

**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.**

## Logamax plus GB142-24/30/45/60

For registered installers

Please read thoroughly  
before installing servicing



# Buderus

### **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.
- 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 12 "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:

**(a)** For all side wall side horizontally vented gas fueled equipment installed in every dwelling, building or structure used in whole or in part for residential purposes, including those owned or operated by the Commonwealth and where the side wall exhaust vent termination is less than seven (7) feet above finished grade in the area of the venting, including but not limited to decks and porches, the following requirements shall be satisfied:

1. **INSTALLATION OF CARBON MONOXIDE DETECTORS.** At the time of installation of the side wall horizontal vented gas fueled equipment, the installing plumber or gasfitter shall observe that a hard wired carbon monoxide detector with an alarm and battery back-up is installed on the floor level where the gas equipment is to be installed. In addition, the installing plumber or gasfitter shall observe that a battery operated or hard wired carbon monoxide detector with an alarm is installed on each additional level of the dwelling, building or structure served by the side wall horizontal vented gas fueled equipment. It shall be the responsibility of the property owner to secure the services of qualified licensed professionals for the installation of hard wired carbon monoxide detectors.

- a. In the event that the side wall horizontally vented gas fueled equipment is installed in a crawl space or an attic, the hard wired carbon monoxide detector with alarm and battery back-up may be installed on the next adjacent floor level.
  - b. In the event that the requirements of this subdivision can not be met at the time of completion of installation, the owner shall have a period of thirty (30) days to comply with the above requirements; provided, however, that during said thirty (30) day period, a battery operated carbon monoxide detector with an alarm shall be installed.
2. **APPROVED CARBON MONOXIDE DETECTORS.** Each carbon monoxide detector as required in accordance with the above provisions shall comply with NPA 720 and be ANSI/UL 2034 listed and IAS certified.
  3. **SIGNAGE.** A metal or plastic identification plate shall be permanently mounted to the exterior of the building at a minimum height of eight (8) feet above grade directly in line with the exhaust vent terminal for the horizontally vented gas fueled heating appliance or equipment. the sign shall read, in print size no less than one-half (½) inch in size, "GAS VENT DIRECTLY BELOW. KEEP CLEAR OF ALL OBSTRUCTIONS".
  4. **INSPECTION.** The state or local gas inspector of the side wall horizontally vented gas fueled equipment shall not approve the installation unless, upon inspections, the inspector observes carbon monoxide detectors and signage installed in accordance with the provisions of 248 CRM 5.08(2)(a)1 through 4.

**(b) EXEMPTIONS:** The following equipment is exempt from 248 CRM 5.08(2)(a)1 through 4:

1. The equipment listed in Chapter 10 entitled "Equipment Not Required To Be Vented" in the most current edition of NFPA 54 as adopted by the board: and
2. Product Approved side wall horizontally vented gas fueled equipment installed in a room or structure separate from the dwelling, building or structure used in whole or in part for residential purposes.



**(c) MANUFACTURERS REQUIREMENTS - GAS EQUIPMENT VENTING SYSTEM REQUIRED.**

When the manufacturer of Product Approved side wall horizontally mounted gas equipment provides a venting system design or venting system components with the equipment, the instructions provided by the manufacturer for the installation of the equipment and venting shall include:

1. Detailed instructions for the installation of the venting system or the venting system components: and
2. A complete parts list for the venting system design or venting system.

**(d) MANUFACTURERS REQUIREMENTS - GAS EQUIPMENT VENTING SYSTEM NOT PROVIDED.**

When the manufacturer of Product Approved side wall horizontally vented gas fueled equipment does not provide the parts for the venting of flue gases, but identifies “special venting systems”, the following requirements shall be satisfied by the manufacturer:

1. The referenced “special venting systems” shall be included with the appliance or equipment installation instructions: and
2. The “special venting systems” shall be Product Approved by the Board, and the instructions for that system shall include a parts list and detailed installation instructions.

**(e)** A copy of all instructions for all Product Approved side wall horizontally vented gas fueled equipment, all venting instructions, all parts lists for venting instructions, and/or venting design instructions shall remain with the appliance or equipment at the completion of the installation.



### 3 Product description

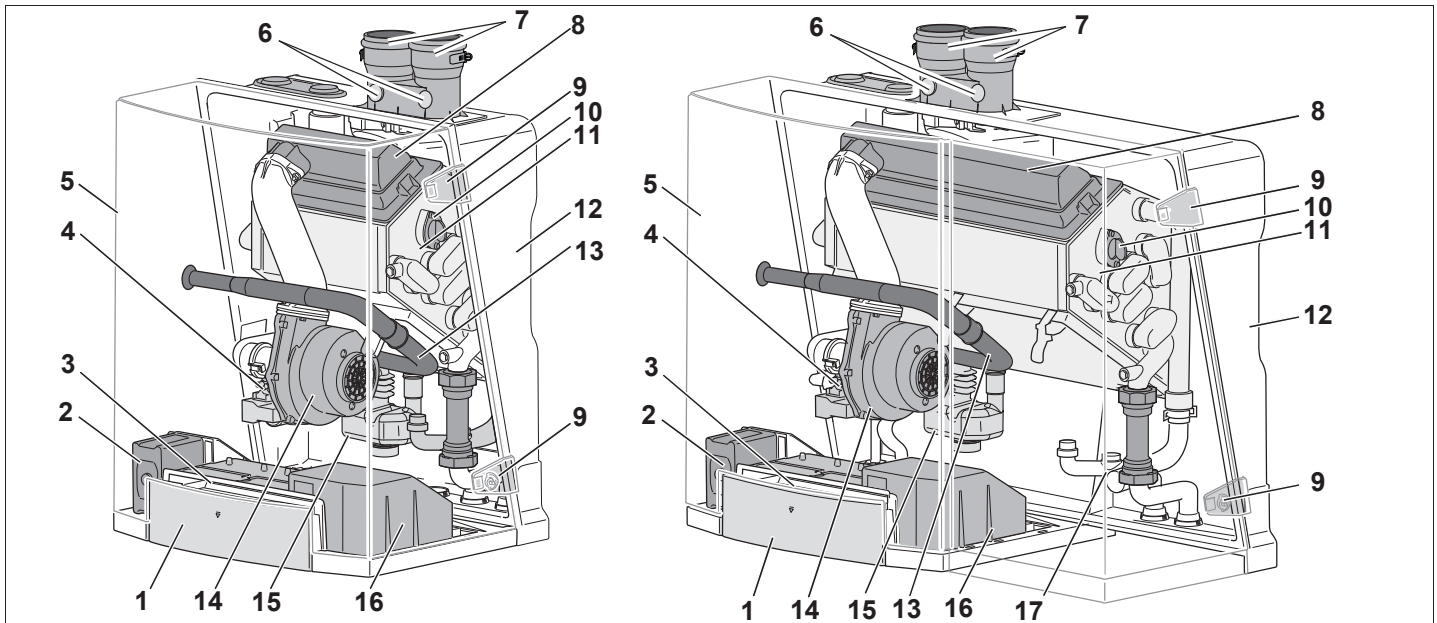


Fig. 1 Logamax plus GB142-24/30 (left) and GB142-45/60 (right)

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

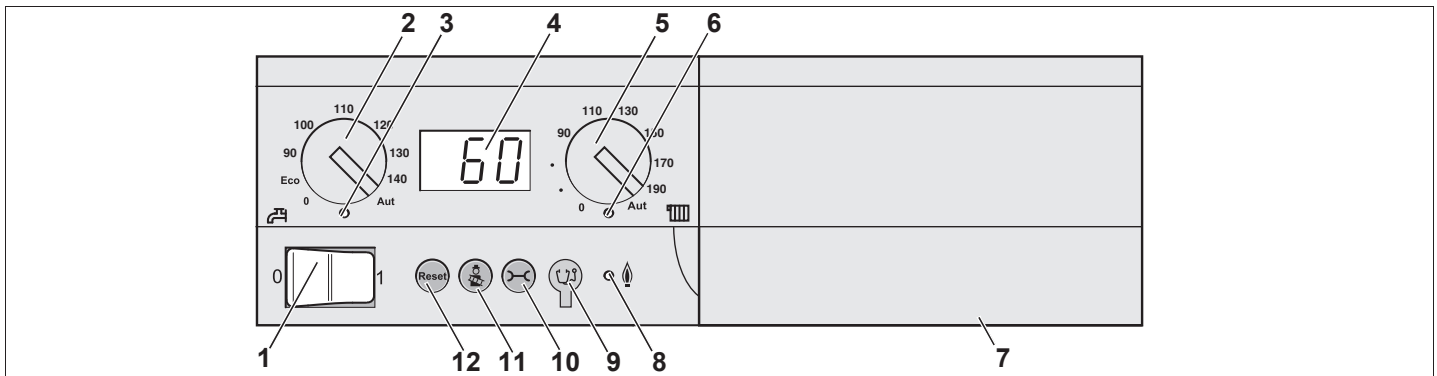


Fig. 2 Basic Controller Logamatic BC10

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

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

## 4 Dimensions and connections

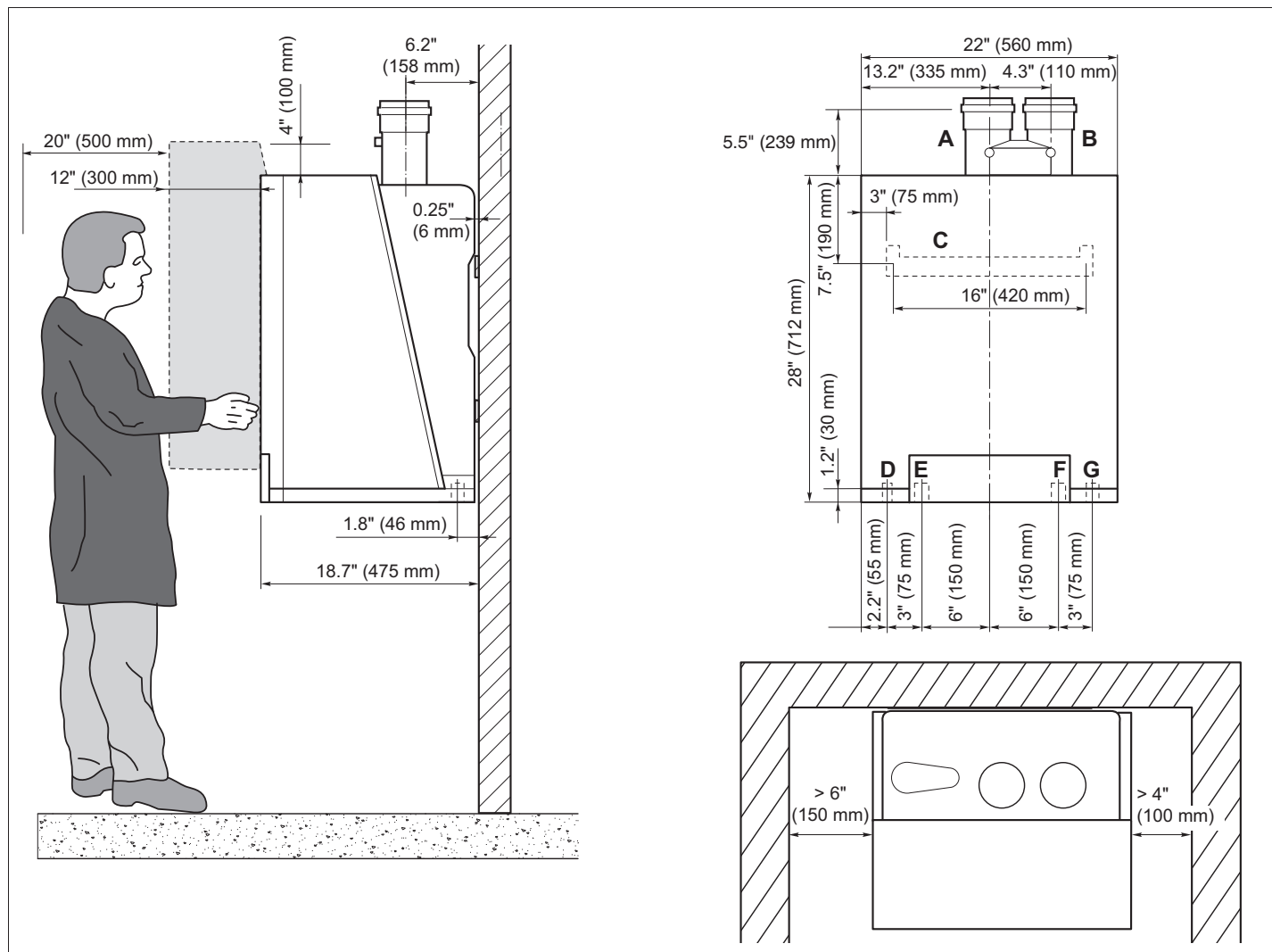


Fig. 3 Dimensions and connections for boiler GB142-24/30 (dimensions in inches)

AA (A) = Flue gas connection (inside diameter 3")

AKO (E) = Condensate water outlet, Ø 1.3" (Ø 32 mm) outside

GAS (D) = diameter

Gas connection, 3/4" NPT

LA (B) = Air intake (inside diameter 3")

RK (G) = Return, Ø 1.0" <sup>1</sup> (Ø 25.4 mm)

VK (F) = Supply, Ø 1.0" <sup>1</sup> (Ø 25.4 mm)

WB (C) = Wall bracket

<sup>1</sup> 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.

