

Installation instructions

Condensing gas boiler

Logamax plus GB142-24/30/45/60



CAUTION!

Before putting the boiler into operation read this manual carefully.

WARNING!

Improper installation, adjustment, alteration, service or maintenance can cause injury, loss of life or property damage. Refer to this manual. For assistance or additional information consult a qualified installer, service agency or the gas supplier.

CAUTION!

The operating manual is part of the documentation that is delivered to the installation's operator. Go through the information in this manual with the owner/operator and make sure that he or she is familiar with all the necessary operating instructions.

NOTICE!

In the Commonwealth of Massachusetts this boiler must be installed by a licensed Plumber or Gas Fitter.

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

- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other boiler.
- **What to do if you smell gas**
 - Do not try to light any boiler.
 - Do not touch any electrical switch; do not use any phone in your building.
 - Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
 - If you cannot reach your gas supplier, call the fire department.
- **Installation and service must be performed by a qualified installer, service agency or the gas supplier.**



Buderus

Please read thoroughly before installing and servicing

About these instructions

These Installation Instructions contain important information for the safe and professional installation, start-up and maintenance of the boiler with boiler capacities 24, 30, 45 and 60 kW.

These Installation Instructions are intended for professional installers, who have the necessary training and experience for working on heating and gas systems.

Subject to technical changes!

Slight changes may be made to the illustrations, process steps and technical data as a result of our policy of continuous improvement.

Updating of documentation

Please contact us if you have any suggestions for improvements or corrections.

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1 Safety and general instructions

Please observe these instructions in the interest of your own safety.

1.1 Designated use

The boiler was designed for heating water for a central heating system and generating domestic hot water.

The boiler is delivered with a BC10 basic controller and the "Universal Automatic Burner Control Unit 3" (UBA 3) pre-installed.

The boiler can be fitted with a modulating outdoor reset control AM10 (scope of delivery), a room controller RC10 (optional), or an On/Off thermostat or relay panel end switch (accessories).

1.2 Hazard definitions

The following defined terms are used throughout the documentation to bring attention to the presence of hazards of various risk levels. Notices give important information concerning the operation of the product.



DANGER:

Indicates the presence of hazards that will cause severe personal injury, death or substantial property damage.



WARNING:

Indicates the presence of hazards that can cause severe personal injury, death or substantial property damage.



CAUTION:

Indicates presence of hazards that will or cause minor personal injury or property damage.



CAUTION:

Risk of electric shock.

Indicates presence of hazards due to electric shock.



NOTICE:

Indicates special instructions on installation, operation or maintenance that are important but not related to personal injury or property damage.

1.3 The following instructions must be observed

- The boiler must only be used for its designated purpose, observing the Installation Instructions.
- Only use the boiler in the combinations and with the accessories and spares listed.
- Other combinations, accessories and consumables must only be used if they are specifically designed for the intended application and do not affect the system performance and the safety requirements.
- Maintenance and repairs must only be carried out by trained professionals.
- You must report the installation of a condensing gas boiler to the relevant gas utility company and have it approved.
- You are only allowed to operate the condensing gas boiler with the combustion air/flue gas system that has been specifically designed and approved for this type of boiler.
- Please note that local permission for the flue system and the condensate water connection to the public sewer system may be required.

You must also observe:

- the local building regulations stipulating the installation rules.
- the local building regulations concerning the air intake and outlet systems and the chimney connection.
- the regulations for the power supply connection.
- the technical rules laid down by the gas utility company concerning the connection of the gas burner fitting to the local gas main.
- the instructions and standards concerning the safety equipment for the water/space heating system.
- the Installation Instructions for building heating systems.
- The boiler must be located in an area where leakage of the tank or connections will not result in damage to the area adjacent to the boiler or to lower floors of the structure. When such locations cannot be avoided, it is recommended that a suitable drain pan, adequately drained, be installed under the boiler. The pan must not restrict combustion air flow.
- The boiler must be installed such that the gas ignition system components are protected from water (dripping, spraying, rain etc.) during boiler operation and service.
- The boiler must not be installed on carpeting.
- Do not restrict or seal any air intake or outlet openings.

1 Safety and general instructions

- If you find any defects, you must inform the owner of the system of the defect and the associated hazard in writing.



DANGER

if flammable gas explodes.
Beware if you smell gas: there may be an explosion hazard!

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

- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other boiler.

What to do if you smell gas

- Do not try to light any boiler.
- Do not touch any electrical switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

Installation and service must be performed by a qualified installer, service agency or the gas supplier.

1.4 Observe these instructions for space heating water

Unsuitable heating system water can promote the formation of scale or sludge, which affects system efficiency. It can also cause corrosion and reduce life of the heat exchanger.

- You must follow Buderus guidelines for boiler water quality.
- Thoroughly flush the system prior to filling.
- Use of a Buderus approved boiler cleaner is recommended.
- Never use salt bedding exchangers to soften the water.
- Do not use inhibitors or other additives unless approved by Buderus for that purpose!
- When frost protection of the heating system is desired, only use Buderus-approved Aluminum-safe antifreeze.
 - When using oxygen-permeable pipes, e. g. for floor heating systems, you must separate the system using heat exchangers.
- The maximum permissible flow rate of the GB142-24/30 this is 11 GPM (gal./min.)(= 42 l/min.), for the GB142-45 is 15 GPM (= 57 l/min.) and for the GB142-60 is 20 GPM (= 76 l/min.).

1.5 Tools, materials and additional equipment

For the installation and maintenance of the boiler you will need the standard tools for space heating, gas and water fitting.

In addition, a handtruck with a fastening belt is useful.

1.6 Disposal

- Dispose of the boiler packaging in an environmentally sound manner.
- Dispose of components of the heating system (e. g. boiler or control device), that must be replaced in an environmentally responsible manner.

2 Regulations and guidelines

The installation must conform to the requirements of the authority having jurisdiction or, in the absence of such requirements, to the latest edition of the National Fuel Gas Code, ANSI Z223.1. In Canada, installation must be in accordance with the requirements of CAN/CSA B149.1, Natural Gas and Propane Installation Code.

Where required by the authority having jurisdiction, the installation must conform to the Standard for Controls and Safety Devices for Automatically Fired Boilers, ANSI/ASME CSD-1.

Install CO detectors per local regulations. Boiler requires yearly maintenance, see maintenance section see chapter 13 "Maintenance", page 49.

Operating Limits of the boiler:

| | |
|--------------------------|-----------------|
| Max. boiler temperature: | 230 °F (110 °C) |
| Max. operating pressure: | 44 psi (3 bar) |

The hot water distribution system must comply with all applicable codes and regulations. When replacing an existing boiler, it is important to check the condition of the entire hot water distribution system to ensure safe operation.

Massachusetts Installations Only:

For direct-vent boilers, mechanical-vent heating boilers or domestic hot water equipment, where the bottom of the vent terminal and the intake is installed below four feet above grade the following requirements must be satisfied:

- 1) If there is not one already present, a carbon monoxide detector and alarm shall be placed in a living area outside the bedrooms. The carbon monoxide detector and alarm shall comply with NFPA 720 (2005 Edition).
- 2) A carbon Monoxide detector and alarm shall be located in the room that houses the boiler or equipment and shall:
 - a) Be powered by in series on the same electrical circuit as the boiler or equipment:
 - b) Have battery back-up power:
 - c) Meet ANSI/UL 2034 Standards and comply with NFPA 720 (2005 Edition):
 - d) Have been approved and listed by a Nationally Recognized Testing Lab:
- 3) A product-approved vent terminal must be used, and if applicable, a Product approved air intake must be used. Installation shall be in strict compliance with the manufacturer's instructions. A copy of the installation.

- 4) A metal or plastic identification plate shall be mounted at the exterior of the building, four feet directly above the location of vent terminal. The plate shall be of sufficient size to be easily read from a distance of eight feet away, and read "Gas Vent Directly Below".
 - b) For direct-vent boilers mechanical-vent heating boilers or domestic hot water equipment where the bottom of the vent terminal and the intake is installed four feet or above grade the following requirements must be satisfied:
 - 1) If there is not one already present, a carbon monoxide detector and alarm shall be placed in the living area outside the bedrooms, The carbon monoxide detector and alarm shall comply with NFPA 720 (2005 Edition).
 - 2) A carbon monoxide detector shall:
 - a) Be located inn the area where the boiler or equipment is located:
 - b) Have battery back-up power:
 - c) Be a minimum comply with NFPA 720 (2005 Edition).
 - 3) A product-approved vent terminal must be used, and if applicable, a product-approved air intake must be used. Installation shall be in strict compliance with the manufacturer's instructions. A copy of the installation instructions shall remain with the boiler or equipment at the completion of the installation.

3 Product description

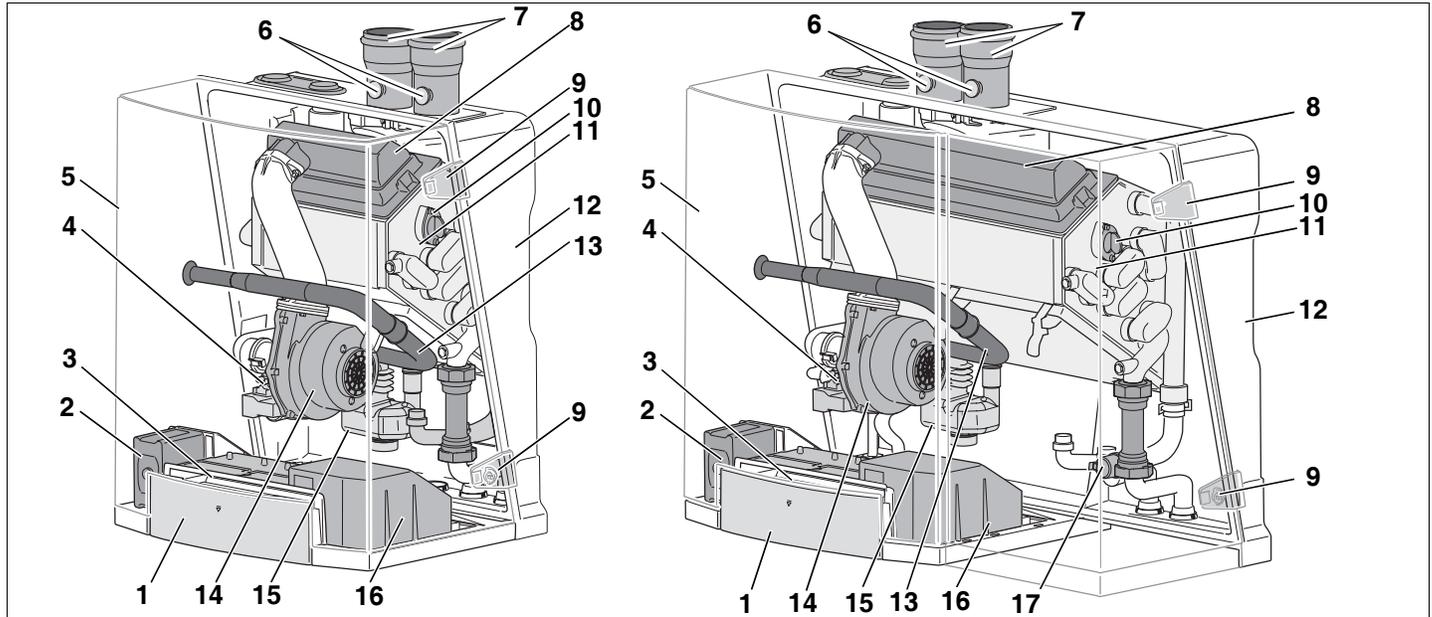


Fig. 1 Logamax plus GB142-24/30 (left) and GB142-45/60 (right)

- pos. 1: Drawer with control unit
- pos. 2: Universal Burner Automat (UBA3)
- pos. 3: Control unit BC10
- pos. 4: Gas valve
- pos. 5: Cover
- pos. 6: Flue measuring points
- pos. 7: Parallel flue
- pos. 8: Burner
- pos. 9: Latches of which two have locks
- pos. 10: Sighting glass
- pos. 11: Heat exchanger
- pos. 12: Back cover
- pos. 13: Air intake for the fan
- pos. 14: Fan
- pos. 15: Condensate trap
- pos. 16: External Connection Board (under the cover)
- pos. 17: Pressure sensor

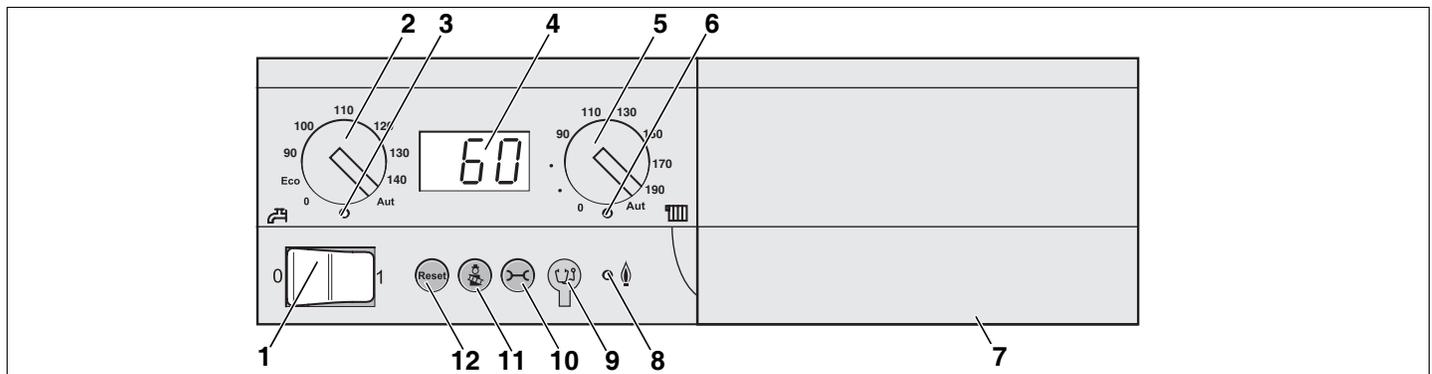


Fig. 2 Basic Controller Logamatic BC10

- pos. 1: Main switch
- pos. 2: DHW temperature knob ¹⁾
- pos. 3: LED "DHW status"
- pos. 4: Display
- pos. 5: Space heating water temperature knob
- pos. 6: LED "Heating system status"
- pos. 7: Under the cover a RC system controller can be installed
- pos. 8: LED "Burner Operation"
- pos. 9: Service Tool connector
- pos. 10: "Service" button
- pos. 11: "Chimney sweep" button
- pos. 12: "Reset" button

1) ECO mode means that the temperature inside the hot water tank is 140 °F (60 °C), with a hysteresis (ΔT) of 18 °F (10 °C) instead of 9 °F (5 °C)

4 Dimensions and connections

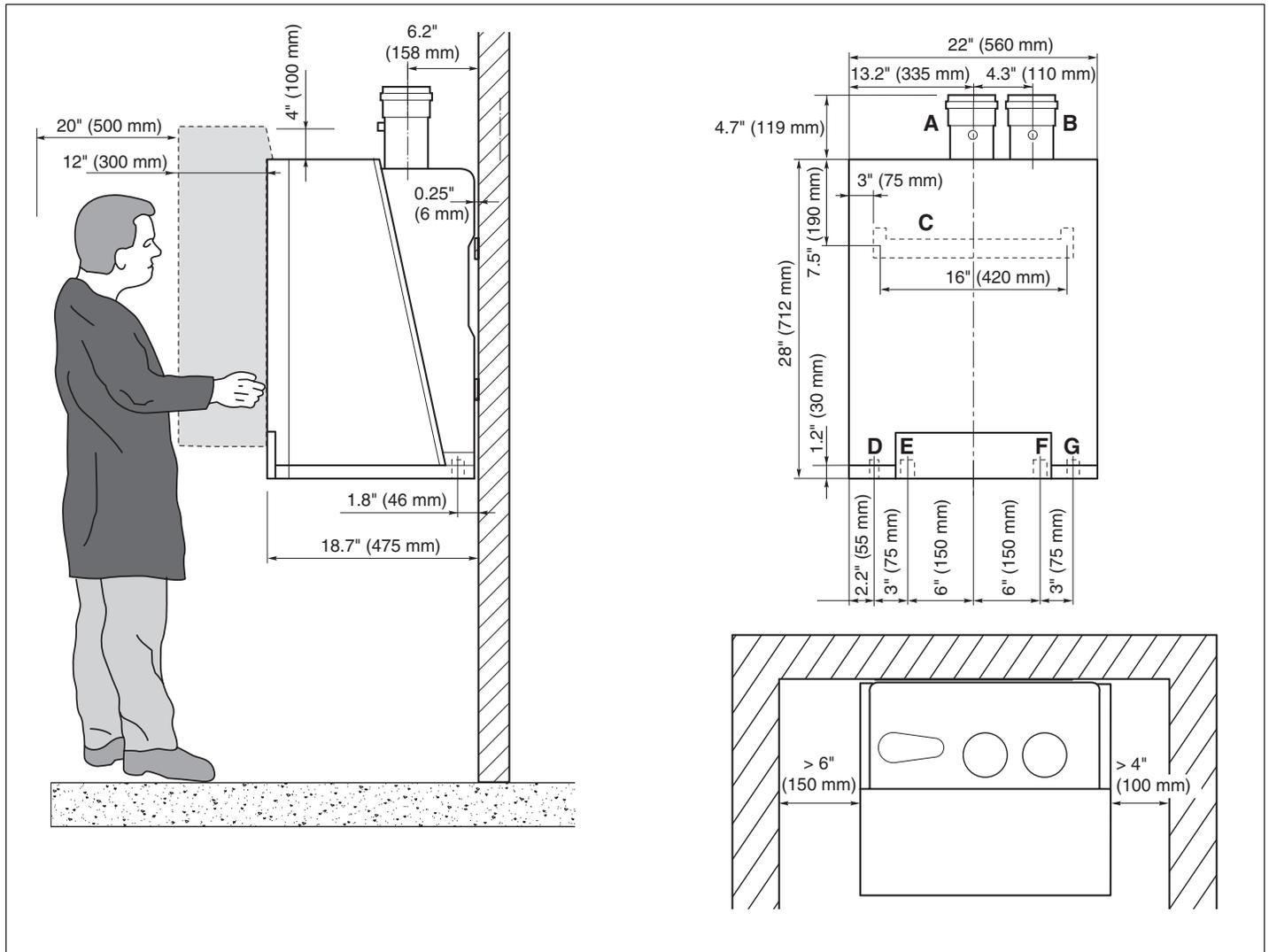


Fig. 3 Dimensions and connections for boiler GB142-24/30 (dimensions in inches)

- | | |
|---|--|
| AA (A) = Flue gas connection (inside diameter 3") | LA (B) = Air intake (inside diameter 3") |
| AKO (E) = Condensate water outlet, Ø 1.3" (Ø 32 mm) outside | RK (G) = Return, Ø 1.0" ¹ (Ø 25.4 mm) |
| GAS (D) = diameter Gas connection, 3/4" NPT | VK (F) = Supply, Ø 1.0" ¹ (Ø 25.4 mm) |
| | WB (C) = Wall bracket |

¹ One Ø 1.0" (Ø 25.4 mm) inside x 1" NPT threaded compression fitting is delivered enclosed with boiler packaging



NOTICE

Observe the lateral minimum distances of the boiler (12" = 300 mm) and the necessary distances (24" (600 mm) at the front and 4" (100 mm) at the top) for removing the casing and for servicing.

Closet clearances are:

4" (100 mm) to the right, 4" (100 mm) at the top and 6" (150 mm) to the left.

