WARNING:
Improper installation, set-up, modification, operation or maintenance of the heating system can cause personal injury and property damage. Follow these instructions precisely. If you require assistance or further information, contact a trained and certified installer or the gas supply company.

WARNING:
The operating instructions are part of the technical documents that must be handed over to the owner or operator of the heating system. Explain to the owner or operator how to use the heating system using the operating instructions. Make sure that they are familiar with all required information for the safe and proper operation of the heating system.

NOTICE:
In Massachusetts, this appliance must be installed by a licensed plumber or gas fitter.

These instructions are available in English and French.

Please keep these instructions for future reference.

Warranty information available at www.bosch-climate.us

Annual service is required

Residential Gas Condensing Boiler

Greenstar FS/Combi FS


Installation and Service Instructions for Contractors
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1 Key to symbols and safety instructions

1.1 Key to symbols

Warnings

Warnings in this document are identified by a warning triangle printed against a grey background.

Keywords at the start of a warning indicate the type and seriousness of the ensuing risk if measures to prevent the risk are not taken.

Keywords at the start of a warning indicate the type and seriousness of the ensuing risk if measures to prevent the risk are not taken. The following keywords are defined and can be used in this document:

- **DANGER** indicates a hazardous situation which, if not avoided, will result in death or serious injury.
- **WARNING** indicates a hazardous situation which, if not avoided, could result in death or serious injury.
- **CAUTION** indicates a hazardous situation which, if not avoided, could result in minor to moderate injury.

**NOTICE:** Contains no warning triangle and indicates a situation that could result in damage to property or equipment, but no personal injury.

This symbol indicates important information where there is no risk to people or property.

Important information for the proper use of the boiler is also provided in this manual. You will find the information with a symbol shown on the left and bordered by horizontal 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>
### 4.1.2 General safety instructions

**If you hear gas leaking**
- Leave the building immediately.
- Prevent others from entering the building.
- Notify the police and fire department from outside the building.
- From outside the building, call the gas supply company and a trained and certified installer or service company.

**If you smell gas**
- Turn off the gas shut-off valve.
- Open windows and doors.
- Do not touch any electrical switch, telephone, and do not use outlets.
- Extinguish all open flames.
- Do not smoke!
- Do not use lighters!
- Warn all occupants of the building that they need to leave the building.
- Do not ring doorbells!
- Notify the police and fire department from outside the building.
- From outside the building, call the gas supply company and a trained and certified installer or service company.

**If you smell flue gas**
- Switch off the heating system by shutting off the emergency shut-off switch.
- Open windows and doors.
- Call a trained and certified installer or service company.

**DANGER: Risk of fatal injury from failing to consider your own safety!**
- Never risk your own life. Your own safety must always take the highest priority.

**NOTICE: Risk of appliance damage from improper operation of the boiler!**
- Only use the boiler for its intended purpose.
- Only operate the boiler if it has been installed and maintained per the instructions provided in the Installation Manual.
- Do not attempt to operate an appliance if any part of it is not in working order or is damaged.
- Use only original spare parts! The use of parts not supplied by the manufacturer may cause damage to the boiler, other property and personal injury. Also, boiler damage caused by the use of unauthorized parts is not covered by the warranty.

**DANGER: Risk of fire when soldering and brazing!**
- Take appropriate protective measures when soldering and brazing around combustible and flammable material.

**NOTICE:**
- The installation must comply with all applicable national, state, and local codes, rules, and regulations.
- The operator is responsible for the operational safety and regulatory compliance of the heating system.
- In the Commonwealth of Massachusetts, the appliance must be installed by a licensed plumber or gas fitter.

**DANGER: Risk of personal injury or death from flue gas poisoning!**
- Do not install a thermostatic flue gas damper downstream of the draft hood.
- Do not tamper with, remove, or attempt to repair the blocked vent switch.
- When replacing the blocked vent switch, install the new part in the original location.

- A blocked vent switch tripping more than once indicates a problem with the venting system or chimney which must be repaired immediately.
- Ensure none of the vent pipes and chimneys are damaged or blocked.
- Connect only one appliance to each venting system or chimney.
- The venting system must not feed into or route through another air extraction duct.
- The venting system must be inspected annually. All parts that show any signs of damage or corrosion must be replaced.
- Never close off or reduce the size of the combustion air openings.
- The boiler must not be operated until any obstructions have been removed.

**DANGER: Risk of personal injury or death from explosion!**
- Work on gas components may only be carried out by a trained and certified installer or service company.
- Appliance installation, the connection of gas and vent piping, initial commissioning, electrical connections, and service and maintenance must only be carried out by a trained and certified installer or service company.

**DANGER: Risk of personal injury or death from fire!**
- Do not use flammable or combustible material in the boiler room.
- It is recommended not to store any items within 16 inches (415mm) of the appliance.

**CAUTION: Appliance damage from contaminated combustion air!**
- Keep the combustion air free of corrosive substances, e.g. halogenated hydrocarbons from painting operations or beauty salons.
- Keep combustion air free from dust and lint, e.g. from laundry or agricultural operations.
- If clean room air is not available, fresh outdoor combustion air must be provided.

**DANGER: Risk of personal injury or death from electric shock.**
- Before removing the front panel, disconnect the heating system from the electrical power supply by shutting off the emergency shutoff switch or the heating system circuit breaker.
- It is not enough to switch off the control panel. **Power to the panel must be disconnected!** Ensure that the power is not restored unintentionally by following proper lock out/tag out procedures.
- Only qualified electricians are permitted to carry out electrical work.

**DANGER: Safety devices!**
- Never shut off safety valves!
- Hot water may escape from the safety valve at any time when the appliance is running.

**DANGER: Risk of personal injury or death after a flood!**
- Do not attempt to operate an appliance if any part of it has been under water.
- An appliance that was subject to flooding must be replaced.

**NOTICE:**
- Upon completion of the installation, these instructions should be handed to the owner and operator of the appliance.
- The installer must instruct the owner and operator on the functionality of the components and the proper operation of the boiler and the heating system.
- The boiler must be serviced annually including the main burner, ignition burner, the entire venting system, and the combustion air supply. All parts that show any signs of damage or corrosion must be replaced.
2  Scope of delivery

2.1  KBR - Residential boiler for space heating and loading of indirect fired DHW tanks

![Image](Fig. 1 Scope of delivery heating boiler KBR..-3A)

Contents of package 1:

- [1] Gas condensing boiler
- [2] Set of documents for appliance
- [3] Adapter for connection of a LWCO
- [5] DHW tank temperature sensor (NTC)
- [6] Flue adapter¹)

¹) Concentric vent kit available as accessory.

2.2  KWB - Residential combi boiler for space heating and DHW generation

![Image](Fig. 2 Scope of delivery combi boiler KWB..-3A)

Contents of package 1:

- [1] Gas condensing boiler
- [2] Set of documents for appliance
- [3] Adapter for connection of a LWCO
- [5] Flue adapter²)

²) Concentric vent kit available as accessory.
3 Information about the appliance

KBR appliances are natural gas, residential boilers for central heating and loading of an indirect fired DHW tank.

KWB appliances are natural gas, residential combi boilers for central heating and on demand DHW heating.

The appliances comply with South Coast Air Quality Management District (SCAQMD) 2012 requirements: (Type-1) 14 Ng/J NOx (and/or 20 ppm at 3% O2).

3.1 Proper use

The appliance may only be installed in closed loop hot water central heating systems.

Any other purpose is considered improper use. Any resulting damage is excluded from the manufacturer's warranty.

The commercial and industrial use of the appliance for generating process heat is not permitted.

3.2 Overview of boiler types

Table 1 describes the meaning of the model number:

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>KBR16-3</td>
<td>Heat only appliance A 23</td>
</tr>
<tr>
<td>KBR21-3</td>
<td>Heat only appliance A 23</td>
</tr>
<tr>
<td>KBR28-3</td>
<td>Heat only appliance A 23</td>
</tr>
<tr>
<td>KBR35-3</td>
<td>Heat only appliance A 23</td>
</tr>
<tr>
<td>KBR42-3</td>
<td>Heat only appliance A 23</td>
</tr>
<tr>
<td>KWB28-3</td>
<td>Combi appliance A 23</td>
</tr>
<tr>
<td>KWB35-3</td>
<td>Combi appliance A 23</td>
</tr>
<tr>
<td>KWB42-3</td>
<td>Combi appliance A 23</td>
</tr>
</tbody>
</table>

Table 1 Appliance types

K Floor standing heating appliance
W DHW heating
B Condensing technology
R Constant temperature control
16...42 Reference to output in kW.
42kW output equals 143 310BTU/hr
-3 Version
A Fan-supported appliance
23 Natural gas (NG)

3.3 Rating plate

The rating plate is located at the right side of the appliance.

The rating plate contains the appliance output, model number, approval data and serial number.

3.4 Appliance description

- Appliance is a floor mounted installation
- Intelligent boiler pump control
- Heatronic boiler control
- Three-speed boiler circulator
- Automatic air vent (combi boiler only)
- Display
- Automatic ignition
- Continuously-controlled output
- Full protection via the Heatronic with flame rod and solenoid valves
- No minimum circulating water flow rate required
- Suitable for all hydronic emitters
- Flue adapter for flue gas and combustion air with test ports
- Variable speed fan
- Gas premix burner
- Heat exchanger temperature and high limit sensor
- LLH / Supply temperature sensor
- Temperature limiter
- Safety relief valve, pressure gauge
- Expansion vessel (combi boiler only)
- Connection possibility for DHW tank temperature sensor (NTC) (heating boiler only)
- Flue gas temperature limiter
- Connection for DHW...
- DHW (combi boiler only)
- Internal motorized 3-way valve (combi boiler only)
- Integrated low loss header with option to isolate flow

3.5 Accessories

Here you will find a list of typical accessories for this appliance. Refer to the Bosch Product Catalog for a complete overview of all available accessories.

- Weather compensation control FW200
- CRC100 or CRC200 user interfaces
- CZM100 Zoning module
- Optional concentric vent kit available for horizontal direct vent terminations
- Modules for system expansions:
  - ICM for cascading up to 4 boilers

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>KBR16-3</td>
<td>Heat only appliance</td>
</tr>
<tr>
<td>KBR21-3</td>
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</tr>
<tr>
<td>KBR28-3</td>
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<td>Heat only appliance</td>
</tr>
<tr>
<td>KBR42-3</td>
<td>Heat only appliance</td>
</tr>
<tr>
<td>KWB28-3</td>
<td>Combi appliance</td>
</tr>
<tr>
<td>KWB35-3</td>
<td>Combi appliance</td>
</tr>
<tr>
<td>KWB42-3</td>
<td>Combi appliance</td>
</tr>
</tbody>
</table>

Fig. 3 Position of the rating plate
3.6 Product dimensions and minimum clearances

Fig. 4

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
<th>Connection size</th>
</tr>
</thead>
<tbody>
<tr>
<td>![ ]</td>
<td>Domestic water inlet</td>
<td>7/8&quot; - (19mm)</td>
</tr>
<tr>
<td>![ ]</td>
<td>Domestic hot water outlet</td>
<td>7/8&quot; - (19mm)</td>
</tr>
<tr>
<td>![ ]</td>
<td>Heating return</td>
<td>1¼&quot; - (31.8mm)</td>
</tr>
<tr>
<td>![ ]</td>
<td>Heating supply</td>
<td>1¼&quot; - (31.8mm)</td>
</tr>
<tr>
<td>![ ]</td>
<td>Gas inlet</td>
<td>¾&quot; - (19mm)</td>
</tr>
</tbody>
</table>

Fig. 5 Dimensions and minimum clearances (front, rear, & side view)

[1] 45½" - (1163mm)
[2] 41½" - (1065mm)
[3] 27½" - (700mm)
[4] “24” - (600mm)
[5] 7½” - (200mm)
[6] “≥ 2½” - (70mm)
[7] “4” - (102mm)
[8] “4” - (102mm)
[9] 41" - (1042mm)
[10] 18½" - (467mm)
[11] 19 9/16" - (497mm)

(*) Zero clearance from combustibles permitted, but 4" (102 mm) recommended for serviceability

(**) 1" (25mm) Distance to door, if mounted inside a closet with 24" (600mm) in front of boiler for serviceability

(***) 12" (300mm) recommended distance behind the boiler for serviceability
3.7 Appliance layout heating boiler KBR...-3A

Fig. 6 Appliance layout heating boiler KBR...-3A
Key to Fig. 6 Heating boiler KBR...-3A:

[1] Pre-wired low voltage installer connection box
[2] Pressure Relief Valve (PRV)
[3] Condensate hose
[4] Flue connector for twin pipe adaptor
[6] Pre-wired high voltage installer connection box
[9] Additional supply temperature limiter
[10] Connection of optional Low Water Cut Off (LWCO)
[12] Cover for maximum gas adjuster
[14] Gas connection
[15] Heating return connection
[16] Heating supply connection
[17] Low Loss Header with flow sensor
[18] Fan
[19] Electrode set
[20] Primary heat sensor
[21] Maximum safety sensor
[22] Inspection and clean out cover
[23] Condensate collector
[24] Boiler circulator
[25] Drain cock
[26] Condensate trap
[27] Heatronic boiler control
[28] ON/OFF switch
[29] Burner on indicator
[30] Service button
[31] Emission test button
[32] Boiler high limit dial
[33] Mounting socket for outdoor reset control
[34] DHW Setpoint Dial
[35] Keypad lock button
[36] ECO button
[37] Reset button
[38] Boiler water pressure gauge
[39] Display
[40] Gas valve minimum adjuster
[41] Gas inlet pressure test point
3.8 Appliance layout combi boiler KWB..-3A

Fig. 7 Appliance layout combi boiler KWB..-3A
### Key to Fig. 7 Combi boiler KWB..-3A:

1. Pre-wired low voltage installer connection box
2. Pressure Relief Valve (PRV)
3. Condensate hose
4. DHW inlet
5. DHW outlet
6. Flue connector for twin pipe adaptor
7. Expansion vessel
8. Pre-wired high voltage installer connection box
9. Manual air bleed
10. Air/gas premix chamber
11. Connection for optional Low Water Cut Off (LWCO)
12. Additional supply temperature limiter
13. Flue gas temperature limiter
14. Cover for maximum gas adjuster
15. Air vent
16. DHW thermostat
17. Gas valve
18. Gas connection
19. Central heat return connection
20. Central heating supply connection
21. Low Loss Header and flow sensor
22. Fan
23. Electrode set
24. Primary heat sensor
25. Maximum safety sensor
26. Inspection and clean out cover
27. Condensate collector
28. Flow meter
29. Pump
30. Three way valve
31. Drain cock
32. Condensate trap
33. Heatronic boiler control
34. ON/OFF switch
35. Burner flame indicator
36. Service button
37. Emission test button
38. Boiler high limit dial
39. Mounting socket for outdoor reset control
40. DHW Setpoint Dial
41. Keypad lock button
42. ECO button
43. Reset button
44. Boiler water pressure gauge
45. Display
46. Gas valve minimum adjuster
47. Gas inlet pressure test point
3.9 Electrical wiring heating boiler KBR..-3A

Fig. 8 Electrical wiring diagram heating boiler KBR...-3A
Key to Fig. 8 Heating boiler KBR...-3A:

[T] Top of control board
[1] Code plug
[2] System supply temperature sensor
[3] Diagnostic interface
[4] ON/OFF switch
[5] Fuse T 6.3 A (120 VAC)
[6] Ignition transformer
[7] Boiler high limit dial
[8] High voltage - Installer connection box
[9] External heating pump
[10] DHW tank primary pump or 3 way valve
[11] 120 VAC connection
[12] Empty (future connectivity)
[13] DHS Sen - Domestic Hot Water temperature sensor (NTC)
[14] LWCO - Low Water Cut Off
[16] BUS - BUS connection to programmer
[17] Low voltage - Installer connection box
[18] Ignition electrode
[19] Boiler block temperature limiter
[20] Boiler circulator
[21] Flame rod electrode
[22] LLH/Supply temperature sensor
[23] Additional supply temperature limiter
[24] Fan
[25] Flue gas temperature limiter
[26] Gas valve
[27] DHW Setpoint Dial
3.10 Electrical wiring combi boiler KWB..-3A

Fig. 9 Electrical wiring diagram combi boiler KWB..-3A
**Key to Fig. 9 Combi boiler KWB..-3A:**

| [T] | Top of control board |
| [1] | Code plug |
| [2] | System supply temperature sensor |
| [3] | Diagnostic interface |
| [4] | ON/OFF switch |
| [5] | Fuse T 6.3 A (120 VAC) |
| [6] | Ignition transformer |
| [7] | Boiler high limit dial |
| [8] | High voltage - Installer connection box |
| [9] | External heating pump |
| [10] | 120 VAC connection |
| [12] | LWCO - Low Water Cut Of |
| [14] | BUS - BUS connection to programmer |
| [15] | Low voltage - Installer connection box |
| [16] | Ignition electrode |
| [17] | Boiler block temperature limiter |
| [18] | Flow meter (turbine) |
| [19] | 3 way valve (space heating/DHW heating) |
| [20] | Flame rod electrode |
| [21] | LLH/Supply temperature sensor |
| [22] | Boiler circulator |
| [23] | Additional supply temperature limiter |
| [24] | Flue gas temperature limiter |
| [25] | Fan |
| [26] | DHW temperature sensor |
| [27] | Gas valve |
| [28] | DHW Setpoint Dial |
3.11 Technical data heating boiler KBR 16-3

<table>
<thead>
<tr>
<th>Input/Output</th>
<th>Unit</th>
<th>NG</th>
<th>LPG (Propane)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. input rate 180/79 °F (82/26 °C)</td>
<td>BTU/hr (kW)</td>
<td>57,200 (16.8)</td>
<td>56,400 (16.5)</td>
</tr>
<tr>
<td>Max. output rate 104/86 °F (40/30 °C)</td>
<td>BTU/hr (kW)</td>
<td>54,900 (16.1)</td>
<td>55,300 (16.2)</td>
</tr>
<tr>
<td>Max. output rate 122/86 °F (50/30 °C)</td>
<td>BTU/hr (kW)</td>
<td>54,300 (15.9)</td>
<td>54,600 (16.0)</td>
</tr>
<tr>
<td>Max. output rate 176/140 °F (80/60 °C)</td>
<td>BTU/hr (kW)</td>
<td>50,800 (14.9)</td>
<td>51,200 (15.0)</td>
</tr>
<tr>
<td>Min. input rate 180/79 °F (82/26 °C)</td>
<td>BTU/hr (kW)</td>
<td>12,900 (3.8)</td>
<td>21,500 (6.3)</td>
</tr>
<tr>
<td>Min. output rate 104/86 °F (40/30 °C)</td>
<td>BTU/hr (kW)</td>
<td>12,600 (3.7)</td>
<td>21,500 (6.3)</td>
</tr>
<tr>
<td>Min. output rate 122/86 °F (50/30 °C)</td>
<td>BTU/hr (kW)</td>
<td>12,600 (3.7)</td>
<td>21,500 (6.3)</td>
</tr>
<tr>
<td>Min. output rate 176/140 °F (80/60 °C)</td>
<td>BTU/hr (kW)</td>
<td>11,300 (3.3)</td>
<td>19,400 (5.7)</td>
</tr>
</tbody>
</table>

**Gas connection value**

Natural gas - $H_s = 1,010$ BTU/ft$^3$ (37.3 MJ/m$^3$) $ft^3$/hr (m$^3$/h)

- 56 (1.6)

Liquid Propane Gas - $HD-S = 2,500$ BTU/ft$^3$ (93.1 MJ/m$^3$) $ft^3$/hr (m$^3$/h)

- - 22 (0.6)

**Permissible gas inlet pressure**

NG

- in. W.C. (mbar) 3.5-10.5" (8.7-26.1)

- LPG (Propane) - in. W.C. (mbar) - 8-13" (19.9-32.3)

**Flue gas**

| Flue gas mass flow at maximum/minimum nominal output | gph | 6.8/1.7 | 6.7/2.6 |
| Flue gas temperature 176/140 °F (80/60 °C) at maximum/minimum nominal heat input | °F (°C) | 136/133 (58/56) | 136/133 (58/56) |
| Flue gas temperature 104/86 °F (40/30 °C) at maximum/minimum nominal heat input | °F (°C) | 99/88 (37/31) | 99/88 (37/31) |
| CO$_2$ at maximum nominal output | % | 9.4 | 11.0 |
| CO$_2$ at minimum nominal output | % | 8.6 | 10.4 |

**Condensate**

| Maximum condensate quantity ($t_{el} = 86 °F (30 °C)) | gph (l/h) | 0.32 (1.2) | 0.32 (1.2) |
| pH level approx. | | 4.8 | 4.8 |

**General**

| Voltage | Vac | 120 | 120 |
| Frequency | Hz | 60 | 60 |
| Max. power consumption (central heating mode) | W | 205 | 205 |
| Max. power consumption (standby mode) | W | <6 | <6 |
| Sound pressure level | dB (A) | ≤ 33 | ≤ 33 |
| Max. supply temperature | °F (°C) | 190 (88) | 190 (88) |
| Max. permissible operating pressure (P$_{MS}$) heating | psi (bar) | 30 (2.07) | 30 (2.07) |
| Permissible ambient temperature | °F (°C) | 32 - 122 (0 - 50) | 32 - 122 (0 - 50) |
| Nominal water capacity (heating) | Gal (L) | 0.925 (3.5) | 0.925 (3.5) |
| Weight (without packaging) | lbs (kg) | 132 (60) | 132 (60) |
| Maximum overall dimensions W x H x D | inch (mm) | 21 15/16 x 41 7/8 x 21 7/8 | 557 x 1048 x 555 | 21 15/16 x 41 7/8 x 21 7/8 | 557 x 1048 x 555 |
### 3.12 Technical data heating boiler KBR 21-3

<table>
<thead>
<tr>
<th>Input/Output</th>
<th>Unit</th>
<th>NG</th>
<th>LPG (Propane)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. input rate 180/79 °F (82/26 °C)</td>
<td>BTU/hr (kW)</td>
<td>79,200 (23.2)</td>
<td>77,500 (22.7)</td>
</tr>
<tr>
<td>Max. output rate 104/86 °F (40/30 °C)</td>
<td>BTU/hr (kW)</td>
<td>74,700 (21.9)</td>
<td>74,700 (21.9)</td>
</tr>
<tr>
<td>Max. output rate 122/86 °F (50/30 °C)</td>
<td>BTU/hr (kW)</td>
<td>74,000 (21.7)</td>
<td>74,000 (21.7)</td>
</tr>
<tr>
<td>Max. output rate 176/140 °F (80/60 °C)</td>
<td>BTU/hr (kW)</td>
<td>70,300 (20.6)</td>
<td>70,300 (20.6)</td>
</tr>
<tr>
<td>Min. input rate 180/79 °F (82/26 °C)</td>
<td>BTU/hr (kW)</td>
<td>24,600 (7.2)</td>
<td>40,100 (11.7)</td>
</tr>
<tr>
<td>Min. output rate 104/86 °F (40/30 °C)</td>
<td>BTU/hr (kW)</td>
<td>23,900 (7.0)</td>
<td>39,900 (11.7)</td>
</tr>
<tr>
<td>Min. output rate 122/86 °F (50/30 °C)</td>
<td>BTU/hr (kW)</td>
<td>23,900 (7.0)</td>
<td>39,600 (11.6)</td>
</tr>
<tr>
<td>Min. output rate 176/140 °F (80/60 °C)</td>
<td>BTU/hr (kW)</td>
<td>21,800 (6.4)</td>
<td>36,200 (10.6)</td>
</tr>
</tbody>
</table>

**Gas connection value**

- Natural gas - $H_s = 1,010$ BTU/ft³ (37.3 MJ/m³) ft³/hr (m³/h) 78 (2.2) -
- Liquid Propane Gas - $H_s = 2,500$ BTU/ft³ (93.1 MJ/m³) ft³/hr (m³/h) - 31 (0.9)

**Permissible gas inlet pressure**

- NG in. W.C. (mbar) 3.5-10.5” (8.7-26.1)
- LPG (Propane) in. W.C. (mbar) - 8-13” (19.9-32.3)