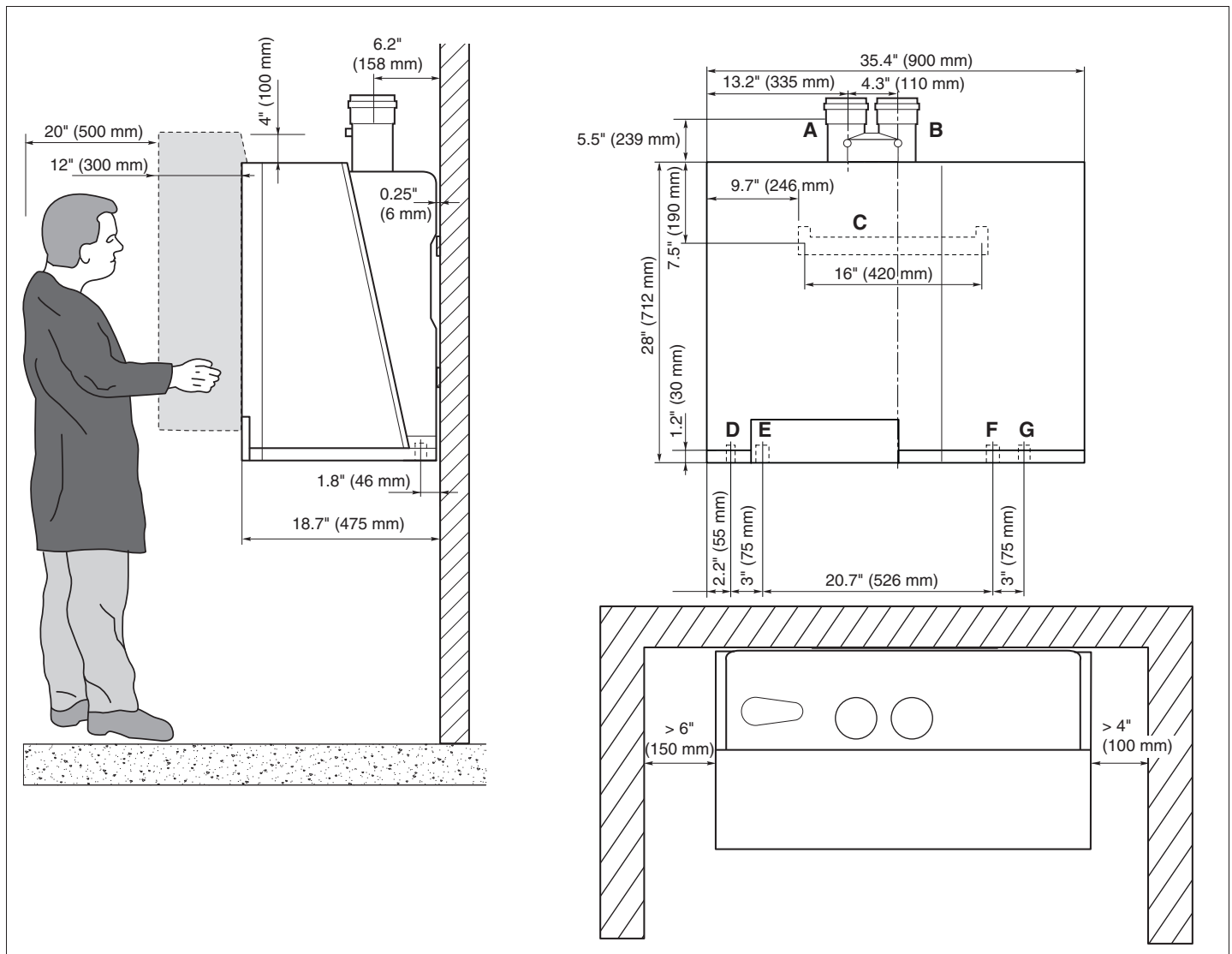


Fig. 4 Dimensions and connections for boiler GB142-45/60 (dimensions in inches)

AA (A) = Combustion air

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

GAS (D) = Gas connection, ¾" NPT

LA (B) = Air intake

RK (G) = Return, Ø 1.0" <sup>1</sup> (Ø 25.4 mm)

VK (F) = Supply, Ø 1.0" <sup>1</sup> (Ø 25.4 mm)

WB (C) = Wall bracket

<sup>1</sup> One Ø 1.0" (Ø 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.

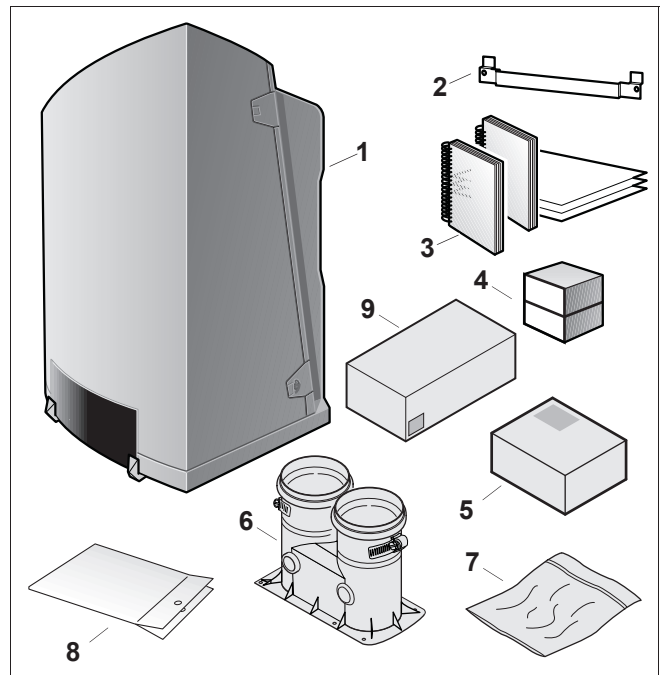


Fig. 5 Items supplied with unit

Pos.	Parts	Quantity	Packaging
1	Boiler with casing	1	1 box
2	Wall bracket	1	
3	Technical documents <sup>1</sup> 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 - Grundfos 15-58 3-speed boiler circulator - supply and return shutoff ball valves	1	

Table 1 Items supplied with unit

<sup>1</sup> 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 spray cans, 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 (see fig. 6).
- Use the radiator key to unlock the two latches a quarter turn (see fig. 7, pos. 1).
- Open the latches (see fig. 7, pos. 2).
- Remove the casing by lifting it upwards and then pulling it forwards (see 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.

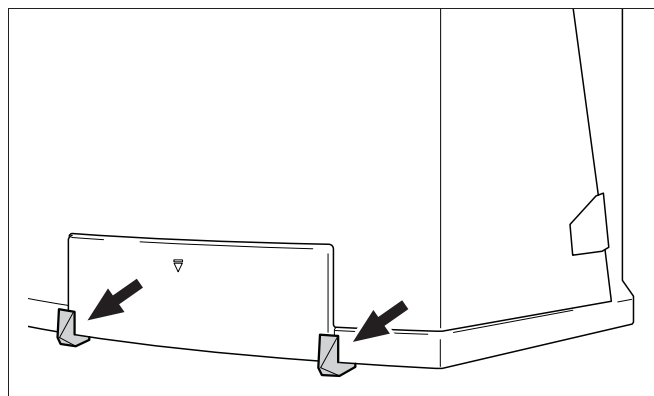


Fig. 6 Removing the transport safety clamps

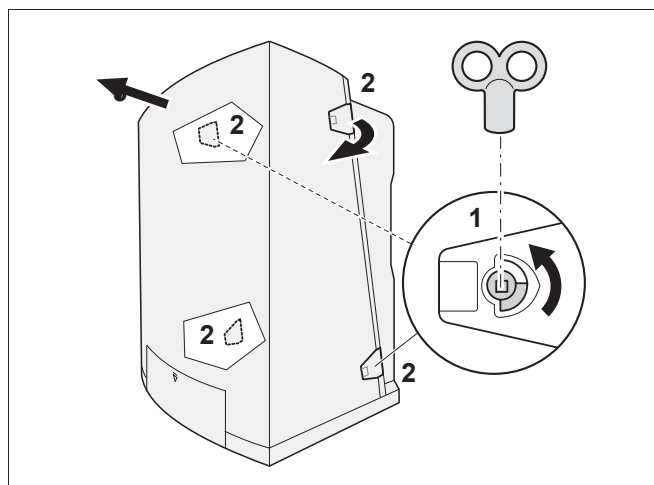


Fig. 7 Removing the casing

### 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  $\frac{3}{4}$ " gas cock on the gas connection.
- Connect the gas pipe to the gas cock (see fig. 8, pos. 1) so that it is free from any strain.

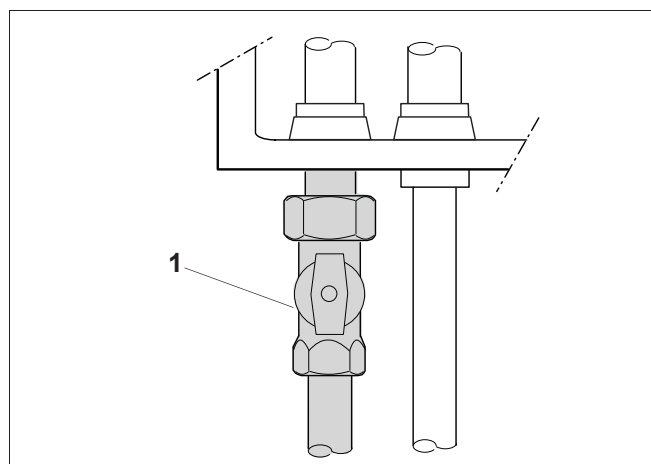


Fig. 8 Making the gas connection

Length of pipe (feet)	Gas Volume Capacity (ft <sup>3</sup> / hr) <sup>1</sup>			
	$\frac{3}{4}$ "	1"	1 $\frac{1}{4}$ "	1 $\frac{1}{2}$ "
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

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

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				
$\frac{3}{4}$	2.1	4.1	0.5	1.25
1	2.6	5.2	0.6	1.60
1 $\frac{1}{4}$	3.5	6.9	0.8	2.15
1 $\frac{1}{2}$	4.0	8.0	0.9	2.50

Table 3 Equivalent length for pipe fittings in feet



#### 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.

## 6.4 Fitting the heating circuit supply and return pipes



### NOTICE

- To protect the entire heating system we require installing a WYE strainer 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 (see 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.

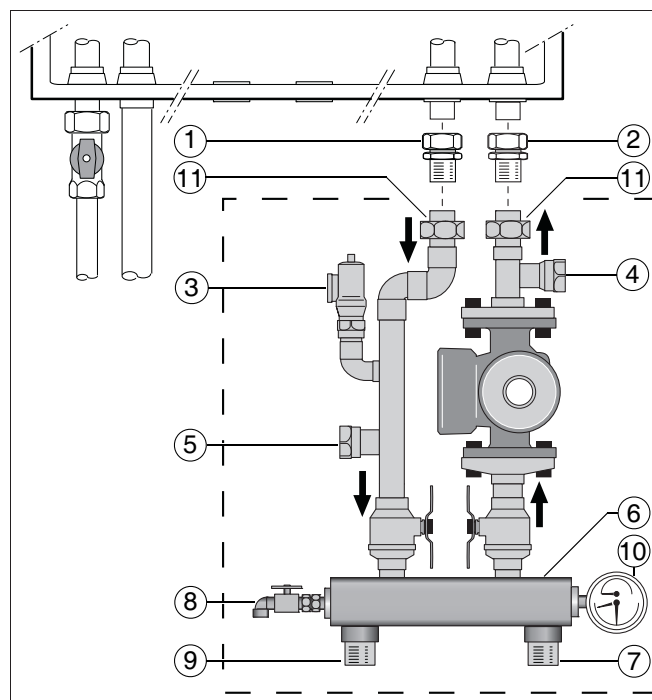


Fig. 9 Pump manifold installation

- 1: Compression fitting (heating system supply pipe)
- 2: Compression fitting (heating system return pipe)
- 3: Relief valve
- 4: DHW return 1" FPT
- 5: DHW supply 1" FPT
- 6: Low loss header
- 7: System return 1½ MPT
- 8: Drain valve
- 9: System supply 1½ MPT
- 10: Tridicator
- 11: Di electric union



## 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.

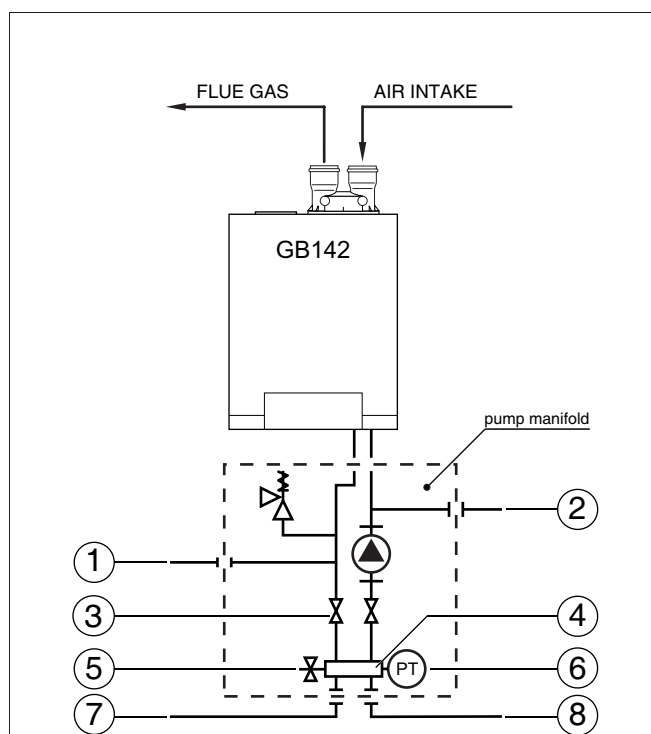


Fig. 10 Schematic representation of the boiler with the hydronic set

- 1: DHW supply 1" FPT
- 2: DHW return 1" FPT
- 3: pump manifold shut-off valve
- 4: Low loss header
- 5: drain valve
- 6: PT gauge (pressure and temperature gauge)
- 7: System supply 1½ MPT
- 8: System return 1½ MPT



### 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.



### NOTICE

For the maximum permissible flow rate of the DHW pump see §1.4 (page 6)

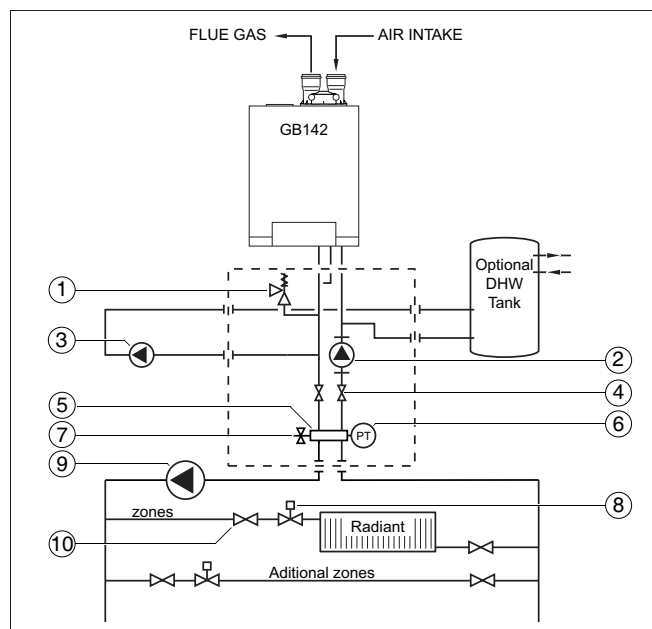


Fig. 11 Schematic representation of the boiler with the hydraulic set connected to an optional hot water tank with one or multiple zones including one pump and zone valves

- |                                              |                    |
|----------------------------------------------|--------------------|
| 1: pressure relief valve                     | 7: drain valve     |
| 2: primary pump                              | 8: zone valve      |
| 3: DHW pump                                  | 9: secondary pump  |
| 4: Shut-off valve                            | 10: shut-off valve |
| 5: Low loss header                           |                    |
| 6: PT gauge (pressure and temperature gauge) |                    |



### NOTICE

Primary boiler pump must have an internal check valve.

