Metro 130 XT
Metro 130 XT Tunnel

G20/G25/G31

English

Installation manual (GB/IE)

Store this document in a safe place

CE

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Contents

1. Introduction

DRU, a manufacturer of gas-fired heating appliances, develops and produces products that comply with the highest quality, performance and safety requirements. This appliance has a CE label, which means that it complies with the essential requirements of the European gas appliance directive. The appliance is supplied with an installation manual and a user manual. As an installer, you must be certified and competent in the field of gas-fired heating. The installation manual will give you the information you need to install the appliance in such a way that it will operate properly and safely.

This manual discusses the installation of the appliance and the regulations that apply to the installation. In addition, you will find the appliance's technical data as well as information on maintenance, possible malfunctions that might occur and what may cause them.

The figures can be found at the back of this booklet, in the appendix.
Please, read and use this installation manual carefully and completely, prior to installing this appliance. If you use the DRU Powervent system®, the DRU Smartvent system® or the DRU Maxvent system®, you must carefully and fully read and use the accompanying installation manual as well, prior to its installation.

The following symbols are used in the manual to indicate important information:

➢ Work to be performed

!Tip Suggestions and recommendations

!Caution You will need these instructions to prevent problems that might occur during installation and/or use.

!Caution You need these instructions to prevent fire, personal injury or other serious damages.

After delivery, you should give the manuals to the user.

2. CE declaration

We hereby declare, that the design and construction method of the gas-fired heating appliance issued by Dru complies with the essential requirements of the gas appliance directive.

Product:	gas-fired heating appliance
Type:	Metro 130 XT + Tunnel
EEC directives:	2009/142/EC
Standards:	NEN-EN-613
	NEN-EN613/A1

Internal precautions at the company will guarantee that appliances produced in series comply with the essential requirements of the EC directives in force and the standards derived from them.
This declaration will lose its validity if adjustments are made to the appliance, without prior written permission by DRU.

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3. SAFETY

3.1 General

!Caution
- Please observe the generally applicable regulations and precautions/safety instruction in this manual.
- First check the exact technical version of the appliance to be installed in Appendix 2, Table 2.

3.2 Regulations

Please install the appliance in accordance with the applicable national, local and constructional (installation) regulations.

3.3 Precautions / safety instructions during installation

Carefully observe the following precautions/safety regulations:

- You should only install and maintain the appliance if you are a certified and competent installer in the field of gas-fired heating;
- Do not make any changes to the appliance;
- If you are installing an appliance that must be built in;
  - use non combustible and heat-resistant material for the chimney breast, including the top of the chimney breast, the material inside the chimney breast and the back wall against which the appliance will be placed. For this you can use both sheet material and stone-like materials;
  - take sufficient measures to prevent high temperatures of the wall behind the chimney breast, including the materials and/or objects that are behind the wall;
  - comply with the minimum required internal measurements of the chimney breast;
  - vent the chimney breast by means of ventilation holes with a combined passage as stated further down in the text;
  - use heat-resistant electric connections and make sure that they do not make contact with the appliance;
- If you are installing an appliance with an open combustion: use a suitable flue gas discharge system that is provided with the CE label;
- if you are installing an appliance with a closed combustion: only use the concentric systems supplied by DRU;
- if you are installing a free-standing appliance: place the appliance away from the back wall by the minimum distance stated further down in the text;
- do not cover the appliance and/or do not wrap it in an insulation blanket or any other material;
- make sure that combustible objects and/or materials have a distance from the appliance of at least 500 mm
- only use the accompanying wood/pebble set and place it exactly as described;
- the space surrounding the pilot burner, 2nd thermocouple or ionisation pins must remain free;
- make sure there is no dirt in gas pipes and connections;
- place a gas tap in accordance with applicable regulations;
- prior to putting into operation, check the complete installation for gastightness;
- if your appliance is provided with explosion hatches on its top, you must make sure that they cannot be blocked and check whether they fit well onto the sealing surface, prior to building in the appliance;
- do not ignite the appliance before the gas and discharge connections have been fully installed, first observe the procedure described in chapter 7.3.
- replace broken or torn glass panes.

!Caution In case of broken or torn glass panes, the application may not be used.

3.4 Second thermocouple safety (if applicable, see Appendix 2, Table 2)

It is possible, that the appliance to be installed has 2 thermocouples. Thermocouple 1 is always next to the pilot burner, thermocouple 2 is always elsewhere above the main burner.
If the appliance is provided with a second thermocouple safety on the main burner, you need to know that it will intervene if no proper transfer has taken place from the pilot burner to the main burner or from the main burner itself. The gas supply will be interrupted after 22 seconds. In order to solve a poor or non-existent transfer from the pilot burner to the main burner, please use the malfunction search diagram in Appendix 1.

3.5 Oxypilot safety (if applicable, see Appendix 2, Table 2)

If the appliance is provided with an oxypilot safety, you need to know that it will intervene (the pilot flame and the gas supply to the main burner will be switched off) if insufficient combustion air (oxygen) is supplied.
Once the supply of combustion air is sufficient again, the appliance can be restarted.
The supply of fresh air can be controlled by installing/opening ventilation holes.

4. Removing the packaging

Note the following items when removing the packaging:

- ➢ Check the appliance and accessories for damages (during transport).
- ➢ If necessary, contact your supplier.
- ➢ Never install an appliance that is damaged !
- ➢ Remove any screws that are used to fix the appliance to a platform or pallet.

!Caution Heat-resistant glass is a ceramic material. Very small irregularities in the glass pane(s) cannot be avoided, but are within the required quality standards.

!Caution Keep plastic bags away from children.

In Appendix 2, Table 1 you can see which parts you should have after removing the packaging.

- ➢ Contact your supplier if you do not have all the parts after you finished removing the packaging.
- ➢ Dispose of packaging in accordance with local regulations.

5. Installation

Read this manual carefully to ensure the proper and safe installation of the appliance.

!Caution Install the appliance in the order described in this chapter.

➢ Please install the appliance in accordance with the applicable national, local and constructional (installation) regulations.
➢ Observe the regulations/instructions in this manual.

5.1 Type of gas

The data plate indicates for which type of gas, gas pressure and for which country this appliance is intended. The data plate can be found on the appliance or can be attached to a chain to which it should remain attached.

!Caution Check whether the appliance is suitable for the type of gas and the gas pressure used at the location.

5.2 Gas connection

Place a gas tap in the gas pipe in accordance with the applicable regulations.

!Caution Make sure there is no dirt in gas pipes and connections;

The following requirements apply to the gas connection:
- use a gas pipe with the correct dimensions, so that no pressure loss can occur;
- the gas tap must be approved (in the EU this will be the CE mark);
- you should always be able to reach the gas tap.

5.3 Placing the appliance

!Caution
- Always place the appliance with a minimum distance of 500 mm from combustible objects or materials;
- Place the discharge pipes in such a way that situations with risk of fire can never occur;
- Always place the appliance in front of a wall of non combustible and heat-resistant material;
- Always maintain a minimum distance between appliance and back wall, if indicated in the dimensional drawing (Appendix 3, fig. 2);
- Take sufficient measures to prevent high temperatures of a possible wall behind the chimney breast, including the materials and/or objects that are behind the wall;
- Do not cover the appliance and/or do not wrap it in an insulation blanket or any other material;
- Make sure that the appliance to be installed has a stable position. If applicable, this could also be done by fixing the extension legs with self-tapping screws.

!Caution When installing an appliance that has to be built in, take the following into account:
- The minimum construction dimensions according to Appendix 3, fig. 1 and 2;
- The construction height of the appliance, which you can determine yourself.

➢ Provide a gas connection at the location. For details, see section 5.2.
➢ Make a passage for the flue gas discharge system or the concentric system with the following diameters; for details, see section 5.7 or 5.8:
- the pipe diameter +10 mm for a passage through non combustible material;
- the pipe diameter +100 mm for a passage through combustible material.

!Caution Starting at section 5.9, you will find additional instructions that are specifically needed for the installation of your appliance.

5.4 Placing a built in appliance (if applicable)

Not all built in appliances by DRU are supplied with a control hatch. If it is not included, this control hatch is available separately. We recommend using the Dru control hatch at all times. In this chapter, it is assumed that the appliance is used with a control hatch.

!Caution If you do not use a recommended Dru control hatch, please strictly observe the safeguards and necessary instructions stated in chapters 5.4 to 5.6.

If you are not using the control hatch, please take the following into account as well:
- the accessibility of components that are normally placed in the control hatch;
- the maximum temperature of these components (maximum 60 °C).

The gas control is mounted under the appliance, at the burner mounting plate. It must be taken out and placed in the control hatch at a later time. For placing the gas control in the control hatch, see section 5.6.

Follow the procedure described below:

➢ Disconnect the pipes from the gas control (flexible gas pipe, aluminium pilot burner pipe and thermocouple 1);

!Caution The red wire of thermocouple 2, if applicable, must remain connected to the gas control.

➢ Disconnect the gas control from the burner mounting plate by unscrewing the self-tapping screw.
➢ Carefully unwind the red and black wire of thermocouple 2, if applicable.
➢ Carefully lay the gas control together with the wires of thermocouple 2, the ignition cable, the flexible gas hose, the aluminium pilot burner pipe and the type plate plus chain in the direction of the control hatch.

!Caution
- Make sure there is no dirt in gas pipes and connections;
- Avoid kinks in the pipes.

!Caution
- Make sure the ignition cable cannot come into contact with other wires;
- The data plate should remain attached to the chain.

➢ Set the height of the appliance using the adjustable feet and
➢ Make the appliance level at the same time.

!Tip The construction frame for most 2 or 3 sided appliances can be adjusted. This will allow you to connect the construction frame to the chimney breast correctly. For 2 or 3 sided appliances that cannot be adjusted, we would like to refer you to chapter 5.9 'Additional instructions'.

!Caution do not ignite the appliance before the gas and discharge connections have been fully installed, first observe the procedure described in chapter 7.3.

5.5 Placing the chimney breast (if applicable)

In order to provide proper heat discharge, there should be sufficient space around the appliance. The chimney breast should be ventilated sufficiently by means of ventilation holes (incoming and outgoing).

