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**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.

Residential Gas Condensing Boiler

# Greenstar

ZBR16-3A... | ZBR21-3A... | ZBR28-3A... | ZBR35-3A... | ZBR42-3A... | ZWB28-3A... | ZWB35-3A... | ZWB42-3A...

BOSCH

Installation and Service Instructions for Contractors

6 720 806 992 (2015/03) CA/US

Inspections Division
Date: 09/18/15

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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.

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** is used to address practices not related to personal injury.

### Important information

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

| Symbol | Explanation |
|---|---|
| ▶ | Sequence of steps |
| → | Cross-reference to other points in this document or to other documents |
| • | Listing/list entry |
| – | Listing/list entry (2nd level) |

*Table 1*

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## 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.

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**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.

*Fig. 1 Scope of delivery heating boiler ZBR..-3A*

# 2 Scope of delivery

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

Contents of package 1:

[1] Gas condensing boiler
[2] Set of documents for appliance
[3] Mounting bracket with mounting kit
[4] Gas conversion kit
[5] Adapter for connection of a LWCO

Contents of package 2:

[6] Rail with connection box
[7] Flue adapter[1)]
[8] DHW tank temperature sensor (NTC)
[9] Hydraulics connection plate with mounting kit
[10] External supply temperature sensor (NTC)
[11] Outdoor reset control FW 200 with mounting kit and outdoor temperature sensor
[12] Set of documents for outdoor reset control FW 200

1) Concentric vent kit available as accessory.

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## 2.2 ZWB - Residential combi boiler for space heating and DHW generation

*Fig. 2 Scope of delivery combi boiler ZWB..-3A*

Contents of package 1:

[1] Gas condensing boiler
[2] Set of documents for appliance
[3] Mounting bracket with mounting kit
[4] Gas conversion kit
[5] Adapter for connection of a LWCO

Contents of package 2:

[6] Rail with connection box
[7] Flue adapter[1)]
[8] Hydraulics connection plate with mounting kit
[9] External supply temperature sensor (NTC)
[10] Outdoor reset control FW 200 with mounting kit and outdoor temperature sensor
[11] Set of documents for outdoor reset control FW 200

1) Concentric vent kit available as accessory.

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# 3 Information about the appliance

**ZBR** appliances are residential boilers for central heating and loading of an indirect fired DHW tank.

**ZWB** appliances are 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 $NO_x$ (and/or 20 ppm at 3% $O_2$).

## 3.1 Proper use

**The Greenstar boiler is not for use in CSD-1 commercial installation.**

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 2 describes the meaning of the model number:

| | | |
|---|---|---|
| **ZBR16-3** | A | 23 |
| **ZBR21-3** | A | 23 |
| **ZBR28-3** | A | 23 |
| **ZBR35-3** | A | 23 |
| **ZBR42-3** | A | 23 |
| **ZWB28-3** | A | 23 |
| **ZWB35-3** | A | 23 |
| **ZWB42-3** | A | 23 |

*Table 2 Appliance types*

| | |
|---|---|
| Z | Central heating appliance |
| W | DHW heating |
| B | Condensing technology |
| R | Constant temperature control |
| 16 | Output up to 54,600 BTU/hr (16 kW) |
| 21 | Output and DHW output up to 71,600 BTU/hr (21 kW) |
| 28 | Output and DHW output up to 95,500 BTU/hr (28 kW) |
| 35 | Output and DHW output up to 119,400 BTU/hr (35 kW) |
| 42 | Output and DHW output up to 143,300 BTU/hr (42 kW) |
| -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.

*Fig. 3 Position of the rating plate*

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

## 3.4 Appliance description

- Appliance for wall installation, regardless of chimney and room size
- Outdoor reset control FW 200
- Intelligent boiler pump control
- Heatronic boiler control with 2-wire BUS
- Three-speed boiler circulator
- Automatic air vent (combi boiler ZWB..-3A 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 radiant floor heating
- Flue adapter for flue gas and combustion air with test ports
- Variable speed fan
- Gas premix burner
- Temperature sensor and temperature control for space heating
- Supply temperature sensor
- Temperature limiter
- Safety relief valve, pressure gauge
- Expansion vessel (combi boiler ZWB..-3A only)
- Connection possibility for DHW tank temperature sensor (NTC) (heating boiler ZBR..-3A only)
- Flue gas temperature limiter
- DHW priority (combi boiler ZWB..-3A only)
- Motorized 3-way valve (combi boiler ZWB..-3A only)
- Hydraulics connection plate

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## 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.

- FB 100 room control
- Modules for system expansions:
  - ISM2 for solar systems (DHW heating, space heating support, pool heating)
  - IPM2 for one or two heating zones with pump control and motorized mixing capability
  - ICM for cascading up to 4 boilers
  - optional concentric vent kit available for horizontal direct vent terminations

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## 3.6 Product dimensions and minimum clearances

*Fig. 4 Dimensions and minimum clearances (front view, rear view, side view)*

[1] Appliance jacket
[2] Service cover
[3] Hydraulics connection plate
(*) Zero clearance from combustibles permitted, but 4" (102 mm) recommended for serviceability
(**) Distance to door, if mounted inside a closet

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## 3.7 Appliance layout heating boiler ZBR..-3A

*Fig. 5 Appliance layout heating boiler ZBR..-3A*

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**Key to Fig. 5:**

[1] Heatronic boiler control
[2] ON/OFF switch
[3] Burner flame indicator
[4] Service button
[5] Emissions test button
[6] Boiler high limit dial
[7] Mounting socket for outdoor reset controls
[8] DHW thermostat
[9] Key pad lock
[10] ECO button
[11] Reset button
[12] Display
[13] Condensate trap
[14] Test ports for inlet gas pressure
[15] Adjustment screw, minimum gas volume
[16] Maximum gas adjuster
[17] Flue gas temperature limiter
[18] Combustion air intake
[19] Exhaust pipe
[20] Boiler supply pipe
[21] Connection for optional low water cut off (LWCO)
[22] Additional supply temperature limiter
[23] Manual air bleeder
[24] Gas/air premix chamber
[25] Fan
[26] Bracket
[27] Wall hanging bracket
[28] Exhaust pipe
[29] Sight glass
[30] Set of electrodes
[31] Supply temperature sensor
[32] Boiler block temperature limiter
[33] Inspection and cleanout cover
[34] Condensate collector
[35] Boiler circulator
[36] Pump speed switch
[37] Condensate drain hose
[38] Drain cock
[39] Pressure relief valve (heating zone)
[40] Safety relief valve discharge hose
[41] Boiler water pressure gauge

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## 3.8 Appliance layout combi boiler ZWB..-3A

*Fig. 6 Appliance layout combi boiler ZWB..-3A*

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**Key to Fig. 6:**

[1] Heatronic boiler control
[2] ON/OFF switch
[3] Burner flame indicator
[4] Service button
[5] Emissions test button
[6] Boiler high limit dial
[7] Mounting socket for outdoor reset controls
[8] DHW thermostat
[9] Key pad lock
[10] ECO button
[11] Reset button
[12] Display
[13] Condensate trap
[14] Test ports for inlet gas pressure
[15] Adjustment screw, minimum gas volume
[16] DHW temperature sensor
[17] Plate-type heat exchanger
[18] Automatic air vent
[19] Maximum gas adjuster
[20] Flue gas temperature limiter
[21] Combustion air intake
[22] Supply pipe
[23] Connection for optional low water cut off (LWCO)
[24] Additional supply temperature limiter
[25] Gas/air premix chamber
[26] Expansion vessel
[27] Fan
[28] Bracket
[29] Wall hanging bracket
[30] Exhaust pipe
[31] Sight glass
[32] Set of electrodes
[33] Supply temperature sensor
[34] Boiler block temperature limiter
[35] Inspection and cleanout cover
[36] Condensate collector
[37] Flow meter
[38] 3-way valve
[39] Drain cock
[40] Condensate drain hose
[41] Boiler circulator
[42] Pump speed switch
[43] Pressure relief valve (heating zone)
[44] Safety relief valve discharge hose
[45] Boiler water pressure gauge

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## 3.9 Electrical wiring heating boiler ZBR..-3A

*Fig. 7 Electrical wiring diagram heating boiler ZBR..-3A*

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**Key to Fig. 7:**

[1] Ignition transformer
[2] Boiler high limit dial
[3] 120 VAC connection
[4] DHW tank primary pump or 3-way valve [1)]
[5] External heating pump for unmixed heating circuit (secondary circuit) [2)] or DHW recirculation pump [2)]
[6] Fuse T 6.3 A (120 VAC)
[7] DHW thermostat
[8] External safety high limit or low water cut off (LWCO)
[9] BUS connection, e.g. heating control
[10] Room thermostat – dry contact
[11] Outdoor temperature sensor
[12] Code plug
[13] Diagnostic interface
[14] ON/OFF switch
[15] Gas valve
[16] Fan
[17] Flue gas temperature limiter
[18] Supply temperature sensor
[19] Flame rod electrode
[20] Ignition electrode
[21] Boiler block temperature limiter
[22] DHW tank temperature sensor (NTC)
[23] Boiler circulator
[24] Additional supply temperature limiter
[25] External system supply temperature sensor

1) Set the service function 1.F, → page 59

2) Set the service function 5.E, → page 62

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## 3.10 Electrical wiring combi boiler ZWB..-3A

*Fig. 8 Electrical wiring diagram combi boiler ZWB..-3A*

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**Key to Fig. 8:**

[1] Ignition transformer
[2] Boiler high limit dial
[3] 120 VAC connection
[4] External heating pump for unmixed heating circuit (secondary circuit) [1] or DHW recirculation pump [1]
[5] Fuse T 6.3 A (120 VAC)
[6] DHW thermostat
[7] External safety high limit or low water cut off (LWCO)
[8] BUS connection, e.g. heating control
[9] Room thermostat – dry contact
[10] Outdoor temperature sensor
[11] Code plug
[12] Diagnostic interface
[13] ON/OFF switch
[14] Gas valve
[15] Fan
[16] Flue gas temperature limiter
[17] Supply temperature sensor
[18] Flame rod electrode
[19] Ignition electrode
[20] Boiler block temperature limiter
[21] DHW temperature sensor
[22] Boiler circulator
[23] 3-way valve (Space heating/DHW heating)
[24] Flow meter (turbine)
[25] Additional supply temperature limiter
[26] External system supply temperature sensor

1) Set the service function 5.E, → page 62

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## 3.11 Technical data heating boiler ZBR16-3A...