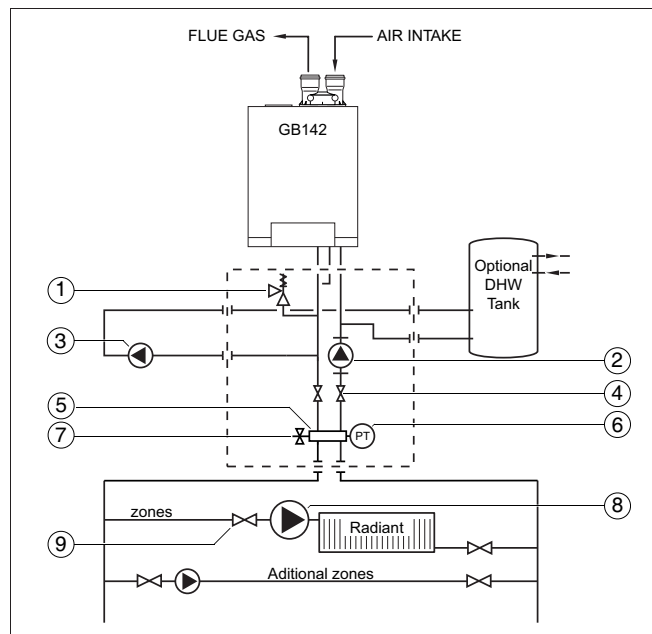


Fig. 12 Schematic representation of the boiler with the Hydronic set connected to an optional hot water tank with one or multiple zones and zone pumps

- |                          |                                              |
|--------------------------|----------------------------------------------|
| 1: pressure relief valve | 6: PT gauge (pressure and temperature gauge) |
| 2: primary pump          | 7: drain valve                               |
| 3: DHW pump              | 8: zone pump                                 |
| 4: shut-off valve        | 9: shut-off valve                            |
| 5: Low loss header       |                                              |

## 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 (non sealed combustion 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 (non sealed combustion)**

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).

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).
- Remove the protective cap from the internal condens bypass pipe. Place the flue gas adapter and connect the internal condens bypass pipe (see fig. 14).
- Screw on the flue gas adapter using six screws (see fig. 15).

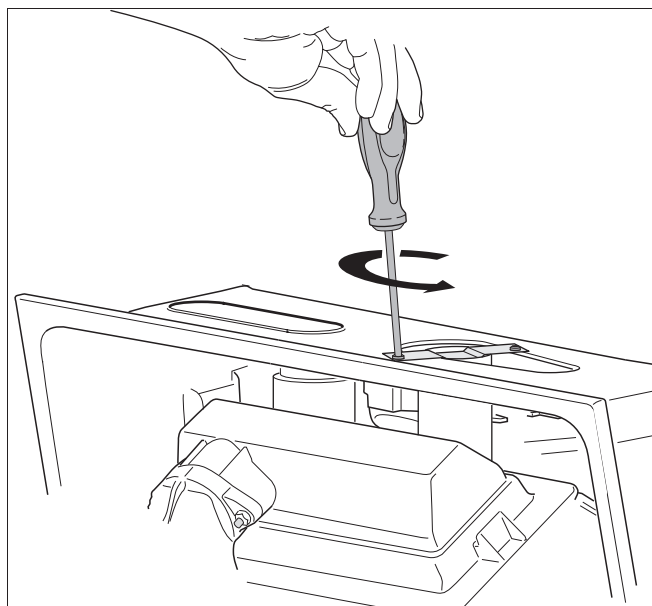


Fig. 13 Removing the transport safety device

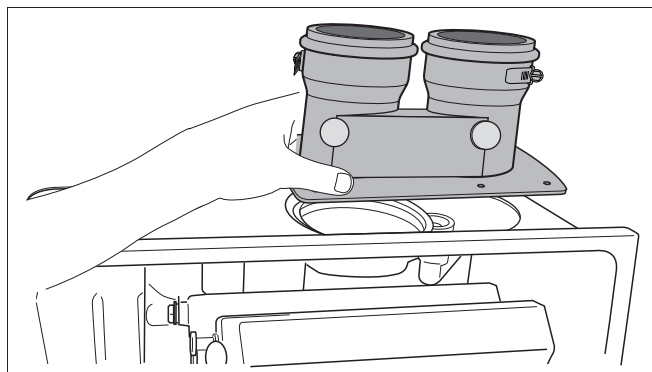


Fig. 14 Placing the flue gas adapter

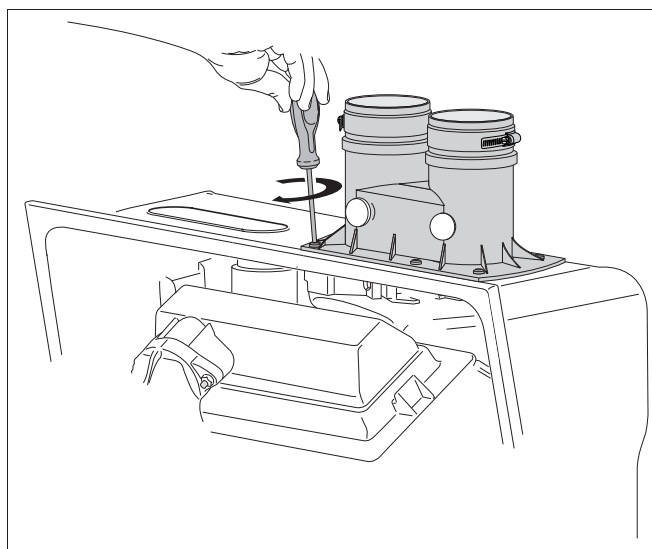


Fig. 15 Connecting the flue gas adapter

## 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 26.

An optional concentric vent/air intake body (see fig. 19 and 27) 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

The boiler can also be operated with separate air intake and exhaust piping (see fig. 20 and fig. 27).

The termination shall be at least 4 ft (1,220 mm) for the U.S. and 6 ft (1,830 mm) for Canada away from a gas utility gauge, service regulator or the like (for non sealed combustion 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. 17).

Vent termination must be at least 7 ft (2,135 mm) above a public walkway (see fig. 18).

Vent must be 3 ft (915 mm) above any forced air intake within 10 ft (3,050 mm) (see fig. 18).

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 outside walls, inside corners and 5ft (1525 mm) below roof overhang (see fig. 18).

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.

All vent pipes must be glued, except for the flue gas adapter (see fig. 16, pos. 1) which is screwed into place and the first connection to the flue gas adapter (see fig. 16, pos. 2). Installed you can slide the pipe onto the adapter, properly supported and the exhaust pipe must be pitched a minimum of a 1/4 inch per foot back to the boiler. This allows the condensate to drain away. Fix the screws (see fig. 16, pos. 3), this is obliged for Canada.

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.

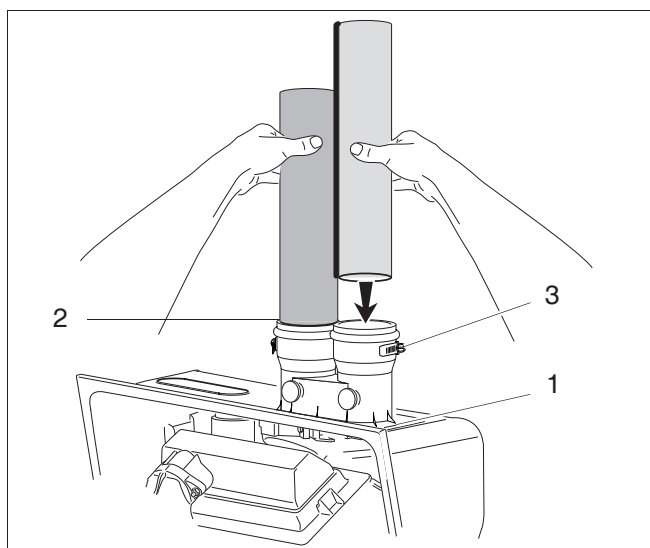


Fig. 16 Vent pipes

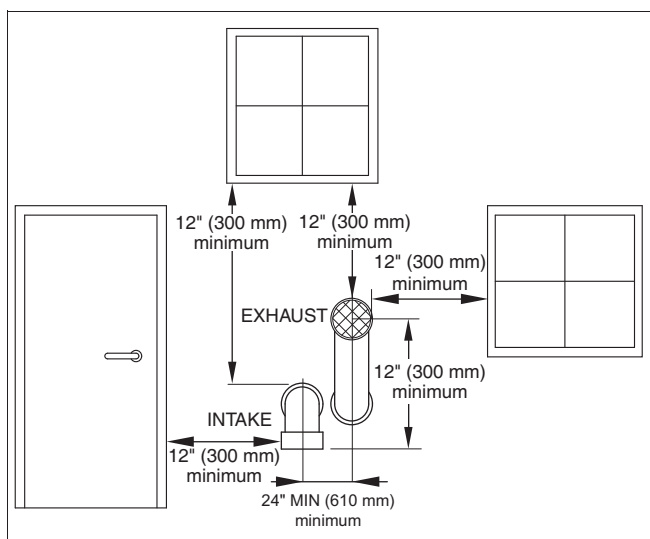


Fig. 17 Vent and air pipe position (1) of a sealed combustion system



#### NOTICE

Use of cellular core PVC (ASTM F891), cellular core CPVC, or Radel® (polyphenolsulfone) in venting systems shall be prohibited.

Covering non-metallic vent pipe and fittings with thermal insulation shall be prohibited.



#### NOTICE

Ensure that a condensate drain is always installed at the exhaust connection.



#### 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 gauges, gas gauges, regulators and relief equipment



#### 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.



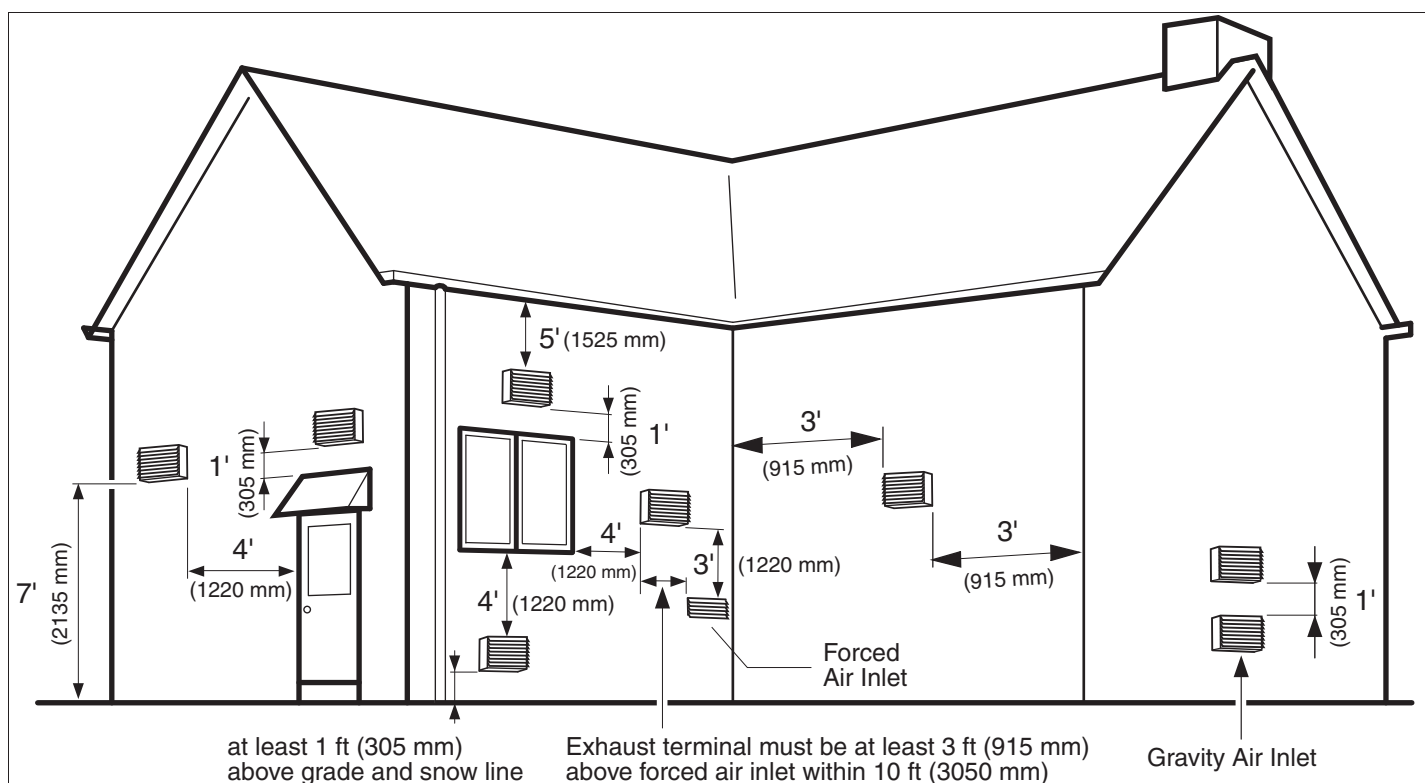


Fig. 18 Vent position of a system with combustion air supply from the room (non-room sealed)

