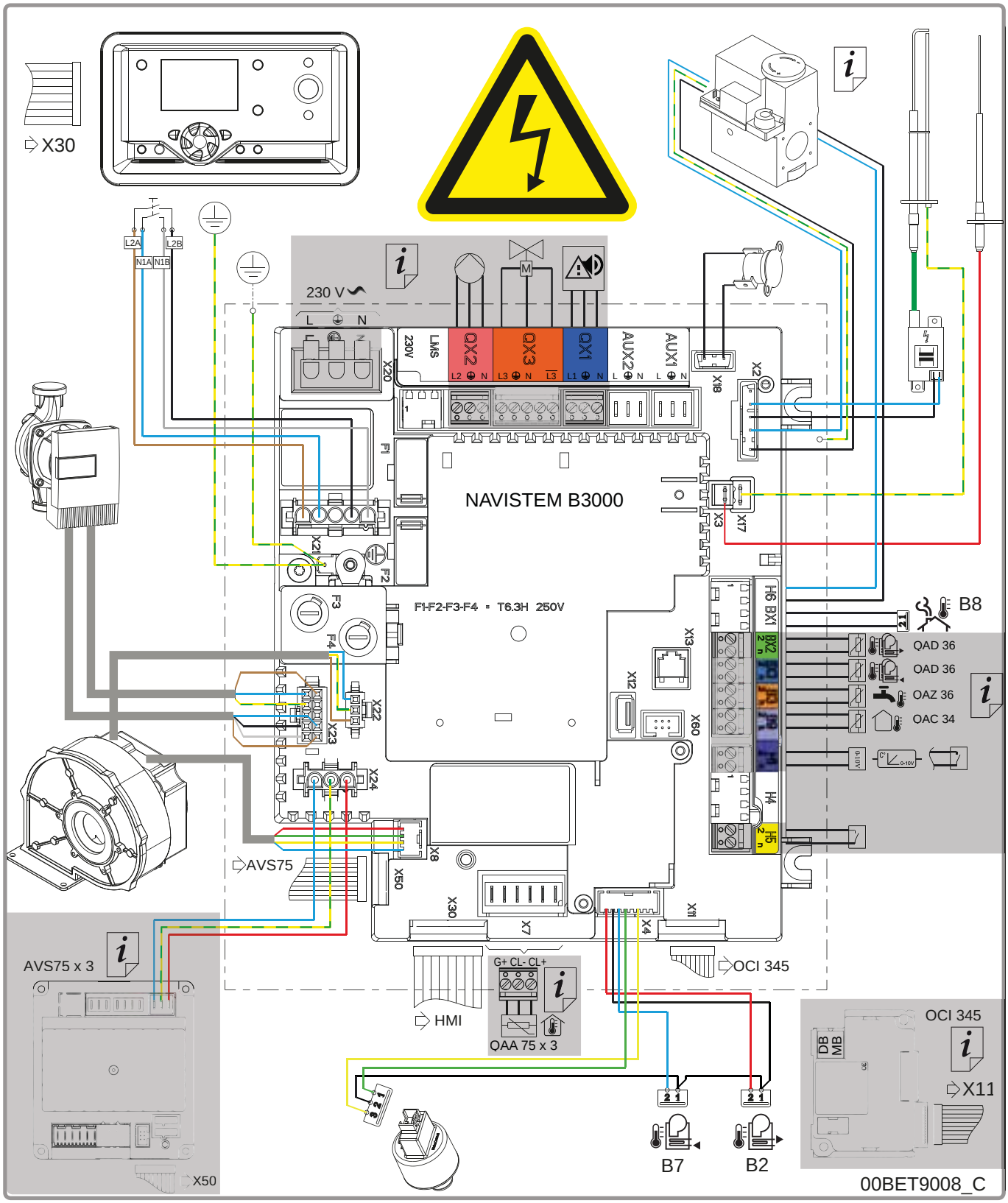



***figure 30 - Electrical wiring diagram***

# 5. COMMISSIONING

## 5.1. Unlocking the boiler

**WARNING:** **During commissioning, the unlocking of the boiler can only be achieved if the hydraulic system is compliant with the recommendations mentioned in the hydraulic diagrams (see section 8.3, page 54). The person in charge of this operation must ensure such compliance.**

***Unlocking the temperature:***
Modify parameter 2212 from 70° C to the desired value (Maximum 85°C).

***Unlocking the power:***
Increase the value of parameter 9529 up to the value of parameter 9530 (corresponding with the nominal power of the boiler).

**WARNING:** **Adjusting the boiler to operate using propane results in the modification of parameter 9529; the boiler power locking function is therefore no longer active.**

| | MODELS | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter 9529 value** | **120** | **140** | **180** | **225** | **275** | **320** | **390** | **450** |
| **power locked** | 4610 | 5300 | 3180 | 3870 | 3360 | 3930 | 3440 | 3900 |
| **power unlocked** | 6490 | 7460 | 4410 | 5400 | 4620 | 5450 | 4810 | 5480 |

## 5.2. Pre-commissioning checks

For a cascade installation, check the hydraulic balance of the boilers.

Check that pressure when cold is at least 1 bar.
**If this is a boiler room renovation, ensure that flushing and if necessary silt removal from the installation have been correctly done (see paragraph 1.5, page 7 of these instructions).**

Check the flue-gas connections depending on the type of chimney (refer to paragraph 4.9, page 24).

Check that the gas pressure and type are suitable for the products.

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

**WARNING:** **If connecting CHIMNEY B23 or B23P, it is COMPULSORY to fit the air filter supplied with the boiler.**

## 5.3. Commissioning

Before being packed up, all boilers are tested in the factory operating on group H natural gas (type G20), during which all settings are made.

For commissioning, carry out the following operations:

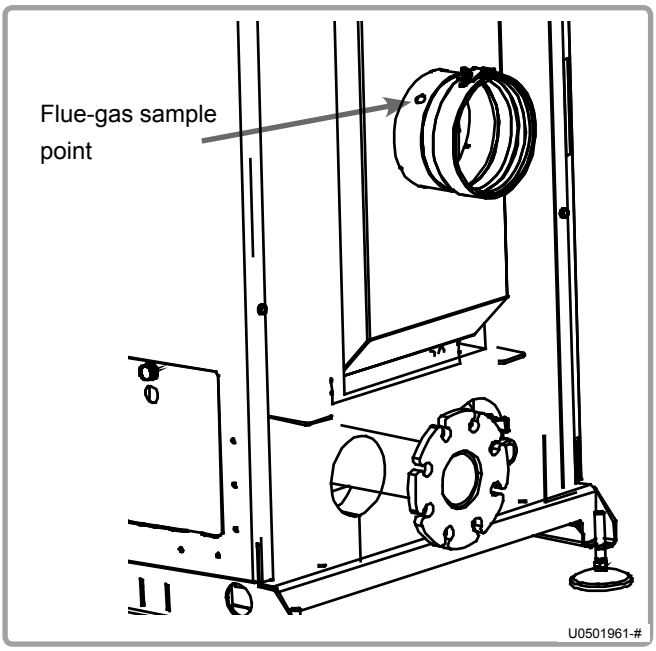



***figure 31 - Taking a sample***

1. Switch on the main power.

2. Create a request for heat via the comfort mode using the customer interface (see chapter "3 - Interface utilisateur" of the LMS boiler command table instructions).