!Caution
- Use non combustible and heat-resistant material for the chimney breast, including the top of the chimney breast, the material inside the chimney breast and the back wall of the chimney breast;
- Make sure that the appliance is not carrying the weight of the chimney breast when using stone-like materials;
- The passage of the ventilation holes (outgoing), which are placed as high as possible, is stated in Appendix 2, Table 2.

!Caution When placing the chimney breast, you should take the following into account (see Appendix 3, fig. 2):

- the location of the control hatch: this must be placed as low as possible;
- the dimensions of the control hatch; see Placing the control hatch section 5.6;
- the Dru control hatch is not supplied with all appliances. Nevertheless, we recommend only using a Dru control hatch, which can be supplied separately, if necessary. If you decide not to take this option, you will have to make a 100 cm^2 ventilation hole that is placed as low as possible, for the benefit of the incoming ventilation.
- the location of the ventilation holes (V) (outgoing);
- maintain a minimum 30 cm distance between the top of the ventilation hole (outgoing) and the ceiling of the house.
- the measurements of the glass pane, so that it can be placed/removed after placing the chimney breast;
- the protection of the gas control and the pipes against cement and plaster.

!Tip You should preferably apply the ventilation holes (outgoing) on both sides of the chimney breast. You can use DRU ventilation elements.

- Prior to completely closing the chimney breast, check whether the discharge / concentric system is placed correctly.
- whether the channels, fixing brackets and possible clip bindings, which cannot be reached after installation, are fastened by means of self-tapping screws.

➢ If applicable, do not plaster on or over the edges of the construction frame, because:

- the heat of the appliance could cause cracks;
- it will no longer be possible to remove/place the glass pane.

➢ When using stone-like materials and/or a plaster finishing, allow the chimney breast to dry for at least six weeks prior to using the appliance in order to prevent cracks.

5.6 Placing the control hatch (if applicable)

The control hatch (also see paragraphs 5.4 and 5.5) is placed as low as possible in the chimney breast.

!Caution - The bottom of the control hatch may not be placed higher in the appliance than the burner surface.

A number of components are placed in the control hatch, such as data plate, gas control, receiver belonging to the remote control and, if applicable, the control panel of the DRU Maxvent system® or the components belonging to the DRU Powervent system®.

Place the control hatch as follows; see Appendix 3, fig. 3 for details:

➢ Make an opening in the chimney breast of 285 x 194 mm (h x w).
➢ Place the inner frame (1); unscrew bolts (5) for this.

!Tip

- When the chimney breast is made of bricks, the inner frame can be built with bricks at the same time
- When using a different material, you can glue the inner frame or fix it with four flush screws.

➢ Mount the gas control to the brackets of the inner frame (2).
➢ Reconnect the pipes to the gas control.

!Caution

- Avoid kinks in the pipes;
- Tighten the flexible gas pipe and the pilot burner pipe until they are gastight.
- First tighten the thermocouple by hand and;
- Then tighten it a quarter turn using a suitable spanner;
- The pilot burner pipe must be protected against possible corrosive influences as a result of, for example, humidity, cement that has fallen down, dirt that has fallen down from the chimney, etc. The pilot burner pipe should remain permanently free from the ground and the walls of the room in which the appliance is built in.

➢ Make sure there is no dirt in gas pipes and connections.
➢ Connect the gas pipe to the gas tap.
➢ Bleed the gas pipe.
➢ Place the receiver in the holder (3); for connecting, see section 6.1.
➢ Place the data plate in its intended clamp (6).
➢ Fix the outer frame with door (4) to the inner frame using 2 socket cap screws (5).

!Tip You can place the outer frame in such a way, that the door turns to the left or to the right.

5.7 Flue gas discharge system in appliances with open combustion

For connection to an existing chimney without a discharge pipe or flexible SS discharge – only allowed in Great Britain – the instructions provided in the separately supplied booklet 'Fitting into a conventional class 1 chimney' apply. In addition to the installation instructions, this booklet also contains supplementary tests.

5.7.1 General

The appliance's type of discharge system is stated in Appendix 2, Table 2.
The appliance must be connected to an existing or newly built chimney, in accordance with the applicable national, local and constructional (installation) regulations.

5.7.2 Connection of flue gas discharge system (if a class 1 chimney is not applicable)

At least a 3 metre discharge pipe or a flexible SS discharge should be connected to the appliance. Bends in the flue gas discharge system are not allowed.

!Caution
- Maintain a distance of at least 50 mm between the outside of the concentric system and the walls and/or ceiling. If the system is built in (for instance) a cove, it should be made with non combustible material all around it;
- Use heat-resistant insulation material when passing through combustible material.
- Use a flue gas discharge system with the correct diameter, and which is provided with the CE mark.

!Caution Some heat-resistant insulation materials contain volatile components that will spread an unpleasant smell during a longer period; these are not suitable.

Place the flue gas discharge system as follows:
➢ Connect the pipe pieces or flexible SS discharge.
➢ You should only install the appliance in a well ventilated room which complies with the applicable national, local and constructional (installation) regulations, in order to guarantee sufficient air supply.

!Tip When the appliance is installed in a house with a mechanical air extraction system and/or an open kitchen with cooker hood, you will need a permanent ventilation hole near the appliance; for this application, please observe the gas installation regulations and the local instructions.

5.8 Flue gas discharge / combustion air supply system in appliances with closed combustion

5.8.1 General

The appliance's type of discharge system is stated in Appendix 2, Table 2.
The appliance will be connected to a combined flue gas discharge / combustion air supply system, hereafter to be referred to as the concentric system.
The passage to the outside can be made with both a wall terminal and roof terminal. If necessary, you can also use an existing chimney (see section 5.8.4).

!Caution
- Only use the concentric system supplied by DRU This system has been tested in combination with the appliance. DRU cannot guarantee a proper and safe operation of other systems and does not accept any responsibility or liability for this;
- For connecting to an existing chimney you should only use the chimney kit supplied by DRU.

The concentric system is constructed from (the flue spigot of) the appliance.
If, due to constructional circumstances, the concentric system is placed first, it is possible to connect the appliance by means of a telescopic pipe piece.

5.8.2 Construction of the concentric system

Depending on the construction of the concentric system, the appliance will have to be further adjusted with possibly a restrictor slide or air inlet guide.
See Tables 4 and 6 for determining the correct adjustment and section 5.9, Adjustment of the appliance, for the method of working.

The concentric system with wall or roof terminal has to comply with the following conditions:

- First, a concentric pipe of minimum length should be connected vertically to the appliance, according to Appendix 2, Table 4 or 5.
- Determine the permissibility of the required discharge.

When using a **wall terminal**, the following applies:

- The total vertical pipe length, when using a wall terminal, may have a maximum length that you can find in Appendix 2, Table 4. In that case, a 90° bend will be connected after the vertical part;
- The total horizontal pipe length, when using a wall terminal, may have a maximum length that you can find in Appendix 2, Table 4 (without wall terminal; see Appendix 3, fig. 4).

When using a **roof terminal**, the following applies:

- The construction of the chosen system, when using a roof terminal, must be permissible according to Appendix 2, Table 5. (See the method of working described below)

The working method below indicates how the permissibility is determined of a concentric system when using a roof terminal.

1) Count the number of 45° and 90° bends required
2) Count the total number of whole metres of horizontal pipe length;
3) Count the total number of metres of vertical and/or sloping pipe length (roof terminal excluded).
4) In the first 2 columns of Table 5, look for the number of bends required and the total horizontal pipe length.
5) In the top row of Table 5, look for the required total vertical and/or sloping pipe length.
6) If you end up in a box with a letter, the concentric system chosen by you is permissible.
7) Use Table 6 to determine how the appliance should be adjusted

5.8.3 Placing the concentric system

!Caution

- Maintain a distance of at least 50 mm between the outside of the concentric system and the walls and /or ceiling. If the system is built in (for instance) a cove, it should be made with non combustible material all around it;
- Use heat-resistant insulation material when passing through combustible material;
- The rosette of the wall terminal is too small to seal the opening when passing through combustible material. That is why you should first apply a sufficiently large heat-resistant intermediate sheet to the wall. Then, the rosette is mounted on the intermediate sheet.

The roof terminal can end in a sloping and a flat roof.
The roof terminal can be supplied with a glue plate for a flat roof or with a universally adaptable tile for a sloping roof.

!Caution Some heat-resistant insulation materials contain volatile components that will spread an unpleasant smell during a longer period; these are not suitable.

Place the concentric system as follows:

- ➢ Build the system up from (the flue spigot of) the appliance.
- ➢ Connect the concentric pipe pieces and, if necessary, the bend(s).
- ➢ On each connection, apply a clip binding with silicon sealing ring.
- ➢ Use a self-tapping screw to fix the clip binding to the pipe on locations that cannot be reached after installation.
- ➢ Apply sufficient wall brackets, so that the weight of the pipes does not rest on the appliance.
- ➢ Attach the wall terminal from the outside by means of four screws.
- ➢ Determine the remaining length for the wall or roof terminal and cut it to size, make sure the correct insertion length is maintained.
- ➢ Place the wall terminal with the (groove/folded) seam at the top;

!Caution - When using the wall terminal, place the terminal with a downward slope of 1 cm / metre towards the outside, in order to prevent rain water from raining in.

5.8.4 Connection to an existing chimney

It is possible to connect the appliance to an existing chimney.
A flexible SS pipe is placed in the chimney with a fitting diameter at the flue gas discharge pipe, for the discharge of flue gas. The surrounding space is used to supply combustion air.

The following requirements apply when connecting to an existing chimney:

- only allowed when used in combination with the special DRU chimney kit. The installation regulation is also supplied;
- the internal dimensions should be at least 150 x 150 mm;
- the vertical length has a maximum of 12 metres;
- the total horizontal pipe length may have a maximum length that you can find in Appendix 2, Table 4;
- the existing chimney has to be clean;
- the existing chimney has to be tight.

For adjusting the appliance, the same conditions/instructions apply as for the concentric system described above.

5.9 Additional instructions

➢ Secure the appliance against the wall using the wall brackets (B) and rawplugs supplied (see Appendix 3, fig. 1).