4 Dimensions and connections

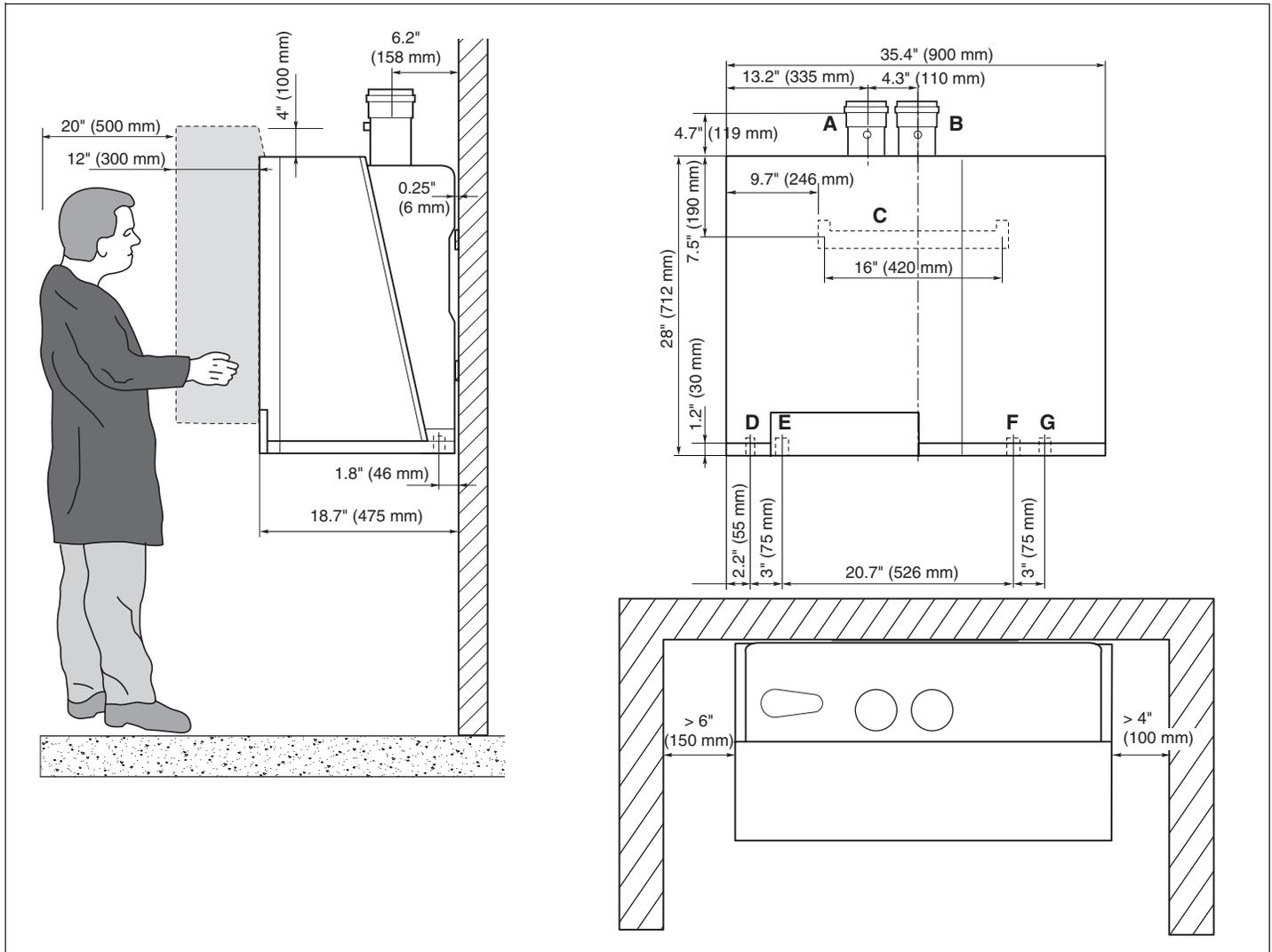


Fig. 4 Dimensions and connections for boiler GB142-45/60 (dimensions in inches)

AA (A) = Combustion air

AKO (E) = Condensate water outlet, \varnothing 1.3" (\varnothing 32 mm)

GAS (D) = Gas connection, $\frac{3}{4}$ " NPT

LA (B) = Air intake

RK (G) = Return, \varnothing 1.0"¹ (\varnothing 25.4 mm)

VK (F) = Supply, \varnothing 1.0"¹ (\varnothing 25.4 mm)

WB (C) = Wall bracket

¹ One \varnothing 1.0" (\varnothing 25.4 mm) inside x 1" NPT threaded compression fitting is delivered enclosed.



NOTICE

Observe the lateral minimum distances of the boiler (12" = 300 mm) and the necessary distances (24" (600 mm) at the front and 4" (100 mm) at the top) for removing the casing and for servicing.

Closet clearances are:

4" (100 mm) to the right, 4" (100 mm) at the top and 6" (150 mm) to the left.

5 Packaging and transportation

5.1 Scope of delivery

The boiler is delivered fully assembled.

- When receiving the delivery, check if the packaging is intact.
- Check that all the items listed in see table 1 are included in the delivery.

5.2 Transporting the boiler



CAUTION

The boiler may be damaged when it is improperly secured.

- Only transport the boiler using the right transportation equipment, such as a handtruck with a fastening belt or special equipment for manoeuvring steps.
- During transportation the boiler must be secured on the transportation equipment to prevent it from falling off.
- Protect all parts against impacts if they are to be transported.
- Observe the transportation markings on the packaging.
- Packaged boilers must always be lifted and carried to their destination by two people, or you must use a handtruck or special equipment to transport them to their destination.
- Transport the boiler to the room where it is to be installed.

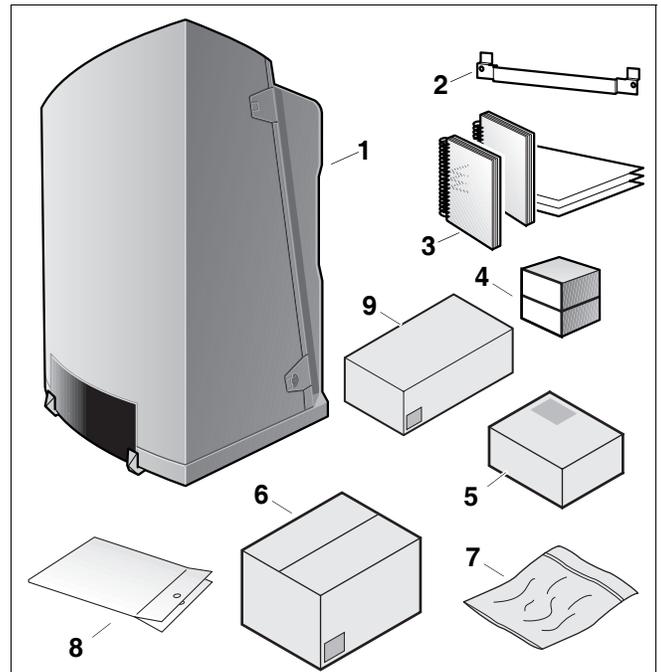


Fig. 5 Items supplied with unit

| Pos. | Parts | Quantity | Packaging |
|------|---|----------|-----------|
| 1 | Boiler with casing | 1 | 1 box |
| 2 | Wall bracket | 1 | |
| 3 | Technical documents ¹ including: - User's Instructions - Installation Instructions - wall mounting template - Servicing Instructions | 3 | |
| 4 | Compression fittings | 2 | |
| 5 | AM10 with outdoor sensor | 1 | |
| 6 | Flue gas adapter | 1 | |
| 7 | Propane conversion kit | 1 | |
| 8 | Boiler connection kit, including the DHW sensor | 1 | |
| 9 | GB142 Boiler manifold including: - low loss header - pressure relief valve - tridicator - DHW connections - Grundfoss 15-58 3-speed boiler circulator - supply and return shutoff ball valves | 1 | |

Table 1 Items supplied with unit

¹ The user's instructions (in a special format) is located in the boiler drawer

6 Installation

6.1 Requirements for the installation room



DANGER

- Install the heating system in a frost-free room.
- Do not store any flammable materials or liquids in the immediate vicinity of the boiler.
- Never use any chlorinated detergents or halogenated hydrocarbons (e. g. in spraycans, solvents and detergents, paints, adhesives).
- Do not allow too much dust to collect on the boiler.

6.2 Fitting the boiler

Observe the installation clearances of the combustion air/flue gas system.



NOTICE

- To protect the connection orifice you must not remove the styrofoam bottom panel.
 - Do not lift the boiler by the drawer.
 - Do not remove the transport safety clamps (see fig. 6) from the drawer at this time.
 - Protect the boiler and the combustion air/flue gas orifice against pollution during installation.
- Remove the packaging materials and dispose of them.
 - Use the mounting template to mark the drill holes.
 - Install the wall bracket taking into account the necessary service clearances.
 - Remove the transport safety clamps (fig. 6).

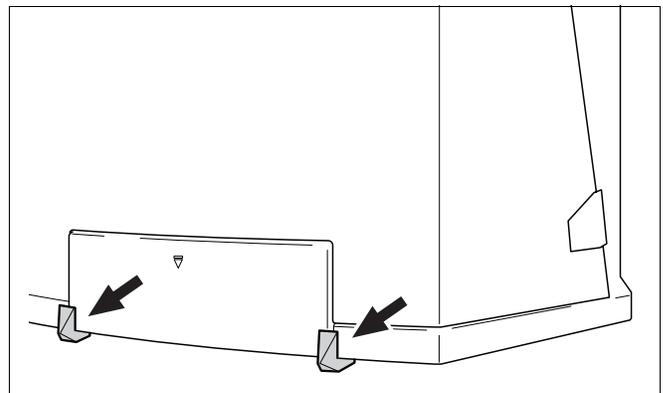


Fig. 6 Removing the transport safety clamps

- Use the radiator key to unlock the two latches a quarter turn (fig. 7, pos. 1).
- Open the latches (fig. 7, pos. 2).
- Remove the casing by lifting it upwards and then pulling it forwards (fig. 7, pos. 3); do not hold the casing by the latches.
- Hold the boiler by the rear boiler casing and place it on the wall bracket.
- Level out the boiler.

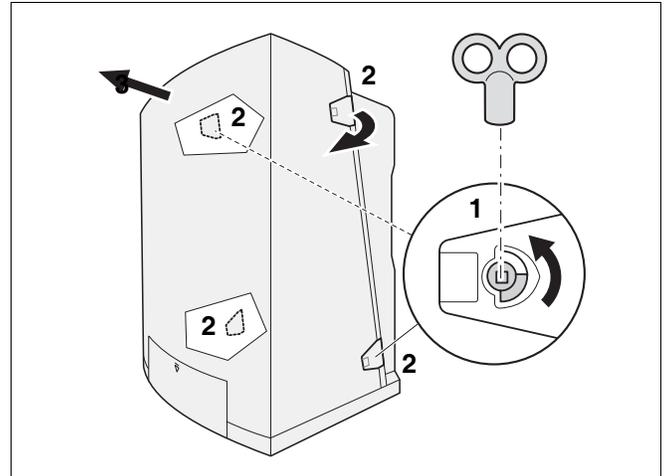


Fig. 7 Removing the casing

6.3 Making the gas connection



DANGER

Only carry out work on gas lines if you are licensed for such work.

- Determine proper size gas pipe for the installation using see table 2 and see table 3. Do not forget the pipe fitting losses and observe proper size of the fittings.
- Install the furnished 3/4" gas cock on the gas connection.
- Connect the gas pipe to the gas cock (fig. 8, pos. 1) so that it is free from any strain.

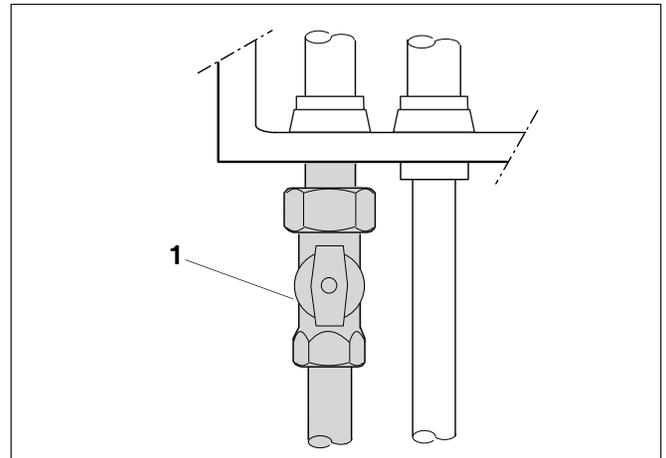


Fig. 8 Making the gas connection



NOTICE

When installing the gas supply connection, it must comply with local regulations or, if such regulations do not exist, with the National Fuel Gas Code, ANSI Z 223.1.

In Canada, the gas supply connection must comply with local regulations or, if such regulations do not exist, with CAN/CSA B149.1, Natural Gas and Propane Installation Code.

A sediment trap must be provided upstream of the gas controls.

| Length of pipe (feet) | Gas Volume Capacity (ft ³ / hr) ¹ | | | |
|-----------------------|---|-----|--------|--------|
| | 3/4" | 1" | 1 1/4" | 1 1/2" |
| 10 | 278 | 520 | 1,060 | 1,600 |
| 20 | 190 | 350 | 730 | 1,100 |
| 30 | 152 | 285 | 590 | 890 |
| 40 | 130 | 245 | 500 | 760 |
| 50 | 115 | 215 | 440 | 670 |
| 75 | 93 | 175 | 360 | 545 |
| 100 | 79 | 160 | 305 | 480 |
| 150 | 64 | 120 | 250 | 380 |

Table 2 Gas Pipe Capacity for different pipe sizes

¹ Maximum pipe capacity in ft³/hr, based on a specific gravity of .60 (42 mbar) and an inlet gas pressure of 14 inches W.C. (35 mbar) or less and a pressure drop of .3 inches W.C. (20 mbar)

6.4 Fitting the heating circuit supply and return pipes



NOTICE

- To protect the entire heating system we recommend installing a dirt particle filter in the return circuit. When retrofitting the boiler to an existing heating system this filter is required.
- Install shut-off valves immediately before and after the dirt particle filter to allow the filter to be cleaned.

- Fit a filling and drain cock in the heating system supply pipe if required.
- Also fit an adequately sized safety valve in the system that meets all applicable codes and regulations.



NOTICE

When using oxygen-permeable pipes, e. g. for radiant floor heating systems, you must separate the system using heat exchangers. Buderus recommends hydraulically isolating snowmelt systems using heat exchangers.

- Thoroughly flush all pipes and radiators. Use of a Buderus approved boiler cleaner is recommended.
- Refer to the installation template for the pipe connection dimensions.
- Fit the compression fittings (fig. 9, pos. 1 and 2) first to the Hydronic set (see fig. 10, 11 and 12) and then to the boiler.
- Connect the expansion tank to the system.
- Connect the pipes so that they are free from strain.

Connecting boiler with DHW tank

- Connect the external hot-water tank according to the Installation instructions of the hot-water tank and fittings concerned.

| Steel pipe diameter in inches | Equivalent length for Pipe Fittings in feet | | | |
|-------------------------------|---|------------------------|------------|-----------|
| | Type of pipe fitting | | | |
| | 90°-Elbow | Tee (flow thru branch) | Gate valve | Gas cocks |
| Equivalent length in feet | | | | |
| ¾ | 2.1 | 4.1 | 0.5 | 1.25 |
| 1 | 2.6 | 5.2 | 0.6 | 1.60 |
| 1 ¼ | 3.5 | 6.9 | 0.8 | 2.15 |
| 1 ½ | 4.0 | 8.0 | 0.9 | 2.50 |

Table 3 Equivalent length for pipe fittings in feet

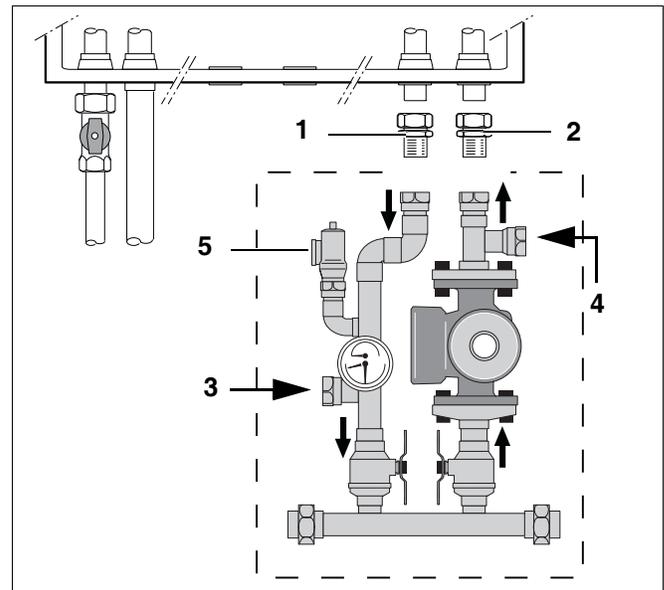


Fig. 9 Pump manifold installation

- pos. 1: Compression fitting (heating system supply pipe)
- pos. 2: Compression fitting (heating system return pipe)
- pos. 3: DHW supply
- pos. 4: DHW return
- pos. 5: Relief valve

Piping examples

The following illustrations are two Installation examples.



NOTICE

The following illustrations are simplified conceptual illustrations only.

Piping and field components must be field verified.

- A hot water boiler installed above radiation level or as required by the Authority having jurisdiction, must be provided with a low water cutoff device either as a part of the boiler or at the time of boiler installation.

Fig. 10 is a schematic representation of fig. 9.



NOTICE

If this boiler is installed in a closed water supply system with an external indirect DHW tank, such as one having a backflow preventer in the cold water supply line, means shall be provided to control thermal expansion. Contact the water supplier or local plumbing inspector on how to control this situation.

Relief valve

The indirect DHW tank must have a temperature and pressure relief valve installed. The relief valve shall comply with the Standard for *Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems, ANSI Z21.22-CSA 4.4*.

- Install the relief valve according fig. 10. The relief valve must comply with following specifications:
 - dimensions: height 2¼ inch (57.15 mm), width 2 inch (50.8 mm).
 - 30 Psi (2 bar) discharge pressure.
 - discharge is ¾ inch (19.1 mm) female in diameter.

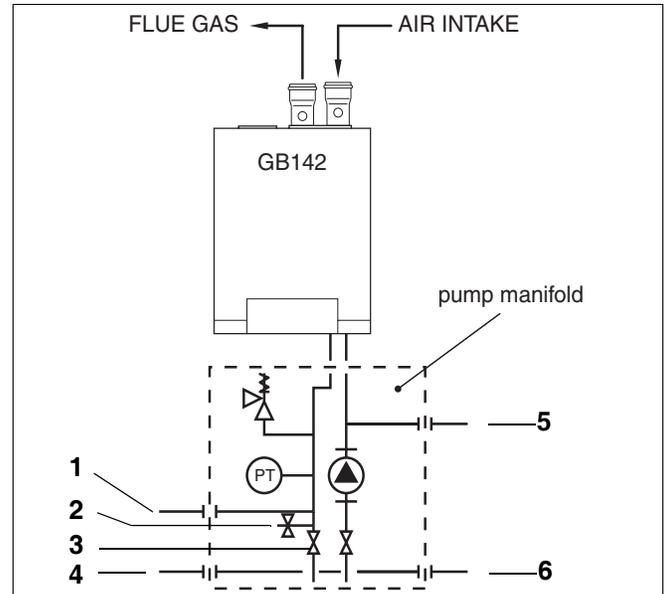


Fig. 10 Schematic representation of the boiler with the hydronic set

- pos. 1: DHW supply
- pos. 2: drain valve
- pos. 3: pump manifold shut-off valves
- pos. 4: secondary supply
- pos. 5: DHW return
- pos. 6: secondary return



WARNING

No valve is to be placed between the relief valve and the tank. Discharge of the relief valve must be conducted to a suitable place for disposal when relief occurs and no reducing coupling or other restriction may be installed in the discharge line.

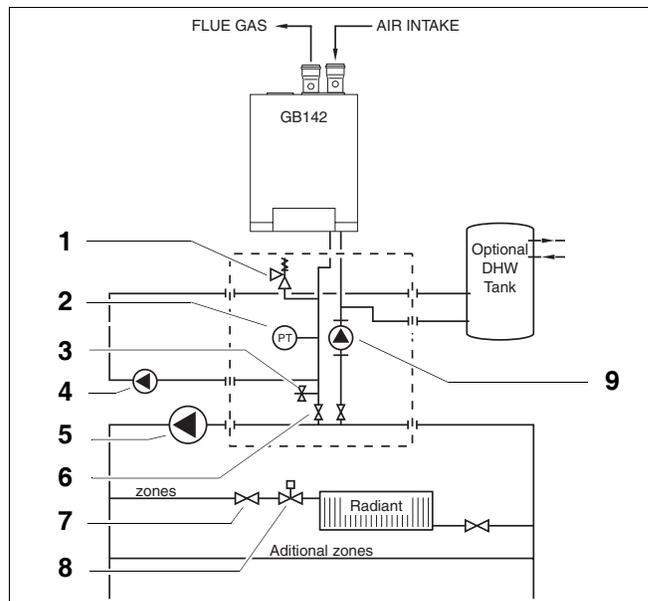


Fig. 11 Schematic representation of the boiler with the hydraulic set connected to an optional hot water tank with one or multiple zones including one pump and zone valves

- | | |
|---|------------------------|
| pos. 1: pressure relief valve | pos. 5: secondary pump |
| pos. 2: PT meter (pressure and temperature meter) | pos. 6: shut-off valve |
| pos. 3: drain valve | pos. 7: shut-off valve |
| pos. 4: DHW pump | pos. 8: zone valve |
| | pos. 9: primary pump |



NOTICE

Primary boiler pump must have an internal check valve.

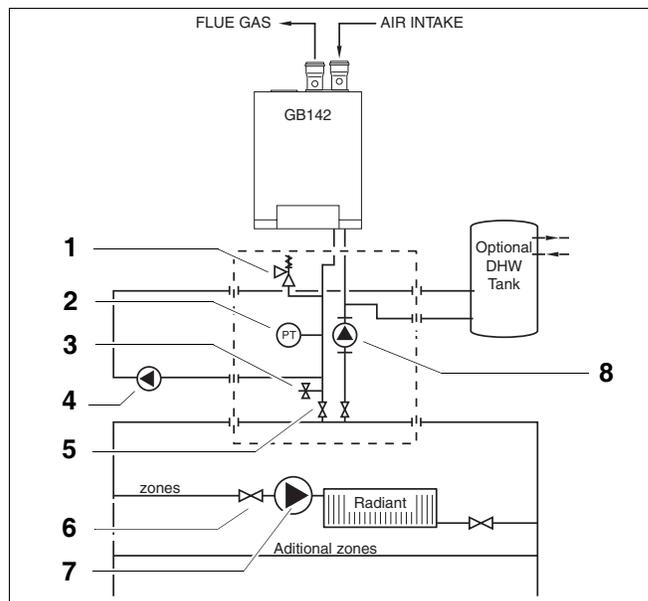


Fig. 12 Schematic representation of the boiler with the Hydronic set connected to an optional hot water tank with one or multiple zones and zone pumps

- | | |
|---|------------------------|
| pos. 1: pressure relief valve | pos. 4: DHW pump |
| pos. 2: PT meter (pressure and temperature meter) | pos. 5: shut-off valve |
| pos. 3: drain valve | pos. 6: shut-off valve |
| | pos. 7: zone pump |
| | pos. 8: primary pump |

6.5 Combustion Air and Ventilation Openings

Provisions for combustion and ventilation air must be made in accordance with section 5.3, Air for Combustion and Ventilation, of the National Flue Gas Code, ANSI Z223.1, or Sections 7.2, 7.3 or 7.4 of CAN/CGA B149, Installation Codes, or applicable provisions of the local building codes.