3. After starting up the burner, check the gas tightness of the gas line connections using a foaming product. Check combustion health using a flue-gas analyser via a sample taken from the flue outlet (see diagram opposite).
   $CO_2$ value range:
   ***G20:***
   at Qmin: 8,3 % < $CO_2$ < 8,7 %
   at Qmax: 8,8 % < $CO_2$ < 9,2 %
   ***G31:***
   at Qmin: 9,8 % < $CO_2$ < 10,2 %
   at Qmax: 10,4 % < $CO_2$ < 10,8 %

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

**WARNING:** **Any work on a sealed element leads to loss of warranty.**

# 6. POST-COMMISSIONING CHECK

## 6.1. Condensate removal

Check that the removal of condensates is not obstructed, on both the boiler side and 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, reengage the circuit breaker. The boilers must start automatically, if not, consult the supplier of the gas pressure regulator.

# 7. MAINTENANCE OPERATIONS

**There are two types of maintenance operations:**
- **yearly maintenance**
- **in-depth maintenance every 3 years.**

**The table below shows which actions to undertake depending on the type of maintenance to be performed.**
**In all events, these operations must be performed by a qualified professional.**

**Before carrying out the following operations:**
- **Switch off the main power**
- **Close the gas supply shut-off valve.**

**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.**

| No. of paragraph to consult | | Maintenance | |
|---|---|---|---|
| | | every year | every three years |
| 7.2 | Verification of the boiler's environment | X | |
| 7.3 | Replacing the air filter matting | X | |
| 7.4 | Verification of ignition and ionisation electrodes | X | |
| 7.5 | Siphon cleaning | X | |
| 7.6 | Checking the combustion circuit's gas-tightness | X | |
| 7.7 | Checking combustion quality | X | |
| 7.9 | Gas filter cleaning | X | |
| 7.10 | Cleaning exchangers and changing of seals on service doors | | X |
| 7.11 | Check the condition of the gas manifold coating<br>Cleaning the burner and changing the seals | | X |

## 7.1. Boiler draining

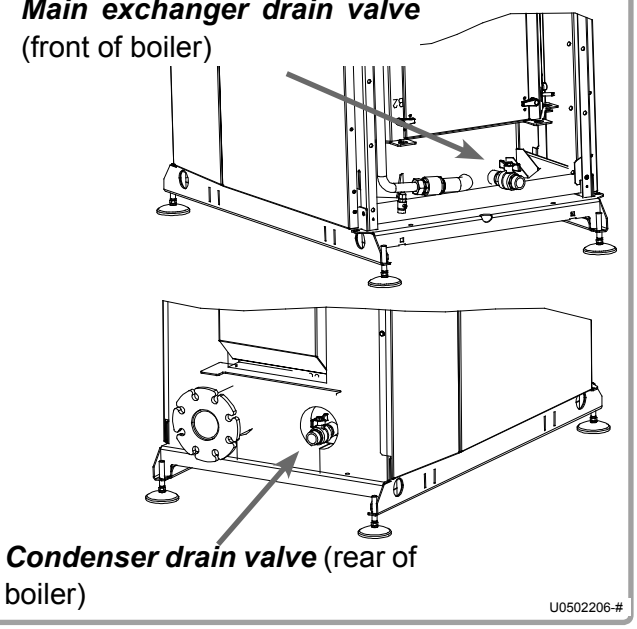



***figure 32 - Drain valves***

- Close the shut-off valves of the flow and return tappings.
- Connect the drain valves (main exchanger and condenser) to the drain with a suitable hose.
- Create an air intake on the "main exchanger" flow nozzle (open the safety valve).
- Open the drain valve.

## 7.2. Verification of the boiler's environment

Before carrying out any maintenance work, it is necessary to perform a certain number of checks concerning the installation's use.

- Water pressure: check that the water pressure is higher than 1 bar when cold.
- Read the makeup water meter. This operation helps to identify any hydraulic leaks. If consumption of makeup water changes, seek the cause and repair.

## 7.3. Replacing the air filter matting

| | |
|---|---|
| **DANGER:** | **To make sure this task is performed in safety, switch off the boiler and cut off the upstream power.** |
| **DANGER:** | **Use personal protective equipment (mask and gloves) to remove the used air filter.** |
| **INFORMATION:** | **The air filter is only present on boilers connected to a B23 or B23P chimney.** |

**INFORMATION:** **The air filter is an important element of the boiler. It limits the burner and the exchangers becoming sooty. Changing it regularly (at least every year) makes burner and exchanger cleaning operations considerably easier.**

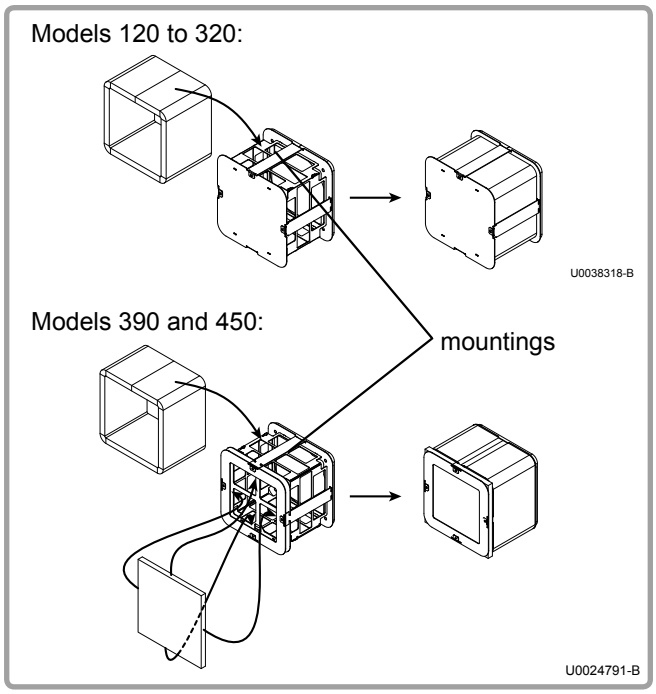



*figure 33 - Filter matting*

- Remove the used filter matting (no tool required).
- **Be careful not to let any dust or other foreign bodies enter the air duct (see opposite).**
- Insert the new rectangular filter matting between the filter's protective grille and the mountings (see opposite).

  **Ensure that the link between both ends of the matting is under one of the mountings.**

- For models 390 and 450, insert the square filter cloth on the back gate of the filter.