5.10 Glass panes

!Caution - Avoid damaging the glass panes during removal/placing;
- Avoid/remove fingerprints on the glass panes, as they will burn into the glass.

5.10.1 Removing glass pane

When removing the front glass pane, you should follow the next steps (see Appendix 3, Fig. 5-16).

➢ Remove the vertical decorative strips on the left and right of the glass frame by pushing the lip at the top of each strip up, tilting the top of the strip parallel with the glass frame, and then removing the strip.
➢ Remove the horizontal decorative strip by lifting it on one side and taking it out.
➢ Unscrew the 4 self-tapping screws in the bottom strip using the socket spanner supplied with the appliance.
➢ Loosen the 3 self-tapping screws in the fastening strips on both sides 2 turns.

!Caution Do not remove the self-tapping screws: leave them in place in the fastening strips.

➢ Push the 2 top wedges (left and right) down as far as possible.
➢ Push the 2 bottom wedges upwards as far as possible.
➢ Press the two fastening strips outwards with your hands as far as possible to avoid damage to the sealing cord.
➢ Take hold of the top and bottom handgrips and lift the glass frame.
➢ Pull on the bottom handgrip to tilt the glass frame in its mounting towards you and, at the same time, pull the top of the glass frame towards you as far as possible.

!Caution Make sure you hold the upper handgrip firmly. If you let go of the handgrip then the glass frame could fall inwards and cause severe damage to both the glass and the appliance;
Make sure that you lift the glass frame out of its mounting as straight as possible to avoid damage to the paintwork and the sealing cord.

➢ Gently allow the glass frame to drop at an angle until it can be removed entirely from the mounting.

5.10.2 Placing glass pane

The glass frame is fitted by using the above procedure, in reverse order.

!Caution Avoid/remove fingerprints on the glass, since otherwise they will burn into the surface;
The self-tapping screws must not be over-tightened, since otherwise they could break or strip the thread: tight=tight;
Replace the fastening strip if the sealing cord has come loose.

Pay attention to the following when fitting the glass frame:

➢ Begin by checking that the two fastening strips are pressed outwards as far as possible to avoid damage to the sealing cord.
➢ Fit the glass frame.
➢ Check that the hook at the top of the glass frame is in position in the seating / U-shaped strip.

!Tip Pull on the upper handgrip to move the glass frame towards you: if it does not move, then it has been fitted correctly.

!Caution Fix the glass frame's bottom strip in place with the 4 self-tapping screws.

➢ Push both bottom wedges downwards.
➢ Push the top wedges upwards until the sealing cord of both fastening strips press against the glass.
➢ Tighten each wedge's self-tapping screw.

!Caution Press on the wedge with your hand to hold it in place while you tighten the screws.

➢ Tighten the middle self-tapping screw in each fastening strip.
➢ Fit the horizontal decorative strips.
➢ Fit the vertical decorative strips.

5.11 Adjustment of the appliance

The appliance has to be set in such a way that it works correctly in combination with the discharge system applied. For that purpose, a restrictor slide is placed and/or the air inlet guide is removed. The conditions for application with wall terminal and roof terminal are stated in Appendix 2, Tables 4, 5 and 6.
This appliance is suitable for PowerVent®. For more information see the PowerVent® Installation Manual.

5.11.1 Air inlet guide

The air inlet guides (L) are located at the bottom (side) of the tray around the burner.
Remove them as follows (see Appendix 3, Fig. 17).

- Unscrew the 4 parkers (K) from the tray surrounding the burner (M).
- Remove the tray surrounding the burner;
- Unscrew and remove the self-tapping screws;
- Remove the air inlet guides;
- Replace the tray round the burner.
- Screw the 4 parkers (K) in the tray surrounding the burner (M).

5.11.2 Restrictor slide

The restrictor slide (R) is supplied separately (see Appendix 3, fig. 18).
It is mounted as follows:

- Unscrew the self-tapping screws (S) from the middle plate (T) and remove them.
- Place the restrictor slide.
- Adjust the distance of the restrictor.
  - in case of a 40 mm setting, the restrictor slide is closed to a maximum level;
  - in case of a 55 mm setting, the distance must be set by means of a gauge (see Appendix 3, fig. 19).
- Fix the restrictor slide by using the allen screw (U).
- Remount the middle plate by using the self-tapping screws.

5.12 Placing the wood/pebble set

The appliance is supplied with a wood set or a pebble set.
The vermiculite that is used to fill the burner is black when using the wood set and has a natural colour when using the pebble set.

!Caution The figures do not always show the correct colours.

!Caution Strictly observe the following instructions to prevent unsafe situations:

- ➢ only ever use the supplied wood/pebble set;
- ➢ place the wood/pebble set exactly as described;
- ➢ make sure the pilot burner and the surrounding space remain free (see Appendix 3, fig. 20);
- ➢ make sure thermocouple 2 and the surrounding space remain free (see Appendix 3, fig. 21);
- ➢ make sure that the slot between the burner and the vermiculite tray is kept free from objects;
- ➢ make sure there is no vermiculite dust on the burner.

5.12.1 Wood set

The wood set consists of vermiculite (see Appendix 3, fig. 22), chips (see Appendix 3, fig. 23), glow material (see Appendix 3, Fig. 24) and a number of branches (see Appendix 3, fig. 25).

!Caution The figures do not always show the correct colours.

➢ Fill the burner with vermiculite; spread the vermiculite evenly (see Appendix 3, fig. 26). The vermiculite may not come higher than the edge of the burner.

!Caution
- You can influence the flame picture by moving the vermiculite, yet
- the burner deck has to remain covered with vermiculite in order to prevent that the life span of the burner is reduced.

➢ Fill the vermiculite tray with chips; spread the chips evenly (see Appendix 3, fig. 26).

➢ Identify branches A up to H (see Appendix 3, fig. 25).

!Tip Use the burn stains on the branches for identification.

➢ Place branch A across the burner, place the ridge of the branch on the positioning bracket (see Appendix 3, fig. 27a):

➢ Proceed with branches B, C, D and E (see Appendix 3, fig. 27b).

➢ Then place branches F up to H (see Appendix 3, fig 27c).

!Caution The branches may not completely cover the burner pattern (see Appendix 3, fig. 28), because:
- the main burner will not ignite properly; which could result in unsafe situations;
- the appliance will become filthy more quickly, as a result of soot;
- the flame picture will be affected.

5.12.2 Pebble set

The pebble set consists of vermiculite (see Appendix 3, fig. 22) and pebbles.

!Caution The figures do not always show the correct colours.

➢ Remove the positioning bracket for the vermiculite tray (see Appendix 3, fig. 29).

➢ Fill the burner with vermiculite; spread the vermiculite evenly (see Appendix 3, fig. 26).

!Caution
- You can influence the flame picture by moving the vermiculite, yet
- the burner deck has to remain covered with vermiculite in order to prevent that the life span of the burner is reduced.

➢ Fill the burner and the vermiculite tray with pebbles.

➢ Spread the pebbles evenly over one layer (see Appendix 3, fig. 30).

!Caution Incorrect placement of the pebbles, e.g. on top of each other, could have the following consequences:
- the main burner will not ignite properly, which could result in unsafe situations;
- the flame picture will be affected.

6. Wireless remote control

The appliance is supplied with a wireless remote control.
Controlling the flame height, igniting and switching off take place through a remote control controlling a receiver.
Chapter 4, Wireless remote control, in the User Manual describes the operation of the appliance and how you should use the remote control.

!Caution Do not ignite the appliance before the gas and discharge connections have been fully installed, first observe the procedure described in chapter 7.3;

Below, we will describe how the receiver is connected.

6.1 Connecting the receiver

Your appliance is equipped with an electronic ignition through the remote control.
The receiver should be connected to the appliance, before the batteries are installed.

- ➢ Connect the receiver according to Appendix 3, fig. 38.
- ➢ Bend the antenna (N) out of the clips and place it erect (Appendix 3, fig. 39).

!Tip
- The plugs have different sizes that correspond with the connectors.
- The size of the eye corresponds with the size of the screw;
- The colours of eye and screw correspond as well.
- Place the batteries as described below in section 6.1.1.

!Caution
- Do not place the ignition cable over and/or along metal, stone or concrete parts: this will weaken the spark. Make sure the cable is hanging freely.
- Make sure that the wires of thermocouple 2 cannot come into contact with hot parts
- Keep the ignition cable at least 10 cm away from the antenna, in order to avoid damaging the receiver.
- Avoid formation of dust on or in the receiver: cover it when performing work.
- Place the receiver in its intended holder under the appliance or in the control hatch according to Appendix 3, fig. 39.
- If you want to use an adapter, only an adapter supplied by DRU will guarantee a proper operation of the receiver.

6.1.1 Placing / replacing the receiver's batteries

Follow the procedure below when placing the batteries:

- ➢ Pick up the receiver and slide off the cover.
- ➢ Place or remove the 4 penlite (AA type) batteries.

!Caution
- Observe the "+" and "-" poles of the batteries and the receiver;
- Use alkaline batteries; rechargable batteries are not allowed.
- Batteries are regarded as "small chemical waste" and may therefore not be disposed with the household rubbish.

- ➢ Slide back the cover.
- ➢ Place back the receiver.

6.2 Setting the communication code

Prior to putting the application into operation, a communication code must be set between the remote control and the receiver. If the receiver or the remote control are replaced, a new code will have to be set.
Follow the procedure described below:

- ➢ If necessary, place the batteries in the receiver's battery holder; see section 6.1.1.
- ➢ If necessary, place the 9V block battery in the remote controle; see User Manual, section 1.1.
- ➢ Hold down the reset button on the receiver, until you hear two consecutive sound signals (see Appendix 3, fig. 40).
- ➢ After the second, longer signal, let go of the reset button.
- ➢ Press the 'small flame' button on the remote control for 20 seconds, until you hear two short sound signals: this is the confirmation of a good communication.

small flame

large flame

7. Final inspection

In order to check whether the appliance is working properly and safely, you must perform the following inspections before the appliance is used.

