Installation instructions

Condensing gas boiler

Logamax plus

GB162-80 kW
GB162-100 kW

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.
Fig. 1 Logamax plus GB162 with pump group
[1] BC10 basic controller receptacle
[2] Installation option for room controller, e.g. RC35
[3] Cover with user manual compartment
[4] BC10 basic controller, can be expanded e.g. by the RC35 room controller
[5] Connection box (low-voltage and 120 VAC connections)
[6] Fan harness and mains lead of the pump
[7] Condensate drain outlet
[8] Condensate collector
[9] Boiler front door
[10] Automatic air vent
[12] Air intake for the fan
[14] Flue gas pipe
[15] Door lock
[16] Flue gas sensor
[17] Flue measuring point
[18] Measuring point for air intake
[19] Flue gas connection
[20] Air intake connection
[21] Fan
[22] Gas valve
[23] Venturi
[24] Burner cover
[25] Flow temperature sensor
[26] Ionization electrode
[27] Sighting glass
[28] Glow igniter
[29] Safety temperature sensor
[30] Heat exchanger
[31] Pressure sensor
[32] Return temperature sensor
[33] Universal Burner Automatic Version 3 (UBA 3)
[34] Draw with function module integration options
[35] Cover shield
[36] Condensate trap

Pump group (scope of delivery)
[37] Isolating valve, blue (CH boiler return) with pump, drain cock, check valve and thermometer
[38] Manual gas shut off valve, yellow (GAS)
[39] Isolating valve, red (CH boiler flow) with drain cock, pressure gauge and thermometer
[40] Pressure gauge
[41] Isolating valve
[42] Thermometer (optional accessory)
[43] Drain valve
[44] Safety valve 30 psi (2 bar) (or 50 psi [3.45 bar] = optional)

The pump group also includes an insulation cover (see also pump group installation instructions).

Low loss header (single appliance only):
[45] Low loss header (not illustrated)
12.4 Check and adjust the gas/air ratio (flue gases CO2 emissions) ........................................... 45
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1 Explanation of symbols and safety information

1.1 Guideline to symbols

Warnings

A fire or explosion may result causing property damage, personal injury or death.
If the information in these instructions is not followed exactly, beware if you smell gas: there may be an explosion hazard!

- Make sure that air vents are not reduced in size or obstructed.
- The boiler may only be operated after the defect has been remedied.
- Warn the user of the system of the defect verbally and in writing.

DANGER: Dangerous flue gas can escape if the air supply is insufficient.

General warnings

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.
- Maintenance and repairs must only be carried out by trained professionals.
- You are only permitted 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 approval of the flue system and the condensate connection to the public sewer system may be required.

1.2 Safety instructions

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

Important information

- Important information neither indicating personal injury nor damage to property are marked with this symbol. They are separated by lines above and below the text.

Additional symbols

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>▶</td>
<td>Sequence of steps</td>
</tr>
<tr>
<td>➔</td>
<td>Cross-reference to other points in this document or to other documents</td>
</tr>
<tr>
<td>•</td>
<td>Listing/list entry</td>
</tr>
<tr>
<td>–</td>
<td>Listing/list entry (2nd level)</td>
</tr>
</tbody>
</table>

Table 1
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.

Operating Limits of the boiler:
Max. boiler temperature: 230 °F (110 °C)
Max. operating pressure: 30 psi (2.6 bar)
- with optional pressure relief valve 50 psi (3.45 bar).

The hot water distribution system must comply with 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.

2.1 Massachusetts Installations Only
(a) For all side wall side horizontally vented gas fuelled 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 7 feet above finished grade in the area of the venting, including but not limited to decks and porches, the following requirements shall be satisfied:

1. INSTALLATION OF CARBON MONOXIDE DETECTORS. At the time of installation of the side wall horizontally 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 30 day period, a battery operated carbon monoxide detector with an alarm shall be installed. alarm and battery back-up may be installed on the next adjacent floor level.

2. APPROVED CARBON MONOXIDE DETECTORS. Each carbon monoxide detector as required in accordance with the above provisions shall comply with NPA 720 and be ANSI/UL 2034 listed and IAS certified.

3. SIGNAGE. A metal or plastic identification plate shall be permanently mounted to the exterior of the building at a minimum height of 8 ft. above grade directly in line with the exhaust vent terminal for the horizontally vented gas fuelled heating appliance or equipment. The sign shall read, in print size no less than 1-½” in size, GAS VENT DIRECTLY BELOW, “KEEP CLEAR OF ALL OBSTRUCTIONS”.

If you cannot reach your gas supplier, do not connect new boiler venting to an existing vent system, if it is shared with other appliances.

The local building regulations stipulating the installation rules at the time of installation.

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.

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.

The boiler must not be installed on carpeting.
4. **INSPECTION.** The state or local gas inspector of the side wall horizontally vented gas fueled equipment shall not approve the installation unless, upon inspections, the inspector observes carbon monoxide detectors and signage installed in accordance with the provisions of 248 CRM 5.08(2)(a)1 through 4.

   **(b) EXEMPTIONS:** The following equipment is exempt from 248 CRM 5.08(2)(a)1 through 4:
   - The following equipment is exempt from 248 CRM 5.08(2)(a)1 through 4:
     1. The equipment listed in Chapter 10 entitled “Equipment Not Required To Be Vented” in the most correct edition of NFPA 54 as adopted by the board; and
     2. Product Approved side wall horizontally vented gas fueled equipment installed in a room or structure separate from the dwelling, building or structure used in whole or in part for residential purposes.

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

   When the manufacturer of Product Approved side wall horizontally mounted gas equipment provides a venting system design or venting system components with the equipment, the instructions provided by the manufacturer for the installation of the equipment and venting shall include:
   1. Detailed instructions for the installation of the venting system or the venting system components: and
   2. A complete parts list for the venting system design or venting system.

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

   When the manufacturer of Product Approved side wall horizontally vented gas fueled equipment does not provide the parts for the venting of flue gases, but identifies “special venting systems”, the following requirements shall be satisfied by the manufacturer:
   1. The referenced “special venting systems” shall be included with the appliance or equipment installation instructions: and
   2. The “special venting systems” shall be Product Approved by the Board, and the instructions for that system shall include a parts list and detailed installation instructions.

   **(e) A copy of all instructions.**

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

   **2.2 California Installations Only**

   In case this boiler is installed in California, it has to comply with SCAQMD Rule 1146.2. This boiler does comply with SCAQMD Rule 1146.2 at an optimum flue CO2-level of 9%. In case CO2-levels exceed the recommended value, the burner gas valve needs to be exchanged by an adjustable gas valve (accessory), and the boiler needs to be re-calibrated.

   **3 General information**

   **About these instructions**

   These Installation Instructions contain important information for the safe and professional installation, start-up and maintenance of the boiler with boiler input rating of 80 kW and 100 kW.

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

   **Cascade installation**

   Special cascade units (accessories) have been developed to enable this boiler to be installed in a cascade system. Every cascade unit includes an installation frame, horizontal headers, connection pipes for the boiler, main gas pipe and a vertical low loss header. Cascade units are available for installing the boilers inline or back-to-back. These cascade units may make installing a cascade system easier and less labor intensive. Please contact Buderus for further information about cascade systems.

   **Updating of documentation**

   The following technical documentation is available for the Logamax plus GB162-80 kW/100 kW:

   • Installation instructions,
   • User’s manual,
   • Service manual.

   **Subject to technical modifications**

   Slight changes may be made without prior notice to the illustrations, process steps and technical data as a result of our policy of continuous improvement.

<table>
<thead>
<tr>
<th>GB162</th>
<th>Natural Gas</th>
<th>Propane Gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>80 kW</td>
<td>290,000 btu/hr</td>
<td>270,000 btu/hr</td>
</tr>
<tr>
<td>100 kW</td>
<td>333,000 btu/hr</td>
<td>315,000 btu/hr</td>
</tr>
</tbody>
</table>

   **Table 2 max. input rate**

   **3.1 Designated use**

   The boiler was designed to heat water in a central heating system and generating domestic hot water. It is suitable for connection to fully pumped, sealed water systems only, with a maximum supply temperature set point off 180 °F (82 °C). The boiler can be installed either as a single system or as part of a multiple system (cascade system).

   This boiler may not be installed in places, 4,000 ft. above sea level.

   **3.2 Heating system water quality**

   The quality of the system water is very important. Poor water quality can damage heating systems due to scale formation and corrosion. For further details, please see the accompanying “Water quality requirements for Logamax plus GB162-80 kW/100 kW” manual.

   **CAUTION:**

   Risk of system damage due to unsuitable heating system water.

   - If oxygen-permeable pipes are used, e.g. for under floor heating systems, the systems must be separated from one another by plate heat exchangers. Unsuitable heating system water promotes sludge and corrosion formation. This can result in heat exchanger malfunction and damage.

   **3.3 Pump test**

   If the boiler has not been operational for approx. 2 days, the pump will automatically run for 10 seconds every 24 hours. This pump test is first carried out 24 hours after the main power has been connected to the boiler.

   **3.4 Freeze protection**

   The boiler has integrated freeze protection that switches the boiler ON at a space heating (CH) water temperature of 45 °F (7 °C) and switches it OFF at a CH flow temperature of 59 °F (15 °C).

   This feature does not protect the central heating system from freezing. If there is a risk of radiators or pipe sections freezing up, we recommend setting the pump run-over time to 24 hours (⇒ § 13.4, page 46).
### 3.5 Tools, materials and further 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 hand truck with a fastening belt is useful.

### 3.6 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.

## 4 Dimensions and connections
### 4.1 Without pump group

![Fig. 2 Dimensions and connections without pump group](image)

The required permanent clearances (closet) are:
- in front: 1" (25 mm)
- right side: 0
- left side: 0
- above: 6" (152 mm).

The position selected for installation MUST allow adequate space for servicing in front of the boiler of at least 16.5" + 20.5" = 37" (940 mm). Maintain an installation clearance from combustible construction from hot water piping of at least 1" (25 mm).
4.2 With pump group

Fig. 3 Dimensions and connections with pump group

[A] (LA) = Flue gas connection; inside diameter 4" (100 mm)
[B] (AA) = Air intake with pompadour; inside diameter 4" (100 mm)
[C] (WB) = Wall Bracket (not shown)
[D] (VK) = Supply; G1½" union nut with female thread
[E] (GAS) = Gas connection to boiler; Rp1" female thread
[F] (RK) = Return; G1½" union nut with female thread
[G] (AKO) = Condensate outlet; Ø 32 mm (1¼") O/D
[H] (PF) = Pump group supply; G1½" male thread, flat seal
[I] (PR) = Pump group return; G1½" male thread, flat seal

The required permanent clearances (closet) are:
in front: 1" (25 mm)
right side: 0
left side: 0
above: 6" (152 mm).

The position selected for installation MUST allow adequate space for servicing in front of the boiler of at least 16.5" + 20.5" = 37" (940 mm).
Maintain an installation clearance from combustible construction from hot water piping of at least 1" (25 mm).
5 Packaging and transportation

5.1 Scope of delivery
The boiler is delivered factory-assembled.

▶ When receiving the delivery, check if the packaging is intact.
▶ Check that all items are included in the delivery.

Fig. 4 Items supplied with unit

<table>
<thead>
<tr>
<th>Nr.</th>
<th>Parts</th>
<th>Qty.</th>
<th>Packaging</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Boiler with casing</td>
<td>1</td>
<td>1 box</td>
</tr>
<tr>
<td>2</td>
<td>Wall bracket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Condensate trap with hose</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Technical documents set</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Supply and return union nuts with sealing rings</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Screws and plugs for wall bracket</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Union nut for gas connection</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>DHW sensor</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Pump group</td>
<td>1</td>
<td>1 box</td>
</tr>
</tbody>
</table>

Table 3 Items supplied with GB162-80 kW/100 kW

Additional required accessories (not in delivery content)
A single boiler must be installed with the Buderus low loss header (LLH) to regulate the flow. The low loss header must be ordered separately. The low loss header delivery comes also with the AM10 modulating outdoor reset control.

Multiple boiler cascade installations can use the Buderus cascade frame accessories. Please contact Buderus for further informations.

▶ When receiving the delivery, check if the packaging is intact.
▶ Check that all items are included in the delivery (fig. 5).

Fig. 5 Additional accessories

1. Low loss header (single installation only)
2. AM10 modulating outdoor reset control

5.2 Transporting the boiler

CAUTION: The boiler may be damaged when it is improperly secured.
▶ Only transport the boiler using the right transportation equipment, such as a hand truck with a fastening belt or special equipment for maneuvering steps.
▶ During transportation the boiler must be secured on the transportation equipment to prevent it from falling off.
▶ Protect all parts against impacts if they are to be transported.
▶ Observe the transportation markings on the packaging.

CAUTION: The unpacked boiler may be damaged when not protected against contamination
▶ Leave the protective covers on the connections.
▶ Cover the flue gas connections at the top of the boiler with plastic film.
▶ Always lift and carry the boiler with 2 people as shown in fig. 6, or use a hand truck or special equipment.

Fig. 6 Lift and carry the boiler correctly

CAUTION: Damage to the unit by lifting or carrying incorrectly.
▶ Do not hold the boiler by the door covering the control panel (fig. 7).

Fig. 7 Incorrect way of lifting and carrying the boiler
6 Installation

6.1 Requirements for the installation room

DANGER:
- Install the heating system in a frost-free room.
- If the boiler is operated dependent on room air, the installation room must have the required air vents. Do not obstruct these vents. The air vents must always be free.
- When installed in a room with thin walls or a thin floor, resonating noise may occur. Install noise reducing parts if required.
- 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 Requirements for the heating system
- Installing a dirt trap like a y-strainer and a desludging device is required. This must be installed in the heating system in the immediate vicinity of the boiler, in an easily accessible position between the boiler and the lowest point in the return of the system.
- Clean the dirt trap at every annual service.
- Never use salt bedding type exchangers (ion exchangers) to soften the water.
- The low loss header and boiler connection set must be installed (supplied with the boiler).
- When using oxygen-permeable pipes (plastic), e.g. for floor heating systems, you must separate the system using secondary heat exchangers.

6.3 Installing the boiler
Observe the installation distances of the combustion air/flue gas system.
- Before starting installation check that the carrying capacity of the wall is sufficient for the boiler weight.

NOTICE
- To protect the connection orifice you must not remove the styrofoam bottom panel.
- Do not lift the boiler by the door covering the control panel (→ chap. 5.2 “Transporting the boiler”, page 10).
- Protect the boiler and the combustion air/flue gas orifice against pollution during installation.

- Remove the packaging and dispose of it in an environmentally manner.
- Measure the installation height (→ chap. 4 “Dimensions and connections”, page 8).
- Mark both holes with the wall bracket (→ fig. 8) using a spirit level.

- Install the wall bracket with 2 screws (→ fig. 8).

Fig. 8 Installing the wall bracket
- With 2 people, lift the boiler by holding it by its back and by the transport rail at its bottom and install it on the wall bracket (→ fig. 6, page 10).
- The boiler can be moved sideways to get the correct position.
- Level the boiler with the set screw and a spirit level (→ fig. 9).

Fig. 9 Aligning the boiler with the set screw
Installation

- Remove the protective covers from the bottom of the boiler (➔ fig. 10).

6.4 Water and Gas connection

6.4.1 General

The water and gas connections to the boiler are made using the pump group (➔ fig. 4, page 10). This pump group includes the circulation pump and a pressure relief valve.