**Flue gas**

- Flue gas mass flow at maximum/minimum nominal output gph 9.4/3.2 9.2/4.8
- Flue gas temperature 176/140 °F (80/60 °C) at maximum/minimum nominal heat input °F (°C) 145/133 (63/56) 145/133 (63/56)
- Flue gas temperature 104/86 °F (40/30 °C) at maximum/minimum nominal heat input °F (°C) 115/90 (46/32) 115/90 (46/32)
- CO₂ at maximum nominal output % 9.4 11.0
- CO₂ at minimum nominal output % 8.6 10.4

**Condensate**

- Maximum condensate quantity (t₉₁ = 86 °F (30 °C)) gph (l/h) 0.32 (1.2) 0.32 (1.2)
- pH level approx. 4.8 4.8

**General**

- Voltage Vac 120 120
- Frequency Hz 60 60
- Max. power consumption (central heating mode) W 205 205
- Max. power consumption (standby mode) W <6 <6
- Sound pressure level dB (A) ≤ 39 ≤ 39
- Max. supply temperature °F (°C) 190 (88) 190 (88)
- Max. permissible operating pressure (Pₘₛ) heating psi (bar) 30 (2.07) 30 (2.07)
- Permissible ambient temperature °F (°C) 32 - 122 (0 - 50) 32 - 122 (0 - 50)
- Nominal water capacity (heating) Gal (L) 0.925 (3.5) 0.925 (3.5)
- Weight (without packaging) lbs (kg) 132 (60) 132 (60)
- Maximum overall dimensions W x H x D inch (mm) 21 15/16 x 41 1/4 x 21 7/8 557 x 1048 x 555 21 15/16 x 41 1/4 x 21 7/8 557 x 1048 x 555
## 3.13 Technical data heating boiler KBR 28-3

<table>
<thead>
<tr>
<th>Input/Output</th>
<th>Unit</th>
<th>NG</th>
<th>LPG (Propane)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. input rate 180/79 °F (82/26 °C)</td>
<td>BTU/hr (kW)</td>
<td>100,800 (29.5)</td>
<td>98,600 (28.9)</td>
</tr>
<tr>
<td>Max. output rate 104/86 °F (40/30 °C)</td>
<td>BTU/hr (kW)</td>
<td>93,800 (27.5)</td>
<td>93,800 (27.5)</td>
</tr>
<tr>
<td>Max. output rate 122/86 °F (50/30 °C)</td>
<td>BTU/hr (kW)</td>
<td>93,100 (27.3)</td>
<td>93,100 (27.3)</td>
</tr>
<tr>
<td>Max. output rate 176/140 °F (80/60 °C)</td>
<td>BTU/hr (kW)</td>
<td>89,400 (26.2)</td>
<td>89,400 (26.2)</td>
</tr>
<tr>
<td>Min. input rate 180/79 (82/26 °C)</td>
<td>BTU/hr (kW)</td>
<td>24,600 (7.2)</td>
<td>40,100 (11.7)</td>
</tr>
<tr>
<td>Min. output rate 104/86 °F (40/30 °C)</td>
<td>BTU/hr (kW)</td>
<td>23,900 (7.0)</td>
<td>39,900 (11.7)</td>
</tr>
<tr>
<td>Min. output rate 122/86 °F (50/30 °C)</td>
<td>BTU/hr (kW)</td>
<td>23,900 (7.0)</td>
<td>39,600 (11.6)</td>
</tr>
<tr>
<td>Min. output rate 176/140 °F (80/60 °C)</td>
<td>BTU/hr (kW)</td>
<td>21,800 (6.4)</td>
<td>36,200 (10.6)</td>
</tr>
</tbody>
</table>

### Gas connection value
- Natural gas: \( H_s = 1,010 \text{ BTU/ft}^3 (37.3 \text{ MJ/m}^3) \)
- Liquid Propane Gas: \( H_d = 2,500 \text{ BTU/ft}^3 (93.1 \text{ MJ/m}^3) \)

### Permissible gas inlet pressure
- NG: in. W.C. (mbar) 3.5-10.5" (8.7-26.1)
- LPG (Propane): in. W.C. (mbar) - 8-13" (19.9-32.3)

### Flue gas
- Flue gas mass flow at maximum/minimum nominal output in. lbs/hr 12.0/3.2
- Flue gas temperature 176/140 °F (80/60 °C) at maximum/minimum nominal heat input °F (°C) 147/133 (64/56) 147/133 (64/56)
- Flue gas temperature 104/86 °F (40/30 °C) at maximum/minimum nominal heat input °F (°C) 117/90 (47/32) 117/90 (47/32)
- CO₂ at maximum nominal output % 9.4 11.0
- CO₂ at minimum nominal output % 8.6 10.4

### Condensate
- Maximum condensate quantity \( t_{R} = 86 °F (30 °C) \) gph (l/h) 0.32 (1.2) 0.32 (1.2)
- pH level approx. 4.8 4.8

### General
- Voltage Vac 120 120
- Frequency Hz 60 60
- Max. power consumption (central heating mode) W 205 205
- Max. power consumption (standby mode) W <6 <6
- Sound pressure level dB (A) ≤ 39 ≤ 39
- Max. supply temperature °F (°C) 190 (88) 190 (88)
- Max. permissible operating pressure (PMS) heating psi (bar) 30 (2.07) 30 (2.07)
- Permissible ambient temperature °F (°C) 32-122 (0-50) 32-122 (0-50)
- Nominal water capacity (heating) Gal (L) 0.925 (3.5) 0.925 (3.5)
- Weight (without packaging) lbs (kg) 132 (60) 132 (60)
- Maximum overall dimensions W x H x D inch (mm) 21 15/16 x 41 7/4 x 21 7/8 (557 x 1048 x 555)
### Technical data heating boiler KBR 35-3

<table>
<thead>
<tr>
<th>Input/Output</th>
<th>Unit</th>
<th>NG</th>
<th>LPG (Propane)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. input rate 180/79 °F (82/26 °C)</td>
<td>BTU/hr (kB)</td>
<td>131,900 (38.6)</td>
<td>129,100 (37.8)</td>
</tr>
<tr>
<td>Max. output rate 104/86 °F (40/30 °C)</td>
<td>BTU/hr (kB)</td>
<td>122,800 (36.0)</td>
<td>122,800 (36.0)</td>
</tr>
<tr>
<td>Max. output rate 122/86 °F (50/30 °C)</td>
<td>BTU/hr (kB)</td>
<td>121,800 (35.7)</td>
<td>121,800 (35.7)</td>
</tr>
<tr>
<td>Max. output rate 176/140 °F (80/60 °C)</td>
<td>BTU/hr (kB)</td>
<td>116,700 (34.2)</td>
<td>116,700 (34.2)</td>
</tr>
<tr>
<td>Min. input rate 180/79 (82/26 °C)</td>
<td>BTU/hr (kB)</td>
<td>36,000 (10.5)</td>
<td>46,400 (13.6)</td>
</tr>
<tr>
<td>Min. output rate 104/86 °F (40/30 °C)</td>
<td>BTU/hr (kB)</td>
<td>35,100 (10.3)</td>
<td>46,100 (13.5)</td>
</tr>
<tr>
<td>Min. output rate 122/86 °F (50/30 °C)</td>
<td>BTU/hr (kB)</td>
<td>34,800 (10.2)</td>
<td>45,700 (13.4)</td>
</tr>
<tr>
<td>Min. output rate 176/140 °F (80/60 °C)</td>
<td>BTU/hr (kB)</td>
<td>31,700 (9.3)</td>
<td>42,000 (12.3)</td>
</tr>
</tbody>
</table>

**Gas connection value**
- Natural gas - Hₘ = 1,010 BTU/ft³ (37.3 MJ/m³)
  - ft³/hr (m³/h) | 130 (3.7) |
- Liquid Propane Gas - HD-S = 2,500 BTU/ft³ (93.1 MJ/m³)
  - ft³/hr (m³/h) | - |

**Permissible gas inlet pressure**
- NG: in. W.C. (mbar) | 3.5-10.5" (8.7-26.1) |
- LPG (Propane): in. W.C. (mbar) | - 8-13" (19.9-32.3) |

**Flue gas**
- Flue gas mass flow at maximum/minimum nominal output | gph (l/h) |
  - | 15.7/4.5 |
  - | 15.2/5.6 |
- Flue gas temperature 176/140 °F (80/60 °C) at maximum/minimum nominal heat input | °F (°C) |
  - | 162/135 (72/57) |
  - | 162/135 (72/57) |
- CO₂ at maximum nominal output | % |
  - | 9.4 |
  - | 11.0 |
- CO₂ at minimum nominal output | % |
  - | 8.6 |
  - | 10.4 |

**Condensate**
- Maximum condensate quantity (tₜ₈ = 86 °F (30 °C)) | gph (l/h) |
  - | 0.32 (1.2) |
  - | 0.32 (1.2) |
- pH level approx. | 4.8 |
  - | 4.8 |

**General**
- Voltage | Vac |
  - | 120 |
  - | 120 |
- Frequency | Hz |
  - | 60 |
  - | 60 |
- Max. power consumption (central heating mode) | W |
  - | 205 |
  - | 205 |
- Max. power consumption (standby mode) | W |
  - | <6 |
  - | <6 |
- Sound pressure level | dB (A) |
  - | ≤ 44 |
  - | ≤ 44 |
- Max. supply temperature | °F (°C) |
  - | 190 (88) |
  - | 190 (88) |
- Max. permissible operating pressure (Pₘₚₜ) heating | psi (bar) |
  - | 30 (2.07) |
  - | 30 (2.07) |
- Permissible ambient temperature | °F (°C) |
  - | 32 - 122 (0 - 50) |
  - | 32 - 122 (0 - 50) |
- Nominal water capacity (heating) | Gal (L) |
  - | 0.925 (3.5) |
  - | 0.925 (3.5) |
- Weight (without packaging) | lbs (kg) |
  - | 132 (60) |
  - | 132 (60) |
- Maximum overall dimensions W x H x D | inch (mm) |
  - | 21 15/16 x 41 1/4 x 21 7/8 |
  - | 21 15/16 x 41 1/4 x 21 7/8 |
  - | 557 x 1048 x 555 |
  - | 557 x 1048 x 555 |
### 3.15 Technical data heating boiler KBR 42-3

#### Input/Output at elevation 0 - 2000 feet (0 - 610 metres)

<table>
<thead>
<tr>
<th>Input/Output at elevation 0 - 2000 feet (0 - 610 metres)</th>
<th>Unit</th>
<th>NG</th>
<th>LPG (Propane)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. input rate 180/79 °F (82/26 °C)</td>
<td>BTU/hr (kW)</td>
<td>151,600 (44.4)</td>
<td>148,300 (43.5)</td>
</tr>
<tr>
<td>Max. output rate 104/86 °F (40/30 °C)</td>
<td>BTU/hr (kW)</td>
<td>137,500 (40.3)</td>
<td>137,500 (40.3)</td>
</tr>
<tr>
<td>Max. output rate 122/86 °F (50/30 °C)</td>
<td>BTU/hr (kW)</td>
<td>134,400 (39.4)</td>
<td>134,400 (39.4)</td>
</tr>
<tr>
<td>Min. input rate 180/79 (82/26 °C)</td>
<td>BTU/hr (kW)</td>
<td>36,000 (10.5)</td>
<td>46,400 (13.6)</td>
</tr>
<tr>
<td>Min. output rate 104/86 °F (40/30 °C)</td>
<td>BTU/hr (kW)</td>
<td>35,500 (10.4)</td>
<td>46,400 (13.6)</td>
</tr>
<tr>
<td>Min. output rate 122/86 °F (50/30 °C)</td>
<td>BTU/hr (kW)</td>
<td>35,100 (10.3)</td>
<td>46,100 (13.5)</td>
</tr>
<tr>
<td>Min. output rate 176/140 °F (80/60 °C)</td>
<td>BTU/hr (kW)</td>
<td>31,700 (9.3)</td>
<td>24,000 (12.3)</td>
</tr>
</tbody>
</table>

#### Input/Output at elevation 2000 - 4500 feet (611 - 1372 metres)

<table>
<thead>
<tr>
<th>Input/Output at elevation 2000 - 4500 feet (611 - 1372 metres)</th>
<th>Unit</th>
<th>NG</th>
<th>LPG (Propane)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. input rate 180/79 °F (82/26 °C)</td>
<td>BTU/hr (kW)</td>
<td>136,440 (40.0)</td>
<td>139,402 (40.9)</td>
</tr>
<tr>
<td>Max. output rate 104/86 °F (40/30 °C)</td>
<td>BTU/hr (kW)</td>
<td>123,750 (36.3)</td>
<td>129,250 (37.9)</td>
</tr>
<tr>
<td>Max. output rate 122/86 °F (50/30 °C)</td>
<td>BTU/hr (kW)</td>
<td>123,750 (36.3)</td>
<td>129,250 (37.9)</td>
</tr>
<tr>
<td>Max. output rate 176/140 °F (80/60 °C)</td>
<td>BTU/hr (kW)</td>
<td>120,960 (35.3)</td>
<td>126,336 (37.0)</td>
</tr>
</tbody>
</table>

#### Input/Output at elevation 4500 - 7000 feet (1373 - 2134 metres)

<table>
<thead>
<tr>
<th>Input/Output at elevation 4500 - 7000 feet (1373 - 2134 metres)</th>
<th>Unit</th>
<th>NG</th>
<th>LPG (Propane)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. input rate 180/79 °F (82/26 °C)</td>
<td>BTU/hr (kW)</td>
<td>125,828 (36.9)</td>
<td>129,021 (37.8)</td>
</tr>
<tr>
<td>Max. output rate 104/86 °F (40/30 °C)</td>
<td>BTU/hr (kW)</td>
<td>114,125 (33.5)</td>
<td>119,625 (35.1)</td>
</tr>
<tr>
<td>Max. output rate 122/86 °F (50/30 °C)</td>
<td>BTU/hr (kW)</td>
<td>114,125 (33.5)</td>
<td>119,625 (35.1)</td>
</tr>
<tr>
<td>Max. output rate 176/140 °F (80/60 °C)</td>
<td>BTU/hr (kW)</td>
<td>111,552 (32.7)</td>
<td>116,928 (34.3)</td>
</tr>
</tbody>
</table>

#### Gas connection value

<table>
<thead>
<tr>
<th>Natural gas - $H_{\text{H}} = 1.010 \text{ BTU/ft}^3 (37.3 \text{ MJ/m}^3)\ stom^3/hr (m^3/h)</th>
<th>ft^3/hr (m^3/h)</th>
<th>NG</th>
<th>LPG (Propane)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquid Propane Gas - HD-S = 2.500 BTU/ft^3 (93.1 MJ/m^3)</td>
<td>ft^3/hr (m^3/h)</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

#### Permissible gas inlet pressure

<table>
<thead>
<tr>
<th>NG (Natural Gas) in. W.C. (mbar)</th>
<th>LPG (Propane) in. W.C. (mbar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5-10.5&quot; (8.7-26.1)</td>
<td>8-13&quot; (19.9-32.3)</td>
</tr>
</tbody>
</table>

#### Flue gas

<table>
<thead>
<tr>
<th>Flue gas mass flow at maximum/minimum nominal output</th>
<th>gsp</th>
<th>NG</th>
<th>LPG (Propane)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18.0/4.5</td>
<td>17.5/5.6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flue gas temperature 176/140 °F (80/60 °C) at maximum/minimum nominal heat input</th>
<th>°F (°C)</th>
<th>NG</th>
<th>LPG (Propane)</th>
</tr>
</thead>
<tbody>
<tr>
<td>171/135 (77/57)</td>
<td>171/135 (77/57)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flue gas temperature 104/86 °F (40/30 °C) at maximum/minimum nominal heat input</th>
<th>°F (°C)</th>
<th>NG</th>
<th>LPG (Propane)</th>
</tr>
</thead>
<tbody>
<tr>
<td>133/91 (56/33)</td>
<td>133/91 (56/33)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### CO₂ at maximum nominal output

<table>
<thead>
<tr>
<th>CO₂ at maximum nominal output</th>
<th>NG</th>
<th>LPG (Propane)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.4</td>
<td>11.0</td>
<td></td>
</tr>
<tr>
<td>8.6</td>
<td>10.4</td>
<td></td>
</tr>
</tbody>
</table>

#### Condensate

<table>
<thead>
<tr>
<th>Maximum condensate quantity ($t_R = 86 °F (30 °C)$)</th>
<th>gph (l/h)</th>
<th>NG</th>
<th>LPG (Propane)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.32 (1.2)</td>
<td>0.32 (1.2)</td>
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</table>

<table>
<thead>
<tr>
<th>pH level approx.</th>
<th>NG</th>
<th>LPG (Propane)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.8</td>
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#### General

<table>
<thead>
<tr>
<th>Voltage (Vac)</th>
<th>NG</th>
<th>LPG (Propane)</th>
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<td>120</td>
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<table>
<thead>
<tr>
<th>Frequency (Hz)</th>
<th>NG</th>
<th>LPG (Propane)</th>
</tr>
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<tr>
<td>60</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Max. power consumption (central heating mode)</th>
<th>NG</th>
<th>LPG (Propane)</th>
</tr>
</thead>
<tbody>
<tr>
<td>205</td>
<td>205</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Max. power consumption (standby mode)</th>
<th>NG</th>
<th>LPG (Propane)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;6</td>
<td>&lt;6</td>
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<table>
<thead>
<tr>
<th>Sound pressure level (dB(A))</th>
<th>NG</th>
<th>LPG (Propane)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 45</td>
<td>≤ 45</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Max. supply temperature (°F (°C))</th>
<th>NG</th>
<th>LPG (Propane)</th>
</tr>
</thead>
<tbody>
<tr>
<td>190 (88)</td>
<td>190 (88)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Max. permissible operating pressure (P_{MS}) heating (psi (bar))</th>
<th>NG</th>
<th>LPG (Propane)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 (2.07)</td>
<td>30 (2.07)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Permissible ambient temperature (°F (°C))</th>
<th>NG</th>
<th>LPG (Propane)</th>
</tr>
</thead>
<tbody>
<tr>
<td>32 - 122 (0 - 50)</td>
<td>32 - 122 (0 - 50)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Nominal water capacity (heating) (Gal (L))</th>
<th>NG</th>
<th>LPG (Propane)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.925 (3.5)</td>
<td>0.925 (3.5)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weight (without packaging) (lbs (kg))</th>
<th>NG</th>
<th>LPG (Propane)</th>
</tr>
</thead>
<tbody>
<tr>
<td>132 (60)</td>
<td>132 (60)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maximum overall dimensions W x H x D (inch (mm))</th>
<th>NG</th>
<th>LPG (Propane)</th>
</tr>
</thead>
<tbody>
<tr>
<td>21 15/16 x 41 1/4 x 21 7/8 (557 x 1048 x 555)</td>
<td>21 15/16 x 41 1/4 x 21 7/8 (557 x 1048 x 555)</td>
<td></td>
</tr>
</tbody>
</table>
### 3.16 Technical data combi boiler KWB 28-3

<table>
<thead>
<tr>
<th>Input/Output</th>
<th>Unit</th>
<th>NG</th>
<th>LPG (Propane)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. input rate 180/79 °F (82/26 °C)</td>
<td>BTU/hr (kW)</td>
<td>100,800 (29.5)</td>
<td>98,600 (28.9)</td>
</tr>
<tr>
<td>Max. output rate 104/86 °F (40/30 °C)</td>
<td>BTU/hr (kW)</td>
<td>93,800 (27.5)</td>
<td>93,800 (27.5)</td>
</tr>
<tr>
<td>Max. output rate 122/86 °F (50/30 °C)</td>
<td>BTU/hr (kW)</td>
<td>93,100 (27.3)</td>
<td>93,100 (27.3)</td>
</tr>
<tr>
<td>Max. output rate 176/140 °F (80/60 °C)</td>
<td>BTU/hr (kW)</td>
<td>89,400 (26.2)</td>
<td>89,400 (26.2)</td>
</tr>
<tr>
<td>Output rate domestic hot water (DHW) 113 °F (45 °C)</td>
<td>BTU/hr (kW)</td>
<td>93,800 (27.5)</td>
<td>93,600 (27.4)</td>
</tr>
<tr>
<td>Output rate domestic hot water (DHW) 140 °F (60 °C)</td>
<td>BTU/hr (kW)</td>
<td>91,400 (26.8)</td>
<td>91,400 (26.8)</td>
</tr>
<tr>
<td>Min. input rate 180/79 °F (82/26 °C)</td>
<td>BTU/hr (kW)</td>
<td>24,600 (7.2)</td>
<td>40,100 (11.7)</td>
</tr>
<tr>
<td>Min. output rate 104/86 °F (40/30 °C)</td>
<td>BTU/hr (kW)</td>
<td>23,900 (7.0)</td>
<td>39,900 (11.7)</td>
</tr>
<tr>
<td>Min. output rate 122/86 °F (50/30 °C)</td>
<td>BTU/hr (kW)</td>
<td>23,900 (7.0)</td>
<td>39,600 (11.6)</td>
</tr>
<tr>
<td>Min. output rate 176/140 °F (80/60 °C)</td>
<td>BTU/hr (kW)</td>
<td>21,800 (6.4)</td>
<td>36,200 (10.6)</td>
</tr>
</tbody>
</table>

**Gas connection value**

- Natural gas - $H_s = 1,010 \text{ BTU/ft}^3 (37.3 \text{ MJ/m}^3)$ $\text{ft}^3/\text{hr (m}^3/\text{h)}$ 99 (2.8) -
- Liquid Propane Gas - $HD-S = 2,500 \text{ BTU/ft}^3 (93.1 \text{ MJ/m}^3)$ $\text{ft}^3/\text{hr (m}^3/\text{h)}$ - 39 (1.1)

**Permissible gas inlet pressure**

- NG in. W.C. (mbar) 3.5-10.5" (8.7-26.1"
- LPG (Propane) in. W.C. (mbar) 8-13" (19.9-32.3"

**Expansion vessel**

- Pre-charge pressure psi (bar) 10.9 (0.75) 10.9 (0.75)
- Total contents Gal (L) 3.17 (12) 3.17 (12)

**DHW**

- Max. DHW flow rate gpm (l/min) 2.64 (10) 2.64 (10)
- Nominal DHW flow rate (at 140 °F (60 °C) outlet temperature) gpm (l/min) 2.03 (7.7) 2.03 (7.7)
- Outlet temperature °F (°C) 104 - 140 (40 - 60) 104 - 140 (40 - 60)
- Max. cold water inlet temperature °F (°C) 140 (60) 140 (60)
- Max. approved DHW pressure psi (bar) 150 (10.3) 150 (10.3)
- Minimum water pressure psi (bar) 4.35 (0.3) 4.35 (0.3)

**Flue gas**

- Flue gas mass flow at maximum/minimum nominal output gps (gpm) 12.0/3.2 11.7/4.9
- Flue gas temperature 176/140 °F (80/60 °C) at max./min. nominal heat input °F (°C) 147/133 (64/56) 147/133 (64/56)
- Flue gas temperature 104/86 °F (40/30 °C) at max./min. nominal heat input °F (°C) 117/90 (47/32) 117/90 (47/32)
- CO₂ at maximum nominal output % 9.4 11.0
- CO₂ at minimum nominal output % 8.6 10.4

**Condensate**

- Maximum condensate quantity (tR = 86 °F (30 °C)) gph (l/h) 0.32 (1.2) 0.32 (1.2)
- pH level approx. 4.8 4.8

**General**

- Voltage Vac 120 120
- Frequency Hz 60 60
- Max. power consumption (central heating mode) W 205 205
- Max. power consumption (standby mode) W <6 <6
- Sound pressure level dB (A) ≤ 39 ≤ 39
- Max. supply temperature °F (°C) 190 (88) 190 (88)
- Max. permissible operating pressure (PMS) heating psi (bar) 30 (2.07) 30 (2.07)
- Permissible ambient temperature °F (°C) 32 - 122 (0 - 50) 32 - 122 (0 - 50)
- Nominal water capacity (heating) Gal (L) 0.925 (3.5) 0.925 (3.5)
- Weight (without packaging) lbs (kg) 136.5 (62) 136.5 (62)
- Maximum overall dimensions W x H x D inch (mm) 23 11/16 x 41 7/8 x 21 7/8 602 x 1048 x 555 23 11/16 x 41 7/8 x 21 7/8 602 x 1048 x 555
### 3.17 Technical data combi boiler KWB 35 - 3