## 7.4. Verification of ignition and ionisation electrodes

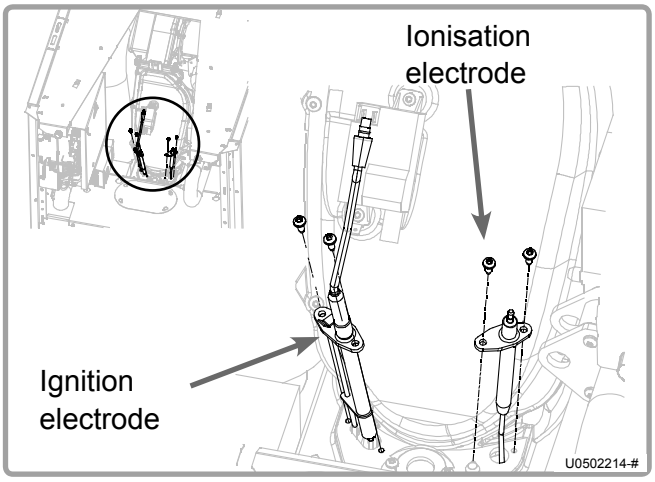



*figure 34 - Position of electrodes*

**Electrode removal**

Unscrew the two M4 Torx screws holding the electrode that needs to be removed.

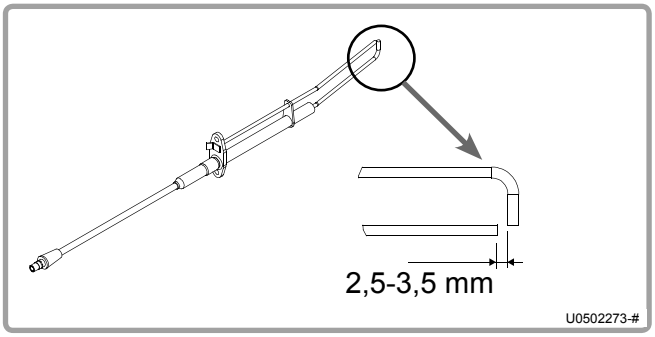



*figure 35 - Spacing*

If necessary and if there is a large amount of oxidation, clean the electrodes by rubbing them with an emery cloth.

Check the space between the ignition electrode and the ground electrode (see diagram opposite). It must be between 2.5 and 3.5 mm. If this is not the case, replace the electrode.

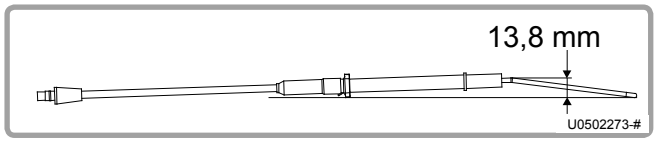



***figure 36 - Geometry***

Check the geometry of the arc electrode:
If deformed more than ±3 mm, replace the electrode.

Re-assemble the electrode block(s). Tightening torque of the block fixing screws = 2.5 N.m.

## 7.5. Siphon cleaning

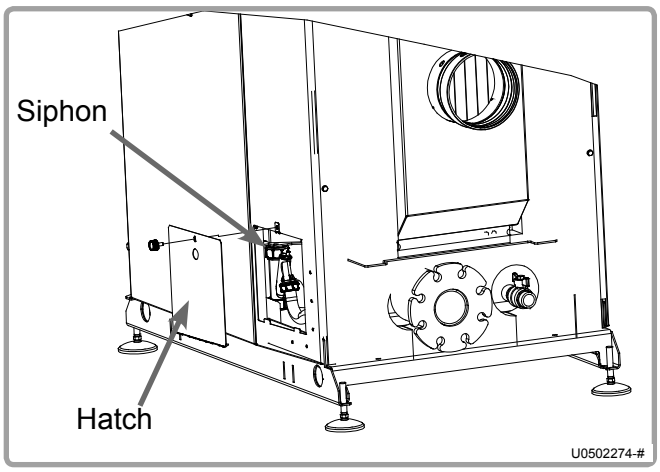



***figure 37 - Siphon***

Check the siphon and clean if necessary. The siphon must be located between the main exchanger and the condenser on the right-hand side (it can be accessed via the hatch without removing the side panel).
To do this:

- Dislodge the siphon by pulling it downwards.
- Clean with water.
- Re-assemble the siphon after checking the presence and the possibility of free movement of the float (ball). Also check that the seal is not damaged.

## 7.6. Checking the combustion circuit's gas-tightness

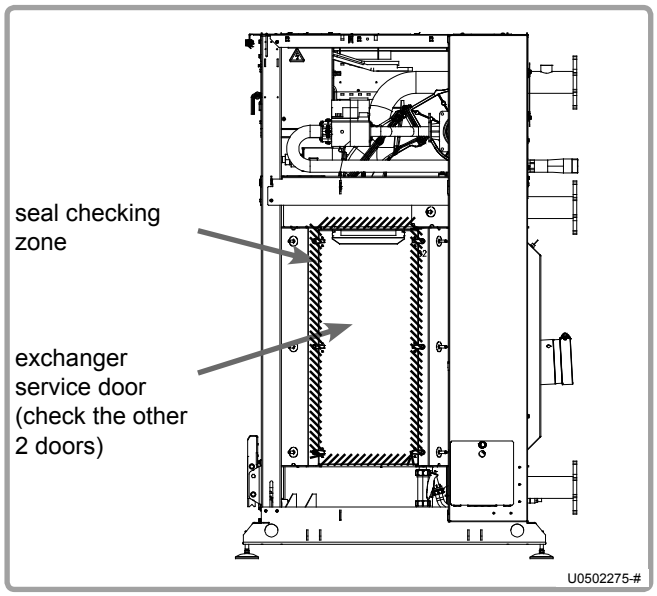



***figure 38 - Gas-tightness of the service door***

Check the gas-tightness of the 3 service doors using the foaming product. The areas to check are shown on the diagram opposite.
The check must be performed when the boiler is off, but with the ventilator operating at its maximum speed (obtained by disconnecting the PWM signal connector).

If a leak is detected, replace the seal with the appropriate kit.

It is recommended to replace the seals each time the exchanger service doors are removed. If they are not replaced, do not cross the doors when re-assembling.

## 7.7. Checking combustion quality

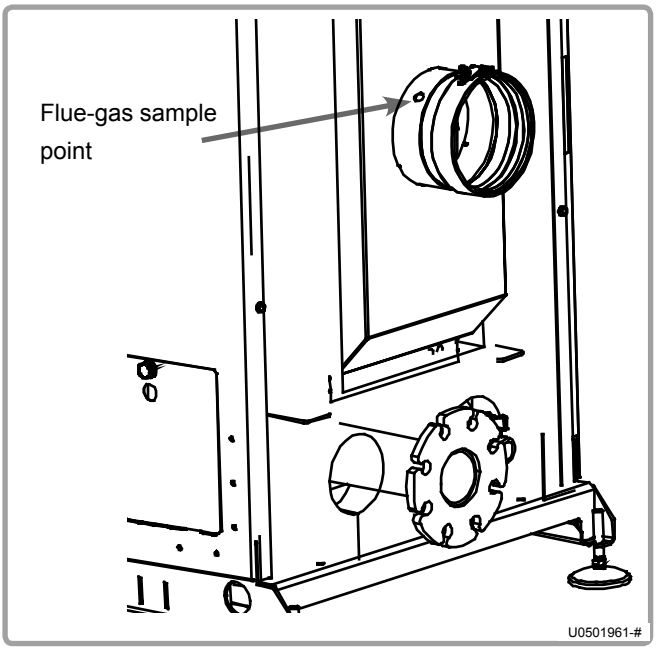



***figure 39 - Sample taking***

This check is performed using a calibrated combustion case. To do this, insert the measuring stick into the flue outlet (see diagram opposite).