▶ Install the pump group on the boiler in accordance with the pump group installation instructions.

A single boiler must be installed with the low loss header to regulate the flow.

▶ Install the low loss header [1].

NOTICE

- Some residual water from final testing may leak away.

6.4.2 Connecting the pressure relief valve (PRV)

The pressure relief valve is a part of the supplied pump group (➔ fig. 11, [1]). A listed ASME pressure relief valve supplied with the boiler must be installed at the time of installation. No valve is to be placed between the PRV and the boiler.

No reducing coupling or other restriction may be installed in the discharge line. The discharge line must be within 12" (305 mm) with a minimum of 4" (100 mm) above a drain and installed such that it allows complete drainage of both the PRV and the line. The location of the PRV must be readily accessible for servicing or replacement and be mounted as close to the boiler as possible. To install the PRV, a suitable fitting connected to an extension on a "T" fitting can be sweated to the hot water line. Support all piping.

Maintain an installation clearance from combustible construction of at least 1" (25 mm) from the hot water piping.

NOTICE

- Avoid installing the boiler above radiation levels. If the boiler is installed above radiation sections, a low water cutoff shall be installed and wired to the boiler. Follow local code or in case of use of a low water cutoff, be aware to use an air vent, in order to prevent the boiler from shutting down unnecessarily.
6.4.3 Making the gas connection

⚠️ **DANGER:**
- Only carry out work on gas lines if you are a qualified gas fitter.

- The manual gas shutoff valve is part of the pump group, and is installed in accordance with the pump group installation instructions.
- Determine proper size gas pipe for the installation using table 4 and table 5. Do not forget the pipe fitting losses and observe proper size of the fittings.
- Connect the gas supply pipe to the manual gas shutoff valve, so that it is free from any strain.

6.4.4 Installing the heating supply and return pipe

**Fig. 13 Connecting the boiler supply and return**

- Connect the supply pipe with a flat rubber seal installed to the Supply connection (fig. 13, [1]) making sure it is not under stress. Use a supply pipe with a minimum diameter of 1½" (38 mm).
- Connect the return pipe with a flat rubber seal installed to the Return connection (fig. 13, [2]) making sure it is not under stress. Use a return pipe with a minimum diameter of 1½" (38 mm).

6.4.5 Installing the pump

Always use the supplied Buderus pump group and the low loss header when installing a single boiler so correct flows are guaranteed. It is not necessary to install a low loss header for cascade systems.

- Install the pump (fig. 13, [8]) in the return circuit (fig. 13, [2]).

6.4.6 Installing the condensate trap

- Fill the condensate trap (supplied with the boiler) with water (fig. 14).

**Table 4 Gas pipe capacity for different pipe sizes**

<table>
<thead>
<tr>
<th>Length of pipe in feet (m)</th>
<th>Gas volume Capacity in ft.3/hr¹/</th>
<th>¾&quot;</th>
<th>1&quot;</th>
<th>1¼&quot;</th>
<th>1½&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 (3.05)</td>
<td>278</td>
<td>520</td>
<td>1,060</td>
<td>1,600</td>
<td></td>
</tr>
<tr>
<td>20 (6.1)</td>
<td>190</td>
<td>350</td>
<td>730</td>
<td>1,100</td>
<td></td>
</tr>
<tr>
<td>30 (9.15)</td>
<td>152</td>
<td>285</td>
<td>590</td>
<td>890</td>
<td></td>
</tr>
<tr>
<td>40 (12.2)</td>
<td>130</td>
<td>245</td>
<td>500</td>
<td>760</td>
<td></td>
</tr>
<tr>
<td>50 (15.25)</td>
<td>115</td>
<td>215</td>
<td>440</td>
<td>670</td>
<td></td>
</tr>
<tr>
<td>75 (22.88)</td>
<td>93</td>
<td>175</td>
<td>360</td>
<td>545</td>
<td></td>
</tr>
<tr>
<td>100 (30.5)</td>
<td>79</td>
<td>160</td>
<td>305</td>
<td>480</td>
<td></td>
</tr>
<tr>
<td>150 (47.25)</td>
<td>64</td>
<td>120</td>
<td>250</td>
<td>380</td>
<td></td>
</tr>
</tbody>
</table>

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

**Table 5 Equivalent length for pipe fittings in feet**

<table>
<thead>
<tr>
<th>Steel pipe diameter in inches (mm)</th>
<th>Equivalent length for Pipe Fittings in feet (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Type of pipe fitting</td>
</tr>
<tr>
<td></td>
<td>90º-Elbow</td>
</tr>
<tr>
<td>¾ (19)</td>
<td>2.1 (0.64)</td>
</tr>
<tr>
<td>1 (25)</td>
<td>2.6 (0.79)</td>
</tr>
<tr>
<td>1¼ (32)</td>
<td>3.5 (1.07)</td>
</tr>
<tr>
<td>1½ (38)</td>
<td>4.0 (1.22)</td>
</tr>
</tbody>
</table>

**NOTICE**

- When using plastic pipes, observe the supplier's instructions - especially those referring to recommended jointing techniques and the notes relating to the heating system water on page 7.

**NOTICE**

- To prevent contamination in the heating system we recommend you integrate a dirt filter (fig. 13, [10]) in the return pipe, near the boiler. In an old system it is a requirement to install a dirt filter. Also install shutoff valves to enable filter cleaning immediately upstream and downstream of the dirt filter (scale cartridge or y-strainer)

**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.
Connect the condensate trap [1] to the condensate outlet. The condensate trap has a bayonet connector, insert and turn \( \frac{1}{4} \) rotation clockwise to click into position.

▶ Connect the condensate trap hose [3] and the rubber sleeve [2] to the condensate trap [1].

6.5 Connecting the condensate drain pipe

**NOTICE**
- The condensate must be drained from the boiler in accordance with local, state or federal rules and regulations.

**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 ULC certified PVC or CPVC pipe, fittings and cement.

▶ Install the condensate drain pipe taking the following into account:
- An air gap of at least 1" (25.4 mm) must be maintained between the boiler condensate trap hose and the condensate pipe work (Fig. 17 and Fig. 18).
- If the condensate outlet of the boiler is lower than the drain, a condensate pump must be used.
- The condensate produced by the boiler has a pH value between 3 and 4.

▶ Install a neutralization unit if required by the local code.

6.5.1 Connecting the expansion vessel in a single-boiler system

**CAUTION:**
Damage to the installation due to faulty pressure relief valve.
- The expansion vessel must be of sufficient capacity.
Connect the expansion tank to the boiler return. If a check valve is available: connect the expansion vessel to the CH-side of the check valve in the return circuit [1].

![Diagram of connecting the expansion vessel in a single-boiler system](image)

**Fig. 19** Connecting the expansion vessel in a single-boiler system

1. Expansion vessel
2. Gas supply
3. Air gap < 1" (25.4 mm)

**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 valve 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.
- Connect a 1" well for the Manual Rest High Limit probe [3] at the horizontal end.
- Remove the 1" NPT plug to connect the LWCO stand pipe [1].
- 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.

**6.6 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/NFPA 54, or Sections 7.2, 7.3 or 7.4 of CAN/CGA B149, Installation Codes, or applicable provisions of the local building codes.

![Diagram of Low Water Cut-Off views](image)

**Fig. 20** 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 probe
4. Manual Reset High Limit

**DANGER:** Fire danger due to flammable materials or liquids.
- Do not store flammable materials and liquids in the immediate vicinity of the boiler.

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

6.7 Flue gas adapter

CAUTION:
Do not use lubricants to avoid degradation of the lip rings.
- When installing PVC vent pipes, remove the upper lip ring and insert [1].
- In case of open venting, use basket [2] on the air intake.
- When installing parallel PP venting material, remove upper lip ring and insert [1] and use PVC/PP PolyPro adapter offered by your local vent supplier.

![Fig. 21 Connecting the flue gas adapter (parallel)]

- When installing concentric PP venting material, remove upper lip ring and insert (⇒ fig. 21, [1]) and place air intake cap [1].

![Fig. 22 Placing air intake cap]

6.8 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.
- Observe the listed maximum lengths of vent system, which are boiler model dependent. The maximum permissible lengths are listed in table 8, page 21.
Optional vent kits are:
1. Parallel or concentric, horizontal (with approved wall terminal) or vertical.

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 meter, service regulator or the like (for room air applications only).

The termination shall terminate at least 2 ft. (610 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" (305 mm) above grade, anticipated snow line or roof surface (Canada 18" (457 mm) minimum) (→ fig. 24).

Vent termination must be at least 7 ft. (2,135 mm) above a public walkway (→ fig. 25).

**Fig. 23 Vent pipes**

Vent must be 3 ft. (915 mm) above any forced air intake within 10 ft. (3,050 mm) (→ fig. 25). Do not extend exposed vent pipe outside the building beyond recommended distance. Condensate could freeze and block vent pipe. Vent should terminate at least 3 ft. (915 mm) away from adjacent walls, inside corners and 5 ft. (1,525 mm) below roof overhang (→ fig. 25). It is not recommended to terminate vent above any door or window, condensate can freeze causing ice formations. Do not use chimney as a raceway if another boiler or fireplace is vented into or through chimney.

All PVC and CPVC vent pipes must be glued, except for the flue gas adapter. Installed you can slide the pipe onto the adapter, properly supported and the exhaust pipe must be pitched a minimum of a ¼" (6.35 mm) per foot back to the boiler. This allows the condensate to drain away.

All non-steel combustion air and vent pipe materials and fittings must comply with the following and must be UL approved venting material:

**Table 6 Approved venting air pipe material**

<table>
<thead>
<tr>
<th>Item</th>
<th>Material</th>
<th>United States</th>
<th>Canada</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot; (100 mm) Intake/combustion air pipe and fitting</td>
<td>PVC schedule 40, 80, CPVC schedule 40, 80</td>
<td>ANSI/ASTM D1785</td>
<td>BH gas venting systems, ULC S636 (1), Class IIA - PVC, Class IIB - CPVC, Class IIC - Polypropylene</td>
</tr>
<tr>
<td>PP M&amp;G Duravent PolyPro and Centrotherm InnoFlue SW</td>
<td>ANSI Cat IV, approved Polypropylene</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PP-Flex M&amp;G Duravent PolyPro Flex and Centrotherm InnoFlue SW Flex</td>
<td>ANSI Cat IV, approved Polypropylene</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pipe cement / primer</td>
<td>PVC</td>
<td>ANSI/ASTM D2564</td>
<td></td>
</tr>
<tr>
<td>CPVC</td>
<td>ANSI/ASTM F493</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 7 Approved vent terminations and flue material**

<table>
<thead>
<tr>
<th>Roof terminals</th>
<th>Flue System (trade name)</th>
<th>Vent / air intake terminal(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot;/6&quot; (100/150 mm) Concentric Intake/combustion air pipe and fitting</td>
<td>Concentric PVC</td>
<td>IPEX System 636 no. CVK</td>
</tr>
<tr>
<td>4&quot;/6&quot; (100/150 mm) M&amp;G Duravent PolyPro concentric and Centrotherm InnoFlue SW concentric</td>
<td>M&amp;G Duravent Order No. 4PPS-VK (-TC) or Centrotherm ICR4769</td>
<td></td>
</tr>
<tr>
<td>4&quot; (100 mm) M&amp;G Duravent - PolyPro Flex Chimney Cap Centrotherm - InnoFlue SW Flex Chimney Cap</td>
<td>M&amp;G Duravent order No. 4PPS FCT or Centrotherm ISCP04</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wall terminals</th>
<th>Flue System (trade name)</th>
<th>Vent / air intake terminal(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot; (100 mm) PVC/parallel stainless steel</td>
<td>ANSI/ASTM D1785 or Field Controls</td>
<td></td>
</tr>
<tr>
<td>4&quot; (100 mm) PolyPro Twin pipe termination (PP)</td>
<td>M&amp;G Duravent Order No. 4PPS-HTP</td>
<td></td>
</tr>
<tr>
<td>4&quot; (100 mm) Parallel PVC to ANSI/ASTM D1785</td>
<td>IPEX no. CVK</td>
<td></td>
</tr>
<tr>
<td>4&quot;/6&quot; (100/150 mm) Concentric PP M&amp;G Duravent PolyPro concentric</td>
<td>Bosch Order No. 7738004825</td>
<td></td>
</tr>
<tr>
<td>90°-elbow with inlet screen</td>
<td>PVC/stainless steel</td>
<td>ANSI/ASTM D1785 or Z-Flex/Heat Fab</td>
</tr>
<tr>
<td>90°-elbow with inlet screen</td>
<td>PP</td>
<td>M&amp;G Duravent PolyPro or Centrotherm InnoFlue SW</td>
</tr>
</tbody>
</table>
Installation

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.
▲ A minimum clearance of 4 ft. (1,220 mm) horizontally from and in no case above and below, unless a 4 ft. (1,220 mm) horizontal distance is maintained, from electric meters, gas meters, regulators and relief equipment.

Fig. 25 Vent and air pipe position (2) of a system with combustion air supply from the room (non-sealed)

[1] Height at Least 1ft (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

Below are approved examples of vertical and horizontal venting installation

NOTICE

▲ Place pipe supports every 5 ft. (1,525 mm) of horizontal and vertical run, beginning with support near boiler.
▲ The condensate must be drained in accordance with the applicable rules (§ 6.5, page 14).
▲ Periodic cleaning of the vent terminal and air-intake screens is mandatory.
▲ Avoid locating vent terminals near equipment or construction which can be subject to degradation from exhaust gases.
Fig. 26  Horizontal venting system (sealed combustion)

1. exhaust 4" (100 mm)
2. intake 4" (100 mm)

Fig. 27  Concentric horizontal venting system (sealed combustion)

1. concentric adaptor 4" (100 mm) / 6" (150 mm)
2. exhaust 4" (100 mm) / intake 6" (150 mm)
3. place the air intake cap

Fig. 28  Horizontal venting system (sealed combustion)

1. exhaust 4" (100 mm)
2. intake 4" (100 mm)

Fig. 29  Vertical parallel venting system (sealed combustion)

1. exhaust 4" (100 mm)
2. intake 4" (100 mm)
3. 10°-0° MIN (250 mm - 0 mm MIN)
4. 12" (300 mm) over max. snow level or 24" (600 mm) whichever is greater
Installation

Fig. 30 Vertical venting system (sealed combustion)

1. exhaust 4" (100 mm)
2. intake 4" (100 mm)
3. 12" (300 mm) over maximum snow level or 24" (600 mm) whichever is greater

Fig. 31 Vertical venting system (non sealed combustion)

1. exhaust 4" (100 mm)
2. intake 4" (100 mm)
3. 12" (300 mm) over max. snow level or 24" (600 mm) whichever is greater
4. 10" - 0" MIN (250 mm - 0 mm MIN)

Fig. 32 Flex Chimney Cap (PP) vertical venting system (sealed combustion)

1. exhaust 4" (100 mm)
2. intake 4" (100 mm)

Fig. 33 Vertical concentric venting system (sealed combustion)

1. exhaust 4" (100 mm)
2. intake 4" (100 mm)
3. 12" (300 mm) over max. snow level or 24" (600 mm) whichever is greater
4. 10" - 0" MIN (250 mm - 0 mm MIN)

Do not exceed the total equivalent venting length of 100 feet (30,480 mm) maximum requirement each for the intake and exhaust piping.
At the time of removal of an existing boiler, the following steps shall be followed with each appliance remaining connected to the common venting system placed in operation, while the other appliances remaining connected to the common venting system are not in operation:

a) Seal any unused openings in the common venting system.

b) Visually inspect the venting system for proper size and horizontal pitch and determine there is no restriction, leakage, corrosion and other deficiencies which could cause unsafe condition.

c) Place in operation the appliance being inspected. Follow the lighting instructions. Adjust thermostat so appliance will operate continuously.

d) Test for spillage at the draft hood relief opening after 5 minutes of burner operation. Use the flame of a match or candle, or smoke from a cigarette, cigar or pipe.

e) Any improper operation of the common venting system should be corrected so the installation conforms with the National Fuel Gas Code, ANSI Z223.1/NFPA 54 and/or CAN/CSA B149.1, Natural Gas and Propane Installation Code.

