Installation instructions

Condensing gas boiler

Logamax plus

GB142-24
GB142-30
GB142-45
GB142-60

CAUTION!
Before putting the boiler into operation read this manual carefully.

DANGER!
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.

Danger: 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 appliance.
• 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.

Notice!
• This manual is available in the English and French language.
• This manual must be retained for future reference.

Read carefully before carrying out installation and maintenance.
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 electrical 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.
When using oxygen-permeable pipes, e.g. for floor heating systems, you must separate the system using heat exchangers.

When oxygen permeable pipes are used, the following guidelines shall be satisfied:

- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other boiler.
- 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 29.

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:

- INSTALLATION OF CARBON MONOXIDE DETECTORS. At the time of installation of the side wall horizontal vented gas fueled equipment, the installing plumber or gas fitter 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 gas fitter 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.
  - 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.
  - 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.
• 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.

• 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”.

• 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:

• The equipment listed in Chapter 10 entitled “Equipment Not Required To Be Vented” in the most correct edition of NFPA 54 as adopted by the board;

• 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) MANUFACTURES REQUIREMENTS - GAS EQUIPMENT VENTING SYSTEM REQUIRED.

When the manufacturer of Product Approved side wall horizontally vented gas fueled 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:

• Detailed instructions for the installation of the venting system or the venting system components; and

• A complete parts list for the venting system design or venting system.

(d) MANUFACTURES 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:

• The referenced “special venting systems” shall be included with the appliance or equipment installation instructions; and

• 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
[2] Universal Burner Automat (UBA3)
[3] Control unit BC10
[5] Cover
[6] Flue measuring points
[7] Parallel flue
[8] Burner

[9] Latches of which two have locks
[10] Sighting glass
[12] Back cover
[13] Air intake for the fan
[14] Fan
[15] Condensate trap and internal condensate drain flue gas pipe
[16] External Connection Board (under the cover)
[17] Pressure sensor
Fig. 2  Basic Controller Logamatic BC10

1) Main switch
2) DHW temperature knob
3) LED “DHW status”
4) Display
5) Space heating water temperature knob
6) LED “Heating system status”
7) Under the cover a RC system controller can be installed
8) LED “Burner Operation”
9) Service Tool connector
10) “Service” button
11) “Chimney sweep” button
12) “Reset” button
13) Air intake for the fan

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

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

[A] (AA) Flue gas connection (inside diameter 3")
[B] (LA) Air intake (inside diameter 3")
[C] (WB) Wall bracket
[D] (GAS) diameter Gas connection, ¾" NPT
[E] (AKO) Condensate water outlet, Ø 1.3" (Ø 32 mm) outside
[F] (VK) Supply, Ø 1.0" 1) (Ø 25.4 mm)
[G] (RK) Return, Ø 1.0" 1) (Ø 25.4 mm)

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.

---

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

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

[A] (AA) Combustion air
[B] (LA) Air intake
[C] (WB) Wall bracket
[D] (GAS) Gas connection, ¾” NPT
[E] (AKO) Condensate water outlet, Ø 1.3” (Ø 32 mm)
[F] (VK) Supply, Ø 1.0”¹ (Ø 25.4 mm)
[G] (RK) Return, Ø 1.0”¹ (Ø 25.4 mm)

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.

¹ One Ø 1.0” (Ø 25.4 mm) inside x 1” NPT threaded compression fitting is delivered enclosed with boiler packaging.
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 fig. 5 are included in the delivery.

Fig. 5 Items supplied with unit (1 box)

[1] Boiler with casing
[3] Technical documents including: User’s Instructions 1), Installation Instructions, wall mounting template and Servicing Instructions
[4] Compression fittings (2x)
[5] 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
[6] AM10 with outdoor sensor
[7] Propane conversion kit
[8] Flue gas adapter
[9] Boiler connection kit, including the DHW sensor

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 (→ fig. 6) from the drawer at this time.
▶ Protect the boiler and the combustion air/flue gas orifice against pollution during installation.

▶ Remove the packaging materials and dispose of them.
▶ Use the mounting template to mark the drill holes.
▶ Install the wall bracket taking into account the necessary service clearances.
▶ Remove the transport safety clamps (→ fig. 6).

Fig. 6 Removing the transport safety clamps

▶ Use the radiator key to unlock the two latches a quarter turn (→ fig. 7, [1]).
▶ Open the latches (→ fig. 7, [2]).
▶ Remove the casing by lifting it upwards and then pulling it forwards (→ fig. 7, [3]); do not hold the casing by the latches.

Fig. 7 Removing the casing

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

- Hold the boiler by the rear boiler casing and place it on the wall bracket.
- Level out the boiler.

### 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 table 1 and table 2. Do not forget the pipe fitting losses and observe proper size of the fittings.

#### Table 1  Gas Pipe Capacity for different pipe sizes

<table>
<thead>
<tr>
<th>Length of pipe (feet)</th>
<th>⅜&quot;</th>
<th>⅜&quot;</th>
<th>1⅛&quot;</th>
<th>1&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>278</td>
<td>520</td>
<td>1,060</td>
<td>1,600</td>
</tr>
<tr>
<td>20</td>
<td>190</td>
<td>350</td>
<td>730</td>
<td>1,100</td>
</tr>
<tr>
<td>30</td>
<td>152</td>
<td>285</td>
<td>590</td>
<td>890</td>
</tr>
<tr>
<td>40</td>
<td>130</td>
<td>245</td>
<td>500</td>
<td>760</td>
</tr>
<tr>
<td>50</td>
<td>115</td>
<td>215</td>
<td>440</td>
<td>670</td>
</tr>
<tr>
<td>75</td>
<td>93</td>
<td>175</td>
<td>360</td>
<td>545</td>
</tr>
<tr>
<td>100</td>
<td>79</td>
<td>160</td>
<td>305</td>
<td>480</td>
</tr>
<tr>
<td>150</td>
<td>64</td>
<td>120</td>
<td>250</td>
<td>380</td>
</tr>
</tbody>
</table>

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

#### Table 2  Equivalent length for pipe fittings in feet

<table>
<thead>
<tr>
<th>Steel pipe diameter in inches</th>
<th>90°-Elbow</th>
<th>Tee (flow thru branch)</th>
<th>Gate valve</th>
<th>Gas cocks</th>
</tr>
</thead>
<tbody>
<tr>
<td>⅜&quot;</td>
<td>2.1</td>
<td>4.1</td>
<td>0.5</td>
<td>1.25</td>
</tr>
<tr>
<td>1&quot;</td>
<td>2.6</td>
<td>5.2</td>
<td>0.6</td>
<td>1.60</td>
</tr>
<tr>
<td>1 ⅛&quot;</td>
<td>3.5</td>
<td>6.9</td>
<td>0.8</td>
<td>2.15</td>
</tr>
<tr>
<td>1 ½&quot;</td>
<td>4.0</td>
<td>8.0</td>
<td>0.9</td>
<td>2.50</td>
</tr>
</tbody>
</table>

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

#### Table 2  Equivalent length for pipe fittings in feet

- Install the ¾" gas cock on the gas connection.
- Connect the gas pipe to the gas cock (→ fig. 8, [1]) so that it is free from any strain.