The boiler's starting temperature must be above 70°C.

**Do not forget to re-position the stopper on the orifice from where the sample is taken afterwards.**

**For the G20, the $CO_2$ content measured in these circumstances must be <u>between 8.3% and 8.7% at Qmini (0% on display) and between 8.8% and 9.2% at Qmaxi (100% on display).</u>**
If this is not the case, it is necessary to alter the setting of the gas valve (see next paragraph).
After this check, it is necessary to either take a measurement of the "gas" throughput or the ΔP valve. These measurements check the state of soiling of the combustion circuit (burner, body, exchanger(s)).

**For the G31 (relevant modls only), the $CO_2$ content measured in these circumstances must be <u>between 9,8% and 10,2% at Qmini (0% on display) and between 10,4% and 10,8% at Qmaxi (100% on display).</u>**
If this is not the case, it is necessary to alter the setting of the gas valve (see next paragraph).
After this check, it is necessary to either take a measurement of the "gas" throughput or the ΔP valve. These measurements check the state of soiling of the combustion circuit (burner, body, exchanger(s)).

**<u>For installations with B23 and B23P, we recommend you take this measurement using a new air filter.</u>**
The measurement must be done for a duration of more than 3 minutes to obtain a sufficiently precise measurement.
If the gas throughput is less than 20% in relation to the value indicated in paragraph 3.3, page 15, it is necessary to clean the main exchanger and the burner (see § 7.10 and 7.11).
If you choose to take a measurement of the ΔP valve, refer to the next paragraph to find out how to do it. If the value measured is lower than the values defined in the table on page 49, it is necessary to clean the main exchanger and the burner (see § 7.10 and 7.11).

## 7.8. Setting the gas valve

This VARMAX boiler has been adjusted in the factory to operate with group H natural gas (type G20) with inlet gas pressure of 20 mbar.

**WARNING:** **Any work on adjusting the gas valve must be performed by a qualified professional.**

The valve must be adjusted with the boiler working at maximum and minimum pressure. To do this, use the operating "Manual operating" mode (see § 3.3.4 of the NAVISTEM B3000 boiler command table instructions), which makes it possible to switch directly to the minimum or maximum value (0% or 100%).

### *7.8.1. For models 120 and 140*

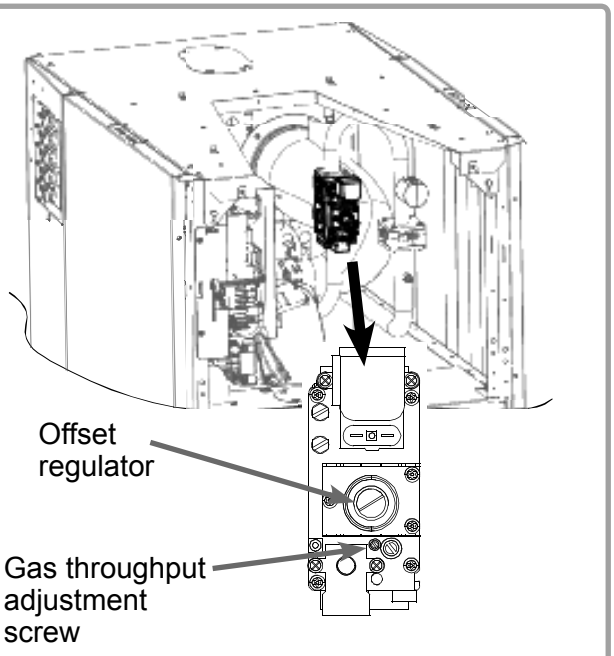



***figure 40 - VARMAX gas valve models 120 and 140***

Start the burner up at maximum power.

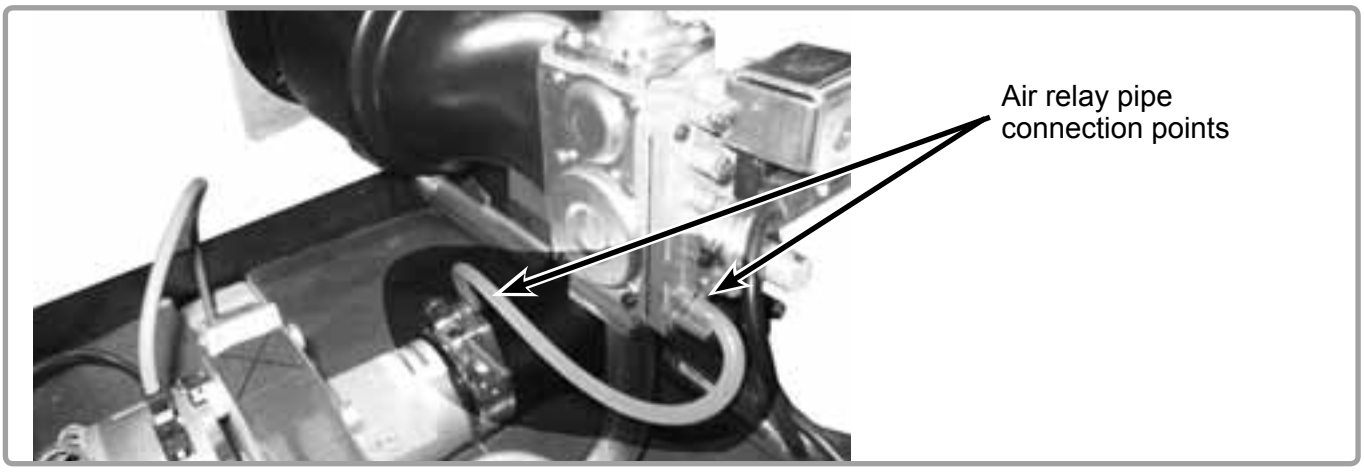
Using the combustion analyser, measure the rate of $CO_2$ in the flue-gases in the flue outlet (see figure 39).

Check the $CO_2$ value at Maximum power and, if necessary, manipulate the valve's gas throughput adjustment screw to obtain $CO_2$ values between 8.8% and 9.2% or between 10,4% and 10,8% (G31).

Move to Minimum power and check that the $CO_2$ value is between 8.3% and 8.7% (G20) or between 9,8% and 10,2% (G31). If necessary, adjust the Offset regulator by removing the stopper using a flat screwdriver and adjust the screw with a Philips screwdriver.

If changing the setting while on minimum power, switch back to Maximum power and check the $CO_2$ value again. Repeat until both values conform.

Go back to standard operating mode.