When resizing any portion of the common venting system, the common venting system should be resized to approach the minimum size as determined using the appropriate tables in Part 11 of the National Fuel Gas Code, ANSI Z223.1/NFPA 54 and/or CAN/CSA B149.1, Natural Gas and Propane Installation Code.

### Table 8 Friction Loss Equivalent in piping and fittings

<table>
<thead>
<tr>
<th>Friction losses</th>
<th>Equivalent feet</th>
<th>m</th>
</tr>
</thead>
<tbody>
<tr>
<td>45° elbow 4&quot;, PVC, CPVC</td>
<td>4</td>
<td>1.22</td>
</tr>
<tr>
<td>90° elbow 4&quot;, PVC, CPVC</td>
<td>7</td>
<td>2.13</td>
</tr>
<tr>
<td>4&quot; plastic pipe per foot, PVC, CPVC</td>
<td>1</td>
<td>0.30</td>
</tr>
<tr>
<td>parallel vent kit</td>
<td>2</td>
<td>0.61</td>
</tr>
<tr>
<td>concentric PVC terminal 4&quot;/6&quot; (100/150 mm)</td>
<td>20</td>
<td>6.1</td>
</tr>
<tr>
<td>45° elbow 4&quot; (100 mm), PolyPro Elbow</td>
<td>7.2</td>
<td>2.2</td>
</tr>
<tr>
<td>45° elbow 4&quot;/6&quot; (100/150 mm), PolyPro Elbow</td>
<td>3.7</td>
<td>1.14</td>
</tr>
<tr>
<td>90° elbow 4&quot; (100 mm), PolyPro Elbow</td>
<td>11.8</td>
<td>3.6</td>
</tr>
<tr>
<td>90° elbow 4&quot;/6&quot; (100/150 mm), PolyPro Elbow</td>
<td>5.6</td>
<td>1.72</td>
</tr>
<tr>
<td>4&quot; (100 mm) PolyPro Pipe per foot</td>
<td>1.0</td>
<td>0.3</td>
</tr>
<tr>
<td>concentric 4&quot;/6&quot; (100/150 mm), PolyPro Pipe per foot</td>
<td>1.0</td>
<td>0.3</td>
</tr>
<tr>
<td>4&quot; (100 mm) PolyPro Flex pipe per foot</td>
<td>2.1</td>
<td>0.64</td>
</tr>
<tr>
<td>parallel PolyPro Wall terminal 4&quot; (100 mm)</td>
<td>112.2</td>
<td>34.2</td>
</tr>
<tr>
<td>concentric PolyPro Wall terminal 4&quot;/6&quot; (100/150 mm)</td>
<td>20.3</td>
<td>6.2</td>
</tr>
<tr>
<td>concentric PolyPro Roof terminal 4&quot;/6&quot; (100/150 mm)</td>
<td>26.0</td>
<td>7.9</td>
</tr>
<tr>
<td>PolyPro Roof terminal Flex Chimney Cap</td>
<td>3.3</td>
<td>1.0</td>
</tr>
</tbody>
</table>

**NOTICE**

- Appliance input rates are based on minimum vent length operation. Longer vent lengths (up to maximum) will reduce the input proportionally.

**CAUTION:**

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

- To avoid moisture and frost build-up and to maintain clearances to openings on adjacent homes, 45° and 90° elbows or tees may be attached to the end of the vent termination pipe to direct exhaust plumes away from the adjacent structure. The total allowable vent length, maximum number of elbows and distance to air intake restrictions must be adhered to.
7 Electrical connections

Fig. 34  Vertical terminations

1. minimum 12” (305 mm)
2. minimum 36” (914 mm)
3. minimum 36” (914 mm)
4. minimum 12” (305 mm)
5. minimum 36” (915 mm)
6. minimum 24” (610 mm)

Horizontal terminations:
Combustion air inlet elbow must terminate at least 12” (305 mm) below exhaust elbow or outlet, but not exceed 15” (381 mm) maximum separation (fig. 35).

Horizontal termination shall not extend beyond 18” from the building (based on minimum 12” (305 mm) required separation between intake and exhaust). Exhaust vent vertical rise shall not extend beyond 39” (991 mm) from building penetration to termination elbow (fig. 35).

Condensate could freeze and block vent pipe.

Terminate all exhaust vents at the same height and all combustion air inlets at the same height, while maintaining the minimum 12” (305 mm) vertical height clearance from between exhaust and combustion air inlet. Exhaust vent termination edge shall be at least 12” (305 mm) laterally from the edge of the air inlet pipe of an adjacent heater. The combustion air inlet is part of the direct vent system and not classified as a forced air inlet.

Fig. 35  Horizontal terminations

1. minimum 12” (305 mm)
2. maximum 15” (381 mm)
3. maximum 18” (457 mm)
4. minimum 12” (305 mm)
5. minimum 12” (305 mm)
6. maximum 39” (991 mm)

7 Electrical connections

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

The electrical connections to the boiler must be made in accordance with all applicable local codes and the latest revision of the National Electrical Code, ANSI/NFPA-70.

If installed in Canada, electrical connections should conform with CSA C22.1 Code part 1.

7.1 External connection board connections

**WARNING:**
Danger of fatal accident due to electric shock.

- 120 VAC-connections may be present on the external connection board when power is supplied to the boiler.

- Open the boiler door.
7.1.1 Routing the cable through the boiler

- Route the cable for the low-voltage connections through the opening on the left [1].
- Route the cable for the 120 VAC connections through the opening on the left [2].
- Route and attach the cable for the 120 VAC connections using the strain relief clamps [3].
- Only the 120 V electrical connections require a 14 gauge wire.

7.1.2 Low voltage connections

**WARNING:** due to electric shock.

- Make sure no power is supplied to the boiler when making connections.

![Fig. 36 Removing the cover](6_720_645_915-32.1N)

**Table 9 External connection board connections**

<table>
<thead>
<tr>
<th>no.</th>
<th>abbr.</th>
<th>color</th>
<th>component</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RC</td>
<td>orange</td>
<td>Room controller RC and EMS bus</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>grey</td>
<td>DHW temperature sensor</td>
</tr>
<tr>
<td>5</td>
<td>EV</td>
<td>red</td>
<td>External switch contact, potential free, e. g. for floor heating safety</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>External heating pump 120 VAC (for use with non Buderus pump group)</td>
</tr>
<tr>
<td>8</td>
<td>PS</td>
<td>grey</td>
<td>DHW tank pump 120 VAC</td>
</tr>
<tr>
<td>9</td>
<td>PZ</td>
<td>lilac</td>
<td>DHW recirculation pump 120 VAC</td>
</tr>
<tr>
<td>10</td>
<td>Netz</td>
<td>white</td>
<td>Main power connection 120 VAC</td>
</tr>
</tbody>
</table>

**NOTICE**

- The RC and WA terminals cannot be used simultaneously.

**RC Terminal - Room Controller**

- Connect a Room- or Cascade controller to the orange RC terminal (→ fig. 38) (→ § 7.1.4, page 24).

**FA Terminal - Outdoor temperature sensor**

If outdoor temperature-dependant control operation is used, an outdoor temperature sensor must be connected.

- Connect the outdoor temperature sensor to the blue FA terminal (→ fig. 38).

**WA Terminal - Potential-free heat demand**

With this connection the room temperature-based modulating function of the boiler is not used. This has a negative effect on comfort and energy consumption. The boiler will now only modulate up to the preset space heating water temperature.

- Connect the potential-free heat demand contact (On/Off thermostat) or relay panel end switch to the green WA terminal (→ fig. 38).
  The maximum allowed resistance of this circuit is 100 Ω.

**FW Terminal - DHW temperature sensor**

- Connect the external DHW temperature sensor to the grey FW terminal, using the harness enclosed with the DHW temperature sensor.
7. Electrical connections

7.1.4 Controller

NOTICE  ► It is not possible to connect more than 1 room controller.

The following controls can be connected to the boiler:
• Logamatic RC35 room controller,
• Logamatic 4323 controls,
• Control with contact for potential free heat demand
• Error reporting module EM10, 0 – 10 V input (can be used to convert a 0 – 10 V signal to a modulating signal),
• MCM boiler cascade module up to 16 boilers.

To install additional modules in the boiler, see § 7.2 "Installing function modules (accessories)", page 24.

Installing an RC35 controller as an outdoor reset control in the boiler
► Open the control panel cover.
► Remove the cover [1].
► Install the RC35 in the slot [2].

7.2 Installing function modules (accessories)

NOTICE  ► Refer to the installation instructions of the relevant function modules for information about installation and combination possibilities.

The following function modules (accessories) can be connected to the boiler:
• Heat demand 0-10 V module EM10,
• Error reporting module EM10,
• Switch module WM10,
• Mixing module MM10.

The function modules (accessories) can be installed in 2 ways:
• in the boiler (max. 2), see § 7.2.1.
• outside the boiler, see § 7.2.2.

NOTICE  ► It is not possible to connect more than 1 DHW temperature sensor in the boiler.

► Connect a DHW temperature sensor suitable for this particular boiler.

EV Terminal - External switching contact
An external switch contact can be used, i.e. to safeguard a floor heating system so that the heating water temperature will not become too high etc.
When the external switch contact is opened, the boiler will be switched off for heating operation and for domestic hot water operation. The pump continues to run for the run-over time set on the boiler.
► Remove the cable from the EV terminal ( fig. 38).
► Connect the external switch contact to the red EV terminal ( fig. 38).

DWV Terminal - 3-way valve
► Do not use this connection.

7.1.3 120 VAC connections

NOTICE  ► Use the 120 VAC connections for specific hydraulic configurations and a corresponding controller.

PK Terminal - External pump
► Connect the external heating or system pump (for situations where the pump of the Buderus pump group is not used) to the green PK terminal ( fig. 39). The maximum allowed connected load of the pump = 100 Watts.

PS Terminal - DHW pump
► Connect the DHW pump to the grey PS terminal ( fig. 39).
The maximum allowed connected load of the pump = 100 Watts.

PZ Terminal - DHW circulation pump
► Connect the DHW circulation pump to the lilac PZ terminal ( fig. 39). The maximum allowed connected load of the pump = 100 Watts.

Mains connector

WARNING: Connecting incoming power
► Ground the boiler electrically in accordance with local codes, or in absence of local codes, with the National Electrical Code, ANSI/INFPA 70 and/or the CSA C22.1, Electrical Code.

► Install a 120 VAC cable to the boiler mains connection.

NOTICE  ► It is not possible to connect more than 1 room controller.

Fig. 39 120 VAC Connections
[1] PK
[2] PS
[3] PZ
[4] 120 VAC

Fig. 40 Installing the room controller
7.2.1 Installing function modules in the boiler

- Loosen the screw (step 1).
- Pull open the drawer (step 2).

Fig. 41 Opening the drawer

- Install the wall bracket in the relevant slots in the drawer (→ fig. 42).

Fig. 42 Installing the wall bracket

- Click the function module(s) into position in the wall bracket (→ fig. 43).

Fig. 43 Clicking the function module into position

- Remove the covers of both free connectors on the function module connection cables (→ fig. 44).

Fig. 44 Removing the covers

- Slide the drawer back into the boiler.
- Connect the free 120 VAC mains cable (→ fig. 44) to the module (1). If more modules are used, the 120 VAC supply for the second module can be taken from the first module using the cable enclosed with the module.

Fig. 45 Interconnecting modules

**NOTICE**

- The module may have the letters RC or EMS above the connection (→ fig. 46, (1)).

- Connect the free connector of the EMS bus connecting cable (→ fig. 45) to the first module (→ fig. 46).
- If more modules are used, the EMS bus connection for the second module may be branched off from the first module using the cable enclosed with the module (→ fig. 45 and fig. 46).
7.2.2 Installing function modules outside the boiler

- Install the module on the wall according to the installation instructions of the module.
- Make an EMS bus connection cable using a 2-core cable and the connector enclosed with the module (fig. 47).

**Important:** Use the connector of the same color as the connections on the module.

- Connect the EMS bus connection cable to the orange RC connection of the external connection board [1].

**NOTICE**
Pay attention to the polarity when using an EMS bus connection cable.

- Connect the wire from terminal 1 to terminal 1 and from terminal 2 to terminal 2 (fig. 45 and fig. 46).

7.3 Electrical wiring diagram

**CAUTION:**
Wiring errors can cause improper and dangerous operation.

- Label all wires prior to disconnection when servicing.
- Verify proper operation after servicing.
Fig. 49 Electrical wiring diagram

1. 81-pole connector (AC 0, 10, 24 and 230 V)
2. 16-pole connector (AC 120 V)
3. Connection for pump in connection kit (accessory)
4. Fan
5. Gas valve
6. Transformer
7. Glow ignitor
8. Earth
9. Ionization
10. Pressure sensor
11. Return sensor
12. Safety-temperature sensor
13. Supply sensor
14. Flue gas sensor
15. Fuse (5 amp. FAST, sand filled)
16. BUS function modules
17. Connector for BC10 Basic Controller
18. Room controller RC and EMS bus
19. Outdoor temperature sensor
20. On/off temperature controller (potential free)
21. DHW sensor
22. External switch contact (potential free, e.g. floor heating)
23. External 3-way valve
24. Boiler pump (120 VAC, max. 100 W)
25. DHW pump (pump 120 VAC, max. 100 W)
26. DHW re-circulation pump (pump 120 VAC, max. 100 W)
27. Main power connection 120 V/60 Hz, max. permissible 5 A
28. Mains switch
29. 120 VAC function module
30. Ground
**Operation**

### 8.1 BC10 basic controller

The boiler is fitted with a control unit, the BC10 basic controller. This controller can be used to control the heating system.

- Push on the control panel (fig. 50) to get access to the BC10 basic controller (fig. 51).

**Fig. 50 Opening the control panel**

**Fig. 51 BC10 basic controller**

[1] Main power switch

[2] "Reset" button

[3] "Chimney sweep" button

[4] "Service" button

[5] Service Tool Connector

[6] LED "Burner operation"

[7] LED "Central heat demand"

[8] Space heating water temperature knob

[9] Display

[10] DHW temperature knob

[11] LED "DHW demand"

The BC10 basic controller has the following components:

**"Main power switch"** (fig. 51, [1])

The main power switch is used to switch the boiler ON and OFF.

**"Reset" button** (fig. 51, [2])

If a fault has occurred you may have to restart the boiler by pressing the "Reset" button. This is only required in the event of a "locking" fault. "Blocking" faults are reset automatically as soon as their cause has been corrected. The display shows during the reset operation.