<table>
<thead>
<tr>
<th>Input/Output</th>
<th>Unit</th>
<th>NG</th>
<th>LPG (Propane)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. input rate 180/79 °F (82/26 °C)</td>
<td>BTU/hr (kW)</td>
<td>131,900 (38.6)</td>
<td>129,100 (37.8)</td>
</tr>
<tr>
<td>Max. output rate 104/86 °F (40/30 °C)</td>
<td>BTU/hr (kW)</td>
<td>122,800 (36.0)</td>
<td>122,800 (36.0)</td>
</tr>
<tr>
<td>Max. output rate 122/86 °F (50/30 °C)</td>
<td>BTU/hr (kW)</td>
<td>121,800 (35.7)</td>
<td>121,800 (35.7)</td>
</tr>
<tr>
<td>Max. output rate 176/140 °F (80/60 °C)</td>
<td>BTU/hr (kW)</td>
<td>116,700 (34.2)</td>
<td>116,700 (34.2)</td>
</tr>
<tr>
<td>Output rate domestic hot water (DHW) 113 °F (45 °C)</td>
<td>BTU/hr (kW)</td>
<td>120,500 (35.3)</td>
<td>120,500 (35.3)</td>
</tr>
<tr>
<td>Output rate domestic hot water (DHW) 140 °F (60 °C)</td>
<td>BTU/hr (kW)</td>
<td>118,700 (34.8)</td>
<td>118,700 (34.8)</td>
</tr>
<tr>
<td>Min. input rate 180/79 °F (82/26 °C)</td>
<td>BTU/hr (kW)</td>
<td>36,000 (10.5)</td>
<td>46,400 (13.6)</td>
</tr>
<tr>
<td>Min. output rate 104/86 °F (40/30 °C)</td>
<td>BTU/hr (kW)</td>
<td>35,100 (10.3)</td>
<td>46,100 (13.5)</td>
</tr>
<tr>
<td>Min. output rate 122/86 °F (50/30 °C)</td>
<td>BTU/hr (kW)</td>
<td>34,800 (10.2)</td>
<td>45,700 (13.4)</td>
</tr>
<tr>
<td>Min. output rate 176/140 °F (80/60 °C)</td>
<td>BTU/hr (kW)</td>
<td>31,700 (9.3)</td>
<td>42,000 (12.3)</td>
</tr>
</tbody>
</table>

**Gas connection value**

Natural gas - $H_s = 1,010$ BTU/ft³ (37.3 MJ/m³) ft³/hr (m³/h) 130 (3.7) -

Liquid Propane Gas - $H_s = 2,500$ BTU/ft³ (93.1 MJ/m³) ft³/hr (m³/h) - 52 (1.5)

**Permissible gas inlet pressure**

- NG in. W.C. (mbar) 3.5-10.5° (8.7-26.1)
- LPG (Propane) in. W.C. (mbar) 8-13° (19.9-32.3)

**Expansion vessel**

- Pre-charge pressure psi (bar) 10.9 (0.75) 10.9 (0.75)
- Total contents Gal (L) 3.17 (12) 3.17 (12)

**DHW**

- Max. DHW flow rate gpm (l/min) 3.17 (12) 3.17 (12)
- Nominal DHW flow rate (at 140 °F (60 °C) outlet temperature) gpm (l/min) 2.6 (10) 2.6 (10)
- Outlet temperature °F (°C) 104-140 (40-60) 104-140 (40-60)
- Max. cold water inlet temperature °F (°C) 140 (60) 140 (60)
- Max. approved DHW pressure psi (bar) 150 (10.3) 150 (10.3)
- Minimum water pressure psi (bar) 4.35 (0.3) 4.35 (0.3)

**Flue gas**

- Flue gas mass flow at maximum/minimum nominal output gps 15.7/4.5 15.2/5.6
- Flue gas temperature 176/140 °F (80/60 °C) at max./min. nominal heat input °F (°C) 162/135 (72/57) 162/135 (72/57)
- Flue gas temperature 104/86 °F (40/30 °C) at max./min. nominal heat input °F (°C) 127/91 (53/33) 127/91 (53/33)

**Condensate**

- Maximum condensate quantity (tR = 86 °F (30 °C)) gph (l/h) 0.32 (1.2) 0.32 (1.2)
- pH level approx. 4.8 4.8

**General**

- Voltage Vac 120 120
- Frequency Hz 60 60
- Max. power consumption (central heating mode) W 205 205
- Max. power consumption (standby mode) W <6 <6
- Sound pressure level dB (A) ≤ 44 ≤ 44
- Max. supply temperature °F (°C) 190 (88) 190 (88)
- Max. permissible operating pressure (PMS) heating psi (bar) 30 (2.07) 30 (2.07)
- Permissible ambient temperature °F (°C) 32-122 (0-50) 32-122 (0-50)
- Nominal water capacity (heating) Gal (L) 0.925 (3.5) 0.925 (3.5)
- Weight (without packaging) lbs (kg) 136.5 (62) 136.5 (62)
- Maximum overall dimensions W x H x D inch (mm) 23 1/8 x 14 1/8 x 21 7/8 (602 x 1048 x 555)
### 3.18 Technical data combi boiler KWB 42 - 3

<table>
<thead>
<tr>
<th>Input/Output</th>
<th>Unit</th>
<th>NG</th>
<th>LPG (Propane)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. input rate 180/79 °F (82/26 °C)</td>
<td>BTU/hr (kW)</td>
<td>151,600 (44.4)</td>
<td>148,300 (43.5)</td>
</tr>
<tr>
<td>Max. output rate 104/86 °F (40/30 °C)</td>
<td>BTU/hr (kW)</td>
<td>137,500 (40.3)</td>
<td>137,500 (40.3)</td>
</tr>
<tr>
<td>Max. output rate 122/86 °F (50/30 °C)</td>
<td>BTU/hr (kW)</td>
<td>137,500 (40.3)</td>
<td>137,500 (40.3)</td>
</tr>
<tr>
<td>Max. output rate 176/140 °F (80/60 °C)</td>
<td>BTU/hr (kW)</td>
<td>134,400 (39.4)</td>
<td>134,400 (39.4)</td>
</tr>
<tr>
<td>Output rate domestic hot water (DHW) 113 °F (45 °C)</td>
<td>BTU/hr (kW)</td>
<td>137,500 (40.3)</td>
<td>137,500 (40.3)</td>
</tr>
<tr>
<td>Output rate domestic hot water (DHW) 140 °F (60 °C)</td>
<td>BTU/hr (kW)</td>
<td>135,800 (39.8)</td>
<td>135,800 (39.8)</td>
</tr>
<tr>
<td>Min. input rate 180/79 °F (82/26 °C)</td>
<td>BTU/hr (kW)</td>
<td>36,000 (10.5)</td>
<td>46,400 (13.6)</td>
</tr>
<tr>
<td>Min. output rate 104/86 °F (40/30 °C)</td>
<td>BTU/hr (kW)</td>
<td>35,500 (10.4)</td>
<td>46,400 (13.6)</td>
</tr>
<tr>
<td>Min. output rate 122/86 °F (50/30 °C)</td>
<td>BTU/hr (kW)</td>
<td>35,100 (10.3)</td>
<td>46,100 (13.5)</td>
</tr>
<tr>
<td>Min. output rate 176/140 °F (80/60 °C)</td>
<td>BTU/hr (kW)</td>
<td>31,700 (9.3)</td>
<td>42,000 (12.3)</td>
</tr>
<tr>
<td>Input/Output at elevation 2000 - 4500 feet (611 - 1372 metres)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. input rate 180/79 °F (82/26 °C)</td>
<td>BTU/hr (kW)</td>
<td>136,440 (40.0)</td>
<td>139,402 (40.9)</td>
</tr>
<tr>
<td>Max. output rate 104/86 °F (40/30 °C)</td>
<td>BTU/hr (kW)</td>
<td>123,750 (36.3)</td>
<td>129,250 (37.9)</td>
</tr>
<tr>
<td>Max. output rate 122/86 °F (50/30 °C)</td>
<td>BTU/hr (kW)</td>
<td>120,960 (35.5)</td>
<td>126,336 (37.0)</td>
</tr>
<tr>
<td>Max. output rate 176/140 °F (80/60 °C)</td>
<td>BTU/hr (kW)</td>
<td>114,125 (33.5)</td>
<td>119,625 (35.1)</td>
</tr>
<tr>
<td>Output rate domestic hot water (DHW) 113 °F (45 °C)</td>
<td>BTU/hr (kW)</td>
<td>123,750 (36.3)</td>
<td>129,750 (37.9)</td>
</tr>
<tr>
<td>Output rate domestic hot water (DHW) 140 °F (60 °C)</td>
<td>BTU/hr (kW)</td>
<td>122,220 (35.8)</td>
<td>127,652 (37.4)</td>
</tr>
<tr>
<td>Input/Output at elevation 4500 - 7000 feet (1373 - 2134 metres)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. input rate 180/79 °F (82/26 °C)</td>
<td>BTU/hr (kW)</td>
<td>125,828 (36.9)</td>
<td>129,021 (37.8)</td>
</tr>
<tr>
<td>Max. output rate 104/86 °F (40/30 °C)</td>
<td>BTU/hr (kW)</td>
<td>114,125 (33.5)</td>
<td>119,625 (35.1)</td>
</tr>
<tr>
<td>Max. output rate 122/86 °F (50/30 °C)</td>
<td>BTU/hr (kW)</td>
<td>114,125 (33.5)</td>
<td>119,625 (35.1)</td>
</tr>
<tr>
<td>Max. output rate 176/140 °F (80/60 °C)</td>
<td>BTU/hr (kW)</td>
<td>111,552 (32.7)</td>
<td>116,928 (34.3)</td>
</tr>
<tr>
<td>Output rate domestic hot water (DHW) 113 °F (45 °C)</td>
<td>BTU/hr (kW)</td>
<td>114,125 (33.5)</td>
<td>119,625 (35.1)</td>
</tr>
<tr>
<td>Output rate domestic hot water (DHW) 140 °F (60 °C)</td>
<td>BTU/hr (kW)</td>
<td>112,714 (33.0)</td>
<td>118,148 (34.6)</td>
</tr>
</tbody>
</table>

**Gas connection value**

- Natural gas: \(H_s = 1,010 \text{ BTU/ft}^3 (37.3 \text{ MJ/m}^3)\)
- Liquid Propane Gas: \(HD-S = 2,500 \text{ BTU/ft}^3 (93.1 \text{ MJ/m}^3)\)

**Permissible gas inlet pressure**

- NG: in. W.C. (mbar) 3.5 - 10.5” (8.7 - 26.1)
- LPG (Propane): in. W.C. (mbar) 8 - 13” (19.9 - 32.3)

**Expansion vessel**

- Pre-charge pressure psi (bar) 10.9 (0.75)
- Total contents Gal (L) 3.17 (12)

**DHW**

- Max. DHW flow rate gpm (l/min) 3.963 (15)
- Nominal DHW flow rate (at 140 °F (60 °C) outlet temperature) gpm (l/min) 3.61 (11.4)
- Outlet temperature °F (°C) 104 - 140 (40 - 60)
- Max. cold water inlet temperature °F (°C) 140 (60)
- Max. approved DHW pressure psi (bar) 150 (10.3)
- Minimum water pressure psi (bar) 4.35 (0.3)

**Flue gas**

- Flue gas mass flow at maximum/minimum nominal output gpm 18.0 - 4.5
- Flue gas temperature 176/140 °F (80/60 °C) at max./min. nominal heat input °F (°C) 171/135 (77/57)
- Flue gas temperature 104/86 °F (40/30 °C) at max./min. nominal heat input °F (°C) 133/91 (56/33)
- CO\(_2\) at maximum nominal output % 9.4
- CO\(_2\) at minimum nominal output % 8.6

**Condensate**

- Maximum condensate quantity (\(t_R = 86 °F (30 °C)\)) gph (l/h) 0.32 (1.2)
- pH level approx. 4.8

**General**
3.19 Condensate composition

The condensate volume and ingredients may change with regionally and seasonally varying gas quality and air quality. Typically the following ingredients and concentrations can be expected:

<table>
<thead>
<tr>
<th>Substance</th>
<th>Value in ppm (mg/l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonium</td>
<td>1.2</td>
</tr>
<tr>
<td>Lead</td>
<td>≤ 0.01</td>
</tr>
<tr>
<td>Cadmium</td>
<td>≤ 0.001</td>
</tr>
<tr>
<td>Chrome</td>
<td>≤ 0.005</td>
</tr>
<tr>
<td>Halogenated hydrocarbons</td>
<td>≤ 0.002</td>
</tr>
<tr>
<td>Hydrocarbons</td>
<td>0.015</td>
</tr>
<tr>
<td>Copper</td>
<td>0.028</td>
</tr>
<tr>
<td>Nickel</td>
<td>≤ 0.1</td>
</tr>
<tr>
<td>Mercury</td>
<td>≤ 0.0001</td>
</tr>
<tr>
<td>Sulfate</td>
<td>1</td>
</tr>
<tr>
<td>Zinc</td>
<td>≤ 0.015</td>
</tr>
<tr>
<td>Tin</td>
<td>≤ 0.01</td>
</tr>
<tr>
<td>Vanadium</td>
<td>≤ 0.001</td>
</tr>
<tr>
<td>pH-value</td>
<td>4.8</td>
</tr>
</tbody>
</table>

Table 2  Typical condensate composition
4.3 Additional regulations for installation in Massachusetts

(a) For all side wall horizontally vented gas fueled equipment installed in every dwelling, building or structure used in whole or in part for residential purposes, including those owned or operated by the Commonwealth and where the side wall exhaust vent termination is less than seven (7) feet [2150 mm] above finished grade in the area of the venting, including but not limited to decks and porches, the following requirements shall be satisfied:

- **INSTALLATION OF CARBON MONOXIDE DETECTORS.**
  At the time of installation of the side wall horizontal vented gas fueled equipment, the installing plumber or gas fitter shall observe that a hard wired carbon monoxide detector with an alarm and battery back-up is installed on the floor level where the gas equipment is to be installed. In addition, the installing plumber or gas fitter shall observe that a battery operated or hard wired carbon monoxide detector with an alarm is installed on each additional level of the dwelling, building or structure served by the side wall horizontal vented gas fueled equipment. It shall be the responsibility of the property owner to secure the services of qualified licensed professionals for the installation of hard wired carbon monoxide detectors.
  - In the event that the side wall horizontally vented gas fueled equipment is installed in a crawl space or an attic, the hard wired carbon monoxide detector with alarm and battery back-up may be installed on the next adjacent floor level.
  - In the event that the requirements of this subdivision can not be met at the time of completion of installation, the owner shall have a period of thirty (30) days to comply with the above requirements; provided, however, that during said thirty (30) day period, a battery operated carbon monoxide detector with an alarm shall be installed.

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

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

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

(b) **EXEMPTIONS:**

The following equipment is exempt from 248 CRM 5.08(2)(a) 1 thru 4:

- The equipment listed in Chapter 10 entitled "Equipment Not Required To Be Vented" in the most current edition of NFPA 54 as adopted by the board; and
- 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:

- Detailed instructions for the installation of the venting system or the venting system components; and
- A complete parts list for the venting system design or venting system.

(d) **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:

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

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

5.1 Multiple zones using zone valves with DHW

![Diagram of piping system](image)

**Fig. 10 Piping**

1. Supply to heating zone 2
2. Motorized valve heating zone 2
3. Supply to heating zone 1
4. Motorized valve heating zone 1
5. System pump
6. DHW pump
7. Supply to indirect tank
8. Drain/Bleed point
9. Boiler supply pipe 1¼"
10. Low Loss Header
11. Heat only boiler
12. Boiler return pipe 1¼"
13. Return from indirect tank
14. Return from heating zone 1
15. Return from heating zone 2
16. Drain/Bleed point
17. Combination fast fill/back flow preventer
18. Expansion (tank) vessel

5.1.1 To utilize the LLH

- Switch off and isolate the boiler
- Drain the boiler
- Remove front panel
- Locate the LLH at the left-hand side of the lower section of the boiler
  1. Unscrew the cap [a] from the body of the LLH [c]
     - This will break the label across the cap and body indicating that the LLH has been employed
  2. Withdraw the cap [a] and plunger assembly [b]
  3. Unscrew the plunger assembly [b] from the cap [a],
  4. Set the plunger assembly [b] aside
  5. Re-fit the cap [a] without the plunger assembly [b]
  6. Tighten the cap [a] and ensure it is secure.

![Diagram of LLH utilization](image)

**Fig. 11 Utilizing the LLH**
5.1.2 Wiring - Multi zone with zone valves and LWCO

When using CZM100 and CRC100 or CRC200 controls the factory installed jumper at terminal [2e] remains.

The LWCO jumper on terminal [2g] is removed when using a LWCO.
For LWCO function an external transformer is required.

Fig. 12 Wiring

[1] High Voltage connection box
[1a] 120 V AC mains power (white plug)
[1b] DHW Storage tank circulator pump (red plug)
[1c] System circulator pump (black plug)
[2] Low Voltage connection box
[2d] BUS EMS connection
[2e] TT - Thermostat/On demand signal (pre-wired link) (dry signal)
[2f] Out Sen - (Outdoor sensor, sold separately)
[2g] LWCO - (pre-wired link) (Low Water Cut Off switch, sold separately)
[2h] DHW Sen - (Tank sensor)
[2k] Empty (future connectivity)
[3] CZM100 (Comfort Zone Manager 100)
[4] PZ1 - System pump
[5] VZ1, VZ2 - Zone valves
[6] 24V Transformer
[7] CRC100 or CRC200 Zone 1 (Comfort room controller)
[8] CRC100 or CRC200 Zone 2 (Comfort room controller)

Greenstar FS
5.2 Multiple zones using circulators with DHW

Fig. 13 Piping

1. Supply to heating zone 2
2. Pump heating zone 2
3. Supply to heating zone 1
4. Pump heating zone 1
5. Supply to indirect tank
6. DHW pump
7. Drain/Bleed point
8. Boiler supply pipe 1 1/4"
9. Low Loss Header
10. Heat only boiler
11. Boiler return pipe 1 1/4"
12. Return from indirect tank
13. Return from heating zone 1
14. Return from heating zone 2
15. Grain/Bleed point x3
16. Combination fast fill/back flow preventer
17. Expansion (tank) vessel

5.2.1 To utilize the LLH

- Switch off and isolate the boiler
- Drain the boiler
- Remove front panel
- Locate the LLH at the left-hand side of the lower section of the boiler
1. Unscrew the cap [a] from the body of the LLH [c]
   - This will break the label across the cap and body indicating that the LLH has been employed
2. Withdraw the cap [a] and plunger assembly [b]
3. Unscrew the plunger assembly [b] from the cap [a]
4. Set the plunger assembly [b] aside
5. Re-fit the cap [a] without the plunger assembly [b]
6. Tighten the cap [a] and ensure it is secure.

Fig. 14 Utilizing the LLH
5.2.2 Wiring

When using CZM100 and CRC100 or CRC200 controls the factory installed jumper at terminal [2e] remains.

The LWCO jumper on terminal [2g] is removed when using a LWCO.
For LWCO function an external transformer is required.
Installation, power connection, connection on the gas and flue gas side and commissioning must only be carried out by a contractor certified for such work by the state or local jurisdiction or the local gas or power utility.

Transportation blank plugs
► Remove the blanking plugs from the appliance water connections. There may be some water present from the appliance testing.

6.1 Installation and operation
When installing and operating the heating system observe the following:
► The elevation of the installation location above sea level must be taken into account (Chapter 12.2).
► Follow all local building regulations regarding the installation conditions on site.
► The local building regulations regarding air supply and venting systems and the chimney flue connection.
► Electrical code requirements for connection to the electrical power supply.
► The technical regulations of the gas company regarding the connection of the gas burner to the local gas main.
► The regulations and standards relating to the DHW heating system.

6.1.1 Notes on installation and operation
Fill and make-up water for the heating system
Unsuitable fill and make-up water can result in the heating system scaling up or failing prematurely.

Recommended steps for commissioning a new or retrofit boiler installation
► Flush the system with clean water.
► Isolate the boiler, fill the system with fresh water and a boiler cleaner, run for 30 minutes to 1 hour. Under no circumstances may boiler cleaner be pumped through the boiler.
► Thoroughly flush the system with fresh water. Ensure all zones and loops are flushed.
► Empty out sediment traps.
► Systems containing antifreeze not approved by Bosch, must be completely flushed to ensure no old fluid remains.
► Fill the system with fresh water and the proper amount of inhibitor.
► Verify the pH is within the proper range.
► Add additional inhibitor if pH is not within the proper range.
► Check pH annually.
► If using antifreeze, fill with approved antifreeze and fresh water.
► Always follow the cleaner, antifreeze, or additive manufacturer’s instructions.
► Do not mix different manufacturer’s products
► Follow manufacturer’s data to determine the anti-freeze ratio for the desired freeze protection temperature.

Recirculation pump/DHW recirculation lines

<table>
<thead>
<tr>
<th>Total length DHW/recirculation line</th>
<th>Flow rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 33 ft (10 m)</td>
<td>0.66 gpm (2.5 l/min)</td>
</tr>
<tr>
<td>33 - 66 ft (10 - 20 m)</td>
<td>0.92 gpm (3.5 l/min)</td>
</tr>
<tr>
<td>66 - 98 ft (20 - 30 m)</td>
<td>1.32 gpm (5 l/min)</td>
</tr>
</tbody>
</table>

Table 4 Recommended flow rates

Use service function 6.d., to determine the current flow rate (page 60).

Electrical connection of the DHW recirculation pump (page 46).
Connect the DHW recirculation line as close as possible to the cold water inlet on the appliance.

Open vented heating systems
► Convert open vented heating systems into closed systems.

Gravity heating systems
► Connect the appliance to the existing piping system via an external low-loss header with a sludge separator.

Galvanized radiators or pipes.
To prevent gas formation:
► Do not use galvanized radiators or pipes.

Plastic pipe work
If using plastic pipe work for the heating system (eg. underfloor/radiant heating), the type of pipe that should be used must be oxygen tight.

Use of a room temperature control
► Do not install thermostatic valves on radiators in the primary room.

Primary-secondary piping or a Low Loss Header (LLH)
Enable the integrated Low Loss Header if hydraulic separation is required and not already provided by a configuration external to the appliance.

Typically all multi zone applications with any combination of emitters like baseboard, panel radiator or radiant would require primary secondary piping or a low loss header for hydraulic separation.

In addition to that some larger single zone applications exceeding a flow rate of 4.0 gpm requires primary secondary piping or a low loss header to achieve hydraulic balance.

A Low Loss Header is used to achieve hydraulic balance on either side of the appliance, using the lowest pump speed that delivers heat to all the radiators in the system.

Radiant floor, panel radiator, multi zone and application systems exceeding 70' (21 m) of 3/4" baseboard at a 20°F delta T and a flow rate of 4.0 gpm plus the necessary supply and return piping, require primary-secondary piping or a low loss header for hydraulic separation of the system from the boiler.
Water Chemistry Guidelines

**NOTICE:** Insufficient antifreeze can accelerate corrosion.
- Follow manufacturer's instructions on antifreeze concentration.
- Frost protection level has to be checked annually during the regular scheduled maintenance of the condensing boiler.

**NOTICE:** System damage!
- It is the installer's responsibility to ensure that the heating system is compatible with the boiler type and size installed.
- pH-value of the heating water to be kept between 7 and 8.5.