#### NOTICE:
- Thoroughly flush all pipes and radiators. Use of a Buderus approved boiler cleaner is recommended.
- Refer to the installation template for the pipe connection dimensions.
- Fit the compression fittings (→ fig. 9, [1] and [2]) first to the Hydronic set (→ fig. 10, 11 and 12) and then to the boiler.

---

**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.

- 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.

---

Fig. 8 Making the gas connection

Fig. 9 Pump manifold installation

[1] Compression fitting (heating system supply pipe)
[2] Compression fitting (heating system return pipe)
Installation

11

Di electric union
DHW return 1” FPT
Low loss header
Tridicator
System return 1½ MPT
System supply 1½ MPT
Drain valve
DHW supply 1” FPT
Relief valve

▶ 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.

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

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

[1] Flue gas
[2] Air intake
[3] Pump manifold
[4] DHW return 1” FPT
[5] Low loss header
[6] PT gauge (pressure and temperature gauge)
[7] System return 1½ MPT
[8] System supply 1½ MPT
[9] Drain valve
[10] Pump manifold shut-off valve
[11] DHW supply 1” FPT

DANGER:
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. 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] Flue gas
[2] Air intake
[3] Optional DHW tank
[4] Primary pump
[5] Shut-off valve
[6] PT gauge (pressure and temperature gauge)
[7] Zone valve

NOTICE: 
▶ For the maximum permissible flow rate of the DHW pump see section 1.4, page 4.
Installation

- Radiant
- Additional zones
- Shut-off valve
- Zones
- Secondary pump
- Drain valve
- Low loss header
- DHW pump
- Pressure relief valve

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. Flue gas
2. Air intake
3. Optional DHW tank
4. Primary pump
5. Shut-off valve
6. PT gauge (pressure and temperature gauge)
7. Zone pump
8. Radiant
9. Additional zones
10. Shut-off valve
11. Zones
12. Drain valve
13. Low loss header
14. DHW pump
15. Pressure relief valve

Low Water Cut-Off (LWCO) and External Manual Reset High Limit
A hot water boiler installed above radiation level or as required by the Authority having jurisdiction, must be provided with an external Low Water Cut-Off (LWCO) and/or an External Manual Reset High Limit device, either as a part of the boiler or at the time of boiler installation.
- Contractor to furnish and install LWCO and Manual Reset High Limit devices as required by local codes.
- Do not install any type of value or check valve in between boiler and LWCO or Manual Reset High Limit.

- Refer to the manufacturer’s instructions when installing LWCO and Manual Reset High Limit.
- LWCO is installed external to the boiler and must be located above the highest point of the boiler heat exchanger.
- Manual Reset High Limit remote sensing bulb must be located in the boiler supply.
- In a cascade each boiler must be equipped with its own LWCO and Manual Reset High Limit.
- Remove the 1” plug and connect a 1” Tee at the back of the boiler manifold.
- Install a 1” stand pipe that reaches above the highest point of the boiler heat exchanger at the vertical connector of the Tee.
- Wire the LWCO [NC1] and the Manual Reset High Limit [NC2] normally closed dry contacts in series with EV pins 1 and 2 on the boiler, which will shut off the burner when the connection is interrupted.

Fig. 13 Low Water Cut-Off views
(Note: Power supply to LWCO and external high limit not shown for clarity.)

1. Automatic air vent
2. Low Water Cut-Off
3. Manual Reset High Limit
4. DHW Return
5. DHW Supply

Buderus
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.

- **CAUTION: BOILER DAMAGE!**
  - Due to contaminated air.
  - 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.

- **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 equipment in the enclosure.
  - 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.
  - 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.
  - 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:**
  - Before installing the exhaust and air intake system, it is necessary to remove the transport safety device and to install the flue gas adapter.

  - Remove the transport safety device with the two screws (→ fig. 14).

- **Fig. 14 Removing the transport safety device**

- **Fig. 15 Placing the flue gas adapter**
Installation

▶ Screw on the flue gas adapter using 6 screws (→ fig. 16).

Fig. 16 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 table 4, page 18.

A horizontal venting system 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

Fig. 17 Vertical venting system (sealed combustion)

1. Exhaust 3" (80 mm)
2. 10°-0° min. (250 mm - 0 mm min.)

Fig. 18 Horizontal venting system (sealed combustion)

1. Exhaust 3" (80 mm)
2. Intake 3" (80 mm)
3. 24" max. (610 mm max.)
4. 3" × 1.5" (80 × 38.1 mm)

The boiler can also be operated with separate air intake and exhaust piping (→ fig. 18 and fig. 19).

Fig. 19 Horizontal venting system (non sealed combustion only) - Situation 1

1. Exhaust 3" (80 mm)
2. Intake 3" (80 mm)
3. 3" × 1.5" (80 × 38.1 mm)

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) (→ fig. 20).

Vent termination must be at least 7 ft (2,135 mm) above a public walkway (→ fig. 21).

Vent must be 3 ft (915 mm) above any forced air intake within 10 ft (3,050 mm) (→ fig. 21).

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 5 ft (1,525 mm) below roof overhang (→ fig. 21).

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

It is allowed to use a chimney as a supply channel, only when there are no other boilers or fireplaces which are using the chimney also as air supply or drainage.

---

**Fig. 20**  Vent and air pipe position (1) of a sealed combustion system

[1] Intake
[2] 12’ (300 mm) minimum
[3] 24’ (610 mm) minimum
[4] Exhaust

---

**Fig. 21**  Vent position of a system with combustion air supply from the room (non-room sealed)

[1]  At least 1 ft (305 mm) above grade and snow line
[2]  Exhaust terminal must be at least 3 ft (915 mm) above forced air inlet within 10 ft (3,050 mm)
[3]  Forced air inlet
All vent pipes must be glued, except for the flue gas adapter (\(\rightarrow\) fig. 22, [1]) which is screwed into place and the first connection to the flue gas adapter (\(\rightarrow\) fig. 22, [2]). Installed you can slide the pipe onto the adapter, properly supported and the exhaust pipe must be pitched a minimum of a ¼ inch per foot back to the boiler. This allows the condensate to drain away. Fix the screws (\(\rightarrow\) fig. 22, [3]), this is obliged for Canada.