**"Chimney sweep" button** (fig. 51, [3])

The "Chimney sweep" button is used to put the boiler into flue gas test, service or manual operation mode. The BC10 maximum heating water temperature setting applies.

- The flue gas test enables the boiler to be run in full-load operation manually for a short period (table 12, page 29).
- The service mode enables the boiler to be run in part-load operation manually for a short period. Measurements and settings can be carried out on the boiler (table 13, page 29).
- The manual operation mode enables the boiler to be operated manually for a longer period. Use this mode when the control system has not been installed yet or is out of order (table 14, page 30).

**"Service" button** (fig. 51, [4])

The "Service" button is used to display the current space heating water temperature, the current system pressure etc.

**Service Tool connection** (fig. 51, [5])

For further information please contact Buderus.

**LED "Burner operation"** (fig. 51, [6])

The LED "Burner operation" lights when the burner of the boiler is active and is extinguished when the burner is switched OFF.

The LED "Burner operation" indicates the burner status.

<table>
<thead>
<tr>
<th>LED</th>
<th>Status</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>Burner operational</td>
<td>Boiler water is being heated.</td>
</tr>
<tr>
<td>OFF</td>
<td>Burner off</td>
<td>The space heating water temperature has reached the target value and there is no heat demand.</td>
</tr>
</tbody>
</table>

**Table 10 Meanings of LED "Burner operation" indications**

**LED "Central heat demand"** (fig. 51, [7])

The LED "Central heat demand" lights when there is a heat demand and is extinguished when the heat demand is no longer present.

**Space heating water temperature knob** (fig. 51, [8])

The Space heating water temperature knob is used to set the upper space heating water temperature limit. The unit is °F.

**Display** (fig. 51, [9])

The appliance display values, display settings and display codes can be read out from the display. If a fault occurs the display will immediately show the accompanying fault code. The fault code flashes if a locking fault has occurred.
8.2 BC10 operating instructions

You can navigate through the menu structure of the boiler on the BC10 using the “Reset” button, the “Chimney sweep” button, the “Service button” (fig. 51, [2, 3 and 4]) and the display (fig. 51, [9]).

The menu structure consists of 5 menus:
- Normal Operation menu, table 11
- Flue Gas Test menu, table 12
- Service Mode menu, table 13
- Manual Operation menu, table 14
- Settings menu, table 15.

### Normal Operation menu

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Press the button.</td>
</tr>
<tr>
<td>3</td>
<td>P 2 2 Shows currently measured system pressure in psi. (§ 13.3, page 46).</td>
</tr>
<tr>
<td>4</td>
<td>Press the button.</td>
</tr>
<tr>
<td>6</td>
<td>After 5 seconds the display returns to step 1, or</td>
</tr>
<tr>
<td>7</td>
<td>Press the button.</td>
</tr>
</tbody>
</table>

**Table 11 Normal operation**

### Flue Gas Test menu

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>[ 1 2 0 ] Shows currently measured space heating water temperature in °F. (§ 13.3, page 46).</td>
</tr>
<tr>
<td>2</td>
<td>To activate the flue gas test: Press and hold the button for more than 2 but not longer than 5 seconds.</td>
</tr>
</tbody>
</table>
| 3    | [ 1 2 0 ] The non-flashing dot in the right-hand bottom corner of the display shows the flue gas test has been activated:  
- the boiler is in heating mode at a capacity of 100% for a maximum of 30 minutes,  
- space heating water temperature is as set on the BC10 basic controller,  
- DHW mode is not possible. |
| 4    | Press the button. |
| 5    | P 2 2 Shows currently measured system pressure in psi. (§ 13.3, page 46). |
| 6    | Press the button. |
| 7    | - R R Display code. Operating phase: The boiler is in flue gas test mode (§ 13.5, page 46). |
| 8    | Press the button. |
| 9    | [ 1 2 0 ] Shows currently measured space heating water temperature in °F. (§ 13.3, page 46). |
| 10   | After 30 minutes or after a power interruption the flue gas test ends automatically.  
To end manually press and hold the button for more than 2 seconds until the dot disappears. |

**Table 12 Flue gas test**

### Service Mode menu

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>[ 1 2 0 ] Shows currently measured space heating water temperature in °F. (§ 13.3, page 46).</td>
</tr>
</tbody>
</table>
| 2    | To activate service mode 1st step:  
Press and hold the button for more than 2 but not longer than 5 seconds. |
| 3    | [ 1 2 0 ] The non-flashing dot is shown in the right-hand bottom corner of the display shows the boiler is now in flue gas test mode. |
| 4    | To activate service mode 2nd step: 
Simultaneously press and hold the + buttons for more than 2 seconds. |
| 5    | L - - Display shows the maximum capacity setting during heating mode in % (§ 13.4, page 46).  
In this case: [L - -] = 100%. Service mode has been activated.  
You can now adjust the boiler performance to partial load, i.e. to check the gas/air ratio or the ionization current. |
| 6    | Press and hold the button until the display shows . Display setting: with a 80-kW boiler and [L 2 0] with a 100-kW boiler.  
Minimum capacity setting during heating mode in % (§ 13.4, page 46).  
The boiler will reduce its performance to 25% or 20% respectively within a couple of seconds.  
The space heating water temperature set on the BC10 basic controller (control panel) applies now.  
Check the gas/air ratio or the ionization current and if necessary set the gas/air ratio according to § 9.8 or § 9.10. |
| 7    | Press the button. |
| 8    | [ F S ] This parameter shows the pump run-over time in minutes that starts when the heating mode has ended (§ 13.4, page 46). |
| 9    | Press the button. |
| 10   | [ 0 ] This parameter indicates the DHW mode status setting (§ 13.4, page 46). |
| 11   | Press the button. |

**Table 13 Service mode**
Service Mode menu

Step 12 Shows currently measured space heating water temperature in °F (§ 13.3, page 46).
Step 13 Press the button.
Step 14 Shows currently measured system pressure in psi (§ 13.3, page 46).
Step 15 Press the button.
Step 16 Display code: Operating phase: The boiler is in service mode (§ 13.5, page 46).
Step 17 After 30 minutes or after a power interruption the flue gas test ends automatically. To end manually press and hold the button for more than 2 seconds until the dot disappears.
Step 18 The boiler input rating drops to the preset capacity (table 15, page 30).

Table 13 Service mode

Manual Operation menu

Step 1 Shows currently measured space heating water temperature in °F (§ 13.3, page 46).
Step 2 To activate manual operation: Press and hold the button for more than 5 seconds.
Step 3 A flashing dot in the right-hand bottom corner of the display shows manual operation is active. This means that the boiler is permanently in heating mode. Space heating water temperature is as set on the BC10 basic controller. The LED “Heating system status” lights. DHW mode is possible during manual operation.
Step 4 Press the button.
Step 5 Shows currently measured system pressure in psi (§ 13.3, page 46).
Step 6 Press the button.
Step 7 Display code. Operating phase (§ 13.5, page 46). The boiler is in manual operation mode. During manual operation the “Settings” menu (table 15 from step 2) can be used to temporarily change the target boiler performance.
Step 8 Press the button.
Step 9 Shows currently measured space heating water temperature in °F (§ 13.3, page 46).
Step 10 After a power interruption manual operation ends automatically. To end manually press and hold the button for more than 2 seconds until the dot disappears.

Table 14 Manual operation

Settings menu

Step 1 Shows currently measured space heating water temperature in °F (§ 13.3, page 46).
Step 2 To open the “Settings” menu: Press and hold the + button for more than 2 seconds.
Step 3 This shows the “Settings” menu is open. You can adjust the setting of this parameter.
Step 4 Target output. Adjust as follows, or go to step 5.
Lower: Decrease the modulation rate with the button. The minimum setting for boilers at sea level is = 25% with an 80 kW boiler and = 20% with a 100 kW boiler.
Higher: Increase the modulation rate with the button. The maximum setting is = 100%. This is equal to the factory setting.
Step 5 Press the button.
Step 6 Pump run-over time in minutes (starts when the heating mode has ended). Adjust as follows or go to step 7.
Lower: Decrease the time with the button. The minimum setting is 0 minutes. The factory default setting is 5 minutes. CAUTION! Do not set the post purge time to less than 5 minutes.
Higher: Increase the time with the button. The maximum setting is 60 minutes or 24 hours.
Step 7 Press the button.
Step 8 DHW mode status setting. Adjust as follows or go to step 9.
DHW mode can be switched OFF or ON. This setting has priority over other DHW mode settings, such as those made on the room thermostat. Set the DHW mode with the or buttons. means “ON”, means “OFF”.
NOTE: Setting also switches OFF the hot water cylinder frost protection.
Step 9 After 5 seconds or after a power interruption the settings menu ends automatically. To end manually press the button.
Any adjustments that you have made have been confirmed.
9 Start-up procedure

There are several steps involved in starting up the boiler. Complete the commissioning record log book after carrying out all activities described in this chapter (§ 15.1, page 53).

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 INSTRUCTIONS

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

TO TURN OFF GAS TO APPLIANCE

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

Fig. 52 Safety sticker
Start-up procedure

9.1 Check for gas leaks
Prior to the initial start-up check that the gas flow pipe work is gas-tight; this must be confirmed in the start-up report.

**WARNING:**
- The boiler and its manual gas shutoff valve must be isolated from the gas supply piping system during any pressure testing of that system, exceeding 0.5 psi (34.5 mbar). The maximum test pressure allowed at the manual gas shutoff valve inlet is 0.5 psi (34.5 mbar).
- 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.

- If 0.5 psi (34.45 mbar) or less, slowly open the gas valve by pushing on the gas valve and turning it ¼ rotation in a counter-clockwise direction (→ fig. 53). The gas valve is open when it is in the vertical position.
- Shut off the appliance from the power supply.
- Check the new conduit section up to and including its connection (i.e. direct sealing location) to the gas fitting for leaks, using a foaming product. The maximum test pressure allowed at the manual gas shutoff valve inlet is 0.5 mbar (0.2" W.C.).

**NOTICE**
- At initial start up, the boiler will start as soon as the system pressure exceeds 15 psi (1.0 bar).
- If the system pressure falls below 3 psi (0.2 bar) the boiler will stop and generate a fault code.

9.2 Fill the heating system
To ensure a trouble-free operation of the boiler, read the accompanying instructions about water quality, before filling the heating system.

- Push and open the control panel cover.
- Turn the Space heating water temperature knob [8] and DHW temperature knob [10] counterclockwise to the “0” position.

**Fig. 54 BC10 basic controller**
- Turn the vent key a quarter rotation to undo the boiler door lock (→ fig. 55, detailed picture). Push the fastener down (→ fig. 55, step 2) and open the boiler door.
- Remove the insulation cover of the pump group (→ fig. 55, step 4).

**Fig. 55 Opening the boiler door**
To purge the boiler, every radiator in the heating system must have a purge facility. In some situations it may even be necessary to provide extra purging facilities at certain locations. The boiler itself has an automatic air vent.
- Loosen the cap of the automatic air vent (→ fig. 56) by turning ¼ rotation counterclockwise.
Start-up procedure

9

Start-up procedure

9.1 Open the heating supply and return isolating valves on the pump group (→ fig. 57). The open position is parallel to the pipe.

9.2 Fill the heating system to a pressure of about 20 psi (1.5 bar)

Fig. 57 Opening the isolating valves (here: open position)

9.3 Fill the condensate trap with water

Fig. 59 Filling the condensate trap with water

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.

9.4 Bleed the gas supply valve

Close the gas valve (→ fig. 60).

Fig. 60 Closing the gas valve

Purge the heating system via the air vents on the heating bodies. Start at the lowest floor of the premises and then work your way up from floor to floor.

9.3 Fill the condensate trap with water

Fig. 59 Filling the condensate trap with water (→ fig. 59). For disconnecting the condensate trap (→ § 12.3.5, page 43).

Fig. 58 Reading the pressure gauge

The pressure in the heating system, which is measured directly at the boiler, must be at least equal to the required pre-pressure of the expansion vessel plus 7 psi (0.5 bar). This minimum pressure must not be less than 12 psi (0.8 bar) (if the heating system is cold). The maximum pressure in the heating system, measured directly at the boiler, must not exceed 30 psi (2.6 bar) or 50 psi (3.5 bar) when the optional 50 psi (3.5 bar) pressure relief valve is used.
Start-up procedure

9.5 Check the air/flue gas connection
Check the following points:
- Is the prescribed flue gas system used (§ 6.8, page 16)?
- Have the configuration instructions from the relevant flue gas system installation instructions been observed?

9.6 Checking the appliance configuration

NOTICE
The burner must only be put into use with the correct orifice (table 16).
- Consult the relevant gas utility company for the type of gas supply.
- Check that the actual gas supply is in accordance with the type of gas supply specified on the gas classification label (fig. 63).

9.7 Measure the gas inlet pressure (working pressure)
- Open at least 2 radiator valves, if present. Do not switch ON the boiler.
- Push on the control panel to open it.
- Switch OFF the power supply to the appliance.
- Close the gas valve in a clockwise direction (fig. 64).

Table 16 Gas orifice diameter

<table>
<thead>
<tr>
<th>Boiler</th>
<th>Type of gas supply</th>
<th>Altitude in ft. (m)</th>
<th>Gas orifice diameter in inch (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GB162-80kW/100kW</td>
<td>Natural gas</td>
<td>0-4,000 (0-1,220)</td>
<td>0.331 (8.40)</td>
</tr>
<tr>
<td></td>
<td>LPG</td>
<td>0-4,000 (0-1,220)</td>
<td>0.193 (4.70)</td>
</tr>
</tbody>
</table>

NOTICE
- Test the tightness of the measuring nipple(s) used.

Boiler Type of gas supply Altitude in ft. (m) Gas orifice diameter in inch (mm)
GB162-80kW Natural gas 0-4,000 (0-1,220) 0.331 (8.40)
LPG 0-4,000 (0-1,220) 0.193 (4.70)

Fig. 61 Bleeding the gas flow pipe
- Open the screw plug on the testing nipple of the gas supply pressure and for purging [1] by 2 turns and install a hose.

Fig. 62 Opening the gas valve
- Slowly open the gas valve by pushing on the gas valve and turning it counterclockwise through ¼ rotation (fig. 62). The gas valve is open when it is in the vertical position.

Fig. 63 Checking the gas classification label
- Purge the gas supply into a well ventilated area.
- Close the gas shutoff valve when no more air is present (fig. 60).
- Remove the hose and tighten the screw plug on the testing nipple again.

Fig. 64 Closing the gas valve
- Turn the vent key through a quarter rotation to undo the boiler door lock (fig. 55, page 32).
- Push the fastener down and open the boiler door.
Start-up procedure

▶ Open the screw plug on the testing nipple for the gas inlet pressure by 2 turns (➔ fig. 65, [1]).

![Fig. 65 Measuring the gas supply pressure](image)

▶ Reset the digital pressure gauge to “0”.

**NOTICE**
▶ Throughout the measuring operation, keep the digital pressure gauge in the same position (horizontal or vertical) in which it was reset to “0”.

▶ Connect the pressure gauge connection tube to the positive port of the testing nipple (➔ fig. 65, [2]).

▶ Slowly open the gas valve by pushing on the gas valve and turning it ¼ rotation in a counterclockwise direction (➔ fig. 62, page 34). The gas valve is open when it is in the vertical position.