**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.

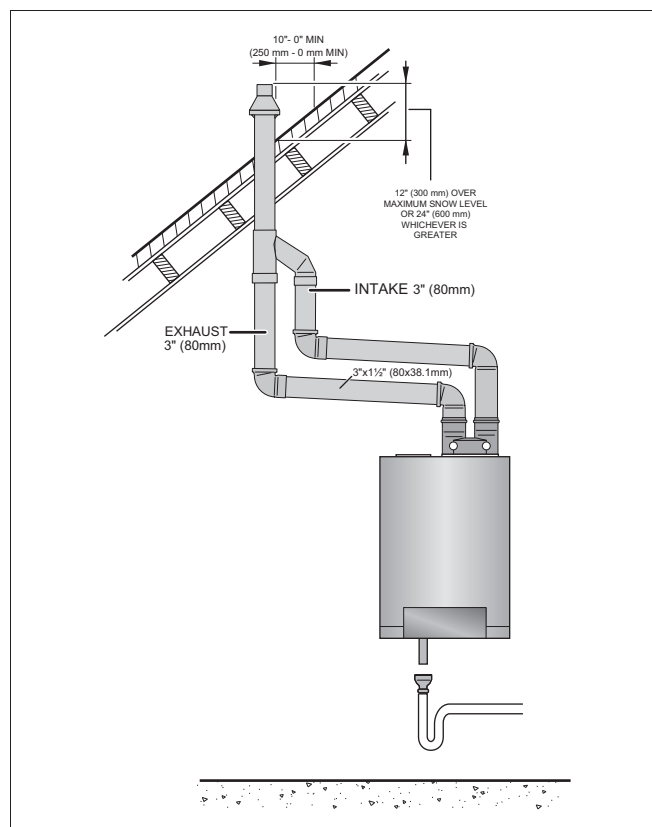


Fig. 19 Vertical venting system (sealed combustion)

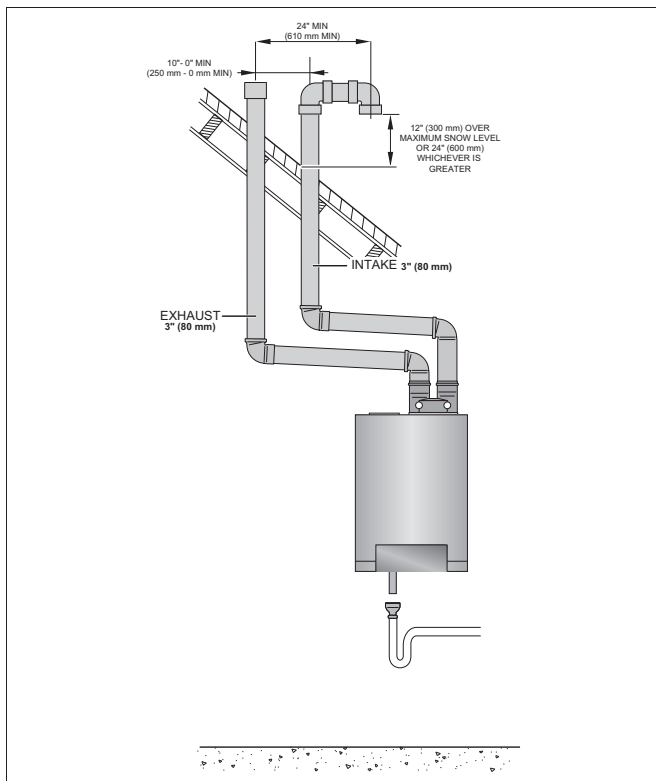


Fig. 21 Vertical parallel venting system (sealed combustion) - Situation 1

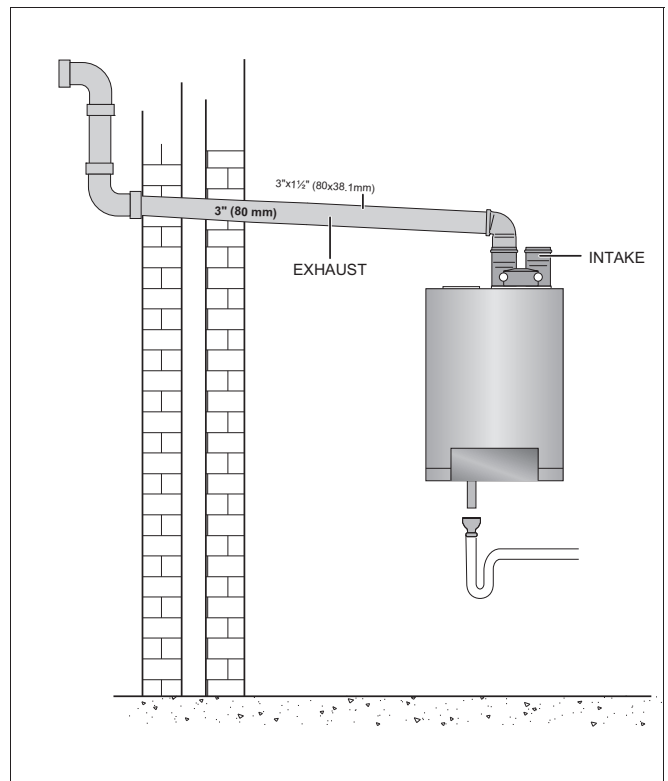


Fig. 20 Horizontal venting system (non sealed combustion only) - Situation 1

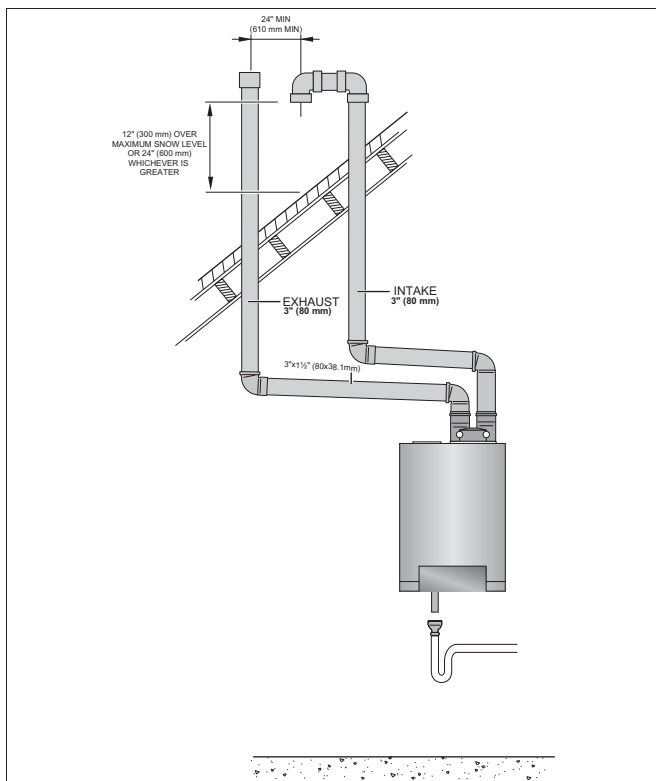


Fig. 23 Vertical parallel venting system (sealed combustion) - Situation 2

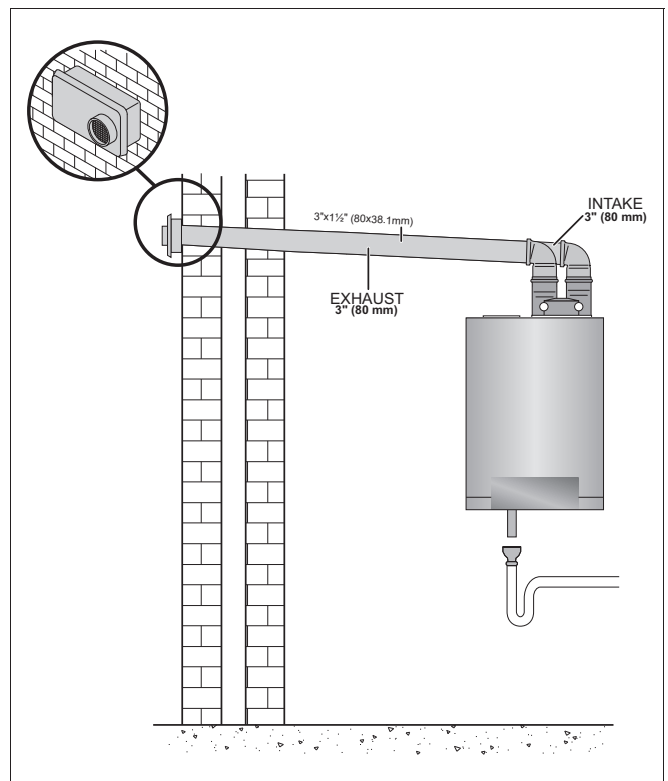


Fig. 22 Horizontal venting system (sealed combustion) - Situation 2

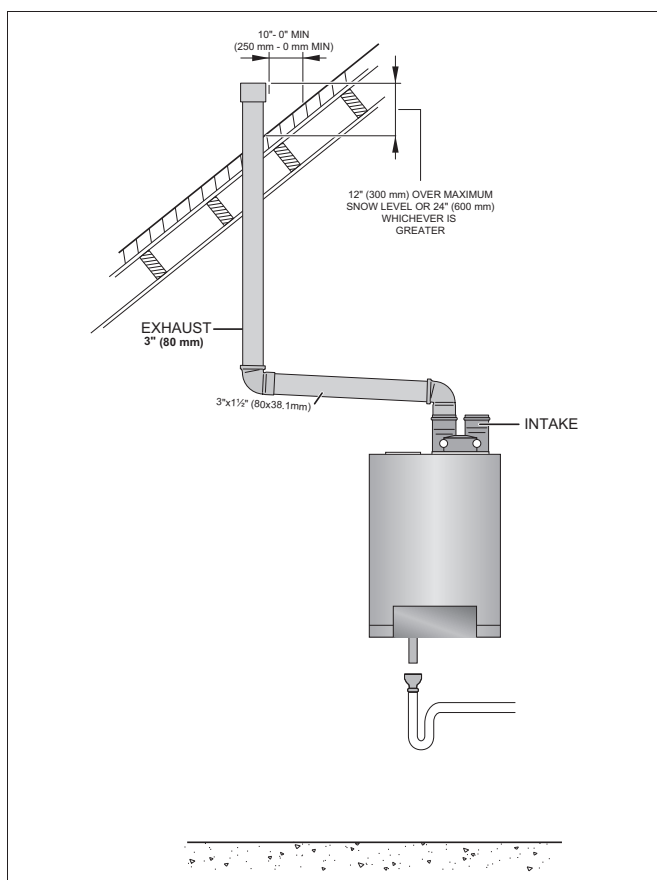


Fig. 25 Vertical venting system (non sealed combustion only)

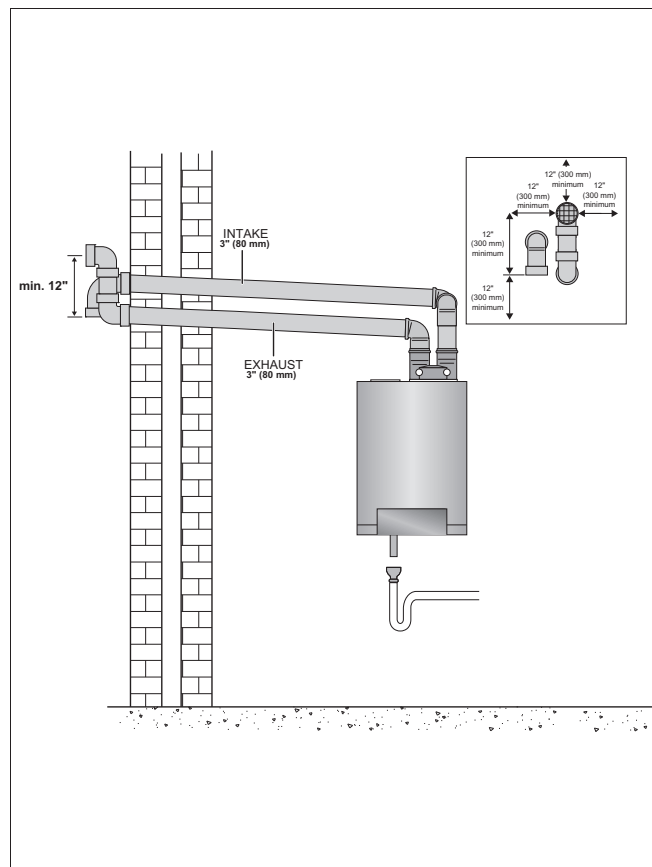


Fig. 24 Horizontal parallel venting system (sealed combustion)

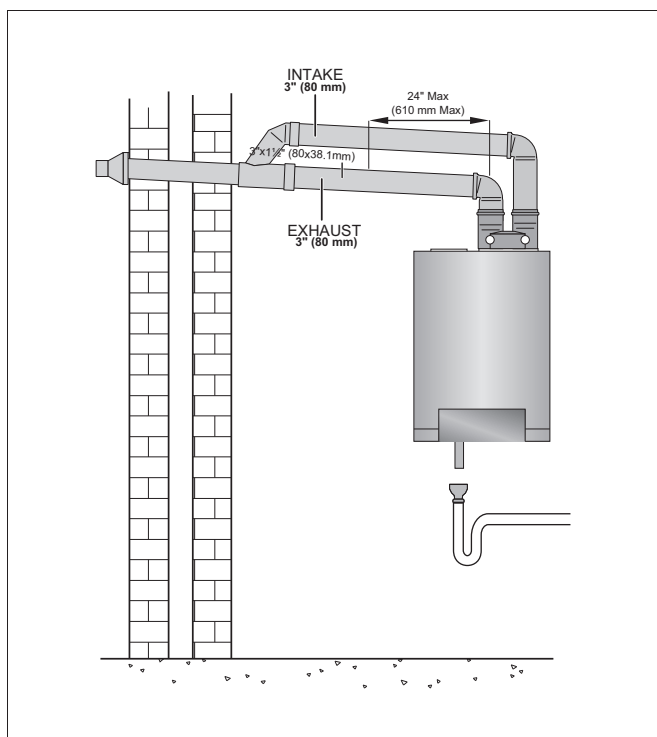


Fig. 27 Horizontal venting system (sealed combustion)

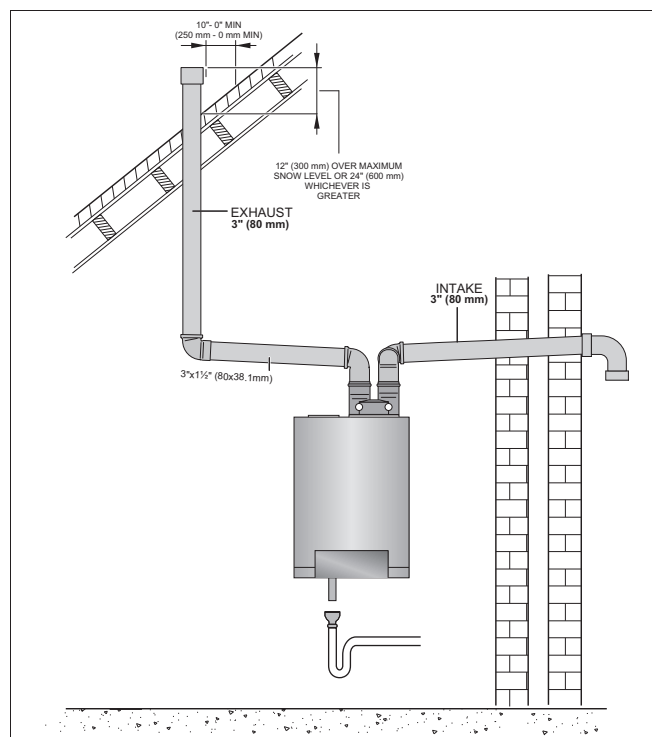


Fig. 26 Vertical exhaust and horizontal intake venting system (sealed combustion)

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 (26.84 m) (GB142-24/30/45) or 48 feet (14.65 m) (GB142-60).

$$\begin{array}{rcl}
 3 \times 45^\circ\text{-elbow} & = & 3 \times 3 \text{ ft (0.91 m)} = 9 \text{ ft (2.73 m)} \\
 \text{concentric vent kit} & = & 3 \text{ ft (0.91 m)} \\
 \text{Total friction loss equivalent} & = & 12 \text{ ft (3.64 m)}
 \end{array}$$

Total venting length for this example is:

$$\text{GB142-24/30/45} = 100 \text{ ft (30.48 m)} - 12 \text{ ft (3.64 m)} = 88 \text{ feet (26.84 m)}$$

$$\text{GB142-60} = 60 \text{ ft (18.29 m)} - 12 \text{ ft (3.64 m)} = 48 \text{ feet (14.65 m)}.$$

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.