CAUTION: BOILER DAMAGE AND OPERATIONAL FAILURES !

Due to insufficient or lacking openings for combustion air and/or ventilation of the boiler room.

Provisions for combustion air and ventilation are always required, regardless whether the combustion air is taken from the outside (sealed combustion) or inside (room air for combustion).

Insufficient ventilation of the boiler room can lead to high air temperatures. This can result in boiler damage.

- Make sure that intake and exhaust openings are sufficiently sized and no reduction or closure of openings takes place.
- When the problem is not resolved, do not operate the boiler.
- Please note these restrictions and its dangers to the operator of the boiler.



WARNING: BOILER DAMAGE !

due to contaminated air.

- Boiler must be clear and free from combustible materials, gasoline and other flammable vapors and liquids, and corrosive liquids and vapors.
Never use chlorine and hydrocarbon containing chemicals (such as spray chemicals, solution and cleaning agents, paints, glues etc) in the vicinity of the boiler.
- Do not store and use these chemicals in the boiler room.
- Avoid excessive dust formation and build-up.



NOTICE

When one expects contaminated combustion air (near swimming pools, chemical cleaning operations and hair salons), sealed combustion operation is recommended.

**DANGER:
FIRE DANGER !**

- due to flammable materials or liquids.
- Do not store flammable materials and liquids in the immediate vicinity of the boiler.

All Air from Inside the Building (room air)

The closet shall be provided with two permanent openings communicating directly with an additional room(s). The total input of all gas utilization equipment installed in the combined space shall be considered in making this determination. Each opening shall have a minimum free area of 1 square inch per 1,000 Btu per hour of total input rating of all gas utilization equipment in the confined space, but no less than 100 square inches. One opening shall commence within 12 inches (305 mm) of the top, and one opening shall commence within 12 inches (305 mm) of the bottom of the enclosure. The minimum dimension of air openings shall be not less than 3 inches (75 mm).

All Air from Outdoor (sealed combustion)

The closet shall be provided with two permanent openings, one commencing within 12 inches (305 mm) from the top, and one commencing within 12 inches (305 mm) from the bottom of the enclosure. The openings shall communicate directly, or by ducts, with the outdoors or spaces (crawl or attic) that freely communicate with the outdoors. The minimum dimension of air openings shall be no less than 3 inches (75 mm).

1. Where directly communicating with the outdoors, each opening shall have a minimum free area of 1 square inch per 4,000 Btu/hr of total input rating of all equipment in the enclosure.
2. Where communicating with the outdoors through vertical ducts, each opening shall have a minimum free area of 1 square inch per 4,000 Btu/hr of total input rating of all equipment in the enclosure.
3. Where communicating with the outdoors through horizontal ducts, each opening shall have a minimum free area of 1 square inch per 2,000 Btu/hr of total input rating of all equipment in the enclosure.
4. Where ducts are used, they shall be of the same cross-sectional area as the free area of the opening to which they connect.

6.6 Installation of the flue gas adapter (included in the scope of delivery)

Before installing the exhaust and air intake system, it is necessary to remove the transport safety device and to install the flue gas adapter.



NOTICE

The transport safety device has been installed to prevent unwanted movement of the heat exchanger during transport.

- Remove the transport safety device with the two screws (see fig. 13).
- Screw on the flue gas adapter using six screws (see fig. 14).

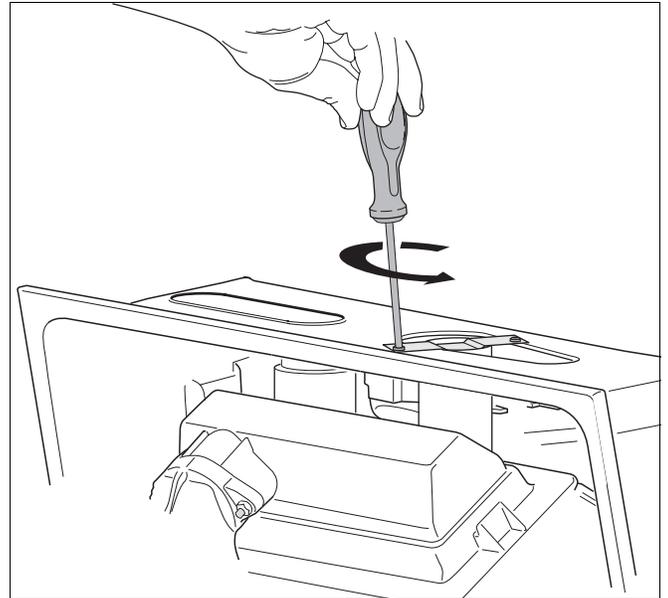


Fig. 13 Removing the transport safety device

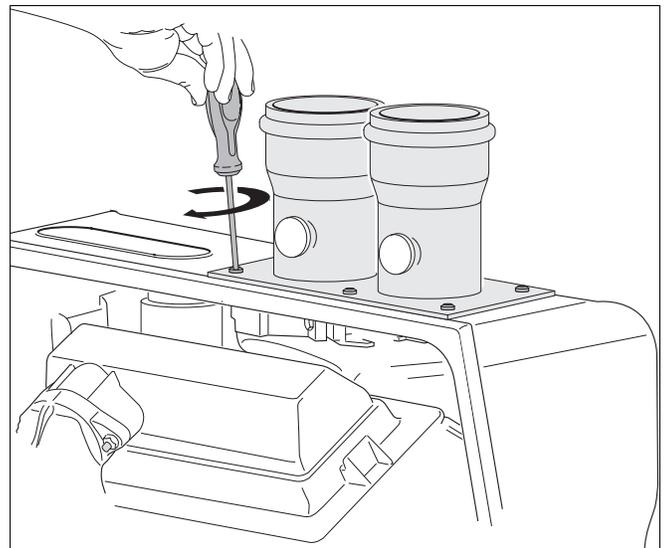


Fig. 14 Connecting the flue gas adapter

6.7 Installation of the Exhaust and Air Intake system.



NOTICE:

Consult local and state codes pertaining to special building code and fire department requirements. Adhere to national code requirements.



NOTICE:

Observe the listed maximum lengths of vent system, which are boiler model dependent. The maximum permissible lengths are listed in see table 4, page 25.

An optional concentric vent/air intake body (see fig. 18 and 26) can be used for the installation of a vertical venting system as well as for a horizontal venting system.

The concentric vent/air intake body can be ordered by Buderus Hydronic Systems, part no. BRYKGAVTO601CV.

Other optional vent kits are:

383-500-397 Plastic Vent Kit
PAZ1900019 V1000 Aluminum Vent Kit.

The boiler can also be operated with separate air intake and exhaust piping (see fig. 19 and fig. 26).

The termination shall be at least 4 ft (1,220 mm) for the U.S. and 6ft. (1,830 mm) for Canada away from a gas utility meter, service regulator or the like (for room air applications only).

The termination shall terminate at least 4 ft (1,220 mm) below, 4 ft (1,220 mm) horizontally from, or 1 ft (305 mm) above any door, window, or gravity air inlet into any building.

Vent must be at least 12 inches (305 mm) above grade, anticipated snow line or roof surface (Canada 18" (457 mm) minimum) (see fig. 16).

Vent termination must be at least 7 ft (2,135 mm) above a public walkway (see fig. 17).

Vent must be 3 ft (915 mm) above any forced air intake within 10 ft (3,050 mm) (see fig. 17).

Do not extend exposed vent pipe outside the building beyond recommended distance. Condensate could freeze and block vent pipe.

Vent should terminate at least 3 ft (915 mm) away from adjacent walls, inside corners and 5ft (1525 mm) below roof overhang (see fig. 17).

It is not recommended to terminate vent above any door or window, condensate can freeze causing ice formations.

Do not use chimney as a raceway if another boiler or fire-place is vented into or through chimney.

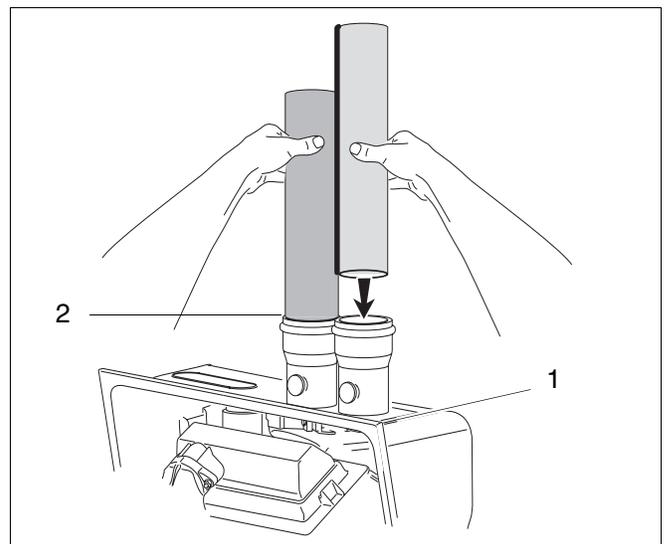


Fig. 15 Vent pipes

All vent pipes must be glued, except for the flue gas adapter (fig. 15, pos. 1) which is screwed into place and the first connection to the flue gas adapter (fig. 15, pos. 2). Installed you can slide the pipe onto the adapter, properly supported and the exhaust pipe must be pitched a minimum of a ¼ inch per foot back to the boiler. This allows the condensate to drain away.

All combustion air and vent pipe materials and fittings must comply with the following:

| Item | Material | United states | Canada |
|------------------------------|---------------------|-----------------|--|
| Vent or air pipe and fitting | PVC schedule 40 | ANSI/ASTM D1785 | CSA or BH Gas venting systems, ULC S636 * certified only |
| | PVC-DWV | ANSI/ASTM D2665 | |
| | CPVC schedule 40 | ANSI/ASTM F441 | |
| | ABS-DWV schedule 40 | ANSI/ASTM D2661 | |
| Pipe cement/primer | PVC | ANSI/ASTM D2564 | |
| | CPVC | ANSI/ASTM F493 | |
| | ABS | ANSI/ASTM D2235 | |

* Components of the certified vent systems must not be interchanged with other vent systems or unlisted pipe fittings Plastic components, and specified primers and glues of the certified vent system must be from a single system manufacturer and not intermixed with other system manufacturer's vent system parts.



NOTICE

Do not use cellular core pipe.



NOTICE

Ensure that a condensate drain is always installed at the exhaust connection see chapter "7 Connecting the condensate drain" on page 26



NOTICE

A minimum clearance of 4 feet horizontally from and in no case above and below, unless a 4-foot horizontal distance is maintained, from electric meters, gas meters, regulators and relief equipment

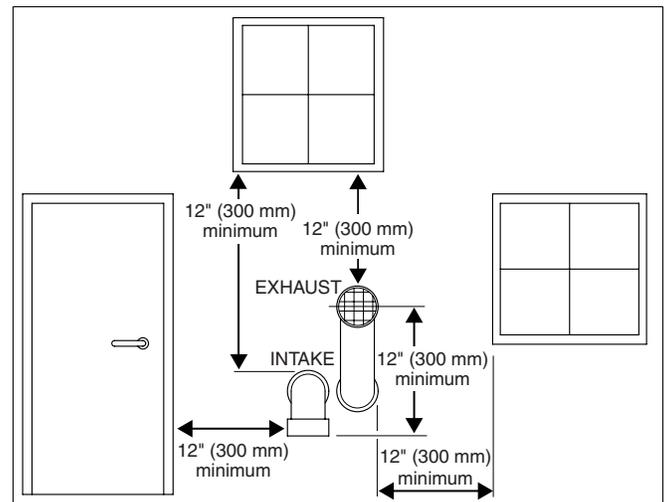


Fig. 16 Vent and air pipe position (1) of a sealed combustion system

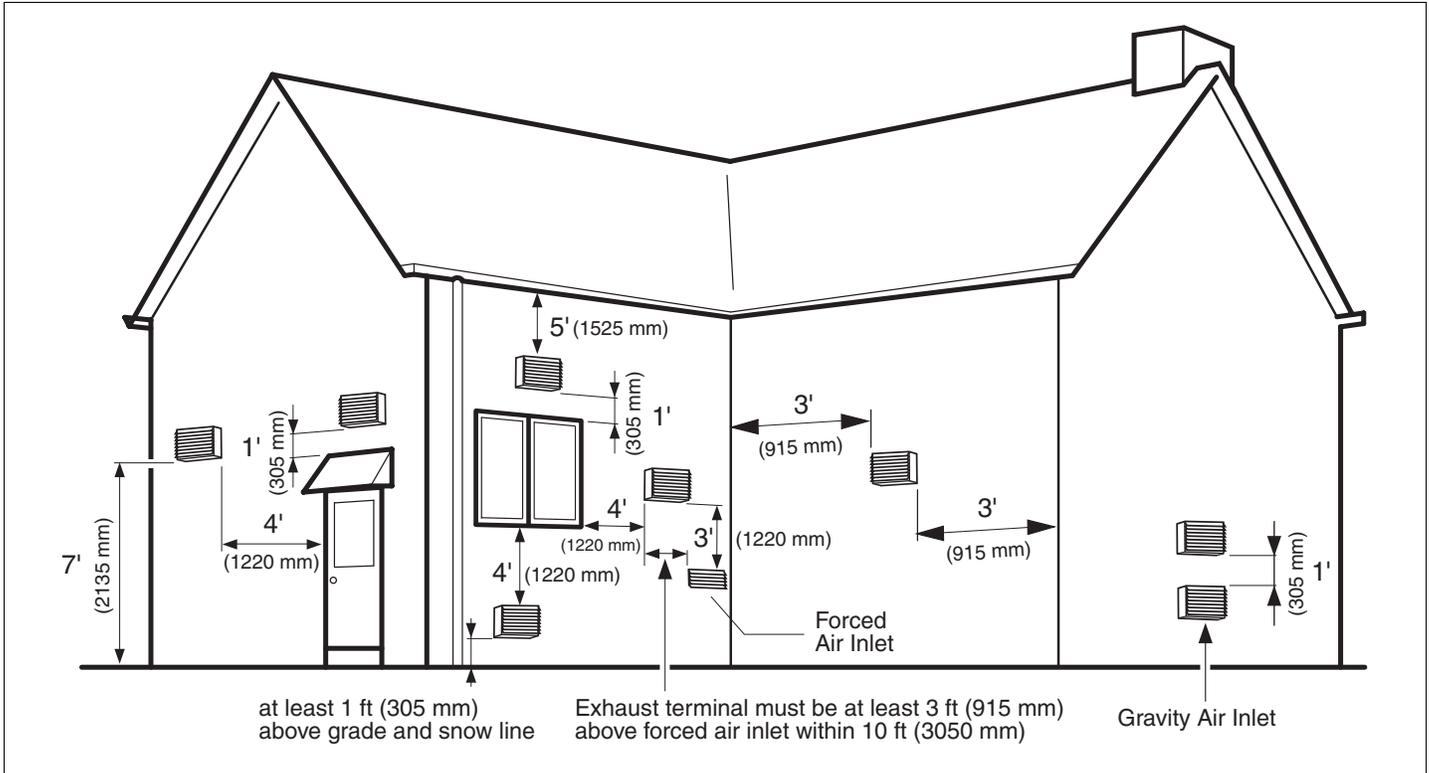


Fig. 17 Vent and air pipe position (2) of a system with combustion air supply from the room (non-room sealed)

Below are approved examples of vertical and horizontal venting installation



NOTICE

Place pipe supports every 5 feet (1525 mm) of horizontal run, beginning with support near boiler.



NOTICE

The condensate water must be drained in accordance with the applicable rules. See chapter 7 „Connecting the condensate drain“.



NOTICE

Periodic cleaning of the vent terminal and air-intake screens is mandatory.

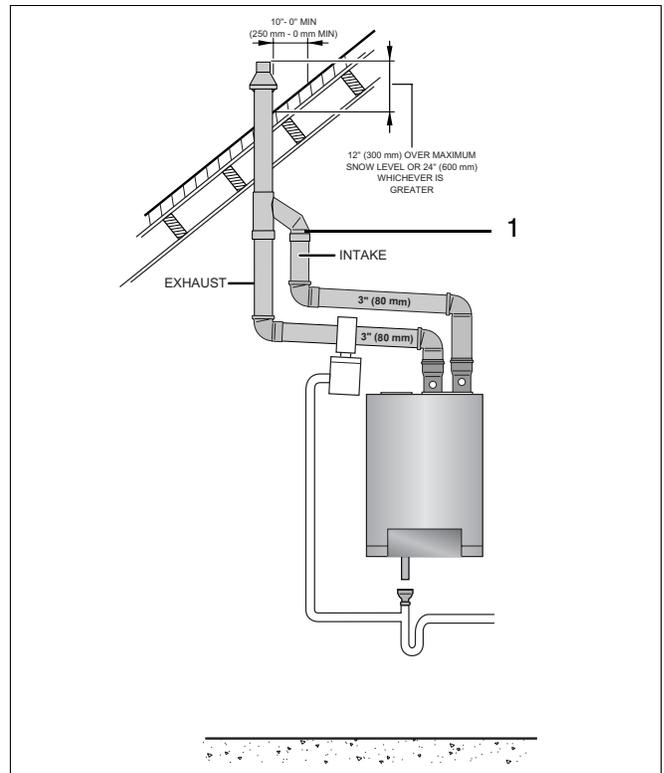


Fig. 18 Vertical venting system (sealed combustion)