7.1 Gastightness

!Caution All connections must be gastight. Check the connections for gastightness.
The gas control can be subjected to a maximum pressure of 50 mbar.

7.2 Gas pressure/line-pressure

The burner pressure is set at the factory; see data plate.

!Caution The line-pressure in house installations must be checked, because it can be wrong.

- ➢ Check the line-pressure; see Appendix 3, fig. 41 for the measuring nipple on the gas control.
- ➢ Contact the gas company if the line-pressure is not correct.

7.3 Ignition pilot and main burner

For igniting the pilot and main burner, see the User Manual, chapter 4, section 4.2, Remote control.

7.3.1 First ignition of the appliance after installation or adjustments

!Caution After installation, or after work has been performed, you should ignite the appliance for the first time without the glass window. If necessary, bleed the gas pipe.

Follow the procedure described below:

- ➢ If required, remove the glass window;
- ➢ Start the ignition procedure according to chapter 4 in the User Manual;
- ➢ If the pilot flame does not ignite:
  - repeat the ignition procedure until the pilot burner ignites;
  - consult the malfunction search diagram (Appendix 1) if this does not happen after a few attempts;
- ➢ After igniting the pilot flame, the main burner will ignite during the ignition procedure;
- ➢ Check whether the main burner continues to burn;
- ➢ If the main burner does not continue to burn:
  - repeat the ignition procedure until the main burner continues to burn
  - consult the malfunction search diagram (Appendix 1) if this does not happen after a few attempts;
- ➢ Switch off the appliance;
- ➢ Then mount the glass window as described in chapter 5.9;
- ➢ Repeat the ignition procedure a few times and perform the checks described in chapter 7.3.2;
- ➢ From now on, the pilot flame should ignite smoothly.

!Tip When checking whether the main burner continues to burn, it is possible that it still switches off after 22 seconds. This happens because the appliance is equipped with a second thermocouple and the glass window has not been placed. In this case you may presume that the main burner will continue to burn.

!Caution
- During the ignition process, you are not allowed to operate control button B on the gas control manually.
- Always wait 5 minutes after the pilot flame has gone out, before you re-ignite the appliance.
- You are not allowed to turn the pilot flame lower by using the settings on the gas control.

7.3.2 Main burner

!Caution
- The pilot burner should ignite the main burner within a couple of seconds, and without popping.
- The main burner(s) must cross the full burner smoothly and without popping and continue to burn.

➢ Check operation of the main burner from a cold condition (pilot flame off):
➢ After opening the gas valve, the main burner should burn within a few seconds.

!Tip
- When the gas valve is opened, the motor will start to run; this is audible.
- The flame picture and a good flame transfer can only be properly judged if the glass window is installed.

Use the malfunction search diagram (Appendix 1) if the ignition of the main burner does not comply with the abovementioned requirements.

7.4 Flame picture

The flame picture can only really be assessed when the appliance has been burning for several hours. Volatile components from paint, materials, etc., which evaporate in the first hours, will affect the flame picture.

!Caution If the chimney breast has been made of stone-like materials or has a plaster finish, the appliance may only be put into operation 6 weeks after the chimney breast has been placed, in order to prevent shrinkage cracks.

➢ Check whether the flame picture is acceptable.
➢ Consult the malfunction search diagram (Appendix 1) if the flame picture is not acceptable.

8. Maintenance

The appliance must be inspected once per year by a skilled installer in the field of gas-fired heating, and repaired if necessary.
Check at least whether the appliance is working properly and safely.

!Caution
- Always close the gas tap during maintenance work;
- Check the gastightness after repair;
- After replacing thermocouple 1 you should first tighten the gland nut by hand and then give it another quarter turn with a suitable spanner;
- You are not allowed to turn the pilot flame lower by using the settings on the gas control.

➢ If required, clean the following components:
- the pilot burner (malfunction search diagram, Appendix 1);
- the space surrounding the pilot burner;
- the glass pane(s).

!Caution
- Remove/place the glass pane(s) as described in section 5.10;
- Remove the deposit on the inside of the glass pane(s) with a damp cloth or a non-abrasive detergent such as copper polish or a ceramic hot plate cleaner;
- Avoid/remove fingerprints on the glass pane(s), since otherwise they will burn into the surface;
- Replace a broken and/or cracked glass pane(s) as described in section 5.10.

!Caution If necessary, replace the wood or pebble set correctly; for this, see section 5.12.

➢ Inspect the flue gas discharge system.

!Caution You must always perform a final inspection.

➢ Perform the inspection as described in chapter 7.

8.1 Parts

Parts requiring replacement can be obtained from your supplier.

9. Delivery

You must explain to the user how to operate the appliance. You must give him/her instructions on putting it in operation, the safety measures, the operation of the remote control and annual maintenance (see the User Manual).

!Caution
- Tell the user to close the gas tap immediately and contact the installer in case of malfunctions/poor operation. This to prevent unsafe situations;
- Indicate the location of the gas tap;
- Point out the precautions in the user manual against unintended ignition by other wireless remote controls such as car keys and garage door openers.

➢ Instruct the user about the appliance and the remote control.
➢ When the appliance is started for the first time, point out that
- In order to avoid cracks in a chimney breast made of stone-like materials or finished with plaster, it should dry for at least 6 weeks prior to putting the appliance into operation.
- When the appliance is stoked up for the first time, volatile components evaporate from paint, materials, etc. (First read chapter 3 of the User Manual as well !);
- When evaporating, the appliance should preferably be set to the highest level;
- The room should be well ventilated.

➢ Give the manuals to the user (all manuals should be stored near the appliance).

10. Malfunctions

In Appendix 1 you will find an overview of malfunctions that might occur, the possible causes and the remedies.

Appendix 1 diagnosis of malfunctions

Fires with electronic ignition, fault finding: Ignition and burning

Start

2.01 Can pilot be lit?
- yes → 2.06 Pilot can be lit. Does it stay alight?
- no → 2.02 Sparking?

2.02 Sparking?
- no → 2.03a
  - Loosen and retighten earthing screw on gas control.
  - If this does not work: replace receiver.
- yes → 2.03 Only one spark?

2.03 Only one spark?
- no → 2.04 Check:

Receiver
- Replace missing, weak or rechargeable batteries (not enough power to open thermoelectric valve)

Presence of gas on pilot burner
Check pilot on presence of gas at normal ignition cycle or in Manual Mode (turn oval knob on gas control to MAN and keep safety shut off valve opened with a screwdriver) and ignite pilot with a lighter.
- Pilot flame not on: Step 1
- Pilot flame on: Step 2

Step 1: Pilot has no gas
- Gas tap open?
- Gas at gas control (line pressure at measuring point on gas control).
- Check presence of gas at pilot burner, by igniting in Manual mode:
  Turn oval knob on gas control on MAN, open safety shut off valve with a screwdriver and try to ignite pilot with a lighter. Not alight, then check the following:
- Blocking of pilot tube (kink or dirt)
- Gas flowing out of gas control? (by loosening pilot tube at gas control)
- If not: check adjustment screw pilot flame (under black cover): sealing not to be broken. Sealing broken: screw should be fully open.
- If this does not help: replace gas control

Step 2: Pilot has gas, but no ignition
- Electrode with **90° bended** tip: bend tip 1mm higher
- Spark too weak (thin and reddish). Act as if 'no spark' in box 2.05 and perform actions described for ignition cable and ignition electrode.
- Pilot flame too weak (dirty). Remove injector (remove gland nut and the pilot tube). See that it does not fall away. Clean with compressed air.

Rectify. Retry.

2.05 Check:

Ignition cable
- Present and connected
- Being free from metal parts or concrete
- Too long: cut away all excessive length at receiver end, and reconnect
- Shorting out to earth; replace ignition cable.
- Spark in wrong position
- slide rubber sleeve on ignition cable over ceramic of electrode.
- Replace electrode if neccessary.

Ignition electrode
- **Straight** electrode:
- oxidation (roughen electrode with file or sand paper)
- position 4 mm from pilot burner
- Cracks in ceramic (not always visible), replace electrode.

Thermocouple circuit interrupted
- Check connection between:
- thermocouple and interruptor
- interruptor and gas control
  Is it tight? (handtight + half a turn)
- Black wires (yellow/red end) not (well) connected in thermocouple interruptor, in right position on receiver (in right position)
- Thermocouple broken inside thermocouple interruptor: Replace.
- Thermocouple interruptor defective.
  Check by screwing thermocouple directly in gas control and ignition in Manual mode (see 2.04))

Starting procedure
After switching off/going out the remote is locked for 120 sec. (older versions 60 sec).
Wait 2 minutes before reigniting.

2.06 Pilot can be lit. Does it stay alight?
- yes → 2.08 Does main burner ignite immediately?
- no → 2.07 Check **thermocouple system**

Step 1: Check pilot flame and thermocouple
- Pilot flame too small
- pilot dirty. Rectify (see 2.04)
- check for pilot gas tube tightness
- pilot tube kinks or dirt inside
- line pressure too low
- tip not in (correct!) pilot flame. Bend into flame.

Step 2: Check circuit for interruptions or short circuiting
- thermocouple tight in interruptor
- interruptor tight in gas control
- black wires (yellow/red end)
- connected to interruptor + receiver
- short circuitiong at interruptor

Step 3: Check receiver
Dismount black-red and -yellow control cables from receiver and link together. Ignite fire in Manual Mode (see 2.04, light pliot with a matchlight):
- Pilot stays on: the receiver is defective (replace) , and the rest of the thermocouple system is OK.
- Pilot goes out: Step 4.

Step 4: Check thermocouple and gas control
Screw thermocouple directly in gas control and light in Manual Mode (see 2.04, light pliot with a matchlight):
- Pilot stays on: Thermocouple interruptor defective.
- Pilot goes out:
- thermocouple defective
- thermo-electric device defective

Go to step 5.

Step 5: Check thermocouple
Check thermocouple by replacing or by measuring output voltage (>5mV, with thermocouple connected). See Appendix 3, fig. 42.

Step 6
If thermocouple is not the cause the themo-electric device is defective. Replace gas control.