**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.

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

---

**Fig. 22 Vent pipes**

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

<table>
<thead>
<tr>
<th>Item</th>
<th>Material</th>
<th>United States</th>
<th>Canada</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vent or air pipe and fitting</td>
<td>PVC schedule 40</td>
<td>ANSI/ASTM D1785</td>
<td>CSA or BH Gas venting systems, ULC S636 1) certified only</td>
</tr>
<tr>
<td></td>
<td>PVC-DWV</td>
<td>ANSI/ASTM D2665</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CPVC schedule 40</td>
<td>ANSI/ASTM F441</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ABS-DWV schedule 40</td>
<td>ANSI/ASTM D2661</td>
<td></td>
</tr>
<tr>
<td>Pipe cement/prime</td>
<td>PVC</td>
<td>ANSI/ASTM D2564</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CPVC</td>
<td>ANSI/ASTM F493</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ABS</td>
<td>ANSI/ASTM D2235</td>
<td></td>
</tr>
</tbody>
</table>

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

**NOTICE:**
- 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:**
- 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.

---

**Fig. 23 Vertical parallel venting system (sealed combustion) - Situation 1**

1. Exhaust 3" (80 mm)
2. 10° - 0° min. (250 mm - 0 mm min.)
3. 24° min. (610 mm min.)
4. 12" (300 mm) over maximum snow level or 24" (600 mm) whichever is greater
5. Intake 3" (80 mm)
Fig. 24  Horizontal venting system (sealed combustion) - Situation 2

1. Exhaust 3” (80 mm)
2. 3” × 1.5” (80 × 38.1 mm)
3. Intake 3” (80 mm)

Fig. 25  Vertical parallel venting system (sealed combustion) - Situation 2

1. Exhaust 3” (80 mm)
2. 12” (300 mm) over maximum snow level or 24” (600 mm) whichever is greater
3. 24” min. (610 mm min.)
4. Intake 3” (80 mm)
5. 3” × 1.5” (80 × 38.1 mm)

Fig. 26  Horizontal parallel venting system (sealed combustion)

1. Exhaust 3” (80 mm)
2. 12” minimum
3. Intake 3” (80 mm)
4. 12” (300 mm) minimum

Fig. 27  Vertical venting system (non-sealed combustion only)

1. 3” × 1.5” (80 × 38.1 mm)
2. Exhaust 3” (80 mm)
3. 10”-0” min. (250 mm - 0 mm min.)
4. 12” (300 mm) over maximum snow level or 24” (600 mm) whichever is greater
5. Intake
7 Electrical connections

Fig. 28 Vertical exhaust and horizontal intake venting system (sealed combustion)

[1] 3" × 1.5" (80 × 38.1 mm)
[2] Exhaust 3" (80 mm)
[3] 10"-0" min. (250 mm - 0 mm min.)
[4] 12" (300 mm) over maximum snow level or 24" (600 mm) whichever is greater
[5] Intake 3" (80 mm)

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).

3 x 45°-elbow = 3 x 3 ft (0.91 m) = 9 ft (2.73 m)
concentric vent kit = 3 ft (0.91 m)
Total friction loss equivalent = 12 ft (3.64 m)

Total venting length for this example is:
GB142-24/30/45 = 100 ft (30.48 m) · 12 ft (3.64 m) = 88 feet (26.84 m)
GB142-60 = 60 ft (18.29 m) · 12 ft (3.64 m) = 48 feet (14.65 m).

Table 4 Friction Loss Equivalent in piping and fittings

<table>
<thead>
<tr>
<th>Fittings or Piping</th>
<th>Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>feet</td>
</tr>
<tr>
<td>45 degree elbow</td>
<td>3</td>
</tr>
<tr>
<td>90 degree elbow</td>
<td>5</td>
</tr>
<tr>
<td>plastic pipe per foot</td>
<td>1</td>
</tr>
<tr>
<td>concentric vent kit</td>
<td>3</td>
</tr>
</tbody>
</table>

NOTICE:
The minimum covering wall thickness is 1" (25 mm).
The maximum covering wall thickness is 16" (406 mm).

7.1 External connection board connections
Make all electrical connections inside the external connection box.

DANGER: 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.

6.8 Conversion to Propane
To convert the boiler to propane, following the instructions in the “Propane, Conversion Kit” Instruction manual. Available kits → page 36 “Spare parts”, [43].

NOTICE:
For Direct venting properly reassemble and reseal the vent and air-intake systems.
▶ Install a 120V cable to the boiler (→ fig. 30, [1]).
▶ Lead the cable through the cable guide (→ fig. 30, [2]).

Fig. 30  External connection board
Terminals 1 – 6 (→ fig. 31) are low-voltage connections and terminals 7 – 10 (→ fig. 31) are 120 Volt connections.

Fig. 31  Connections to external connection board

<table>
<thead>
<tr>
<th>[Pos]</th>
<th>Abbr.</th>
<th>Color</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>[1]</td>
<td>RC</td>
<td>orange</td>
<td>RC room controller connection or for an AM10 or other module</td>
</tr>
<tr>
<td>[2]</td>
<td>FA</td>
<td>blue</td>
<td>Outdoor-temperature sensor</td>
</tr>
<tr>
<td>[3]</td>
<td>WA</td>
<td>green</td>
<td>Potential-free On/Off thermostat</td>
</tr>
<tr>
<td>[4]</td>
<td>FW</td>
<td>gray</td>
<td>DHW temperature sensor</td>
</tr>
<tr>
<td>[5]</td>
<td>EV</td>
<td>red</td>
<td>External switching contact, potential-free for floor heating safety etc.</td>
</tr>
<tr>
<td>[6]</td>
<td>DWV</td>
<td>green</td>
<td>Connection for external 3-way valve</td>
</tr>
<tr>
<td>[7]</td>
<td>PK</td>
<td>green</td>
<td>Primary loop pump 120 V 60 Hz</td>
</tr>
<tr>
<td>[8]</td>
<td>PS</td>
<td>gray</td>
<td>DHW tank pump 120 V 60 Hz</td>
</tr>
<tr>
<td>[9]</td>
<td>PZ</td>
<td>lilac</td>
<td>DHW recirculating pump 120 V 60 Hz</td>
</tr>
<tr>
<td>[10]</td>
<td>Netz</td>
<td>white</td>
<td>Main power connection 120 V 60 Hz</td>
</tr>
</tbody>
</table>

**CAUTION:** Make sure that the power consumption of each of the terminals 7 – 9 (→ 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.