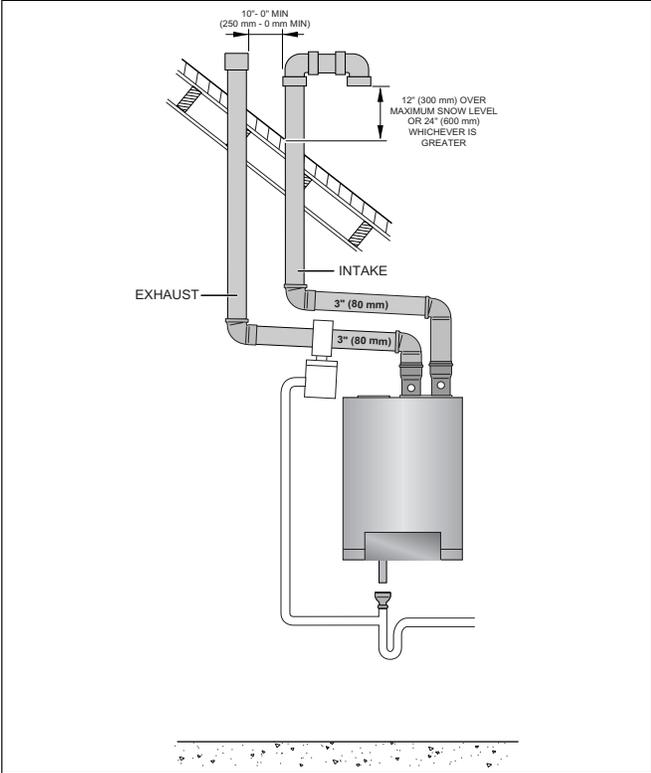


Fig. 20 Vertical parallel venting system (sealed combustion) - Situation 1

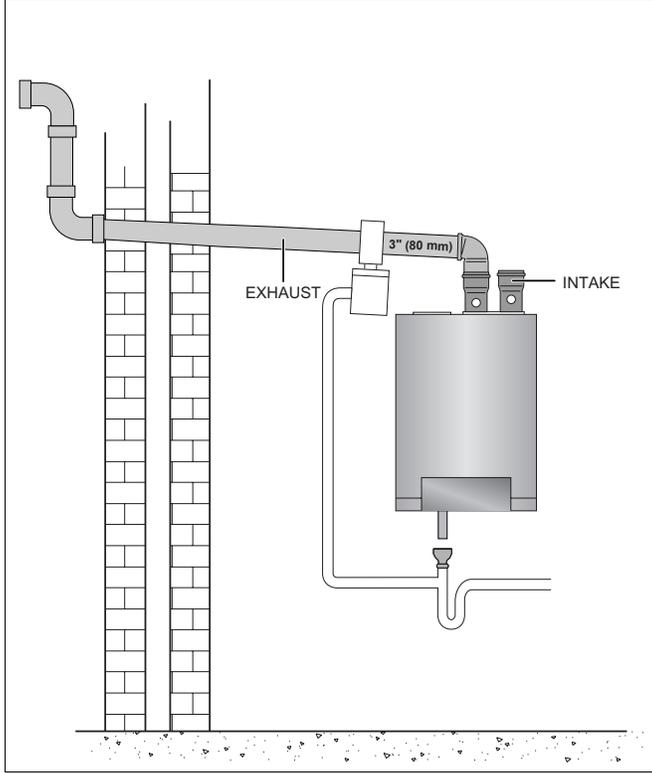


Fig. 19 Horizontal venting system (room air only) - Situation 1

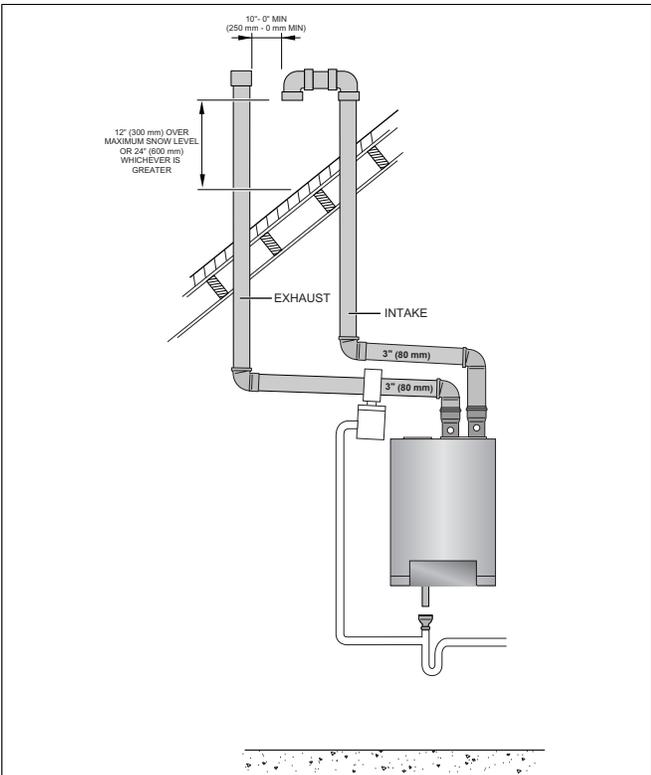


Fig. 22 Vertical parallel venting system (sealed combustion) - Situation 2

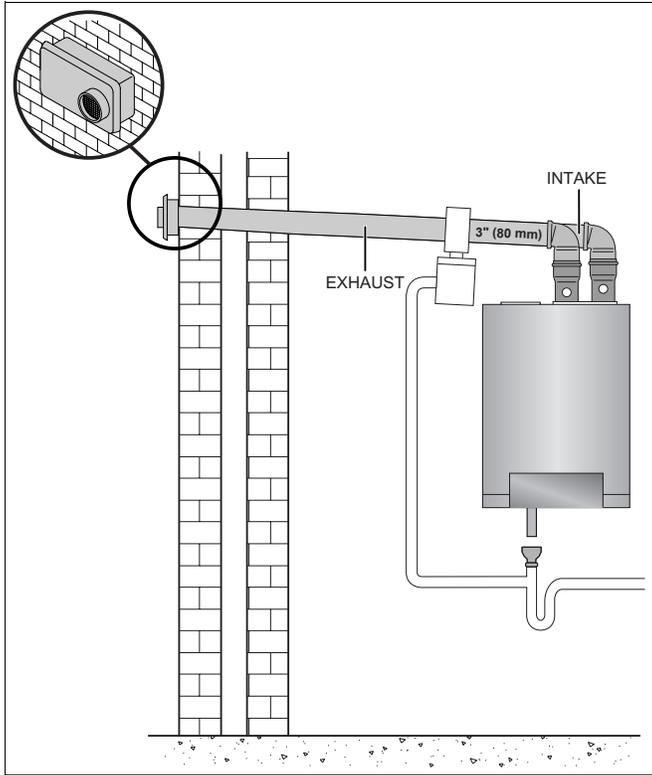


Fig. 21 Horizontal venting system (sealed combustion) - Situation 2

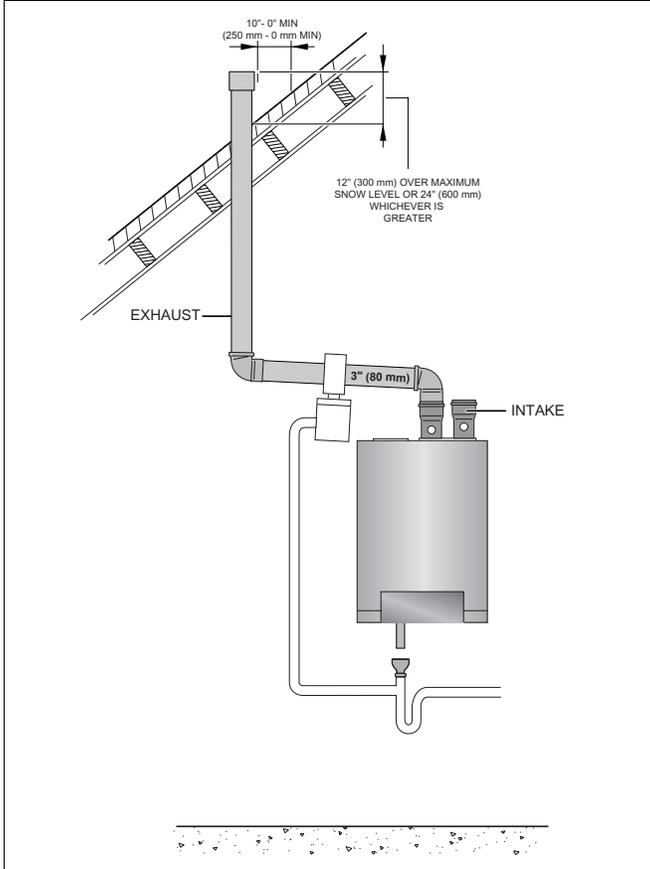


Fig. 24 Vertical venting system (room air only)

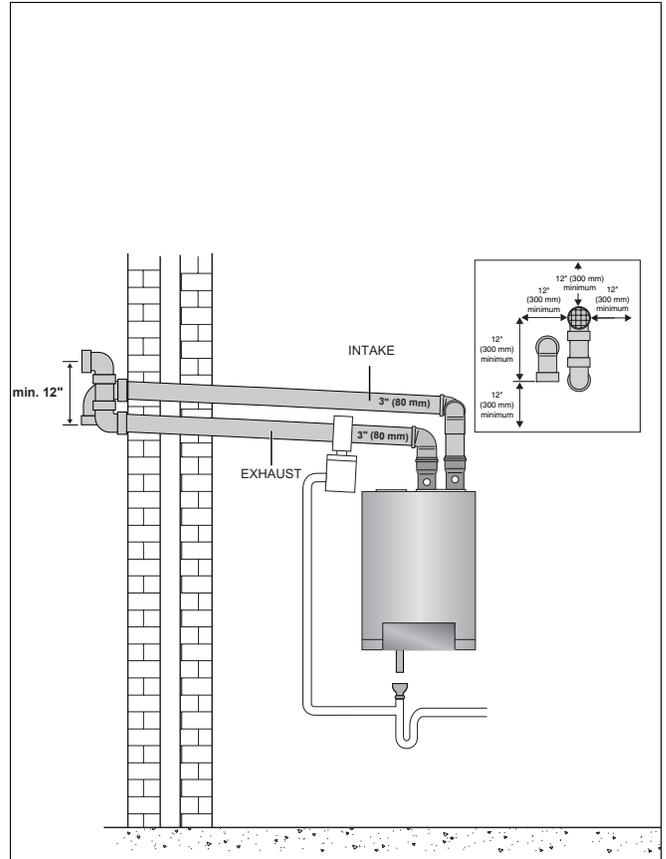


Fig. 23 Horizontal parallel venting system (sealed combustion)

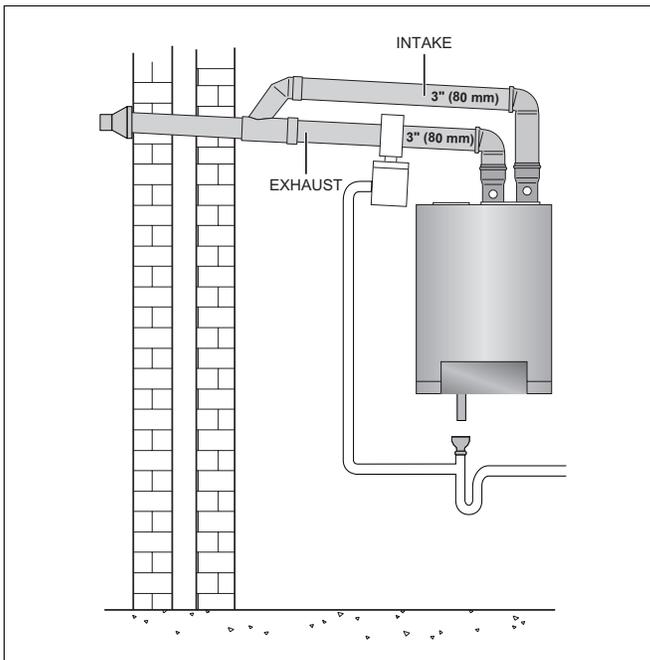


Fig. 26 Horizontal venting system (sealed combustion)

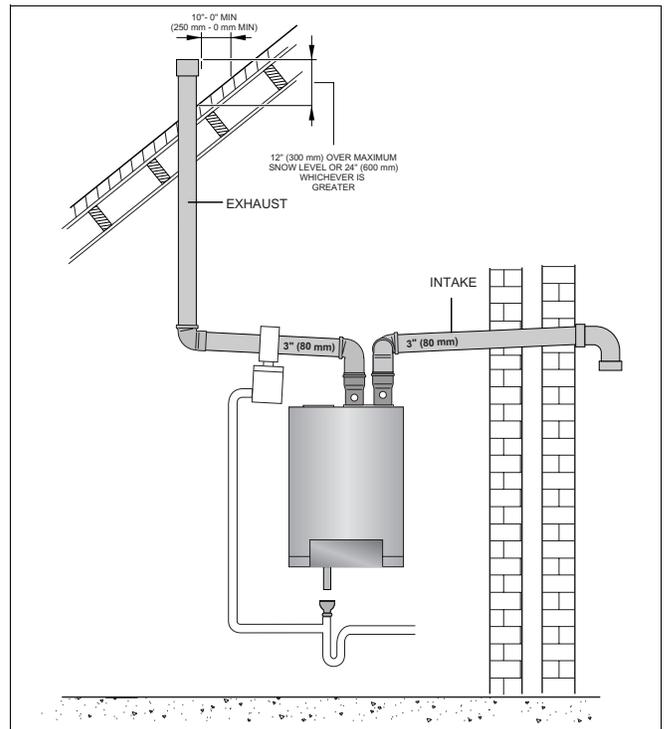


Fig. 25 Vertical exhaust and horizontal intake venting system (sealed combustion)

Do not exceed the total equivalent venting length of 100 feet (30,480 mm) (GB142-24/30/45) and 60 feet (18,288 mm) (GB142-60) maximum requirement each for the intake and exhaust piping.

See table 4 for the Friction Loss Equivalent in piping and fittings.

Example:

When you end up using 3 x 45°-elbows and the concentric vent kit, then the total venting length may not exceed 88 feet (26.82 m) (GB142-24/30/45) or 48 feet (14.63 m) (GB142-60).

3 x 45°-elbow = 3 x 3 ft (0.91 m) = 9 ft (2.73 m)

concentric vent kit = 3 ft (0.91 m)

Total friction loss equivalent = 12 ft (3.66 m)

Total venting length for this example is:

GB142-24/30/45 = 100 ft (30.48 m) - 12 ft (3.66 m) =

88 feet (26.82 m)

GB142-60 = 60 ft (18.29 m) - 12 ft (3.66 m) =

48 feet (14.63 m).

| Fittings or Piping | Equivalent | |
|-----------------------|------------|------|
| | feet | m |
| 45 degree elbow | 3 | 0.91 |
| 90 degree elbow | 5 | 1.52 |
| plastic pipe per foot | 1 | 0.30 |
| concentric vent kit | 3 | 0.91 |

Table 4 Friction Loss Equivalent in piping and fittings



NOTICE

The minimum covering wall thickness is 1" (25 mm).

The maximum covering wall thickness is 16" (406 mm).



CAUTION !

Vent connectors serving appliances vented by natural draft shall not be connected into any portion of mechanical draft systems operating under positive pressure.



NOTICE

For Direct venting properly reassemble and reseal the vent and air-intake systems.

7 Connecting the condensate drain



NOTICE

The condensate must be drained from the boiler and from the flue in accordance with the applicable rules and regulations.

No condensate drain is integrated into the boiler. It is required to install the furnished 3" x 3/4" drain tee as an external condensate drain. See fig. 27. Install this drain tee as close as possible to the boiler exhaust connection.



NOTICE

Use materials approved by the authority having jurisdiction. In the absence of such authority, PVC and CPVC pipe must comply with ASTM D1785, F441 or D2665. Cement and primer must comply with ASTM D2564 or F493. For Canada, use CSA or ULC certified PVC or CPVC pipe, fittings and cement.

If the condensate outlet of the boiler is lower than the drain, a condensate pump must be used.

The condensate produced by the boiler has a pH value between 3 and 4.

Install a neutralization unit if required by the local code.

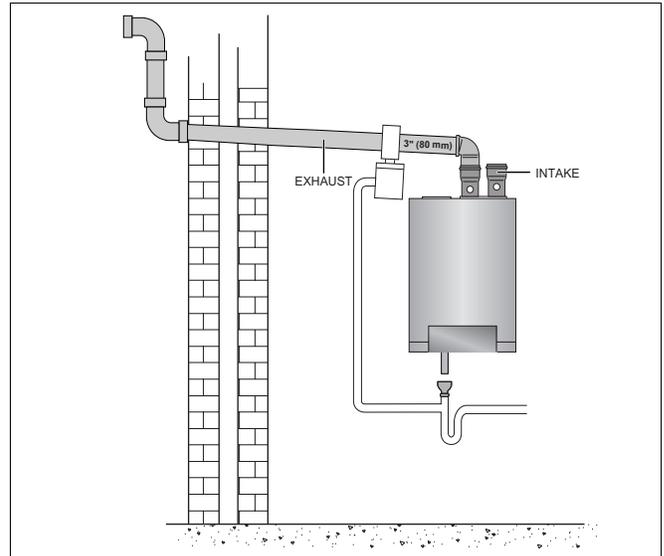


Fig. 27 Condensate drain

8 Electrical connections

Devices such as pumps, outdoor sensor and 3-way valve are all connected to the external connection board.

The electrical connections to the boiler must be made in accordance with all applicable local codes and the latest revision of the National Electrical Code, ANSI/NFPA-70. Installations should also conform with CSA C22.1 Canadian Electrical Code Part 1 if installed in Canada.

8.1 External connection board connections

Make all electrical connections inside the external connection box.

- Remove the cover of the external connection box (fig. 28).



Connecting incoming power

The boiler must be electrically grounded in accordance with local codes, or in absence of local codes, with the National Electrical Code, ANSI/INFP A 70 and/or the CSA C22.1, Electrical Code.

- Install a 120V cable to the boiler (see fig. 29, pos. 1).
- Lead the cable through the cable guide (see fig. 29, pos. 2).

Terminals 1 – 6 (fig. 30) are low-voltage connections and terminals 7 – 10 (fig. 30) are 120 Volt connections.



CAUTION RISK OF ELECTRIC SHOCK.

Once the main power supply is on then there is 120V on terminals 7 – 10 (can only be used with the correct configuration of the control unit and specific system hydraulics), if the main switch of the BC10 basic controller is switched on.

RC terminal

Connector for installation of an RC controller for indoor reset operation or a module like the AM10.

FA terminal

This is the terminal where you connect the outdoor temperature sensor. Only necessary for outdoor weather responsive operation.

WA terminal

For connection of a potential free thermostat or relay panel end switch.

FW

Connection for an external DHW tank sensor

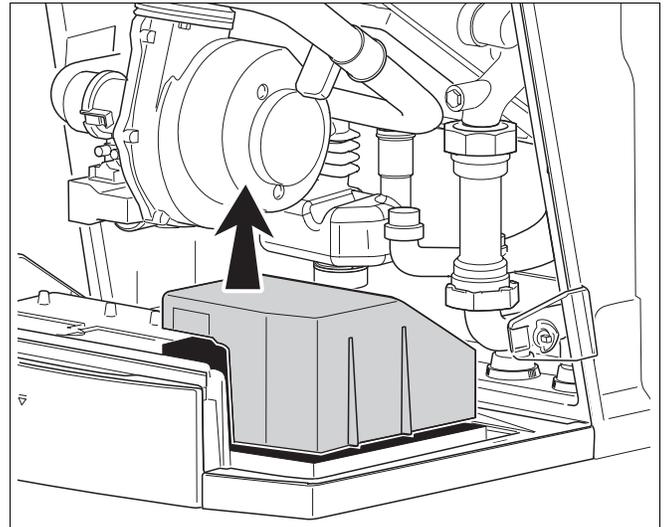


Fig. 28 Removing the cover from the external connection box

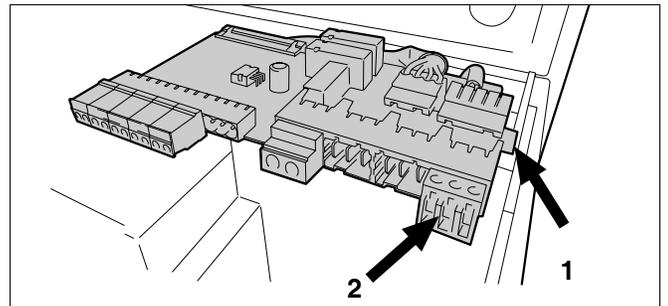


Fig. 29 external connection board

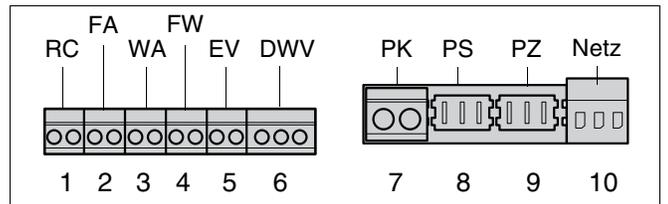


Fig. 30 Connections to external connection board

| Abbr. | Color | Component |
|-------|--------|--|
| RC | orange | RC room controller connection or for an AM10 or other module |
| FA | blue | Outdoor-temperature sensor |
| WA | green | Potential-free On/Off thermostat |
| FW | gray | DHW temperature sensor |
| EV | red | External switching contact, potential-free for floor heating safety etc. |
| DWV | green | Connection for external 3-way valve |
| PK | green | Primary loop pump 120V 60Hz |
| PS | gray | DHW tank pump 120V 60Hz |
| PZ | lilac | DHW recirculating pump 120V 60Hz |
| Netz | white | Main power connection 120V 60Hz |

EV terminal (external switching contact)

This terminal can be used for example for the safety switch of floor heating. This protects the floor heating against too high boiler water temperatures (external manual reset high limit). The boiler is shut down when the external switching contact is opened.

The normally closed contacts of a LWCO will shut down burner operation but allow the pump to continue to operate in case of a low water condition.

DWV

Terminal for connection of an external 3-way valve.

PK

Connector for the primary loop pump 120V 60Hz.

PS

Connector for the DHW tank pump 120V 60Hz.

PZ

Connector for the DHW recirculating pump 120V 60Hz.

Netz

Main power connector 120V 60Hz.

120-volt connections**CAUTION**

Make sure that the power consumption of each of the terminals 7 – 9 (see circuit diagram) does not exceed 250 W or 5 Amp.



CAUTION

Label all wires prior to disconnection when servicing.
Wiring errors can cause improper and dangerous operation.
Verify proper operation after servicing.