| Input/Output | Unit | NG | LPG (propane) |
|---|---|---|---|
| Max. input rate 180/79 °F (82/26 °C) | BTU/hr (kW) | 57,200 (16.8) | 56,400 (16.5) |
| Max. output rate 104/86 °F (40/30 °C) | BTU/hr (kW) | 54,900 (16.1) | 55,300 (16.2) |
| Max. output rate 122/86 °F (50/30 °C) | BTU/hr (kW) | 54,300 (15.9) | 54,600 (16.0) |
| Max. output rate 176/140 °F (80/60 °C) | BTU/hr (kW) | 50,800 (14.9) | 51,200 (15.0) |
| Min. input rate 180/79 °F (82/26 °C) | BTU/hr (kW) | 12,900 (3.8) | 21,500 (6.3) |
| Min. output rate 104/86 °F (40/30 °C) | BTU/hr (kW) | 12,600 (3.7) | 21,500 (6.3) |
| Min. output rate 122/86 °F (50/30 °C) | BTU/hr (kW) | 12,600 (3.7) | 21,500 (6.3) |
| Min. output rate 176/140 °F (80/60 °C) | BTU/hr (kW) | 11,300 (3.3) | 19,400 (5.7) |
| **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/ft3 (93.1 MJ/m3) | ft$^3$/hr (m$^3$/h) | – | 22 (0.6) |
| **Permissible inlet gas 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 | gps | 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 max. nominal output | % | 9.4 | 11.0 |
| $CO_2$ at minimum nominal output | % | 8.6 | 10.4 |
| **Condensate** | | | |
| Max. 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 (Stand-by) | 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) | 103.6 (47) | 103.6 (47) |
| Dimensions, W x H x D | inch (mm) | 17-21/64" × 33-15/32" × 13-57/64" (440 × 850 × 353) | |

*Table 3 Technical data heating boiler ZBR16-3A...*

Inspections Division
Date: 09/18/15

## 3.12 Technical data heating boiler ZBR21-3A...

| Input/Output | Unit | NG | LPG (propane) |
|---|---|---|---|
| Max. input rate 180/79 °F (82/26 °C) | BTU/hr (kW) | 79,200 (23.2) | 77,500 (22.7) |
| Max. output rate 104/86 °F (40/30 °C) | BTU/hr (kW) | 74,700 (21.9) | 74,700 (21.9) |
| Max. output rate 122/86 °F (50/30 °C) | BTU/hr (kW) | 74,000 (21.7) | 74,000 (21.7) |
| Max. output rate 176/140 °F (80/60 °C) | BTU/hr (kW) | 70,300 (20.6) | 70,300 (20.6) |
| Min. input rate 180/79 °F (82/26 °C) | BTU/hr (kW) | 24,600 (7.2) | 40,100 (11.7) |
| Min. output rate 104/86 °F (40/30 °C) | BTU/hr (kW) | 23,900 (7.0) | 39,900 (11.7) |
| Min. output rate 122/86 °F (50/30 °C) | BTU/hr (kW) | 23,900 (7.0) | 39,600 (11.6) |
| Min. output rate 176/140 °F (80/60 °C) | BTU/hr (kW) | 21,800 (6.4) | 36,200 (10.6) |
| **Gas connection value** | | | |
| Natural Gas – $H_s$ = 1,010 BTU/ft$^3$ (37.3MJ/m$^3$) | ft$^3$/hr (m$^3$/h) | 78 (2.2) | – |
| Liquid Propane Gas – HD-S = 2,500 BTU/ft3 (93.1MJ/m3) | ft$^3$/hr (m$^3$/h) | – | 31 (0.9) |
| **Permissible inlet gas 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 | gps | 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) |
| $CO_2$ at max. nominal output | % | 9.4 | 11.0 |
| $CO_2$ at minimum nominal output | % | 8.6 | 10.4 |
| **Condensate** | | | |
| Max. condensate quantity ($t_R$ = 86 °F (30 °C)) | gph (l/h) | 0.5 (1.8) | 0.5 (1.8) |
| 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 (Stand-by) | W | < 6 | < 6 |
| Sound pressure level | dB(A) | ≤ 39 | ≤ 39 |
| 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) | 103.6 (47) | 103.6 (47) |
| Dimensions, W x H x D | inch (mm) | 17-21/64" × 33-15/32" × 13-57/64" (440 × 850 × 353) | |

*Table 4 Technical data heating boiler ZBR21-3A...*

Inspections Division
Date: 09/18/15

## 3.13 Technical data heating boiler ZBR28-3A...

| Input/Output | Unit | NG | LPG (propane) |
|---|---|---|---|
| Max. input rate 180/79 °F (82/26 °C) | BTU/hr (kW) | 100,800 (29.5) | 98,600 (28.9) |
| Max. output rate 104/86 °F (40/30 °C) | BTU/hr (kW) | 93,800 (27.5) | 93,800 (27.5) |
| Max. output rate 122/86 °F (50/30 °C) | BTU/hr (kW) | 93,100 (27.3) | 93,100 (27.3) |
| Max. output rate 176/140 °F (80/60 °C) | BTU/hr (kW) | 89,400 (26.2) | 89,400 (26.2) |
| Min. input rate 180/79 °F (82/26 °C) | BTU/hr (kW) | 24,600 (7.2) | 40,100 (11.7) |
| Min. output rate 104/86 °F (40/30 °C) | BTU/hr (kW) | 23,900 (7.0) | 39,900 (11.7) |
| Min. output rate 122/86 °F (50/30 °C) | BTU/hr (kW) | 23,900 (7.0) | 39,600 (11.6) |
| Min. output rate 176/140 °F (80/60 °C) | BTU/hr (kW) | 21,800 (6.4) | 36,200 (10.6) |
| **Gas connection value** | | | |
| Natural Gas – $H_s$ = 1,010 BTU/ft$^3$ (37.3MJ/m$^3$) | ft$^3$/hr (m$^3$/h) | 99 (2.8) | – |
| Liquid Propane Gas – HD-S = 2,500 BTU/ft3 (93.1MJ/m3) | ft$^3$/hr (m$^3$/h) | – | 39 (1.1) |
| **Permissible inlet gas 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 | gps | 12.0/3.2 | 11.6/4.8 |
| 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) |
| $CO_2$ at max. nominal output | % | 9.4 | 11.0 |
| $CO_2$ at minimum nominal output | % | 8.6 | 10.4 |
| **Condensate** | | | |
| Max. condensate quantity ($t_R$ = 86 °F (30 °C)) | gph (l/h) | 0.6 (2.3) | 0.6 (2.3) |
| 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 (Stand-by) | W | < 6 | < 6 |
| Sound pressure level | dB(A) | ≤ 39 | ≤ 39 |
| 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) | 103.6 (47) | 103.6 (47) |
| Dimensions, W x H x D | inch (mm) | 17-21/64" × 33-15/32" × 13-57/64" (440 × 850 × 353) | |

*Table 5 Technical data heating boiler ZBR28-3A...*

Inspections Division
Date: 09/18/15

## 3.14 Technical data heating boiler ZBR35-3A...

| Input/Output | Unit | NG | LPG (propane) |
|---|---|---|---|
| Max. input rate 180/79 °F (82/26 °C) | BTU/hr (kW) | 131,900 (38.6) | 129,100 (37.8) |
| Max. output rate 104/86 °F (40/30 °C) | BTU/hr (kW) | 122,800 (36.0) | 122,800 (36.0) |
| Max. output rate 122/86 °F (50/30 °C) | BTU/hr (kW) | 121,800 (35.7) | 121,800 (35.7) |
| Max. output rate 176/140 °F (80/60 °C) | BTU/hr (kW) | 116,700 (34.2) | 116,700 (34.2) |
| Min. input rate 180/79 °F (82/26 °C) | BTU/hr (kW) | 36,000 (10.5) | 46,400 (13.6) |
| Min. output rate 104/86 °F (40/30 °C) | BTU/hr (kW) | 35,100 (10.3) | 46,100 (13.5) |
| Min. output rate 122/86 °F (50/30 °C) | BTU/hr (kW) | 34,800 (10.2) | 45,700 (13.4) |
| Min. output rate 176/140 °F (80/60 °C) | BTU/hr (kW) | 31,700 (9.3) | 42,000 (12.3) |
| **Gas connection value** | | | |
| Natural Gas – $H_s$ = 1,010 BTU/ft$^3$ (37.3MJ/m$^3$) | ft$^3$/hr (m$^3$/h) | 130 (3.7) | – |
| Liquid Propane Gas – HD-S = 2,500 BTU/ft3 (93.1MJ/m3) | ft$^3$/hr (m$^3$/h) | – | 52 (1.5) |
| **Permissible inlet gas 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 | gps | 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) |
| Flue gas temperature 104/86 °F (40/30 °C) at maximum/minimum nominal heat input | °F (°C) | 127/91 (53/33) | 127/91 (53/33) |
| $CO_2$ at max. nominal output | % | 9.4 | 11.0 |
| $CO_2$ at minimum nominal output | % | 8.6 | 10.4 |
| **Condensate** | | | |
| Max. condensate quantity ($t_R$ = 86 °F (30 °C)) | gph (l/h) | 0.8 (3.1) | 0.8 (3.1) |
| 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 (Stand-by) | W | < 6 | < 6 |
| Sound pressure level | dB(A) | ≤ 44 | ≤ 44 |
| 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) | 103.6 (47) | 103.6 (47) |
| Dimensions, W x H x D | inch (mm) | 17-21/64" × 33-15/32" × 13-57/64" (440 × 850 × 353) | |