▶ Switch ON the appliance by pressing the main switch of the BC10 basic controller (➔ fig. 66, [1]).

▶ Press and hold the “Chimney sweep” button (➔ fig. 66, [3]) (approx. 2 seconds), until the dot in the right-hand bottom corner of the display (➔ fig. 66, [9]) appears (➔ table 12, page 29).

▶ After the LED “Burner operation” (➔ fig. 66, [6]) has lit up wait for 1 minute until the boiler is burning at full load.

▶ Statically measure the gas supply pressure and enter it in the start-up report (➔ § 15.1, page 53).

To obtain the best performance of the appliance, the gas supply pressure must be:

<table>
<thead>
<tr>
<th>Statically measured gas supply pressure</th>
<th>Natural gas inch W.C. (mbar)</th>
<th>LPG inch W.C. (mbar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min.</td>
<td>5 (12.4)</td>
<td>8 (19.9)</td>
</tr>
<tr>
<td>Nom.</td>
<td>8 (19.9)</td>
<td>11 (27.4)</td>
</tr>
<tr>
<td>Max.</td>
<td>10.5 (26.1)</td>
<td>13 (32.3)</td>
</tr>
</tbody>
</table>

Table 17 Gas supply pressure
1) Measured statically perpendicular to flow at full load.

▶ Press the “Service” button (➔ fig. 66, [4]) repeatedly until the temperature reading is shown in the display.

▶ Press the “Chimney sweep” button (➔ fig. 66, [3]) to clear the reading (➔ table 12, page 29).

**NOTICE**
▶ Throughout the measuring operation, keep the digital pressure gauge in the same position (horizontal or vertical) in which it was reset to “0”.

**WARNING:**
A leaking testing nipple causes explosive fumes.
▶ Check the testing nipples used for leaks.
▶ Only use approved detection products to locate leaks.

▶ If the supply pressure is too low, check the gas supply pipe or contact the relevant gas utility company if the required supply pressure is not available.

▶ If the supply pressure is too high, a gas pressure regulator must be integrated upstream of the gas fitting. Contact the gas utility company.

**NOTICE**
▶ If the supply pressure is too low, check the gas supply pipe or contact the relevant gas utility company if the required supply pressure is not available.

To obtain the best performance of the appliance, the gas supply pressure must be:

<table>
<thead>
<tr>
<th>Statically measured gas supply pressure</th>
<th>Natural gas inch W.C. (mbar)</th>
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</thead>
<tbody>
<tr>
<td>Min.</td>
<td>5 (12.4)</td>
<td>8 (19.9)</td>
</tr>
<tr>
<td>Nom.</td>
<td>8 (19.9)</td>
<td>11 (27.4)</td>
</tr>
<tr>
<td>Max.</td>
<td>10.5 (26.1)</td>
<td>13 (32.3)</td>
</tr>
</tbody>
</table>

Table 17 Gas supply pressure
1) Measured statically perpendicular to flow at full load.

▶ Press the “Service” button (➔ fig. 66, [4]) repeatedly until the temperature reading is shown in the display.

**WARNING:**
Damage to the boiler by incorrect adjustment of the gas/air ratio.
▶ Adjust gas/air ratio ONLY with part load!
▶ Adjust gas/air ratio ONLY based on the gas/air pressure differential and never based on measured flue gas values such as CO/CO₂/NOₓ!
Start-up procedure

**WARNING:**
A leaking testing nipple causes explosive fumes.
- Check the testing nipples used for gas tightness.
- Only use approved detection products to locate leaks.

**CAUTION:**
Due to short circuits.
- Cover any hazardous locations prior to locating the leaks.
- Do not spray the leak detection product on cable runs, plugs or electrical wiring. Do not let it drip onto them either.

- Open at least 2 thermostatic radiator valves, if present. Do not switch ON the boiler.
- Push on the control panel to open it.
- Switch OFF the heating system by pressing the main switch of the BC10 basic controller (fig. 66, [1]).
- Close the gas valve (fig. 64).
- Turn the vent key through a ¼ rotation to undo the boiler door lock (fig. 55, detailed picture).
- Push the fastener down (fig. 55) and open the boiler door.
- Open the screw plug on the testing nipple for the burner pressure by 2 turns (fig. 67, [1]).

**Fig. 67 Checking the gas/air ratio at minimum load**
- Set the pressure gauge to “0”.

**NOTICE**
- Throughout the measuring operation, keep the digital pressure gauge in the same position (horizontal or vertical) in which it was reset to “0”.

- Use a connection tube to connect the positive port of the pressure gauge to the testing nipple for burner pressure (fig. 67, [2]).
- Slowly open the gas valve by pushing on the gas valve and turning it ¼ rotation in an counterclockwise direction (fig. 62).
- Switch ON the heating system by pressing the main switch of the BC10 basic controller (fig. 66, [1]).
- Activate the Service mode in accordance with the “Service mode” menu (table 13, page 29).
- Set the capacity to minimum (part load) according to the “Service mode” menu (table 13, page 29).
- After the LED “Burner operation” (fig. 66, [6]) has lit wait for one minute until the boiler is burning at part load.

**Fig. 68 Air/gas difference at part load**

1. turn counterclockwise
2. turn clockwise
- Enter the result in the commissioning log book (§ 15.1 “Start-up report”, page 53).
- If the gas/air ratio is incorrect, it must be adjusted on the set screw [1]. The set screw is located behind the screw-on cover.

**Fig. 69 Adjusting the gas/air ratio**

- Press the “Chimney sweep” button (fig. 66, [3]) until the dot disappears from the display.
- Switch OFF the heating system by pressing the main switch of the BC10 basic controller (fig. 66, [1]).
- Close the gas valve (fig. 64, page 34).
- Remove the measuring devices.
- Tighten the screw in the burner pressure measuring nipple.
- Slowly open the gas valve by pushing on the gas valve and turning it ¼ rotation in an counterclockwise direction (fig. 62).
- Switch ON the heating system by pressing the main switch of the BC10 basic controller (fig. 66, [1]).
- Press and hold the “Chimney sweep” button (fig. 66, [3]) (approx. 2 seconds), until the dot in the right-hand bottom corner of the display appears (fig. 66, [9]) (table 12, page 29).
- After the LED “Burner operation” (fig. 66, [6]) has lit wait for 1 minute until the boiler is burning at full load.
- Press the “Chimney sweep” button (fig. 66, [3]) to clear the reading (table 12, page 29).
- Check that the boiler performance is still at the required value (table 15, page 30).

- Read the differential pressure. The differential pressure \( \Delta P = P_{\text{Gas}} - P_{\text{Air}} \) 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) (fig. 68).
9.9 Carry out a leakage test in operating conditions

**WARNING:**
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.

- Press and hold the “Chimney sweep” button (fig. 66, [3]) (approx. 2 seconds), until the dot in the right-hand bottom corner of the display (fig. 66, [9]) appears (table 12, page 29).
- After the LED “Burner operation” (fig. 66, [6]) has lit up wait for 1 minute until the boiler is burning at full load.
- Use a foaming product to check all sealing locations in the total gas circuit of the burner while the burner is active.
- Press the “Chimney sweep” button (fig. 66, [3]) to clear the reading (table 12, page 29).

9.10 Check and adjust the flue gases CO emissions

- Open at least 2 radiator valves, if present. Do not switch ON the boiler.
- Push on the control panel to open it.
- Switch OFF the appliance by pressing the main switch of the BC10 basic controller (fig. 66, [1]).
- Remove the cover from the flue gas measuring point (fig. 70, [1]).
- Connect the flue gas analyzer to the left-hand measuring point, insert it roughly 2” (fig. 70).

![Fig. 70 Measuring the flue gases CO emissions](image)

- Press and hold the button (fig. 71, [3]) (approx. 2 seconds), until the dot in the right-hand bottom corner of the display (fig. 71, [9]) appears (table 12, page 29).
- After the “LED Burner operation” (fig. 71, [6]) has lit wait for 1 minute until the boiler is burning at full load.
- Measure in the flue gas measuring port the CO percentage.
  - The CO values in air-free condition must be less than 400 ppm or 0.04 vol. %.
  - Values of 400 ppm or more indicate an incorrect burner adjustment (§ 9.8, page 35), a dirty gas burner or heat exchanger or burner faults.
  - You must determine and remove the cause (chap. 12 “Maintenance”, page 41).
- Press the “Chimney sweep” button (fig. 71, [3]) to clear the reading (table 12, page 29).

9.11 Function test

- During initial start-up and annual inspection and/or needs-oriented servicing, make sure that all control, regulating and safety devices are in full working order and, if applicable, check them for correct adjustment.
- The gas and water circuits must be tested for leaks (§ 9.1, page 32), (§ 9.10, page 37).

9.12 Measure the ionization current

- During initial start-up and annual inspection and/or needs-oriented servicing, make sure that all control, regulating and safety devices are in full working order and, if applicable, check them for correct adjustment.
- The gas and water circuits must be tested for leaks (§ 9.1, page 32), (§ 9.10, page 37).
- Switch OFF the appliance by pressing the main switch of the BC10 basic controller (fig. 71, [1]).

![Fig. 71 BC10 basic controller](image)

- Turn the vent key through a quarter turn to undo the boiler door lock (fig. 55, step 1).
- Push the fastener down (fig. 55, step 2) and open the boiler door.
- Undo the plug and socket connection of the monitoring cable (fig. 72).
Start-up procedure

Connect the multi meter in series (fig. 73). Select the μA DC range on the multi meter. The multi meter must have a resolution of at least 1 μA.

Press the “Chimney Sweep” button return to normal operating conditions.

9.14 Boiler settings

9.14.1 Set the heating capacity

Set the required heating capacity on the BC10 according to the “Settings” menu. See table 18, when making these settings.

9.14.2 Set the space heating water temperature

Set the upper space heating water temperature limit for heating mode with the “space heating water temperature” knob (fig. 74, [8]) (table 19). This limitation does not apply to DHW preparation.

9.14.3 Set the pump run-over time

After each start-up attempt the boiler will signal a start-up failure. A “6A” code can be seen in the display.

If the heating system is room temperature controlled, and not controlled parts of the heating system risk freeze damage (e.g. radiators in the garage), set the pump run-over time to 24 hours.

9.13 Test the Ignition Safety shut off device

Disconnect the plug and socket connection of the monitoring cable.

Press the “Reset” button.

Check if the boiler starts-up.

Switch OFF the appliance by pressing the main switch of the BC10 basic controller (fig. 71, [1]).

Remove the multi meter and reconnect the monitoring cable.

Switch ON the appliance by pressing the main switch of the BC10 basic controller (fig. 71, [1]).

Check that the boiler performance is still at the required value (table 13, page 29).

Display indication [%] | Rated heating capacity (+5%), based on natural gas (sea level) | GB162-80 kW | GB162-100 kW
--- | --- | --- | ---
L20 | - | 20.0 | 68,300
L30 | 24.3 | 78,300 | 29.9 | 97,900
L40 | 32.9 | 104,400 | 39.9 | 130,500
L50 | 41.5 | 130,500 | 49.8 | 163,200
L60 | 50.1 | 156,600 | 59.8 | 195,800
L70 | 58.7 | 182,700 | 69.7 | 228,400
L80 | 67.3 | 208,800 | 79.6 | 261,000
L90 | 75.9 | 234,900 | 89.6 | 293,700
L--- | 84.5 | 261,000 | 99.5 | 326,300

Table 18 Heating capacity (as a percentage) (0-4,000 ft.)

Knob position | Explanation
--- | ---
0 | No supply to appliance (e.g. only DHW mode)
86-190 | The temperature (in °F) set on the BC10 cannot be changed with a room controller. The supply temperature does not rise above this set temperature. (maximum supply temperature set point 180 °F (82 °C)).
Aut | The temperature is determined automatically on the basis of the heating curve. If no room controller is connected, the maximum supply temperature is 180 °F (82 °C).

Table 19 Setting of the “space heating water temperature”

Fig. 74 BC10 basic controller
9.14.4 Switch DHW mode ON/OFF
▶ Set the DHW mode according to the “Settings” menu (table 15, page 30).
When DHW-mode is switched OFF (0), the freeze protection for the hot water cylinder (if present) is switched OFF.

9.14.5 Set the DHW temperature
▶ Set the DHW temperature knob (fig. 74, [10]) to the required temperature of the hot water in the hot water cylinder (table 20).

<table>
<thead>
<tr>
<th>Knob position</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>DHW mode is OFF (only heating mode)</td>
</tr>
<tr>
<td>ECO</td>
<td>Economy mode. The DHW will only be reheated to 140 °F (60 °C), if the temperature has significantly fallen. This reduces the number of burner starts and saves energy. As a result the water may be a bit colder initially.</td>
</tr>
<tr>
<td>86-140</td>
<td>The temperature set on the BC10 is a temperature that cannot be changed using a RC thermostat. If no thermostat is connected, the maximum DHW temperature is 140 °F (60 °C).</td>
</tr>
<tr>
<td>Aut</td>
<td>The temperature is set on the thermostat (e.g. RC35). If no thermostat is connected, the maximum DHW temperature is 140 °F (60 °C).</td>
</tr>
</tbody>
</table>

Table 20 Setting of the “DHW temperature”

9.15 Final activities

9.15.1 Close the boiler door and the control panel
▶ Close the boiler door (fig. 75) and lock the fastener by turning the vent screw through ¼ rotation in a clockwise direction.
▶ Push on the control panel to close it.

![Fig. 75 Closing the boiler door](image)

9.15.2 Hand over
▶ Hand over all relevant documentation to the end user and explain his/her responsibilities under the relevant national and regional regulations.
▶ Explain and demonstrate the start-up and shut down procedures.

10 Shutting down the system

10.1 Shut down the appliance using the basic controller
Shut down your appliance by means of the Logamatic BC10 basic controller. When the system is shut down, the burner is automatically switched off.

Further information about the use of the BC10 basic controller is provided in chap. 8 “Operation”, page 28.
▶ Push on the control panel to open it.
▶ Switch OFF the appliance by pressing the main switch of the BC10 (fig. 74, [1]).
▶ Close the main gas supply or the gas valve (fig. 76).

![Fig. 76 Closing the gas valve](image)

10.2 Shutting down the heating system if there is a risk of freezing (interruption of use)
If conditions are such that the heating system has to be shut down for a long period while there is a risk of freezing, the water must be drained from the heating system.
▶ Push on the control panel to open it.
▶ Switch off OFF appliance by pressing the main switch of the BC10 (fig. 74, [1]).
▶ Close the main gas supply or the gas valve (fig. 76).
▶ Drain the heating water at the lowest point of the heating system, using the drain cock or the heating body (fig. 77). The (automatic) air vent at the highest point of the heating system/radiator must be open.

![Fig. 77 Draining the heating system (example)](image)
11 Inspection

Offer your customer an annual inspection and maintenance contract. The activities to be included in an annual inspection and maintenance contract can be found in the inspection (§ 15.2, page 54) and service reports (§ 15.3, page 55).

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

You must immediately close the main shutoff valve or gas shutoff valve and disconnect the power from the appliance.

▶ Close the main shutoff valve.

▶ Close the isolating valves [2].

![Fig. 78 Closing the valves (here: in closed position)]

▶ Open the boiler door:
  - Turn the vent key through a quarter rotation to undo the boiler door lock (→ fig. 79, step 1).
  - Push the fastener down (→ fig. 79, step 2) and open the boiler door.