8-Wire black control cable
- 8-wire cable between receiver and gas control not connected.
- Poor contact of connector. Check for pins on receiver not being bended.
- One of eight wires loose in connector.

Check by pulling wire by wire at both ends of cable)

2.08 Does main burner ignite immediately?
- yes → 2.10 Do(es) main burner(s) ignite smoothly and across its/their full length after after first ignition by pilot burner?
- no → 2.09 **Ignition procedure**
  - Oval knob on gas control is on "MAN". Set to "ON" and restart.

Retarded ignition of main burner
Gas to main burner opens ca. 3-5 seconds after servo motor operating the gas valve starts running (sound of motor!). After this the main burner is to ignite (at least partially) within 10 seconds and not with a firm noise WHOOF.
If not: no or delayed cross lighting of main burner.
Hazardous situation. Stop ignition procedure straight away and first check for:
- Position of logs or pebbles
- Burner holes (locally) blocked. Remove vermiculite dust.
- Vermiculite missing
- Chips on burner
- Vermiculite not distributed evenly across burner(s)

PowerVent® (if present)
Consult PowerVent® installation manual how to carry out the checks below.
Check:
- 230V to fan controller unit and fan
- Silicon pressure measurement hoses swapped
  leaking or barred
- Pressure difference set too high
- Resistance of flue system too high
  adjustment of appliance damper and air inlet guides)
  flue length or number of bends too large
  dirty (e.g. cobwebs)
- Operation of the fan
- Operation of solenoid gas valve
- Operation of fan controller unit
- Operation of pressure measurement gauge

2.10 Do(es) main burner(s) ignite smoothly and across its/their full length after after first ignition by pilot burner?
- yes
- no → 2.11 No proper cross lighting of main burner(s)
  Go to box 2.09 and take actions act as described for 'retarded ignition of main burner'.

2.12 Does appliance switch off exactly 22 sec after servomotor starts running? — no → 2.14 Does main burner go out after 'some time'? — no → 2.16 Is flame picture OK? — yes → 2.18 Can fire be switched off? — yes → 2.20 Perfect! You have a well functioning fire

yes

2.13 **Check cross lighting main burner and 2nd thermocouple system.**

Wiring
- the black and red extension wire of the 2nd thermocouple is connected to:
- the 2nd thermocouple (both wires)
- the receiver (black wire, can be forgotten during installation)
- earth (red wire)

Flame transfer main burner
- Is flame transfer main burner OK?

Flame must heat 2nd couple within approx. 18 sec. (after servomotor starts to run).
If not, check:
- 2nd couple free from vermiculite, chips or pebbles
- Placement of wood blocks or pebbles
- Burner holes (locally) blocked. Remove (vermiculite) dust
- Vermiculite is missing
- Chips on burner
- Lack of combustion air. See 2.15
- Vermiculite not spread evenly over burner(s).

Voltage 2nd thermocouple
- Measure the voltage of the 2nd thermocouple just before the appliance turns off.
- Measure between black extension wire and earth.

Voltage <1,8mV Glass window mounted!
- Flame transfer main burner too low.

See above. Correct this fault, before taking further action!!
- Flame suffocates, see 2.15. Correct, before taking further action!!
- Burner pressure (too high or too low)
- 2nd thermocouple defective (output: 0 mV)
- 2nd thermocouple not correct position.

Bend into correct position (see Appendix 3, fig. 43).
- 2nd thermocouple in correct position.

Bend deeper into flame (on the condition that flame transfer and flame picture are in order!! See 2.17)

Voltage >1,8mV
- Receiver defective. Replace.

yes

2.15 Check

Gas supply
- Supply pressure does not drop away as main burner (or other appliance) lights, causing pilot flame to shorten
- Burner pressure (too high or too low)

Flames suffocating, lack of air.
Dancing flames on burner.
- Lack of combustion air. Check:
- flue system permissible
- proper flue terminal used Make should be 'DRU'
- terminal correctly sited on roof or wall relative to obstructions.
- integrity of flueing system (no interruptions, not barred, cobwebs)
- air inlet guides
- flue restrictor/damper
- throttle rings

PowerVent®
Check if pressure difference set too high
See manual for specific requirements.

Pilot burner
- Pilot burner dirty. Weak pilot flame being drawn away by flames main burner. Clean with compressed air. See 2.04

no

2.17 Check

Flames: too low
- Supply pressure does not drop away as main burner or other appliances in the building light, causing flames to shorten.
- Burner pressure (too low)
- False air: Check soundness glass window gasket/soundness of the connection of the glass panes of two/three sided appliances (no slots allowed)

Flames: too high
- Line pressure
- Burner pressure

Flames: no even distribution/out on part of burner(s)
- Position of logs or pebbles.
- Burner holes (locally) blocked. Remove vermiculite dust.
- Vermiculite not distributed evenly across burner(s)
- Adjustment of throttle ring(s) Remove (vermiculite) dust.
- Vermiculite not distributed evenly across burner(s)
- Adjustment of throttle ring(s)

Flames: too blue/too yellow or sooting
- Air inlet guides
- Flue restrictor/damper
- Throttle rings

Flames: suffocating: lack of air
You see dancing flames on burner, seeking for air. See 2.15

Flame picture 'restless'
Indication of too much draught.
Check:
- adjustment of appliance damper and air inlet guides)
- vertical flue length allowed (<12m)
- window glass not mounted gas tight

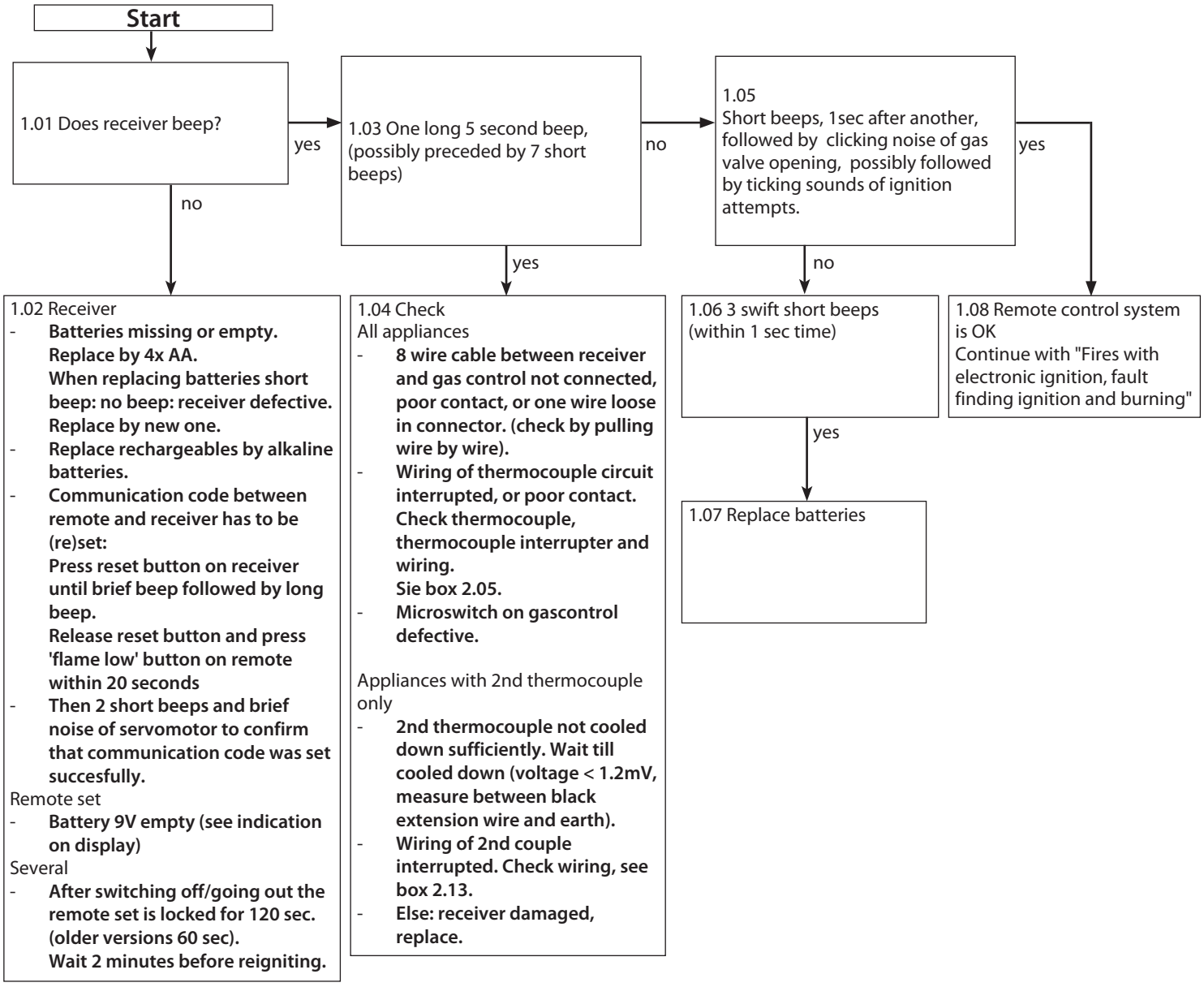
PowerVent®? Check:
- Pressure difference set too high
- Silicon pressure measurement hoses leaking

Consult PowerVent® installation manual for more info

no

2.19 Replace gas control (thermo-electric valve does not shut down quick enough because of some permanent magnetism)

Malfunction search diagram atmospheric gas-fired heating appliance with electronic ignition: Starting up cycle



Appendix 2

Table 1: Parts included with the delivery	
Part	Number
Wood set / pebble set	1x
Control hatch	1x
Control hatch manual	1x
Installation manual	1x
User manual	1x
Decorative strip left	1x
Decorative strip right	1x
Decorative strip below	1x
Gauge for restrictor slide	1x
Restrictor slide	1x
Key bolts M8x 140x50	2x
Hexagonal nut M8	2x
Washer 8.4 mm	2x
Spare self-tapping screws for mounting the glass panes	4x
Socket spanner 8 mm	1x
Remote control with receiver	1x
9V block battery	1x
Penlite battery (AA type)	4x
Compression fitting 15 mm x G3/8"	1x