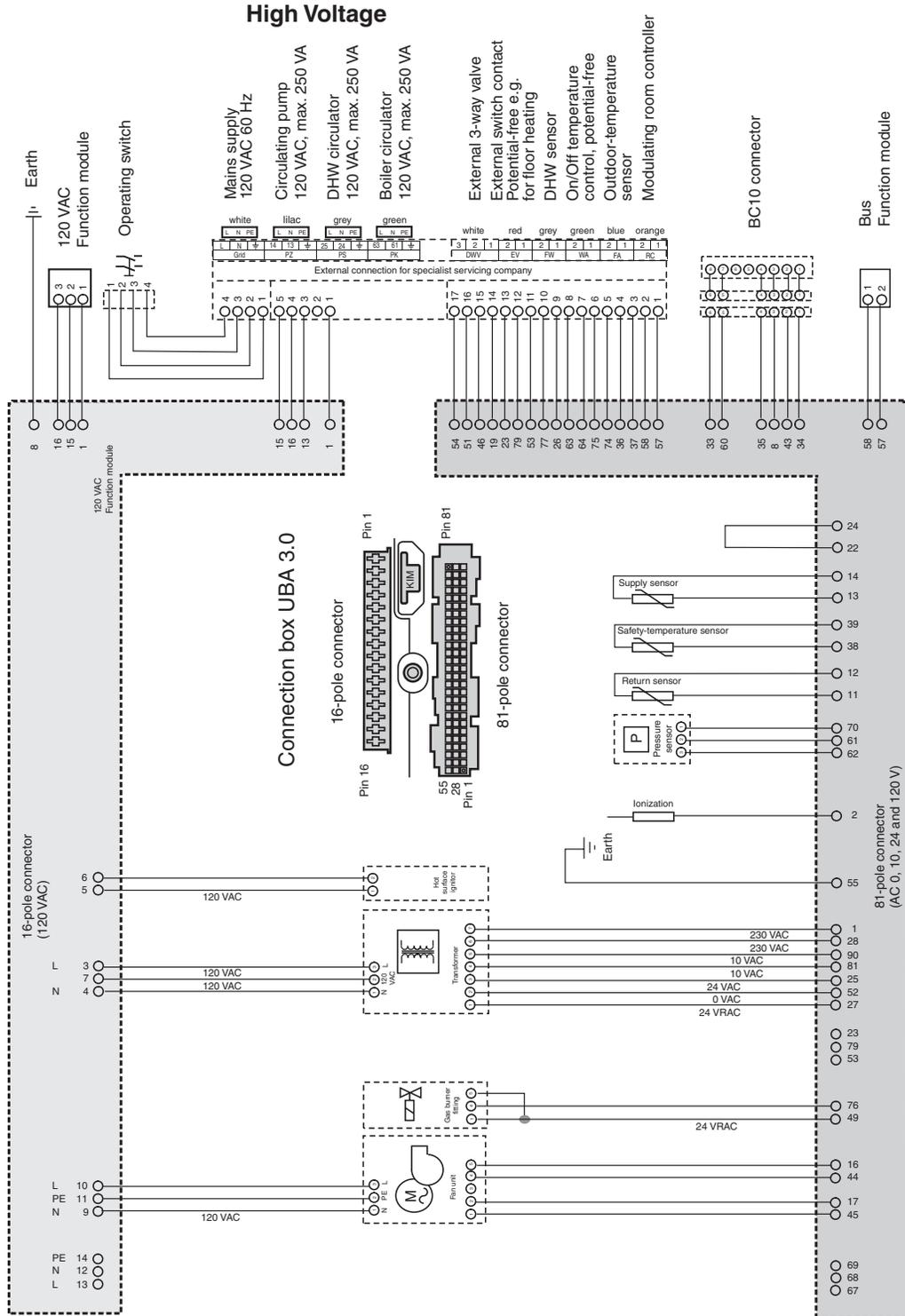


Fig. 31 Electric circuit diagram

9 Start-up procedure

There are several steps involved in starting up the boiler.

FOR YOUR SAFETY READ BEFORE OPERATING

WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

- A. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand,
- B. **BEFORE OPERATING** smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- Do not touch any electric switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instruction.
- If you cannot reach your gas supplier, call the fire department.
- C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.
- D. Do not use this appliance if any parts have been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

OPERATING INSTRUCTION

1. **STOP!** read the safety information above on this label.
2. Turn off all electric power to the appliance.
3. Set the thermostat or other operating control to lowest setting.
4. This appliance is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
5. Close main gas shut off valve.
6. Wait (5) minutes to clear out any gas. Then smell for gas. Including near the floor. If you smell gas, **STOP!** Follow "B" in the safety information above on this label. If you don't smell gas, go to the next step.
7. Open main shut off valve.
8. Set the thermostat or other operation control to desired setting.
9. Turn on all electric power to the appliance.
10. If the appliance will not operate, follow the instruction "To Turn Off Gas To Appliance" and call your service technician or gas supplier.

TO TURN OFF GAS TO APPLIANCE

1. Turn off all electric power to the appliance if service is to be performed.
2. Set the thermostat or other operating control to lowest setting.
3. Close main gas shut off valve.

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9.1 Testing for gas leaks

Prior to start-up of the boiler you must check the external tightness of the gas supply valve and confirm this in the start-up report.



WARNING

- Cover endangered positions before leak testing.
- Do not spray the leak testing agent onto cables, plugs or electrical connection lines. Do not allow it to drip onto them either.



DANGER

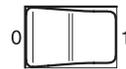
Leaks may be caused to pipes and screw connections during commissioning and maintenance activities.

- Carry out a proper leak test.
- Only use approved leak detection agents for leak detection.

- Disconnect the heating system from the power supply.
- Check the exterior tightness of new conduit sections up to and including the direct sealing point on the gas burner fitting. The maximum test pressure allowed on the input of the gas burner fitting is 14 inch W.C. (35 mbar).

9.2 Filling the boiler

Set the main switch to "1". P0.0 appears in the display of the BC10 telling you that there is no system pressure.



- Fill the heating system to a pressure of around 20 psi (1.5 bar).



NOTICE

Observe the space heating water requirements as described in paragraph 1.4 on page 6.

- Observe the pressure on the BC10 or the P/T gauge in the pump manifold for the heating circuit. The fill pressure of the system should be at least the required inlet pressure for the expansion tank plus 7.2 psi (0.5 bar). The minimum pressure is 15 psi (1.0 bar) (on a cold system). The maximum pressure is 44 psi (3.0 bar) (if the heating medium temperature is at its highest possible level). If this pressure is exceeded, the pressure relief valve will open.



NOTICE

If a relief valve discharges periodically, this may be due to thermal expansion in a closed water supply system. Contact the water supplier or local plumbing inspector on how to correct the situation. Never plug the relief valve.

9 Start-up procedure

For first time start up it is necessary to set the DHW temperature knob and the space heating water temperature knob to the desired setting (see subsection 10.3.2 and 10.3.3). Factory setting is "0".



WARNING

There is a hot water scald potential if the BC10 is set too high.

9.3 Filling the condensate trap

- Make sure that you fill the condensate trap with water. This is to prevent exhaust gases from entering the room.
- Remove the condensate trap (see fig. 32).
- Fill with water and refit the condensate trap in reverse order.

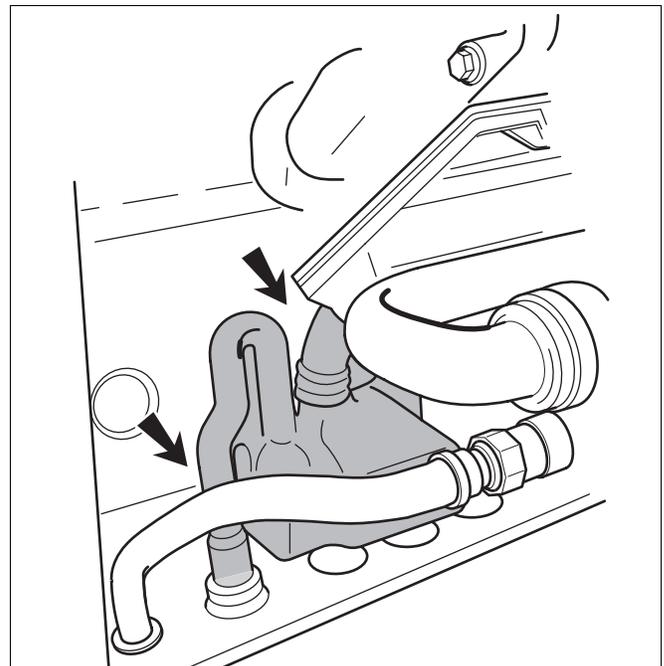


Fig. 32 Filling water into the condensate trap

9.4 Bleeding the gas supply valve

- Loosen the screw plug on the testing nipple for the gas connection and venting (fig. 33, pos. 1) by two turns and fit a hose.
- Slowly open the gas shut-off valve.
- Run the gas that is discharged through a water bath.
- Close the gas shut-off valve when no more air is released.
- Remove the hose and tighten the screw plug again.

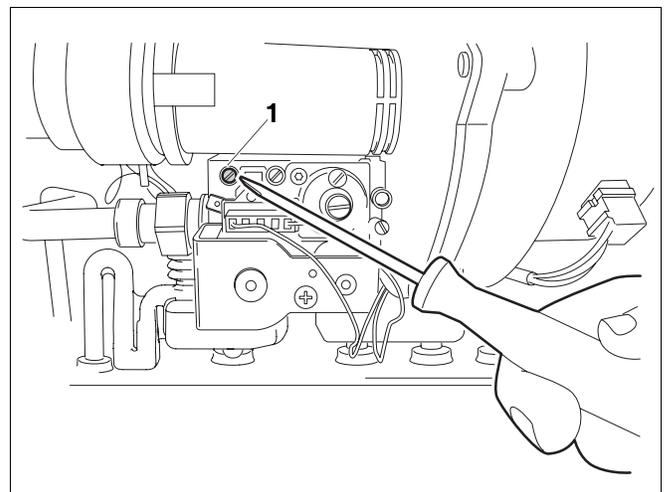


Fig. 33 Bleeding the gas supply conduit

9.5 Checking the combustion air/flue gas connection

Check the following points:

- Is the prescribed combustion air/flue system used?
- Have the instructions for configuring the flue system as specified in the relevant Installation instruction for the flue gas system been observed?

9.6 Checking the orifices



CAUTION

The burner must only be commissioned if the correct orifices are fitted (see table 6).

- Convert the burner fitting to another gas type if required (see chapter 14 "Converting the boiler to propane", page 52).

9.7 Inlet gas pressure

- Open at least one thermostatic radiator valve if present to allow water to flow through the boiler. Do not switch on the boiler.
- Close the gas shut-off valve. Loosen the screw plug on the inlet gas pressure testing nipple by two turns (fig. 34, pos. 1).

- Connect the pressure gauge connection hose to the testing nipple (fig. 34, pos. 2).
- Slowly open the gas shut-off valve.

The boiler and its individual shutoff valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of ½ psi (3.5 kPa).

The boiler must be isolated from the gas supply piping system by closing its individual manual shutoff valve during any pressure testing of the gas supply piping system at test pressures equal to or less than ½ psi (3.5 kPa).

- Briefly press on the control panel cover to open it.

- Switch on the heating system by setting the main switch to position "1" (see chapter 10 "BC10 basic controller", page 39).
- Press the "Chimney Sweep"  button and hold it (for approx. two seconds) until the display shows a decimal point.

| Boiler capacity | Type of gas supply | Gas orifice diameter in mm (inch) |
|-----------------|--------------------|-----------------------------------|
| 24 kW | Natural gas | 4.45 (0.174) |
| | LPG P | 3.35 (0.131) |
| 30 kW | Natural gas | 4.45 (0.174) |
| | LPG P | 3.35 (0.131) |
| 45 kW | Natural gas | 5.40 (0.213) |
| | LPG P | 4.05 (0.158) |
| 60 kW | Natural gas | 7.50 (0.293) |
| | LPG P | 5.40 (0.213) |

Table 6 Gas orifice diameter

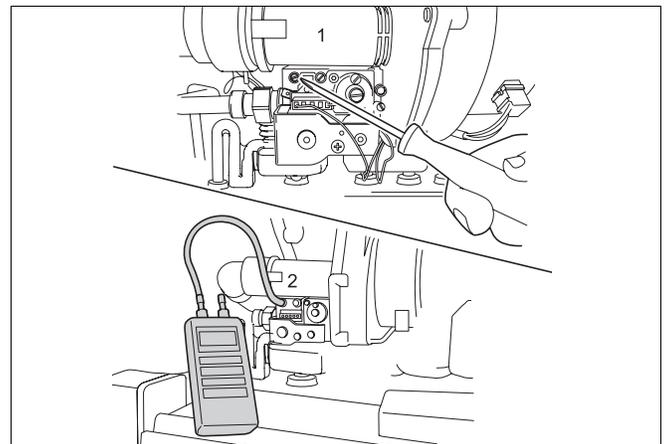


Fig. 34 Measuring the inlet gas pressure

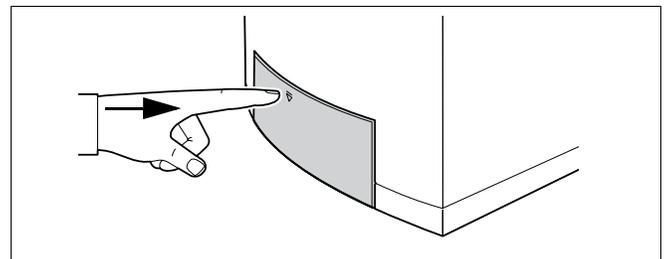


Fig. 35 Opening the control panel



9 Start-up procedure

- Measure the gas connection pressure as soon as the "Burner" LED lights and enter this value in the start-up report.



The inlet gas pressure must be:

- for natural gas - min. 3.5 to 10.5 inch W.C (8.7 to 26.1 mbar), nominal supply pressure 7.0 inch W.C. (17,4 mbar)
- for LPG - min. 8.0 to 13.0 inch W.C. (19.9 to 32.3 mbar), nominal supply pressure 11.0 inch W.C. (27.4 mbar).
- Repeatedly press the "Service" (↔) button until the temperature indication is displayed.
- Press the "Chimney Sweep" (🧹) button to end the measurement procedure.
- Close the gas shut-off valve.
- Remove the connection hose again and tighten the screw plug on the testing nipple.
- Open the gas shut-off valve again.



CAUTION

- Contact the relevant gas utility company if the required inlet gas pressure is not available.
- Install a gas pressure regulator before the gas burner fitting if the supply pressure is too high.

9.8 Checking and adjusting the gas/air ratio

- Switch off the heating system using the main switch.
- Loosen the screw plug on the measuring nipple for the burner pressure by two rotations (fig. 36, pos. 1).
- Set the pressure gauge to zero.
- Use a hose to connect the plus terminal of the pressure gauge to the burner pressure measuring nipple (fig. 36, pos. 2).

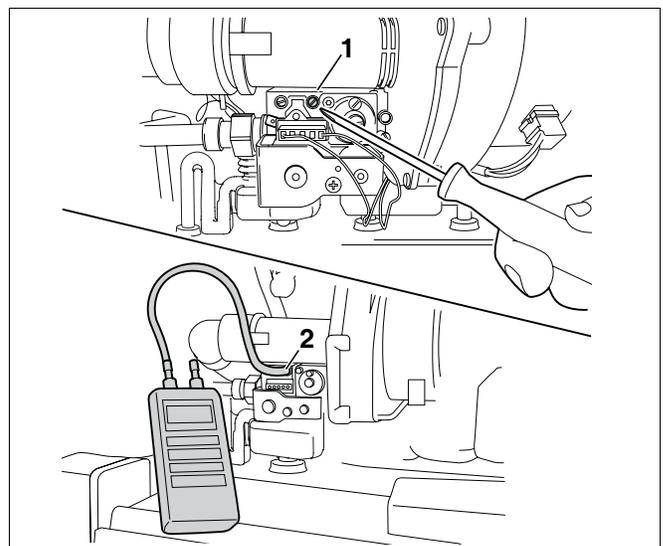


Fig. 36 Checking the gas/air ratio

- Switch on the heating system using the main switch.



- Press the "Chimney Sweep"  button and hold it (for approx. two seconds) until the display shows the decimal point.
- Press and hold the "Chimney Sweep"  and "Service"  buttons (for approx. five seconds) until the display shows "Lxx" (e. g. L88).
- Set the boiler to partial load "L30" by pressing the "Chimney Sweep"  button (higher values) or the "Reset"  button (lower values).
- Read out the differential pressure.
The differential pressure ($p_{Gas} - p_{Air}$) must be -0.02 inch W.C. (- 5 Pa) (± 0.02 inch W.C. = ± 5 Pa) (read-out on pressure gauge: -0.04 – 0 inch W.C. = -10 – 0 Pa).
- Enter the value measured in the start-up report.
- If the gas/air ratio is not correct it can be adjusted using the adjustment screw (fig. 37, pos. 1). The adjustment screw is located behind the cover screw.

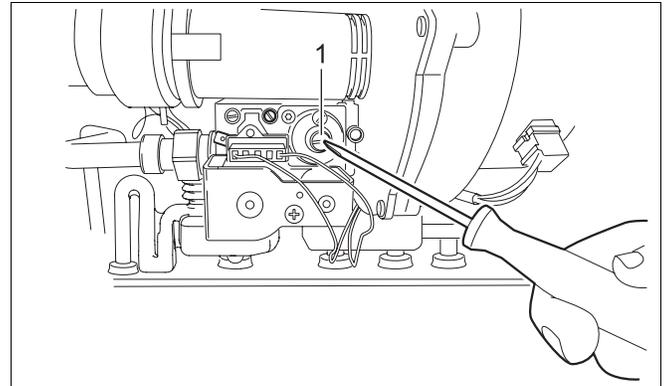
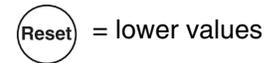
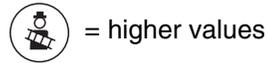
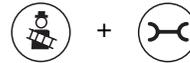
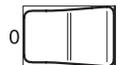


Fig. 37 Setting the gas/air ratio

- Repeatedly press the "Service"  button until the temperature indication is displayed.
- Press the "Chimney Sweep"  button until the decimal point is cleared from the display.
- Switch off the heating system using the main switch.
- Remove the measurement set-up, tighten the screw in the burner pressure measuring nipple.
- Switch on the heating system using the main switch.



9.9 Carrying out a leak test in operating conditions

- Check all gaskets and joints in the burner gas circuit for leaks while the burner is operational, using a foaming agent.



DANGER

Leaks may be caused to pipes and screw connections during start-up activities if flammable gas explodes.

- Only use approved leak detection agents for leak detection such as a soapy water solution.



CAUTION

due to a short circuit.

- Cover damageable parts before leak testing.
- Do not spray the leak testing agent onto cables, plugs or electrical connection lines. Do not allow it to drip onto them either.

9.10 Measuring the carbon monoxide content (CO)

- Measure the carbon monoxide content on the flue gas sampling point (fig. 38).

The CO values in an air-free condition must be below 400 ppm or 0.04 vol. %.

Values of 400 ppm and up indicate that the burner adjustment may be wrong, the gas burner fitting or the heat exchanger are dirty or that there may be burner faults.

- You must establish and resolve the cause. The boiler must be operational when you do this.

9.11 Function testing

- You must check the functioning and, if readjustment is possible, the adjustment of all control, regulating and safety devices when carrying out start-up tests, annual inspections or maintenance as required.
- You must also test the gas and water lines for leaks.

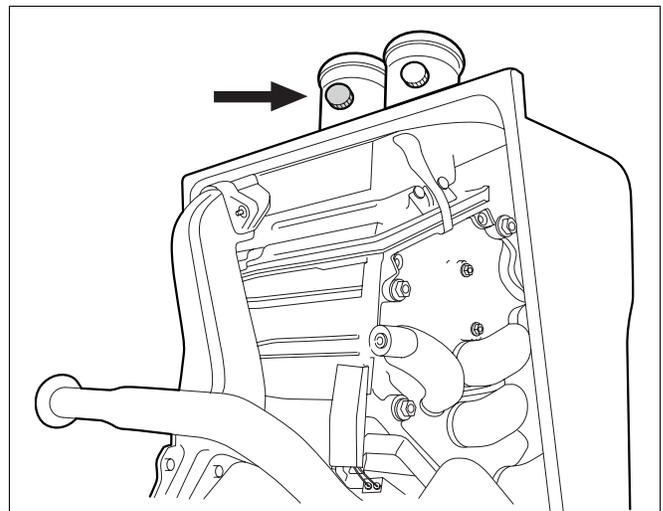


Fig. 38 Flue gas sampling point

9.12 Measuring the ionization current

- Switch off the heating system using the main switch.
- Disconnect the plug and socket connection of the monitoring cable and connect the measuring device in series (fig. 39). Select the μA direct current range on the measuring device. The measuring device must have a resolution of at least $1 \mu\text{A}$.

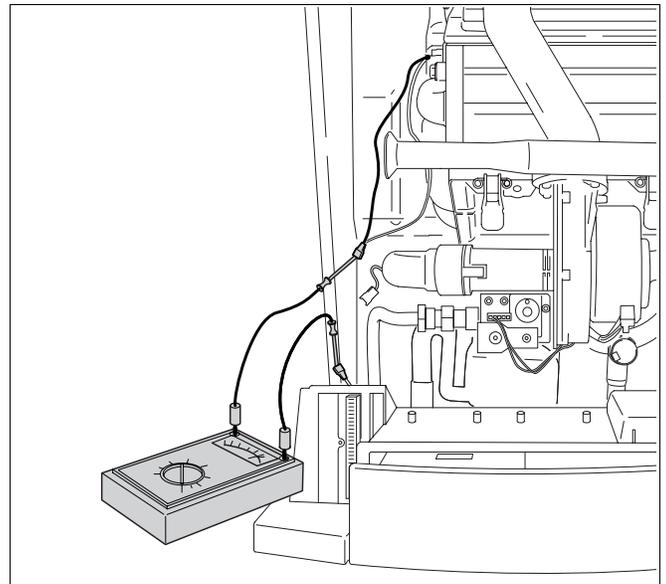
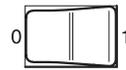
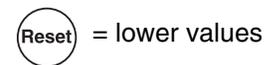
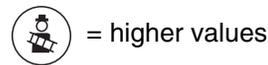
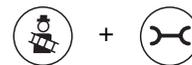


Fig. 39 Measuring the ionization current

- Switch on the heating system using the main switch.
- Press the "Chimney Sweep"  button and hold it (for approx. two seconds), until the display shows the decimal point.
- Press and hold the "Chimney Sweep"  and "Service"  buttons, until the display shows "Lxx" (e. g. L88).
- Set the boiler to partial load "L30" by pressing the "Chimney Sweep"  button (higher values) or the "Reset"  button (lower values).
- Measure the ionization current. When the boiler is in partial load mode the ionization current must be $> 5 \mu\text{A}$ DC.
- Enter the value measured in the start-up report.
- Repeatedly press the "Service"  button, until the temperature indication is displayed.
- Press the "Chimney Sweep"  button to end the measurement procedure.
- Switch off the heating system using the main switch.
- Remove the measuring device and restore the plug and socket connection.
- Switch on the heating system again using the main switch.