![Fig. 79 Opening the boiler door]

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

11.1 Prepare the appliance for inspection

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.

▶ Switch OFF the appliance by pressing the main switch of the BC10.
▶ Close the gas valve [1].

![Fig. 80 Opening the screw plug on the testing nipple for the gas connection by 2 turns (→ fig. 80, [1]).]

▶ Connect the pressure gauge tube to the testing nipple (→ fig. 80, [2]). The pressure drop allowed after 1 minute is max. 3.8" W.C. (10 mbar).

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:

Insufficient or improper cleaning and maintenance can cause damage to the installation.
▶ Inspect and clean the appliance once a year.
▶ Carry out maintenance as required. Immediately remedy faults. This will avoid further damage to the system!

CAUTION:

Risk of electric shock.
▶ Before opening the appliance:
  - disconnect the appliance from the power supply using the appliance emergency OFF button or disconnect the relevant circuit breaker of the house from the power grid.
  - Secure the appliance against accidental restarting.

▶ Inspect and clean the appliance once a year.
▶ Carry out maintenance as required. Immediately remedy faults. This will avoid further damage to the system!
If the pressure drop is higher, check all sealing locations of the gas fitting for leaks using a foaming product. Repeat the pressure test if no leaks are found. Replace the gas fitting if the pressure drop is higher than 3.8” W.C. (10 mbar) per minute again. See § 12.3.2 “Remove the burner cover with the fan and the gas valve”, page 42 for instructions on how to remove.

Fig. 80 Checking the gas fitting for internal tightness

11.4 Measure the ionization current
(➔ § 9.12, page 37).

11.5 Measure the gas inlet pressure (working pressure)
(➔ § 9.7, page 34).

11.6 Check and adjust the gas/air ratio
(➔ § 9.8, page 35).

11.7 Carry out a leakage test in operating conditions
(➔ § 9.9, page 37).

11.8 Measure the flue gases CO emissions
(➔ § 9.10, page 37).

11.9 Fill the heating system
To ensure a trouble free operation of your boiler check the pH-value every year and correct it, if necessary. See accompanying manual about water quality for more information (➔ § 9.2, page 32).

11.10 Check the air/flue gas connection
(➔ § 9.5, page 34).

12 Maintenance

CAUTION:
Risk of electric shock.

Before opening the appliance: disconnect the appliance from the power supply using the appliance emergency OFF button or disconnect the relevant circuit breaker of the house from the power grid.

Secure the appliance against accidental restarting.

INSTRUCTION FOR THE INSTALLER

Record the activities in the service report (➔ § 15.3, page 55).

NOTICE

The cover over the electrical connections does not have to be removed from the boiler.

Fig. 82 Removing the boiler door
12.3 Clean the heat exchanger, burner and condensate trap
The boiler heat exchanger has a self-cleaning coating.

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.

12.3.1 Remove the gas valve
- Undo the gas fitting screw connection [1] and pull the 4 connectors [2] from the gas valve.

Fig. 83 Undoing the connections to the gas fitting

12.3.2 Remove the burner cover with the fan and the gas valve
- Pull the mains connector [1] from the fan.
- Pull the connector of the harness [2] from the fan while pushing on the connector lock to loosen it.

Fig. 84 Removing the connectors from the fan

12.3.3 Remove the burner and the burner seal
- Remove the burner seal [1] and replace it if necessary.
- Remove the burner plate [2] and clean it on all sides using compressed air or a soft brush.

When re-installing the burner plate make sure that the notch is on the right-hand side (→ fig. 88, detailed picture).

Fig. 85 Pulling the air suction tube from the fan

- Carefully open the 4 snap retaining clips on the burner cover (→ fig. 86). The retaining clips may be under tension.
- Remove the retaining clips.

Fig. 86 Opening the retaining clips

- Remove the burner cover with the gas/air unit (→ fig. 87).

Fig. 87 Removing the burner cover with the gas/air unit
12.3.4 Checking ignition unit

**DANGER:**
- Close the gas valve prior to working on components in contact with gas.
- Check for gas tightness after carrying out work on components in contact with gas.

**NOTICE**
The glow ignitor is fragile.
- Handle with care.

**NOTICE**
If the seat of the cover plate leaks, the seal can burn away.
- Check the cover plate for tightness.

**NOTICE**
Since the effectiveness of the seals in the ignition unit is reduced, the gas condensing boiler may become damaged.
- The rubber seal (→ fig. 90, [3]) and the cover plate with seal (→ fig. 90,[4]) need to be replaced every 4 years.
- Check the individual components of the ignition unit (→ fig. 90) for wear or contamination (→ fig. 89).
- If required, replace the ionization electrode and/or glow ignitor.
- After checking or replacing the ionization electrode and/or the glow ignitor fit a new cover plate and rubber seal.

**NOTICE**
If the seat of the cover plate leaks, the seal can burn away.
- Check the cover plate for tightness.

**WARNING:**
- Disconnect the condensate trap hose [3] and the rubber sleeve [2] from the condensate trap [1].
- Turn the condensate trap a quarter rotation counterclockwise (→ fig. 91).

**NOTICE**
The glow ignitor is fragile.
- Handle with care.

**NOTICE**
If the seat of the cover plate leaks, the seal can burn away.
- Check the cover plate for tightness.

**NOTICE**
Since the effectiveness of the seals in the ignition unit is reduced, the gas condensing boiler may become damaged.
- The rubber seal (→ fig. 90, [3]) and the cover plate with seal (→ fig. 90,[4]) need to be replaced every 4 years.
- Check the individual components of the ignition unit (→ fig. 90) for wear or contamination (→ fig. 89).
- If required, replace the ionization electrode and/or glow ignitor.
- After checking or replacing the ionization electrode and/or the glow ignitor fit a new cover plate and rubber seal.
12 Maintenance

▶ Rinse the condensate trap to clean it.
▶ Fill the condensate trap with water and reinstall it.

CONTROL
▶ The condensate trap has a bayonet connector. After inserting it, the condensate trap must be turned ¼ rotation clockwise to click into position.

12.3.6 Remove the condensate collector
▶ Disconnect the flexible condensate drain hose and bend it backwards (ﬁg. 93).

Fig. 93 Removing the condensate trap hose
▶ Open the 2 clamps on the right and left at the bottom of the condensate collector [1].
▶ Pull the condensate collector down [step 1] and remove it by pulling it towards you [step 2].

Fig. 94 Removing the condensate collector
▶ Check the condensate collector for damage and replace it if required.

▶ Clean the condensate collector mechanically (using compressed air or a soft brush) and rinse it with clean water (ﬁg. 95).

Fig. 95 Cleaning the condensate collector

12.3.7 Clean the heat exchanger

CAUTION:
Incorrect handling can damage the boiler.
▶ Do not use metal brushes or similar hard cleaning tools.
▶ Handle the glow ignitor with care, it is made from fragile ceramic material.
▶ Cover the boiler interior using a blanket or a cover to prevent dirt entering the boiler.

WARNING:
If the condensate collector is installed incorrectly.
▶ Flue gas or condensate may leak

▶ Clean the heat exchanger with compressed air or a soft brush (ﬁg. 96).

Fig. 96 Cleaning the heat exchanger
▶ Refit the condensate collector and make sure that the 2 retaining clips close smoothly. If this is not the case, the seal between the condensate collector and the flue pipe at the rear side of the heat exchanger may be leaking.
13 Display information

13.1 Removing the control panel
To make it easier to use the buttons on the control panel when the boiler door is open and to make it easier to read the values in the display, you can disassemble the control panel from the boiler door and hang it from the boiler frame.

- Open the boiler door.
- Loosen the 2 screws of the control panel at the rear side of the boiler door [1].

Fig. 98 Loosening the screws

- Loosen the cable tie [1].
- Remove the control panel (→ fig. 99).

Fig. 99 Removing the control panel

- Use the 2 hooks to hang the control panel from the boiler (→ fig. 100).

Fig. 100 Hanging the control panel from the boiler frame
13 Display information

13.2 Replacing the control panel
► Take the control panel from the boiler frame.
► Install the control panel in the boiler door by following the procedure in § 13.1 “Removing the control panel”, page 45 in reverse order.

13.3 BC10 Display readings

<table>
<thead>
<tr>
<th>Display reading</th>
<th>Key to display reading</th>
<th>Unit</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>Current space heating water temperature</td>
<td>°F</td>
<td>0 - 190</td>
</tr>
<tr>
<td>P22</td>
<td>Current system pressure</td>
<td>psi</td>
<td>100 - 1500</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Display readings</th>
<th>Display setting</th>
<th>Meaning of display setting</th>
<th>Unit</th>
<th>Range</th>
<th>Factory-adjusted setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>L99</td>
<td>Sea level (0-4,000 ft.): configured target load (GB162-80 kW)</td>
<td>%</td>
<td>L25 / L99 / L- -</td>
<td>100%</td>
<td>L- -</td>
</tr>
<tr>
<td></td>
<td>Sea level (0-4,000 ft.): configured target load (GB162-100 kW)</td>
<td>%</td>
<td>L20 / L99 / L- -</td>
<td>100%</td>
<td>L- -</td>
</tr>
<tr>
<td>F5</td>
<td>Configured target value of the pump run-over time.</td>
<td>min.</td>
<td>F60 / F60 / F1d</td>
<td>100%</td>
<td>F5</td>
</tr>
<tr>
<td>C0</td>
<td>DHW flow operating condition setting.</td>
<td>-</td>
<td>C0 “Off” / C1 “On”</td>
<td>C1</td>
<td></td>
</tr>
</tbody>
</table>

13.4 BC10 Display settings

<table>
<thead>
<tr>
<th>Display readings</th>
<th>Display setting</th>
<th>Meaning of display setting</th>
<th>Unit</th>
<th>Range</th>
<th>Factory-adjusted setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>L99</td>
<td>Sea level (0-4,000 ft.): configured target load (GB162-80 kW)</td>
<td>%</td>
<td>L25 / L99 / L- -</td>
<td>100%</td>
<td>L- -</td>
</tr>
<tr>
<td></td>
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<td>%</td>
<td>L20 / L99 / L- -</td>
<td>100%</td>
<td>L- -</td>
</tr>
<tr>
<td>F5</td>
<td>Configured target value of the pump run-over time.</td>
<td>min.</td>
<td>F60 / F60 / F1d</td>
<td>100%</td>
<td>F5</td>
</tr>
<tr>
<td>C0</td>
<td>DHW flow operating condition setting.</td>
<td>-</td>
<td>C0 “Off” / C1 “On”</td>
<td>C1</td>
<td></td>
</tr>
</tbody>
</table>

13.5 BC10 Display codes

The following table contains all codes that can show on the BC10 display. To show the current display code and/or sub code, press the “Service” button repeatedly.

If a blinking code is displayed together with other codes, all displayed codes will blink. A locking code will always show on the first screen of the BC10.

<table>
<thead>
<tr>
<th>Main display code</th>
<th>Sub display code</th>
<th>Key to display code</th>
<th>Other effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td></td>
<td>Operating phase: Communication test while starting up. This display code flashes 5 times within 5 seconds while starting up to indicate that the communication between the UBA 3 and the BC10 basic controller is being tested. If a new UBA 3 or a new KIM was fitted, this code will flash for max. 10 seconds.</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>1-2</td>
<td></td>
<td>Blocking fault: If this code continues to flash on the display, there is a fault in the communication between the UBA 3 and the BC10 basic controller.</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>-R 208 1)</td>
<td></td>
<td>Operating phase: The boiler is in flue gas test or service mode.</td>
<td></td>
</tr>
<tr>
<td>-H 200 1)</td>
<td></td>
<td>Operating phase: The boiler is in heating mode</td>
<td></td>
</tr>
<tr>
<td>-H 200 1)</td>
<td></td>
<td>Operating phase: The boiler is in heating mode</td>
<td></td>
</tr>
<tr>
<td>-H 200 1)</td>
<td></td>
<td>Operating phase: The boiler is in manual operation mode.</td>
<td>The room temperature is too high.</td>
</tr>
<tr>
<td>.H 201 1)</td>
<td></td>
<td>Operating phase: The boiler is in DHW mode.</td>
<td></td>
</tr>
<tr>
<td>.H 201 1)</td>
<td></td>
<td>Operating phase: Pump run-over time via the external hot water cylinder 130 seconds at minimum speed. The LED “Burner operation” is off.</td>
<td></td>
</tr>
</tbody>
</table>

Table 21 BC10 Display readings

Table 22 BC10 Display settings

Table 23 Display codes
Table 23 Display codes

<table>
<thead>
<tr>
<th>Main display code</th>
<th>Sub display code</th>
<th>Key to display code</th>
<th>Other effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>0A</td>
<td>202</td>
<td>Operating phase: The switch optimization program is activated. This program is activated if there has been a DHW request from an RC regulator more frequently than once every 10 minutes. This means that the boiler cannot be restarted until at least 10 minutes have elapsed since initial burner start-up.</td>
<td>The room temperature is not possibly reached.</td>
</tr>
<tr>
<td>0A</td>
<td>305</td>
<td>Operating phase: The boiler cannot start up temporarily after a DHW request has ended.</td>
<td></td>
</tr>
<tr>
<td>0C</td>
<td>283</td>
<td>Pre-operative phase: The boiler prepares for a burner start-up whenever a heat demand or a DHW request arises.</td>
<td></td>
</tr>
<tr>
<td>0E</td>
<td>265</td>
<td>Readiness for operation: The boiler is in standby mode. There is a current heat demand, but too much energy has been supplied.</td>
<td></td>
</tr>
<tr>
<td>0H</td>
<td>203</td>
<td>Readiness for operation: The boiler is in standby mode. There is no current heat demand.</td>
<td></td>
</tr>
<tr>
<td>0L</td>
<td>289</td>
<td>Ignition phase: The gas valve is activated.</td>
<td></td>
</tr>
<tr>
<td>0U</td>
<td>270</td>
<td>Start-up phase: The boiler starts up after activation of the mains power supply or completion of a system reset. This code is displayed for a maximum of 4 minutes.</td>
<td></td>
</tr>
<tr>
<td>0Y</td>
<td>204</td>
<td>Operating phase: The flow temperature sensor has detected that the current flow temperature is higher than the flow temperature setting on the BC10, or that it is higher than the flow temperature calculated according to the heating curve, or that it is higher than the flow temperature calculated for the DHW mode.</td>
<td>The room temperature is not possibly reached.</td>
</tr>
<tr>
<td>0Y</td>
<td>276</td>
<td>Locking fault: The flow temperature sensor has measured a current flow temperature higher than 203 °F (95 °C).</td>
<td>The room temperature is not possibly reached.</td>
</tr>
<tr>
<td>0Y</td>
<td>277</td>
<td>Locking fault: The safety temperature sensor has measured a current flow temperature higher than 203 °F (95 °C).</td>
<td>The room temperature is not possibly reached.</td>
</tr>
<tr>
<td>0Y</td>
<td>285</td>
<td>Locking fault: The return temperature sensor has measured a current return temperature higher than 203 °F (95 °C).</td>
<td>The room temperature is not possibly reached.</td>
</tr>
<tr>
<td>1A</td>
<td>316</td>
<td>Blocking fault: The flue gas sensor temperature is too high.</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>1L</td>
<td>211</td>
<td>Locking fault: There is no connection between contacts 78 and 50 of the UBA 3 installation base.</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>1U</td>
<td>317</td>
<td>Blocking fault: The flue gas sensor contacts have shorted.</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>1U</td>
<td>319</td>
<td>Blocking fault: The flue gas sensor contacts are open.</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>2E</td>
<td>207</td>
<td>Locking fault: The system pressure is too low (less than 3 psi [0.2 bar]).</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>2F</td>
<td>260</td>
<td>Locking fault: The flow temperature sensor has not, after burner start-up, detected any temperature increase in the heating systems water.</td>
<td></td>
</tr>
<tr>
<td>2P</td>
<td>271</td>
<td>Locking fault: The heating water temperature difference, measured between the flow temperature sensor and the safety temperature sensor, is too high.</td>
<td></td>
</tr>
<tr>
<td>2P</td>
<td>212</td>
<td>Locking fault: The flow temperature sensor has measured a heating water temperature increase of over 40 °F/s (5 °C/s).</td>
<td></td>
</tr>
</tbody>
</table>
### Display codes