Table 2: Technical data				
Product name		Metro 130 XT + Tunnel		
Type of appliance		Built-in		
Combustion		Closed combustion		
Supply and discharge system		Concentric 200/130		
Flame protection version		Pilot flame with thermocouple		
2nd thermocouple safety		yes		
Atmosphere safety		no		
Explosion hatch		yes		
Ventilation hole chimney breast		200 cm^2		
Type		C11/C31		
Type of gas		**G20**	**G25**	**G31**
Burner pressure	mbar	15	19	27
Nominal heat input (Hs)	kW	14.5	13.5	14.0
Nominal heat input (Hi)	kW	13.1	12.3	12.6
Nominal output	kW	10.8	9.9	10.6
Consumption	L/h	1385	1480	508
Burner injector	mm	3x Ø 1.70	3x Ø 1.70	3x Ø 1.15
Consumption on low output	L/h	650	703	299
Low setting injector	mm	Ø 2.00	Ø 2.00	Ø 1.60
Pilot burner injector	Code:	51	51	30
Efficiency class		1	1	1

Table 3: Line-pressure when using G31	
Country	**mbar**
NL / DK / FI / NO / SE / HU / BA / GR	30
FR / BE / IT / PT / ES / GB / IE	37
D	50

Permissibility and conditions concentric system with wall terminal

Table 4: Conditions for setting the appliance					
G20/G25/G31					
Total number of meters vertical pipe length	Total number of meters horizontal pipe length (excluding wall terminal)	See Figure	Air inlet guide	Restrictor slide	Distance of restriction in mm
0,8 [1] - 4	0 - 1 [2]	4	YES	NO	OPEN
0,8 [1] - 4	2 - 5	4	NO	NO	OPEN

1) minimum length
2) factory setting

!Caution In case of a wall terminal, you should always use a diameter of 130/200.

Permissibility and conditions concentric system with roof terminal

Table 5: Determining permissibility concentric system

G20/G25/G31	Total number of meters horiz. pipe length	Total no. of meters vertical and/or sloping pipe length											
		1[1])	2	3	4	5	6	7	8	9	10	11	12
no bends	0	B	B	B	C	C	C	C	C	D	D	D	D
2 bends	0	A	A	B	B	C	C	C	C	C	C	D	D
	1		A	A	B	B	B	C	C	C	C	C	
	2			A	A	B	B	B	C	C	C		
	3				A	A	B	B	B	C			
	4					A	A	B	B				
	5												
3 bends	0	A	A	A	B	B	B	C	C	C	C	C	D
	1		A	A	A	B	B	B	C	C	C	C	
	2			A	A	A	B	B	B	C	C		
	3				A	A	A	B	B	B			
	4					A	A	A	B				
	5												
4 bends	0	A	A	A	A	B	B	B	C	C	C	C	C
	1		A	A	A	A	B	B	B	C	C	C	
	2			A	A	A	A	B	B	B	C		
	3				A	A	A	A	B	B			
	4					A	A	A	A				
	5												
5 bends	-												

= Situation is not permissible

[1]) minimum length

Table 6: Conditions for the adjustment of the appliance with a roof terminal

G20/G25/G31

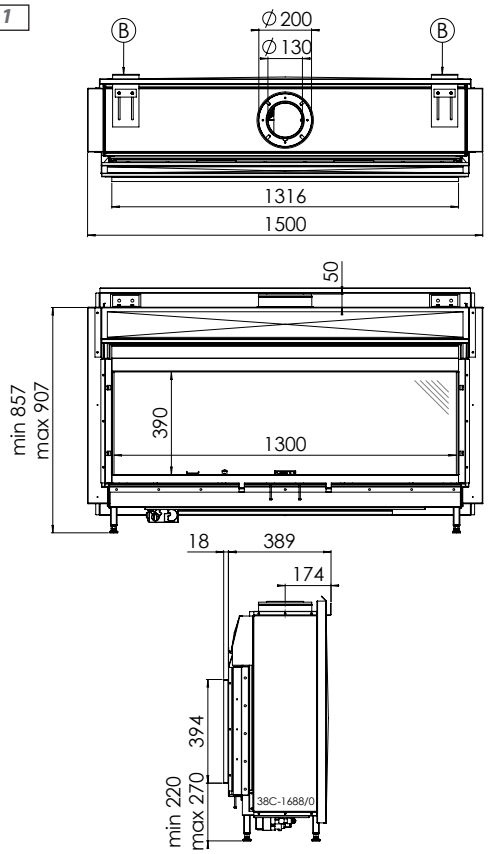
Situation	Air inlet guide	Restrictor slide	Distance restrictor. in mm
A	NO	NO	OPEN
B	YES	NO	OPEN
C	YES	YES	55
D	YES	YES	40

!Caution If a roof terminal without bends is used, you must first connect a 0.8 metre concentric pipe with a 130/200 mm diameter vertically to the appliance. After the first metre, reduce the diameter to 100/150mm

!Caution If a roof terminal with bends is used, you must first connect a 0.8 metre concentric pipe with a 130/200 mm diameter vertically to the appliance. Make the system with a 130/200 mm diameter, and reduce the diameter to 100/150 mm after the last bend.

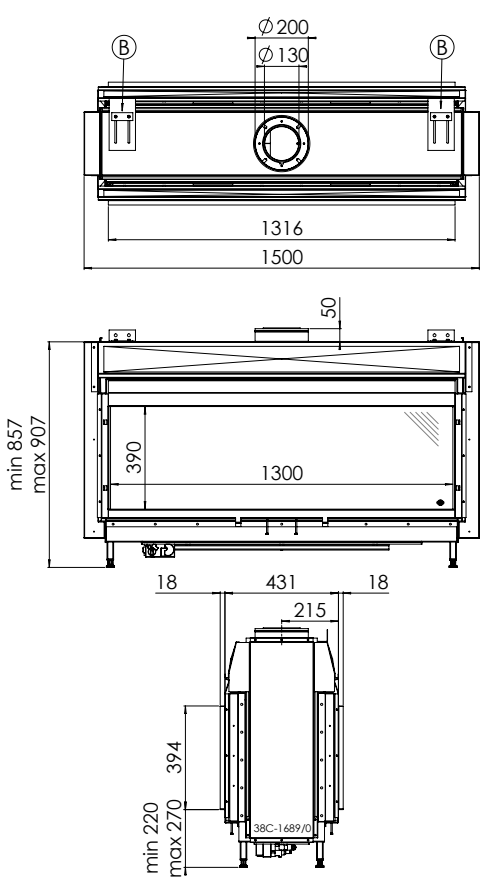
Appendix 3 Figures

1



Metro 130 XT

1



Metro 130 XT Tunnel

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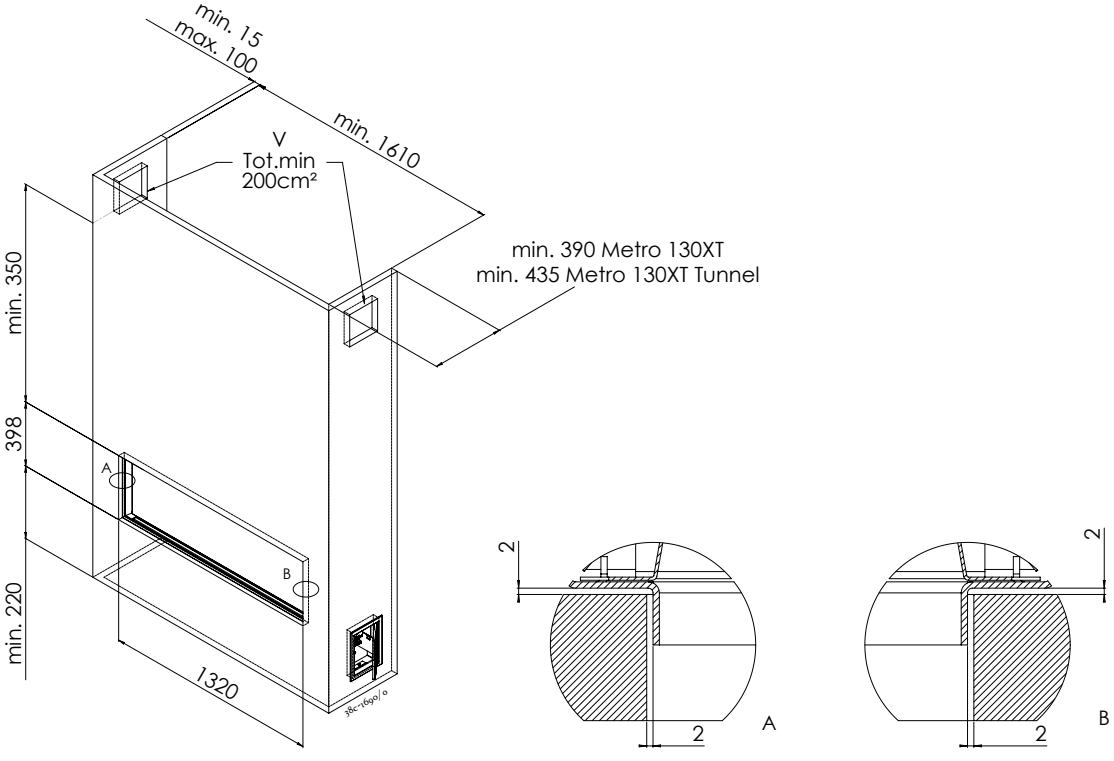