**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.

**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 120 V 60 Hz.

**PS**
Connector for the DHW tank pump 120 V 60 Hz.

**PZ**
Connector for the DHW recirculating pump 120 V 60 Hz.

**NETZ**
Main power connector 120 V 60 Hz (-15% +10%).

**120-volt connections**

**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.
Electrical connections

Fig. 32 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.

---

Fig. 33
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” 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 4.

▶ 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 (⇒ 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 (⇒ fig. 34) 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.

8.4 Bleeding the gas supply valve
▶ Loosen the screw plug on the testing nipple for the gas connection and venting (⇒ fig. 35, [1]) by two turns and fit a hose.

**WARNING:**
- There is a hot water scald potential if the BC10 is set too high.

**CAUTION:**
The burner must only be commissioned if the correct orifices are fitted (⇒ table 5).
▶ Convert the burner fitting to another gas type if required (⇒ chapter 6.8 “Conversion to Propane”, page 18).
8.7 Inlet gas pressure

▶ Connect the pressure gauge connection hose (➔ fig. 36, [2]) to the testing nipple (➔ fig. 36, [1]).

Fig. 36  Measuring the inlet gas pressure

[1] Testing nipple
[2] Pressure gauge connection hose

▶ 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.

Fig. 37  Opening the control panel

<table>
<thead>
<tr>
<th>Boiler capacity</th>
<th>Type of gas supply</th>
<th>Gas orifice diameter</th>
<th>Altitude 0-10,200 ft</th>
<th>Altitude 4,001-10,200 ft with CO₂-correction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>inch</td>
<td>mm</td>
<td>inch</td>
</tr>
<tr>
<td>24 kW</td>
<td>Natural gas</td>
<td>0.175</td>
<td>4.45</td>
<td>0.179</td>
</tr>
<tr>
<td></td>
<td>LPG P</td>
<td>0.132</td>
<td>3.35</td>
<td>0.134</td>
</tr>
<tr>
<td>30 kW</td>
<td>Natural gas</td>
<td>0.175</td>
<td>4.45</td>
<td>0.177</td>
</tr>
<tr>
<td></td>
<td>LPG P</td>
<td>0.132</td>
<td>3.35</td>
<td>0.134</td>
</tr>
<tr>
<td>45 kW</td>
<td>Natural gas</td>
<td>0.213</td>
<td>5.40</td>
<td>0.219</td>
</tr>
<tr>
<td></td>
<td>LPG P</td>
<td>0.163</td>
<td>4.15</td>
<td>0.163</td>
</tr>
<tr>
<td>60 kW</td>
<td>Natural gas</td>
<td>0.295</td>
<td>7.50</td>
<td>0.301</td>
</tr>
<tr>
<td></td>
<td>LPG P</td>
<td>0.213</td>
<td>5.40</td>
<td>0.215</td>
</tr>
</tbody>
</table>

Table 5  Gas orifice diameter

8.8 Checking and adjusting the gas/air ratio

▶ Switch off the heating system using the main switch b.
▶ Loosen the screw plug on the measuring nipple for the burner pressure by 2 rotations (➔ fig. 38, [1]).

Fig. 38  Checking the gas/air ratio

[1] Burner pressure measuring nipple
[2] Pressure gauge connection hose

▶ Set the pressure gauge to zero.
▶ Use a hose to connect the plus terminal of the pressure gauge to the burner pressure measuring nipple (➔ fig. 38, [1]).
▶ Switch on the heating system using the main switch a.
▶ 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. L80).

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 Start-up procedure

- 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) (±0.02 inch W.C. = ±5 Pa) (read-out on pressure gauge: \(-0.04 - 0\) inch W.C. = \(-10 - 0\) Pa).
- Enter the value measured in the start-up report.
- If the gas/air ratio is not correct it can be adjusted using the adjustment screw (fig. 39, [1]). The adjustment screw is located behind the cover screw.

Fig. 39 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 a.

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 (fig. 40).

Fig. 40 Flue gas sampling point

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.

8.12 Measuring the ionization current
- Switch off the heating system using the main switch b.
- Disconnect the plug and socket connection of the monitoring cable and connect the measuring device in series (fig. 41). 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. 41 Measuring the ionization current
Switch on the heating system using the main switch (a).
Press the “Chimney Sweep” (d) button and hold it (for approx. two seconds), until the display shows the decimal point.
Press and hold the “Chimney Sweep” (d) and “Service” (e) buttons, until the display shows “Lxx” (e.g. L80).
Set the boiler to partial load “L30” by pressing the “Chimney Sweep” (d) button (higher values) or the “Reset” (c) button (lower values).
Measure the ionization current. When the boiler is in partial load mode the ionization current must be > 5 μA DC.
Enter the value measured in the start-up report.
Repeatedly press the “Service” (e) button, until the temperature indication is displayed.
Press the “Chimney Sweep” (d) button to end the measurement procedure.
Switch off the heating system using the main switch (b).
Remove the measuring device and restore the plug and socket connection.
Switch on the heating system again using the main switch (a).
Push against the drawer (→ fig. 42) to close the control panel.

8.14 Installing the casing
Install the casing and close the latches (→ fig. 43). 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.

9 BC10 basic controller

9.1 Operating the BC10 basic controller

[1] Main switch
[2] DHW temperature knob
[3] LED “DHW status”
[4] Display
[5] Space heating water temperature knob
[7] Under the cover a RC system controller can be installed (not available).
[8] LED “Burner Operation”
[9] Service Tool connector
[10] “Service” (e) button
[11] “Chimney sweep” (d) button
[12] “Reset” (c) button
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.

<table>
<thead>
<tr>
<th>LED</th>
<th>Condition</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>On</td>
<td>Burner operational</td>
<td>The water in the boiler is being heated.</td>
</tr>
<tr>
<td>Off</td>
<td>Burner off</td>
<td>The water in the boiler has reached the required temperature or there is no heat request.</td>
</tr>
</tbody>
</table>

Table 6 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 (→ section 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 → section 13.3.