<table>
<thead>
<tr>
<th>Main display code</th>
<th>Sub display code</th>
<th>Key to display code</th>
<th>Other effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 u</td>
<td>2 1 3</td>
<td>Locking fault: The temperature difference measured between the flow temperature sensor and the return temperature sensor, is more than 122 °F (50 °C).</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>2 y</td>
<td>2 8 1</td>
<td>Locking fault: The pump has stopped or is running without water.</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>2 y</td>
<td>2 8 2</td>
<td>Locking fault: No feedback from the pump.</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>3 A</td>
<td>2 6 4</td>
<td>Locking fault: The tacho signal from the fan has failed during the operating phase.</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>3 C</td>
<td>2 1 1</td>
<td>Blocking fault: No current of air after a certain time.</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>3 F</td>
<td>2 7 3</td>
<td>Operating phase: The appliance has been switched off for a couple of seconds, because it had been running without any interruption for 24 hours. This is a safety check.</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>3 L</td>
<td>2 1 4</td>
<td>Blocking fault: The tacho signal from the fan is not present during the pre-operative or operating phase.</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>3 L</td>
<td>2 1 5</td>
<td>Blocking fault: The fan is running too slowly.</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>3 L</td>
<td>2 1 6</td>
<td>Blocking fault: The fan is running too fast.</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>4 H</td>
<td>2 2 8</td>
<td>Blocking fault: The flow temperature sensor has detected a flow temperature of over 221 °F (105 °C)</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>4 l</td>
<td>2 2 4</td>
<td>Blocking fault: There is no bridging cable between contacts 22 and 24 of the UBA 3 contact strip.</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>4 L</td>
<td>2 1 9</td>
<td>Blocking fault: The sensor test has failed.</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>4 F</td>
<td>2 1 9</td>
<td>Blocking fault: The safety temperature sensor has detected a flow temperature of over 266 °F (130 °C).</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>4 L</td>
<td>2 2 0</td>
<td>Blocking fault: The contacts for the safety temperature sensor have shorted or the safety temperature sensor has detected a flow temperature of over 266 °F (130 °C).</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>4 F</td>
<td>2 2 1</td>
<td>Blocking fault: The contacts for the safety temperature sensor have been interrupted.</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>4 H</td>
<td>2 2 2</td>
<td>Blocking fault: The contacts for the safety temperature sensor have shorted.</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>4 H</td>
<td>2 2 3</td>
<td>Blocking fault: The contacts for the safety temperature sensor have been interrupted.</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>5 H</td>
<td>2 6 8</td>
<td>Operating phase: Component test phase.</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>6 R</td>
<td>2 2 7</td>
<td>Locking fault: The system has detected an insufficient ionization current during the ignition phase.</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>6 R</td>
<td>2 2 1</td>
<td>Blocking fault: The system has detected an insufficient ionization current after 4 start-up attempts.</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>6 L</td>
<td>2 2 8</td>
<td>Blocking fault: The system has detected an ionization current before burner start-up.</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>6 L</td>
<td>3 0 6</td>
<td>Blocking fault: An ionization current has been measured after the burner shut down.</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>6 L</td>
<td>2 2 9</td>
<td>Blocking fault: The system has detected an insufficient ionization current during the operating phase.</td>
<td>No heating operation and no DHW.</td>
</tr>
</tbody>
</table>

*Table 23 Display codes*
### Display codes

<table>
<thead>
<tr>
<th>Main display code</th>
<th>Sub display code</th>
<th>Key to display code</th>
<th>Other effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>16p</td>
<td>269</td>
<td>Blocking fault: The system has detected an insufficient ionization current during the operating phase.</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>16y</td>
<td>203</td>
<td>Blocking fault: The ionization current is too high.</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>1B2</td>
<td>23</td>
<td>Blocking fault: The power supply was interrupted during a locking fault</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>1B2</td>
<td>2B8</td>
<td>Blocking fault: There was a momentary interruption of power.</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>1L0</td>
<td>26</td>
<td>Blocking fault: The UBA 3 is defect.</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>1L0</td>
<td>280</td>
<td>Blocking fault: The UBA 3 is defect.</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>8Y</td>
<td>232</td>
<td>Operating phase: The external switch contact is open.</td>
<td>No heating operation.</td>
</tr>
<tr>
<td>888</td>
<td></td>
<td>Start-up phase: The boiler starts up after activation of the mains power supply or completion of a system reset. This code is displayed for a maximum of 4 minutes.</td>
<td></td>
</tr>
<tr>
<td>10R</td>
<td>235</td>
<td>Blocking fault: The UBA 3 or the KIM is defective.</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>10H</td>
<td>237</td>
<td>Blocking fault: The UBA 3 or the KIM is defective.</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>10H</td>
<td>231</td>
<td>Blocking fault: The UBA 3 or the KIM is defective.</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>10H</td>
<td>234</td>
<td>Blocking fault: The contacts for the gas valve have been broken.</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>10H</td>
<td>238</td>
<td>Blocking fault: The UBA 3 or the KIM is defective.</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>10H</td>
<td>239</td>
<td>Blocking fault: The UBA 3 or the KIM is defective.</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>10U</td>
<td>233</td>
<td>Blocking fault: The UBA 3 or the KIM is defective.</td>
<td>No heating operation and no DHW.</td>
</tr>
<tr>
<td>R01</td>
<td>80</td>
<td>Locking fault: The contacts to the outdoor-temperature sensor have shorted or are interrupted, the sensor has been connected incorrectly or is defective.</td>
<td>Minimum outdoor temperature is assumed.</td>
</tr>
<tr>
<td>R01</td>
<td>808</td>
<td>Locking fault: The contacts to the DHW temperature sensor have shorted or are interrupted, the sensor has been connected incorrectly or is defective.</td>
<td>No DHW is heated any more.</td>
</tr>
<tr>
<td>R01</td>
<td>809</td>
<td>Locking fault: The contacts to DHW temperature sensor to have shorted or are interrupted, the sensor has been connected incorrectly or is defective.</td>
<td>No DHW is heated any more.</td>
</tr>
<tr>
<td>R01</td>
<td>810</td>
<td>Locking fault: The boiler water does not warm up. Sensor lead broken or shorted, sensor connected incorrectly or defective, filling pump connected incorrectly or defective, permanent tapping or leak.</td>
<td>No DHW available, but there is heating operation. The DHW priority is cancelled when the fault message appears. Switch the boiler off and on to reset the boiler.</td>
</tr>
<tr>
<td>R01</td>
<td>811</td>
<td>Locking fault: Thermal disinfection has failed. Outlet flow during disinfection period too high, sensor lead broken or shorted, sensor connected incorrectly or defective, filling pump defective.</td>
<td>Thermal disinfection was interrupted.</td>
</tr>
<tr>
<td>R01</td>
<td>816</td>
<td>Locking fault: No connection to EMS. EMS bus system is overloaded, UBA 3/MC10 is defective.</td>
<td>The boiler no longer receives a heat demand. The heating system does not heat any longer.</td>
</tr>
<tr>
<td>R01</td>
<td>828</td>
<td>Locking fault: Water pressure sensor generates a fault code. The digital water pressure sensor is defective.</td>
<td>No heating operation and no DHW.</td>
</tr>
</tbody>
</table>

*Table 23 Display codes*
## Display information

<table>
<thead>
<tr>
<th>Display codes</th>
<th>Main display code</th>
<th>Sub display code</th>
<th>Key to display code</th>
<th>Other effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>R02</td>
<td>8 16</td>
<td></td>
<td>Locking fault:</td>
<td>No communication with BC10. Contact problem at BC10 or BC10 is defective.</td>
</tr>
<tr>
<td>R12</td>
<td>8 15</td>
<td></td>
<td>Locking fault:</td>
<td>The contacts to the switch sensor have shorted or are interrupted, the sensor has been connected incorrectly or is defective.</td>
</tr>
<tr>
<td>R12</td>
<td>8 16</td>
<td></td>
<td>Locking fault:</td>
<td>WM10 not available or no communication. WM10 or bus circuit connected incorrectly or defective. WM10 is not recognized by the RC-thermostat.</td>
</tr>
<tr>
<td>R18</td>
<td>8 25</td>
<td></td>
<td>Locking fault:</td>
<td>Conflicting addresses. Both RC20 and RC35 are registered as Master.</td>
</tr>
<tr>
<td>R21</td>
<td>8 06</td>
<td></td>
<td>Locking fault:</td>
<td>RC20-HK1 temperature sensor. The integrated temperature sensor of the remote control (control unit) of heating circuit 1 is defective.</td>
</tr>
<tr>
<td>R21</td>
<td>8 16</td>
<td></td>
<td>Locking fault:</td>
<td>The contacts to the switch sensor have shorted or are interrupted, the sensor has been connected incorrectly or is defective.</td>
</tr>
<tr>
<td>R32</td>
<td>8 07</td>
<td></td>
<td>Locking fault:</td>
<td>The contacts to the switch sensor have shorted or are interrupted, the sensor has been connected incorrectly or is defective.</td>
</tr>
<tr>
<td>R32</td>
<td>8 16</td>
<td></td>
<td>Locking fault:</td>
<td>MM10 not available or no communication. The heating circuit addresses on the MM10 and the RC35 do not match up, the MM10 or the bus circuit is connected incorrectly or is defective. MM10 is not recognized by the RC35.</td>
</tr>
<tr>
<td>E00</td>
<td>286</td>
<td></td>
<td>Blocking fault:</td>
<td>The return temperature sensor has measured a return temperature higher than 221 °F (105 °C).</td>
</tr>
<tr>
<td>E00</td>
<td>288</td>
<td></td>
<td>Blocking fault:</td>
<td>The contacts for the pressure sensor have been interrupted or have shorted.</td>
</tr>
<tr>
<td>E00</td>
<td>289</td>
<td></td>
<td>Blocking fault:</td>
<td>The contacts for the pressure sensor have shorted.</td>
</tr>
<tr>
<td>E00</td>
<td>240</td>
<td></td>
<td>Blocking fault:</td>
<td>The contacts for the return temperature sensor have shorted.</td>
</tr>
<tr>
<td>E00</td>
<td>241</td>
<td></td>
<td>Blocking fault:</td>
<td>The contacts for the return temperature sensor have been interrupted.</td>
</tr>
<tr>
<td>E00</td>
<td>290</td>
<td></td>
<td>Locking fault:</td>
<td>The UBA 3 or the KIM is defective.</td>
</tr>
<tr>
<td>E3</td>
<td>242 2 thru 288</td>
<td></td>
<td>Blocking fault:</td>
<td>The UBA 3 or the KIM is defective.</td>
</tr>
<tr>
<td>H1</td>
<td>290</td>
<td></td>
<td>Operating phase:</td>
<td>The system pressure is too low (less than 12 psi [0.8 bar]).</td>
</tr>
<tr>
<td>H1</td>
<td>291</td>
<td></td>
<td>Operating phase:</td>
<td>The system pressure is too low (less than 12 psi [0.8 bar]).</td>
</tr>
</tbody>
</table>

Table 23 Display codes
### 14 Technical specifications

#### 14.1 Technical specifications of GB162-boilers at sea level (0-4,000 ft.)

<table>
<thead>
<tr>
<th>General specifications</th>
<th>unit</th>
<th>GB162-80 (NG)</th>
<th>GB162-80 (LP)</th>
<th>GB162-100 (NG)</th>
<th>GB162-100 (LP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas category</td>
<td></td>
<td>Natural gas</td>
<td>Propane</td>
<td>Natural gas</td>
<td>Propane</td>
</tr>
<tr>
<td>Rated thermal load</td>
<td>btu/h</td>
<td>72,000-290,000</td>
<td>62,000-270,000</td>
<td>72,000-333,000</td>
<td>62,000-315,000</td>
</tr>
<tr>
<td>Rated heating capacity, heating curve 176/140 °F (80/60 °C)</td>
<td>btu/h</td>
<td>64,100-255,200</td>
<td>55,200-237,600</td>
<td>64,100-293,000</td>
<td>55,200-277,200</td>
</tr>
<tr>
<td>Rated heating capacity, heating curve 122/86 °F (50/30 °C)</td>
<td>btu/h</td>
<td>71,300-281,300</td>
<td>61,400-261,900</td>
<td>71,300-326,300</td>
<td>61,400-308,700</td>
</tr>
<tr>
<td>Boiler efficiency at max. capacity, heating curve 176/140 °F (80/60 °C)</td>
<td>%</td>
<td>88</td>
<td>88</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boiler efficiency at max. capacity, heating curve 122/86 °F (50/30 °C)</td>
<td>%</td>
<td>97</td>
<td>98</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSA Output</td>
<td>btu/h</td>
<td>261,000</td>
<td>243,000</td>
<td>295,000</td>
<td>279,000</td>
</tr>
<tr>
<td>De-ration altitudes 2,000 - 4,000 ft.</td>
<td>% / 1,000 ft.</td>
<td>2.3</td>
<td>2.2</td>
<td>2.1</td>
<td>2.0</td>
</tr>
<tr>
<td>AFUE at 80/180 °F (27/82 °C)</td>
<td>93.8</td>
<td>93.9</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>BTS 2000 at 80/180 °F (27/82 °C), full load</td>
<td>96.1</td>
<td>96.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BTS 2000 at 80/180 °F (27/82 °C), partial load</td>
<td>90.8</td>
<td>90.8</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Heating

| Maximum flow temperature | °F (°C) | 180 (82) |
| Maximum working pressure (boiler) | psi (bar) | 50 (3.6) |
| Minimum water circulation volume | Gal/h (l/h) | 0 |
| Flow temperature | °F(°C) | 86-180 (30-82), can be set on the BC10 basic controller |
| Resistance at ΔT = 20 K | psi (bar) | 3.26 (225) | 4.57 (315) |
| Heating circuit volume of heat exchanger | Gal l | 1.3 (5.0) |

#### Pipe connections boiler, without pump group

| Gas connection | in | Rp 1" |
| Heating water connection | in | G 1½" union nut with female thread enclosed |
| Condensate connection | in (mm) | Ø 1¼" (32) |