## 6.8 Conversion to Propane

To convert the boiler to propane, following the instructions in the "Propane, Conversion Kit" Instruction manual. Available kits see page 59 "spare parts, pos. 43".

## 7 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.

### 7.1 External connection board connections

Make all electrical connections inside the external connection box.

- Remove the cover of the external connection box (see 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/NFPA 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 (see fig. 30) are low-voltage connections and terminals 7 – 10 (see 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.

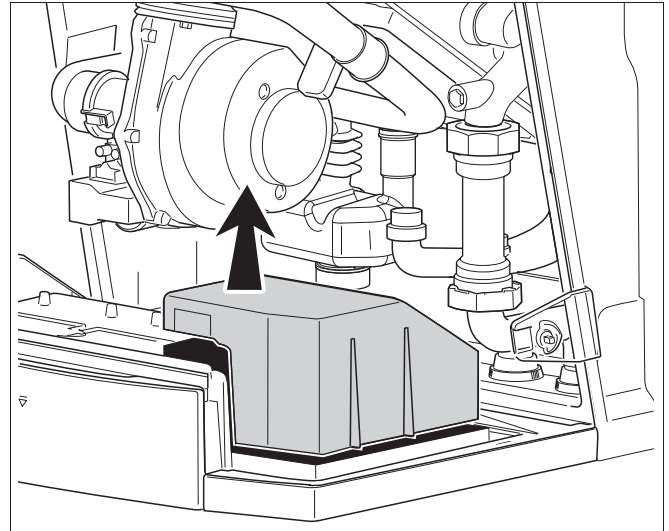


Fig. 28 Removing the cover from the external connection box

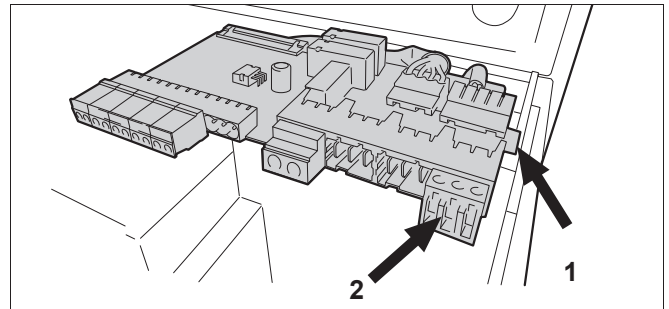


Fig. 29 external connection board

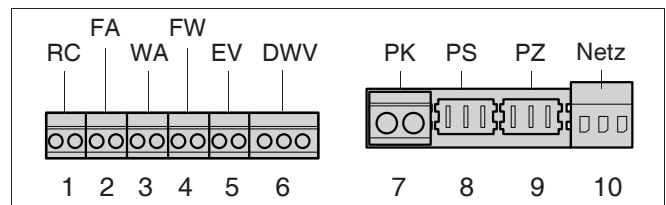


Fig. 30 Connections to external connection board

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 (not used).

**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 (-15% +10%).

**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.

**High Voltage**

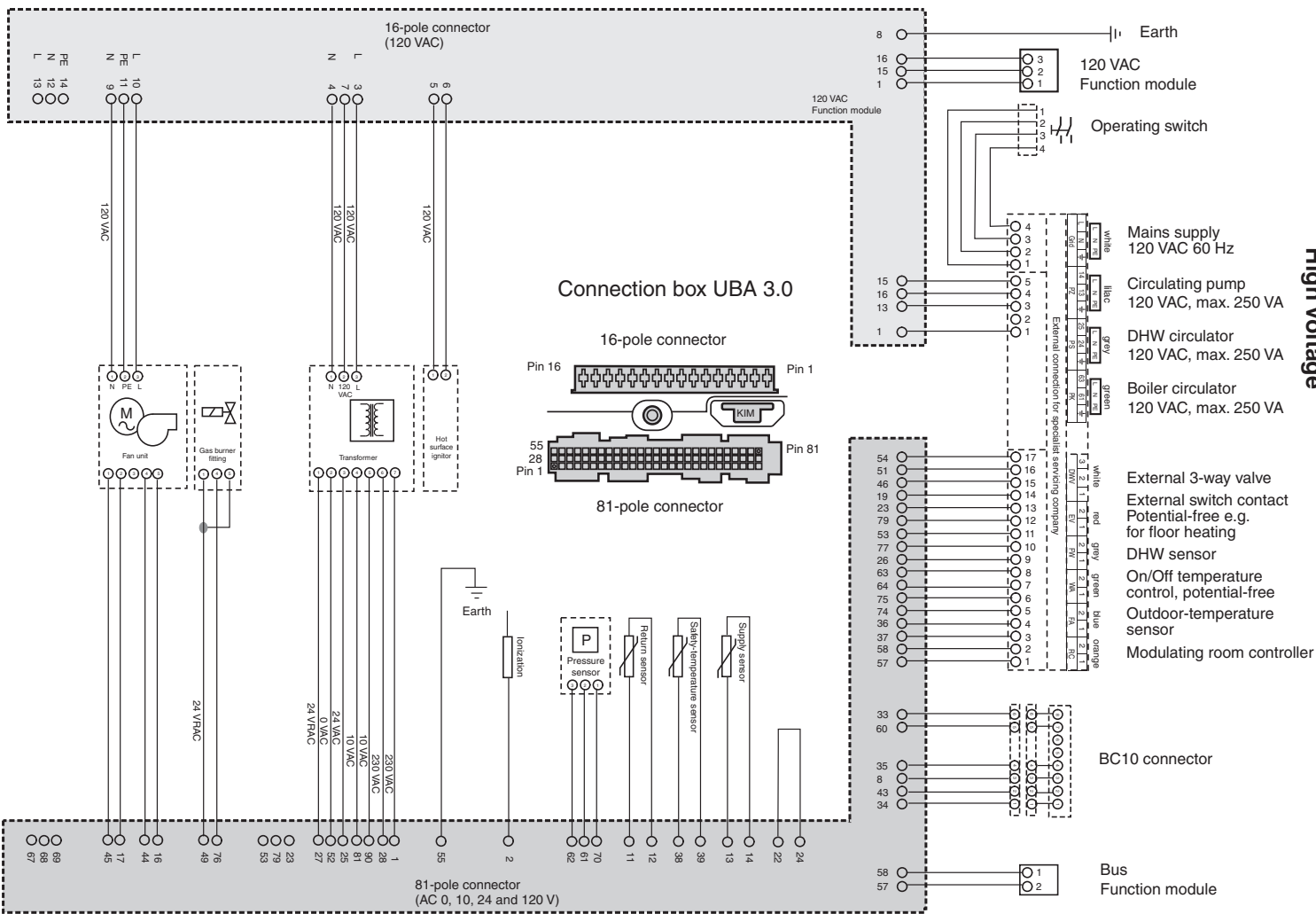


Fig. 31 Electric circuit diagram



## 8 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 the 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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## 8.1 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).

## 8.2 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.

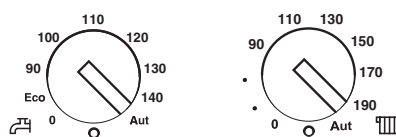
- Observe the pressure on the BC10 or the P/T gauge in the pump manifold for the heating circuit. The fill pressure of the system should be at least the required inlet pressure for the expansion tank plus 7.2 psi (0.5 bar). The minimum pressure is 15 psi (1.0 bar) (on a cold system). The maximum pressure 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.

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 9.3.2 and 9.3.3). Factory setting is "0".



#### WARNING

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

### 8.3 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) by disconnecting the connection to the heat exchanger and the connection to the condensate bypass pipe.
- Fill with water and refit the condensate trap in reverse order.



#### WARNING

Danger of fatal accident due to poisoning. If the condensate trap is not filled with water, flue gas can escape and put people's lives at risk.

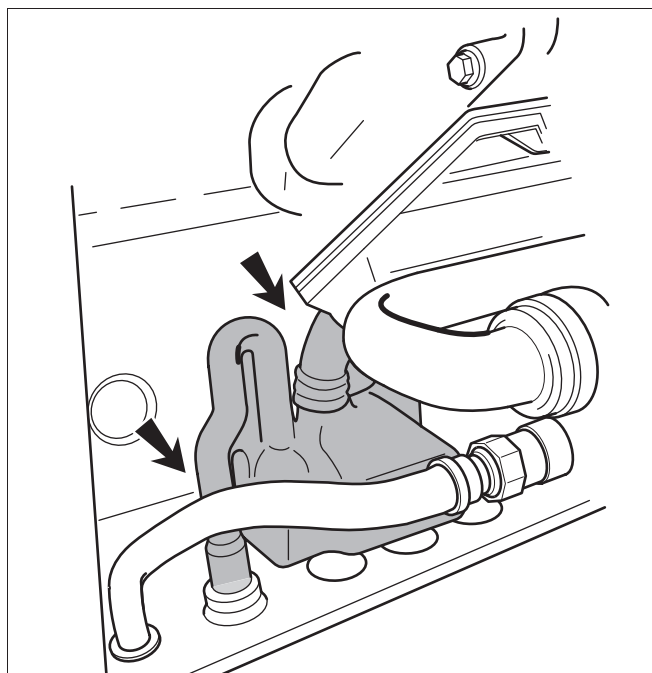


Fig. 32 Filling water into the condensate trap

### 8.4 Bleeding the gas supply valve

- Loosen the screw plug on the testing nipple for the gas connection and venting (see 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.

### 8.5 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?

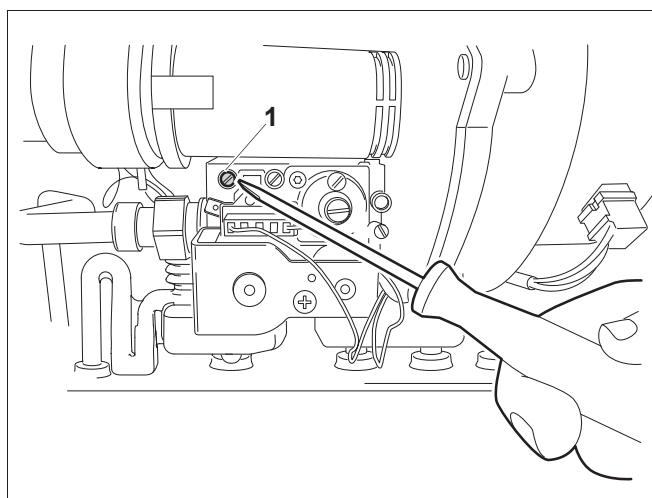


Fig. 33 Bleeding the gas supply conduit

## 8.6 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 6.8 "Conversion to Propane", page 26).

## 8.7 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 (see fig. 34, pos. 1).

- Connect the pressure gauge connection hose to the testing nipple (see 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 9 "BC10 basic controller", page 39).

Boiler capacity	Type of gas supply	Gas orifice diameter Altitude 0-10,200 ft			
		No CO <sub>2</sub> correction		Altitude 4,001-10,200 ft with CO <sub>2</sub> correction	
		inch	mm	inch	mm
24 kW	Natural gas	0.175	4.45	0.179	4.55
	LPG P	0.132	3.35	0.134	3.40
30 kW	Natural gas	0.175	4.45	0.177	4.50
	LPG P	0.132	3.35	0.134	3.40
45 kW	Natural gas	0.213	5.40	0.219	5.55
	LPG P	0.163	4.15	0.163	4.15
60 kW	Natural gas	0.295	7.50	0.301	7.65
	LPG P	0.213	5.40	0.215	5.45

Table 6 Gas orifice diameter

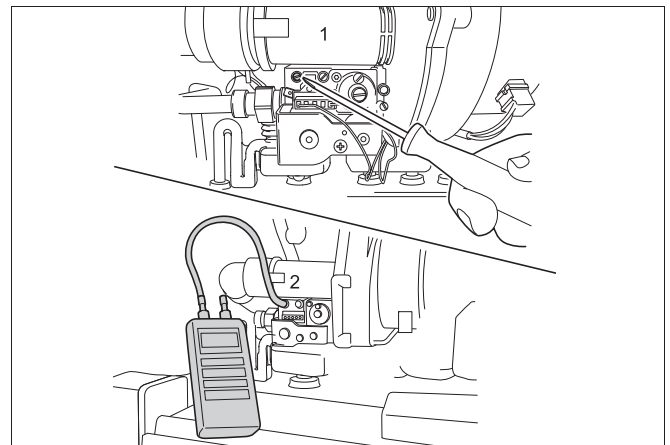


Fig. 34 Measuring the inlet gas pressure

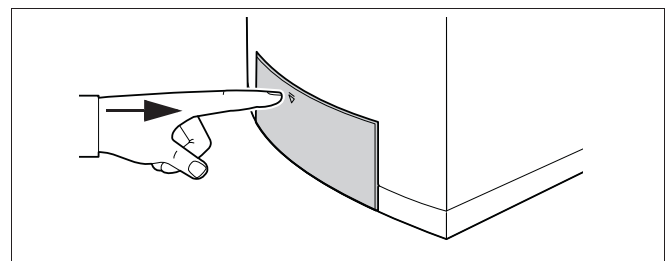





Fig. 35 Opening the control panel



- Press the "Chimney Sweep"  button and hold it (for approx. two seconds) until the display shows a decimal point.
- 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.