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

<table>
<thead>
<tr>
<th>Displays (examples)</th>
<th>Values</th>
<th>Meaning</th>
<th>Operating condition/Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>140</td>
<td>number 0 … 199</td>
<td>Current boiler water temperature (in °F)</td>
<td>Normal operating conditions</td>
</tr>
<tr>
<td>1</td>
<td>P2 1</td>
<td>Current system pressure (in psi)</td>
<td>Warning</td>
</tr>
<tr>
<td>1</td>
<td>-H</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P12</td>
<td>P3 … P12</td>
<td>Warning: System pressure is too low (between 3 and 12 psi = 0.2 and 0.8 bar)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>-H</td>
<td></td>
<td></td>
</tr>
<tr>
<td>140</td>
<td>current boiler water temperature (in °F)</td>
<td>Normal operating conditions</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>P12</td>
<td>P3 … P12</td>
<td>Warning</td>
</tr>
<tr>
<td>1</td>
<td>current system pressure (in psi)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>P3</td>
<td>Fault: system pressure is far too low (&lt; 3 psi = 0.2 bar)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>201</td>
<td>Error code</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>combination of letters and digits</td>
<td>Service code</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>207</td>
<td>number &gt; 199</td>
<td>Fault</td>
</tr>
<tr>
<td>1</td>
<td>current boiler water temperature (in °F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>current system pressure (in psi)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 7 Possible status displays

Displays (examples) Values Meaning Operating condition/Remedy
140 number 0 … 199 Current boiler water temperature (in °F) Normal operating conditions
1 P2 1 > P15 Current system pressure (in psi) Warning Heating system remains operational between 12 psi and 3 psi (0.8 and 0.2 bar).
1 -H Warning The system pressure is shown for 10 minutes after which the standard display returns.
140 number 0 … 199 Current boiler water temperature (in °F) Normal operating conditions
1 P12 P3 … P12 Current system pressure (in psi) Warning The system pressure is shown for 10 minutes after which the standard display returns.
1 P3 < P3 Fault: system pressure is far too low (< 3 psi = 0.2 bar) Warning Heating system remains operational between 12 psi and 3 psi (0.8 and 0.2 bar).
1 201 number > 200 Error code Warning The system pressure is shown for 10 minutes after which the standard display returns.
1 140 number 0 … 199 Current boiler water temperature (in °F) Fault Burner and boiler circuit pump are not operational. Frost protection is active up to 2 psi (0.1 bar). The heating system will only become operational again if the pressure is back to 14.5 psi (1.0 bar).
1 P3 < P3 Current system pressure (in psi) Fault Burner and boiler circuit pump are not operational. Frost protection is active up to 2 psi (0.1 bar). The heating system will only become operational again if the pressure is back to 14.5 psi (1.0 bar).
1 201 number > 199 Error code Fault 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.
1 140 number 0 … 199 Current boiler water temperature (in °F) Fault Remedy any blocking faults that remain active for a long time using the service section in this manual.
### 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 partial load mode.
- 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 % (= 0.5 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 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.

#### 9.3 Configuring the boiler

##### 9.3.1 Adjusting the heating capacity

Setting the heating capacity depending on the maximum heat requirement (→ table 8).

<table>
<thead>
<tr>
<th>Regulator setting in %</th>
<th>boiler cap. 24 kW</th>
<th>Heating capacity (±5 %, sea level 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>kW</td>
<td>boiler cap. kW</td>
</tr>
<tr>
<td>L30</td>
<td>7.2</td>
<td>24,566</td>
</tr>
<tr>
<td>L40</td>
<td>9.6</td>
<td>32,755</td>
</tr>
<tr>
<td>L50</td>
<td>12.0</td>
<td>40,944</td>
</tr>
<tr>
<td>L60</td>
<td>14.4</td>
<td>49,133</td>
</tr>
<tr>
<td>L70</td>
<td>16.8</td>
<td>57,322</td>
</tr>
<tr>
<td>L80</td>
<td>19.2</td>
<td>65,510</td>
</tr>
<tr>
<td>L90</td>
<td>21.6</td>
<td>73,699</td>
</tr>
<tr>
<td>L--</td>
<td>24.0</td>
<td>81,888</td>
</tr>
</tbody>
</table>

Table 8 Heating capacity

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

- Press and hold the "Chimney Sweep" and "Service" buttons until an "L" with a double-digit value (e.g. L80) or an "L" followed by two dashes (L - - ) is displayed. Factory setting "L - - (= L - - ) is displayed.

- 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.

### Table 7 Possible status displays

<table>
<thead>
<tr>
<th>Displays (examples)</th>
<th>Values</th>
<th>Meaning</th>
<th>Operating condition/Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>R 12</td>
<td>A00 ... A99</td>
<td>Service code</td>
<td></td>
</tr>
<tr>
<td>8 16</td>
<td>number &gt; 800</td>
<td>Error code</td>
<td>Remedy the error using the service section in this manual</td>
</tr>
<tr>
<td>- H</td>
<td>number 0 ... 199</td>
<td>Current boiler water temperature (in °F)</td>
<td></td>
</tr>
<tr>
<td>140</td>
<td>&gt; P15</td>
<td>Current system pressure (in psi)</td>
<td></td>
</tr>
<tr>
<td>- (flashing)</td>
<td>Fault</td>
<td>No communication between BC10 and automatic gas burner.</td>
<td></td>
</tr>
</tbody>
</table>

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

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

**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).
9.3.2 Setting the DHW temperature value
▶ Turn the “DHW temperature” \( \circ \) rotary knob to set the desired temperature of the hot water in the hot-water tank.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Explanation</th>
<th>LED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>No hot water supply (only heating mode).</td>
<td>Off</td>
</tr>
<tr>
<td>Eco (^1)</td>
<td>Economy mode, Hot water temperature (^2) (140 , ^\circ F (60 , ^\circ C))</td>
<td>On (^3)</td>
</tr>
<tr>
<td>86 – 140</td>
<td>Direct setting on BC10 (^4) in °F</td>
<td>On (^3)</td>
</tr>
<tr>
<td>Aut</td>
<td>Entry via thermostat (^2) (presetting)</td>
<td>On (^3)</td>
</tr>
</tbody>
</table>

Table 9 Settings of “DHW temperature” knob
\(^1\) This function has been optimized for boilers with combined DHW heating (combi-units).
\(^2\) The heating program (timer) of the room control unit remains active, as a result of which no hot water is heated during night-time operation.
\(^3\) The heating program (timer) of the room control unit remains active, as a result of which no hot water is heated during night-time operation.

9.3.3 Entering the space heating water temperature
▶ Turn the “space heating water temperature” \( \circ \) knob to set the upper limit value of the heater water for the heating operation. This limitation does not apply to DHW preparation.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Explanation</th>
<th>LED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>No supply to heating system (only DHW heating operation).</td>
<td>Off</td>
</tr>
<tr>
<td>86 – 190</td>
<td>Direct setting on BC10 in °F (86 – 190 °F = 30 – 90 °C)</td>
<td>On (^1)</td>
</tr>
<tr>
<td>Aut</td>
<td>Entry via thermostat (presetting)</td>
<td>On (^1)</td>
</tr>
</tbody>
</table>

Table 10 Settings of “space heating water temperature” rotary knob
\(^1\) The LED under the rotary knob lights up when the heating system is switched on and heat is requested. In summer mode the heating system is switched off (LED off).