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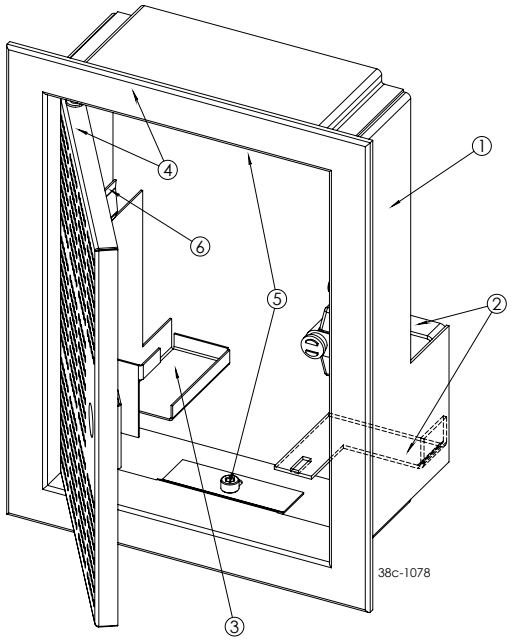
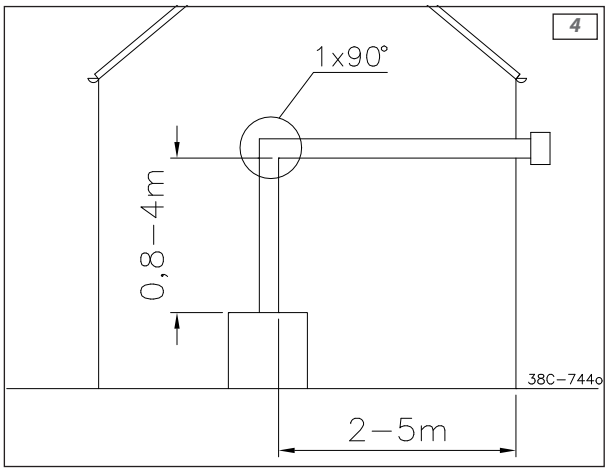
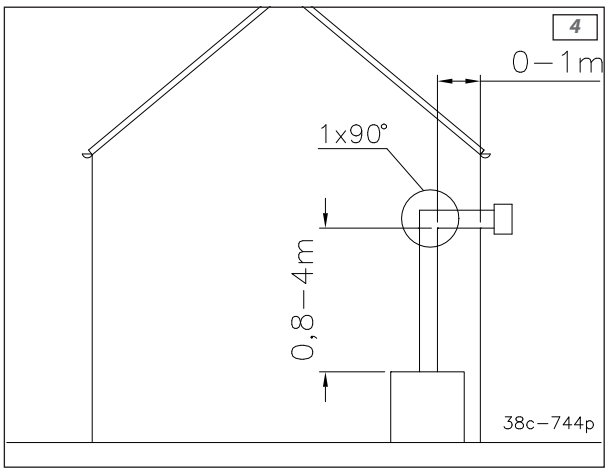

1
2
3
4
5
6
38c-1078

4


1x90°
0,8–4m
2–5m
38C–744o

4


0–1m
1x90°
0,8–4m
38c–744p

5

6

7


38p-0321 /0

8


9


10


11


12

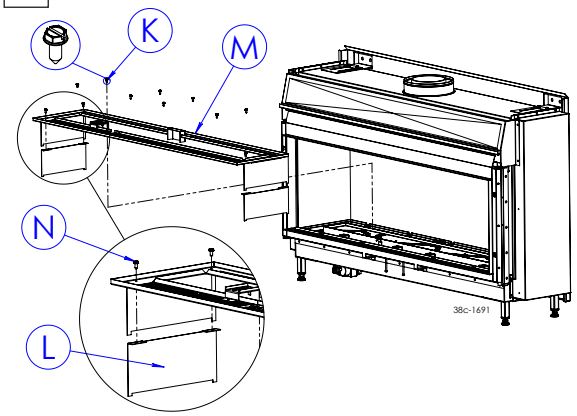

9


14


15


16

17



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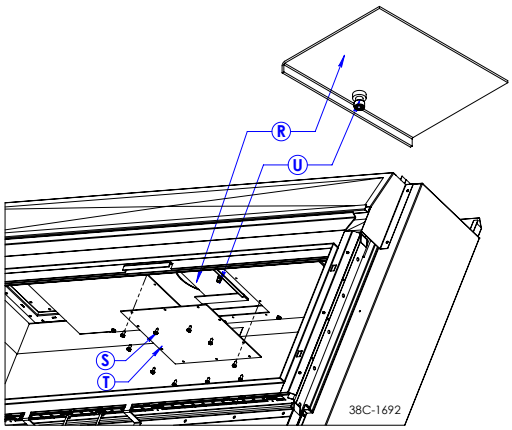
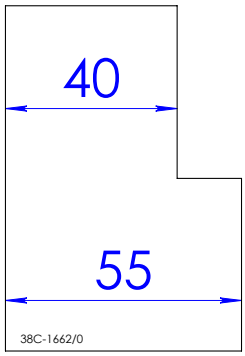
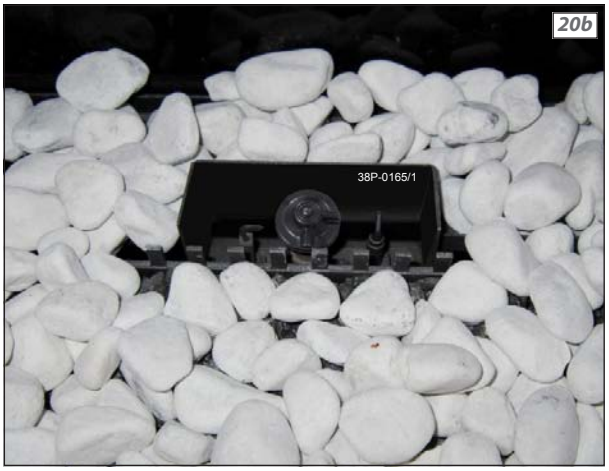