The following anti-freeze fluids and concentrations have been approved:

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nalco (Varidos) FSK</td>
<td>22 - 55 %</td>
</tr>
<tr>
<td>Fernox Alphi 11</td>
<td>Refer to manufacturer's instructions</td>
</tr>
<tr>
<td>Intercool NFP-50 AA</td>
<td>0 - 39 %</td>
</tr>
<tr>
<td>Antifrogen N</td>
<td>Refer to manufacturer's instructions</td>
</tr>
<tr>
<td>NoBurst AL</td>
<td>0 - 55 %</td>
</tr>
</tbody>
</table>

*Table 5  Anti-freeze*

**Corrosion inhibitors**

The following anti-corrosion agents are approved:

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fernox F1</td>
<td>Refer to manufacturer's instructions</td>
</tr>
<tr>
<td>Nalco 77381</td>
<td>1 - 2 %</td>
</tr>
<tr>
<td>Sentinel X 100</td>
<td>1.1 %</td>
</tr>
</tbody>
</table>

*Table 6  Corrosion inhibitors*

- System fluid pH must be maintained between 7 and 8.5 to prevent system damage.
- Use only untreated water to fill the system.
- Do not use TSP (tri-sodium phosphate).
- Do not use fill water treated with salt bedding type exchangers (ion exchanger).
- Never introduce non-approved boiler treatment or similar additives.
- Only use fill water with a hardness below 7 grains.
- Filling with chlorinated water is acceptable if chlorine levels are below 100 ppm.
- Do not use inhibitors or other additives unless listed in this document.
- Consult a local water treatment specialist for recommendations if any of the above is outside the stated ranges.
- When using oxygen permeable PEX, the system must be separated from the boiler by a heat exchanger.
- A correctly sized and working expansion vessel must be installed.
- Do not exceed the maximum permissible flow rate through the boiler. Excessive flow can cause erosion damage to the heat exchanger.

**Eliminate System Leaks**

Continuous addition of make-up water will constantly add oxygen to the system and lead to corrosion. All system leaks must be repaired.

**Boiler sealer**

This boiler is not approved for use with boiler sealer.

**LPG**

To protect the appliance against high pressure (ANSI/Z223.1/NFPA54 (National fuel gas code) or CAN/CSA B 149.1 (Natural Gas and Propane installation code)):

- Install a pressure regulator with a safety valve.

**6.1.2 Other important information**

- The installation of this boiler must comply with all national and local code and regulations.
- Only operate this boiler with the combined air/flue system specifically designed and approved for it.
- Only use approved venting systems per the manufacturer's instructions.
- Do not dispose of untreated boiler condensate in septic systems.
- Inspect the sewer pipes for suitability before disposing of untreated boiler condensate into them.
- Verify with the local authority that disposing of untreated boiler condensate into public sewer systems is permitted.

**NOTICE:**

- Insufficient antifreeze can accelerate corrosion.
- Follow manufacturer's instructions on antifreeze concentration.
- Frost protection level has to be checked annually during the regular scheduled maintenance of the condensing boiler.

**NOTICE:**

- System damage!
- It is the installer's responsibility to ensure that the heating system is compatible with the boiler type and size installed.
- pH-value of the heating water to be kept between 7 and 8.5.

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- Filling with chlorinated water is acceptable if chlorine levels are below 100 ppm.
- Do not use inhibitors or other additives unless listed in this document.
- Consult a local water treatment specialist for recommendations if any of the above is outside the stated ranges.
- When using oxygen permeable PEX, the system must be separated from the boiler by a heat exchanger.
- A correctly sized and working expansion vessel must be installed.
- Do not exceed the maximum permissible flow rate through the boiler. Excessive flow can cause erosion damage to the heat exchanger.

**Eliminate System Leaks**

Continuous addition of make-up water will constantly add oxygen to the system and lead to corrosion. All system leaks must be repaired.

**Boiler sealer**

This boiler is not approved for use with boiler sealer.

**LPG**

To protect the appliance against high pressure (ANSI/Z223.1/NFPA54 (National fuel gas code) or CAN/CSA B 149.1 (Natural Gas and Propane installation code)):

- Install a pressure regulator with a safety valve.

**6.1.2 Other important information**

- The installation of this boiler must comply with all national and local code and regulations.
- Only operate this boiler with the combined air/flue system specifically designed and approved for it.
- Only use approved venting systems per the manufacturer's instructions.
- Do not dispose of untreated boiler condensate in septic systems.
- Inspect the sewer pipes for suitability before disposing of untreated boiler condensate into them.
- Verify with the local authority that disposing of untreated boiler condensate into public sewer systems is permitted.

**NOTICE:**

- Insufficient antifreeze can accelerate corrosion.
- Follow manufacturer's instructions on antifreeze concentration.
- Frost protection level has to be checked annually during the regular scheduled maintenance of the condensing boiler.

**NOTICE:**

- System damage!
- It is the installer's responsibility to ensure that the heating system is compatible with the boiler type and size installed.
- pH-value of the heating water to be kept between 7 and 8.5.
6.2 Comparing the size of the integrated expansion vessel (KWB-3A boiler only)

The following diagrams allow verifying that the integrated expansion vessel has sufficient capacity for the intended application, or if an additional expansion vessel is needed (not for radiant floor heating).

The following standard conditions were used:

- Pre-charge volume 20% of the rated volume in the expansion vessel
- Differential to the safety valve of 7.25 psi (0.5 bar)
- Pre-charge pressure of the expansion vessel equal to the static system height above the boiler
- Maximum operating pressure: 30 psi (2.07 bar)

**Fig. 16** Operating capacity of the expansion vessel in °F and gallons

**Fig. 17** Operating capacity of the expansion vessel in °C and liters

**Key to Fig. 16 and Fig. 17:**

[I] Pre-charge pressure 7.25 psi (0.5 bar) (default setting)
[II] Pre-charge pressure 10.9 psi (0.75 bar)
[III] Pre-charge pressure 14.5 psi (1.0 bar)

- $t_V$ Supply temperature in °F (°C)
- $V_A$ System capacity in gallons (liters)
- **A** Within operating capacity of the expansion vessel (left of the relevant curve)
- **B** Additional expansion vessel required (right of the relevant curve)

▶ If results are borderline: Determine precise vessel sizes.
▶ If the results are to the right of the curve: Install additional expansion vessel.

6.3 KBR..-3A appliances (heating boilers): Selecting an expansion vessel

**External expansion vessel**

- Determine size of the expansion vessel.

**Fig. 18** Sample installation - expansion vessel

6.4 Selecting the installation location

**Installation location requirements**

- Observe the current national and local codes and regulations.
- Observe country-specific requirements.
- Observe installation instructions of the venting system accessories and their clearances.

**Combustion air**

To avoid corrosion, keep the supply of combustion air free of corrosive substances; contained in solvents, paints, adhesives, propellants and domestic cleaning agents.

**Industrial sources**

- Chemical cleaning: Trichloroethylene, tetrachloroethylene, fluorinated hydrocarbons
- Degreasing bath: Perchloroethylene, trichloroethylene, methylchloroform
- Printing shops: Trichloroethylene
- Hair salons: Aerosol propellants, hydrocarbons containing fluorine and chlorine (difluorodichloromethane)

**Household sources**

- Cleaning and degreasing agents: Perchloroethylene, methylchloroform, trichloroethylene, methane chloride, carbon tetrachloride, hydrochloric acid

**Workshop**

- Solvents and thinners: Various chlorinated hydrocarbons
- Aerosols: Chlorofluorinated hydrocarbons (difluorodichloromethane)

**Table 7** Corrosive materials

**Surface temperature**

The max. surface temperature of this appliance is below 185 °F (85 °C). According to ANSI/Z223.1/NFPA43 (National fuel gas code) and CAN/CGAB 149.1 (Natural Gas and Propane installation code), the appliance is approved for zero clearance to combustibles. For servicing a clearance of 4" (102 mm) is recommended.
### 6.5 Low Loss Header (LLH) utilization

A Low Loss Header is primarily used on systems that require higher flow rate (gpm) requirements that exceed the flow rate (gpm) of the low mass heat exchanger. Typically systems that require additional zone pumps that are external to the appliance or exceed the single zone limitation of 4.5 gpm would require the low loss header.

A Low Loss Header is used to achieve hydraulic separation between the appliance and system piping.

- If the heating system is a single zone and has no additional circulators other than its integrated pump, no modification of the LLH manifold is required.
- If the heating system has additional circulators (for example multiple zones of panel radiator or baseboard heat) then the LLH plunger must be removed to allow the hydraulic separation of the appliance from the system.

This allows the appliance to continue satisfying the demands of the heating system when high system flow rates are expected.

#### 6.5.1 To utilize the LLH

- Switch off and isolate the boiler
- Drain the boiler
- Remove front panel
- Locate the LLH at the left-hand side of the lower section of the boiler
  1. Unscrew the cap [a] from the body of the LLH [c]
     - This will break the label across the cap and body indicating that the LLH has been employed
  2. Withdraw the cap [a] and plunger assembly [b]
  3. Unscrew the plunger assembly [b] from the cap [a],
  4. Set the plunger assembly [b] aside
  5. Re-fit the cap [a] without the plunger assembly [b]
  6. Tighten the cap [a] and ensure it is secure.

**Fig. 19**

1. Central heating supply
2. Central heating return
3. Domestic hot water outlet
4. Domestic cold water inlet
5. Low Loss Header

**Fig. 20** Utilizing the LLH
6.6 Locating the appliance

**NOTICE:** Residue, metal shavings, and contaminants in the piping can damage the appliance.
- Flush the piping thoroughly and completely to remove all residue.
- Follow the instructions with respect to water quality (→ Chapter 6.1, page 30).

- Remove packaging, observing all notes and symbols.
- On the rating plate, check the identification of the target country and suitability for the gas type supplied by the local gas utility company (→ page 8).

### Removing the cover
To remove the cover:
- Pull the front panel towards you from the top right and left edge to release the ball catches [1] from their retainers [2]
- Lift the front panel of the lower mounts [3] and place in a safe location away from the work area

![Fig. 21 Remove the cover](image1)

**Fig. 21 Remove the cover**

### 6.6.1 Positioning the appliance
The boiler must be adjusted to be level. This ensures air can escape from the heat exchanger and condensate drains freely.

**NOTICE:** Damage caused by insufficient load bearing or unsuitability of the boiler room floor
- Ensure the floor area is suitable for installing a boiler and can take the “wet weight” of the appliance.

**NOTICE:** Damage caused by mechanical strain on the hydraulic and flue gas connections when adjusting the position of the appliance.
- Do not apply any strain the connections when adjusting the boiler position

- Place boiler in its final location
- Release the locknuts on the boiler feet
- Adjust the boiler feet until the boiler is level vertically and horizontally, check using a spirit level
- Secure in position with the locknuts

**Notice:** Residue, metal shavings, and contaminants in the piping can damage the appliance.
- Flush the piping thoroughly and completely to remove all residue.
- Follow the instructions with respect to water quality (→ Chapter 6.1, page 30).

**Fig. 22 Levelling the boiler**

![Fig. 22 Levelling the boiler](image2)
6.7 Installing a low water cut off (LWCO)

The boiler is equipped with several sensors that prevent firing or running the boiler in case of low water pressure or low water levels. Nevertheless, code may require the installation of a separate low water cut off (LWCO) device.

The boiler is equipped with a dedicated port for installation of a LWCO device on the supply pipe on the back of the boiler cabinet. This location represents the minimum water level for safe operation of the boiler.

The LWCO device must be specified for an ambient temperature of 176 °F (80 °C) and a water temperature of 250 °F (121 °C).

The following LWCO is approved with the boiler:

- Hydrolevel Safgard 1100

The device is available at most Bosch wholesalers. It requires an external 24VAC minimum 20VA transformer provided on site.

If other LWCO devices are to be used, they must be installed external to the boiler.

- Disconnect the boiler from power by shutting off the emergency switch or disengaging the heating system circuit breaker.
- Drain the boiler.
- 1. Remove the safety clip from the dummy plug in the supply pipe.
- 2. Pull off the dummy plug and place with the boiler documentation.
- Ensure the O-ring remains in place on the pipe.
- Lubricate the O-ring.

**Fig. 23 Installing a LWCO device - removing dummy plug**

- Screw the LWCO as far as possible into LWCO adapter located in the boiler accessory kit. Follow the Hydrolevel Safgard 1100 instructions.

**Fig. 24 Installing a LWCO device - LWCO adapter**

1. Push the adapter with the LWCO onto the pipe

2. Secure with the clip

**Fig. 25 Installing a LWCO device - securing with a clip**

- Connect the wires of the LWCO (chapter 7.4, page 48).

The LWCO is positioned upright for technical reasons. Tests have shown that all air will bleed from the pipe during commissioning and full functionality is established.

If fault d3 is displayed when commissioning the boiler, purge the boiler properly and check the boiler water pressure.
6.8 Connecting flue gas accessories

Optional vent systems are:

- Twin pipe PVC / CPVC 2" / 3"
- Twin pipe PP 2" (50mm) / 3" (80 mm)
  (M&G Duravent PolyPro and Centrotherm InnoFlue)
- Concentric PP 3" / 5" (80/125 mm) (Bosch)

Using the twin pipe adaptor:

The twin pipe adaptor is supplied with the boiler kit as standard and is certified as a part of the vent system.

- Peel the backing of the gasket [1] and attach to the underside of the vent flange so that the holes line up [2]
- Remove three screws from the top of the appliance, align the vent flange to the open screw holes then secure the vent flange with the three screws that were just removed or the three screws provided.

Fig. 26 Attaching the vent flange and gasket
[1] Gasket
[2] Vent flange
[3] Screws

- Insert the flue gas adapter as far as it will go into the vent flange and align it.

Fig. 27 Flue gas adapter
[1] Combustion air test port
[3] Flue gas adapter
[4] Vent flange

- Tighten the screws.

To avoid premature wear of the gaskets DO NOT use lubricants.

Using open venting:
- Use basket on the air intake.

Using concentric venting system:

As an alternative to twin pipe venting, a purposely designed and built telescopic concentric vent kit can be obtained as an accessory from Bosch Thermotechnology for a horizontal direct vent wall termination. This vent system can be used for vent lengths of 2 feet to 3 feet (610 mm to 915 mm).

For more details on connecting the flue system, refer to the installation instructions for the flue kit.

Fig. 28 Horizontal venting system (telescopic concentric vent kit)
[1] Intake
[2] Exhaust
L 2 feet to 3 feet (610 mm to 915 mm)

- Install the concentric vent adaptor with the screws enclosed.
6.8.1 Installation of the exhaust and air intake system

**DANGER:** Carbon Monoxide poisoning

Improper venting of the Greenstar boiler can result in excessive levels of carbon monoxide which can result in severe personal injury or death.

- The boiler must be vented in accordance with the “Venting of Equipment” section of the latest edition of ANSI Z 223.1 / NFPA 54 Natural Fuel Gas Code and/or the “Venting systems and air supply for appliances” section of the latest version of CAN/CGA B149.1 Natural Gas and Propane Installation Code in Canada and in accordance with all applicable local building codes.

**DANGER:** Flue connections

Incorrectly fitted flue connections can lead to carbon monoxide escaping into the boiler room.

- Ensure that the flue pipes and seals are not damaged.
- Use only sealing compounds (primer and glue) approved with the vent material.
- Never install a barometric or a thermally controlled vent damper with this boiler.
- Connect only one boiler to each flue system.
- Do not route the flue system piping through or inside another duct that is used for exhausting air or other flue gases.
- The condensate trap must be primed at all times. Failure to do so may allow combustion gases to escape into boiler room.
- External insulation on plastic vent pipe is prohibited.

**NOTICE:** Vent connectors

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

**NOTICE:** Burner damage!

- Avoid drawing in combustion air excessively loaded with dust or airborne particles.

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.

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 (→ chapter 6.8.3).

**Direct vent installations (sealed combustion)**

For direct vent applications all applicable items below must be met.

**NOTICE:** Vent connectors

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

**NOTICE:** Burner damage!

- Avoid drawing in combustion air excessively loaded with dust or airborne particles.

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.

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 (→ chapter 6.8.3).

---

**Fig. 29** Installing the concentric vent adaptor

[1] Concentric vent adaptor
[2] Screws
[3] Combustion air test port
[4] Flue gas test port

**Fig. 30** Vent & combustion air pipe position of a sealed combustion system

[1] Intake
[2] Exhaust

X At least 1 foot (305 mm)

The termination shall terminate at least 1 foot (305 mm) below, 1 foot (305 mm) horizontally from or 1 foot (305 mm) above any door, window or gravity air inlet into any building (→ fig. 31 [2], [X1], [X3], page 40).

If multiple boilers are installed in a row, allow at least 1 foot (305 mm) clearance between the vent termination of one and the combustion air intake of the other.
Vent termination must be at least 1 foot (305 mm) above grade, anticipated snow line or roof surface (Canada 1-1/2 feet (457 mm) minimum) (→ fig. 31 [YA], page 40). Ensure that condensate spilling from the termination does not create a hazard or a nuisance.

Vent termination must be at least 7 feet (2135 mm) above a public walkway (→ fig. 31 [X5], page 40). Ensure that condensate spilling from the termination does not create a hazard or a nuisance.

Vent termination must be 3 feet (915 mm) above any forced air intake within 10 feet (3050 mm) (→ fig. 31 [1], [YB], page 40).

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 feet (915 mm) away from adjacent walls, inside corners and 5 feet (1525 mm) below roof overhang (→ fig. 31 [X2], [X4], page 40).

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 PP/PVC/CPVC combustion air and vent pipe materials and fittings must comply with the following and must be UL approved venting material:

All PVC/CPVC vent pipes must be glued, except for the flue gas adapter-pipe connection.

The exhaust pipe must be properly supported and pitched a minimum of ¼ inch (6.35 mm) per foot back to the boiler. This allows the condensate to properly drain.

### Table 8 Materials for pipe

<table>
<thead>
<tr>
<th>Material</th>
<th>Item</th>
<th>United states</th>
<th>Canada</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVC schedule 40, 80</td>
<td>2&quot; (50 mm) Vent or air pipe and fitting</td>
<td>ANSI/ASTM D1785</td>
<td>XX XX XX XX</td>
</tr>
<tr>
<td>PVC-DWV</td>
<td></td>
<td>ANSI/ASTM D2665</td>
<td>X X X X</td>
</tr>
<tr>
<td>CPVC schedule 40, 80</td>
<td></td>
<td>ANSI/ASTM F441</td>
<td>X X X X</td>
</tr>
<tr>
<td>PVC schedule 40, 80</td>
<td>3&quot; (76 mm) Vent or air pipe and fitting</td>
<td>ANSI/ASTM D1785</td>
<td>X X X X</td>
</tr>
<tr>
<td>PVC-DWV</td>
<td></td>
<td>ANSI/ASTM D2665</td>
<td>X X X X</td>
</tr>
<tr>
<td>CPVC schedule 40, 80</td>
<td></td>
<td>ANSI/ASTM F441</td>
<td>X X X X</td>
</tr>
<tr>
<td>PP rigid venting</td>
<td>2&quot; (50 mm) vent or air pipe</td>
<td>ANSI Cat IV</td>
<td>X X X X</td>
</tr>
<tr>
<td></td>
<td>M&amp;G Duravent PolyPro and Centrotherm InnoFlue</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PP rigid venting</td>
<td>3&quot; (80 mm) vent or air pipe</td>
<td>ANSI Cat IV</td>
<td>X X X X</td>
</tr>
<tr>
<td></td>
<td>M&amp;G Duravent PolyPro and Centrotherm InnoFlue</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PP rigid venting</td>
<td>3'/5&quot; (80/125 mm) concentric</td>
<td>ANSI Cat IV</td>
<td>X X X X</td>
</tr>
<tr>
<td></td>
<td>Bosch (manufactured by M&amp;G Duravent)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PP Flex</td>
<td>Same as 3&quot; PP above</td>
<td>ANSI Cat IV</td>
<td>X X X X</td>
</tr>
<tr>
<td>PP Flex</td>
<td>Same as 2&quot; PP above</td>
<td>ANSI Cat IV</td>
<td>X X X X</td>
</tr>
<tr>
<td>PVC</td>
<td>Pipe cement/primer</td>
<td>ANSI/ASTM D2564</td>
<td>X X X X</td>
</tr>
<tr>
<td>CPVC</td>
<td></td>
<td>ANSI/ASTM F493</td>
<td>X X X X</td>
</tr>
</tbody>
</table>

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

For installations in Canada, field supplied plastic vent piping must comply with CAN/CGA B149.1 (latest edition) and be certified to the Standard for Type BH Gas Venting systems. ULC S636 Components of this listed system shall not be interchanged with other vent systems or unlisted pipe fittings. All plastic components and specified primers and glues of certified vent systems must be from a single manufacturer and not intermingled with other system manufacturer's vent system parts.

The supplied vent connector and separate available vent termination are certified as a part of the Greenstar Boiler.
### Roof terminals

<table>
<thead>
<tr>
<th>Material</th>
<th>Supplier</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø 3&quot; / Ø 5&quot; (Ø 76/125mm)</td>
<td>IPEX System 636</td>
<td>196006</td>
</tr>
<tr>
<td>Ø 3&quot; / Ø 5&quot; (Ø 76/125mm)</td>
<td>IPEX System 636</td>
<td>197009</td>
</tr>
<tr>
<td>Ø 3&quot; / Ø 5&quot; (Ø 80/125mm)</td>
<td>M&amp;G Duravent PolyPro and Centrotherm InnoFlue.</td>
<td>3PPS-VK (-TC) (M&amp;G Duravent) or ICRT3539 (Centrotherm)</td>
</tr>
<tr>
<td>Ø 3&quot; (Ø 80mm) with base support</td>
<td>PolyPro Flex Chimney Cap (PP)</td>
<td>3PPS-FCT</td>
</tr>
<tr>
<td>PolyPro Support elbow</td>
<td>M&amp;G Duravent PolyPro Centrotherm InnoFlue</td>
<td>ISCP03</td>
</tr>
<tr>
<td>Base Support + SW to Flex Coupler</td>
<td>M&amp;G Duravent PolyPro Centrotherm InnoFlue</td>
<td>3PPS-SE90X</td>
</tr>
<tr>
<td>M&amp;G Duravent PolyPro Centrotherm InnoFlue</td>
<td>ISBS0387 + IFSFC03</td>
<td></td>
</tr>
<tr>
<td>Ø 2&quot; (Ø 50mm) with base support</td>
<td>PolyPro Flex Chimney Cap (PP)</td>
<td>2PPS-FCT</td>
</tr>
<tr>
<td>PolyPro Support elbow</td>
<td>M&amp;G Duravent PolyPro Centrotherm InnoFlue</td>
<td>ISCP02</td>
</tr>
<tr>
<td>Base Support + SW to Flex Coupler</td>
<td>M&amp;G Duravent PolyPro Centrotherm InnoFlue</td>
<td>2PPS-SE90X</td>
</tr>
<tr>
<td>M&amp;G Duravent PolyPro Centrotherm InnoFlue</td>
<td>ISBS0287 + IFSFC02</td>
<td></td>
</tr>
</tbody>
</table>

### Wall terminals

<table>
<thead>
<tr>
<th>Flue System / Materials</th>
<th>Supplier</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø 3&quot; (Ø 76 mm)</td>
<td>parallel stainless steel</td>
<td>Flex-L</td>
</tr>
<tr>
<td>90°-elbow with inlet screen</td>
<td>PVC (elbow), stainless steel (screen)</td>
<td>IPEX (elbow), Langly Wire (screen)</td>
</tr>
<tr>
<td>Ø 3&quot; (Ø 76 mm) twin pipe termination</td>
<td>PP</td>
<td>M&amp;G Duravent PolyPro</td>
</tr>
<tr>
<td>Ø 3&quot; (Ø 76 mm) single pipe termination</td>
<td>PP</td>
<td>M&amp;G Duravent PolyPro</td>
</tr>
<tr>
<td>Ø 3&quot; / Ø 5&quot; (Ø 80/125 mm) Bosch Greenstar Horizontal Telescopic Terminal Kit</td>
<td>PP</td>
<td>Bosch (manufactured by M&amp;G Duravent)</td>
</tr>
</tbody>
</table>

**NOTICE:**
- DO NOT use cellular core pipe.
- DO NOT use PVC when using anti-freeze in the primary circuit of the boiler. Use CPVC, PP or stainless steel only!
**NOTICE:**
- Vent terminations must keep the following minimum clearances from electric meters, gas meters, regulators and relief equipment: 4 feet (1220 mm) [Canada 1830 mm] horizontally and in no case above and below, unless a horizontal distance of 4 feet (1220 mm) [Canada 1830 mm] is maintained.