## 8.8 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 (see 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 (see fig. 36, pos. 2).

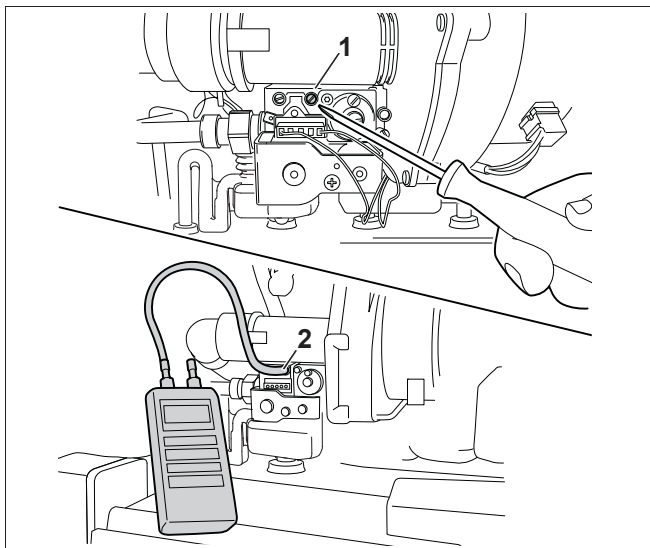







Fig. 36 Checking the gas/air ratio

- 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 ( $p_{\text{Gas}} - p_{\text{Air}}$ ) must be -0.02 inch W.C. (- 5 Pa) ( $\pm 0.02$  inch W.C. =  $\pm 5$  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 (see fig. 37, pos. 1). The adjustment screw is located behind the cover screw.

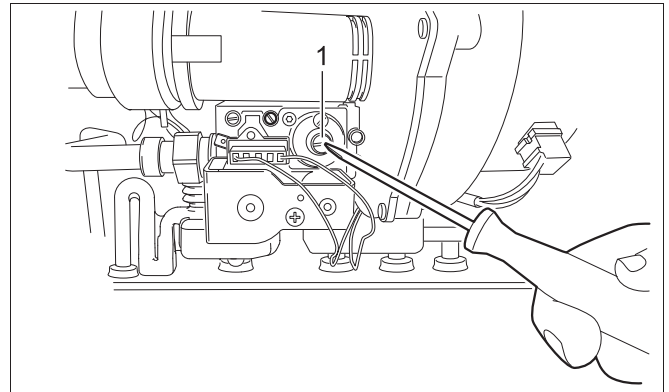
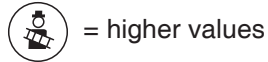
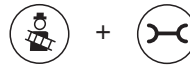
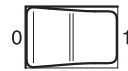




Fig. 37 Setting the gas/air ratio

- 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.



## 8.9 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.

## 8.10 Measuring the carbon monoxide content (CO)

- Measure the carbon monoxide content on the flue gas sampling point (see 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.

## 8.11 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.

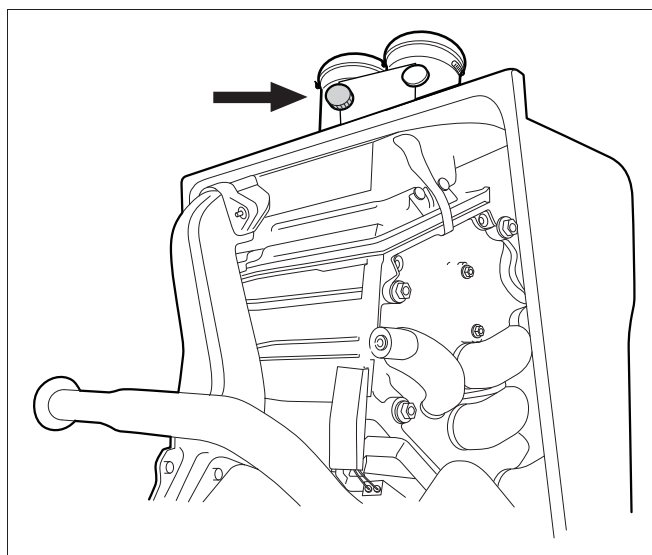


Fig. 38 Flue gas sampling point



## 8.12 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 (see fig. 39). Select the  $\mu\text{A}$  direct current range on the measuring device. The measuring device must have a resolution of at least  $1 \mu\text{A}$ .

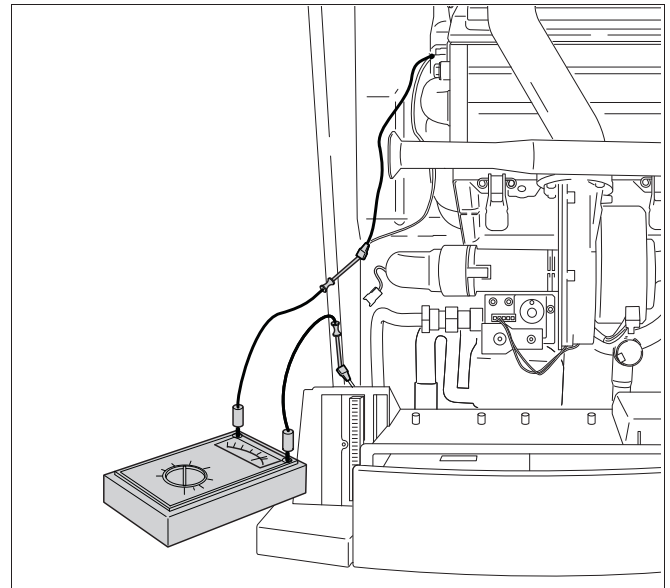







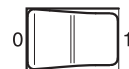
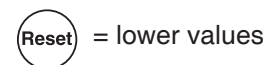
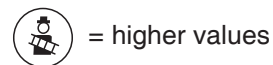
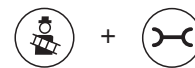



Fig. 39 Measuring the ionization current

- 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 (see fig. 40) to close the control panel.

### 8.13 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.

### 8.14 Installing the casing

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

### 8.15 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.

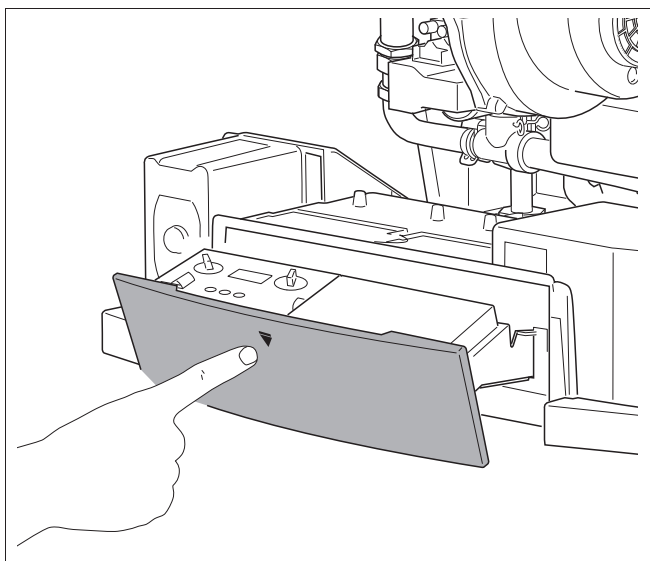


Fig. 40 Closing the control panel

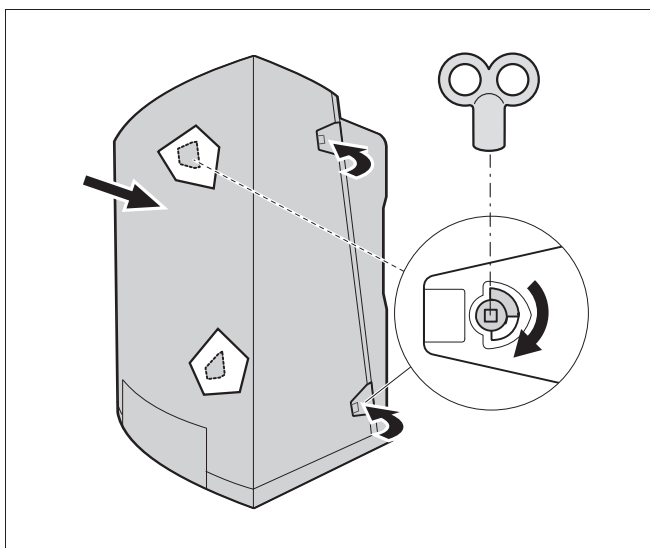


Fig. 41 Installing the casing

## 9 BC10 basic controller

### 9.1 Operating the BC10 basic controller

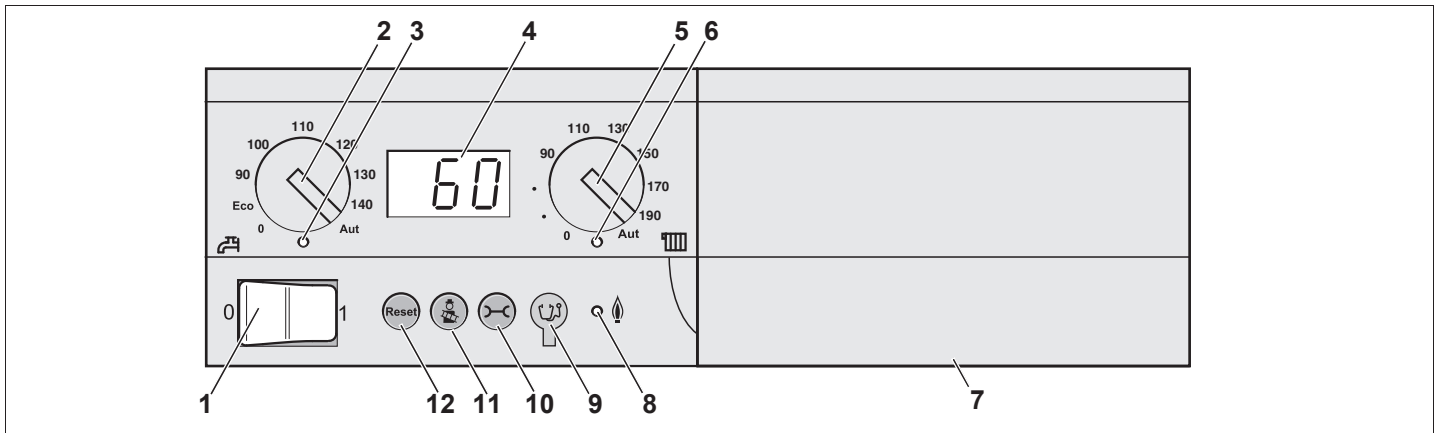


Fig. 42 BC10 basic controller – Controls

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

#### 9.1.1 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).



#### 9.1.2 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.

## 9.1.3 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 13.2). 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 13.3.



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





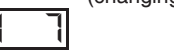



Displays (examples)	Values	Meaning	Operating condition/Remedy
 <sup>1)</sup>	number 0 ... 199 <sup>2)</sup>	Current boiler water temperature (in °F)	<b>Normal operating conditions</b>
	> P15	Current system pressure (in psi)	
			
 <sup>1)</sup> (changing)	P3 ... P12	Warning: System pressure is too low (between 3 and 12 psi = 0.2 and 0.8 bar)	<b>Warning</b> 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 ( $\geq 14.5$ psi = $\geq 1.0$ bar). The system pressure is shown for 10 minutes after which the standard display returns.
			
			
	number 0 ... 199 <sup>2)</sup>	Current boiler water temperature (in °F)	
	P3 ... P12	Current system pressure (in psi)	

Table 8 Possible status displays

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

<sup>2)</sup> The temperature is higher as 199° when 199 is blinking in the display.
















Displays (examples)	Values	Meaning	Operating condition/Remedy
 <sup>1)</sup> (flashing)	< P3	Fault: system pressure is far too low (< 3 psi = < 0.2 bar)	<b>Fault</b> 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 ( $\geq 14.5$ psi = $\geq 1.0$ bar). The system pressure is shown for 10 minutes after which the standard display returns.
 207	number > 200	Error code Remedy the error see servicing section	
 140	number 0 ... 199 <sup>2)</sup>	Current boiler water temperature (in °F)	
 P3	< P3	Current system pressure (in psi)	
 <sup>1)</sup> (partially flashing)	Combination of letters and digits	Service code	<b>Fault</b> Lock-out faults (flashing display) must be reset by pressing the "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.
 207	number > 199	Error code Remedy the error using the servicing section in this manual	
 140	number 0 ... 199 <sup>2)</sup>	Current boiler water temperature (in °F)	
 P21	> P15	Current system pressure (in psi)	
 <sup>1)</sup>	A00 ... A99	Service code	<b>System faults</b> System faults are faults in the heating system that do not affect the burner operation.
 816	number > 800	Error code Remedy the error using the service section in this manual	
 -H			
 140	number 0 ... 199	Current boiler water temperature (in °F)	
 P21	> P15	Current system pressure (in psi)	<b>Fault</b> No communication between BC10 and automatic gas burner. <b>Fault</b> Remedy the error using the service section in this manual. Check the connections to both devices. Check the communication lines.
 (flashing)			

Table 8 Possible status displays

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



<sup>2)</sup> The temperature is higher as 199° when 199 is blinking in the display.

## 9.2 Carrying out additional tasks

### 9.2.1 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.

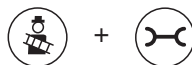
- Press and hold the "Chimney Sweep"  button (< 5 seconds) until the decimal point is displayed.
- Carry out the flue gas test.
- Press the "Chimney Sweep"  button to interrupt the flue gas test.



### 9.2.2 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.




### 9.2.3 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

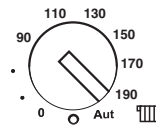
- Turn the "space heating system temperature" knob to limit the heating system temperature to the permissible flow temperature for the floor heating circuit (e. g. 86 – 104 °F = 30 – 40 °C), so pipes will not overheat.



### 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 %, sea level <sup>a)</sup> )							
	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

a. For use at high altitude the capacity decreases with 3% for every 1000 feet.