### *7.8.2. For models 180 to 450*

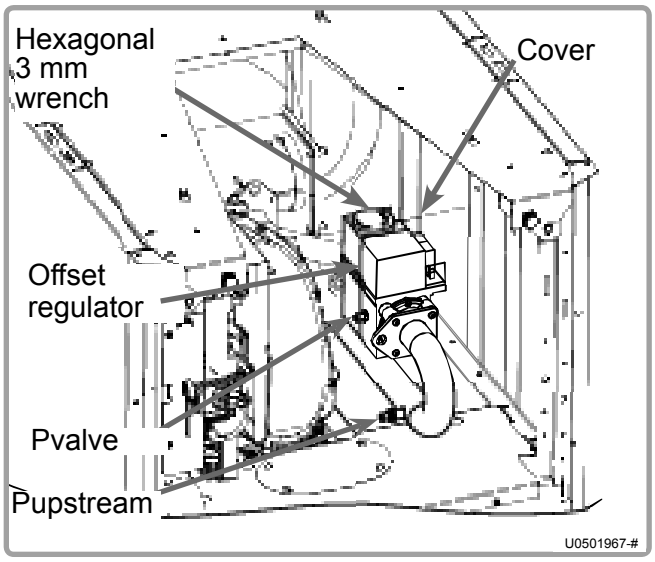
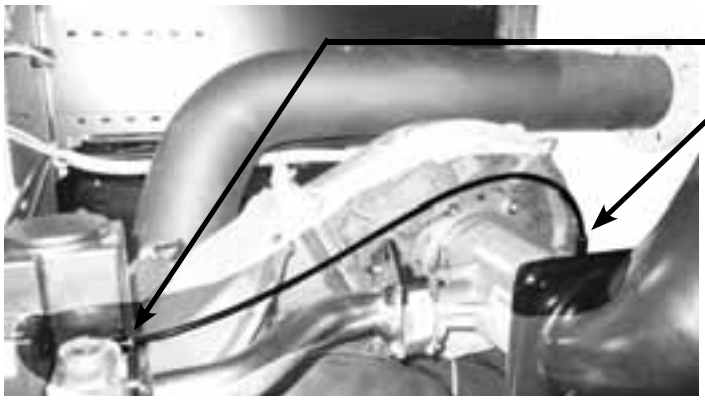
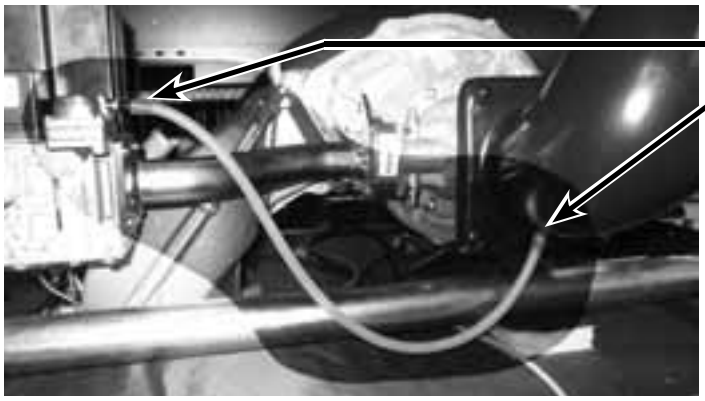



***figure 41 - Gas valve setting***

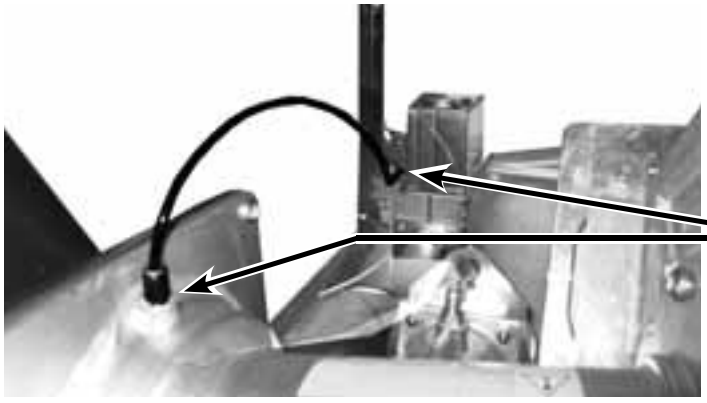
**The measurements for setting the valve must be taken using the pressures indicated Pvalve and Pupstream (see diagram opposite).**



Air relay pipe connection points
(Models 180 and 225)



Air relay pipe connection points
(Models 275 and 320)



Air relay pipe connection points
(Models 390 and 450)

| Models | Valve type | Type of gas | $\Delta P_{Schieber}$ (mbar) |
|---|---|---|---|
| 180 | VR420 | G20 | 3,8 |
| | | G31 | 1,6 |
| 225 | VR420 | G20 | 5,9 |
| | | G31 | 2,4 |
| 275 | VR432 | G20 | 3,6 |
| | | G31 | 1,7 |
| 320 | VR432 | G20 | 5,2 |
| | | G31 | 2,4 |
| 390 | VR434 | G20 | 5,4 |
| 450 | VR434 | G20 | 7,1 |

$\Delta P_{valve} = (P_{upstream} - P_{valve})$

Setting at maximum power:
Start the burner up at maximum power.
Remove the cover (see figure 41).
Measure the inlet gas pressure (Pupstream).
Adjust the valve pressure (Pvalve) taking into account $\Delta P_{valve} = (P_{upstream} - P_{valve})$ given in the table opposite (set the pressure by manipulating the adjustment screw on the top of the valve underneath the black cover, 3 mm hexagonal wrench).
If necessary, adjust the valve pressure to obtain a $CO_2$ rate between 8.8% and 9.2% (G20) or between 10,4% and 10,8% (G31).

Then switch to minimum power:
Adjust the offset regulator (see figure 41) to get a $CO_2$ rate at minimum power between 8.3% and 8.7% (G20) or between 9,8% and 10,2% (G31). Use a flat screwdriver to remove the protective stopper and a Torx wrench to adjust.
To validate the correct setting of the valve increase to Pmaxi (HMI = 100%) and check the $CO_2$ rate in the flue-gases in the flue outlet (see figure 39).
If the setting is not correct, perform the above steps again.

## 7.9. Gas filter cleaning

- Unscrew the 4 screws that hold the gas filter in place.
- Carefully remove the gas filter.
- Clean the gas filter **ONLY** with a blower.
- Refit the filter and tighten the 4 M5 screws (tightening torque = 5 N.m).