9.3.4 Setting the pump post-purge period
A pump must be connected to PK (\( \rightarrow \) fig. 31, \( [7] \)) 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” \( \circ \) and “Service” \( \circ \) buttons until the display shows “L- -” (= \([1/ -/ -])\).

▶ Press the “Service” \( \circ \) 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” \( \circ \) or “Reset” \( \circ \) 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” \( \circ \) 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 25.
▶ Switch off the heating system using the main switch b.
▶ 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.

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” \( \circ \) and “Service” \( \circ \) buttons until the display shows “L- -” (= \([1/ -/ -])\).

▶ Press the “Service” \( \circ \) 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” \( \circ \) or “Reset” \( \circ \) 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” \( \circ \) button to confirm the setting.

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

We advise you to offer your customer an annual inspection and maintenance contract (for the contents of this contract, ➔ page 35 and page 35).

If inspection reveals that maintenance work is necessary you can carry this out as required (➔ chapter 12 “Maintenance”, page 29).

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.

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 collection 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 9).

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 section 8.12 “Measuring the ionization current” page 24.

11.5 Measuring the inlet gas pressure

See section 8.7 “Inlet gas pressure”, page 23.

11.6 Checking and adjusting the gas/air ratio

See section 8.8 “Checking and adjusting the gas/air ratio”, page 23.

11.7 Carrying out a gas leak test in operating conditions

See section 8.9 “Carrying out a leak test in operating conditions”, page 24.

11.8 Measuring the carbon monoxide content (CO)

See section 8.10 “Measuring the carbon monoxide content (CO)”, page 24.

11.9 Carrying out a pressure test of the heating system

See chapter 8 “Start-up procedure”, page 21.

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

See section 8.5 “Checking the combustion air/flue gas connection”, page 22.

11.11 Checking venting systems

Check air intake and flue gas for obstruction or damage.

12 Maintenance

► 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

► Dismantle the hot surface ignitor and the ionization electrode.
► Loosen the fastening nuts (➔ fig 45, [1]).
► Remove the earth cable (➔ fig 45, [2]).
► Remove the retaining plate.
► Pull the hot surface ignitor (➔ fig 45, [3]) and the ionization electrode (➔ fig 45, [4]) out of the heat exchanger.

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:
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.

Fig. 45 Removing the hot surface ignitor and the ionization electrode

[1] Fastening nut
[2] Earth cable
[3] Hot surface ignitor
[4] Ionization electrode
Loosen the threaded connection to the gas control valve (fig 46, [1]) and pull the plug (fig 46, [2]) from the gas valve terminal block.

Pull the plug from the fan unit (fig 46, [3]).

Loosen both sets of retaining clips (fig 46, [4] and [5]) of the burner cover and remove the burner cover with the fan unit and the gas burner fitting (fig 47, [1]).

Remove the gas/air distributor plate (fig 47, [2]), the orifice plate (GB142-24, GB142-30 and GB142-60 only, fig 47, [3]) and the burner (fig 47, [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.

Remove the baffle plate and clean it using compressed air (fig 48).

Flush the heat exchanger with water (fig. 49).

Re-assemble all parts in reverse order of disassembly.

NOTICE:

Switch on the heating system using the main switch .

Press the “Chimney Sweep” button until the decimal point is displayed. Leave the boiler on for approx. 10 minutes.

Switch off the heating system using the main switch .

Dismantle the boiler again and flush the heat exchanger with water.

Pull the condensate trap from the condensate plate (fig 50, [1]).

Pull the internal condensate bypass pipe from the condensate trap (fig 50, [2]).
Appendix

13 Appendix

13.1 Operating messages
- Press the “Service” button a number of times to switch between the various status displays.

<table>
<thead>
<tr>
<th>Display</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal mode –/–</td>
<td></td>
</tr>
<tr>
<td>- H</td>
<td>Boiler in space heating mode ¹</td>
</tr>
<tr>
<td>- H</td>
<td>Boiler in DHW heating mode</td>
</tr>
<tr>
<td>Normal mode</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Burner interval circuit, burner will start automatically after 10 minutes</td>
</tr>
<tr>
<td>C</td>
<td>Burner is started</td>
</tr>
<tr>
<td>E</td>
<td>More capacity was delivered than required</td>
</tr>
<tr>
<td>E</td>
<td>Standby</td>
</tr>
<tr>
<td>L</td>
<td>Gas burner fitting is opened</td>
</tr>
<tr>
<td>U</td>
<td>Initializing/pre purge</td>
</tr>
<tr>
<td>Y</td>
<td>Flow temperature higher than set</td>
</tr>
<tr>
<td>Test mode –</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>Dot displayed in right hand bottom corner</td>
</tr>
<tr>
<td>Manual mode –</td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>Blinking dot in right hand bottom corner</td>
</tr>
<tr>
<td>Reset</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Reset (after holding the “Reset” button for 5 seconds, the heating system is returned to its switch-on condition)</td>
</tr>
</tbody>
</table>

Table 11 Normal operating messages

¹ “- 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 A01/018. 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 “R” and they refer to faults between the boiler and the additionally available electronic components.

<table>
<thead>
<tr>
<th>Display</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Water flow / water pressure</td>
<td>E 207 System pressure too low &lt; 3 psi (0.2 bar).</td>
</tr>
<tr>
<td></td>
<td>F 211 Temperature difference between safety and supply sensors too much or no temperature increase after starting the burner.</td>
</tr>
<tr>
<td></td>
<td>L 266 Test of pump operation via a pressure increase in the heating system (during pump start).</td>
</tr>
<tr>
<td></td>
<td>P Temperature increase of safety sensor or supply sensor too high.</td>
</tr>
<tr>
<td></td>
<td>U Temperature difference between supply and return sensor too much.</td>
</tr>
<tr>
<td></td>
<td>Y Pump feedback fault.</td>
</tr>
<tr>
<td>3 Fan speed</td>
<td>R 264 Fan unit failed during operation.</td>
</tr>
<tr>
<td></td>
<td>C 217 Fan unit is running too fast.</td>
</tr>
<tr>
<td></td>
<td>F 213 Continuous 24 hour operation.</td>
</tr>
<tr>
<td></td>
<td>L 214 Fan shut down during security test.</td>
</tr>
<tr>
<td></td>
<td>P 216 Fan unit is running too slowly.</td>
</tr>
<tr>
<td></td>
<td>Y 215 Fan unit is running too fast.</td>
</tr>
<tr>
<td>4 Temperatures</td>
<td>R 218 Supply sensor over 220 °F (105 °C).</td>
</tr>
<tr>
<td></td>
<td>E 210 Sensor test failed.</td>
</tr>
<tr>
<td></td>
<td>F 219 The safety temperature sensor has detected a flow temperature of over 266 °F (130 °C).</td>
</tr>
<tr>
<td></td>
<td>L 220 Safety sensor affected by short circuit or higher than 266 °F (130 °C).</td>
</tr>
<tr>
<td></td>
<td>P 221 Loose contact or defective safety sensor.</td>
</tr>
<tr>
<td></td>
<td>U 222 Supply sensor affected by short circuit.</td>
</tr>
<tr>
<td></td>
<td>Y 223 Loose contact or faulty supply sensor.</td>
</tr>
<tr>
<td>6 Flame monitoring</td>
<td>R 227 No ionization message after ignition.</td>
</tr>
<tr>
<td></td>
<td>C 229 Ionization measured before burner start.</td>
</tr>
<tr>
<td></td>
<td>L 306 The flame went out during the heating phase.</td>
</tr>
<tr>
<td></td>
<td>P 229 Hot-surface ignitor on for too long.</td>
</tr>
<tr>
<td>1 Grid voltage</td>
<td>L 250 The grid power was interrupted after an error.</td>
</tr>
<tr>
<td></td>
<td>L 261 UBA fault.</td>
</tr>
<tr>
<td>8 External switching contact</td>
<td>Y External switching contact, e.g. temperature safety switch for floor heating, has taken place.</td>
</tr>
</tbody>
</table>