19



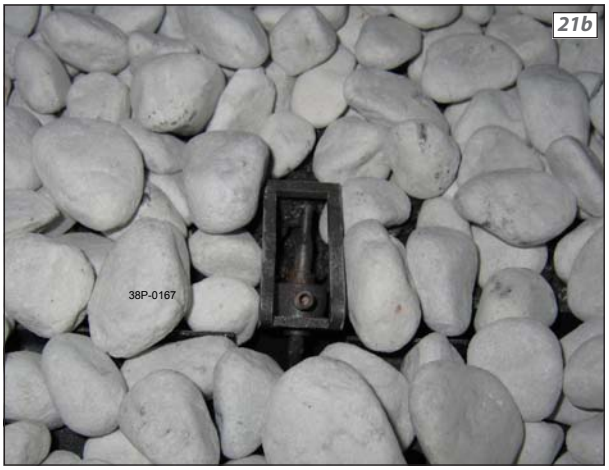
20a

20b



21a

21b



22

38p-0022

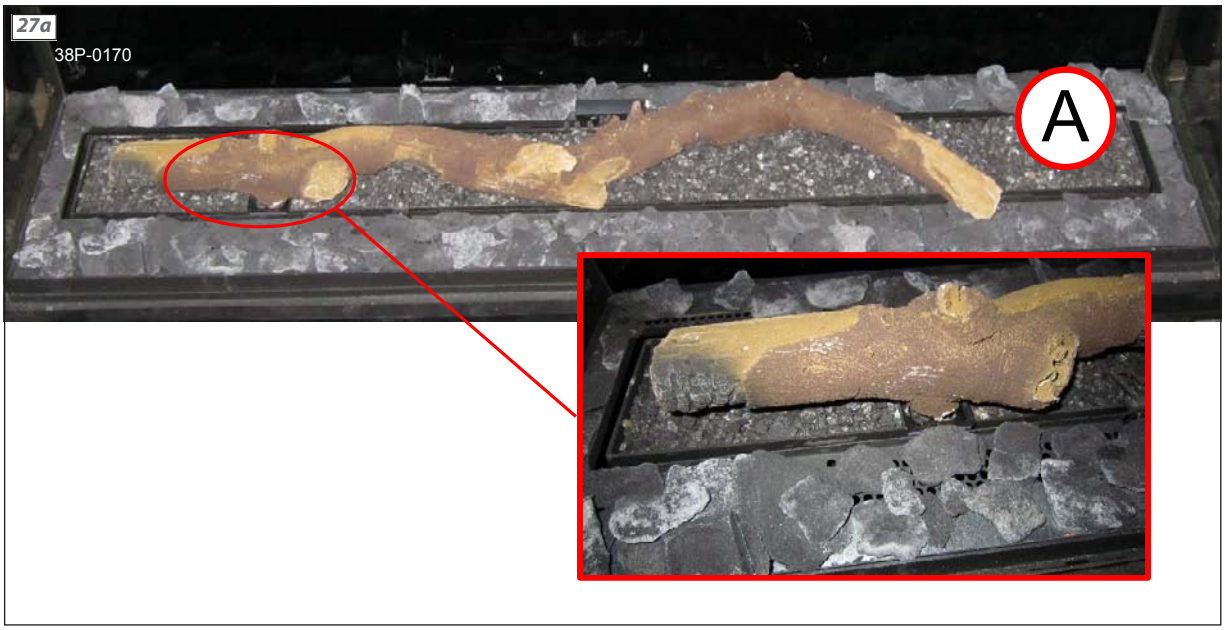
23

38p-0023

24

25


26
38P-0168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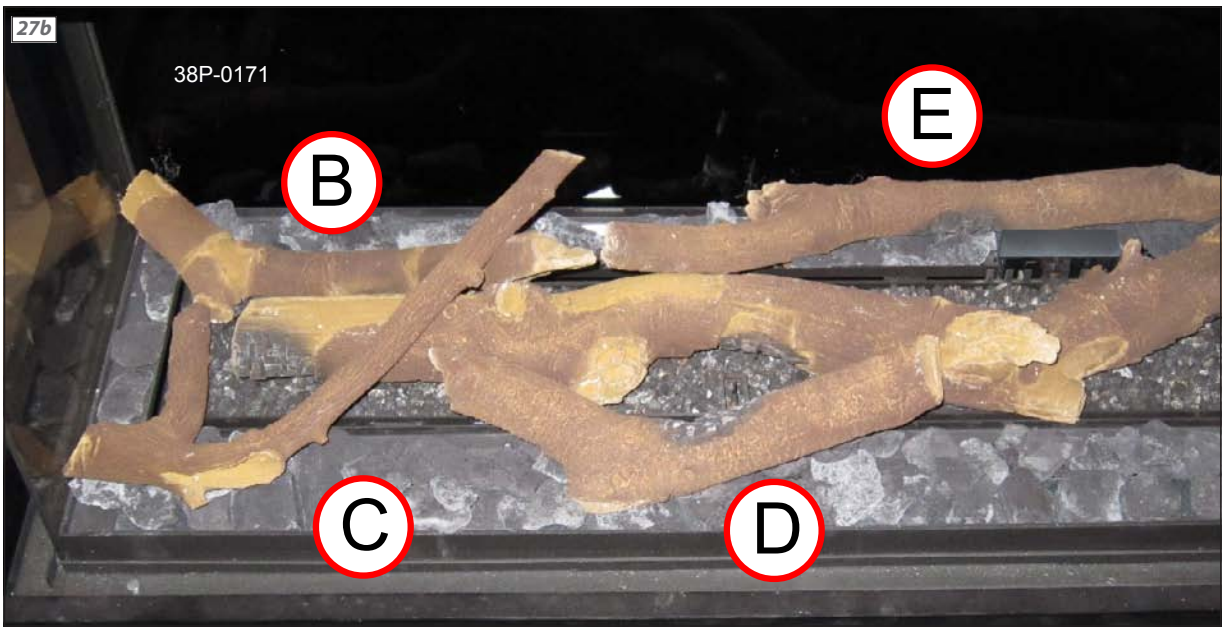
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C
D
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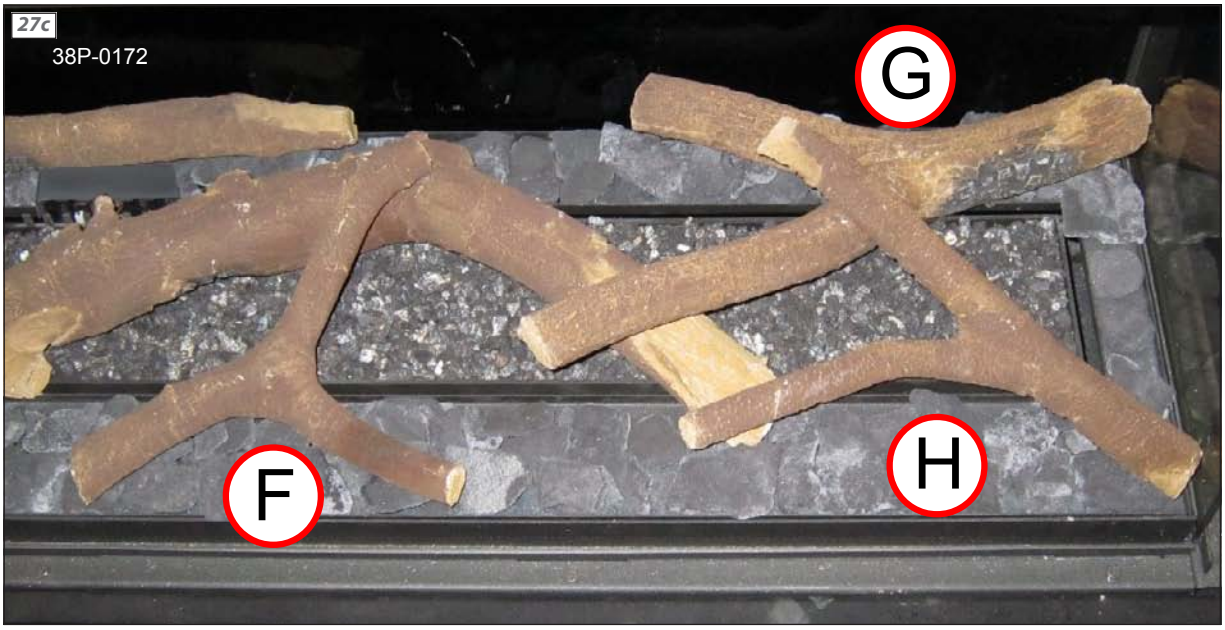
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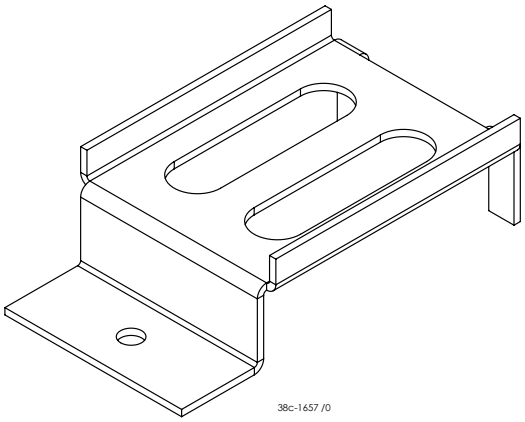
H


28a
38P-0173


28b
38P-0174

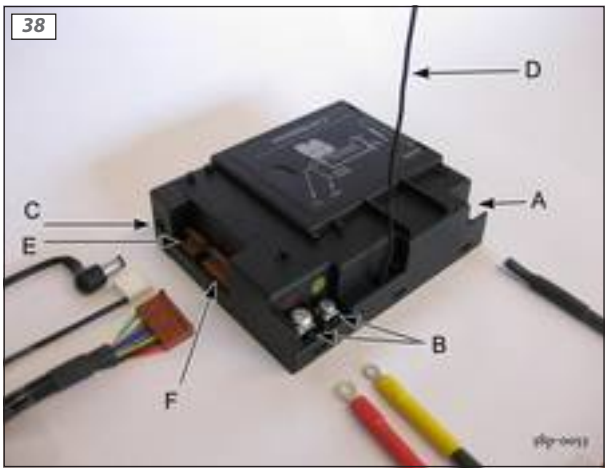
29



30a

30b

38



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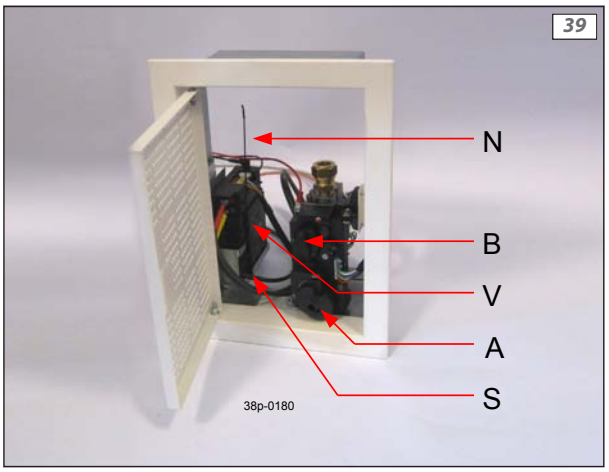

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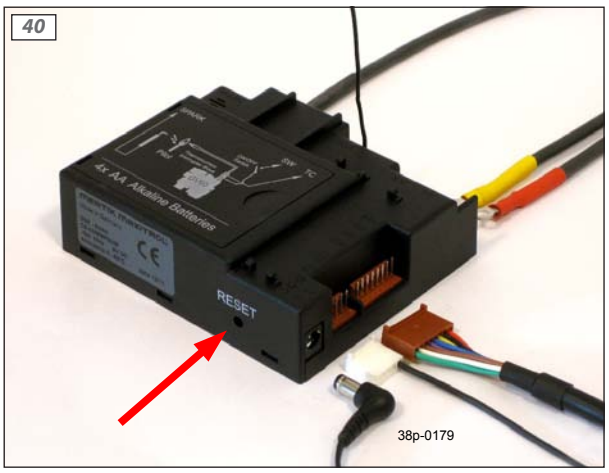

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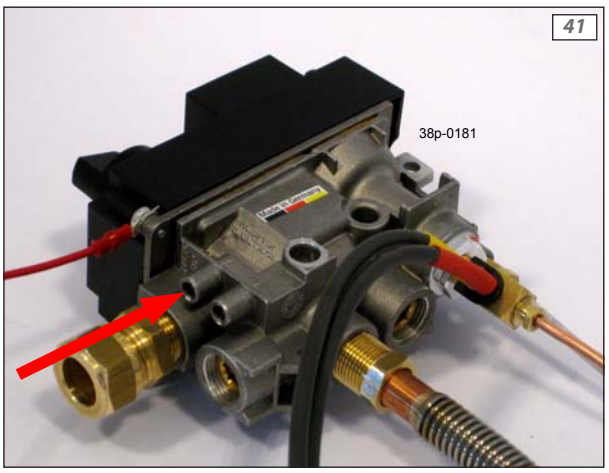

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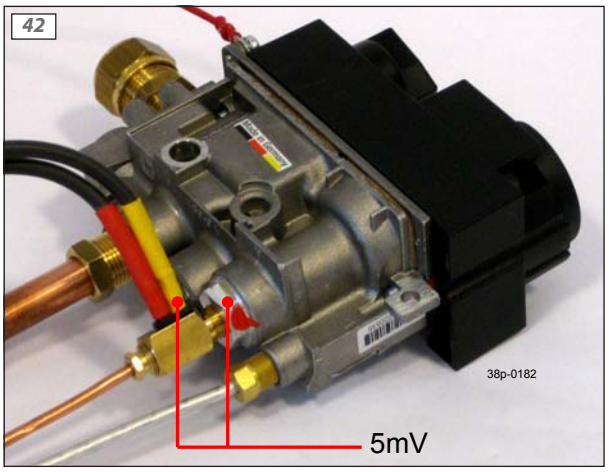

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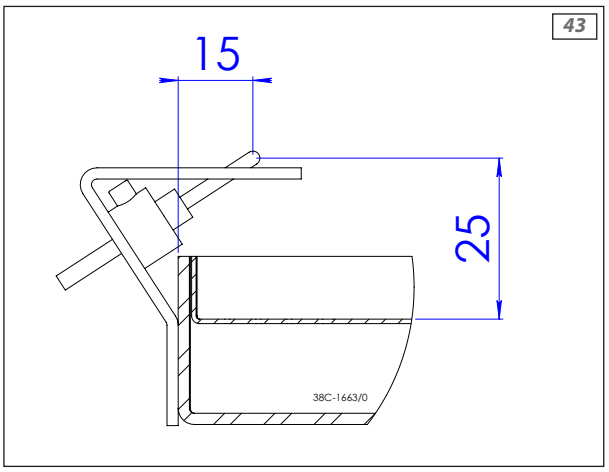

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