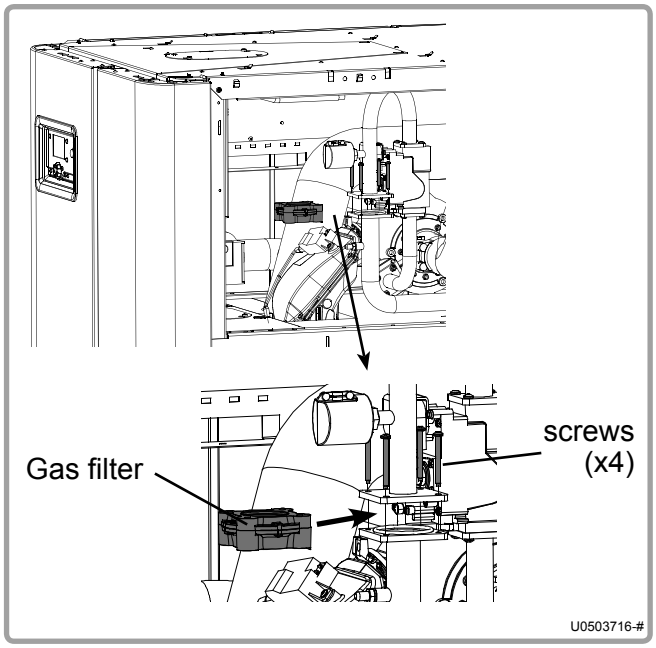



*figure 42 - Gas filter on VARMAX 120 and 140*

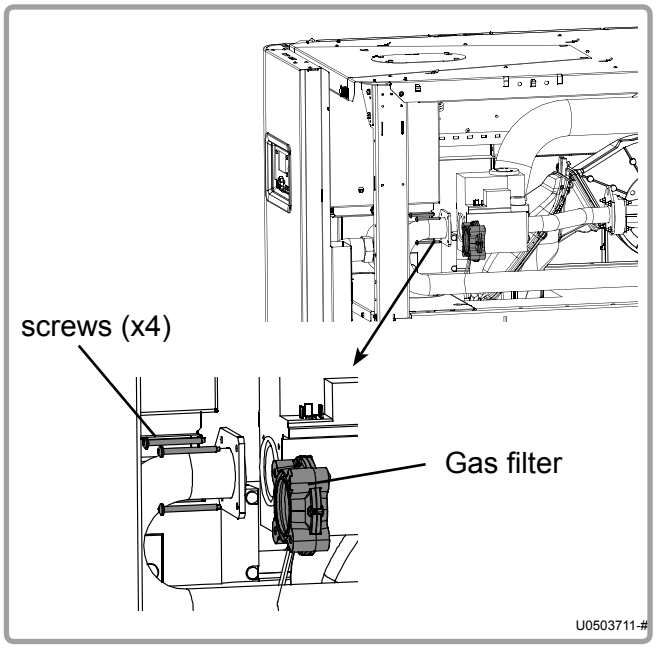



*figure 43 - Gas filter on VARMAX 180 to 450*

**WARNING:** **Check gas-tightness after refitting.**

## 7.10. Cleaning exchangers and changing seals

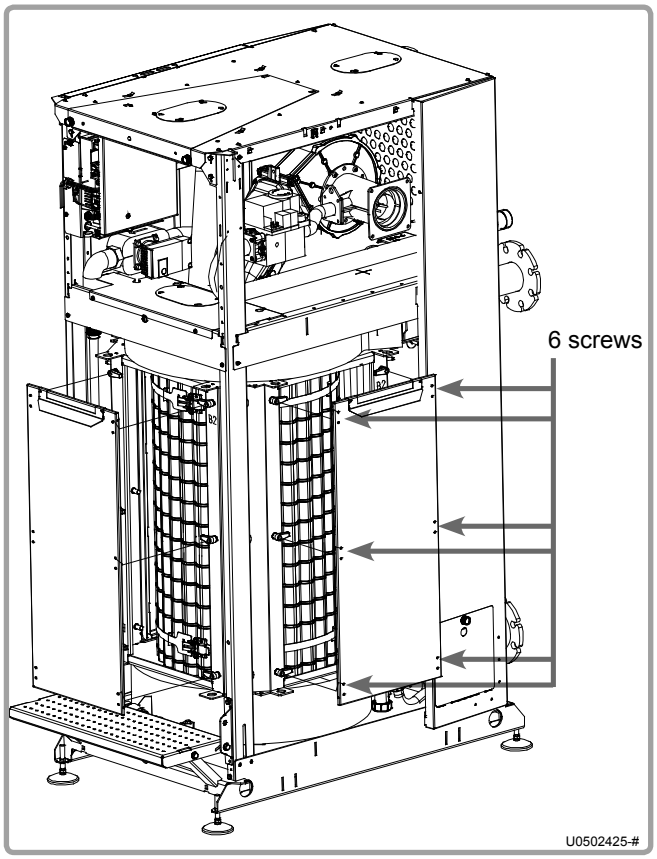



*figure 44 - Removal of exchanger doors*

**Removal of exchanger doors:**

- Remove the front and side cladding to access the 3 service doors.
- Using a 13mm wrench, unscrew the service door attachment screws until the tightening bolts turn.
- Then remove the door.
- Repeat for the other 2 service doors.

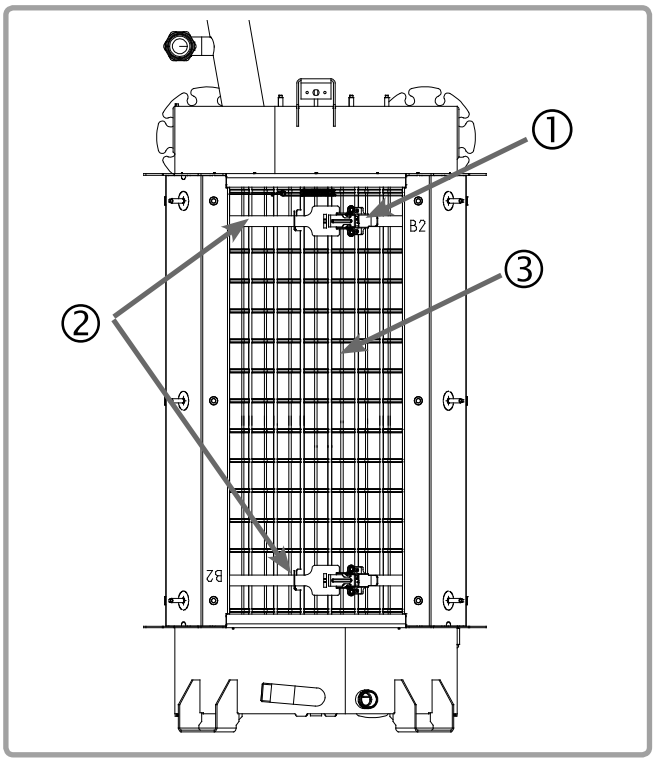



*figure 45 - Removal of baffles*

**Removal of baffles:**

- Open the fastenings (mark 1) that close the 2 flue-gas baffle strappings (mark 2).
- Remove the 2 strappings (mark them in some way so that you can refit them in the same order) and then remove the flue-gas baffles (marks 3). Mark these too so that you can refit them in the same position.

**Cleaning baffles and exchangers:**

- Brush the flue-gas baffles with a stainless steel or plastic brush**, so as not to geometrically deform them**.
- Clean by brushing or if the exchanger is very dirty, wash with water and then dry. If washing with water, be careful of the electrical parts.