Table 12
### 13.3 Technical specifications

#### General specifications

<table>
<thead>
<tr>
<th></th>
<th>unit</th>
<th>boiler cap. 24 kW</th>
<th>boiler cap. 30 kW</th>
<th>boiler cap. 45 kW</th>
<th>boiler cap. 60 kW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas category</td>
<td></td>
<td>Natural gas</td>
<td>Natural gas</td>
<td>Natural gas</td>
<td>Natural gas</td>
</tr>
<tr>
<td>Rated thermal load for Natural gas</td>
<td>btu/hr</td>
<td>25,700 – 84,800</td>
<td>31,800 – 106,000</td>
<td>46,000 – 160,900</td>
<td>66,000 – 214,800</td>
</tr>
<tr>
<td>Rated heating capacity for heating curve 176/140 °F (80/60 °C)</td>
<td>btu/hr</td>
<td>22,700 – 75,200</td>
<td>28,100 – 91,500</td>
<td>40,600 – 142,200</td>
<td>58,200 – 189,800</td>
</tr>
<tr>
<td>Rated heating capacity for heating curve 122/86 °F (50/30 °C)</td>
<td>btu/hr</td>
<td>25,300 – 83,300</td>
<td>30,700 – 102,400</td>
<td>45,100 – 158,500</td>
<td>64,800 – 211,600</td>
</tr>
<tr>
<td>Boiler efficiency rating max. capacity for heating curve 176/140 °F (80/60 °C)</td>
<td>%</td>
<td>88</td>
<td>88</td>
<td>88</td>
<td>88</td>
</tr>
<tr>
<td>Boiler efficiency rating max. capacity for heating curve 122/86 °F (50/30 °C)</td>
<td>%</td>
<td>97</td>
<td>97</td>
<td>97</td>
<td>97</td>
</tr>
<tr>
<td>CSA Output</td>
<td>btu/hr</td>
<td>76,300</td>
<td>95,400</td>
<td>144,800</td>
<td>178,900</td>
</tr>
</tbody>
</table>

#### Heating

<table>
<thead>
<tr>
<th>Max. flow temperature</th>
<th>°F (°C)</th>
<th>194 (90)</th>
<th>194 (90)</th>
<th>194 (90)</th>
<th>194 (90)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heater water temperature</td>
<td>°F (°C)</td>
<td>86 – 190 (30 – 90), can be set on BC10 basic controller</td>
<td>86 – 190 (30 – 90), can be set on BC10 basic controller</td>
<td>86 – 190 (30 – 90), can be set on BC10 basic controller</td>
<td>86 – 190 (30 – 90), can be set on BC10 basic controller</td>
</tr>
</tbody>
</table>

#### Pipe connections

<table>
<thead>
<tr>
<th>Gas connection</th>
<th>inch</th>
<th>%&quot; NPT</th>
<th>%&quot; NPT</th>
<th>%&quot; NPT</th>
<th>%&quot; NPT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heating system water connection</td>
<td>inch (mm)</td>
<td>1.0&quot; NPT (25.4)</td>
<td>1.0&quot; NPT (25.4)</td>
<td>1.0&quot; NPT (25.4)</td>
<td>1.0&quot; NPT (25.4)</td>
</tr>
<tr>
<td>Condensate water connection</td>
<td>inch (mm)</td>
<td>Ø 1.3&quot; (Ø 32)</td>
<td>Ø 1.3&quot; (Ø 32)</td>
<td>Ø 1.3&quot; (Ø 32)</td>
<td>Ø 1.3&quot; (Ø 32)</td>
</tr>
</tbody>
</table>

#### Flue gas values

| Condensate water quantity for natural gas G20, 104/86 °F (40/30 °C) | gallons per hour | 2.6 | 3.3 | 4.7 | 7.1 |
| pH value condensate water | 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) |
| CO₂ content, full load, natural gas G20 | % | 9.2 | 9.2 | 9.3 | 9.3 |
| CO₂ content, full load, LPG G31, propane | % | 10.0 | 10.0 | 10.0 | 10.0 |
| Standard emission factor CO | mg/kWh | ≤ 15 | ≤ 15 | ≤ 15 | ≤ 15 |
| Standard emission factor NOₓ | mg/kWh | ≤ 20 | ≤ 20 | ≤ 20 | ≤ 20 |
| Free fan feed pressure | inch w.c. (Pa) | up to 0.023 (up to 60) | up to 0.039 (up to 100) | up to 0.054 (up to 140) | up to 0.054 (up to 140) |

#### Flue gas connection

| Ø Flue system, dependent on the air in the room | inch (mm) | 3 (80) | 3 (80) | 3 (80) | 3 (80) |
| Ø Flue gas system, independent of the air in the room | inch (mm) | 3/3 (80/80) parallel | 3/3 (80/80) parallel | 3/3 (80/80) parallel | 3/3 (80/80) parallel |

#### Electric data

| Mains voltage (-15%, +10%) | V, Hz | 120, 60 | 120, 60 | 120, 60 | 120, 60 |
| Fuses | amps | 5 amps 120 V slow blow | 5 amps 120 V slow blow | 5 amps 120 V slow blow | 5 amps 120 V 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 |

#### Boiler dimensions and weight

| Height × Width × Depth | inch (mm) | 28 × 22 × 18.7 (712 × 560 × 475) | 28 × 22 × 18.7 (712 × 560 × 475) | 28 × 35.4 × 18.7 (712 × 900 × 475) | 28 × 35.4 × 18.7 (712 × 900 × 475) |
| Weight | lbs (kg) | 110 (50) | 110 (50) | 143 (65) | 158 (72) |

---

1) The performance information shown is based on 'European performance standards'.
2) If the heating capacity is limited to max. 80% (L80).
The gas orifice diameter is marked on the gas orifice (in mm).