- Push against the drawer (fig. 40) to close the control panel.

9.13 Testing the Ignition Safety shut off device

- Switch off the heating system using the main switch.
- Disconnect the plug and socket connection of the monitoring cable.
- Switch on the heating system using the main switch.
- Press the "Chimney Sweep"  button and hold it (for approx. two seconds), until the display shows the decimal point.
- Check if the boiler does one start-up attempt and three restart attempts.

After each start-up attempt the boiler will signal a start-up failure. A "ER" code can be seen in the display.

After the last start-up attempt, the boiler will lock out. The "ER" code is blinking in the display.

- Connect the plug and socket connection of the monitoring cable.
- Press the reset button.
- Check if the boiler starts-up.
- Press the "Chimney Sweep" button return to normal operating conditions.

9.14 Installing the casing

- Install the casing and close the latches (fig. 41). Do not lift the casing by the latches!
- Lock the latches using the radiator key.

9.15 Informing the owner, handing over the technical documents

- Show the owner how the heating system works and how the boiler can be operated. Hand over the technical documents.

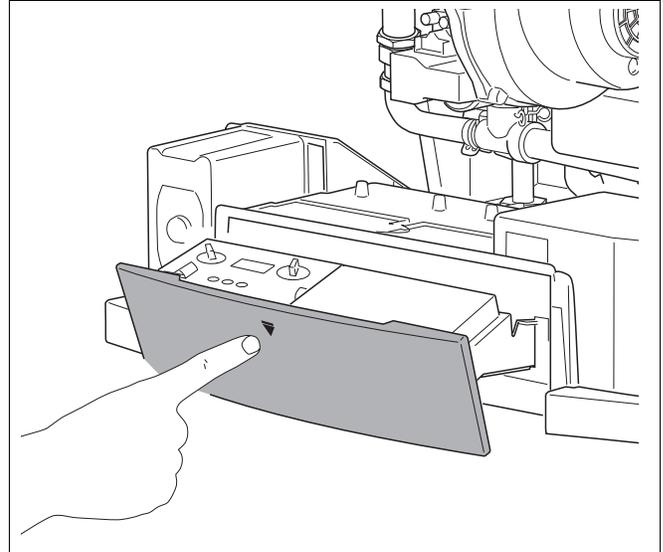


Fig. 40 Closing the control panel

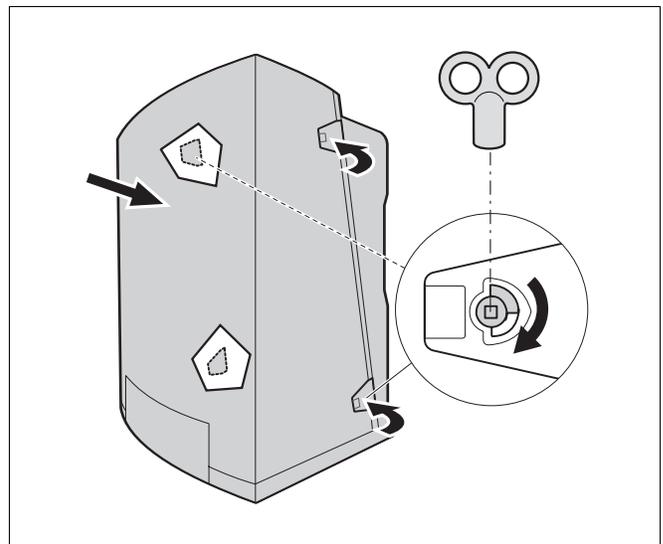


Fig. 41 Installing the casing

10 BC10 basic controller

10.1 Operating the BC10 basic controller

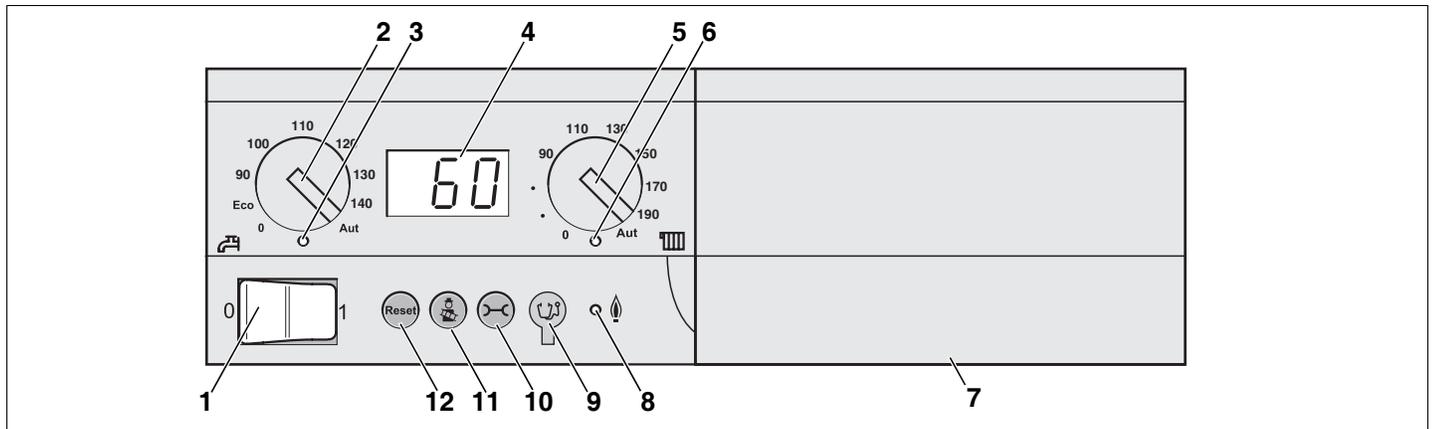


Fig. 42 BC10 basic controller – Controls

- pos. 1: Main switch
- pos. 2: DHW temperature knob
- pos. 3: LED "DHW status"
- pos. 4: Display
- pos. 5: Space heating water temperature knob
- pos. 6: LED "Heating system status"
- pos. 7: Under the cover a RC system controller can be installed (not available).
- pos. 8: LED "Burner Operation"
- pos. 9: Service Tool connector
- pos. 10: "Service" button
- pos. 11: "Chimney sweep" button
- pos. 12: "Reset" button

10.1.1 Switching the heating system on and off

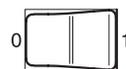
Switching on the heating system

- Set the main switch on the BC10 basic controller to position "1" (On).



Switching off the heating system

- Set the main switch on the BC10 basic controller to position "0" (Off).



10.1.2 Displaying the operating conditions of the burner and resetting the burner or resetting burner faults

Displaying the operating conditions of the burner

The LED indicates the operating condition of the burner.



| LED | Condition | Explanation |
|-----|--------------------|---|
| On | Burner operational | The water in the boiler is being heated. |
| Off | Burner off | The water in the boiler has reached the required temperature or there is no heat request. |

Table 7 LED indication

Resetting the boiler or resetting faults

If the boiler is down due to a fault, you can reset the boiler by pressing the "Reset"  button. This is only possible for so-called lock-out faults. There is another type of fault, so-called blocking faults, that reset themselves when the cause has been remedied.

- Press the "Reset"  button to reset the boiler.



The display shows "rE" while resetting.

It is only possible to reset the boiler when a lock-out code (blinking fault code) is visible in the display.



NOTICE

If the burner returns to fault mode after resetting the boiler, you must resolve the fault using the servicing section in this document. Contact your supplier if necessary.

10.1.3 Displaying the heating system status and/or faults

The display of the BC10 basic controller shows the status of the heating system.

In the event of a fault the display immediately shows the fault or the warning in the form of an error code (see subsection 15.2). The status display will flash if the fault is a lock-out fault.

- Press the "Service"  button to switch between status displays or to read out the service and error codes.
- Resolve the fault see subsection 15.3.



The following status displays can be seen depending on the operating conditions:

| Displays (examples) | Values | Meaning | Operating condition/Remedy |
|---|--------------------------------|--|------------------------------------|
|  ¹⁾ | number 0 ... 199 ²⁾ | Current boiler water temperature (in °F) | Normal operating conditions |
|  ²⁾ | > P15 | Current system pressure (in psi) | |
|  ³⁾ | | | |

Table 8 Possible status displays

¹⁾ Standard display for this operating condition. This display appears after 5 minutes if no button is pressed.

²⁾ The temperature is higher as 199° when 199 is blinking in the display.

| Displays (examples) | Values | Meaning | Operating condition/Remedy |
|---|--|---|---|
|      | P3 ... P12 number 0 ... 199 ²⁾ P3 ... P12 | Warning: System pressure is too low (between 3 and 12 psi = 0.2 and 0.8 bar) Current boiler water temperature (in °F) Current system pressure (in psi) | Warning Heating system remains operational between 12 psi and 3 psi (0.8 and 0.2 bar). Fill the heating system and restore the minimum filling pressure (≥ 14.5 psi = ≥ 1.0 bar). The system pressure is shown for 10 minutes after which the standard display returns. |
|     | < P3 number > 200 number 0 ... 199 ²⁾ < P3 | Fault: system pressure is far too low (< 3 psi = < 0.2 bar) Error code Remedy the error see servicing section Current boiler water temperature (in °F) Current system pressure (in psi) | Fault Burner and boiler circuit pump are not operational. Frost protection is active up to 2 psi (0.1 bar). The heating system will only become operational again if the pressure is back to 14.5 psi (1.0 bar). Fill the heating system and restore the minimum filling pressure (≥ 14.5 psi = ≥ 1.0 bar). The system pressure is shown for 10 minutes after which the standard display returns. |
|     | Combination of letters and digits number > 199 number 0 ... 199 ²⁾ > P15 | Service code Error code Remedy the error using the servicing section in this manual Current boiler water temperature (in °F) Current system pressure (in psi) | Fault Lock-out faults (flashing display) must be reset by pressing the "Reset" (Reset) button. Blocking faults reset automatically as soon as the cause has been removed. Remedy any blocking faults that remain active for a long time using the service section in this manual. |
|      | A00 ... A99 number > 800 number 0 ... 199 > P15 | Service code Error code Remedy the error using the service section in this manual Current boiler water temperature (in °F) Current system pressure (in psi) | System faults System faults are faults in the heating system that do not affect the burner operation. |
|  | | Fault No communication between BC10 and automatic gas burner. | Fault Remedy the error using the service section in this manual. Check the connections to both devices. Check the communication lines. |

Table 8 Possible status displays

¹⁾ Standard display for this operating condition. This display appears after 5 minutes if no button is pressed.

²⁾ The temperature is higher as 199° when 199 is blinking in the display.

10.2 Carrying out additional tasks

10.2.1 Carrying out a flue gas test

The "Chimney Sweep"  button is used for the flue gas test.

The heating control system works at the maximum flow temperature for 30 minutes. This is set on the BC10 basic controller using the "maximum heater temperature" knob. During flue gas testing the decimal point lights up in the display.

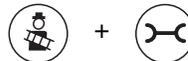
- Press and hold the "Chimney Sweep"  button (< 5 seconds) until the decimal point is displayed.
- Carry out the flue gas test.
- Press the "Chimney Sweep"  button to interrupt the flue gas test.



10.2.2 Selecting partial load operation (e. g. during flue gas testing)

You can operate the boiler at a reduced boiler capacity during flue gas testing. This reduction is only effective for the duration of the flue gas test.

- Press the "Chimney Sweep"  button (max. 2 seconds) until the decimal point shows in the status display. This will switch on the flue gas test.
- Press and hold the "Chimney Sweep"  and "Service"  buttons (for approx. 5 seconds) to enter the partial load mode.
- Press the "Reset"  button to reduce the boiler capacity percentage.



Example: boiler capacity reduced to 50 % of the rated boiler capacity.



- Press the "Chimney Sweep"  button to increase the boiler capacity percentage.
- When test is completed, press the "Service"  button until the temperature indication is displayed.
- Press the "Chimney Sweep"  button until the decimal point is cleared from the display.



10.2.3 Switching the heating system to manual mode

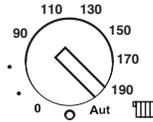
In manual mode the heating system can be operated independently of an external control unit. The boiler is operated with the heating system temperature set on the right knob serving as the target value.

A blinking decimal point is displayed while manual mode is active.

- Press the "Chimney Sweep"  button (for more than 5 seconds) until the decimal point in the status display flashes.



- Turn the knob to set the maximum space heating system temperature.
- Press the "Chimney Sweep"  button to exit manual mode.



WARNING

- Turn the "space heating system temperature" knob to limit the heating system temperature to the permissible flow temperature for the floor heating circuit (e. g. 86 – 104 °F = 30 – 40 °C), so pipes will not overheat.



DANGER

- The heating system can freeze up if a power failure occurs or after switching off the power supply, because manual operation then is no longer active.
- You must re-activate manual operation after switching on the system to keep the heating system operational (especially if there is a risk of frost).

| Regulator setting in % | Heating capacity (±5 %) | | | | | | | |
|------------------------|-------------------------|--------|-------------------|---------|-------------------|---------|-------------------|---------|
| | boiler cap. 24 kW | | boiler cap. 30 kW | | boiler cap. 45 kW | | boiler cap. 60 kW | |
| | kW | btu | kW | btu | kW | btu | kW | btu |
| L30 | 7.2 | 24,566 | 8.7 | 29,684 | 13.5 | 46,062 | 18.0 | 61,542 |
| L40 | 9.6 | 32,755 | 11.7 | 39,920 | 18.0 | 61,416 | 24.0 | 82,080 |
| L50 | 12.0 | 40,944 | 14.8 | 50,498 | 24.5 | 83,619 | 30.0 | 102,630 |
| L60 | 14.4 | 49,133 | 17.8 | 60,734 | 27.0 | 92,178 | 36.0 | 123,192 |
| L70 | 16.8 | 57,322 | 20.9 | 71,311 | 31.5 | 107,573 | 42.0 | 143,766 |
| L80 | 19.2 | 65,510 | 23.9 | 81,547 | 36.0 | 122,976 | 48.0 | 164,352 |
| L90 | 21.6 | 73,699 | 27.0 | 92,124 | 40.5 | 138,389 | 54.0 | 184,950 |
| L-- | 24.0 | 81,888 | 30.0 | 102,360 | 45.0 | 153,810 | 60.0 | 205,560 |

Table 9 Heating capacity

10.3 Configuring the boiler

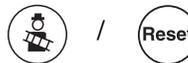
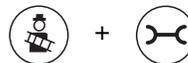
10.3.1 Adjusting the heating capacity

Setting the heating capacity depending on the maximum heat requirement (see table 9).

- Press and hold the "Chimney Sweep"  and "Service"  buttons until an "L" with a double-digit value (e. g. L88) or an "L" followed by two dashes (L--) is displayed.

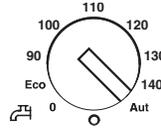
Factory setting "L--".

- Set the heating capacity by pressing the "Chimney Sweep"  button (higher values) or the "Reset"  button (lower values).
- Press the "Service"  button to confirm the setting.



10.3.2 Setting the DHW temperature value

- Turn the "DHW temperature" rotary knob to set the desired temperature of the hot water in the hot-water tank.



| | Condition | Explanation | LED |
|-------------------------|--|---|-----------------|
| 0 | Off | No hot water supply (only heating mode). | Off |
| Eco ¹ | Economy mode, Hot water temperature 140 °F (60 °C) | The DHW will only be reheated to 140 °F (60 °C), if the temperature has significantly fallen. This reduces the number of burner starts and saves energy. As a result the water may be a bit colder initially. | On ² |
| 86 – 140 | Direct setting on BC10 in °F | The temperature set on the BC10 is a temperature that cannot be changed using a RC thermostat. | On ² |
| Aut | Entry via thermostat (presetting) | The temperature is set on the thermostat (e. g. RC30). If no thermostat is connected, the maximum DHW temperature is 140 °F (60 °C). | On ² |

Table 10 Settings of "DHW temperature" knob

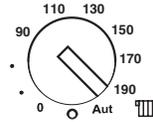
¹ This function has been optimized for boilers with combined DHW heating (combi-units).

² The heating program (timer) of the room control unit remains active, as a result of which no hot water is heated during night-time operation.

³ The LED under the rotary knob lights up if the DHW temperature is below the target value (heat request for DHW).

10.3.3 Entering the space heating water temperature

- Turn the "space heating water temperature" knob to set the upper limit value of the heater water for the heating operation. This limitation does not apply to DHW preparation.



| | Condition | Explanation | LED |
|-----------------|---|--|-----------------|
| 0 | Off | No supply to heating system (only DHW heating operation). | Off |
| 86 – 190 | Direct setting on BC10 in °F (86 – 190 °F = 30 – 90 °C) | The temperature set on the BC10 is a temperature that cannot be changed using a RC thermostat. Supply temperature does not rise above the set temperature. | On ¹ |
| Aut | Entry via thermostat (presetting) | The temperature is automatically determined on the basis of the heating characteristic. If no thermostat is connected, the maximum heater temperature is 190 °F (90 °C). | On ¹ |

Table 11 Settings of "space heating water temperature" rotary knob

¹ The LED under the rotary knob lights up when the heating system is switched on and heat is requested. In summer mode the heating system is switched off (LED off).

10.3.4 Setting the pump post-purge period

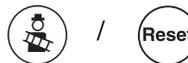
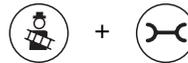
A pump must be connected to PK (see fig. 29, pos. 7) of the external connection board in order to be able to set the pump run over time.



CAUTION

- Set the boiler primary pump post-purge period to 24 hours if the heating system is controlled by room temperature sensor and there is a risk of parts of the heating system that are outside the coverage of the room thermostat freezing (e. g. radiators in a garage; constant circulation).

- Press and hold the "Chimney Sweep"  and "Service"  buttons until the display shows "L--".
- Press the "Service"  button. The display shows "F05". The heating system has been factory-set to a pump post-purge period of 5 minutes.
- Press the "Chimney Sweep"  or "Reset"  buttons to set the pump post-purge period. The pump post-purge period can be set from 5 – 60 minutes (F 5 - F60) or to 24 hours (F1d).
- Press the "Service"  button to confirm the setting.



NOTICE

On thermostat only systems a 5 to 10 minute post-purge setting is recommended to purge heat from the boiler.

11 Shutting down the system



DANGER

The heating system may freeze if it is not operational in times of frost.

Protect the heating system against freezing if there is a danger of frost affecting the system. Drain the heating system water from the lowest point of the heating system. The vent screw at the highest point of the heating system must then be open.



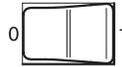
DANGER

Should overheating occur or gas supply fail to shut off, turn off the manual gas control valve to the boiler.

11.1 Shut down the heating system using the control unit

Shut down your heating system using the BC10 basic controller. When the BC10 basic controller is shut down, the burner is also switched off automatically. Further information on how to operate the BC10 basic controller can be found in chapter 10 "BC10 basic controller", page 39.

- Switch off the heating system using the main switch.
- Close the main shut-off valve or the gas shut-off valve.



11.2 Shutting down the heating system in the event of an emergency

You must immediately close the main shut-off valve or gas shut-off valve and disconnect the power from the heating system.

- Close the main shut-off valve.

12 Inspection

We advise you to offer your customer an annual inspection and maintenance contract (for the contents of this contract, see page 59 and page 60).

If inspection reveals that maintenance work is necessary you can carry this out as required (see chapter 13 "Maintenance", page 49).



CAUTION

- Check and clean the heating system once a year.
- Carry out a maintenance overhaul if necessary. Immediately repair defects to avoid damage to the heating system!



WARNING

Do not use this boiler if any part has been under water. Immediately call a qualified service technician to inspect the boiler and to replace any part of the control system and any gas control which has been under water.



CAUTION

Risk of electric shock.

- Before opening the system: disconnect the heating system from the power supply using the heating system emergency OFF button or disconnect the relevant circuit breaker of the house from the power grid.
- Secure the heating system against accidental restarting.

- Periodically examine the venting systems and cleaning of the screens in the vent terminal.
- Also periodically inspect the low water cutoffs, including flushing of float types and clean the condensate collections and disposal system.

12.1 Preparing the boiler for inspection

- Switch off the heating system using the main switch.
- Remove the cover from the boiler (fig. 7, page 13).



INSTRUCTION FOR THE INSTALLER

- If gas pipes have to be disconnected from the gas burner fitting, the burner cover must only be opened by a specialized professional.

12.2 Visual inspection for general signs of corrosion

- Check all gas and water pipes for signs of corrosion.
- Replace any pipes that are corroded.

12.3 Internal leak testing

- Switch off the heating system using the main switch.
- Test for internal leaks of the gas burner fitting on the inlet side, applying a test pressure of 7.0 inch W.C. (17.4 mbar) in case of natural gas and 11.0 mbar (27.4 mbar) in case of LPG.



After one minute the pressure must not have dropped by more than 3.8 inch W.C. (10 mbar).