*Table 6 Technical data heating boiler ZBR35-3A...*

Inspections Division
Date: 09/18/15

## 3.15 Technical data heating boiler ZBR42-3A...

| Input/Output at elevation 0 - 2000 feet (0 - 610 m) | Unit | NG | LPG (propane) |
|---|---|---|---|
| Max. input rate 180/79 °F (82/26 °C) | BTU/hr (kW) | 151,600 (44.4) | 148,300 (43.5) |
| Max. output rate 104/86 °F (40/30 °C) | BTU/hr (kW) | 137,500 (40.3) | 137,500 (40.3) |
| Max. output rate 122/86 °F (50/30 °C) | BTU/hr (kW) | 137,500 (40.3) | 137,500 (40.3) |
| Max. output rate 176/140 °F (80/60 °C) | BTU/hr (kW) | 134,400 (39.4) | 134,400 (39.4) |
| Min. input rate 180/79 °F (82/26 °C) | BTU/hr (kW) | 36,000 (10.5) | 46,400 (13.6) |
| Min. output rate 104/86 °F (40/30 °C) | BTU/hr (kW) | 35,500 (10.4) | 46,400 (13.6) |
| Min. output rate 122/86 °F (50/30 °C) | BTU/hr (kW) | 35,100 (10.3) | 46,100 (13.5) |
| Min. output rate 176/140 °F (80/60 °C) | BTU/hr (kW) | 31,700 (9.3) | 42,000 (12.3) |
| **Input/Output at elevation 2000 - 4500 feet (611 - 1372 m) above sea level** | | | |
| Max. input rate 180/79 °F (82/26 °C) | BTU/hr (kW) | 136,440 (40.0) | 139,402 (40.9) |
| Max. output rate 104/86 °F (40/30 °C) | BTU/hr (kW) | 123,750 (36.3) | 129,250 (37.9) |
| Max. output rate 122/86 °F (50/30 °C) | BTU/hr (kW) | 123,750 (36.3) | 129,250 (37.9) |
| Max. output rate 176/140 °F (80/60 °C) | BTU/hr (kW) | 120,960 (35.5) | 126,336 (37.0) |
| **Input/Output at elevation 4500 - 7000 feet (1373 - 2134 m) above sea level** | | | |
| Max. input rate 180/79 °F (82/26 °C) | BTU/hr (kW) | 125,828 (36.9) | 129,021 (37.8) |
| Max. output rate 104/86 °F (40/30 °C) | BTU/hr (kW) | 114,125 (33.5) | 119,625 (35.1) |
| Max. output rate 122/86 °F (50/30 °C) | BTU/hr (kW) | 114,125 (33.5) | 119,625 (35.1) |
| Max. output rate 176/140 °F (80/60 °C) | BTU/hr (kW) | 111,552 (32.7) | 116,928 (34.3) |
| **Gas connection value** | | | |
| Natural Gas – $H_s$ = 1,010 BTU/ft$^3$ (37.3MJ/m$^3$) | ft$^3$/hr (m$^3$/h) | 149 (4.2) | – |
| Liquid Propane Gas – HD-S = 2,500 BTU/ft3 (93.1MJ/m3) | ft$^3$/hr (m$^3$/h) | – | 59 (1.7) |
| **Permissible inlet gas 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 | gps | 18.0/4.5 | 17.5/5.6 |
| Flue gas temperature 176/140 °F (80/60 °C) at maximum/minimum nominal heat input | °F ( °C) | 171/135 (77/57) | 171/135 (77/57) |
| Flue gas temperature 104/86 °F (40/30 °C) at maximum/minimum nominal heat input | °F ( °C) | 133/91 (56/33) | 133/91 (56/33) |
| $CO_2$ at max. nominal output | % | 9.4 | 11.0 |
| $CO_2$ at minimum nominal output | % | 8.6 | 10.4 |
| **Condensate** | | | |
| Max. condensate quantity ($t_R$ = 86 °F (30 °C)) | gph (l/h) | 0.9 (3.5) | 0.9 (3.5) |
| 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 (Stand-by) | W | < 6 | < 6 |
| Sound pressure level | dB(A) | ≤ 45 | ≤ 45 |
| 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) | 103.6 (47) | 103.6 (47) |
| Dimensions, W x H x D | inch (mm) | 17-21/64" × 33-15/32" × 13-57/64" (440 × 850 × 353) | |

*Table 7 Technical data heating boiler ZBR42-3A...*

Inspections Division
Date: 09/18/15

## 3.16 Technical data combi boiler ZWB28-3A...

| Input/Output | Unit | NG | LPG (propane) |
|---|---|---|---|
| Max. input rate 180/79 °F (82/26 °C) | BTU/hr (kW) | 100,800 (29.5) | 98,600 (28.9) |
| Max. output rate 104/86 °F (40/30 °C) | BTU/hr (kW) | 93,800 (27.5) | 93,800 (27.5) |
| Max. output rate 122/86 °F (50/30 °C) | BTU/hr (kW) | 93,100 (27.3) | 93,100 (27.3) |
| Max. output rate 176/140 °F (80/60 °C) | BTU/hr (kW) | 89,400 (26.2) | 89,400 (26.2) |
| Output rate domestic hot water (DHW), 113 °F (45 °C) | BTU/hr (kW) | 93,600 (27.4) | 93,600 (27.4) |
| Output rate domestic hot water (DHW), 140 °F (60 °C) | BTU/hr (kW) | 91,400 (26.8) | 91,400 (26.8) |
| Min. input rate 180/79 °F (82/26 °C) | BTU/hr (kW) | 24,600 (7.2) | 40,100 (11.7) |
| Min. output rate 104/86 °F (40/30 °C) | BTU/hr (kW) | 23,900 (7.0) | 39,900 (11.7) |
| Min. output rate 122/86 °F (50/30 °C) | BTU/hr (kW) | 23,900 (7.0) | 39,600 (11.6) |
| Min. output rate 176/140 °F (80/60 °C) | BTU/hr (kW) | 21,800 (6.4) | 36,200 (10.6) |
| **Gas connection value** | | | |
| Natural Gas – $H_s$ = 1,010 BTU/ft$^3$ (37.3MJ/m$^3$) | ft$^3$/hr (m$^3$/h) | 99 (2.8) | – |
| Liquid Propane Gas – HD-S = 2,500 BTU/ft3 (93.1MJ/m3) | ft$^3$/hr (m$^3$/h) | – | 39 (1.1) |
| **Permissible inlet gas 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 | 12.0/3.2 | 11.7/4.9 |
| 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) |
| $CO_2$ at max. nominal output | % | 9.4 | 11.0 |
| $CO_2$ at minimum nominal output | % | 8.6 | 10.4 |
| **Condensate** | | | |
| Max. condensate quantity ($t_R$ = 86 °F (30 °C)) | gph (l/h) | 0.6 (2.3) | 0.6 (2.3) |
| 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 (Stand-by) | W | < 6 | < 6 |
| Sound pressure level | dB(A) | ≤ 39 | ≤ 39 |
| 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) | 110.2 (50) | 110.2 (50) |
| Dimensions, W x H x D | inch (mm) | 17-21/64" × 33-15/32" × 13-57/64" (440 × 850 × 353) | |

*Table 8 Technical data combi boiler ZWB28-3A...*

Inspections Division
Date: 09/18/15

## 3.17 Technical data combi boiler ZWB35-3A...

| Input/Output | Unit | NG | LPG (propane) |
|---|---|---|---|
| Max. input rate 180/79 °F (82/26 °C) | BTU/hr (kW) | 131,900 (38.6) | 129,100 (37.8) |
| Max. output rate 104/86 °F (40/30 °C) | BTU/hr (kW) | 122,800 (36.0) | 122,800 (36.0) |
| Max. output rate 122/86 °F (50/30 °C) | BTU/hr (kW) | 121,800 (35.7) | 121,800 (35.7) |
| Max. output rate 176/140 °F (80/60 °C) | BTU/hr (kW) | 116,700 (34.2) | 116,700 (34.2) |
| Output rate domestic hot water (DHW), 113 °F (45 °C) | BTU/hr (kW) | 120,500 (35.3) | 120,500 (35.3) |
| Output rate domestic hot water (DHW), 140 °F (60 °C) | BTU/hr (kW) | 118,700 (34.8) | 118,700 (34.8) |
| Min. input rate 180/79 °F (82/26 °C) | BTU/hr (kW) | 36,000 (10.5) | 46,400 (13.6) |
| Min. output rate 104/86 °F (40/30 °C) | BTU/hr (kW) | 35,100 (10.3) | 46,100 (13.5) |
| Min. output rate 122/86 °F (50/30 °C) | BTU/hr (kW) | 34,800 (10.2) | 45,700 (13.4) |
| Min. output rate 176/140 °F (80/60 °C) | BTU/hr (kW) | 31,700 (9.3) | 42,000 (12.3) |
| **Gas connection value** | | | |
| Natural Gas – $H_s$ = 1,010 BTU/ft$^3$ (37.3MJ/m$^3$) | ft$^3$/hr (m$^3$/h) | 130 (3.7) | – |
| Liquid Propane Gas – $H_{D-S}$ = 2,500 BTU/ft$^3$ (93.1MJ/m$^3$) | ft$^3$/hr (m$^3$/h) | – | 52 (1.5) |
| **Permissible inlet gas 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 maximum/minimum nominal heat input | °F ( °C) | 162/135 (72/57) | 162/135 (72/57) |
| Flue gas temperature 104/86 °F (40/30 °C) at maximum/minimum nominal heat input | °F ( °C) | 127/91 (53/33) | 127/91 (53/33) |
| $CO_2$ at max. nominal output | % | 9.4 | 11.0 |
| $CO_2$ at minimum nominal output | % | 8.6 | 10.4 |
| **Condensate** | | | |
| Max. condensate quantity ($t_R$ = 86 °F (30 °C)) | gph (l/h) | 0.8 (3.1) | 0.8 (3.1) |
| 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 (Stand-by) | W | < 6 | < 6 |
| Sound pressure level | dB(A) | ≤ 44 | ≤ 44 |
| 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) | 110.2 (50) | 110.2 (50) |
| Dimensions, W x H x D | inch (mm) | 17-21/64" × 33-15/32" × 13-57/64" (440 × 850 × 353) | |

*Table 9 Technical data combi boiler ZWB35-3A...*

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## 3.18 Technical data combi boiler ZWB42-3A...