The venturi article number is marked on both clips of the venturi (→ fig. 51, [1]).

The venturi article number is marked on both clips of the venturi (→ fig. 51, [1]).

Table 14 Factory setting of the gas control valve

<table>
<thead>
<tr>
<th>Type of gas supply</th>
<th>Factory pre-setting of the gas control valve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural gas</td>
<td>Delivered factory-set: Natural Gas</td>
</tr>
<tr>
<td>LPG P</td>
<td>Suitable for propane after conversion (→ chapter “Conversion to Propane”). Information on gas type instruction plate: Set to gas category: Propane.</td>
</tr>
</tbody>
</table>

Table 15 Gas orifice diameter

<table>
<thead>
<tr>
<th>Boiler capacity</th>
<th>Type of gas supply</th>
<th>Venturi article number</th>
<th>Gas orifice diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Altitude 0 - 10,200 ft</td>
</tr>
<tr>
<td>24 kW</td>
<td>Natural gas H</td>
<td>423.072A</td>
<td>0.175</td>
</tr>
<tr>
<td></td>
<td>LPG P</td>
<td>423.072A</td>
<td>0.132</td>
</tr>
<tr>
<td>30 kW</td>
<td>Natural gas H</td>
<td>423.072A</td>
<td>0.175</td>
</tr>
<tr>
<td></td>
<td>LPG P</td>
<td>423.072A</td>
<td>0.132</td>
</tr>
<tr>
<td>45 kW</td>
<td>Natural gas H</td>
<td>423.170A</td>
<td>0.213</td>
</tr>
<tr>
<td></td>
<td>LPG P</td>
<td>423.170A</td>
<td>0.163</td>
</tr>
<tr>
<td>60 kW</td>
<td>Natural gas H</td>
<td>423.173A</td>
<td>0.295</td>
</tr>
<tr>
<td></td>
<td>LPG P</td>
<td>423.173A</td>
<td>0.213</td>
</tr>
</tbody>
</table>

14 Reports

14.1 Start-up report

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

<table>
<thead>
<tr>
<th>Start-up activities</th>
<th>Page</th>
<th>Measured values</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Fill the heating system and check that all connections are tight</td>
<td>21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Inlet pressure of expansion tank (observe the installation instructions for the expansion tank)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Pressurize the system</td>
<td>21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Fill the condensate trap</td>
<td>21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Carry out a gas tightness test</td>
<td>21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Note down the gas characteristics:</td>
<td>21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wobbe index</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating heat value</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Convert the boiler to another type of gas supply (only if allowed)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Vent the gas supply conduit</td>
<td>22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Check the combustion air/flue gas connection</td>
<td>22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Measure the gas connection pressure (flow pressure)</td>
<td>23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Check and adjust the gas/air ratio</td>
<td>23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Measure the carbon monoxide content (CO)</td>
<td>24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Check and if necessary adjust the carbon monoxide content (CO₂)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Measuring the ionization current</td>
<td>24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Make the necessary settings on the thermostat</td>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Carry out function testing</td>
<td>24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Fitting the casing</td>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Inform the owner; hand over the technical documents</td>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Confirm proper start-up</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Company stamp/signature/date

Table 16
### 14.2 Inspection report

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

<table>
<thead>
<tr>
<th>Inspection activities</th>
<th>Page</th>
<th>Date: ________</th>
<th>Date: ________</th>
<th>Date: ________</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Test the general condition of the heating system</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Carry out a visual inspection and test the functions of the heating system</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Test all gas and water conduits and fittings for:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• their tightness during operation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• visible corrosion</td>
<td>29</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• signs of aging</td>
<td>22</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• fill the condensate trap</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Check the burner, the heat exchanger and the condensate trap for pollution.</td>
<td>29</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First shut down the heating system</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Check the burner and the ignition and ionization electrodes.</td>
<td>29</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First shut down the heating system</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Measure the ionization current</td>
<td>24</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Measure the gas connection pressure (flow pressure)</td>
<td>23</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Check the gas/air ratio</td>
<td>23</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Carry out a gas tightness test in operating conditions</td>
<td>29</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Measure the carbon monoxide content (CO)</td>
<td>29</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Check the water pressure of the heating system</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Inlet pressure of expansion tank (also see the Installation Instructions for the expansion tank)</td>
<td>29</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Filling pressure</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Check the operation and safety of the air intake and flue pipe</td>
<td>22</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Check that the thermostat is set in line with the needs (see documents with the thermostat)</td>
<td>25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Final check of inspection activities, note down the measurement and test results</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Confirm proper inspection</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 17

### 14.3 Maintenance report

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

<table>
<thead>
<tr>
<th>Needs-dependent maintenance activities</th>
<th>Page</th>
<th>Date: ________</th>
<th>Date: ________</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Clean the burner, the heat exchanger and the condensate trap. First shut down the heating system</td>
<td>29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Check and adjust the gas/air ratio</td>
<td>23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO₂ content with full load</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO₂ content with partial load</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Confirm proper maintenance</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 18
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.

<table>
<thead>
<tr>
<th>Pos.</th>
<th>Description</th>
<th>Product No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Casing 24/30 kW</td>
<td>7099988</td>
</tr>
<tr>
<td></td>
<td>Casing 45/60 kW</td>
<td>7099901</td>
</tr>
<tr>
<td>2</td>
<td>Casing latches left (2 pc)</td>
<td>7099039</td>
</tr>
<tr>
<td>3</td>
<td>Casing latches right (2 pc)</td>
<td>7099038</td>
</tr>
<tr>
<td>4</td>
<td>Casing seal 24/30 kW</td>
<td>7098752</td>
</tr>
<tr>
<td>5</td>
<td>Casing seal 45/60 kW</td>
<td>7098798</td>
</tr>
<tr>
<td>6</td>
<td>Wall mounting bracket</td>
<td>7098364</td>
</tr>
<tr>
<td>7</td>
<td>Back panel 24/30 kW</td>
<td>7099001</td>
</tr>
<tr>
<td></td>
<td>Back panel 45/60 kW</td>
<td>7099903</td>
</tr>
<tr>
<td>8</td>
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<td>Cable harness of on/off switch</td>
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<td>Cable harness BX holder</td>
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Table 19

1) not shown in exploded views
Exploded view Logamax plus GB142-24/30

Fig. 52
Exploded view Logamax plus GB142-45/60

Fig. 53