**NOTICE:**
- For clearances not specified in ANSI Z223.1 / NFPA 54 or CSA B149.1, clearance in accordance with local installation codes and the requirements of the gas supplier including the authority having jurisdiction.

---

**Fig. 31 Vent and combustion air pipe position**

**Direct vent (sealed combustion):**
1. Forced Air Inlet
2. Gravity Air Inlet
3. Exhaust terminal

- X₁ 1 foot (305 mm)
- X₂ See Note ¹
- X₃ 1 foot (305 mm) **USA**
  - 3 feet (915 mm) **Canada**
- X₄ See Note ¹
- X₅ 7 feet (2135 mm) ²
- Yₐ At least 1 foot (305 mm) above grade or snow line
- Yₐ Exhaust terminal must be at least:
  - 3 feet (915 mm) above forced air inlet within 10 feet (3050 mm) horizontally - **USA**
  - 6 feet (915 mm) above forced air inlet - **Canada**

**Fan assisted appliance (non-sealed combustion):**
1. Forced Air Inlet
2. Gravity Air Inlet
3. Exhaust terminal

- X₁ 1 foot (305 mm)
- X₂ See Note ¹
- X₃ 1 foot (305 mm) **USA**
  - 3 feet (915 mm) **Canada**
- X₄ See Note ¹
- X₅ 7 feet (2135 mm) above public walkway
- Yₐ At least 1 foot (305 mm) above grade or snow line
- Yₐ Exhaust terminal must be at least:
  - 3 feet (915 mm) above forced air inlet within 10 feet (3050 mm) horizontally - **USA**
  - 6 feet (915 mm) above forced air inlet - **Canada**

---

¹ For Clearances not specified in ANSI Z223.1 / NFPA 54 or CSA B149.1, clearance in accordance with local installation codes and the requirements of the gas supplier including the Authority having jurisdiction.

² A vent shall not terminate directly above a sidewalk or paved driveway that is located between 2 single family dwellings and serves both dwellings.

---

**Clearance in accordance with local installation codes and the requirements of the gas supplier including the authority having jurisdiction.**
6.8.2 Approved examples of horizontal and vertical venting installation

**NOTICE:**
- Place pipe supports every 5 feet (1525 mm) of horizontal and vertical run, beginning with support near boiler.
- The condensate must be disposed of in accordance with applicable rules.
- Periodic cleaning of the vent terminal and air-intake screens is mandatory.
- Avoid locating vent terminals near equipment or building features which can be subject to degradation from exhaust gases.
- If multiple boilers are installed in a row, allow at least 1 foot (305 mm) clearance between the vent termination of one and the combustion air intake of the other.

---

**Fig. 32** Horizontal venting system (room air only)

**Fig. 33** Horizontal venting system (room air only)

**Key to Fig. 32 and Fig. 33:**
[1] Intake
[2] Exhaust

---

**Fig. 34** Horizontal venting system (sealed combustion)

**Fig. 35** Horizontal venting system (sealed combustion)

**Key to Fig. 34 and Fig. 35:**
[1] Intake, behind exhaust
[2] Exhaust
[3] Wall termination
Fig. 36  Vertical venting system (sealed combustion)

Fig. 37  Vertical venting system (room air only)

Fig. 38  Vertical venting system (sealed combustion)

Key to Fig. 36, Fig. 37 and Fig. 38:

[1] Intake
[2] Exhaust
[3] Concentric termination
X Greater than 12 inches (305 mm)
Y 12 inches (305 mm) above maximum snow level or at least 24 inches (610 mm) whichever is greater
**Installation**

### Fig. 39 Vertical venting system (sealed combustion)

1. **Intake**
2. **Exhaust**

**X**  Greater than 12 inches (305 mm)

**Y**  12 inches (305 mm) above maximum snow level or at least 24 inches (610 mm) whichever is greater

The transitions from rigid to corrugated pipe must conform to the S636 standard - Plastic vent pipe for gas fired appliances

### Fig. 40 PolyPro Flex Chimney Cap (PP) vertical venting system (sealed combustion)

1. **Intake**
2. **Exhaust**

### 6.8.3 Vent and combustion air pipe lengths

3" (76 mm) Vent and combustion air pipe

For all installation situations and for all appliances the maximum vent and combustion air pipe length is 100 feet each, with no more than 8 elbows each.

2" (50 mm) Vent and combustion air pipe

The maximum combined vent and combustion air pipe length (→ tab. 11, 12 and 13) depend on the installation situation, the appliance type and the number of elbows used.

<table>
<thead>
<tr>
<th>Number of 90° elbows used</th>
<th>KBR16-3</th>
<th>KBR21-3</th>
<th>KBR28-3</th>
<th>KBR35-3</th>
<th>KWB28-3</th>
<th>KWB42-3</th>
<th>KWB44-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>81 ft (24.6 m)</td>
<td>65 ft (19.8 m)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>76 ft (23.1 m)</td>
<td>57 ft (17.3 m)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>71 ft (21.6 m)</td>
<td>48 ft (14.6 m)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>66 ft (20.1 m)</td>
<td>40 ft (12.2 m)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>61 ft (18.6 m)</td>
<td>32 ft (9.8 m)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>56 ft (17.1 m)</td>
<td>23 ft (7.0 m)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 11 Vent and combustion air pipe lengths with 2" diameter and separate terminations**

With Flex pipe the maximum length is reduced by 50% Flex pipe according to the suppliers instructions for use in the vertical part of the installation only.

6 720 810 590-26.1Wo

6 720 810 590-27.1Wo
Installation

Greenstar FS6 720 810 590 (2015/11)

Ø 3" / Ø 5" (Ø 80/125 mm) Concentric venting system

The maximum concentric pipe length (→ tab. 14) depends on the installation situation, the appliance type and the number of elbows used.

### Example:
- **Model:** KBR28-3A
- **90° elbows used:** 2
- **45° elbows used:** 2

Maximum straight vent pipe allowed: **38ft (11.6 m)**

### 6.9 Testing gas and water connections for leaks

**Water connections**
- Open the heating supply and return valves and fill the heating system.
- Check all connections for leakage (test pressure: Max. 30 psi (2.07 bar) on the pressure gauge).

**Gas line**
- Close the gas shutoff valve to protect the gas valve from damage.
- Check all connections for leakage (test pressure: Max. 60" W.C. (150 mbar)).
- Release pressure.

### Table 15 Concentric pipe friction loss equivalent for fittings

<table>
<thead>
<tr>
<th>Fitting</th>
<th>Equivalent ft</th>
<th>m</th>
</tr>
</thead>
<tbody>
<tr>
<td>45° elbow</td>
<td>3</td>
<td>0.91</td>
</tr>
<tr>
<td>90° elbow</td>
<td>6</td>
<td>1.82</td>
</tr>
</tbody>
</table>

### Table 12 Vent and combustion air pipe lengths with 2" diameter and the stainless steel wall termination

<table>
<thead>
<tr>
<th>Number of 90° elbows used</th>
<th>KBR16-3</th>
<th>KBR21-3</th>
<th>KBR28-3</th>
<th>KWR28-3</th>
<th>KBR35-3</th>
<th>KWR35-3</th>
<th>KBR42-3</th>
<th>KWR42-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>76 ft (23.1 m)</td>
<td>60 ft (18.3 m)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>71 ft (21.6 m)</td>
<td>52 ft (15.9 m)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>66 ft (20.1 m)</td>
<td>43 ft (13.1 m)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>61 ft (18.6 m)</td>
<td>35 ft (10.7 m)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>56 ft (17.1 m)</td>
<td>27 ft (8.2 m)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>51 ft (15.6 m)</td>
<td>18 ft (5.5 m)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

### Table 13 Vent and combustion air pipe lengths with 2" diameter and the concentric termination

<table>
<thead>
<tr>
<th>Number of 90° elbows used</th>
<th>KBR16-3</th>
<th>KBR21-3</th>
<th>KBR28-3</th>
<th>KWR28-3</th>
<th>KBR35-3</th>
<th>KWR35-3</th>
<th>KBR42-3</th>
<th>KWR42-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>66 ft (20.1 m)</td>
<td>47 ft (14.3 m)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>61 ft (18.6 m)</td>
<td>38 ft (11.6 m)</td>
<td></td>
<td></td>
<td></td>
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<td>3</td>
<td>56 ft (17.1 m)</td>
<td>30 ft (9.1 m)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>51 ft (15.6 m)</td>
<td>22 ft (6.7 m)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>5</td>
<td>46 ft (14.1 m)</td>
<td>13 ft (4.0 m)</td>
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</tr>
<tr>
<td>6</td>
<td>41 ft (12.5 m)</td>
<td>5 ft (1.5 m)</td>
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<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

### Table 14 Pipe lengths with Ø 3" / Ø 5" (Ø 80/125 mm) diameter and termination

<table>
<thead>
<tr>
<th>Number of 90° elbows used</th>
<th>KBR16-3</th>
<th>KBR21-3</th>
<th>KBR28-3</th>
<th>KWR28-3</th>
<th>KBR35-3</th>
<th>KWR35-3</th>
<th>KBR42-3</th>
<th>KWR42-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>50 ft (15.2 m)</td>
<td>44 ft (13.4 m)</td>
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<td></td>
</tr>
<tr>
<td>2</td>
<td>44 ft (13.4 m)</td>
<td>38 ft (11.6 m)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>38 ft (11.6 m)</td>
<td>32 ft (9.8 m)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>32 ft (9.8 m)</td>
<td>26 ft (7.9 m)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>26 ft (7.9 m)</td>
<td>20 ft (6.1 m)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>20 ft (6.1 m)</td>
<td>14 ft (4.3 m)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
7 Making the electrical connections

7.1 General notes

**DANGER: Risk of electric shock!**
- Before working on the power supply (120 VAC), disconnect the boiler from the grid by shutting off the emergency shutoff switch or disengaging the heating system circuit breaker. Take measures to prevent accidental re-connection.
- It is not sufficient to simply shut off the controls.
- Observe all applicable electrical codes and regulations.

Electrical components must be installed by a trained and certified electrician and the installation must meet the National Electric Code as well as all applicable local codes and regulations.

The boiler must be properly electrically grounded in accordance with the requirements of the authority having jurisdiction or, in the absence of such requirements with the National Electrical Code, ANSI/NFPA 70 and/or the Canadian Electrical Code Part I, CSA C22.1, Electrical Code.

All appliance modulation, control and safety components are tested and pre-wired for use.

Observe safety precautions and all rules and regulations required by local code and the National Electric Code.

**Fuses**
The appliance is protected with a fuse. It is located on the circuit board (Fig. 9, page 14).

Replacement fuses can be found on the back of the cover.

**Controls and modules**
For installation and electrical connection of controls and modules, see the installation instructions of the accessory.
7.2.3 Connecting an external heating zone pump or DHW recirculation pump

Without accessories the appliance offers the connection of one heating zone pump, one circulator of an unmixed heating circuit, or one DHW recirculation pump.

The pump used must have the following connection values: 120 VAC, max. 2 A.

- Route cable from pump to appliance.
- Insert cable into the junction box as shown in Fig. 45.
- Connect cable to the black plug according to Fig. 44.

![Fig. 44 Attach plug (external pump)

1. L (120 VAC, 60 Hz)
2. PE (GND, Ground)
3. N (Neutral)
4. Black plug (in the junction box upon delivery)

- Connect black plugs and insert grommet until stop.

![Fig. 45 Cable connected (external pump)

- Use service function 5.E, to set connection to 01 (DHW recirculation pump) (→ page 59)
- or-
- Use service function 5.E to set connection to 02 (external heating zone pump in an unmixed heating circuit) (→ page 59).
- or-
- Use service function 5.E to set connection to 03 (external heating pump) (→ page 59).

The DHW recirculation pump is controlled by the Bosch FW 200.

7.2.4 DHW tank loading pump or 3-way valve with spring return (only heating boiler KBR..-3A)

The pump used must have the following connection values: 120 VAC, max. 2 A.

- Route cable from pump or 3-way valve to appliance.
- Insert cable into the junction box as shown in Fig. 47.
- Connect cable to the red plug according to Fig. 46.

![Fig. 46 Attach plug (external DHW tank loading pump or 3-way valve)

1. L (120 VAC, 60 Hz)
2. PE (GND, Ground)
3. N (Neutral)
4. Red plug (in the junction box upon delivery)

- Connect red plugs and insert grommet until stop.

![Fig. 47 Cable connected (external DHW tank loading pump or 3-way valve)

- Mount the 3-way valve for space heating operation when de-energized, and DHW tank loading when energized.
- Use service function 1.F to set pump mode. (→ page 57).
7.2.5 Connecting mains power supply

- Route the power cable (AC 120 V, 60 Hz) from the emergency shutoff switch to the boiler.
- Insert cable into the junction box as shown in Fig. 49.
- Connect cable to the white plug according to Fig. 48.

![Fig. 48 Attach plug (mains power supply)

1. L (120 VAC, 60 Hz)
2. PE (GND, Ground)
3. N (Neutral)
4. White plug (in the junction box upon delivery)

- Connect white plugs and insert grommet until stop.

![Fig. 49 Cable connected (mains power supply)

- Mount junction box on the rail.

7.2.6 Low voltage (LV) junction box

The low voltage installer junction box provides connections to sensors, thermostat and programmers.

**Bosch room controls**

Connect only Bosch room controls to the internal BUS of this boiler.

For installation and electrical connection of Bosch controls, see installation instructions for the Bosch control.

**Connecting external manual reset high limit or low water cut off (LWCO)**

This connection allows the installation of external safety switches.

![Fig. 50 Low voltage (LV) connections

- External manual reset high limit
- Low water cut-off (LWCO)
- Radiant overheat protection

![Fig. 51 Low voltage (LV) terminals (pre-wire links not shown for simplicity)

1. BUS - BUS connection to programmer
2. TT - Thermostat/On demand signal (pre-wired link) (dry contact)
3. Out Sen - Outdoor temperature sensor (included with FW200 accessory)
4. LWCO - Low Water Cut Off switch (pre-wired link) (external 24V power required)
5. DHW Sen - Domestic Hot Water tank temperature sensor
6. Empty (future connectivity)
7.3 DHW tank temperature sensor connection
Before connecting the DHW tank temperature sensor to the Low voltage (LV) connections.
► Remove the pre fitted connector [1] from DHW tank temperature sensor lead [2].
► The DHW tank temperature sensor lead can now be wired to the Low voltage (LV) connection “DHW Sen” position 5.

![DHW tank sensor connector plug removal](image).

7.4 Connecting the LWCO device
► Install a 24VAC 20VA transformer near the boiler.
► Follow LWCO manufacturer’s instructions.
► Connect the lead labeled BOILER GROUND (green) to pin 2 (center, Fig. 48 [2]) of the white plug in the boiler junction box.
► Connect the leads labeled 24V HOT (red) and 24V COMMON (white) to the external 24VAC transformer.
► At the Low Voltage box on the rear of the boiler, remove the link across LWCO connections and connect the leads labeled SWITCH CONTACT (yellow) to these connections.

![Wires of a LWCO device with LWCO adapter](image).

[1] LWCO device (Hydrolevel Safgard 1100)
[2] BOILER GROUND (green)
[3] SWITCH CONTACT (yellow)
[4] SWITCH CONTACT (yellow)
[5] 24V HOT (red)
[6] 24V COMMON (white)
8 Commissioning

Fig. 54 Overview of the controls

1. Emissions test button
2. Service button
3. Burner operation indicator lamp
4. ON/OFF power switch
5. Key pad lock
6. ECO button
7. Reset button
8. Display
9. System water pressure gauge
10. DHW temperature control
11. Blank panel for optional programmer
12. Heating temperature control

8.1 Before operating the appliance

NOTICE: Commissioning without being properly filled and purged will damage the appliance.

- Only operate this appliance after ensuring there is sufficient water in the boiler and the system.
- Adjust the expansion (tank) vessel pre-charge pressure to the static head of the heating system (page 32).
- Manually open radiator and or zone valves as applicable.
- Open heating supply and return valves, fill heating system to 14.5 to 21.75 psi (1 to 1.5 bar) and close fill valve.
- Bleed all air from the system.
- If the boiler water pressure has dropped, fill the heating system again to 14.5 to 21.75 psi (1 to 1.5 bar).
- On KBR..-3A appliances (heating boilers) with a DHW tank, open the cold water supply and open a DHW tap until water runs out.
- Verify that the gas type specified on the rating plate is the same as the gas type used.
- Open the gas cock.

8.2 Switching the appliance ON/OFF

Startup

- Switch the appliance ON using the ON/OFF switch.
  The display indicates the supply temperature of the hot water in °F. If necessary, convert to °C (Service function 0.E: Metric or US customary units, page 60).

Fig. 55 Switching the appliance ON/OFF
When the appliance is switched ON for the first time, it performs a once-only purging sequence. This involves the heating zone pump switching on and off at intervals (for approx. 4 minutes). The display shows \( \square \) in alternation with the supply temperature.

- Open the automatic vent [9] (only combi boiler KWB..-3A) and close it again when the purging sequence has finished (⇒ page 49).

If the display shows \( \square \) in alternation with the supply temperature, the trap filling function is active (⇒ page 59).

**Shutdown**
- Switch appliance OFF using the ON/OFF switch. The display goes out.
- If the appliance is taken out of service for a longer period: Observe frost protection (⇒ Section 8.10).

### 8.3 Setting up space heating

Set the maximum supply temperature based on the structure's heat loss on design day.

<table>
<thead>
<tr>
<th>Boiler high limit dial</th>
<th>Typical supply temperatures</th>
<th>Sample application</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>approx. 95 °F (35 °C)</td>
<td>Frost protection</td>
</tr>
<tr>
<td>2</td>
<td>approx. 109 °F (43 °C)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>approx. 122 °F (50 °C)</td>
<td>Radiant floor heating system</td>
</tr>
<tr>
<td>4</td>
<td>approx. 140 °F (60 °C)</td>
<td>Panel radiator system</td>
</tr>
<tr>
<td>5</td>
<td>approx. 153 °F (67 °C)</td>
<td>Cast iron radiator system</td>
</tr>
<tr>
<td>6</td>
<td>approx. 167 °F (75 °C)</td>
<td></td>
</tr>
<tr>
<td>max</td>
<td>approx. 194 °F (90 °C)</td>
<td>Baseboard &amp; convector system</td>
</tr>
</tbody>
</table>

Table 16 Typical supply temperatures

With radiant floor heating, limit the maximum permissible supply temperature as recommended by the manufacturer.

- In order to set the maximum supply temperature, turn the boiler high limit dial [11].

---

### 8.4 Programming the FW 200 heating control unit (optional accessory)

The FW200 outdoor reset control units are optional accessory which enables the boiler to be operated more efficiently by allowing the user to optimize the heating system

- Observe the operating instructions for the heating control included in the scope of delivery. There you can read:
  - How to set the operating mode and the heating curve for weather compensation controls
  - How to adjust the room temperature
  - How to heat economically and comfortably
  - How the control can be mounted in the boiler or in the living space

---

**Legend to Fig. 57:**

1. Dial
2. Mode selector
3. Advance button (activate heating immediately)
4. DHW single charge button (activate DHW mode immediately)
5. Menu button
6. Info button
7. Delete/Reset button
8. Menu up button

---

**Fig. 56 Switch on heat**

If the burner is operating, the burner operation indicator lamp is illuminated.
8.5 FW 200 outdoor reset heating control quick start (optional accessory)

Instructions for programming

In the following description, at any time, pressing the menu button (Fig. 57, [3]) will bring you back to the standard display.

8.5.1 Setting date and time

Set date and time upon initial start-up:

▶ Turn the dial (Fig. 57, [1]) to adjust time and date.
▶ Press the dial to confirm the setting.

You will be asked about system configuration, which is only necessary if you have added additional controls.

▶ Press and hold the menu button (Fig. 57, [3]) until this prompt disappears.

Set Date and Time after initial programming:

▶ Press the menu button (Fig. 57, [3]).
Vacation will be highlighted.
▶ Turn the dial (Fig. 57, [1]) counter-clockwise until General settings is highlighted.
▶ Press the dial .
Time and date will be highlighted.
▶ Press the dial .
Time will be highlighted.
▶ Press the dial .
▶ Turn the dial (Fig. 57, [1]) to adjust the time.
▶ Press the dial to confirm the setting.
▶ Turn the dial until Date is highlighted.
▶ Press the dial .
▶ Turn the dial to adjust the date.
▶ Press the dial to confirm the setting.

8.5.2 Setting constant heating (no night set back)

This can be done two ways:

• By turning the selector (Fig. 57, [2]) to the comfort symbol ( ).
• Or by changing the programming.

To change programming:

▶ Press the menu button (Fig. 57, [3]).
Vacation will be highlighted.
▶ Turn the dial (Fig. 57, [1]) one click counter-clockwise to highlight Heating.
▶ Press the dial .
Program will be highlighted.
▶ Press the dial .
Activate will be highlighted.
▶ Turn the dial (Fig. 57, [1]) one click to highlight Edit.
▶ Press the dial .
A: Program A will be highlighted.
▶ Press the dial .
Replace with preset program will be highlighted.
▶ Turn the dial (Fig. 57, [1]) counter-clockwise to highlight All days.
▶ Press the dial .
P1 will be highlighted.
▶ Press the dial .
The display will flash.
▶ Turn the dial one clockwise to 12:00PM.
▶ Press the dial to confirm the setting.
▶ Turn the dial until Comfort appears.
The area around the display should fill in.
▶ Press the dial to confirm the setting.
▶ Press menu button to return to main display.

8.5.3 Setting type of heating system

There are three separate default presets: Baseboard, Radiators, Radiant Floor. They have an approximate base point of 75 °F. With this base point, the heating system will take some time to raise the room temperature in warmer weather. Please see the FW 200 Installation and Operating Instructions, “Heating circuit parameters” for more details on those presets. For a custom preset, see below.

To open INSTALLER SETTINGS: press and hold the menu button for approx. 5 seconds.
System configuration will be highlighted.
▶ Turn the dial one click counter-clockwise to highlight Heating parameters.
▶ Press the dial .
Heating circuit 1 will be highlighted.
▶ Press the dial .
Heating circuit type will be highlighted.
▶ Press the dial .
Radiators will be highlighted.
▶ Press the dial .
Radiators will flash.
▶ Turn the dial to choose Baseline/Design temp.
▶ Press the dial .
Heating circuit type will be highlighted.
▶ Turn the dial counter-clockwise.
Base line will be displayed.
▶ Press the dial and 78 °F (25 °C) will flash. This is the supply temperature at 65 °F (18 °C) outdoor temperature.
▶ Set accordingly (Fig. 58).
▶ Press the dial to confirm the setting.

For hydroair systems, the minimum supply temperature must be raised to the turn on temperature for that coil.

▶ Turn the dial until Design Temp will be highlighted.
▶ Press the dial .
168 °F (75 °C) will flash. This is the supply temperature at 5 °F (−15 °C) outdoor temperature.
▶ Set accordingly (Fig. 58).
▶ Press the dial to confirm the setting.

Refer to the FW 200 Installation and Operating Instructions for more custom settings.
Fig. 58
[1] Maximum Base Line Adjustment 186 °F (85 °C)
[2] Minimum Base Line Adjustment 50 °F (10 °C)
[3] Maximum Design Temperature Adjustment 186 °F (85 °C)

AT Outdoor temperature
VL Supply temperature
▶ Turn the dial counter-clockwise until Maximum heating supply temperature is highlighted.
▶ Press the dial .
▶ Turn the dial to set the desired value.
▶ Press the dial to confirm the setting.
▶ Press menu button to return to main display.