## 9.3 Configuring the boiler

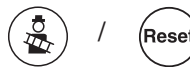
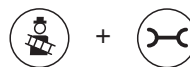
### 9.3.1 Adjusting the heating capacity

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.

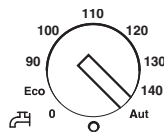
Factory setting "L--".

- 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.



### 9.3.2 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
<b>0</b>	Off	No hot water supply (only heating mode).	Off
<b>Eco</b> <sup>1</sup>	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 <sup>2</sup>
<b>86 – 140</b>	Direct setting on BC10 in °F	The temperature set on the BC10 is a temperature that cannot be changed using a RC thermostat.	On <sup>2</sup>
<b>Aut</b>	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 <sup>2</sup>

Table 10 Settings of "DHW temperature" knob

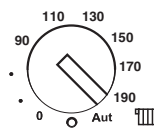
<sup>1</sup> This function has been optimized for boilers with combined DHW heating (combi-units).

<sup>2</sup> 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.

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

### 9.3.3 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
<b>0</b>	Off	No supply to heating system (only DHW heating operation).	Off
<b>86 – 190</b>	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 <sup>1</sup>
<b>Aut</b>	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 <sup>1</sup>

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

<sup>1</sup> 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).









### 9.3.4 Setting the pump post-purge period

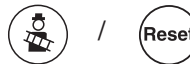
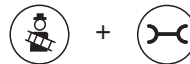
A pump must be connected to PK (see fig. 29, pos. 7) of the external connection board in order to be able to set the pump run over time.



#### 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.

## 10 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.

### 10.1 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 9 "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.



### 10.2 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.

# 11 Inspection

We advise you to offer your customer an annual inspection and maintenance contract (for the contents of this contract, see page 57 and page 58).

If inspection reveals that maintenance work is necessary you can carry this out as required (see chapter 12 "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.

## 11.1 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

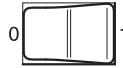
- If gas pipes have to be disconnected from the gas burner fitting, the burner cover must only be opened by a specialized professional.

## 11.2 Visual inspection for general signs of corrosion

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

### 11.3 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.

### 11.4 Measuring the ionization current

See subsection 8.12 "Measuring the ionization current", page 37.

### 11.5 Measuring the inlet gas pressure

See subsection 8.7 "Inlet gas pressure", page 33.

### 11.6 Checking and adjusting the gas/air ratio

See subsection 8.8 "Checking and adjusting the gas/air ratio", page 34.

### 11.7 Carrying out a gas leak test in operating conditions

See subsection 8.9 "Carrying out a leak test in operating conditions", page 36.

### 11.8 Measuring the carbon monoxide content (CO)

See subsection 8.10 "Measuring the carbon monoxide content (CO)", page 36.

### 11.9 Carrying out a pressure test of the heating system

See chapter 8 "Start-up procedure", page 30.

### 11.10 Checking the functioning and the safety of the air intake and flue gas conduit

See subsection 8.5 "Checking the combustion air/flue gas connection", page 32.

### 11.11 Checking venting systems

Check air intake and flue gas for obstruction or damage.

## 12 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.



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

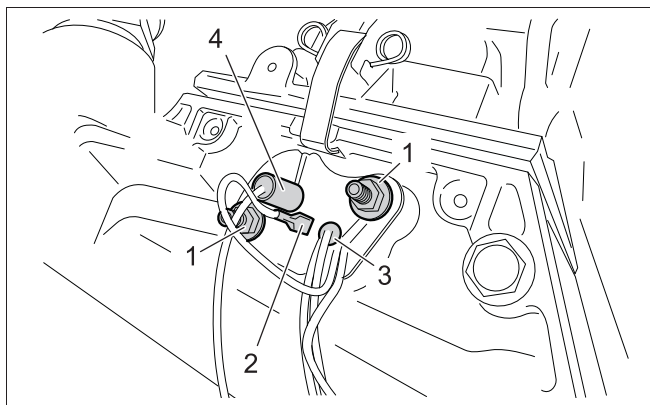


Fig. 43 Removing the hot surface ignitor and the ionization electrode

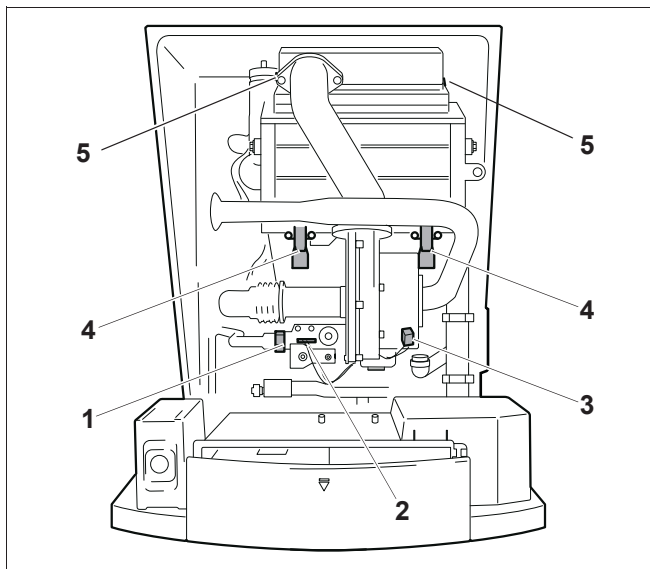


Fig. 44 Removing the connections

- 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 (see fig. 45, pos. 1).
- Remove the gas/air distributor plate (see fig. 45, pos. 2), the orifice plate (GB142-24, GB142-30 and GB142-60 only, fig. 45, pos. 3) and the burner (see 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.

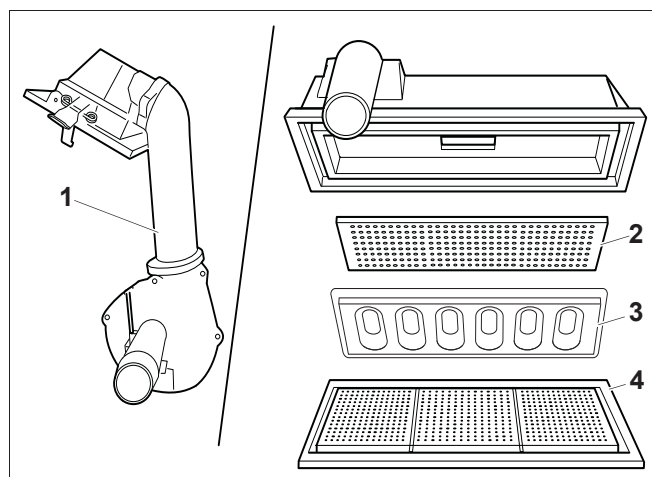


Fig. 45 Cleaning the burner cover, gas/air distributor plate, orifice plate and burner

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

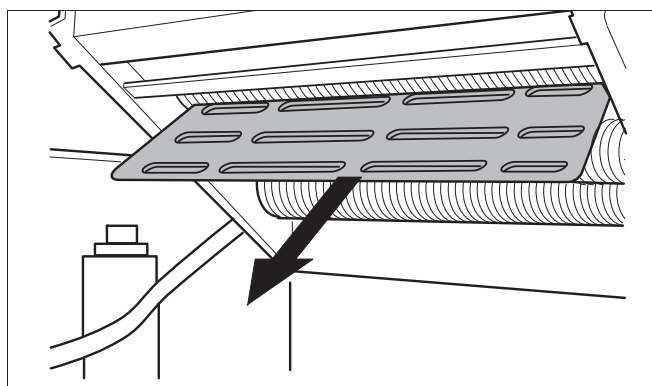


Fig. 46 Baffle plate

- 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.

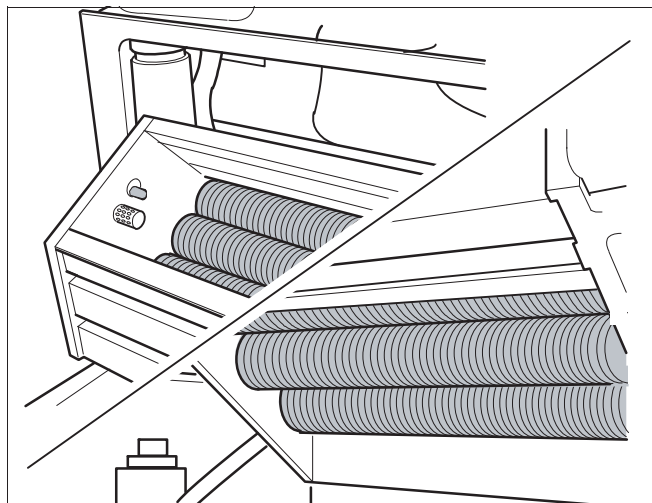



Fig. 47 Cleaning the heat exchanger

- 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 (see fig. 48, pos. 1).
- Pull the internal condensate bypass pipe from the condensate trap (see fig. 48, pos. 2).
- Loosen the condensate trap from the connection (see fig. 48, pos. 3) 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.

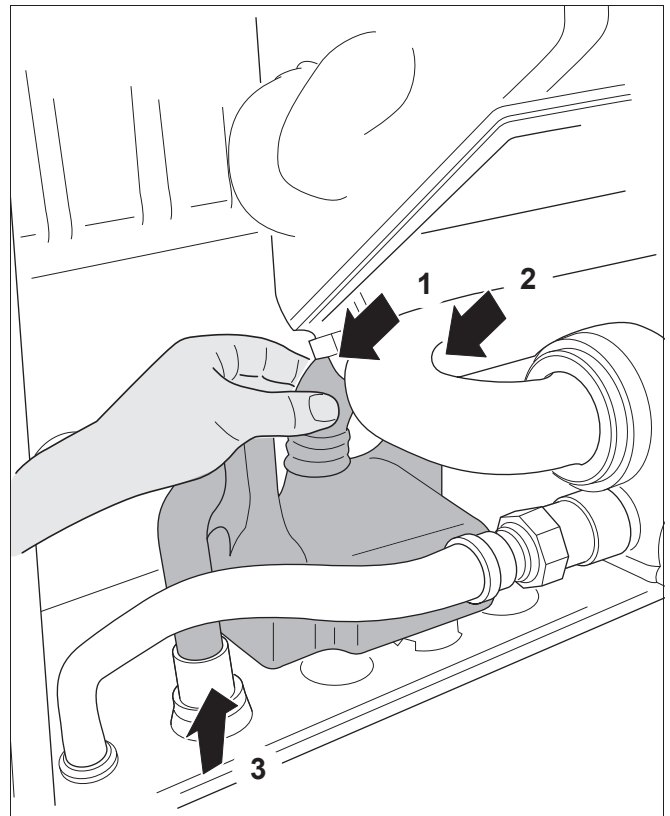
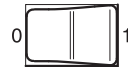


Fig. 48 Condensate trap

## 12.2 Checking and adjusting the gas/air-ratio

See chapter 8.8 "Checking and adjusting the gas/air ratio", page 34.

## 13 Appendix

### 13.1 Operating messages

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
















Display	Meaning
<b>Normal mode</b> =/-	
	Boiler in space heating mode *
	Boiler in DHW heating mode
<b>Normal mode</b> □	
	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
<b>Test mode</b> –	
 Dot displayed in right-hand bottom corner	Boiler in flue gas test
<b>Manual mode</b> –	
 Blinking dot in right-hand bottom corner	Boiler in manual mode
<b>Reset</b>	
	Reset (after holding the "Reset"  button for 5 seconds, the heating system is returned to its switch-on condition)

Table 12 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.



## 13.2 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
<b>2 Water flow / water pressure</b>	
E 207	System pressure too low < 3 psi (0.2 bar).
F 271	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.
<b>3 Fan speed</b>	
R 264	Fan unit failed during operation.
C 217	Fan unit is running too fast.
F 273	Continuous 24 hour operation.
L 214	Fan shut down during security test.
P 216	Fan unit is running too slowly.
Y 215	Fan unit is running too fast.
<b>4 Temperatures</b>	
R 218	Supply sensor over 220 °F (105 °C).
E 278	Sensor test failed
F 219	The safety temperature sensor has detected a flow temperature of over 266 °F (130 °C)
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
<b>6 Flame monitoring</b>	
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.
<b>7 Grid voltage</b>	
C 231	The grid power was interrupted after an error.
L 261	UBA fault.
280	
<b>8 External switching contact</b>	
Y	External switching contact, e. g. temperature safety switch for floor heating, has taken place.
<b>9 System faults</b>	
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.
<b>E System faults</b>	
1, R, C,	Internal UBA fault.
F, H, L,	
Y	

### 13.3 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 – 160,900	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 – 142,200	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 – 158,500	64,800 – 211,600
Boiler efficiency rating max. capacity for heating curve 176/140 °F (80 – 60 °C) <sup>a)</sup>	%	88	88	88	88
Boiler efficiency rating max. capacity for heating curve 122/86 °F (50 – 30 °C) <sup>1)</sup>	%	97	97	97	97
CSA output	btu/hr	76,300	95,400	144,800	178,900
<b>Heating</b>					
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 con- troller	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)
<b>Pipe connections</b>					
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)	Ø 1.3" (Ø 32)	Ø 1.3" (Ø 32)	Ø 1.3" (Ø 32)
<b>Flue gas values</b>					
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 <sub>2</sub> content, full load, natural gas G20	%	9.2	9.2	9.3	9.3
CO <sub>2</sub> content, full load, LPG G31, propane	%	10.0	10.0	10.0	10.0
Standard emission factor CO	mg/kWh	≤ 15	≤ 15 <sup>b)</sup>	≤ 15	≤ 15
Standard emissions factor NO <sub>x</sub>	mg/kWh	≤ 20	≤ 20 <sup>2)</sup>	≤ 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)
<b>Flue gas connection</b>					
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
<b>Electric data</b>					
main voltage (-15%, +10%)	V, Hz	120, 60	120, 60	120, 60	120, 60
Fuses	amps	5 amps 120V slow blow	5 amps 120V slow blow	5 amps 120V slow blow	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
<b>Boiler dimensions and weight</b>					
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 13 Technical specifications

a. The performance information shown is based on 'European performance standards'.

b. 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 <b>P</b>	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 14 Factory setting of the gas control valve

- 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. 49, pos. 1 and 2).