| Input/Output at elevation 0 - 2000 feet (0 - 610 m) | Unit | NG | LPG (propane) |
|---|---|---|---|
| Max. input rate 180/79 °F (82/26 °C) | BTU/hr (kW) | 151,600 (44.4) | 148,300 (43.5) |
| Max. output rate 104/86 °F (40/30 °C) | BTU/hr (kW) | 137,500 (40.3) | 137,500 (40.3) |
| Max. output rate 122/86 °F (50/30 °C) | BTU/hr (kW) | 137,500 (40.3) | 137,500 (40.3) |
| Max. output rate 176/140 °F (80/60 °C) | BTU/hr (kW) | 134,400 (39.4) | 134,400 (39.4) |
| Output rate domestic hot water (DHW), 113 °F (45 °C) | BTU/hr (kW) | 137,500 (40.3) | 137,500 (40.3) |
| Output rate domestic hot water (DHW), 140 °F (60 °C) | BTU/hr (kW) | 135,800 (39.8) | 135,800 (39.8) |
| Min. input rate 180/79 °F (82/26 °C) | BTU/hr (kW) | 36,000 (10.5) | 46,400 (13.6) |
| Min. output rate 104/86 °F (40/30 °C) | BTU/hr (kW) | 35,500 (10.4) | 46,400 (13.6) |
| Min. output rate 122/86 °F (50/30 °C) | BTU/hr (kW) | 35,100 (10.3) | 46,100 (13.5) |
| Min. output rate 176/140 °F (80/60 °C) | BTU/hr (kW) | 31,700 (9.3) | 42,000 (12.3) |
| **Input/Output at elevation 2000 - 4500 feet (611 - 1372 m) above sea level** | | | |
| Max. input rate 180/79 °F (82/26 °C) | BTU/hr (kW) | 136,440 (40.0) | 139,402 (40.9) |
| Max. output rate 104/86 °F (40/30 °C) | BTU/hr (kW) | 123,750 (36.3) | 129,250 (37.9) |
| Max. output rate 122/86 °F (50/30 °C) | BTU/hr (kW) | 123,750 (36.3) | 129,250 (37.9) |
| Max. output rate 176/140 °F (80/60 °C) | BTU/hr (kW) | 120,960 (35.5) | 126,336 (37.0) |
| Output rate domestic hot water (DHW), 113 °F (45 °C) | BTU/hr (kW) | 123,750 (36.3) | 129,250 (37.9) |
| Output rate domestic hot water (DHW), 140 °F (60 °C) | BTU/hr (kW) | 122,220 (35.8) | 127,652 (37.4) |
| **Input/Output at elevation 4500 - 7000 feet (1373 - 2134 m) above sea level** | | | |
| Max. input rate 180/79 °F (82/26 °C) | BTU/hr (kW) | 125,828 (36.9) | 129,021 (37.8) |
| Max. output rate 104/86 °F (40/30 °C) | BTU/hr (kW) | 114,125 (33.5) | 119,625 (35.1) |
| Max. output rate 122/86 °F (50/30 °C) | BTU/hr (kW) | 114,125 (33.5) | 119,625 (35.1) |
| Max. output rate 176/140 °F (80/60 °C) | BTU/hr (kW) | 111,552 (32.7) | 116,928 (34.3) |
| Output rate domestic hot water (DHW), 113 °F (45 °C) | BTU/hr (kW) | 114,125 (33.5) | 119,625 (35.1) |
| Output rate domestic hot water (DHW), 140 °F (60 °C) | BTU/hr (kW) | 112,714 (33.0) | 118,146 (34.6) |
| **Gas connection value** | | | |
| Natural Gas – $H_S$ = 1,010 BTU/ft$^3$ (37.3MJ/m$^3$) | ft$^3$/hr (m$^3$/h) | 149 (4.2) | – |
| Liquid Propane Gas – $H_{D-S}$ = 2,500 BTU/ft$^3$ (93.1MJ/m$^3$) | ft$^3$/hr (m$^3$/h) | – | 59 (1.7) |
| **Permissible inlet gas 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) | 3.963 (15) | 3.963 (15) |
| Nominal DHW flow rate (at 140 °F (60 °C) outlet temperature) | gpm (l/min) | 3.61 (11.4) | 3.61 (11.4) |
| 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 | 18.0/4.5 | 17.5/5.6 |
| Flue gas temperature 176/140 °F (80/60 °C) at maximum/minimum nominal heat input | °F ( °C) | 171/135 (77/57) | 171/135 (77/57) |
| Flue gas temperature 104/86 °F (40/30 °C) at maximum/minimum nominal heat input | °F ( °C) | 133/91 (56/33) | 133/91 (56/33) |
| $CO_2$ at max. nominal output | % | 9.4 | 11.0 |
| $CO_2$ at minimum nominal output | % | 8.6 | 10.4 |

*Table 10 Technical data combi boiler ZWB42-3A...*

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| Input/Output at elevation 0 - 2000 feet (0 - 610 m) | Unit | NG | LPG (propane) |
|---|---|---|---|
| **Condensate** | | | |
| Max. condensate quantity ($t_R$ = 86 °F (30 °C)) | gph (l/h) | 0.9 (3.5) | 0.9 (3.5) |
| 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 (Stand-by) | W | < 6 | < 6 |
| Sound pressure level | dB(A) | ≤ 45 | ≤ 45 |
| 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) | 110.2 (50) | 110.2 (50) |
| Dimensions, W x H x D | inch (mm) | 17-21/64" × 33-15/32" × 13-57/64" (440 × 850 × 353) | |

*Table 10 Technical data combi boiler ZWB42-3A...*

### 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:

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

*Table 11 Typical condensate composition*

## 4 Regulations

Observe all rules, regulations, standards and guidelines applicable to the installation and operation of this appliance in your country.

In the Commonwealth of Massachusetts, this appliance must be installed by a licensed plumber and gas fitter. Valves external to the boiler must be fitted with T-handles and condensate piping must be installed in accordance with the State Plumbing Code.

### 4.1 Compliance with standards and regulations

The installation must conform to the requirements of the authority having jurisdiction or, in the absence of such requirements, to the latest edition of the National Fuel Gas Code, ANSI Z223.1./NFPA 54. In Canada, installation must be in accordance with the requirements of CAN/CSA B149.1, Natural Gas and Propane Installation Code.

This wall mounted condensing gas boiler complies in its design and mode of operation with the American National Standard ANSI Z21.13/ CSA4.9, latest edition for Gas Fired Low Pressure Steam and Hot Water Boilers.

Other confirmed approvals and certifications are indicated by labels on the boiler.

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

Install CO detectors per local regulations. Boiler requires yearly maintenance (→ chapter 15, page 68).

### 4.2 Operating limits of the boiler

The heat exchanger has been designed and certified in accordance with the ASME Boiler and Pressure Vessel Code, Section IV.

| | |
|---|---|
| Maximum boiler temperature | 190 °F (88 °C) |
| Maximum operating pressure | 30 psi (2.07 bar) |

*Table 12 Operating limits*

The hot water distribution system must comply with all applicable codes and regulations. When replacing an existing boiler, it is important to check the condition of the entire hot water distribution system to ensure safe operation. Common practice calls for inspecting an existing system in its entirety and bringing it up to code. All pipework should be properly cleaned and flushed.

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

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

- The equipment listed in Chapter 10 entitled “Equipment Not Required To Be Vented” in the most 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 t 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.

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# 5 Common Applications of ZBR boilers

## 5.1 Multiple zones using zone valves with DHW

*Fig. 9 Piping*

[1] To heating zone 2
[2] Motorized valve heating zone 2
[3] To heating zone 1
[4] Motorized valve heating zone 1
[5] System pump
[6] DHW pump
[7] To indirect tank
[8] External system supply temperature sensor for system supply pipe (to be installed in closest vicinity with boiler supply Tee)
[9] Boiler primary line - supply pipe 1"
[10] Heating boiler ZBR..-3A... with FW 200 installed on front
[11] Boiler primary line - return pipe 1"
[12] From indirect tank
[13] From heating zone 1
[14] From heating zone 2
[15] Expansion vessel

X ≤ 4 × pipe diameters on boiler primery side (here ≤ 4 × 1")

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*Fig. 10 Wiring*

[1] PCB in heating boiler ZBR..-3A... with FW 200 installed on front
[2] White plug for mains power supply, 120 V AC, 60 Hz (→ chapter 7.3.4, page 49)
[3] 120 V AC, 60 Hz
[4] Red plug for external DHW tank (→ chapter 7.3.3, page 49)
[5] DHW pump
[6] Black plug for extermnal (system) pump (→ chapter 7.3.2, page 48)
[7] System pump
[8] DPDT Relay
[9] Motorized valve heating zone 2
[10] Motorized valve heating zone 1
[11] 24 V AC transformer
[12] Outdoor temperature sensor
[13] LWCO (Low Water Cut Off, 24V AC Transformer required)
[14] DHW temperature sensor (connection with clear connector)
[15] External supply temperature sensor (connection with white plug)

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## 5.2 Multiple zones using circulators with DHW

*Fig. 11 Piping*

[1] To heating zone 2
[2] Pump heating zone 2
[3] To heating zone 1
[4] Pump heating zone 1
[5] To indirect tank
[6] DHW pump
[7] External system supply temperature sensor for system supplypipe (to be installed in closest vicinity with boiler supply Tee)
[8] Boiler primary line - supply pipe 1"
[9] Heating boiler ZBR..-3A... with FW 200 installed on front
[10] Boiler primary line - return pipe 1"
[11] From indirect tank
[12] From heating zone 1
[13] From heating zone 2
[14] Expansion vessel

X ≤ 4 × pipe diameters on boiler primery side (here ≤ 4 × 1")

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*Fig. 12 Wiring*

[1] PCB in heating boiler ZBR..-3A... with FW 200 installed on front
[2] White plug for mains power supply, 120 V AC, 60 Hz
(→ chapter 7.3.4, page 49)
[3] 120 V AC, 60 Hz
[4] Red plug for external DHW tank (→ chapter 7.3.3, page 49)
[5] DHW pump
[6] Taco Circulator Relay (SR504)
[7] Pump heating zone 1
[8] Pump heating zone 2
[9] Outdoor temperature sensor
[10] LWCO (Low Water Cut Off, 24V AC Transformer required)
[11] DHW temperature sensor (connection with clear connector)
[12] External supply temperature sensor (connection with white plug)

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# 6 Installation

**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.

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.

## 6.1 Notes on 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**

| Total length DHW/recirculation line | Flow rate |
|---|---|
| ≤ 33 ft (10 m) | 0.66 gpm (2.5 l/min) |
| 33 - 66 ft (10 - 20 m) | 0.92 gpm (3.5 l/min) |
| 66 - 98 ft (20 - 30 m) | 1.32 gpm (5 l/min) |

*Table 13 Recommended flow rates*

Use service function **6.d**, to determine the current flow rate (→ page 62).

Electrical connection of the DHW recirculation pump (→ page 48).

Connect the DHW recirculation line with the cold water inlet as close as possible to the Hydraulics connection plate.

**Open vented heating systems**

- ▶ Convert open vented heating systems into closed systems.

**Gravity heating systems**

- ▶ Connect the appliance to the existing piping system via a low-loss header with a sludge separator.

**Galvanized radiators or pipes.**

To prevent gas formation:

- ▶ Do not use galvanized radiators or pipes.

**Plastic pipework**

If using plastic pipework 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**

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.