8.5.4 Adjusting warm weather shut down (WWSD)
▶ To open INSTALLER SETTINGS: press and hold the menu button for approx. 5 seconds. System configuration will be highlighted.
▶ Turn the dial one click counter-clockwise to highlight Heating parameters.
▶ Press the dial . Heating circuit 1 will be highlighted.
▶ Turn the dial counter-clockwise until Heating OFF at outdoor temperature is highlighted.
▶ Press the dial and the display will flash. The default value is 68 °F (20 °C) and is adjustable from 50 °F (10 °C) to 77 °F (25 °C). Turning above 77 °F (25 °C) will move it to 210 °F (99 °C), which disables WWSD.
▶ Press the dial to confirm the setting.

8.5.5 Resetting all settings (for installers only)
This function resets all settings on the MAIN MENU and the INSTALLER SETTINGS to their factory settings. Following such a reset, you will need to commission the system again!
If the default display is showing:
▶ Simultaneously press and hold the menu button and the delete button until a count down display appears.
▶ Continue holding the menu button and the delete button until the message appears that the reset is completed.
▶ Press . All settings have now been reset to their factory settings with the exception of the date and time, which remain unchanged.

8.6 After commissioning
▶ Check flue path for tightness.
▶ Check gas supply dynamic pressure ( page 64).
▶ Check that condensate is being discharged from the condensate hose. If that is not the case, switch the appliance first OFF and then ON again using the ON/OFF switch. That activates the trap filling sequence ( page 59). Repeat the procedure several times until condensate starts running out.
▶ Complete commissioning report ( page 78).

8.7 KBR..-3A appliances (heating boilers) with DHW tank: Setting the DHW temperature
▶ Set the DHW temperature on the DHW thermostat .

Fig. 59 Set the DHW temperature (heating boiler KBR..-3A)

Table 17 Typical DHW temperatures for heating boiler KBR..-3A

<table>
<thead>
<tr>
<th>DHW thermostat</th>
<th>Typical DHW temperatures</th>
</tr>
</thead>
<tbody>
<tr>
<td>min</td>
<td>approx. 59 °F (15 °C)</td>
</tr>
<tr>
<td>e</td>
<td>approx. 131 °F (55 °C)</td>
</tr>
<tr>
<td>max</td>
<td>approx. 158 °F (70 °C)</td>
</tr>
</tbody>
</table>

WARNING: Danger of scalding!
▶ In normal operation, it is recommended to limit the DHW temperature to 122 °F (50 °C) to limit the risk of scalding.
▶ Install a tempering valve if running DHW temperatures above 104 °F (40 °C).
▶ Only use temperatures up to 158 °F (70 °C) for thermal disinfection ( page 54).
If there is reason for concern for contamination from bacteria such as Legionella, consider setting the DHW thermostat to at least “e” (131 °F (55 °C)). This setting ensures an economical and comfortable DHW generation. Consult your local water department or municipality for further information.

ECO button
The default setting is DHW priority; the ECO button is not lit. In order to switch between DHW tank priority and alternating operation, press the ECO button.

• DHW priority
First, the DHW tank is heated up to the set temperature. The appliance then goes into heating mode. Therefore, it can happen that space heating is interrupted for a while and the room temperature
may drop. DHW tank priority guarantees highest DHW comfort.

- **Alternating operation**
  The appliance switches between space heating mode and DHW mode. This prevents the room from cooling off too much. Alternating operation guarantees an even room temperature with somewhat less DHW convenience.

### 8.8 KWB..-3A appliances (combi boilers): Setting the DHW temperature

- Set the DHW temperature on the DHW thermostat. The set DHW temperature flashes on the display for 30 seconds.

#### Fig. 60 Set the DHW temperature (combi boiler KWB..-3A)

<table>
<thead>
<tr>
<th>DHW thermostat</th>
<th>Typical DHW temperatures</th>
</tr>
</thead>
<tbody>
<tr>
<td>min</td>
<td>approx. 104 °F (40 °C)</td>
</tr>
<tr>
<td>e</td>
<td>approx. 122 °F (50 °C)</td>
</tr>
<tr>
<td>max</td>
<td>approx. 140 °F (60 °C)</td>
</tr>
</tbody>
</table>

**Table 18 Typical DHW temperatures for combi boiler KWB..-3A**

- **ECO button** Pressing and holding the ECO button until it lights up switches between **Comfort mode** and **Economy mode**.
  - **Comfort mode (default setting)**
    The appliance is continually maintained at the set temperature. Consequently, DHW draws are immediate, however the appliance may run even if no DHW is being drawn.
  - **Economy mode, ECO button lights up**
    - DHW is only generated when DHW is drawn.
    - **On demand**: Quickly open and close a DHW tap to signal the appliance to heat to the selected temperature. After a short wait DHW will be available.

- **The DHW on demand signal allows maximum gas and water savings.**

#### 8.9 Setting manual summer mode

In summer mode or warm weather shut down (WWSD), the heating zone pump and consequently central heating are switched off. DHW generation remains active following the DHW program.

- See also the warm weather shutdown (WWSD) feature in the operating instructions for the heating control included in the scope of delivery.

- **NOTICE**: Heating system at risk of freezing. In manual summer mode, only the appliance is protected from freezing.

- **Make a note of the setting of the boiler high limit dial.**

- **Turn the boiler high limit dial counterclockwise to min.**

**Fig. 61 Summer mode**

For further information, see the operating instructions for the heating control included in the scope of delivery.

### 8.10 Setting frost protection

**Frost protection of the heating system:**

- Leave the appliance switched ON; set the boiler high limit to at least 95 °F (35 °C) (position 1, Tab. 16, page 50).

**Fig. 62 Frost protection of the heating system**

- **Or**: If you want to leave the appliance switched OFF:
  - Mix Bosch-approved anti-freeze into the heating water (Tab. 5, page 31) and drain the DHW circuit.

**For further information, see the operating instructions for the heating control included in the scope of delivery.**

**Frost protection of the DHW tank:**

- Leave the appliance switched ON; set the boiler high limit to at least 95 °F (35 °C) (position 1, Tab. 16, page 50).

- **Turn the DHW thermostat counterclockwise to min (59 °F (15 °C)).**

**Fig. 63 Frost protection for the DHW tank**

### 8.11 Activating the key pad lock

The key pad lock affects the boiler high limit dial, the DHW thermostat, and all buttons except the ON/OFF switch, emissions test button, and reset button. It can be used to limit unauthorized access to the boiler.

- **Activating the key pad lock:**
  - Press the key pad lock button until and the heating supply temperature are alternating on the display.
Unlocking the key pad:
▶ Press the key pad lock button until the display shows only the supply temperature.

9 KBR..-3A appliances (heating boiler) with DHW tank: Thermal disinfection

Thermal disinfection covers the DHW system including the taps. For solar DHW tanks, the solar portion of the tank is not covered.

**WARNING:** Risk of scalding!
Hot water can result in severe scalding.
▶ Carry out thermal disinfection only outside the normal hours of use, or install a tempering valve.

▶ Close all DHW taps.
▶ Advise occupants of the risk of scalding if no tempering valve is installed.
▶ Set the time and DHW temperature accordingly on the heating control with DHW program.
▶ Set any DHW recirculation pump to continuous operation.
▶ Turn DHW thermostat clockwise to max (approx. 158 °F (70 °C)).

Wait until the maximum temperature has been reached.
▶ Open all DHW taps, from the nearest to the one furthest away, and draw off hot water until it reaches a minimum of 158 °F (70 °C) at all taps for at least 3 minutes.
▶ Reset the DHW thermostat, DHW recirculation pump, and heating control to standard operation.

Thermal disinfection can also be carried out automatically and on a regular basis; see operating instructions for the heating control included in the scope of delivery.
10  **Boiler circulator**

10.1  **Pump anti-seize protection**

This function prevents the heating zone pump from seizing up following longer idle periods.

The appliance will briefly run the pump at least every 24 hours after its last activation.

10.2  **Changing the pump curve of the boiler pump**

The speed of the boiler pump can be changed using the dial on the pump.

---

**Key to Fig. 66 and Fig. 67:**

1. Residual head pressure at speed 1
2. Residual head pressure at speed 2
3. Residual head pressure at speed 3 (default setting)
4. Head pressure of the boiler pump by itself (at speed 3)

**H**  Head pressure in feet of head (m)

**V**  Circulating water volume in gallons per minute (l/h)

---

In order to save as much energy as possible and keep any water circulation noises to a minimum, select the lowest possible pump speed.
11  Heatronic boiler control settings

11.1  Guideline to service functions
The Heatronic allows easy setting and testing of many appliance functions.
For an overview of service functions, see Chapter 11.2 on page 56.

Selecting a service function
The service functions are subdivided into two levels: The **1st level** includes service functions up to 0.E, the **2nd level** includes service functions starting with 8.A.

- Press and hold the service button until it illuminates. The display shows a code such as 1.A (first service level). Press the ECO button and key pad lock button simultaneously until the code 8.A appears (second service level).
- On the second service level, select the service function 8.E and value 00. The appliance restarts with the default settings.

Adjust Value
- Repeatedly press the key pad lock button or ECO button to adjust the value up or down.
- Record the value in the commissioning log (page 78).

Saving the value
- Press and hold the emissions test button until the display shows (value saved).

Exiting the service function without saving values
- Briefly press the emissions test button. The light of the emissions test button will go out.

Restoring factory settings
In order to reset all values for the service levels 1 and 2 to the factory setting:

Table 19  Service functions, 1st level

<table>
<thead>
<tr>
<th>Service function</th>
<th>Display</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.A</td>
<td>Maximum space heating output</td>
<td>57</td>
</tr>
<tr>
<td>1.b</td>
<td>Maximum DHW output</td>
<td>57</td>
</tr>
<tr>
<td>1.E</td>
<td>Pump mode for space heating operation</td>
<td>57</td>
</tr>
<tr>
<td>1.F</td>
<td>Pump mode</td>
<td>57</td>
</tr>
<tr>
<td>2.A</td>
<td>Heating circuit pump lockout time</td>
<td>57</td>
</tr>
<tr>
<td>2.b</td>
<td>Maximum supply temperature</td>
<td>57</td>
</tr>
<tr>
<td>2.C</td>
<td>Purging function</td>
<td>58</td>
</tr>
<tr>
<td>2.d</td>
<td>Thermal disinfection</td>
<td>58</td>
</tr>
<tr>
<td>2.F</td>
<td>Operating mode</td>
<td>58</td>
</tr>
<tr>
<td>3.A</td>
<td>Automatic anti-cycle function</td>
<td>58</td>
</tr>
<tr>
<td>3.b</td>
<td>Set anti-cycle time</td>
<td>58</td>
</tr>
<tr>
<td>3.C</td>
<td>Switching differential (hysteresis)</td>
<td>58</td>
</tr>
<tr>
<td>3.d</td>
<td>Minimum output (heating and DHW)</td>
<td>58</td>
</tr>
<tr>
<td>3.E</td>
<td>Cycle time, keeping DHW hot</td>
<td>58</td>
</tr>
<tr>
<td>3.F</td>
<td>Constant DHW period</td>
<td>59</td>
</tr>
<tr>
<td>4.b</td>
<td>Maximum heat exchanger temperature</td>
<td>59</td>
</tr>
<tr>
<td>4.d</td>
<td>Audible fault warning tone</td>
<td>59</td>
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11.2.2 Second service level (at first service level, service button lights up, press ECO button and key pad lock button simultaneously until 8.A appears)

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<td>b.F</td>
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<td>61</td>
</tr>
</tbody>
</table>

Table 20 Service functions, 2nd level

11.3 Description of the service functions

11.3.1 First service level

Service function 1.A: Maximum space heating output

Some gas supply companies offer a performance-dependent basic price.

The output can be limited in percent from the minimum and maximum nominal output to suit the specific heat demand.

Even if the heating output has been limited, the maximum nominal output is still available for DHW generation.

► Select service function 1.A.
► Select heat output in MBH (kW) and determine associated setting in percent (%).
► Enter the setting (→ 11.1).
► Save the setting (→ 11.1).
► Record the set heat output in the commissioning log (→ page 78).
► Exit the service functions.

The display returns to the supply temperature.

Default setting is the maximum nominal output: 100 (100 %).

Service function 1.B: Maximum DHW output

The hot water output can be adjusted between the minimum and maximum DHW outputs to suit the heat transfer capacity of the DHW tank coil.

► Select service function 1.b.
► Select the DHW output in MBH (kW) and determine the associated setting in percent (%).
► Enter the setting (→ 11.1).
► Save the setting (→ 11.1).
► Record the set DHW output in the commissioning log (→ page 78).
► Exit the service functions.

The display returns to the supply temperature.

Default setting is the maximum nominal output: 100 (100 %).

Service function 1.E: Pump mode for space heating operation

► Never change the setting of this service function on combi boiler KWB..-3A appliances.

NOTICE: System damage or boiler malfunction!

If an outdoor temperature sensor for an weather compensation control is connected, pump control mode 04 is automatically set.

- **Pump control mode 00 (automatic mode)**: The BUS control controls the central heating pump.
- **Pump control mode 01**: For heating systems without control.
  The supply temperature controls the central heating pump. When there is a demand for heat, the central heating pump and the burner start up.
- **Pump control mode 02**: Do not use.
- **Pump control mode 03**: The central heating pump runs continuously (exceptions: See heating control operating instructions).
- **Pump control mode 04**: Intelligent control of central heating pump in heating systems with weather compensation control. The heating zone pump is only switched on when needed.

Default setting is 00.

Service function 1.F: Pump mode (only heating boiler KBR..-3A)

Based on this setting, the pump connected to the Heatronic or 3-way valve are controlled according to the configuration of the heating system.

The following settings are possible:

- **Pump mode 00**: The appliance is used only as central heating boiler.
- **Pump mode 01**: A 3-way valve for DHW tank loading is connected in boiler circuit before low loss header (see also service function 2.A).
- **Pump mode 02**: Do not use this setting!
- **Pump mode 03**: A DHW tank pump is connected on the system side after the low loss header.
  In DHW mode, DHW tank loading pump runs.
  In space heating mode, DHW tank loading pump does not run.

Default setting is 03.

Service function 2.A: Heating circuit pump lockout time (only heating boiler KBR..-3A)

NOTICE: System damage or boiler malfunction!

This setting is only active if Service function 1.F: Pump mode is set to 01 (3-way valve).

During the runtime of an external 3-way valve actuator, the space heating pump is blocked. Select the run time of the 3-way valve actuator between 01 - 24 (10 - 240) seconds according to the manufacturer's documentation.

Default setting is 24 (240 seconds).

Service function 2.b: Maximum supply temperature

The values of this service function displayed depend on the setting of the service function 0.E:
Service function 0.E is set to 00 (metric units):
- The maximum supply temperature can be adjusted between 35 and 88 (35 - 88 °C).
Service function 0.E is set to 01 (US customary units):
- The maximum supply temperature can be adjusted between 96 and 190 (96 - 190 °F).
Default setting is 190 (190 °F (88 °C)).

Service function 2.C: Purging function

When the appliance is switched ON for the first time, it performs a once-only purging sequence. This involves the heating zone pump switching on and off at intervals (for approx. 4 minutes). The display shows O in alternation with the supply temperature.

This service function allows activating the purging function manually, e.g. after servicing.

The following settings are possible:
- 00: Purging function off
- 01: Purging function is switched on and after completion automatically reset to 00
- 02: Purging function is permanently on and is not reset to 00
Default setting is 00 for heating boilers KBR..-3A appliances, otherwise 01.

Service function 2.d: Thermal disinfection (legionella protection)

WARNING: Risk of scalding! Hot water can result in severe scalding.
- Carry out thermal disinfection only outside the normal hours of use.
- Install a tempering valve if this function is enabled permanently.

When this service function is enabled, the DHW is permanently heated to approx. 158 °F (70 °C) if the DHW temperature dial has been turned clockwise to max.

The following settings are possible:
- 00: Thermal disinfection not enabled
- 01: Thermal disinfection enabled
Default setting is 00 (disabled).

Service function 2.F: Operating mode

With this service function, you can temporarily change the appliance's operating mode.

The following settings are possible:
- 00: Default mode; the appliance runs according to control settings.
- 01: The appliance runs for 15 minutes at minimum output. The display shows 2.F. When this service function is aborted or has been active for 15 minutes, the appliance reverts to default mode.
- 02: The appliance runs for 15 minutes at maximum output. The display shows 2.F. When this service function is aborted or has been active for 15 minutes, the appliance reverts to default mode.
Default setting is 00.

Service function 3.A: Automatic anti-cycle function

If an outdoor reset control is connected, there is no need to adjust this setting on the appliance.
The control automatically optimizes the anti-cycle time.

Use service function 3.A to set the automatic adaptation of the anti-cycle time. This can be required in case of unfavorably-dimensioned heating systems. Short cycling may increase boiler and system wear and tear, increase emissions, reduce comfort, and should be avoided.

With auto-adaptation of the anti-cycle time disabled, the anti-cycle time must be set using service function 3.b (→ page 58).

The following settings are available:
- 00: Automatic adaptation of the anti-cycle time is disabled
- 01: Automatic adaptation of the anti-cycle time is enabled
Default setting is 00 (switched off).

Service function 3.b: Set anti-cycle time

Only if the automatic anti-cycle time is disabled (service function 3.A) will this function be active.

If an outdoor reset control is connected, there is no need to adjust this setting on the appliance.
The control automatically optimizes the anti-cycle time.

The anti-cycle time can be set from 00 to 15 (0 to 15 minutes).

With 00, the anti-cycle lock is switched off.
The shortest possible switching interval is 1 minute (recommended for single zone or forced air heating systems).
Default setting is 03.

Service function 3.C: Switching differential

Only if the automatic anti-cycle time is disabled (service function 3.A) will this function be active.

If an outdoor reset control is connected, there is no need to adjust this setting on the appliance.
The control automatically optimizes this setting.

The switching differential is the permitted boiler differential from the target supply temperature. It can be set in increments of 1 °F (0.5 °C). The minimum supply temperature is 95 °F (35 °C).

Service function 0.E is set to 00 (metric units):
- You can set the switching differential between 00 and 30 (0 - 30 °C).
Service function 0.E is set to 01 (US customary units):
- You can set the switching differential between 00 and 54 (0 - 54 °F).
Default setting is 18 (18 °F (10 °C)).

Service function 3.d: Minimum output (heating and DHW)
The output for heating and DHW can be set to any level in percent between the minimum and maximum nominal output.
The default setting is the minimum nominal output (heating and DHW) and varies according to appliance.

Service function 3.E: Cycle time, keeping DHW hot (only combi boiler KWB..-3A)

NOTICE: System damage or boiler malfunction!
- Never change the setting of this service function on heating boiler KBR..-3A appliances.

This service function is only active in comfort mode.
Service function 4.F: Condensate trap filling sequence

DANGER: Risk of flue gas poisoning!
If the condensate trap is not filled, flue gas may escape from the dry trap.
- Only deactivate the trap filling sequence for servicing purposes.
- When servicing is complete, reactivate the trap filling function.

The trap filling sequence ensures that the condensate trap is filled after initial installation or after a longer downtime of the appliance.

The trap filling sequence is activated if:
- The appliance is switched OFF using the ON/OFF switch
- The burner has not been in use for at least 28 days
- You are switching between summer and winter mode

The next time there is a demand for heat in central heating or hot water mode, the appliance is held at low output for 15 minutes. The trap filling sequence remains active until the appliance has completed 15 minutes of operation at low output. The display shows "\(\text{G} \)\) in alternation with the supply temperature.

The following settings are available:
- **00**: Condensate trap filling sequence is off.
- **01**: Trap filling program at the lowest output.
- **02**: Trap filling sequence at set minimum output.

Default setting is **01**.

Service function 5.A: Reset inspection interval

This function enables resetting the indication \(\text{G} \)\) on the display after completing inspection/servicing of the appliance.

Default setting **00**.

Service function 5.b: Fan post purge time

This service function allows setting the time the fan purges after the burner is shut off.

The post purge time can be set from **01** to **18** (10 - 180 seconds).

Default setting is **03** (30 seconds).

Service function 5.E: Functionality of black plug in boiler junction box

With this service function you can set the functionality of the black plug in the boiler junction box (\(\rightarrow\) page 46).

The following settings are possible:
- **00**: Off - black connector in junction box is disabled (120VAC output deactivated).
- **01**: DHW recirculation pump enabled - see FW200 instructions on how to set a recirculation pump program.
- **02**: External heating zone pump in heating circuit without 3-way valve controlled by FW 200.
- **03**: External heating zone pump in heating circuit without mixer controlled by Heatronic running in parallel with boiler pump in central heating mode

Default setting is **03**.

Service function 5.F: Set inspection interval

This service function allows setting the number of months after which the 'service due' reminder \(\text{G} \)\) appears on the display alternating with the supply temperature.

The number of months can be set from **00** - **72** (0 to 72 months).

Default setting is **00** (disabled).
Service function 6.A: Display the latest fault code
Use this service function to display the most recent fault code.

Service function 6.b: Room temperature control, current voltage, terminal 2
The current voltage of the analog control at terminal 2 is displayed.
Possible displays are:
- **00 - 24:** 0 V to 24 V in increments of 1 V

Service function 6.C: Supply temperature required by weather compensation control
This service function allows displaying the current target supply temperature set by the weather compensation control.

Service function 6.d: Current DHW turbine flow rate (only combi boiler KWB..-3A)
The current flow rate of the DHW turbine is displayed.

Service function 6.E is set to **00** (metric units):
- **0.0 - 99.9:** 0.0 to 99 l/min in increments of 0.1 l/min

Service function 6.E is set to **01** (US-customary units):
- **0.0 - 99.9:** 0.0 to 99 gpm in increments of 0.1 gpm

Service function 7.A: Indicator lamp for burner operation / faults
With this service function you can activate and deactivate the indicator lamp for burner operation (continuously illuminated) and faults (flashing).
The following settings are possible:
- **00:** Off
- **01:** On (burner operation) and flashing (fault present)

Default setting is **00**.

Service function 7.b: 3-way valve in center position
After the value **01** has been saved, the 3-way valve moves to the center position. This allows draining the system completely and removing the motor easily.

When you exit this service function, the appliance returns to setting **00**.

Service function 7.d: Connecting an external supply or low-loss header temperature sensor
Presence of an external supply or low loss header temperature sensor is automatically detected by default; you do not need to change any settings.

If a sensor is disconnected, change the setting back to the default setting **00**.

The following settings are available:
- **00:** Once-only automatic detection of a sensor
- **01:** External supply temperature sensor connected to Heatronic.
- **02:** External supply temperature sensor connected to IPM2.

Default setting is **00**.

Service function 7.E: Building drying function
This service function allows you to start and stop the building drying function.

**NOTICE:** System damage or boiler malfunction!
▶ Never change the setting of this service function on heating boiler KBR..-3A appliances.

The current flow rate of the DHW turbine is displayed.

Service function 0.E is set to **00** (metric units):
- **0.0 - 99.9:** 0.0 to 99 l/min in increments of 0.1 l/min

Service function 0.E is set to **01** (US-customary units):
- **0.0 - 99.9:** 0.0 to 99 gpm in increments of 0.1 gpm

Service function 8.A: Software version
The current software version is displayed.

If **U0** appears on the display, the function was already set via the FW200 control.

Service function 0.A: Do not use this setting!
Default setting is **00** (disabled).

Service function 0.d: Altitude adjustment
Input and output rates are reduced at higher altitudes due to thin air with reduced oxygen levels.

Setting | Elevation above sea level
--- | ---
**00** | 0 ft – 2,000 ft (0 m – 610 m)
**01** | 2,001 ft – 4,500 ft (611 m – 1,372 m)
**02** | above 4,500 ft (1,372 m)

Table 21: Altitude adjustment (service function 0.d)

Default setting is **00**.

Service function 0.E: Metric or US customary units
With this service function you can set if Metric or US customary units are displayed on the boiler.
The following settings are available:
- **00:** °C, l/min (metric units)
- **01:** °F, gpm (US-customary units)

Default setting is **01**.

11.3.2 Second service level

Service function 8.A: Software version
The current software version is displayed.
Service function 8.b: Code plug number

The last four digits of the code plug number are shown. The code plug determines the appliance functions. The code plug must be changed if the appliance has been converted from natural gas to LPG (or vice versa).