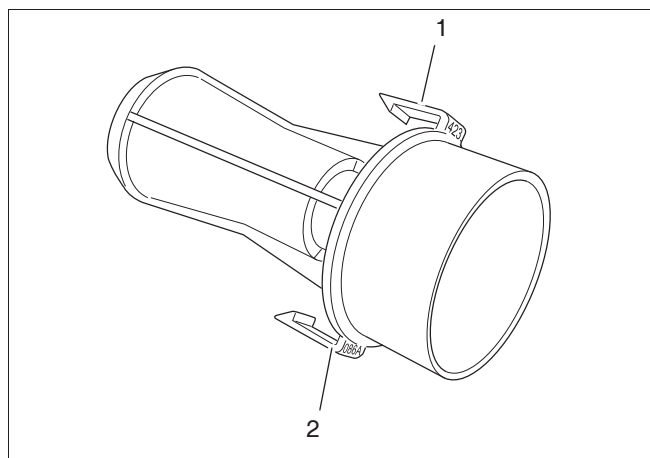


Fig. 49 Venturi article number

Boiler capacity	Type of gas supply	Venturi article number	Gas orifice diameter Altitude 0 - 10,200 ft			
			No CO <sub>2</sub> correction		Altitude 4,001 - 10,200 ft with CO <sub>2</sub> correction	
			[inch]	[mm]	[inch]	[mm]
24 kW	Natural gas <b>H</b>	423.072A	0.175	4.45	0.179	4.55
	LPG <b>P</b>	423.072A	0.132	3.35	0.134	3.40
30 kW	Natural gas <b>H</b>	423.072A	0.175	4.45	0.177	4.50
	LPG <b>P</b>	423.072A	0.132	3.35	0.134	3.40
45 kW	Natural gas <b>H</b>	423.170A	0.213	5.40	0.219	5.55
	LPG <b>P</b>	423.170A	0.163	4.15	0.163	4.15
60 kW	Natural gas <b>H</b>	423.173A	0.295	7.50	0.301	7.65
	LPG <b>P</b>	423.173A	0.213	5.40	0.215	5.45

table 15 Gas orifice diameter

## 14 Reports

### 14.1 Start-up report

Put your signature and the date at the bottom of the start-up report.

Start-up activities	Page	Measured values	Remarks
1. Fill the heating system and check that all connections are tight – Inlet pressure of expansion tank (observe the Installation Instructions for the expansion tank) – Pressurize the system – Fill the condensate trap	30 30 30 30	<input type="checkbox"/> ____ psi  <input type="checkbox"/> ____ psi	
2. Carry out a gas tightness test	30		
3. Note down the gas characteristics: <div style="text-align: right;">Wobbe index Operating heat value</div>	30	____ kWh/m <sup>3</sup> ____ kWh/m <sup>3</sup>	
4. Convert the boiler to another type of gas supply (only if allowed)		<input type="checkbox"/>	
5. Vent the gas supply conduit	32	<input type="checkbox"/>	
6. Check the combustion air/flue gas connection	32	<input type="checkbox"/>	
7. Measure the gas connection pressure (flow pressure)	33	____ inch W.C.	
8. Check and adjust the gas/air ratio	34	____ inch W.C.	
9. Measure the carbon monoxide content (CO)	36	____ ppm	
10. Check and if necessary adjust the carbon monoxide content (CO <sub>2</sub> )		____ %	
11. Measuring the ionization current	37	____ μA	
12. Make the necessary settings on the thermostat	39	<input type="checkbox"/>	
13. Carry out function testing	36	<input type="checkbox"/>	
14. Fitting the casing	38	<input type="checkbox"/>	
15. Inform the owner; hand over the technical documents	38	<input type="checkbox"/>	
<div>Confirm proper start-up</div> <div style="text-align: right; margin-top: 100px;">Company stamp/signature/date</div>			

## 14.2 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	_____ $\mu$ A	_____ $\mu$ A	_____ $\mu$ 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

### 14.3 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 <sub>2</sub> content with full load CO <sub>2</sub> content with partial load	34	_____ inch W.C. _____ % _____ %	_____ inch W.C. _____ % _____ %
3. Confirm proper maintenance		<div>Company stamp/ Signature</div>	<div>Company stamp/ Signature</div>

## 15 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 2 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
9	Seal ring Ø 3"	8718600719
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 45 kW	7098832
	Orifice plate 60 kW	67900523
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

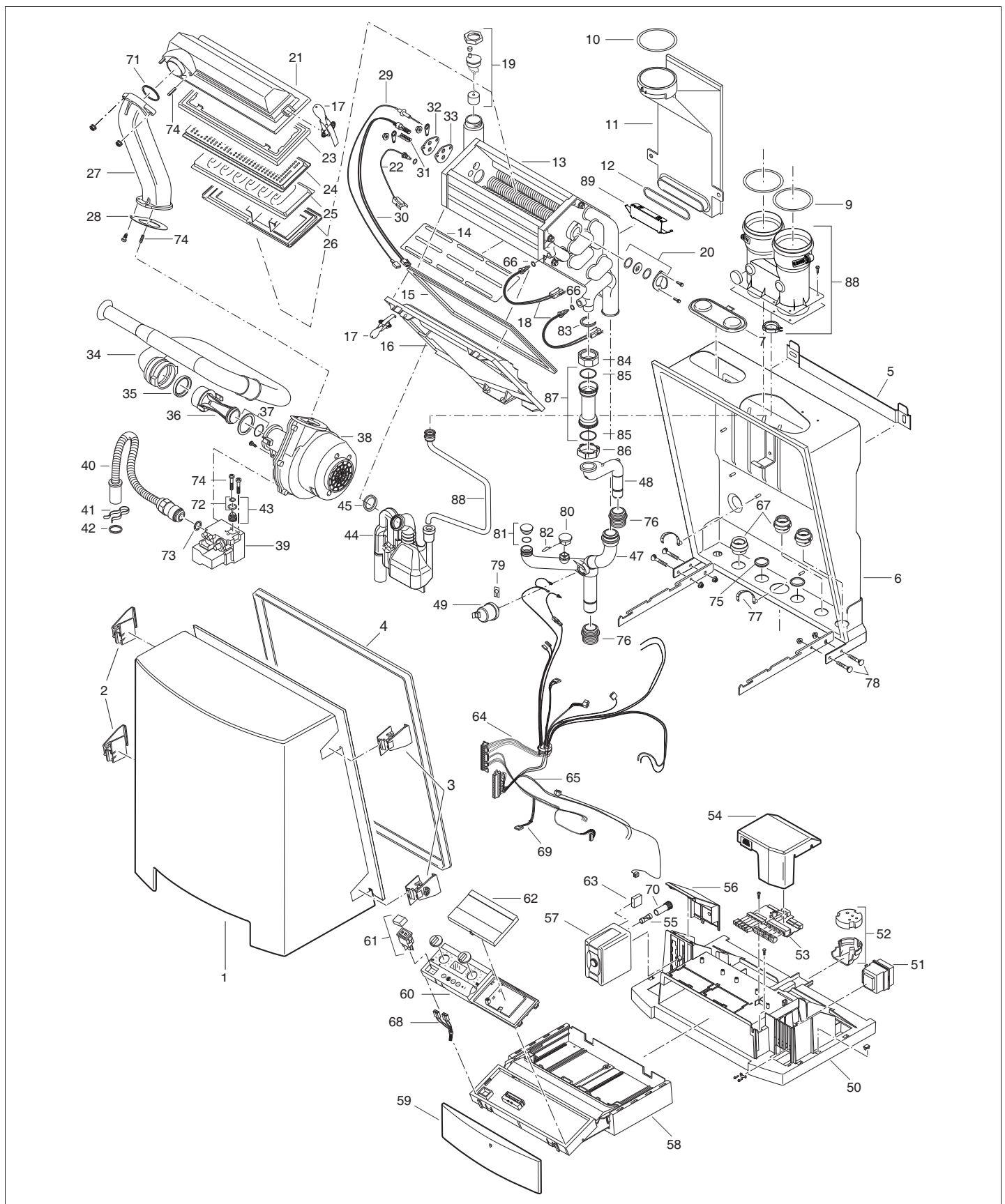
Pos.	Description	Product No.
34	Air inlet pipe; 24/30 kW	7099024
	Air inlet pipe; 45/60 kW	7099923
35	Seal Ø50 mm (5 pc)	7099058
36	Venturi 24/30 kW	7099020
	Venturi 45 kW	7099925
	Venturi 60 kW	7099931
37	Seal set (4 pc)	7099021
38	Fan	78184
39	Gas control valve 24/30/45 kW	7746900891
	Gas control valve 60 kW	7736700203
40	Gas supply pipe GB142 USA	76685
41	Spring (5 pc)	7100549
42	Seal 2x16x22 (5 pc)	7098778
43	L.P. Orifice Ø 3.35 - 24/30 kW 0-10,200 ft	76687
	L.P. Orifice Ø 3.40 - 24/30 kW 4,001-10,200 ft	7746901353
	L.P. Orifice Ø 4.15 - 45 kW 0-10,200 ft	7746901355
	N.G. Orifice Ø 4.45 - 24/30 kW 0-10,200 ft	7099016
	N.G. Orifice Ø 4.50 - 30 kW 4,001-10,200 ft	7746901421
	N.G. Orifice Ø 4.55 - 24 kW 4,001-10,200 ft	7746901354
	N.G. Orifice Ø 5.40 - 45 kW 0-10,200 ft	76690
	L.P. Orifice Ø 5.40 - 60 kW 0-10,200 ft	76690
	L.P. Orifice Ø 5.45 - 60 kW 4,001-10,200 ft	7746901357
	N.G. Orifice Ø 5.55 - 45 kW 4,001-10,200 ft	7746901356
	N.G. Orifice Ø 7.50 - 60 kW 0-10,200 ft	76686
	N.G. Orifice Ø 7.65 - 60 kW 4,001-10,200 ft	7746901358
44	Condensate trap, part of pos. 88	8718600689
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	7099965
	Return pipe 60 kW	709945
49	Pressure sensor **	8718600019
50	Bottom plate	7099049
51	Transformer 120V	78191
52	Grommet	7099050
53	External connection board	73814
54	External connection board cover	7099046
55	Fuse 5 AF slow blow	73904s
56	UBA cover	7099047
57	UBA3 - 120V	8718600083
58	Drawer	7099043
59	Drawer front	7099037
60	Controller connection plate	78186

\*\* not shown in exploded views

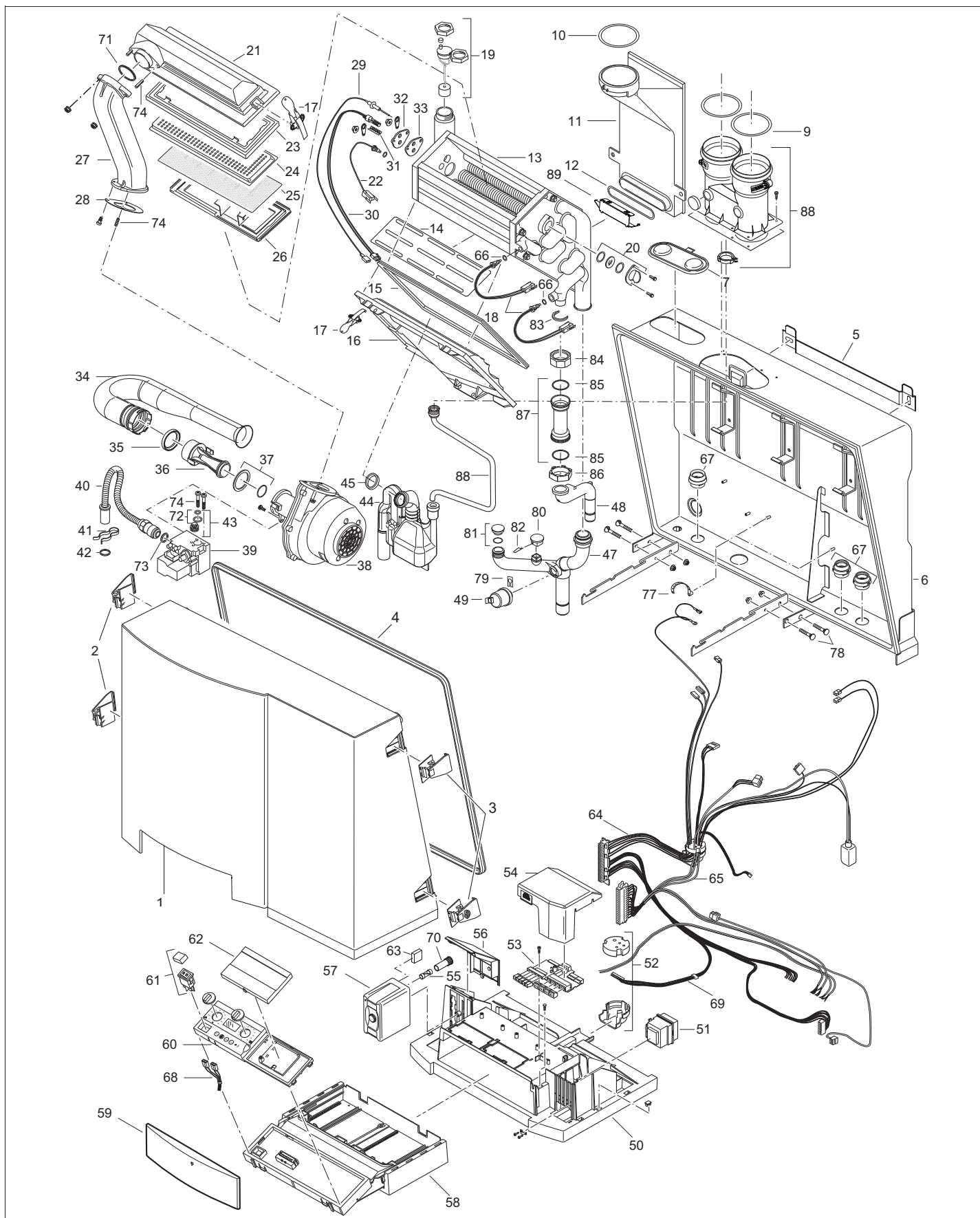
Pos.	Description	Product No.
61	On/off switch	7099041
62	Controller cover	73698
63	Boiler ident. module 24 kW	78223
	Boiler ident. module 30 kW	78224
	Boiler ident. module 45 kW	78225
	Boiler ident. module 60 kW	7736700204
64	Cable harness low voltage	78193
65	Cable harness high voltage	7099957
66	O-ring (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)	8718600045
74	Set screw M5x20 (5 pc)	7099065
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
88	Flue gas adaptor drain set, incl. pos. 44	8718600686
89	Flue gas silencer 24/30/45 kW	7099056



## Exploded view Logamax plus GB142-24/30



## Exploded view Logamax plus GB142-45/60



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