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

| Chemical Name | Concentration |
|---|---|
| Nalco (Varidos) FSK | 22 - 55 % |
| Fernox Alphi 11 | Observe manufacturer's instructions |
| Intercool NFP-50 AA | 0 - 39 % |
| Antifrogen N | Observe manufacturer's instructions |
| NoBurst AL | 0 - 55 % |

*Table 14 Anti-freeze*

**Corrosion inhibitors**

The following anti-corrosion agents are approved:

| Chemical Name | Concentration |
|---|---|
| Fernox F1 | Observe manufacturer's instructions |
| Nalco 77381 | 1 - 2 % |
| Sentinel X 100 | 1.1 % |

*Table 15 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 fl ow 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 untr boiler condensate into them.
- Verify with the local authority that disposing of untreated boiler condensate into public sewer systems is permitted.

## 6.2 Comparing the size of the integrated expansion vessel

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:

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

*Fig. 13 Operating capacity of the expansion vessel in °F and gallons*

*Fig. 14 Operating capacity of the expansion vessel in °C and liters*

**Key to Fig. 13 and Fig. 14:**

[I] Precharge pressure 7.25 psi (0.5 bar) (default setting)
[II] Precharge pressure 10.9 psi (0.75 bar)
[III] Precharge 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.

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

### External expansion vessel

▶ Determine size of the expansion vessel.

*Fig. 15 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, methylene chloride, carbon tetrachloride, hydrochloric acid |
| **Workshop** | |
| Solvents and thinners | Various chlorinated hydrocarbons |
| Aerosols | Chlorofluorinated hydrocarbons (difluorodichloromethane) |

*Table 16 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/CGA B 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 Pre-installing pipes

▶ Secure the installation template (supplied with the technical documentation) to the wall; observe the minimum side clearances of 4 inches (102 mm) (→ page 9).
▶ Drill holes for the appliance and for the hydraulics connection plate in accordance with the mounting template.

*Fig. 16 Mounting template*

**NOTICE:** For walls with insufficient load capacity, the appliance and the hydraulics connection plate must be mounted on a sheet of plywood or similar reinforcement.

▶ Remove the mounting template.

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▶ Secure the hydraulics connection plate and the mounting bracket with the mounting kits supplied.

*Fig. 17 Mounting of the hydraulics connection plate and the mounting bracket*

*Fig. 18 Hydraulics connection plate for heating boiler ZBR..-3A (front view)*

[1] Heating supply, R 1" NPT
[2] Gas, R 3/4" NPT
[3] Heating return, R 1" NPT

*Fig. 19 Hydraulics connection plate for heating boiler ZBR..-3A (top view)*

*Fig. 20 Hydraulics connection plate for combi boiler ZWB..-3A (front view)*

[1] Heating supply, R 1" NPT
[2] DHW, R 3/4" NPT
[3] Gas, R 3/4" NPT
[4] Cold water, R 3/4" NPT
[5] Heating return, R 1" NPT

*Fig. 21 Hydraulics connection plate for combi boiler ZWB..-3A (top view)*

▶ Determine pipe size for the gas supply.

▶ To fill and drain the system, install a fill and drain valve at the lowest point.

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## 6.6 Mounting 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 32).

- ▶ 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 10).

**Removing the cover**

The cover is secured with two screws against unintentional removal (electrical safety).
- ▶ Always keep the cover secured with these screws.

- ▶ Undo screws (step 1).
- ▶ Lift strap (step 2) and remove cover toward the front (step 3).

*Fig. 22 Remove the cover*

**Hanging the appliance**

- ▶ Place flat gaskets on the connections of the hydraulic bracket.
- ▶ Hang appliance on the mounting bracket.
- ▶ Tighten the union nuts on the pipe connections.

## 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). The boiler is equipped with a dedicated port for installation of a LWCO on the supply pipe inside 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). It needs a dry contact.

The following LWCO is approved with the boiler:
- Hydrolevel Safgard 1100

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

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

The Hydrolevel Safgard 1100 is installed in the supply pipe to the left of the heat exchanger.
- ▶ Disconnect the boiler from power by shutting off the emergency shutoff switch or disengaging the heating system circuit breaker.
- ▶ Drain the boiler.
- ▶ Remove the safety clip from the dummy plug in the supply pipe (step 1).
- ▶ Pull off the dummy plug (step 2) 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*

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▶ 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*

▶ Push the adapter with the LWCO onto the pipe (step 1) and secure with the clip (step 2).

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

▶ Connect the wires of the LWCO (→ chapter 7.4, page 50).

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

In case of 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.

▶ Install the vent flange and gasket with the screws enclosed.

*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] Vent flange
[2] Flue gas adapter
[3] Combustion air test port
[4] Flue gas test ports

▶ Tighten the screws.

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

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In case of **open venting**:

▶ Use basket on the air intake.

In case of **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.

*Fig. 29 Installing the concentric vent adaptor*

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

### 6.8.1 Installation of the exhaust and air intake system

**NOTICE:**
▶ 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.

**DANGER:**
▶ 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 nor a thermally controlled vent damper with this boiler.
▶ Connect only one boiler to each flue system or chimney flue.
▶ 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.

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).

**DANGER:** 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.

**NOTICE:**
▶ 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.

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**Direct vent installations (sealed combustion)**

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

*Fig. 30 Vent and 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], [$X_1$], [$X_3$], page 41).

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 [$Y_A$], page 41).

Vent termination must be at least 7 feet (2135 mm) above a public walkway (→ fig. 31 [$X_5$], page 41). 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], [$Y_B$], page 41).

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 [$X_2$], [$X_4$], page 41).

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

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

All PVC/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.

**NOTICE:** Damage of 2 inch PVC pipes.
▶ For ZBR42-3A and ZWB42-3A use 2 inch CPVC-pipes or 3 inch pipes.

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

| Material | Item | United states | Canada | ZBR16-3A | ZBR28-3A | ZBR35-3A | ZBR42-3A | ZWB28-3A | ZWB35-3A | ZWB42-3A |
|---|---|---|---|---|---|---|---|---|---|---|
| PVC schedule 40, 80 | 2" (50 mm) Vent or air pipe and fitting | ANSI/ASTM D1785 | BH Gas venting systems, ULC S636 [1], Class IIA - PVC, Class IIB - CPVC, Class IIC - Polypropylene (certified to ULC S636) | X | X | X | | X | X | |
| PVC-DWV | | ANSI/ASTM D2665 | | X | X | X | | X | X | |
| CPVC schedule 40, 80 | | ANSI/ASTM F441 | | X | X | X | X | X | X | X |
| PVC schedule 40, 80 | 3" (76 mm) Vent or air pipe and fitting | ANSI/ASTM D1785 | | X | X | X | X | X | X | X |
| PVC-DWV | | ANSI/ASTM D2665 | | X | X | X | X | X | X | X |
| CPVC schedule 40, 80 | | ANSI/ASTM F441 | | X | X | X | X | X | X | X |
| PP rigid venting | 3" (80 mm) vent or air pipe M&G Duravent PolyPro and Centrotherm InnoFlue | ANSI Cat IV Approved Polypropylene | | X | X | X | X | X | X | X |
| PP rigid venting | 2" (50 mm) vent or air pipe M&G Duravent PolyPro and Centrotherm InnoFlue | ANSI Cat IV Approved Polypropylene | | X | X | X | | X | X | |
| PP rigid venting | 3"/5" (80/125 mm) concentric (Bosch, manufactured by M&G Duravent) | ANSI Cat IV Approved Polypropylene | | X | X | X | X | X | X | X |
| PP rigid venting | | ANSI Cat IV Approved Polypropylene | | X | X | X | X | X | X | X |

*Table 17 Materials for pipe*

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| Material | Item | United states | Canada | ZBR16-3A | ZBR28-3A | ZBR35-3A | ZBR42-3A | ZWB28-3A | ZWB35-3A | ZWB42-3A |
|---|---|---|---|---|---|---|---|---|---|---|
| PP-Flex | 3" (80 mm) vent or air pipe M&G Duravent PolyPro and Centrotherm InnoFlue | ANSI Cat IV Approved Polypropylene | BH Gas venting systems, ULC S636 [1], Class IIA - PVC, Class IIB - CPVC, Class IIC - Polypropylene (certified to ULC S636) | X | X | X | X | X | X | X |
| PP-Flex | 2" (50 mm) vent or air pipe M&G Duravent PolyPro and Centrotherm InnoFlue | ANSI Cat IV Approved Polypropylene | | X | X | X | | X | X | |
| PVC | Pipe cement/primer | ANSI/ASTM D2564 | | X | X | X | X | X | X | X |
| CPVC | | ANSI/ASTM F493 | | X | X | X | X | X | X | X |

*Table 17 Materials for pipe*

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 | Material | Supplier | Part number |
|---|---|---|---|
| Ø 3" / Ø 5" (Ø 76/125 mm) | concentric PVC | IPEX System 636 | 196006 |
| Ø 3" / Ø 5" (Ø 76/125 mm) | concentric CPVC | IPEX System 636 | 197009 |
| Ø 3" / Ø 5" (Ø 80/125 mm) | concentric PP | M&G Duravent PolyPro and Centrotherm InnoFlue | 3PPS-VK (-TC) (M&G Duravent) or ICRT3539 (Centrotherm) |
| Ø 3" (80 mm) | PolyPro Flex Chimney Cap (PP) | M&G Duravent PolyPro<br>Centrotherm InnoFlue | 3PPS-FCT<br>ISCP03 |
| with base support | PolyPro Support Elbow<br>Base Suport + SW to Flex Coupler | M&G Duravent PolyPro<br>Centrotherm InnoFlue | 3PPS-SE90X<br>ISBS0387 + IFSFC03 |
| Ø 2" (50 mm) | PolyPro Flex Chimney Cap (PP) | M&G Duravent PolyPro<br>Centrotherm InnoFlue | 2PPS-FCT<br>ISCP02 |
| with base support | PolyPro Support Elbow<br>Base Suport + SW to Flex Coupler | M&G Duravent PolyPro<br>Centrotherm InnoFlue | 2PPS-SE90X<br>ISBS0287 + IFSFC02 |

*Table 18 Roof terminals*

| Wall terminals | Flue System / Materials | Supplier | Part number |
|---|---|---|---|
| Ø 3" (Ø 76 mm) | parallel stainless steel | Flex-L | 46546901 |
| 90°-elbow with inlet screen | PVC (elbow)<br>stainless steel (screen) | IPEX (elbow)<br>Langly Wire (screen) | ULC S636 approval (elbow)<br>L2594 (screen) |
| Ø 3" (Ø 76 mm) twin pipe termination | PP | M&G Duravent PolyPro | 3PPS-HTP |
| Ø 3" (Ø 76 mm) single pipe termination | PP | M&G Duravent PolyPro | 3PPS-HST |
| Ø 3" / Ø 5" (Ø 80/125 mm) Bosch Greenstar Horizontal Telescopic Terminal Kit | PP | Bosch (manufactured by M&G Duravent) | 7738003218 |