- If the pressure has dropped more, you must check all gaskets and joints upstream of the gas burner fitting for leaks using a foaming agent. Repeat the pressure test if no leaks are found. If the pressure has again dropped by more than 3.8 inch W.C. (10 mbar) per minute you will have to replace the gas burner fitting.

12.4 Measuring the ionization current

See subsection 9.12 "Measuring the ionization current", page 37.

12.5 Measuring the inlet gas pressure

See subsection 9.7 "Inlet gas pressure", page 33.

12.6 Checking and adjusting the gas/air ratio

See subsection 9.8 "Checking and adjusting the gas/air ratio", page 34.

12.7 Carrying out a gas leak test in operating conditions

See subsection 9.9 "Carrying out a leak test in operating conditions", page 36.

12.8 Measuring the carbon monoxide content (CO)

See subsection 9.10 "Measuring the carbon monoxide content (CO)", page 36.

12.9 Carrying out a pressure test of the heating system

See chapter 9 "Start-up procedure", page 30.

12.10 Checking the functioning and the safety of the air intake and flue gas conduit

See subsection 9.5 "Checking the combustion air/flue gas connection", page 32.

12.11 Checking venting systems

Check air intake and flue gas for obstruction or damage.

13 Maintenance



CAUTION

There is no need to lubricate the combustion motor as it is permanently lubricated.

- Switch off the heating system using the main switch.
- Close the gas shut-off valve.
- Remove the casing.

13.1 Cleaning the heat exchanger, burner and condensate trap



CAUTION

To avoid a short circuit.

- Do not spray the cleaning agent onto the burner, the hot surface ignitor, the ionization electrode or other electric components.

- Dismantle the hot surface ignitor and the ionization electrode.
- Loosen the fastening nuts (fig. 43, pos. 1).
- Remove the earth cable (fig. 43, pos. 2).
- Remove the retaining plate.
- Pull the hot surface ignitor (fig. 43, pos. 3) and the ionization electrode (fig. 43, pos. 4) out of the heat exchanger.
- Loosen the threaded connection to the gas control valve (fig. 44, pos. 1) and pull the plug (fig. 44, pos. 2) from the gas valve terminal block.
- Pull the plug from the fan unit (fig. 44, pos. 3).

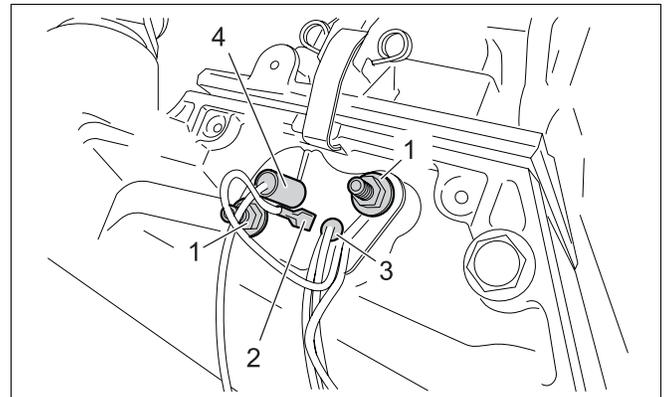
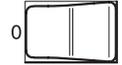


Fig. 43 Removing the hot surface ignitor and the ionization electrode

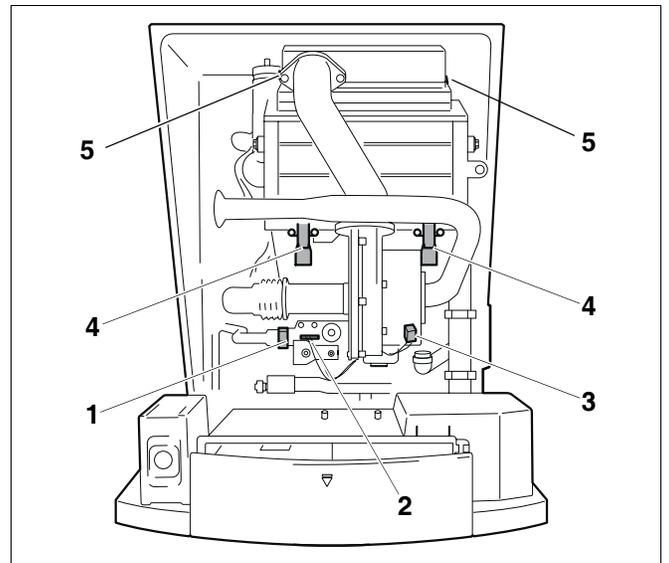


Fig. 44 Removing the connections

- Loosen both sets of retaining clips (fig. 44, pos. 4 and 5) of the burner cover and remove the burner cover with the fan unit and the gas burner fitting (fig. 45, pos. 1).
- Remove the gas/air distributor plate (fig. 45, pos. 2), the orifice plate (GB142-24, GB142-30 and GB142-60 only, fig. 45, pos. 3) and the burner (fig. 45, pos. 4). Note that the orifice plate of the GB142-60 has a different shape.
- Clean the gas/air distributor plate, the orifice plate (GB142-24, GB142-30 and GB142-60 only) and the burner using compressed air.

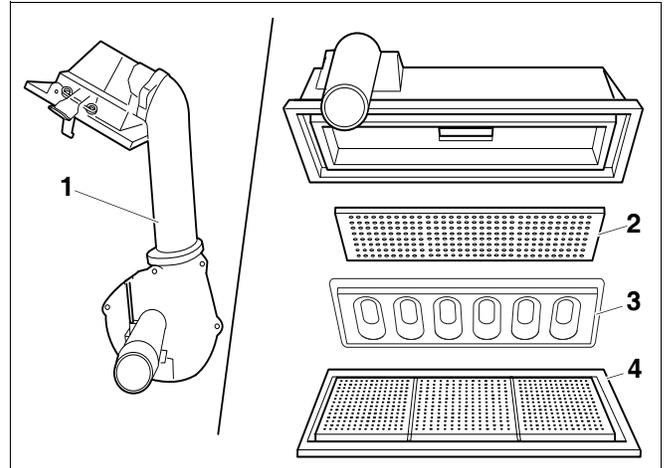


Fig. 45 Cleaning the burner cover, gas/air distributor plate, orifice plate and burner

- Remove the baffle plate and clean it using compressed air (fig. 46).

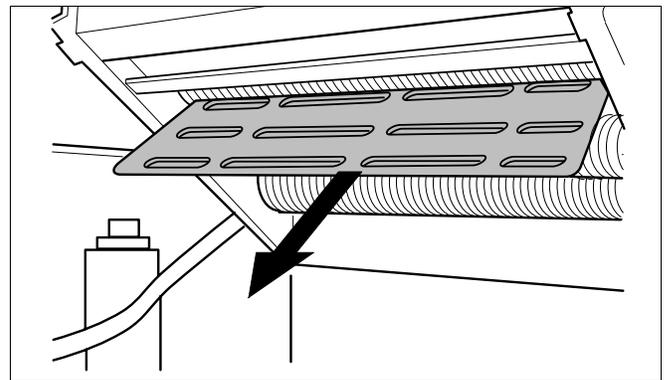


Fig. 46 Baffle plate

- Flush the heat exchanger with water.
- Re-assemble all parts in reverse order of disassembly.



NOTICE

It is important to inspect and properly replace the rubber gaskets.

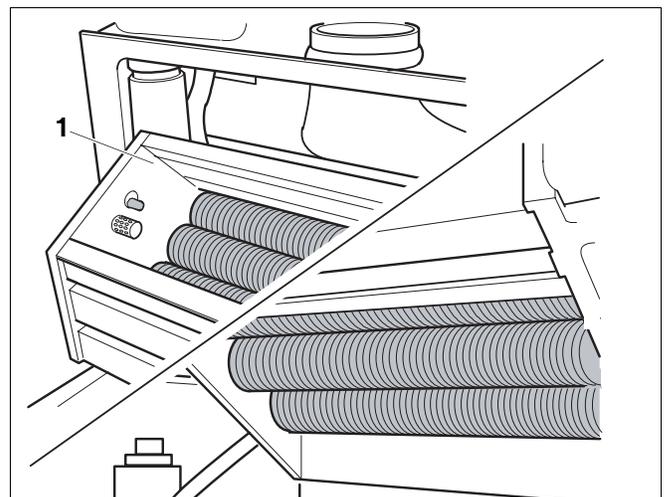


Fig. 47 Cleaning the heat exchanger

- Switch on the heating system using the main switch.
- Press the "Chimney Sweep"  button until the decimal point is displayed. Leave the boiler on for approx. 10 minutes.



- Switch off the heating system using the main switch.
- Dismantle the boiler again and flush the heat exchanger with water.
- Pull the condensate trap from the condensate plate (fig. 48, pos. 1).
- Loosen the condensate trap from the connection (fig. 48, pos. 2) and remove it.
- Use a bristle brush to clean the condensate trap.
- Flush the condensate trap.
- Fill the condensate trap with water before re-installing it.
- Check the condensate trap gasket for damage and replace it if necessary.
- Re-assemble all parts in reverse order of disassembly.

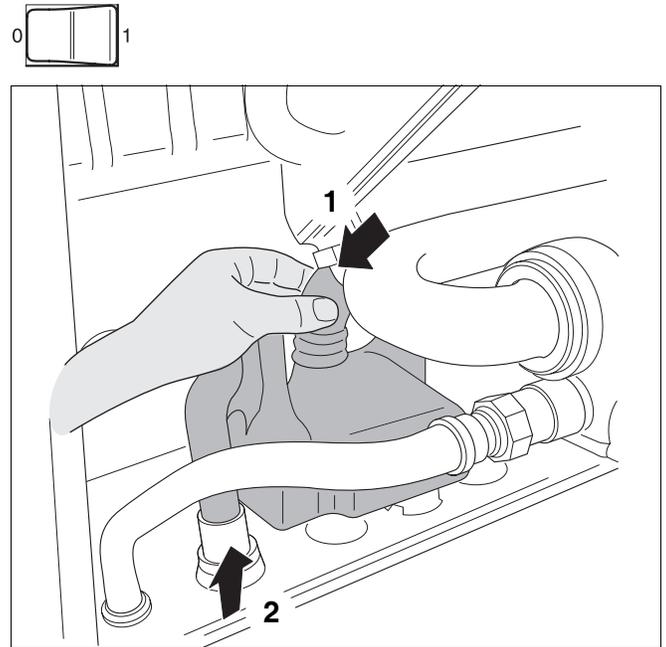


Fig. 48 Condensate trap

13.2 Checking and adjusting the gas/air-ratio

See chapter 9.8 "Checking and adjusting the gas/air ratio", page 34.

14 Converting the boiler to propane

To convert the boiler to propane, the following instructions must be adhered to:



DANGER

if flammable gas explodes.

Only carry out work on gas conduits and fittings if you are licensed for such work.

- Turn off the gas supply.
- Switch off the heating system using the main switch.
- Disconnect the electrical power to the boiler.
- Set the thermostat or other operating control to lowest setting.
- Remove the casing (fig. 49).

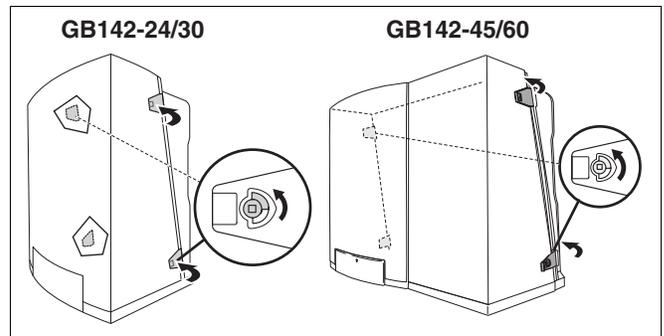
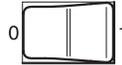


Fig. 49 Remove the casing

- Loosen the screw connection on the gas valve (fig. 44, pos. 1, page 49) and pull the plug (fig. 44, pos. 2, page 49) from the gas valve.
- Pull both plugs from the fan unit (fig. 44, pos. 3, page 49).
- Loosen both retaining clips (fig. 44, pos. 4, page 49) on the burner cover and remove the burner cover together with the fan unit and the gas valve.
- Loosen the three crosshead screws and remove the gas valve from the fan unit (fig. 50, pos. 1).
- Remove the gas orifice (fig. 50, pos. 2).

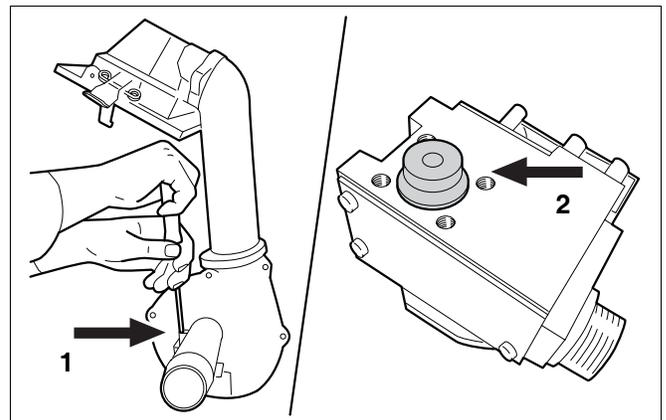


Fig. 50 Replacing the gas orifice

- Fit the right orifice for the new type of gas supply (see table 12). Make sure not to damage the O-rings.
- Re-assemble all parts in reverse order of disassembly.
- Carry out the start-up activities and complete a new start-up report.
- Also check all joints and gaskets affected by the installation activities while carrying out the tightness test in operating conditions.
- Place a new sticker underneath the existing rating plate sticker indicating the type of gas supply installed. Fill out the required information on the conversion label.
- Fit the casing again.

| Boiler capacity | Type of gas supply | Gas orifice diameter in mm (inch) |
|-----------------|--------------------|-----------------------------------|
| 24 kW | Natural gas | 4.45 (0.174) |
| | LPG P | 3.35 (0.131) |
| 30 kW | Natural gas | 4.45 (0.174) |
| | LPG P | 3.35 (0.131) |
| 45 kW | Natural gas | 5.40 (0.213) |
| | LPG P | 4.05 (0.158) |
| 60 kW | Natural gas | 7.50 (0.293) |
| | LPG P | 5.40 (0.213) |

Table 12 Gas orifice diameter

15 Appendix

15.1 Operating messages

- Press the "Service"  button a number of times to switch between the various status displays.

| Display | Meaning |
|------------------------|---|
| Normal mode =/- | |
| | Boiler in space heating mode * |
| | Boiler in DHW heating mode |
| Normal mode □ | |
| | Burner interval circuit, burner will start automatically after 10 minutes |
| | Burner is started |
| | More capacity was delivered than required |
| | Standby |
| | Gas burner fitting is opened |
| | Initializing/ pre purge |
| | Flow temperature higher than set |
| Test mode - | |
| | Boiler in flue gas test |
| Manual mode - | |
| | Boiler in manual mode |
| Reset | |
| | Reset (after holding the "Reset"  button for 5 seconds, the heating system is returned to its switch-on condition) |

Table 13 Normal operating messages

* "- H" May also appear when the boiler is in frost protection mode. There has been a continuous DHW demand and CH request for more than one hour. The boiler then switches to CH mode. The operating code flashing in the display after the service button is pressed is A01/ 818. To enable the DHW, restart the boiler.

15.2 Error messages

- Press the "Service"  button to display the service code (e. g. "3R").
- Press the "Service"  button to display the error code (e. g. "207").

The error message is a combination of the service code (e. g. "3R") and the error code (e. g. "207"). You can only resolve the error message using the Service chapter in this manual.



INSTRUCTION FOR INSTALLERS

The display may also show system faults (e. g. "R11"). In principle, they are identified by the initial letter "A" and they refer to faults between the boiler and the additionally available electronic components.

| Display | Meaning |
|----------|---|
| 2 | Water flow / water pressure |
| E 207 | System pressure too low < 3 psi (0.2 bar). |
| F 211 | Temperature difference between safety and supply sensors too much or no temperature increase after starting the burner. |
| L 266 | Test of pump operation via a pressure increase in the heating system (during pump start). |
| P | Temperature increase of safety sensor or supply sensor too high. |
| U | Temperature difference between supply and return sensor too much. |
| Y | Pump feedback fault. |
| 3 | Fan speed |
| R 264 | Fan unit failed during operation. |
| F 273 | Continuous 24 hour operation. |
| L 274 | Fan shut down during security test. |
| P 276 | Fan unit is running too slowly. |
| Y 275 | Fan unit is running too fast. |
| 4 | Temperatures |
| R 218 | Supply sensor over 220 °F (105 °C). |
| E 278 | Sensor test failed |
| L 220 | Safety sensor affected by short circuit or higher than 266 °F (130 °C). |
| P 221 | Loose contact or defective safety sensor. |
| U 222 | Supply sensor affected by short circuit. |
| Y 223 | Loose contact or faulty supply sensor. |

| Display | Meaning |
|----------|---|
| 6 | Flame monitoring |
| R 227 | No ionization message after ignition. |
| C 228 | Ionization measured before burner start. |
| L 306 | The flame went out during the heating phase. |
| P 229 | Hot-surface ignitor on for too long. |
| 7 | Grid voltage |
| C 231 | The grid power was interrupted after an error. |
| L 261 | UBA fault. |
| 280 | |
| 8 | External switching contact |
| Y | External switching contact, e. g. temperature safety switch for floor heating, has taken place. |
| 9 | System faults |
| R 235 | Communication fault between UBA and KIM. |
| H 237 | UBA fault. |
| 267 | |
| 272 | |
| P 239 | UBA fault. |
| L 234 | Faulty gas burner fitting cable connection. |
| 238 | |
| 239 | |
| U 233 | KIM out of order. |
| Y | Communication fault between BC10 basic controller and UBA. |
| E | System faults |
| 1, R, C, | Internal UBA fault. |
| F, H, L, | |
| Y | |

15.3 Technical specifications

| General specifications | Unit | boiler cap. 24 kW | boiler cap. 30 kW | boiler cap. 45 kW | boiler cap. 60 kW |
|--|------------------|---|---|---|---|
| Gas category | | Natural gas | Natural gas | Natural gas | Natural gas |
| Rated thermal load for Natural gas | btu/hr | 25,700 – 84,800 | 31,800 – 106,000 | 46,000 – 149,000 | 66,000 – 214,800 |
| Rated heating capacity for heating curve 176/140 °F (80 – 60 °C) | btu/hr | 22,700 – 75,200 | 28,100 – 91,500 | 40,600 – 131,500 | 58,200 – 189,800 |
| Rated heating capacity for heating curve 122/86 °F (50 – 30 °C) | btu/hr | 25,300 – 83,300 | 30,700 – 102,400 | 45,100 – 146,300 | 64,800 – 211,600 |
| Boiler efficiency rating max. capacity for heating curve 176/140 °F (80 – 60 °C) | % | 88 | 88 | 88 | 88 |
| Boiler efficiency rating max. capacity for heating curve 122/86 °F (50 – 30 °C) | % | 97 | 97 | 97 | 97 |
| CSA output | btu/hr | 76,300 | 95,400 | 144,800 | 178,900 |
| Heating | | | | | |
| Max. flow temperature | °F (°C) | 194 (90) | 194 (90) | 194 (90) | 194 (90) |
| Heater water temperature | °F (°C) | 86 – 190 (30 – 90), can be set on BC10 basic controller | 86 – 190 (30 – 90), can be set on BC10 basic controller | 86 – 190 (30 – 90), can be set on BC10 basic controller | 86 – 190 (30 – 90), can be set on BC10 basic controller |
| Max. operating overpressure of boiler | psi (bar) | 43.5 (3) | 43.5 (3) | 58 (4) | 58 (4) |
| Heat exchanger heating circuit volume | gallons (l) | 0.7 (2.5) | 0.7 (2.5) | 1.0 (3.6) | 1.3 (4.7) |
| Pipe connections | | | | | |
| Gas connection | inch | ¾" NPT | ¾" NPT | ¾" NPT | ¾" NPT |
| Heating system water connection | inch (mm) | 1.0" NPT (25.4) | 1.0" NPT (25.4) | 1.0" NPT (25.4) | 1.0" NPT (25.4) |
| Condensate water connection | inch (mm) | Ø 1.3" (Ø 32) |
| Flue gas values | | | | | |
| Condensate water quantity for natural gas G20, 104/86 °F (40/30 °C) | gallons per hour | 2.6 | 3.3 | 4.7 | 7.1 |
| pH value condensate water | pH | approx. 4.1 | approx. 4.1 | approx. 4.1 | approx. 4.1 |
| Flue gas mass flow rate at full load | g/s | 10.0 | 12.6 | 19.4 | 25.9 |
| Flue gas temperature 176/140 °F (80/60 °C), full load | °F (°C) | 150 (66) | 167 (75) | 150 (66) | 150 (66) |
| Flue gas temperature 176/140 °F (80/60 °C), partial load | °F (°C) | 135 (57) | 137 (58) | 135 (57) | 135 (57) |
| Flue gas temperature 122/86 °F (50/30 °C), full load | °F (°C) | 113 (45) | 118 (48) | 96 (36) | 96 (36) |
| Flue gas temperature 122/86 °F (50/30 °C), partial load | °F (°C) | 91 (33) | 91 (33) | 91 (33) | 91 (33) |
| CO ₂ content, full load, natural gas G20 | % | 9.2 | 9.2 | 9.3 | 9.3 |
| CO ₂ content, full load, LPG G31, propane | % | 10.0 | 10.0 | 10.0 | 10.0 |
| Standard emission factor CO | mg/kWh | ≤ 15 | ≤ 15 ¹ | ≤ 15 | ≤ 15 |
| Standard emissions factor NO _x | mg/kWh | ≤ 20 | ≤ 20 ¹ | ≤ 20 | ≤ 20 |
| Free fan unit feed pressure | inch W.C. (Pa) | up to 0.023 (up to 60) | up to 0.039 (up to 100) | up to 0.054 (up to 140) | up to 0.054 (up to 140) |
| Flue gas connection | | | | | |
| Ø Flue system, dependent on the air in the room | inch (mm) | 3 (80) | 3 (80) | 3 (80) | 3 (80) |
| Ø Flue system, independent of the air in the room | inch (mm) | 3/3 (80/80) parallel | 3/3 (80/80) parallel | 3/3 (80/80) parallel | 3/3 (80/80) parallel |
| Electric data | | | | | |
| main voltage | V, Hz | 120, 60 | 120, 60 | 120, 60 | 120, 60 |
| Fuses | amps | 5 amps 120V slow blow |
| Electrical protection rating | | IP X4D | IP X4D | IP X4D | IP X4D |
| Electrical power consumption, at full load | W | 96 | 117 | 64 | 82 |
| Electrical power consumption, at partial load | W | 22 | 22 | 20 | 22 |