#### Flue gas values

| Condensate quantity at 104/86 °F (40/30 °C) | Gal/h (L/h) | 2.4 (9.0) | 2.85 (10.8) |
| pH value of condensate | pH | approx. 4.1 |
| Flue gas mass flow rate, full load | g/s | 35.3 | 44.9 |
| Flue gas temperature 176/140 °F (80/60 °C), full load | °F(°C) | 153 (67) | 149 (65) | 169 (76) | 165 (63) |
| Flue gas temperature 176/140 °F (80/60 °C), partial load | °F(°C) | 142 (61) | 136 (58) | 142 (61) | 136 (58) |
| Flue gas temperature 122/86 °F (50/30 °C), full load | °F(°C) | 118 (48) | 114 (46) | 124 (51) | 120 (49) |
| Flue gas temperature 122/86 °F (50/30 °C), partial load | °F(°C) | 93 (34) | 88 (31) | 96 (34) | 88 (31) |
| CO₂ content at full load | % | 9.3 ± 0.5 % | 9.6 ± 0.5 % | 9.3 ± 0.5 % | 9.7 ± 0.5 % |

Table 24 Technical specifications of GB162-boilers at sea level
Technical specifications

General specifications

<table>
<thead>
<tr>
<th>Description</th>
<th>Unit</th>
<th>GB162-80 (NG)</th>
<th>GB162-80 (LP)</th>
<th>GB162-100 (NG)</th>
<th>GB162-100 (LP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free fan feed pressure</td>
<td>w.c. (Pa)</td>
<td>0.602 (150)</td>
<td>0.883 (220)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flue gas connection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø Flue gas system, room-air dependent</td>
<td>in (mm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø Flue gas system, room-air independent</td>
<td>in (mm)</td>
<td>Ø 4&quot; (100)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø Flue gas system, room-air dependent (parallel)</td>
<td>in (mm)</td>
<td>Ø 4&quot; (100)</td>
<td>4&quot; (100)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydraulic resistance of the boiler</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fig. 101 Boiler resistance curve</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Flue gas connection

- Ø Flue gas system, room-air dependent
  - Ø 4" (100)
- Ø Flue gas system, room-air independent
  - Ø 4" (100) / 4" (100) parallel

Hydraulic resistance of the boiler

- Ø Flue gas system, room-air dependent
  - Ø 4" (100)
- Ø Flue gas system, room-air independent
  - Ø 4" (100) / 4" (100) parallel

Electrical data

<table>
<thead>
<tr>
<th>Description</th>
<th>Unit</th>
<th>GB162-80 (NG)</th>
<th>GB162-80 (LP)</th>
<th>GB162-100 (NG)</th>
<th>GB162-100 (LP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mains connection voltage</td>
<td>VAC, Hz</td>
<td>120, 60</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical protection rating</td>
<td>IPX4D</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuses</td>
<td>Amp</td>
<td>104</td>
<td>156</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical power consumption, full load (without a pump group)</td>
<td>W</td>
<td>29</td>
<td>29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical power consumption, partial load (without a pump group)</td>
<td>W</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Boiler dimensions and weight

- Height × width × depth (with pump group) in (mm)
  - 50.4 x 20.5 x 18.3 (1280 x 520 x 465)
- Weight (without a pump group) lb (kg)
  - 154 (70)

Table 24 Technical specifications of GB162 boilers at sea level

Table 25 Gas orifice diameter

<table>
<thead>
<tr>
<th>Type of gas supply</th>
<th>Altitude in kwh (m)</th>
<th>Gas orifice diameter in mm (inch)</th>
<th>Set number with orifice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural gas</td>
<td>0 - 4,000 (0 - 1,220)</td>
<td>8.40 (0.331)</td>
<td>7746900399</td>
</tr>
<tr>
<td>LPG</td>
<td>0 - 4,000 (0 - 1,220)</td>
<td>4.70 (0.193)</td>
<td>7746900499</td>
</tr>
</tbody>
</table>

Table 26 Factory setting of the gas control valve

- Natural gas: Delivered factory-set: Natural Gas
- LPG: Suitable for propane after conversion (also see the instruction "Conversion to another type of gas supply").
  - Information on gas type instruction plate:
    - Set to gas category: Propane.

Hydraulic resistance of the boiler

- Ø Flue gas system, room-air dependent
  - Ø 4" (100)
- Ø Flue gas system, room-air independent
  - Ø 4" (100) / 4" (100) parallel

Electrical data

- Mains connection voltage VAC, Hz
  - 120, 60
- Electrical protection rating IPX4D
- Fuses Amp
  - 104
  - 156
- Electrical power consumption, full load (without a pump group) W
  - 29
- Electrical power consumption, partial load (without a pump group) W
  - 29

Boiler dimensions and weight

- Height × width × depth (with pump group) in (mm)
  - 50.4 x 20.5 x 18.3 (1280 x 520 x 465)
- Weight (without a pump group) lb (kg)
  - 154 (70)

Table 24 Technical specifications of GB162 boilers at sea level

Table 25 Gas orifice diameter

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Natural gas</td>
<td>0 - 4,000 (0 - 1,220)</td>
<td>8.40 (0.331)</td>
<td>7746900399</td>
</tr>
<tr>
<td>LPG</td>
<td>0 - 4,000 (0 - 1,220)</td>
<td>4.70 (0.193)</td>
<td>7746900499</td>
</tr>
</tbody>
</table>

Table 26 Factory setting of the gas control valve

- The gas orifice diameter is marked on the gas orifice (in mm).
15 Reports

15.1 Start-up report

- Enter your signature and the date after completing the start-up activities.

<table>
<thead>
<tr>
<th>Start-up activities</th>
<th>Page</th>
<th>Measurement results</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Check for gas leaks</td>
<td>page 32</td>
<td>□</td>
<td></td>
</tr>
<tr>
<td>2. Fill the heating system</td>
<td>page 32</td>
<td>□</td>
<td></td>
</tr>
<tr>
<td>- Pre-pressure expansion vessel (refer to the installation instructions for the expansion - vessel)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Heating system filling pressure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Fill the condensate trap with water</td>
<td>page 33</td>
<td>□</td>
<td></td>
</tr>
<tr>
<td>4. Write down the gas characteristics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heat input</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heat output</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Bleed the gas supply valve</td>
<td>page 33</td>
<td>□</td>
<td></td>
</tr>
<tr>
<td>6. Check the air/flue gas connection</td>
<td>page 34</td>
<td>□</td>
<td></td>
</tr>
<tr>
<td>7. Checking the appliance configuration</td>
<td>page 34</td>
<td>□</td>
<td></td>
</tr>
<tr>
<td>8. Measure the gas inlet pressure (working pressure)</td>
<td>page 34</td>
<td>□</td>
<td></td>
</tr>
<tr>
<td>9. Carry out a leakage test in operating conditions</td>
<td>page 37</td>
<td>□</td>
<td></td>
</tr>
<tr>
<td>10. Check and adjust the flue gases CO₂ emissions</td>
<td>page 37</td>
<td>□</td>
<td></td>
</tr>
<tr>
<td>11. Carry out a function test</td>
<td>page 37</td>
<td>□</td>
<td></td>
</tr>
<tr>
<td>- Measure the ionization current</td>
<td>page 37</td>
<td>□</td>
<td></td>
</tr>
<tr>
<td>12. Measure the pH-value</td>
<td>page 38</td>
<td>□</td>
<td></td>
</tr>
<tr>
<td>13. Boiler settings</td>
<td>page 39</td>
<td>□</td>
<td></td>
</tr>
<tr>
<td>14. Final activities</td>
<td>page 39</td>
<td>□</td>
<td></td>
</tr>
<tr>
<td>- Close the boiler door and the control panel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Hand over</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Confirming proper start-up

Company stamp/signature/date

Table 27 Start-up report
### 15.2 Inspection report

Indicate the inspection activities that have been carried out, enter the values measured and enter your signature and the date.

<table>
<thead>
<tr>
<th>Inspection activities</th>
<th>See paragraph</th>
<th>Date:</th>
<th>Date:</th>
<th>Date:</th>
<th>Date:</th>
<th>Date:</th>
<th>Date:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Check the general condition of the heating system</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Carry out a visual inspection and function test of the heating system</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Checking the gas and water-bearing system components for:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Operational tightness</td>
<td>§ 9.9, page 37</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Visible corrosion</td>
<td>§ 11.2, page 40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Signs of wear</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Fill the condensate trap</td>
<td>§ 9.3, page 33</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Measure the ionization current</td>
<td>§ 9.12, page 37</td>
<td>______μA</td>
<td>______μA</td>
<td>______μA</td>
<td>______μA</td>
<td>______μA</td>
<td>______μA</td>
<td>______μA</td>
</tr>
<tr>
<td>6. Check and adjust the flue gases CO\textsubscript{2} emissions</td>
<td>§ 9.10, page 37</td>
<td>_____ppm</td>
<td>_____ppm</td>
<td>_____ppm</td>
<td>_____ppm</td>
<td>_____ppm</td>
<td>_____ppm</td>
<td>_____ppm</td>
</tr>
<tr>
<td>7. Carry out a leakage test in operating conditions</td>
<td>§ 9.9, page 37</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Check and adjust the flue gases CO\textsubscript{2} emissions</td>
<td>§ 9.10, page 37</td>
<td>_____psi</td>
<td>_____psi</td>
<td>_____psi</td>
<td>_____psi</td>
<td>_____psi</td>
<td>_____psi</td>
<td>_____psi</td>
</tr>
<tr>
<td>9. Fill the heating system</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Pre-pressure of expansion vessel (also see installation instructions for expansion vessel)</td>
<td></td>
<td>______psi</td>
<td>______psi</td>
<td>______psi</td>
<td>______psi</td>
<td>______psi</td>
<td>______psi</td>
<td>______psi</td>
</tr>
<tr>
<td>- Filling pressure</td>
<td>§ 9.2, page 32</td>
<td>______psi</td>
<td>______psi</td>
<td>______psi</td>
<td>______psi</td>
<td>______psi</td>
<td>______psi</td>
<td>______psi</td>
</tr>
<tr>
<td>10. Check the air/flue gas connection</td>
<td>§ 9.5, page 34</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Checking the boiler settings of the control device (in accordance with requirements)</td>
<td>documents for the control device.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Final check of the inspection activities, documenting the measurement and test results</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Confirming proper inspection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 28: Inspection report
### 15.3 Service report

- Indicate the maintenance activities that have been carried out, enter the values measured and enter your signature and the date.

#### Needs-dependant maintenance activities

<table>
<thead>
<tr>
<th>Description</th>
<th>Page</th>
<th>Date:</th>
<th>Date:</th>
<th>Date:</th>
<th>Date:</th>
<th>Date:</th>
<th>Date:</th>
<th>Date:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Clean the heat exchanger, burner and condensate trap</td>
<td>42</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>2. Check and adjust the flue gases CO₂ emissions</td>
<td>37</td>
<td>&quot;W.C.&quot;</td>
<td>&quot;W.C.&quot;</td>
<td>&quot;W.C.&quot;</td>
<td>&quot;W.C.&quot;</td>
<td>&quot;W.C.&quot;</td>
<td>&quot;W.C.&quot;</td>
<td>&quot;W.C.&quot;</td>
<td>&quot;W.C.&quot;</td>
</tr>
<tr>
<td>- CO₂ content at full load</td>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>- CO₂ content at part load</td>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>3. Function check</td>
<td>45</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>4. Confirming proper inspection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Table 29 Service report

#### Table 30 Spare parts

The following are parts commonly required due to damage or replacements. Their failure will affect safety or performance of this appliance.

For a pictorial representation of the part see the respective position number on the exploded view pictures on page 57 and page 58.
# Table 30 Spare parts

<table>
<thead>
<tr>
<th>Description</th>
<th>Product No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>75 Fuse 5AF (10 pc)</td>
<td>8718601966</td>
</tr>
<tr>
<td>76 Connection board</td>
<td>7099042</td>
</tr>
<tr>
<td>77 Electronic connection red</td>
<td>73776</td>
</tr>
<tr>
<td>78 Electronic connection grey</td>
<td>73774</td>
</tr>
<tr>
<td>79 Electronic connection grey</td>
<td>73773</td>
</tr>
<tr>
<td>80 Electronic connection blue</td>
<td>73775</td>
</tr>
<tr>
<td>81 Electronic connection orange</td>
<td>73777</td>
</tr>
<tr>
<td>83 Flue gas adapter</td>
<td>73936</td>
</tr>
<tr>
<td>84 Measure nipple cap</td>
<td>7101424</td>
</tr>
<tr>
<td>86 Cable harness low voltage</td>
<td>7746900392</td>
</tr>
<tr>
<td>87 Cable harness high voltage</td>
<td>7746900393</td>
</tr>
<tr>
<td>88 Cable harness on/off switch</td>
<td>7101476</td>
</tr>
<tr>
<td>89 Cable harness earth</td>
<td>7101474</td>
</tr>
<tr>
<td>91 Union nut 1 1/2&quot; (5x)</td>
<td>7099224</td>
</tr>
<tr>
<td>92 Sealing (5 pc)</td>
<td>7746700417</td>
</tr>
<tr>
<td>93 Nut 1&quot;</td>
<td>7099416</td>
</tr>
<tr>
<td>95 Gas valve</td>
<td>7746900401</td>
</tr>
<tr>
<td>96 Pump UP26-99U</td>
<td>7746900402</td>
</tr>
<tr>
<td>98 Level ball valve blue</td>
<td>7746700421</td>
</tr>
<tr>
<td>99 Level ball valve red</td>
<td>7746700422</td>
</tr>
<tr>
<td>100 Casing</td>
<td>7101514</td>
</tr>
<tr>
<td>101 Thermometer</td>
<td>7746900404</td>
</tr>
<tr>
<td>102 Manometer</td>
<td>7101506</td>
</tr>
<tr>
<td>103 Valve housing return</td>
<td>74549</td>
</tr>
<tr>
<td>106 Air release tap</td>
<td>7746900403</td>
</tr>
<tr>
<td>107 Connection pressure gauge</td>
<td>73081</td>
</tr>
<tr>
<td>108 Drain pipe</td>
<td>7101410</td>
</tr>
<tr>
<td>109 Valve housing supply</td>
<td>7746900406</td>
</tr>
<tr>
<td>110 Adapter parallel 4&quot;</td>
<td>7746900384</td>
</tr>
<tr>
<td>111 Adapter insert 4&quot;</td>
<td>7746900385</td>
</tr>
<tr>
<td>112 Open venting insert</td>
<td>7746900386</td>
</tr>
<tr>
<td>113 Lip ring 114</td>
<td>7746900387</td>
</tr>
<tr>
<td>114 Lip ring 103</td>
<td>7746900388</td>
</tr>
<tr>
<td>117 Strain relief bracket</td>
<td>7746900398</td>
</tr>
<tr>
<td>118 Safety valve ASME</td>
<td>7746900405</td>
</tr>
<tr>
<td>119 Low loss header</td>
<td>7746901646</td>
</tr>
<tr>
<td>120 plug protector</td>
<td>73948</td>
</tr>
<tr>
<td>- AM10</td>
<td>7746900020</td>
</tr>
<tr>
<td>- BCM 1100– 100 kW (0-4,000 ft.)</td>
<td>8718600725</td>
</tr>
<tr>
<td>- BCM 1101– 80 kW (0-4,000 ft.)</td>
<td>8718600726</td>
</tr>
<tr>
<td>- Screw 6.3 x 19 (10 pc)</td>
<td>73986</td>
</tr>
</tbody>
</table>
Fig. 102 Exploded view Logamax plus GB162-80 kW/100 kW
Fig. 103 Exploded view pump group Logamax plus GB162-80 kW/100 kW
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