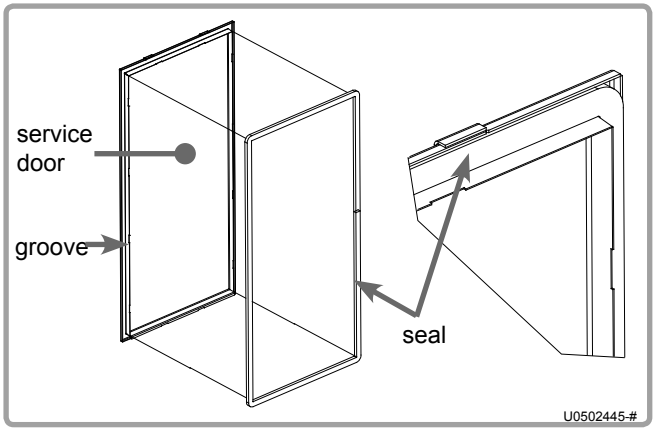



***figure 46 - Changing door seals***

**Changing door seals:**

- Remove the seals from their groove and replace with new seals from the maintenance kit (see figure 46).

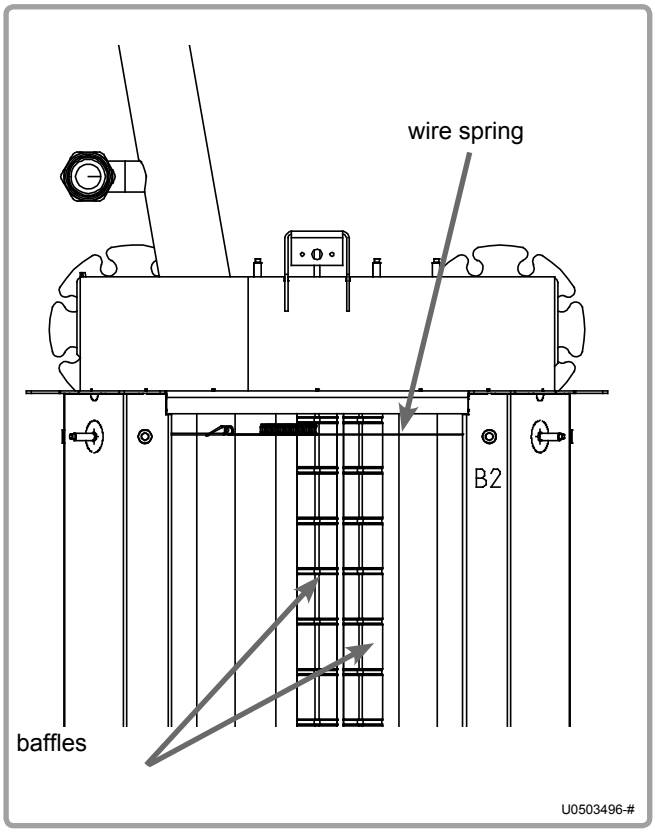



***figure 47 - Refitting***

**Refitting:**

- Insert the baffles under the wire spring between the top part of the exchanger tubes (see detail). Replace the baffles holding the strappings (mark 3) as shown on the diagram opposite.

- Position the strappings inside the pins of the baffles holding the strappings.

- Tighten the fastenings and ensure the baffles are correctly fitted to the exchanger tubes and **check that each of the baffles are correctly fitted on the exchanger tubes at their lower and upper ends.**

  Note:
  It is normal that the baffles are not fitted tightly in the area between the 2 strappings.

**Checking gas-tightness:**

- After refitting the 3 service doors (tightening torque of screws = 15 N.m), check the gas tightness using the foaming product around the service doors before starting the boiler up again (see chapter 7.6).

## 7.11. Cleaning the burner and changing the seals

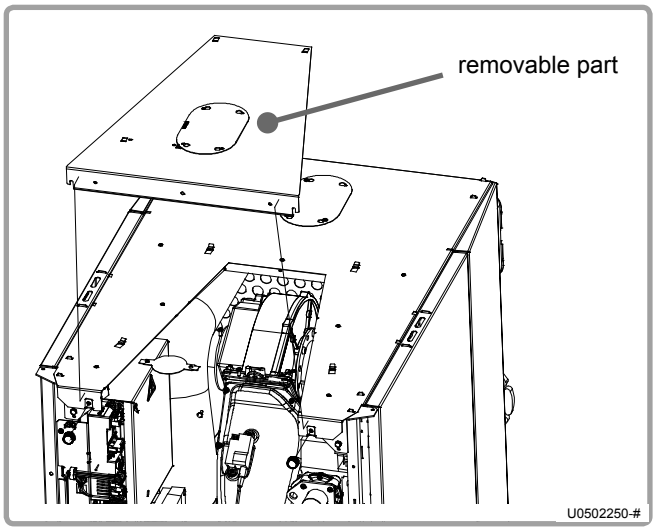



***figure 48 - Removable upper door***

To facilitate access to the spool piece and then the gas tube, part of the upper door is removable.

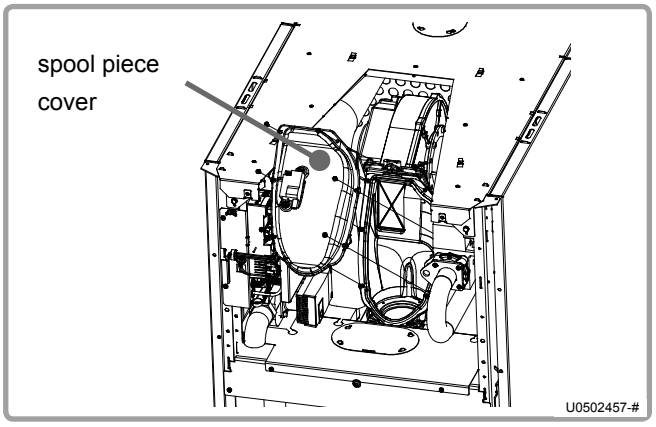



***figure 49 - Removal of spool piece cover***

**<u>Removing the burner tube:</u>**

- Remove the 2 electrode blocks before removing the burner tube (see chapter 7.4).
- Unscrew the attachment screws from the spool piece cover to remove it.

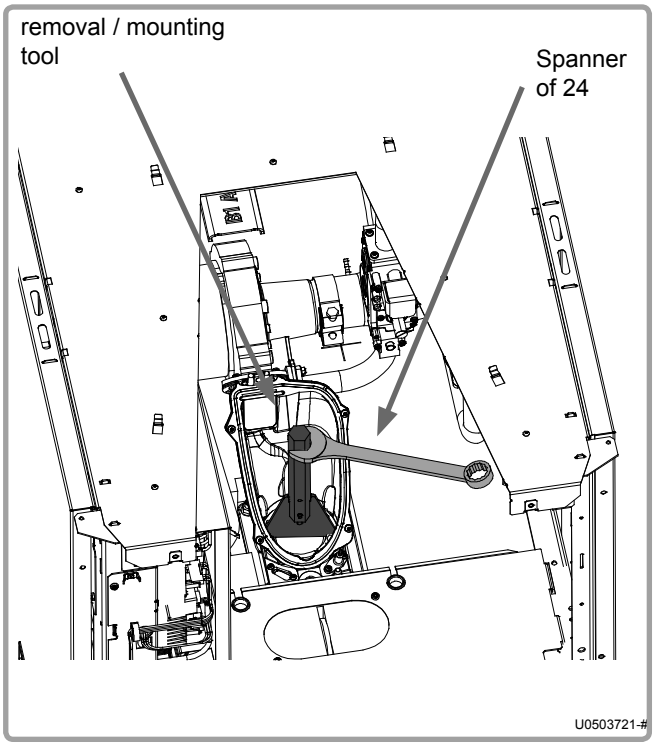



***figure 50 - Release the burner tube***

- Put the burner tube's removal / mounting tool in position (the tool is located under the gas line to the right of the sleeve cover).
- Position the tool in the slots of the tightening flange and compress on it (by pressing down) .