Service function 8.c: GFA Gas burner control unit status

Internal parameter. If you are on the line with Bosch Technical Support Service function 8.A: GFA Gas burner control unit status

Service function 8.d: GFA Gas burner control unit fault

Internal parameter.

Service function 8.e: Restore boiler to factory settings

This function allows resetting all parameters of the boiler including all service functions to their factory settings.

- Press and hold the service button until it illuminates.
- Press and hold ECO button and key pad lock button simultaneously until a service function, e.g. 8.A, is displayed (second service level).
- Repeatedly press the key pad lock button or ECO button until service function 8.e is displayed.
- Press and release the emissions test button until the display shows 8.e.
- The emissions test button lights up and the display shows 00.
- Press and hold the emissions test button until the display shows 00.
- Reset altered service functions to the settings recorded in the commissioning log (page 78).

Service function 8.f: Permanent ignition

This function enables permanent ignition without gas supply to test the performance of all ignition related components.

The following settings are available:
- 00: Off
- 01: On

Default setting is 00.

Service function 9.a: Constant mode

This function sets one operating mode permanently (Service function 2.f: Operating mode, page 58).

The following settings are available:
- 00: Default mode: the appliance runs according to control settings.
- 01: The appliance runs permanently at minimum output. The display shows 9.A.
- 02: The appliance runs permanently at maximum output. The display shows 9.A.

Default setting is 00.

Service function 9.b: Current fan speed

This service function allows you to display the current fan speed in revolutions per second (1/s).

Service function 9.c: Current boiler output

This service function displays the current boiler output (in percent (%)).

Service function 9.d: Set fan start speed

At higher elevations the boiler fan may need to spin faster upon startup to ensure reliable ignition every time. The start speed of the boiler fan can be set from 45 to 77 revolutions per second (1/s).

Default setting is 50.

Service function 9.e: Turbine signal delay (only combi boiler KWB..-3A)

This service function allows setting a time delay to prevent the appliance starting up as a result of transient pressure spikes in the water supply. Through spontaneous pressure change in the water supply, the flow meter (turbine) can signal that DHW is being drawn and cause the burner to come on unnecessarily.

The turbine signal delay can be set from 02 to 08 (0.5 seconds to 2 seconds) in increments of 0.25 seconds.

Default setting is 04 (1 second).

Service function 9.f: Heating zone pump post purge

This service function allows setting a pump post purge time after the end of the heat demand from the external control.

The pump post purge time can be set from 01 to 10 (1 to 10 minutes).

Default setting is 03.

Service function a.b: Display DHW temperature

This service function allows displaying the current DHW temperature.

Service function a.c: Display DHW tank temperature

This service function allows displaying the temperature of the DHW tank temperature sensor.

Service function b.f: Solar DHW backup heating delay (only combi boiler KWB..-3A)

For systems with a solar thermal DHW tank in series before the DHW line of the combi boiler. DHW heating by the boiler will be suppressed expecting that solar thermal DHW will reach the hot water temperature sensor prior eliminating the need to run the boiler. Set the heating delay in accordance with system conditions.

If this setting is enabled, the DHW demand signal is no longer available (page 52).

The start delay can be set between 00 to 50 (0 to 50 seconds) in increments of 1 second.

Default setting is 00.

Service function c.d: Display current heat demand

Available displays are:
- 00: No heat demand
- 01: Space heating demand present
- 02: DHW heat demand present
12 Gas type conversion

**DANGER:** Personal injury and property damage
- This conversion shall only be performed by a trained and certified installer in accordance with the manufacturer’s instructions and all applicable codes and requirements of the authority having jurisdiction.
- If the information in these instructions is not followed exactly, or the installation, adjustment, modification, operation or maintenance is carried out by an unqualified person, a fire, explosion or generation of large amounts of carbon monoxide may result causing property damage, personal injury or loss of life.
- Before carrying out electrical work: Disconnect the installation from the power supply at the emergency shutoff switch or by disengaging the heating system circuit breaker. Take measures to prevent accidental re-connection.
- The installer is responsible for the proper conversion of this appliance.
- The conversion is not complete until the operation of the converted appliance is checked as specified in these instructions.

The gas-air ratio must always be set on the basis of a CO₂ or O₂ reading taken at maximum nominal output and minimum nominal output using an electronic flue gas analyzer. Adjustment to different flue systems using throttle discs or baffles is not necessary.

**NG**
- Appliances are set at the factory to Wobbe index 1,333 BTU/ft³ (49.6 MJ/m³) at 60 °F (15 °C), 30" Hg (1016 hPa) and 7.0" W.C. (17.4 mbar) gas supply pressure and sealed.

### 12.1 Converting to a different gas type

**DANGER:** Explosion!
- Close the gas cock prior to working on the gas train.
- Check for gas leaks after carrying out work on the gas train.

A gas conversion kit is included in the scope of delivery.
- Swing the Heatronic to the left.
- Check the number on the code plug from the gas conversion kit (Code plug number → table 34, page 77).
- Replace the code plug in the Heatronic with the code plug from the gas conversion kit.

**Affix the provided LP gas label from the gas conversion kit onto the original NG gas type label. It is important to cover the original gas type information located at the bottom of the original gas type label.**

**Fig. 69** Replacing the code plug

**Fig. 70** Affixing the gas type label

1. Rating plate
2. Model name and serial number
3. Technical data

**Always adjust the gas-air ratio (CO₂ or O₂).**
- Section 12.3) after converting to a different gas type and measure the CO content of the flue gas (→ Section 13).

### 12.2 Installation location higher than 2,000 feet (610 m) above sea level

Input and output rates are reduced at higher altitudes due to thin air with reduced oxygen levels.

- KBR42-3A... and KWB42-3A... appliances are derated at 3 % per 1000 feet (305 m).
- KBR30-3A and KWB30-3A appliances offer altitude adjustment which compensates for the effects of thin air, and are therefore NOT derated up to 6000 feet (1829 m). Above 6000 feet (1829 m) a rate of 3% per 1000 feet (305 m) applies.

**Correction of the fan speed curve of the burner:**
- Use service function 0.d to adjust the elevation setting (→ page 60).

**DANGER:** Explosion!
- Close the gas cock prior to working on the gas train.
- Check for gas leaks after carrying out work on the gas train.

**The Bosch Greenstar boiler is factory set for installation below 2000 feet (610 m) above sea level.**

- Section 12.3) after converting to a different gas type and measure the CO content of the flue gas (→ Section 13).
12.3 Setting the gas-air ratio (CO₂ or O₂)

- Switch the appliance OFF using the ON/OFF switch.
- Remove the cover (→ page 34).
- Switch the appliance ON using the ON/OFF switch.
- Unscrew a plug, indicated in the figure below, to open one of the flue gas test ports.

Fig. 71 Open one of the flue gas test ports

- Insert the probe approximately 2-3/4 inches (70 mm) into the test port and seal around it.
- Press and hold the emissions test button until it lights up.
  The display shows the supply temperature alternating with = maximum set output in heating mode.
- Briefly press the emissions test button .
  The display shows the supply temperature in alternation with = maximum nominal output.
- Measure the CO₂ or O₂ level and the CO content of the flue gas (→ Section 13).
- On the gas throttle, break the seal at the slot and remove the cap.

Fig. 72 Remove seal from the gas throttle

- Adjust the gas throttle to match the CO₂ or O₂ level for maximum nominal output according to table 22.

Fig. 73 Set CO₂ or O₂ level for maximum nominal output

<table>
<thead>
<tr>
<th>Gas type</th>
<th>CO₂</th>
<th>O₂</th>
<th>CO₂</th>
<th>O₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>NG</td>
<td>9.4%</td>
<td>4.0%</td>
<td>8.6%</td>
<td>5.5%</td>
</tr>
<tr>
<td>LPG (propane)</td>
<td>11.0%</td>
<td>4.2%</td>
<td>10.4%</td>
<td>5.1%</td>
</tr>
</tbody>
</table>

Table 22 CO₂ or O₂ values at maximum and minimum nominal output

- Briefly press the emissions test button .
  The display shows the supply temperature in alternation with = minimum nominal output.
- Measure the CO₂ or O₂ level and the CO content of the flue gas (→ Section 13).
- Remove the sealed screw (→ Fig. 74, [3]) from gas valve adjustment screw (→ Fig. 74, [2]) and set CO₂ or O₂ level for minimum nominal output.

Fig. 74 Set CO₂ or O₂ level for minimum nominal output

[1] Gas inlet pressure test point

- Re-check settings at maximum and minimum nominal output and re-adjust if necessary.
- Repeatedly press the emissions test button until the light goes out.
  The display returns to the supply temperature.
- Record the CO₂ or O₂ levels and the CO content of the flue gas in the commissioning log.
- Reinstall the screw (→ Fig. 74, [3]) to cover the gas valve adjustment screw.
- Remove flue gas probe and refit the plug into the flue gas test port and tighten to secure.
12.4 Dynamic gas pressure test

- Switch the appliance OFF and close the gas shut-off valve.
- Loosen the screw in the test port for gas inlet pressure (→ Fig. 74, [1]) and connect a pressure gauge (→ Fig. 75).

![Fig. 75 Dynamic gas pressure test port](image)

Fig. 75 Dynamic gas pressure test port

- Turn on the gas cock and switch the appliance ON.
- Press and hold the emissions test button $\bigstar$ until it lights up.
  The display shows the supply temperature alternating with \( = \) maximum set output in heating mode.
- Briefly press the emissions test button $\bigstar$.
  The display shows the supply temperature in alternation with \( = \) maximum nominal output.
- Check the required inlet gas pressure according to table 23.
- Press the emissions test button $\bigstar$ until the light goes out.
  The display returns to the supply temperature.
- Switch the appliance OFF, turn off the gas cock, remove the pressure gauge and tighten the screw in the test port for gas inlet pressure.
- Reinstall the cover.

<table>
<thead>
<tr>
<th>Gas type</th>
<th>Nominal pressure $\ast$ W.C. (mbar)</th>
<th>Permissible pressure range for maximum nominal output $\ast$ W.C. (mbar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NG</td>
<td>7 (17.4)</td>
<td>3.5-10.5 (8.7-26.1)</td>
</tr>
<tr>
<td>LPG (propane)</td>
<td>11 (27.4)</td>
<td>8-13 (19.9-32.3)</td>
</tr>
</tbody>
</table>

Table 23 Inlet gas pressure

Do not operate the appliance if the measured value is below or above these values. Determine the cause and eliminate the fault. If this is not possible, block the appliance on the gas side and notify the gas supplier.

- Press the emissions test button $\bigstar$ until the light goes out.
  The display returns to the supply temperature.
- Switch the appliance OFF, turn off the gas cock, remove the pressure gauge and tighten the screw in the test port for gas inlet pressure.
- Reinstall the cover.

13 Flue gas test

13.1 Emissions test button

The following appliance outputs can be selected by pressing the emissions test button $\bigstar$ until it lights up:

- \( = \) Maximum set output in heating mode (à Maximum heating output, page 57)
- \( = \) Maximum nominal output
- \( = \) Minimum nominal output

You have 15 minutes to complete the tests. After that, the appliance returns to default mode.

13.2 Measuring CO content of flue gas

Use a multiport flue gas probe for the measurements.

- Open one of the flue gas test ports (→ Fig. 71).
- Insert the flue gas probe approx. 2-3/4 inches (70 mm) into the test port and seal around it.
- Press the emissions test button to select \( = \) maximum nominal output.
- Measure the CO levels.

**DANGER:** Risk of flue gas poisoning. The CO level in the flue gas must be below 200 ppm (air free).

- If 9.4 Vol.%$^1$ CO$_2$ and a CO level under 200 ppm (af) can not be achieved due to the gas supplied, use a lower CO$_2$ level with CO emissions under 200 ppm (af) instead.

```
1) 9.4 Vol.% with NG and 11.0 Vol.% with LPG (propane)
```

- Repeatedly press the emissions test button $\bigstar$ until the light goes out.
  The display returns to the supply temperature.
- Remove flue gas probe and close the flue gas test port properly.
14 Environmental responsibility/disposal

Environmental responsibility is one of the fundamental company policies of the Bosch Group.
We regard quality of performance, economy and environmental responsibility as equal objectives. Environmental protection laws and regulations are strictly adhered to.
To protect the environment, we use the best possible technology and materials taking into account economic points of view.

Packaging
All packaging materials used are environmentally-friendly and recyclable.

Old appliances
Old appliances contain resources that must be submitted for recycling. The components are easy to separate and the plastics are marked. This allows the various components to be sorted for appropriate recycling or disposal.

15 Inspection and maintenance

Annual service and maintenance is required for a long service life of the appliance, for efficient and economical operation, and to keep the environmental impact as low as possible. Owners/operators are encouraged to sign a service and maintenance contract with a trained and certified installer for annual servicing and maintenance of the boiler.

DANGER: Explosion!
► Close the gas cock prior to working on the gas train.
► Check for gas leaks after carrying out work on the gas train.

DANGER: Risk of flue gas poisoning.
► Check for leaks after carrying out work on the venting system.

DANGER: Risk of electric shock!
► Always disconnect the appliance from the mains power before performing any work. Disconnect the emergency shutoff switch or disengage the heating system circuit breaker. Take measures to prevent accidental re-connection.

NOTICE: Insufficient antifreeze can accelerate corrosion.
► Frost protection level has to be checked annually during the regular scheduled maintenance of the condensing boiler.

NOTICE: Damage to the coating of the heat exchanger.
► Cleaning of the heat exchanger should not be necessary until five years after the initial commissioning.
► Only use a Bosch cleaning blade or Bosch cleaning brush (page 68).
► Only clean heat exchanger if soiling is clearly visible.

Heatronic boiler control
In case of a component defect, a fault is shown on the display.

The Heatronic boiler control monitors all safety and control components.

NOTICE: The Heatronic boiler control can be damaged by leaking water.
► Cover the Heatronic prior to working on water filled components.

Notes on installation and operation

An overview of the faults can be found on page 74.

• The following analytical tools are needed for service and maintenance:
  – Electronic flue gas analyzer for CO₂, O₂, CO, and flue gas temperature
  – Pressure gauge 0 to 12 inches W.C. (0 to 30 mbar)
  – pH Test strips
  – Glycol tester of antifreeze is being used
• Special tools are not required.
• Approved lubricants are:
  – For parts touched by water: Unisilkon L 641 (part #: 8 709 918 413 0)
  – or fittings: Hft 1 v 5 (part #: 8 709 918 010 0).
► Use part #: 8 719 918 658 0 as heat conducting paste.
► Use only genuine Bosch spare parts.
► Request spare parts (Section 19, page 80).
► Replace removed gaskets and O-rings with new ones.

After the inspection/maintenance

► Re-tighten all loosened threaded connections.
► Restart the appliance (page 49).
► Check all connections for leaks.
► Check the gas-air ratio and adjust if necessary (page 63).

15.1 Description of various steps

15.1.1 Calling up the latest fault (service function 6.A)
► Select service function 6.A (page 60).

An overview of the faults can be found on page 74.

15.1.2 Fresh water filter (only combi boiler KWB..-3A)
► Close cold water tap.
► Depressurize the cold water pipe.
► To access the filter remove the safety clip (step 1), pull out the pipe (step 2), and remove the filter from the pipe (step 3).
► If necessary, clean with plastic brush under running water.
15.1.3 Plate type heat exchanger (only combi boiler KWB..-3A)

If the DHW output on the combi boiler is significantly reduced:

- Check filter in the cold water pipe for contamination (Fig. 65).
- Depressurize the appliance.
- Remove the plate type heat exchanger and replace with a new unit.
- or -
- Descale with descaling agent approved for stainless steel (Grade 316-1.4401).

To remove the plate type heat exchanger:

- Unplug electrical connections.
- Remove hose from safety relief valve.
- Loosen/remove pipe connections.
- Remove the boiler pressure gauge from the Heatronic boiler control.
- Loosen the quick releases (steps 1 and 2) and remove the hydraulic assembly in its entirety (step 3).
Inspection and maintenance

15.1.4 Checking the electrodes

▶ Remove the electrode set (→ page 8 / 10) including gasket and check the electrodes for contamination; clean or replace, as required.
▶ Re-install electrode set with new gaskets and check for leaks.

15.1.5 Burner servicing

DANGER: Fire danger!
▶ Only operate the burner while installed in a boiler.
▶ Remove the burner cover (steps 1 - 4).

Fig. 81 Removing the hydraulic assembly
▶ Remove the plate type heat exchanger.

Fig. 82 Removing the plate heat exchanger
▶ Install a new plate type heat exchanger with new gaskets and reconnect the hydraulic assembly in reverse order.
▶ Check all connections used during maintenance for leaks.

Fig. 83 Reinstalling the electrode set

Fig. 84 Check for gas leaks

Fig. 85 Removing the burner cover
Remove the burner and clean the components.

Reinstall the burner in reverse order, including a new gasket.

Adjust the gas-air ratio (→ page 63).

### 15.1.6 Heat exchanger block inspection and cleaning

**NOTICE:** Damage to the coating of the heat exchanger.
- Cleaning of the heat exchanger should not be necessary until five years after the initial commissioning.
- Only use a Bosch cleaning blade and Bosch cleaning brush (→ page 69).
- Only clean heat exchanger in case if soiling is clearly visible.

Remove the inspection cover (→ page 8) and any sheet metal insert below, if installed.

Determine degree of soiling of the heat exchanger through visual inspection.

**If mechanical cleaning is required:**
For cleaning the heat exchanger, use Bosch main heat exchanger gaskets, the heat exchanger brush and the heat exchanger cleaning blade which are available as spare parts.

Remove the condensate trap (steps 1 and 2) and place a suitable container underneath.

With the cleaning blade, clean the heat exchanger block from the bottom to the top.

**Fig. 86 Burner**

**Fig. 87 Removing the condensate trap**

**Fig. 88 Cleaning the heat exchanger with the cleaning blade**
Inspect and maintenance

— Clean the heat exchanger block with the brush from top to bottom.

▶ Clean the condensate tray (with reversed brush).

▶ Remove burner (➔ Chapter 15.1.5 “Burner servicing”).
▶ Rinse the heat exchanger with water from the top.

▶ Rinse the heat exchanger with water from the top.
▶ Clean the condensate trap connection.
▶ Close the inspection opening again using a new gasket and tighten the screws with approx. 3.69 ft.-lbf. (5 Nm).

15.1.7 Condensate trap cleaning
▶ Remove the condensate trap (steps 1 and 2) and check that the heat exchanger has a clear passage.

▶ Remove and clean the condensate trap lid.
▶ Check condensate the hose and clean if necessary.
15.1.8 Checking the mixer diaphragm

- Open the mixer unit.
- Carefully remove the diaphragm from the fan air intake and check for contamination and cracks.

![Diaphragm flaps must open upwards.]

15.1.9 Expansion vessel

DANGER: Risk of electric shock!
- Always disconnect the appliance from the mains power before performing any work. Disconnect the emergency shutoff switch or disengage the heating system circuit breaker. Take measures to prevent accidental re-connection.

Annual inspection of the expansion vessel is required.
- Depressurize the appliance.
- If necessary, adjust the expansion vessel pre-charge pressure to the static head of the heating system (→ page 32).

15.1.10 Setting the boiler water pressure

<table>
<thead>
<tr>
<th>Display on the pressure gauge</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>14.5 psi (1 bar)</td>
<td>Minimum filling pressure (when system is cold)</td>
</tr>
<tr>
<td>14.5 psi to 21.75 psi</td>
<td>Optimal filling pressure</td>
</tr>
<tr>
<td>(1 bar to 1.5 bar)</td>
<td></td>
</tr>
<tr>
<td>30 psi (2.07 bar)</td>
<td>Maximum pressure at maximum heating water temperature must not be exceeded (safety valve will spill).</td>
</tr>
</tbody>
</table>

Table 24 Operating pressure

- If the indicator is below 14.5 psi (1 bar) when the system is cold, top up the water. The indicator must be between 14.5 psi (1 bar) and 21.75 psi (1.5 bar).

If using a hose to fill the heating system, prefill the hose with water to prevent air being introduced into the system.

- If the pressure is not held, check the expansion vessel and heating system for leaks.

15.1.11 Testing system water quality

- Take a representative sample of the system water and analyze pH using a pH meter or pH test strips.

Table 25 Water preparation for filling and maintaining the heating system (pH-value)

<table>
<thead>
<tr>
<th>pH-value</th>
<th>Water preparation</th>
</tr>
</thead>
<tbody>
<tr>
<td>7-8.5</td>
<td>Not needed</td>
</tr>
<tr>
<td>4.5-7</td>
<td>Required</td>
</tr>
</tbody>
</table>

If antifreeze is being used in the system, check the frost protection properties to ensure the site specific requirements are met.

15.1.12 Inspecting electrical wiring

- Check electrical wiring for mechanical damage and replace defective cables.
### Checklist for annual inspection and maintenance

Use this form to guide you through the service and maintenance procedure. Fill out each step according to the findings and work performed.

<table>
<thead>
<tr>
<th>Date</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Latest fault code from service function 6.A (→ page 65).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Fresh water inlet filter (Combi boiler KWB appliances only) (→ page 65).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Visual inspection of the combustion air pipes and vent pipes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Dynamic gas pressure (→ page 64).</td>
<td>inches W.C. (mbar)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Gas-air ratio at min./max. nominal output (→ page 63).</td>
<td>min. % max. %</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Gas and water-side leak test (→ page 44).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Inspect electrodes (→ page 67).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Inspect heat exchanger block (→ page 68).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Check burner (→ page 67).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Inspect diaphragm in mixer unit (→ page 70).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Clean condensate trap (→ page 69).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>With the system depressurized, check the expansion vessel pre-charge pressure vs. the static head of the heating system.</td>
<td>psi (bar)</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Check the heating system filling pressure.</td>
<td>psi (bar)</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Inspect electrical wiring for damage.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Check settings of the heating control.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Check set service functions according to commissioning report (→ page 78).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 26 Maintenance and inspection checklist
16 Readings on the display

The boiler display can provide the following information (Tab. 27 and 28):

<table>
<thead>
<tr>
<th>Value displayed</th>
<th>Description</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number or letter, dot followed by letter</td>
<td>Service function</td>
<td></td>
</tr>
<tr>
<td>(→ Tab. 19 / 20, page 56)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Letter followed by number or letter</td>
<td>Fault code</td>
<td></td>
</tr>
<tr>
<td>(→ Tab. 29, page 74) (exception: b.A = service function)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Three numbers (≤ 199)</td>
<td>Decimal value, e.g. supply temperature</td>
<td>00..199</td>
</tr>
<tr>
<td>One number (displayed for longer) followed by two numbers displayed briefly)</td>
<td>Decimal figure (three digits); first digit is shown alternating with two last digits (e.g. 2.69..69 for 269)</td>
<td>0..999</td>
</tr>
<tr>
<td>Two dashes followed by two pairs of numbers</td>
<td>Code is shown in three stages: 1. Two dashes 2. First two digits 3. Last two digits (e.g. -- 10 04)</td>
<td>1000 ... 9999</td>
</tr>
<tr>
<td>Two letters followed by two pairs of numbers</td>
<td>Code is shown in three stages: 1. Two letters 2. First two digits 3. Last two digits (e.g. CF 10 20)</td>
<td></td>
</tr>
</tbody>
</table>

Table 27 Display readings

<table>
<thead>
<tr>
<th>Status code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Acknowledge by pressing any button (except reset).</td>
</tr>
<tr>
<td></td>
<td>Acknowledge by pressing two buttons simultaneously</td>
</tr>
<tr>
<td></td>
<td>Acknowledge by pressing  and holding for more than 3 seconds (Save function).</td>
</tr>
<tr>
<td></td>
<td>The display shows the supply temperature in alternation with . The appliance works for 15 minutes at the minimum nominal output, → service function 2.F.</td>
</tr>
<tr>
<td></td>
<td>The display shows the supply temperature in alternation with . The appliance works with the set maximum output in heating mode, → service function 1.A.</td>
</tr>
<tr>
<td></td>
<td>The display shows the supply temperature in alternation with . The appliance works for 15 minutes at the maximum nominal output, → service function 2.F.</td>
</tr>
<tr>
<td></td>
<td>The air purging function is active, → service function 2.C</td>
</tr>
<tr>
<td></td>
<td>The display shows the supply temperature in alternation with . The trap filling sequence is active, → service function 4.F.</td>
</tr>
<tr>
<td></td>
<td>The display shows the supply temperature alternating with : Service reminder, → service function 5.A.</td>
</tr>
<tr>
<td></td>
<td>The display shows the supply temperature in alternation with . The pump may have seized, → fault E.9.</td>
</tr>
<tr>
<td></td>
<td>The display shows the supply temperature in alternation with . The temperature gradient limiter was triggered. Excessive supply temperature increase: Heating mode is suspended for two minutes.</td>
</tr>
<tr>
<td></td>
<td>Slab drying function of the FW200 weather compensation control (→ operating instructions) or building drying function (→ service function 7.E) are activated.</td>
</tr>
<tr>
<td></td>
<td>Key pad lock enabled. To unlock the key pad, press until the supply temperature is shown on the display.</td>
</tr>
</tbody>
</table>

Table 28 Special displays
17 Faults

17.1 Troubleshooting

DANGER: Explosion!
- Close the gas cock prior to working on the gas train.
- Check for gas leaks after carrying out work on the gas train.