*Table 19 Wall terminals*

**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!

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**NOTICE:**

- Vent terminations must keep the following minimum clearances from electric meters, gas meters, regulators and relief equipment: 4 feet (1220 mm) [Canada 6 feet (1830 mm)] horizontally and in no case above and below, unless a horizontal distance of 4 feet (1220 mm) [Canada 6 feet (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
$X_1$ 1 foot (305 mm)
$X_2$ Clearance in accordance with local installation codes and the requirements[1)]
$X_3$ 1 foot (305 mm) USA
3 feet (915 mm) Canada
$X_4$ Clearance in accordance with local installation codes and the requirements[1)]
$X_5$ 7 feet (2135 mm)[2)]
$Y_A$ At least 1 foot (305 mm) above grade or snow line
$Y_B$ 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
$X_1$ 1 foot (305 mm)
$X_2$ Clearance in accordance with local installation codes and the requirements[1)]
$X_3$ 1 foot (305 mm) USA
3 feet (915 mm) Canada
$X_4$ Clearance in accordance with local installation codes and the requirements[1)]
$X_5$ 7 feet (2135 mm)[2)]
$Y_A$ At least 1 foot (305 mm) above grade or snow line
$Y_B$ 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.

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### 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

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*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

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*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

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

[1] Intake
[2] Exhaust

*Fig. 41 Horizontal venting system (telescopic concentric vent kit)*

### 6.8.3 Vent and combustion air pipe lengths

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.

**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. 20, 21 and 22) depend on the installation situation, the appliance type and the number of elbows used.

| Installations → Fig. 32, 33, 34, 36, 37 and 39<br>Separate terminations | | |
|---|---|---|
| 2" PIPE | Maximum straight vent pipe length allowed for Ø 2" pipe | |
| Number of 90° elbows used | ZBR16-3A<br>ZBR21-3A<br>ZBR28-3A<br>ZWB28-3A | ZBR35-3A<br>ZWB35-3A<br>ZBR42-3A<br>ZWB42-3A |
| **1** | 81 ft (24.6 m) | 65 ft (19.8 m) |
| **2** | 76 ft (23.1 m) | 57 ft (17.3 m) |
| **3** | 71 ft (21.6 m) | 48 ft (14.6 m) |
| **4** | 66 ft (20.1 m) | 40 ft (12.2 m) |
| **5** | 61 ft (18.6 m) | 32 ft (9.8 m) |
| **6** | 56 ft (17.1 m) | 23 ft (7.0 m) |

*Table 20 Vent and combustion air pipe lengths with 2" diameter and separate terminations*

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| Installations → Fig. 35 Stainless steel wall termination | | |
|---|---|---|
| 2" PIPE | Maximum straight vent pipe length allowed for Ø 2" pipe | |
| Number of 90° elbows used | ZBR16-3A<br>ZBR21-3A<br>ZBR28-3A<br>ZWB28-3A | ZBR35-3A<br>ZWB35-3A<br>ZBR42-3A<br>ZWB42-3A |
| **1** | 76 ft (23.1 m) | 60 ft (18.3 m) |
| **2** | 71 ft (21.6 m) | 52 ft (15.9 m) |
| **3** | 66 ft (20.1 m) | 43 ft (13.1 m) |
| **4** | 61 ft (18.6 m) | 35 ft (10.7 m) |
| **5** | 56 ft (17.1 m) | 27 ft (8.2 m) |
| **6** | 51 ft (15.6 m) | 18 ft (5.5 m) |

*Table 21 Vent and combustion air pipe lengths with 2" diameter and the stainless steel wall termination*

| Installations → Fig. 38 Concentric termination | | |
|---|---|---|
| 2" PIPE | Maximum straight vent pipe length allowed for Ø 2" pipe | |
| Number of 90° elbows used | ZBR16-3A<br>ZBR21-3A<br>ZBR28-3A<br>ZWB28-3A | ZBR35-3A<br>ZWB35-3A<br>ZBR42-3A<br>ZWB42-3A |
| **1** | 66 ft (20.1 m) | 47 ft (14.3 m) |
| **2** | 61 ft (18.6 m) | 38 ft (11.6 m) |
| **3** | 56 ft (17.1 m) | 30 ft (9.1 m) |
| **4** | 51 ft (15.6 m) | 22 ft (6.7 m) |
| **5** | 46 ft (14.1 m) | 13 ft (4.0 m) |
| **6** | 41 ft (12.5 m) | 5 ft (1.5 m) |

*Table 22 Vent and combustion air pipe lengths with 2" diameter and the concentric termination*

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

The maximum concentric pipe length (→ tab. 23) depends on the installation situation, the appliance type and the number of elbows used.

| Installations → Fig. 41 | | |
|---|---|---|
| Ø 3" / Ø 5" (Ø 80/ 125 mm) CONCENTRIC PIPE | Maximum straight vent pipe length allowed for Ø 3" / Ø 5" (Ø 80/125 mm) concentric pipe | |
| Number of 90° elbows used | ZBR16-3A<br>ZBR21-3A<br>ZBR28-3A<br>ZWB28-3A | ZBR35-3A<br>ZWB35-3A<br>ZBR42-3A<br>ZWB42-3A |
| **1** | 50 ft (15.2 m) | 44 ft (13.4 m) |
| **2** | 44 ft (13.4 m) | 38 ft (11.6 m) |
| **3** | 38 ft (11.6 m) | 32 ft (9.8 m) |
| **4** | 32 ft (9.8 m) | 26 ft (7.9 m) |
| **5** | 26 ft (7.9 m) | 20 ft (6.1 m) |
| **6** | 20 ft (6.1 m) | 14 ft (4.3 m) |

*Table 23 Pipe lengths with Ø 3" / Ø 5" (Ø 80/125 mm) diameter and termination*

| Fitting | Equivalent | |
|---|---|---|
| | ft | m |
| 45° elbow | 3 | 0.91 |
| 90° elbow | 6 | 1.82 |

*Table 24 Concentric pipe friction loss equivalent for fittings*

Example:
- Model: **ZBR28-3A**
- 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

**NOTICE:** System damage!
Pressure, control and safety equipment may be damaged by excessive pressure.
- ▶ When you carry out a leakage test, make sure that no pressure, control or safety equipment is installed that cannot be isolated from the test pressure.
- ▶ The boiler and its dedicated shutoff valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of 14" W.C. (35 mbar).

**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.

# 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 reconnection.
- ▶ 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 C221.1, Electrical Code.

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Provide a dedicated circuit breaker for the boiler and heating system rated at least 15A. All line voltage wiring must use at least AWG14 size cables.

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. 8, page 16).

Replacement fuses can be found on the back of the cover (→ Fig. 43).

**Controls and modules**

For installation and electrical connection of controls and modules, see the installation instructions of the accessory.

## 7.2 Low voltage electrical connections in the Heatronic boiler control

### 7.2.1 Open the Heatronic boiler control

**NOTICE:** Small pieces of wire can cause shorts and damage the electronics.
▶ Always strip cables away from electronics.

▶ Unhook the clip (step 1) and fold the Heatronic down (step 2).

*Fig. 42 Fold the Heatronic down*

▶ Remove screws (step 1), unhook cable and remove cover (step 2).

*Fig. 43 Remove the cover*

### 7.2.2 Connecting the outdoor temperature sensor

▶ Connecting the controls automatically establishes the internal communications BUS connection (→ see installation instructions for the controls).
▶ Punch out plastic insert.
▶ Connect cable of the outdoor temperature sensor according to Fig. 44.
▶ Insert cable for the outdoor temperature sensor.
▶ Secure the cable with the strain relief.

*Fig. 44 Electrical wiring outdoor temperature sensor*

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### 7.2.3 Connecting the DHW tank temperature sensor (only heating boiler ZBR..-3A)

Wire the DHW tank temperature sensor directly to the appliance terminals. The sensor is provided with the appliance.

Do not exceed a sensor cable length of 33 feet (10 m).

- ▶ Punch out plastic insert.
- ▶ Plug connector into the circuit board.
- ▶ Insert the cable of the DHW tank temperature sensor.
- ▶ Secure the cable with the strain relief.

*Fig. 45 Electrical connections DHW tank temperature sensor*

### 7.2.4 Connecting additional accessories

- ▶ For splash-proof (IP) strain relief, cut the grommet to match the diameter of the cable.

*Fig. 46 Cut off grommets*

- ▶ Feed cable through strain relief and connect accordingly.
- ▶ Secure the cable on the strain relief.

**Bosch room controls**

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

For installation and electrical connection of the FB 100 remote control, see installation instructions for the remote control.

**Connecting temperature guard TB 1 (external manual reset high limit or low water cut off (LWCO))**

This connection allows the installation of external safety switches.

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

*Fig. 47 Electrical wiring TB1*

When the temperature guard trips, central heating and DHW modes are interrupted.

**Connecting the supply temperature sensor (e.g. for low-loss header or system supply pipe)**

Do not exceed a sensor cable length of 33 feet (10 m).

> Supply temperature sensor for system supply pipe (→ Fig. 48 [2]) must be installed in closest vicinity with boiler supply Tee.

*Fig. 48 Mounting supply temperature sensor right next to boiler supply*

[1] System secondary line – supply pipe
[2] Supply temperature sensor for system supply pipe
[3] Boiler primary line – supply pipe 1"
[4] Boiler primary line – return pipe 1"
[5] System secondary line – return pipe

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*Fig. 49 Electrical wiring of external supply temperature sensor*

The service function 7.d connection of an external supply temperature sensor is automatically set to **01** (→ page 63).

**Connecting Third party room thermostats or zone controls**

A voltage free (dry contact) third party room thermostat or heat demand from a relay panel can be used to send an ON/OFF signal to the appliance.

*Fig. 50 Electrical wiring third party room thermostat or zone control*

To communicate a heat demand the third party room thermostat or zone control must connect pins 2 and 4.

## 7.3 Electrical connections in the junction box (120 VAC

### 7.3.1 Mounting rails for junction box

- ▶ Hold the rail against the appliance from below (step 1) and fasten with the screws from the outside or inside (step 2).
- ▶ Loosen junction box from the rail (step 3).