- Rotate the tool anticlockwise to unlock the ramp.

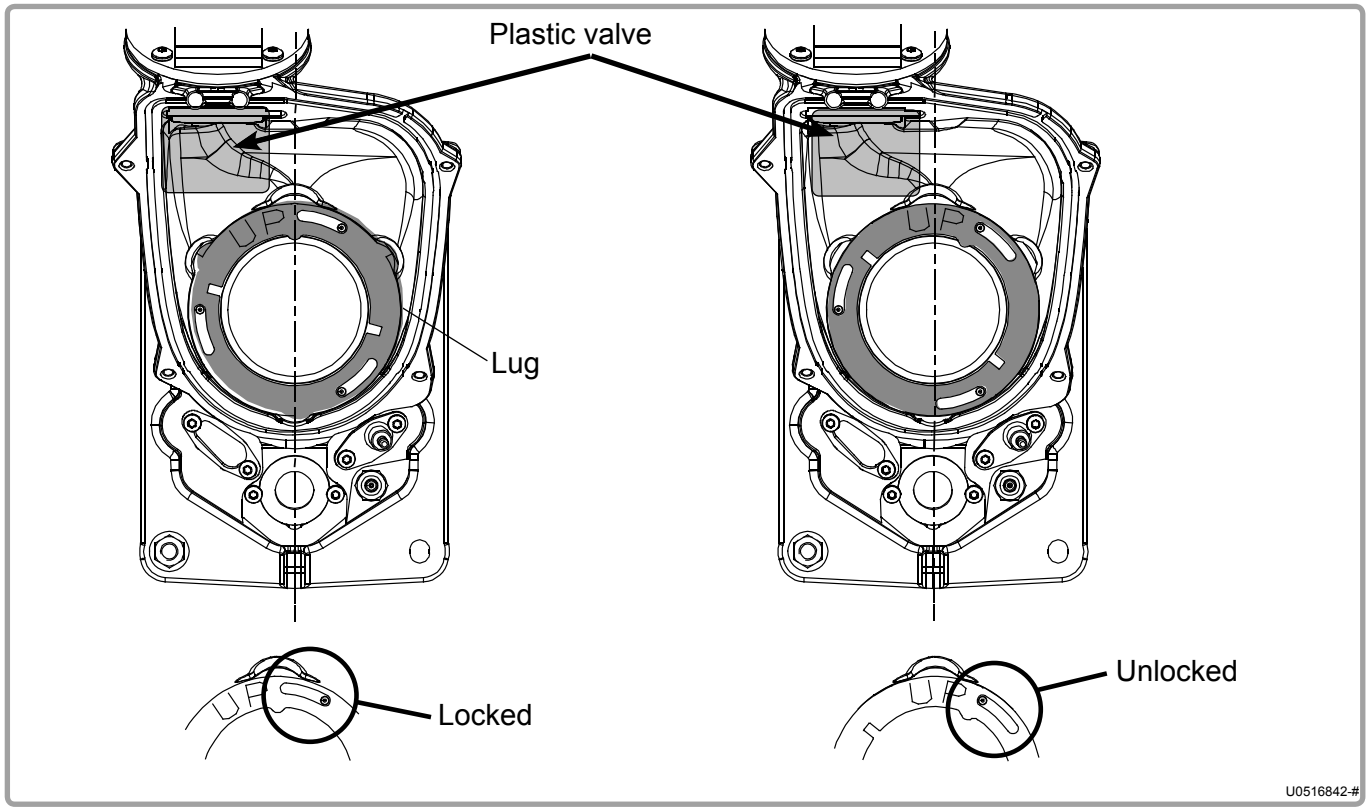



***figure 51 - Positions of the fastening clamps***

- Remove the clamp from the burner tube.
- Remove the burner tube.

**WARNING:** **Remove the plastic valve on the spool piece before removing the burner tube. Do not forget to put it back when refitting.**

**WARNING:** **When removing the burner tube, be careful not to rub metal mesh against the spool piece.**

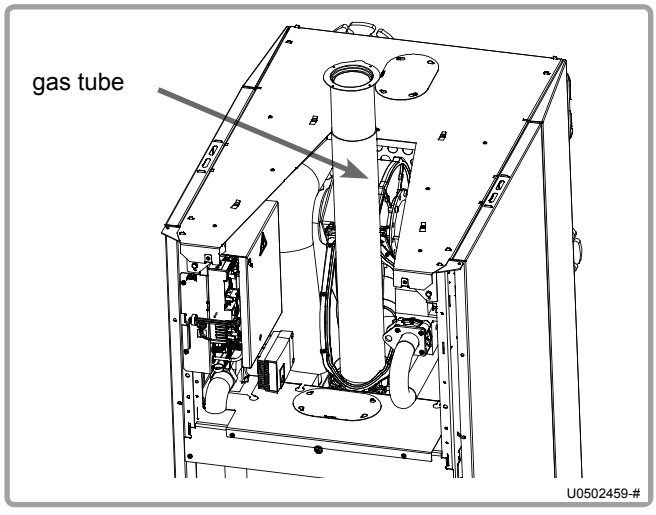



***figure 52 - Cleaning the gas tube***

**<u>Cleaning the burner tube:</u>**

- Suck out the entire surface in metal mesh using a vacuum cleaner.

**WARNING:** **Keep a distance of 10 mm between the suction nozzle and the metal mesh. Any rubbing of the boiler tube may cause damage.**
**NEVER USE A METAL BRUSH.**

**WARNING:** **Replace the seal under the clamp on the burner tube.**

**Refitting:**

- Put the burner tube into the spool piece (be careful not to rub the metal mesh on the spool piece). A directional pin enables the burner tube to be correctly positioned.
- Position the clamp (the word "UP" must be visible and the inner lug must be positioned on the rear axis of the boiler - see figure 47)
- Position the burner tube's removal / mounting tool in the slots in the clamp.
- Compress by pushing downwards and rotate the tool in a clockwise direction to lock the tube (see figure 47).

- Check the seal on the spool piece's cover and replace if necessary.
- Position the cover over the spool piece.
- Screw the cover onto the spool piece using the screws (tightening torque = 5 N.m).
- Refit the 2 electrode blocks.

**WARNING:** **Check the different seals after mounting. If using a foaming product, be careful of the ionisation electrode's electrical connection.**

# 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