DANGER: Risk of flue gas poisoning.
- Check for leaks after carrying out work on the venting system.

DANGER: Risk of electric shock!
- Always disconnect the appliance from the mains power before performing any work. Disconnect the emergency shutoff switch or disengage the heating system circuit breaker. Take measures to prevent accidental re-connection.

WARNING: Danger of scalding!
Hot water can scald.
- Drain the appliance before working on components that are water filled.

NOTICE: The Heatronic boiler control can be damaged by leaking water.
- Cover the Heatronic prior to work on water filled components.

The Heatronic boiler control monitors all safety and control components.
If a fault arises during operation, an audible warning tone sounds.

Press a button to mute the warning sound.

The display indicates a fault code (e.g. ⚠ ⚠) and the reset button flashes.
If the reset button is flashing:
- Press the reset button and hold it until ⚠ ⚠ appears on the display.
  The appliance starts up again and the current supply temperature is displayed.

If the reset button is not flashing:
- Switch the appliance OFF and ON again.
  The appliance starts up again and the current supply temperature is displayed.

An overview of the faults can be found on page 74.
An overview of the status codes can be found on page 72.

If the fault persists:
- Check the PCB and replace if required. Adjust the service functions in accordance with the commissioning report (→ page 78).
## 17.2 Faults that are shown on the display

<table>
<thead>
<tr>
<th>Display</th>
<th>Description</th>
<th>Elimination</th>
</tr>
</thead>
</table>
| **A7** | DHW temperature sensor defective. | ▶ Check temperature sensor and leads for interruptions or shorts, and replace if defective.  
▶ Insert code plug correctly; replace if defective. |
| **A8** | Communication fault. | ▶ Check BUS communications wiring, replace if defective.  
▶ Check control, replace if defective. |
| **A9** | DHW tank temperature not detected. | ▶ Check DHW tank temperature sensor and connecting lead, replace if defective.  
▶ Reset the boiler to the factory default settings (→ service function 8.E), reset the IPM 2 (if installed) to the factory default settings and carry out the automatic system configuration. |
| **B1** | Code plug not detected. | ▶ Insert code plug correctly; replace if defective. |
| **B7** | Fault in the burner controls. | ▶ Reset boiler to factory default setting (→ service function 8.E). |
| **C6** | Fan not running. | ▶ Check fan leads and fan, replace if defective. |
| **CC** | Outdoor temperature sensor not recognized. | ▶ Check outdoor temperature sensor and leads for interruptions, replace if defective.  
▶ Verify the outdoor temperature sensor is connected to 3 (Out Sen) on the terminal block in the low voltage junction box. |
| **D3** | Temperature high limit defective.  
External guard has tripped.  
Temperature limiter locked out. | ▶ Check temperature sensor and leads for interruptions or shorts, and replace if defective.  
▶ Temperature guard TB1 has tripped. Check if jumper across 8-9 or PR-PO is missing.  
▶ Reset external temperature limiter (if installed). Reset LWCO (if installed). |
| **D5** | External supply temperature sensor defective (low-loss header).  
The external supply temperature sensor was recognized on the BUS and then reconnected to the appropriate terminal. | ▶ Check temperature sensor and leads for interruptions or shorts, and replace if defective.  
▶ Check whether only one temperature sensor is connected; otherwise remove second temperature sensor.  
▶ Reset the boiler to the factory default settings (→ service function 8.E), reset the IPM 2 (if installed) to the factory default settings and carry out the automatic system configuration. |
| **E2** | Supply temperature sensor defective. | ▶ Check temperature sensor and leads for interruptions or shorts, and replace if defective. |
| **E3** | Additional supply temperature sensor defective. | ▶ Check temperature sensor and leads for interruptions or shorts, and replace if defective. |
| **E9** | Heat exchanger safety high limit or flue gas temperature limiter has tripped. | ▶ Check flue gas safety high limit and leads for interruptions or shorts, and replace if defective.  
▶ Check heat exchanger safety high limit and leads for interruptions or shorts, and replace if defective.  
▶ Check the operating pressure.  
▶ Check temperature limit; replace if defective.  
▶ Check pump capacitor; replace pump if defective.  
▶ Check PCB fuse, replace if blown (6.3 A fuse according to IEC default).  
▶ Purge the appliance  
▶ Check heat exchanger on the DHW side; replace if clogged. |

Table 29 Faults shown on the display
<table>
<thead>
<tr>
<th>Display</th>
<th>Description</th>
<th>Elimination</th>
</tr>
</thead>
<tbody>
<tr>
<td>EA</td>
<td>No flame detected.</td>
<td>▶ Check that ground lead is properly connected, replace if defective.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▶ Check that gas cock is open.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▶ Check inlet gas pressure; correct if needed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▶ Check power supply.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▶ Check electrodes for visual damage; replace if defective.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▶ Check flue gas system; clean or repair if defective.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▶ Check gas/air ratio; correct if out of range.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▶ Check gas valve; replace if defective.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▶ In room air operation, check air supply or ventilation apertures.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▶ Clean the condensate trap.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▶ Remove diaphragm at fan inlet connection and check for contamination or cracks.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▶ Check heat exchanger for soiling (→ Chapter 15.1.6, page 68).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▶ Check gas cock; replace if defective.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▶ Insert code plug correctly; replace if defective.</td>
</tr>
<tr>
<td></td>
<td>GFA: Safety time expired.</td>
<td></td>
</tr>
<tr>
<td>F0</td>
<td>Internal fault</td>
<td>▶ Press reset for 3 seconds and release. When the button is released, the appliance will restart.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▶ Check electrical plug-in contacts and ignition leads; replace PCB if defective.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▶ Check gas/air ratio; correct if out of specification.</td>
</tr>
<tr>
<td>F1</td>
<td>Internal data error.</td>
<td>▶ Reset boiler to the factory default setting (→ service function 8.E).</td>
</tr>
<tr>
<td>F7</td>
<td>Flame detected even when burner is off.</td>
<td>▶ Check electrodes; replace if defective.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▶ Check flue gas system; clean or repair if defective.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▶ Check PCB for moisture; dry if needed.</td>
</tr>
<tr>
<td>FA</td>
<td>After switching gas off: Flame is detected.</td>
<td>▶ Check gas cock; replace if defective.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▶ Clean condensate trap.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▶ Check electrodes and leads; replace if defective.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▶ Check flue gas system; clean or repair if needed.</td>
</tr>
<tr>
<td>Fd</td>
<td>Reset button pressed by mistake.</td>
<td>▶ Press reset button again.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▶ Check cable harness to safety high limit and gas cock for ground connection.</td>
</tr>
<tr>
<td>6</td>
<td>Temperature gradient limiter: Temperature rise too fast</td>
<td>▶ Fully open service shut-off valves.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▶ Check electrical connection between heating zone pump and Heatronic.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▶ Check pump plug connection per installation instructions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▶ Manually test operation of heating zone pump and replace if defective.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▶ Set pump speed correctly to match maximum output.</td>
</tr>
</tbody>
</table>

Table 29 Faults shown on the display
### 17.3 Faults that are not shown on the display

<table>
<thead>
<tr>
<th>Appliance faults</th>
<th>Elimination</th>
</tr>
</thead>
</table>
| Combustion noise too loud; rumbling noises             | ► Insert code plug correctly; replace if defective.  
   ► Check gas type.  
   ► Check inlet gas pressure; adjust if defective.  
   ► Check flue gas system; clean or repair if defective.  
   ► Check gas/air ratio in the combustion air and flue gas; replace gas valve if defective. |
| Flow noises                                           | ► Set pump speed correctly to match maximum output.  
   ► Set pump mode.                                                                                                            |
| Heating-up takes too long                             | ► Set pump speed correctly to match maximum output.  
   ► Set pump mode.                                                                                                            |
| Flue gas readings incorrect; CO levels too high       | ► Check gas type.  
   ► Check inlet gas pressure; adjust if defective.  
   ► Check flue gas system; clean or repair if defective.  
   ► Check gas/air ratio in flue gas; replace gas valve if defective.                                                               |
| Violent ignition, poor ignition                        | ► Check gas type.  
   ► Check inlet gas pressure; adjust if defective.  
   ► Check power supply.  
   ► Check electrodes for visual damage; replace if defective.  
   ► Check flue gas system; clean or repair if defective.  
   ► Check gas/air ratio; replace gas valve if defective.  
   ► Check gas valve; replace if defective.  
   ► Check burner; replace if required.                                                                                           |
| DHW has unpleasant odor or has a dark color           | ► Perform thermal disinfection of the DHW circuit.  
   ► Replace sacrificial anode in the tank (if installed).  
   ► Consult local water department.                                                                                              |
| Set supply temperature (e.g. of the FW200 control) exceeded | ► Switch off automatic anti-cycle timer, i.e., set value to 0.  
   ► Set the required anti-cycle timer, e.g. default setting of 3 minutes.                                                        |
| Condensate in air box                                 | ► Insert diaphragm in the mixer unit per installation instructions; replace if defective.                                               |
| DHW temperature is not reached (combi boiler KWB..-3A only) | ► Insert code plug correctly; replace if defective.  
   ► Check whether voltage (120 VAC) is present between terminal 1 and terminal 3; repair if defective.  
   ► Check turbine; replace if defective.                                                                                          |
| Heatronic is flashing (i.e. all buttons, all display segments, burner indicator etc. are flashing) | ► Replace fuse Si 3 (24 V) (6.3 A fuse according to IEC default).                                                                 |

*Table 30 Faults not shown on the display*
17.4 Check sensor values

17.4.1 Outdoor temperature sensor

<table>
<thead>
<tr>
<th>Temperature °F (°C)</th>
<th>Testing tolerance ± 10%</th>
<th>Resistance [Ω]</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4 (-20)</td>
<td></td>
<td>2,392</td>
</tr>
<tr>
<td>3 (-16)</td>
<td></td>
<td>2,088</td>
</tr>
<tr>
<td>10 (-12)</td>
<td></td>
<td>1,811</td>
</tr>
<tr>
<td>17 (-8)</td>
<td></td>
<td>1,562</td>
</tr>
<tr>
<td>24 (-4)</td>
<td></td>
<td>1,342</td>
</tr>
<tr>
<td>32 (0)</td>
<td></td>
<td>1,149</td>
</tr>
<tr>
<td>39 (4)</td>
<td></td>
<td>984</td>
</tr>
<tr>
<td>46 (8)</td>
<td></td>
<td>842</td>
</tr>
<tr>
<td>50 (10)</td>
<td></td>
<td>781</td>
</tr>
<tr>
<td>59 (15)</td>
<td></td>
<td>642</td>
</tr>
<tr>
<td>68 (20)</td>
<td></td>
<td>528</td>
</tr>
<tr>
<td>77 (25)</td>
<td></td>
<td>436</td>
</tr>
</tbody>
</table>

Table 31 Resistance table outdoor temperature sensor

17.4.2 Additional supply temperature limiter

<table>
<thead>
<tr>
<th>Temperature °F (°C)</th>
<th>Testing tolerance ± 10%</th>
<th>Resistance [Ω]</th>
</tr>
</thead>
<tbody>
<tr>
<td>32 (0)</td>
<td></td>
<td>33,555</td>
</tr>
<tr>
<td>50 (10)</td>
<td></td>
<td>21,232</td>
</tr>
<tr>
<td>68 (20)</td>
<td></td>
<td>13,779</td>
</tr>
<tr>
<td>86 (30)</td>
<td></td>
<td>9,128</td>
</tr>
<tr>
<td>104 (40)</td>
<td></td>
<td>6,205</td>
</tr>
<tr>
<td>122 (50)</td>
<td></td>
<td>4,298</td>
</tr>
<tr>
<td>140 (60)</td>
<td></td>
<td>3,025</td>
</tr>
<tr>
<td>158 (70)</td>
<td></td>
<td>2,176</td>
</tr>
<tr>
<td>176 (80)</td>
<td></td>
<td>1,589</td>
</tr>
<tr>
<td>194 (90)</td>
<td></td>
<td>1,177</td>
</tr>
<tr>
<td>212 (100)</td>
<td></td>
<td>886</td>
</tr>
</tbody>
</table>

Table 32 Resistance table supply temperature limiter

17.4.3 Supply temperature sensor, External supply temperature sensor, DHW tank temperature sensor, DHW temperature sensor

<table>
<thead>
<tr>
<th>Temperature °F (°C)</th>
<th>Testing tolerance ± 10%</th>
<th>Resistance [Ω]</th>
</tr>
</thead>
<tbody>
<tr>
<td>68 (20)</td>
<td></td>
<td>14,772</td>
</tr>
<tr>
<td>77 (25)</td>
<td></td>
<td>11,981</td>
</tr>
<tr>
<td>86 (30)</td>
<td></td>
<td>9,786</td>
</tr>
<tr>
<td>95 (35)</td>
<td></td>
<td>8,047</td>
</tr>
<tr>
<td>104 (40)</td>
<td></td>
<td>6,653</td>
</tr>
<tr>
<td>113 (45)</td>
<td></td>
<td>5,523</td>
</tr>
<tr>
<td>122 (50)</td>
<td></td>
<td>4,608</td>
</tr>
<tr>
<td>131 (55)</td>
<td></td>
<td>3,856</td>
</tr>
<tr>
<td>140 (60)</td>
<td></td>
<td>3,243</td>
</tr>
<tr>
<td>149 (65)</td>
<td></td>
<td>2,744</td>
</tr>
<tr>
<td>158 (70)</td>
<td></td>
<td>2,332</td>
</tr>
<tr>
<td>167 (75)</td>
<td></td>
<td>1,990</td>
</tr>
<tr>
<td>176 (80)</td>
<td></td>
<td>1,704</td>
</tr>
<tr>
<td>185 (85)</td>
<td></td>
<td>1,464</td>
</tr>
<tr>
<td>194 (90)</td>
<td></td>
<td>1,262</td>
</tr>
<tr>
<td>203 (95)</td>
<td></td>
<td>1,093</td>
</tr>
<tr>
<td>212 (100)</td>
<td></td>
<td>950</td>
</tr>
</tbody>
</table>

Table 33 Resistance table NTCs

17.5 Replacement code plug

<table>
<thead>
<tr>
<th>Appliance</th>
<th>Order number</th>
</tr>
</thead>
<tbody>
<tr>
<td>KBR16-3A NG</td>
<td>8 714 432 501 0</td>
</tr>
<tr>
<td>KBR16-3A LPG</td>
<td>8 714 432 506 0</td>
</tr>
<tr>
<td>KBR21-3A NG</td>
<td>8 714 432 528 0</td>
</tr>
<tr>
<td>KBR21-3A LPG</td>
<td>8 714 432 529 0</td>
</tr>
<tr>
<td>KBR28-3A NG</td>
<td>8 714 432 502 0</td>
</tr>
<tr>
<td>KBR28-3A LPG</td>
<td>8 714 432 507 0</td>
</tr>
<tr>
<td>KBR35-3A NG</td>
<td>8 714 432 503 0</td>
</tr>
<tr>
<td>KBR35-3A LPG</td>
<td>8 714 432 508 0</td>
</tr>
<tr>
<td>KBR42-3A NG</td>
<td>8 714 432 504 0</td>
</tr>
<tr>
<td>KBR42-3A LPG</td>
<td>8 714 432 509 0</td>
</tr>
<tr>
<td>KWB28-3A NG</td>
<td>8 714 432 520 0</td>
</tr>
<tr>
<td>KWB28-3A LPG</td>
<td>8 714 432 521 0</td>
</tr>
<tr>
<td>KWB35-3A NG</td>
<td>8 714 432 524 0</td>
</tr>
<tr>
<td>KWB35-3A LPG</td>
<td>8 714 432 525 0</td>
</tr>
<tr>
<td>KWB42-3A NG</td>
<td>8 714 432 500 0</td>
</tr>
<tr>
<td>KWB42-3A LPG</td>
<td>8 714 432 505 0</td>
</tr>
</tbody>
</table>

Table 34 Code plugs for all appliances
### Commissioning log for the appliance

**Home owner/operator:**
- Last name, first name
- Number, Street
- Telephone/fax
- ZIP code, town

**System installer:**
- Order number:
- Appliance type: [Complete a separate log for every appliance!]
- FD (Date of manufacture):
- Date commissioned:
  - Individual appliance

**Installation location:**
- Basement | Attic | Garage | other:
- Room air only: Number and size of ventilation openings ft² (m²)

**Vent pipe routing:**
- Twin pipe system | Concentric pipe system | Room air | Sealed combustion
- PVC | CPVC | PP | 2" | 3"
- Total length: Approx. ...... ft (m) | Elbows 90°: ...... Qty | Elbows 15 - 45°: ...... Qty
- Flue tightness test completed: yes | no
- CO₂ value in the combustion air at maximum nominal output: %
- O₂ value in the combustion air at maximum nominal output: %

**Notes regarding under or over pressure operation:**

**Gas setting and flue gas test:**
- Gas conversion: NG | LPG (propane)
- Inlet gas pressure * W.C. (mbar)
- Selected maximum output: MBH (kW)
- Gas flow rate at maximum nominal output: gpm (l/min)
- Net calorific value H₁₀ (per gas supplier): MBTU/ft³ (kWh/m³)
- CO₂ at max. nominal output: %
- CO₂ at minimum nominal output: %
- O₂ at maximum nominal output: %
- O₂ at minimum nominal output: %
- CO at maximum nominal output: ppm
- CO at minimum nominal output: ppm
- Flue gas temperature at maximum nominal output: °F (°C)
- Maximum measured supply temperature: °F (°C)

**System hydraulics:**
- Low-loss header, type:
- Low-loss header enabled: No | Yes
- Heating pump:
- Primary secondary piping
- DHW tank/type/number/heating surface output:
- System hydraulics checked, notes:
### Modified service functions

(Select the modified service functions and enter the values here.)

**Example:** Service function 7.d changed from 00 to 01

<table>
<thead>
<tr>
<th>Service Function d</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Heating control:**

- [ ] FW 200
- [ ] FB 100 × ....... Qty, coding heating zone(s):
- [ ] ISM 2
- [ ] IPM 2 × ....... Qty, coding heating zone(s):

**Other:**

- [ ] Heating control programmed, notes:
- [ ] Documented the modified settings of the heating control in the control operating/installation instructions

### The following work has been carried out:

- [ ] Electrical connections checked, notes:
- [ ] Condensate trap filled
- [ ] Function check carried out
- [ ] Carry out a combustion air/flue gas test
- [ ] Tightness test carried out on the gas and water sides
- [ ] Carry out a combustion air/flue gas test
- [ ] Tightness test carried out on the gas and water sides

Commissioning includes checking the settings, a visual heating leak test and a functional check of the boiler and control. The system installer conducts a test of the heating system.

This system has been checked to the extent described.

The documents have been handed over to the home owner/operator. The home owner/operator has been instructed regarding safety and operation of the boiler and accessories, including the need for regular scheduled maintenance.

Affix the test report here.

---

**Name of service installing contractor**

**Date, owner/operator signature**

**Date, system installer’s signature**

---

Greenstar FS
19  **Spare parts**

- Order spare parts by name and part number using the spare parts list.

<table>
<thead>
<tr>
<th>Designation</th>
<th>KBR16-3</th>
<th>KBR21-3</th>
<th>KWB26-3</th>
<th>KWB35-3</th>
<th>KWB42-3</th>
<th>KWB50-3</th>
<th>KWB55-3</th>
<th>KWB60-3</th>
<th>Spare parts list</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1 - Sheet metal</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>⇒ page 82</td>
</tr>
<tr>
<td>Group 2 - Burner/Heat exchanger</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>⇒ page 84</td>
</tr>
<tr>
<td>Group 3 - Gas valve</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>⇒ page 86</td>
</tr>
<tr>
<td>Group 4 - Pipes combi boiler KWB..3A</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>⇒ page 88</td>
</tr>
<tr>
<td>Group 5 - Pipes heating boiler KBR..3A</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>⇒ page 90</td>
</tr>
<tr>
<td>Group 6 - Control box</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>⇒ page 92</td>
</tr>
<tr>
<td>Group 7 - Hydraulic block combi boiler KWB..3A</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>⇒ page 94</td>
</tr>
<tr>
<td>Group 8 - Accessories for service/installation</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>⇒ page 94</td>
</tr>
</tbody>
</table>

*Table 35  Spare part groups Greenstar*
Fig. 94  Group 1 - Sheet metal Greenstar
<table>
<thead>
<tr>
<th>Item (→ Fig. 94)</th>
<th>Designation</th>
<th>KBR16-3</th>
<th>KBR21-3</th>
<th>KBR28-3</th>
<th>KBR35-3</th>
<th>KBR42-3</th>
<th>KWB28-3</th>
<th>KWB35-3</th>
<th>KWB42-3</th>
<th>Order number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Case front panel assembly</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>8 716 117 483</td>
</tr>
<tr>
<td>2</td>
<td>Case side panel LH assembly</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>8 716 117 484</td>
</tr>
<tr>
<td>3</td>
<td>Case side panel RH assembly</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>8 716 117 485</td>
</tr>
<tr>
<td>4</td>
<td>Case top panel assembly</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>8 716 117 486</td>
</tr>
<tr>
<td>5</td>
<td>Cover</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>8 716 681 234 0</td>
</tr>
<tr>
<td>6</td>
<td>Screw (10x) M5 x 12</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗</td>
<td>✗</td>
<td>2 914 411 420 0</td>
</tr>
<tr>
<td>7</td>
<td>Trade mark badge Bosch</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
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<td>✗</td>
<td>✗</td>
<td>8 716 011 807 0</td>
</tr>
<tr>
<td>8</td>
<td>Washer</td>
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<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>8 710 302 042 0</td>
</tr>
<tr>
<td>9</td>
<td>Terminal exhaust adaptor WB5</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗</td>
<td>✗</td>
<td>8 716 117 335</td>
</tr>
<tr>
<td>10</td>
<td>Expansion vessel</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>8 715 407 328 0</td>
</tr>
<tr>
<td>11</td>
<td>Shape screw</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗ ✗ ✗ ✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>8 713 407 012 0</td>
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Table 36 Group 1 - Sheet metal Greenstar
Fig. 95  Group 2 - Burner/Heat exchanger Greenstar
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Table 37 Group 2 - Burner/Heat exchanger Greenstar
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Fig. 97  Group 4 - Pipes combi boiler KWB..3A Greenstar
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*Table 39 Group 4 - Pipes combi boiler KWB..3A Greenstar*
Item 37 (Flow sensor) not shown

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Table 40 Group 5 Pipes heating boiler KBR... 3A Greenstar
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### Table 42 Group 7 Hydraulic block combi boiler KWB.. 3A Greenstar

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<th>KBR16-3</th>
<th>KBR21-3</th>
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### Table 43 Group 8 - Accessories for service/installation Greenstar

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