Table 14 Technical specifications

¹ If the heating capacity is limited to max. 80% (L80).

| General specifications | Unit | boiler cap. 24 kW | boiler cap. 30 kW | boiler cap. 45 kW | boiler cap. 60 kW |
|-------------------------------------|--------------|-------------------------------------|-------------------------------------|---------------------------------------|---------------------------------------|
| Boiler dimensions and weight | | | | | |
| Height x Width x Depth | inch (mm) | 28 x 22 x 18.7 (712 x 560 x 475) | 28 x 22 x 18.7 (712 x 560 x 475) | 28 x 35.4 x 18.7 (712 x 900 x 475) | 28 x 35.4 x 18.7 (712 x 900 x 475) |
| Weight | lbs (kg) | 110 (50) | 110 (50) | 143 (65) | 158 (72) |

Table 14 Technical specifications

¹ If the heating capacity is limited to max. 80% (L80).

| Type of gas supply | Factory pre-setting of the gas control valve |
|--------------------|---|
| Natural gas | Delivered factory-set: Natural Gas |
| LPG P | Suitable for propane after conversion (also see the chapter "Conversion to another type of gas supply"). Information on gas type instruction plate: Set to gas category: Propane. |

Table 15 Factory setting of the gas control valve

| Thermal power gas boiler | Type of gas supply | Gas orifice diameter in mm (inch) | Venturi article number |
|--------------------------|--------------------|-----------------------------------|------------------------|
| GB142-24 | Natural gas | 4.45 (0.174) | 423.072A |
| | LPG P | 3.35 (0.131) | 423.072A |
| GB142-30 | Natural gas | 4.45 (0.174) | 423.072A |
| | LPG P | 3.35 (0.131) | 423.072A |
| GB142-45 | Natural gas | 5.40 (0.213) | 423.170A |
| | LPG P | 4.05 (0.158) | 423.170A |
| GB142-60 | Natural gas | 7.50 (0.293) | 423.173A |
| | LPG P | 5.40 (0.213) | 423.173A |

Table 16 Gas orifice diameter

- The gas orifice diameter is marked on the gas orifice (in mm).
- The venturi article number is marked on both clips of the venturi (see fig. 51, pos. 1 and 2).

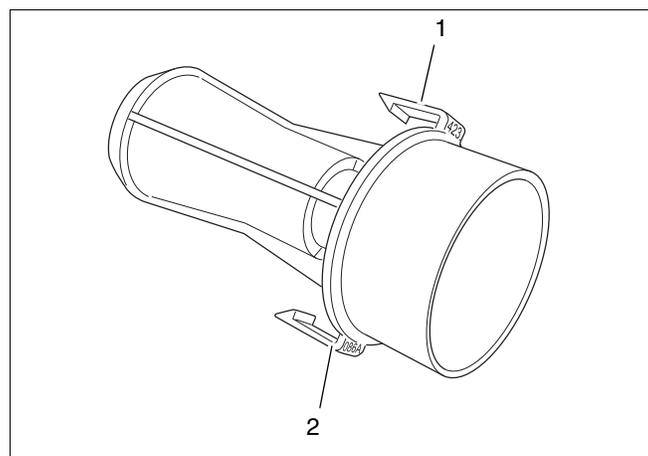


Fig. 51 Venturi article number

16.2 Inspection report

- Please indicate the inspection activities that you have carried out and enter the values measured.

| Inspection activities | page | Date: _____ | Date: _____ | Date: _____ |
|--|----------------|---|--------------------------|--------------------------|
| 1. Test the general condition of the heating system | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Carry out a visual inspection and test the functions of the heating system | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Test all gas and water conduits and fittings for: – their tightness during operation – visible corrosion – signs of aging – fill the condensate trap | 48 47 32 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Check the burner, the heat exchanger and the condensate trap for pollution. First shut down the heating system | 49 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Check the burner and the ignition and ionization electrodes. First shut down the heating system | 49 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Measure the ionization current | 37 | _____ μ A | _____ μ A | _____ μ A |
| 7. Measure the gas connection pressure (flow pressure) | 33 | _____ psi | _____ psi | _____ psi |
| 8. Check the gas/air ratio | 34 | _____ inch W.C. | _____ inch W.C. | _____ inch W.C. |
| 9. Carry out a gas tightness test in operating conditions | 48 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Measure the carbon monoxide content (CO) | 48 | _____ ppm | _____ ppm | _____ ppm |
| 11. Check the water pressure of the heating system – Inlet pressure of expansion tank (also see the Installation Instructions for the expansion tank) – Filling pressure | 30 30 | <input type="checkbox"/> _____ _____ psi _____ psi | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. Check the operation and safety of the air intake and flue pipe | 32 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 13. Check that the thermostat is set in line with the needs (see documents with thermostat) | 39 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 14. Final check of inspection activities, note down the measurement and test results | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 15. Confirm proper inspection | | | | |
| | | Company stamp/signature | Company stamp/signature | Company stamp/signature |

16.3 Maintenance report

- Sign for the maintenance activities that you have carried out and enter the date.

| Needs-dependent maintenance activities | Page | Date: _____ | Date: _____ |
|--|-----------------------------|---------------------------------------|---------------------------------------|
| 1. Clean the burner, the heat exchanger and the condensate trap. First shut down the heating system | 49 | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Check and adjust the gas/air ratio CO ₂ content with full load CO ₂ content with partial load | 34 | _____ inch W.C. _____ % _____ % | _____ inch W.C. _____ % _____ % |
| 3. Confirm proper maintenance | Company stamp/ Signature | | Company stamp/ Signature |

17 Spare parts

Below is a list of the spare parts for this boiler. Look up the position number in the exploded view drawing on the next two pages for the illustration. Spare parts may be ordered from Buderus.

| Pos. | Description | Product No. |
|------|---|-------------|
| 1 | Casing 24/30 kW | 7099988 |
| | Casing 45/60 kW | 7099901 |
| 2 | Casing latches left (2 pc) | 7099039 |
| 3 | Casing latches right (2 pc) | 7099038 |
| 4 | Casing seal 24/30 kW | 7098752 |
| | Casing seal 45/60 kW | 7098798 |
| 5 | Wall mounting bracket | 7098364 |
| 6 | Back panel 24/30 kW | 7099001 |
| | Back panel 45/60 kW | 7099903 |
| 7 | Cap air vent | 7100250 |
| 8 | Exhaust adapter 3" – 3" | 28268 |
| 9 | Seal ring Ø 3" | 77470s |
| 10 | Seal ring Ø 80 mm | 7096475 |
| 11 | Flue gas collector | 7098857 |
| 12 | Oval seal | 7098858 |
| 13 | Heat exchanger 24/30 kW | 7746900159 |
| | Heat exchanger 45 kW | 7746900160 |
| | Heat exchanger 60 kW | 7746900161 |
| 14 | Heat exchanger baffle 24/30 kW | 7098828 |
| 15 | Seal condensate collector 24/30 kW | 7098834 |
| | Seal condensate collector 45 kW | 7098838 |
| | Seal condensate collector 60 kW | 67900522 |
| 16 | Condensate collector + sealing 24/30 kW | 7098840 |
| | Condensate collector + sealing 45 kW | 7098844 |
| | Condensate collector + sealing 60 kW | 67900521 |
| 17 | Clamp | 7098848 |
| 18 | Sensor NTC | 7100136 |
| 19 | Revision set air vent ** | 7098822 |
| 20 | Sight glass | 7098575 |
| 21 | Burner box 24/30 kW | 7099057 |
| | Burner box 45 kW | 7098875 |
| | Burner box 60 kW | 67900525 |
| 22 | Safety sensor | 78194 |
| 23 | Seal burner 24/30 kW | 7098916 |
| | Seal burner 45 kW | 7098920 |
| | Seal burner 60 kW | 67900526 |
| 24 | Gas/air distribution plate 24/30 kW | 7100922 |
| | Gas/air distribution plate 45 kW | 7098926 |
| | Gas/air distribution plate 60 kW | 67900527 |
| 25 | Orifice plate 24/30 kW | 7100920 |
| | Orifice plate 60 kW | 7746700120 |
| 26 | Burner 24/30 kW | 7099003 |
| | Burner 45 kW | 7098932 |
| | Burner 60 kW | 67900528 |
| 27 | Gas-air inlet | 7099004 |
| 28 | Seal fan | 7099023 |
| 29 | Ionization electrode | 78195 |
| 30 | Hot surface ignitor | 7099006 |
| 31 | Shield hot surface ignitor | 7100229 |
| 32 | Mounting plate | 7098852 |
| 33 | Seal mounting plate (5 pc) | 7098850 |

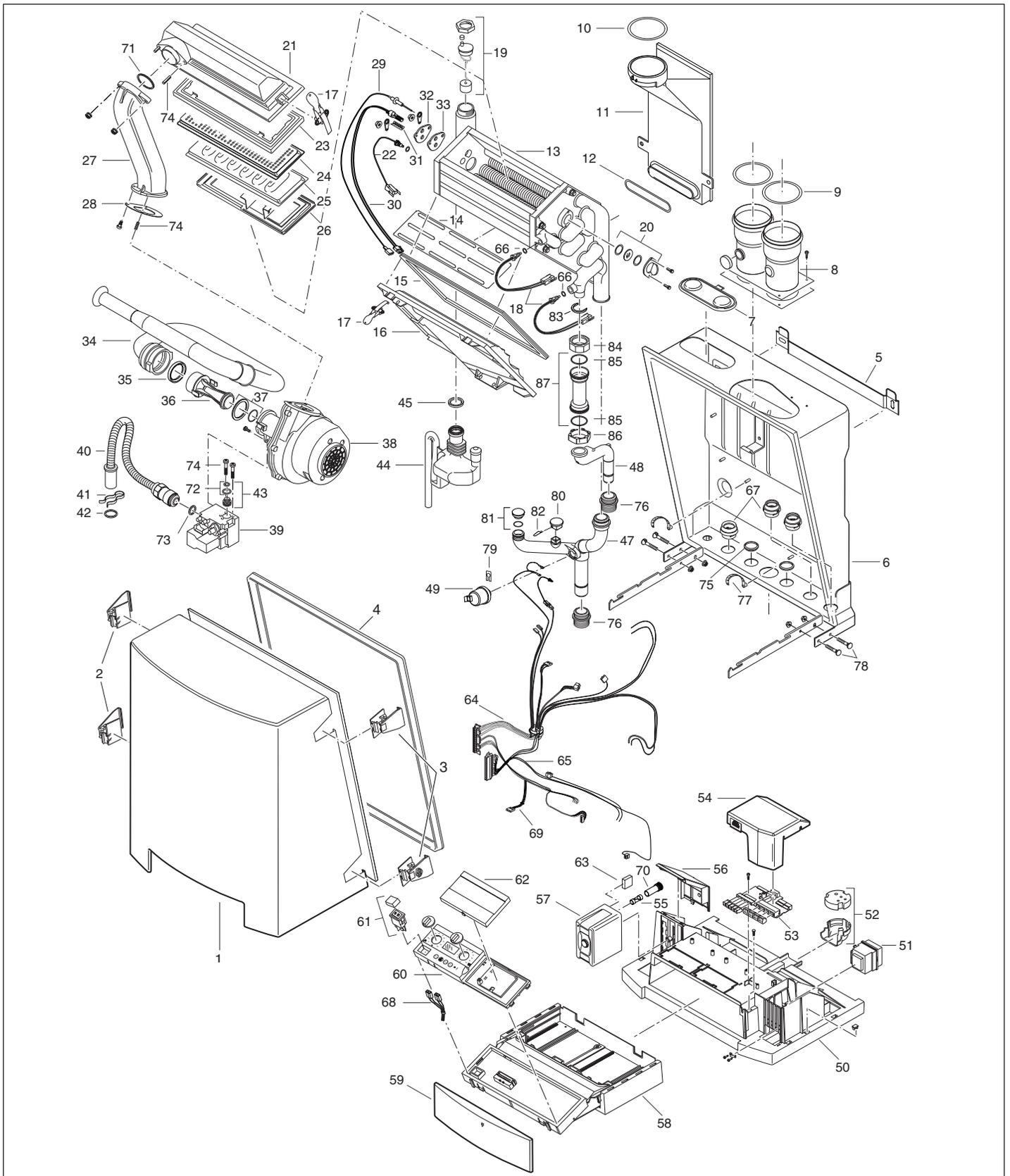
| Pos. | Description | Product No. |
|------|---------------------------------|-------------|
| 34 | Air inlet pipe; 24/30 kW | 7099024 |
| | Air inlet pipe; 45/60 kW | 7099023 |
| 35 | Seal Ø50 mm (5 pc) | 7099058 |
| 36 | Venturi 24/30 kW | 7099020 |
| | Venturi 45 kW | 7099925 |
| | Venturi 60 kW | 7099931 |
| 37 | Seal set (4 pc) | 7099021 |
| 38 | Fan | 78184 |
| 39 | Gas control valve | 7099025 |
| 40 | Gas supply pipe GB142 USA | 76685 |
| 41 | Spring (5 pc) | 7100549 |
| 42 | Seal 2x16x22 (5 pc) | 7098778 |
| 43 | Orifice Ø 4.45 24/30 kW | 7099016 |
| | Orifice Ø 5.40 45 kW | 76690 |
| | Orifice Ø 7.50 60 kW | 76686 |
| 44 | Condensate trap | 75978 |
| 45 | Seal condensate trap (5 pc) | 7100742 |
| 47 | Supply pipe CH; 24/30/45 kW | 75990 |
| | Supply pipe CH; 60 kW | 75991 |
| 48 | Return pipe 24/30/45 kW | 709965 |
| | Return pipe 60 kW | 709945 |
| 49 | Pressure sensor ** | 7101436 |
| 50 | Bottom plate | 7099049 |
| 51 | Transformer 120V | 78191 |
| 52 | Grommet | 7099050 |
| 53 | External connection board | 7099042 |
| 54 | External connection board cover | 7099046 |
| 55 | Fuse 5 AF slow blow | 73904s |
| 56 | UBA cover | 7099047 |
| 57 | UBA3 - 120V | 7099707 |
| 58 | Drawer | 7099043 |
| 59 | Drawer front | 7099037 |
| 60 | Controller connection plate | 78186 |
| 61 | On/off switch | 7099041 |
| 62 | Controller cover | 73698 |
| 63 | Boiler ident. module 24 kW | 78223 |
| | Boiler ident. module 30 kW | 78224 |
| | Boiler ident. module 45 kW | 78225 |
| | Boiler ident. module 60 kW | 78226 |
| 64 | Cable harness low voltage | 78193 |
| 65 | Cable harness high voltage | 7099957 |
| 66 | O-ring (10 pc) | 38434s |
| 67 | Sealing bush (set) | 7099002 |
| 68 | Cable harness of on/off switch | 7099072 |
| 69 | Cable harness BX holder | 7099070 |
| 70 | Fuse holder | 38345 |
| 71 | Seal Ø60 mm (5 pc) | 7098878 |
| 72 | O-ring set orifice | 7099018 |
| 73 | Seal (5 pc) | 7099059 |
| 74 | Set screw M5x20 (5 pc) | 7099065 |

** not shown in exploded views

17 Spare parts

| Pos. | Description | Product No. |
|------|---------------------------------|-------------|
| 75 | Cap 24/30 kW | 79105 |
| 76 | Double nipple THR x COMPR | 75977 |
| 77 | Cabel saddle (10 pc) | 7098810 |
| 78 | Bolt M6x16 (2 pc) | 7099078 |
| 79 | Clip pressure sensor | 7101370 |
| 80 | Drainplug | 7099364 |
| 81 | Cap connection piece | 38498 |
| 82 | Clip (5 pc) | 73651s |
| 83 | Centering ring (5 pc) | 73480s |
| 84 | Coupling nut pump | 73481s |
| 85 | Seal pump (10 pc) | 15022s |
| 86 | Coupling nut pump | 15020 |
| 87 | Conversion set pump | 73149 |
| *** | Conversion kit propane 24/30 kW | 76687 |
| *** | Conversion kit propane 45 kW | 76688 |
| *** | Conversion kit propane 60 kW | 7746900156 |

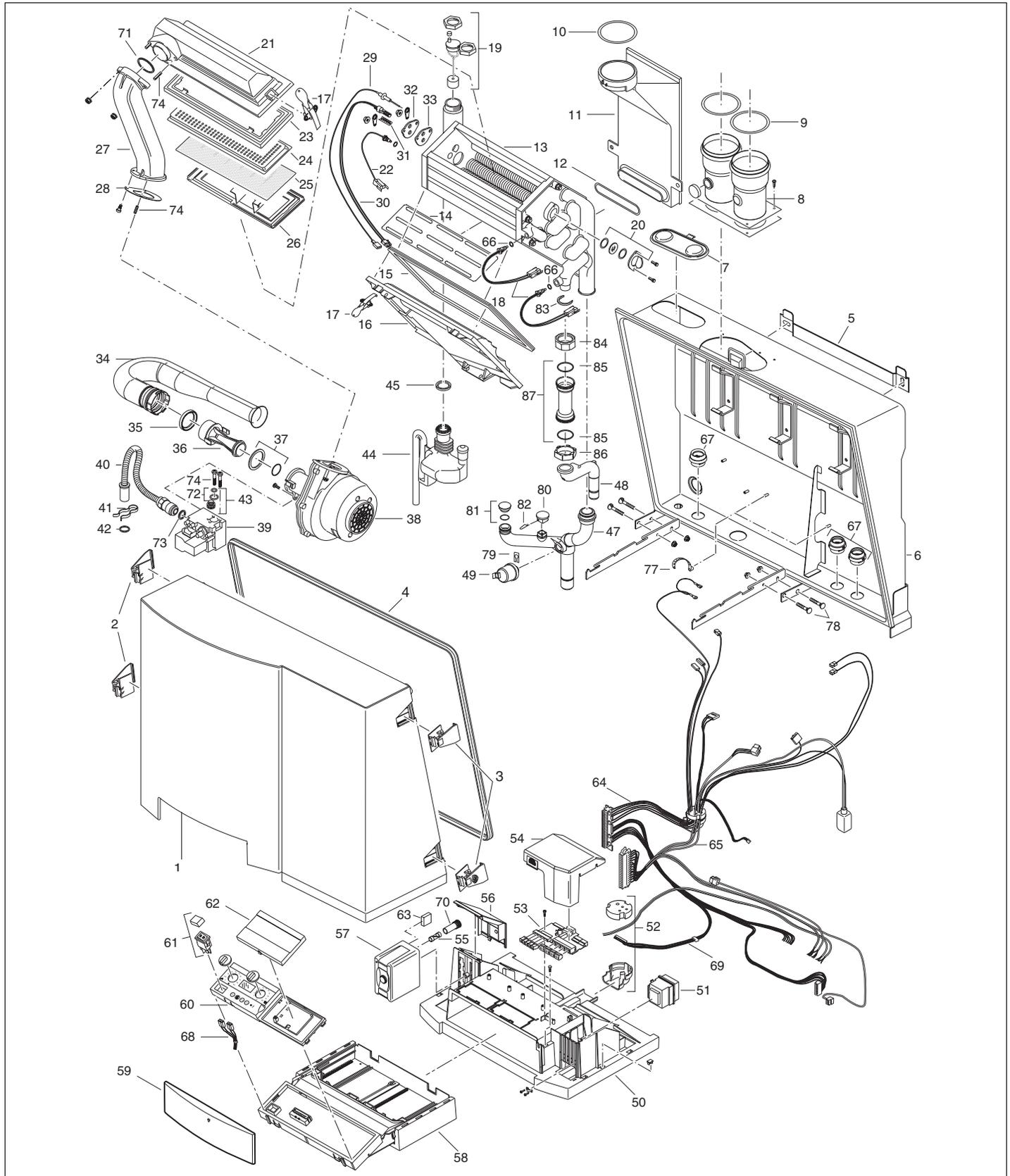
Exploded view Logamax plus GB142-24/30



We reserve the right to make any changes due to technical modifications!

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Exploded view Logamax plus GB142-45/60



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Heating Contractor:

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