*Fig. 51 Mounting rails for junction box*

### 7.3.2 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. 53.
- ▶ Connect cable to **the black plug** according to Fig. 52.

*Fig. 52 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)

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▶ Connect black plugs and insert grommet until stop.

*Fig. 53 Cable connected (external pump)*

▶ Use service function 5.E, to set connection to **01** (DHW recirculation pump) (→ page 62)

**-or-**

▶ Use service function 5.E to set connection to **02** (external heating zone pump in an unmixed heating circuit) (→ page 62).

**-or-**

▶ Use service function 5.E to set connection to **03** (external heating pump) (→ page 62).

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

### 7.3.3 DHW tank loading pump or 3-way valve with spring return (only heating boiler ZBR..-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. 55.

▶ Connect cable to **the red plug** according to Fig. 54.

*Fig. 54 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. 55 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 59).

### 7.3.4 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. 57.

▶ Connect cable to **the white plug** according to Fig. 56.

*Fig. 56 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)

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▶ Connect white plugs and insert grommet until stop.

*Fig. 57 Cable connected (mains power supply)*

▶ Mount junction box on the rail.

## 7.4 Connecting the LWCO device

**NOTICE:** System damage or malfunction!
- ▶ Ensure the air box remains air-tight when routing the LWCO cable to the outside.
- ▶ Do not route the LWCO cable through the ignition cable grommet as appliance malfunction may occur.

▶ Punch a hole (maximum diameter 3/16" (5 mm)) through the fan cable grommet (steps 1 – 3) and run the LWCO cable through it.

*Fig. 58 Punch a hole in fan cable grommet for LWCO cable*

▶ 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. 56 [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.

▶ Connect the leads labeled SWITCH CONTACT (yellow) to the TB1 temperature guard (→ Fig 47, page 47) on the Heatronic.

*Fig. 59 Wires of a LWCO device with LWCO adapter*

[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)

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# 8 Commissioning

*Fig. 60 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] Automatic air vent (ZWB..-3A combi boilers only)
[10] Boiler water pressure gauge
[11] DHW thermostat
[12] Safety relief valve discharge hose
[13] Condensate drain hose
[14] Heating return pipe
[15] Cold water pipe (ZWB..-3A combi boilers only)
[16] Gas pipe
[17] DHW pipe (ZWB..-3A combi boilers only)
[18] Supply pipe
[19] Boiler high limit dial

## 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 vessel pre-charge pressure to the static head of the heating system (→ page 33).
▶ Open radiator and zone valves (as applicable).
▶ Open heating supply and return valves, fill heating system to 14.5 to 21.75 psi (1 - 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 ZBR..-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.

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## 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 63)

*Fig. 61 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 in alternation with the supply temperature.

▶ Open the automatic vent [9] (only combi boiler ZWB..-3A) and close it again when the purging sequence has finished (→ page 51).

If the display shows in alternation with the supply temperature, the trap filling function is active (→ page 62).

**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.

| Boiler high limit dial | Typical supply temperatures | Sample application |
|---|---|---|
| 1 | approx. 95 °F (35 °C) | Frost protection |
| 2 | approx. 109 °F (43 °C) | |
| 3 | approx. 122 °F (50 °C) | Radiant floor heating system |
| 4 | approx. 140 °F (60 °C) | Panel radiator system |
| 5 | approx. 153 °F (67 °C) | Cast iron radiator system |
| 6 | approx. 167 °F (75 °C) | |
| max | approx. 194 °F (90 °C) | Baseboard and convector system |

*Table 25 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 .

*Fig. 62 Switch on heat*

If the burner is operating, the burner operation indicator lamp is illuminated.

## 8.4 Programming the FW 200 heating control unit

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 outdoor reset 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

*Fig. 63 FW 200 heating control with front flap closed / flap opened*

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**Legend to Fig. 63:**

[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

## 8.5 FW 200 heating control quick start

This is a quick reference to highlight the BASIC programming of this control. For a more in depth understanding or complete programming of the control, please refer to the FW 200 Installation and Operating manuals.

**Instructions for programming**

In the following description, at any time, pressing the menu button (→ Fig. 63, [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. 63, [1]) to adjust time and date.
▶ Press the dial to confirm the setting.

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

▶ Press and hold the menu button (→ Fig. 63, [5]) until this prompt disappears.

Set Date and Time after intitial programming:

▶ Press the menu button (→ Fig. 63, [5]).
**Vacation** will be highlighted.
▶ Turn the dial (→ Fig. 63, [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 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. 63, [2]) to the comfort symbol (☼).
- Or by changing the programming.

To change programming:

▶ Press the menu button (→ Fig. 63, [3]).
**Vacation** will be highlighted.
▶ Turn the dial one click counter-clockwise to highlight **Heating**.
▶ Press the dial .
**Program** will be highlighted.
▶ Press the dial .
**Activate** will be highlighted.
▶ Turn the dial 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 counter-clockwise to highlight **All days**.
▶ Press the dial .
**P1** will be highlighted.
▶ Press the dial .
The display will fl ash.
▶ Turn the dial one click 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 seperate default presets: Baseboard, Radiators, Radiant Floor. They have an approximate basepoint of 75 °F. With this basepoint, 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 fl ash.
▶ 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 fl ash.
This is the supply temperature at 65 °F (18 °C) outdoor temperature.
▶ Set accordingly (→ Fig. 64).
▶ 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.

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- ▶ Turn the dial until **Design Temp** will be highlighted.
- ▶ Press the dial .
  **168 °F** (75 °C) will fl ash. This is the supply temperature at 5 °F ( – 15 °C) outdoor temperature.
- ▶ Set accordingly (→ Fig. 64).
- ▶ Press the dial to confirm the setting.

Refer to the FW 200 Installation and Operating Instructions for more custom settings.

*Fig. 64*

[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)
[4] Minimum Design Temperature Adjustment 86 °F (30 °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 menu to return to main display.

### 8.5.4 Adjusting warm weather shut down (WWSD)

- ▶ To open **INSTALLER SETTINGS**: press and hold the menu button menu 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 fl ash.
  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 menu and the delete button until a count down display appears.
- ▶ Continue holding the menu button menu 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 67).
- ▶ 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 62). Repeat the procedure several times until condensate starts running out.
- ▶ Complete commissioning report (→ page 81).

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## 8.7 ZBR..-3A appliances (heating boilers) with DHW tank: Setting the DHW temperature

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

*Fig. 65 Set the DHW temperature (heating boiler ZBR..-3A)*

| DHW thermostat | Typical DHW temperatures |
|---|---|
| min | approx. 59 °F (15 °C) |
| e | approx. 131 °F (55 °C) |
| max | approx. 158 °F (70 °C) |

*Table 26 Typical DHW temperatures for heating boiler ZBR..-3A*

**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 56).

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 ZWB..-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. 66 Set the DHW temperature (combi boiler ZWB..-3A)*

| DHW thermostat | Typical DHW temperatures |
|---|---|
| min | approx. 104 °F (40 °C) |
| e | approx. 122 °F (50 °C) |
| max | approx. 140 °F (60 °C) |

*Table 27 Typical DHW temperatures for combi boiler ZWB..-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.
▶ Observe frost protection measures where there is a risk of frost (→ Chapter 8.10).

▶ Make a note of the setting of the boiler high limit dial .

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▶ Turn the boiler high limit dial counterclockwise to ❄.

*Fig. 67 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. 25, page 52).

*Fig. 68 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. 14, page 32) 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. 25, page 52).

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

*Fig. 69 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 Lo and the heating supply temperature are alternating on the display.

*Fig. 70 Key pad lock*

Unlocking the key pad:

▶ Press the key pad lock button until the display shows only the supply temperature.

# 9 ZBR..-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)).

*Fig. 71 Thermal disinfection*

▶ 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.

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# 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.

*Fig. 72 Pump curve of the boiler pump heating boiler ZBR..-3A*

*Fig. 73 Pump curve of the boiler pump combi boiler ZWB..-3A*

**Key to Fig. 72 and Fig. 73:**

[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)
**V̇** 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.

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# 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 58.

*Fig. 74 Overview of the controls*

[1] Emissions test button
[2] Service button
[3] Display
[4] ECO button, service functions “up”
[5] Key pad lock, service functions “down”

### 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).
- ▶ Repeatedly press the key pad lock button or ECO button to scroll to the desired service function.
- ▶ Press and release the emissions test button .
  The emissions test button will light up and the display shows the setting for the selected service function.

### 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 81).

### Saving the value

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

The unit automatically exits the service level if no button is pressed for 15 minutes.

### 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:

- ▶ 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.

## 11.2 Overview of the service functions

### 11.2.1 First service level (press and hold the service button until it lights up)

| Service function<br>Display | | Page |
|---|---|---|
| **1.A** | Maximum space heating output | 59 |
| **1.b** | Maximum DHW output | 59 |
| **1.E** | Pump mode for space heating operation | 59 |
| **1.F** | Pump mode | 59 |
| **2.A** | Heating circuit pump lockout time | 60 |
| **2.b** | Maximum supply temperature | 60 |
| **2.C** | Purging function | 60 |
| **2.d** | Thermal disinfection | 60 |
| **2.F** | Operating mode | 60 |
| **3.A** | Automatic anti-cycle function | 60 |
| **3.b** | Set anti-cycle time | 61 |
| **3.C** | Switching differential (hysteresis) | 61 |
| **3.d** | Minimum output (heating and DHW) | 61 |
| **3.E** | Cycle time, keeping DHW hot | 61 |
| **3.F** | Constant DHW period | 61 |
| **4.b** | Maximum heat exchanger temperature | 61 |
| **4.d** | Audible fault warning tone | 61 |
| **4.E** | Appliance type | 61 |
| **4.F** | Condensate trap filling sequence | 62 |
| **5.A** | Reset inspection interval | 62 |
| **5.b** | Fan post purge time | 62 |
| **5.E** | Functionality of black plug in boiler junction box | 62 |
| **5.F** | Set inspection interval | 62 |
| **6.A** | Display the latest fault code | 62 |
| **6.b** | Room temperature control, current voltage, terminal 2 | 62 |
| **6.C** | Supply temperature required by outdoor reset control | 62 |
| **6.d** | Current DHW turbine flow rate | 62 |
| **7.A** | Indicator lamp for burner operation / faults | 62 |
| **7.b** | 3-way valve in center position | 63 |
| **7.d** | Connecting an external supply or low-loss header temperature sensor | 63 |
| **7.E** | Building drying function | 63 |
| **0.A** | Do not use this setting! | 63 |
| **0.d** | Altitude adjustment | 63 |
| **0.E** | Metric or US customary units | 63 |

*Table 28 Service functions, 1st level*

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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)

| Service function Display | | Page |
|---|---|---|
| **8.A** | Software version | 63 |
| **8.b** | Code plug number | 63 |
| **8.C** | GFA Gas burner control status | 63 |
| **8.d** | GFA Gas burner control fault | 63 |
| **8.E** | Restore boiler to factory settings | 64 |
| **8.F** | Permanent ignition | 64 |
| **9.A** | Constant mode | 64 |
| **9.b** | Current fan speed | 64 |
| **9.C** | Current boiler output | 64 |
| **9.d** | Set fan start speed | 64 |
| **9.E** | Turbine signal delay | 64 |
| **9.F** | Heating zone pump post purge | 64 |
| **A.b** | Display DHW temperature | 64 |
| **A.C** | Display DHW tank temperature | 64 |
| **b.F** | Solar DHW backup heating delay | 64 |
| **C.d** | Display current heat demand | 64 |

*Table 29 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 between 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 81).
- ▶ 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 81).
- ▶ 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**

If an outdoor temperature sensor for an outdoor reset 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 outdoor reset control. The heating zone pump is only switched on when needed.

**Default setting** is **00**.

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

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

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**.

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

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

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 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 ZBR..-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 61).

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).

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### 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 ZWB..-3A)

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

This service function is only active in comfort mode.

It specifies the time from completion of preheating or DHW demand until the next time the plate-type heat exchanger is heated up. This prevents the plate-type heat exchanger from overheating.

The cycle time can be set from **20** to **60** minutes.

**Default setting** is **20** (20 minutes).

### Service function 3.F: Constant DHW period (only combi boiler ZWB..-3A)

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

The constant DHW period specifies how long the space heating mode remains disabled after DHW is drawn.

The duration for keeping DHW hot can be set from **00** to **30** (0 to 30 minutes).

**Default setting** is **01** (1 minute).

### Service function 4.b: Maximum heat exchanger temperature (only combi boiler ZWB..-3A)

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

This function can be used to reduce limestone built-up in the heat exchanger, which increases with temperature. The maximum heat exchanger temperature can be set in steps of 1 °F (0.5 °C).

Service function **0.E** is set to **00** (metric units):

- The maximum temperature for keeping the heat exchanger hot can be set from **40** to **65** (40 to 65 °C).

Service function **0.E** is set to **01** (US-customary units):

- The maximum temperature for keeping the heat exchanger hot can be set from **104** to **150** (104 to 150 °F).

**Default setting** is 140 (140 °F (60 °C)).

### Service function 4.d: Audible fault warning tone

The appliance can be set to sound an audible alarm to alert the operator of a fault present. The audible warning tone can be deactivated with the service function 4.d.

- **00**: Warning tone off
- **01**: Warning tone on

**Default setting** is **01** (ON).

### Service function 4.E: Appliance type

This service function displays the appliance type detected.

Possible displays are:

- **00**: Central heating only
- **01**: Combi appliance
- **02**: DHW tank temperature sensor (NTC) connected to Heatronic.
- **03**: DHW tank thermostat connected to Heatronic.
- **04**: Stratified DHW tank
- **05**: Tank with NTC return

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### 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 ⊣⊢ 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 ⊣⊢ 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 (→ page 49).

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 ⊣⊢ 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).

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

### 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 outdoor reset control

This service function allows displaying the current target supply temperature set by the outdoor reset control.

### Service function 6.d: Current DHW turbine flow rate (only combi boiler ZWB..-3A)

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

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**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.

Never confuse the appliance building drying function with the slab drying function of the outdoor reset control FW200.

When the building drying function is on, you cannot adjust the appliance gas settings.

The following settings are available:

- **00**: Off
- **01**: Heating operation only in accordance with the appliance or control setting, i.e. all other heat demands are blocked.

**Default setting** is **00**.

**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.

ZBR42-3A... and ZWB42-3A... appliances are derated at 3 % per 1000 feet (305 m).

ZBR16-3A..., ZBR21-3A..., ZBR28-3A..., ZBR35-3A..., ZWB28-3A... and ZWB35-3A... 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.

This service function is used to adjust the fan speed for high altitude operation.

The following settings are available:

- **00**: Normal
- **01**: Medium
- **02**: High

| Setting | Elevation above sea level |
|---|---|
| 00 | 0 ft – 2,000 ft (0 m – 610 m) |
| 01 | 2,001 ft – 4,500 ft (611 m – 1372 m) |
| 02 | above 4,500 ft (1372 m) |

*Table 30 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. If the appliance has been converted from natural gas to LPG (or vice versa), the code plug must be replaced.

**Service function 8.C: GFA Gas burner control unit status**

Internal parameter. If you are on the line with Bosch Technical Support you may be asked for this number.

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

Internal parameter.

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### 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.
  The display shows a code such as 1.A (first service level).
- ▶ 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 .
  The emissions test button lights up and the display shows **00**.
- ▶ Press and hold the emissions test button until the display shows .
  All settings are reset and the appliance restarts with the default settings.
- ▶ Reset altered service functions to the settings recorded in the commissioning log (→ page 81).

### Service function 8.F: Permanent ignition

> **NOTICE:** Ignition transformer damage.
> ▶ Never leave this function on for longer than 2 minutes at a time.

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 60).

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 ZWB..-3A)

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

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 ZWB..-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 55.

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

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## 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 reconnection.
- ▶ 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 $CO_2$ or $O_2$ 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/ft$^3$ (49.6 MJ/m$^3$) 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.

- ▶ Fold the Heatronic down.
- ▶ Check the number on the code plug from the gas conversion kit (Code plug number → table 43, page 80).
- ▶ Replace the code plug in the Heatronic with the code plug from t conversion kit.

*Fig. 75 Replacing the code plug*

- ▶ Affix the gas type label from the gas conversion kit to the appliance.

*Fig. 76 Affixing the gas type label*

- ▶ Always adjust the gas-air ratio ($CO_2$ or $O_2$, → 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.

ZBR42-3A... and ZWB42-3A... appliances are derated at 3 % per 1000 feet (305 m).

ZBR16-3A..., ZBR21-3A..., ZBR28-3A..., ZBR35-3A..., ZWB28-3A... and ZWB35-3A 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.

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

- ▶ Correction of the fan speed curve of the burner:
  Use service function 0.d to adjust the elevation setting (→ page 63).

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## 12.3 Setting the gas-air ratio ($CO_2$ or $O_2$)

- ▶ Switch the appliance OFF using the ON/OFF switch.
- ▶ Remove the cover (→ page 36).
- ▶ Switch the appliance ON using the ON/OFF switch.
- ▶ Open one of the flue gas test ports.

*Fig. 77 Open one of the flue gas test ports*

- ▶ Insert the probe approx. 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 $CO_2$ or $O_2$ 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. 78 Remove seal from the gas throttle*

- ▶ Adjust the gas throttle to match the $CO_2$ or $O_2$ level for maximum nominal output according to table 31.

*Fig. 79 Set $CO_2$ or $O_2$ level for maximum nominal output*

| | Maximum nominal output | | Minimum nominal output | |
|---|---|---|---|---|
| Gas type | $CO_2$ | $O_2$ | $CO_2$ | $O_2$ |
| NG | 9.4 % | 4.0 % | 8.6 % | 5.5 % |
| LPG (propane) | 11.0 % | 4.2 % | 10.4% | 5.1 % |

*Table 31 $CO_2$ or $O_2$ 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 $CO_2$ or $O_2$ level and the CO content of the flue gas (→ Section 13).
- ▶ Remove the sealed screw (→ Fig. 80, [3]) from gas valve adjustment screw (→ Fig. 80, [2]) and set $CO_2$ or $O_2$ level for minimum nominal output.

*Fig. 80 Set $CO_2$ or $O_2$ level for minimum nominal output*

- ▶ 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 $CO_2$ or $O_2$ levels and the CO content of the flue gas in the commissioning log.
- ▶ Reinstall the screw (→ Fig. 80, [3]) to cover the gas valve adjustment screw.

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▶ Remove flue gas probe and close the flue gas test port properly.

*Fig. 81 Close flue gas test ports*

## 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. 80, [1]) and connect a pressure gauge (→ Fig. 82).

*Fig. 82 Dynamic gas pressure test port*

▶ Turn on the gas cock and switch the appliance ON.

▶ 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**.

▶ Check the required inlet gas pressure according to table 32.

| Gas type | Nominal pressure " W.C. (mbar) | Permissible pressure range for maximum nominal output " W.C. (mbar) |
|---|---|---|
| NG | 7 (17.4) | 3.5-10.5 (8.7-26.1) |
| LPG (propane) | 11 (27.4) | 8-13 (19.9-32.3) |

*Table 32 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.

▶ Repeatedly press the emissions test button 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.

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# 13 Flue gas test

## 13.1 Emissions test button

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

*Fig. 83 Press the emissions test button*

- = **Maximum set output in heating mode** (→ Maximum heating output, page 59)
- = **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. 77).
- ▶ 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 until the light goes out.
  The display returns to the supply temperature.
- ▶ Remove flue gas probe and close the flue gas test port properly (→ Fig. 81).

# 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

Regular service and maintenance are recommended 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 reconnection.

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

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**Heat exchanger**

> **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 98).
> ▶ 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 77.

- The following analytical tools are needed for service and maintenance:
  - Electronic flue gas analyzer for $CO_2$, $O_2$, 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 83).
▶ Replace removed gaskets and O-rings with new ones.

**After the inspection/maintenance**

▶ Re-tighten all loosened threaded connections.
▶ Restart the appliance (→ page 51).
▶ Check all connections for leaks.
▶ Check the gas-air ratio and adjust if necessary (→ page 66).

## 15.1 Description of various steps

### 15.1.1 Calling up the latest fault (service function 6.A)

▶ Select service function **6.A** (→ page 62).

An overview of the faults can be found on page 77.

### 15.1.2 Fresh water filter (only combi boiler ZWB..-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.

*Fig. 84 Filter in fresh water pipe (combi boiler ZWB..-3A only)*

### 15.1.3 Plate type heat exchanger (only combi boiler ZWB..-3A)

If the DHW output on the combi boiler is significantly reduced:
▶ Check filter in the cold water pipe for contamination (→ Fig. 69).
▶ Depressurize the appliance.
▶ Remove plate type heat exchanger and replace

**-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.

*Fig. 85 Unplugging electrical connections / removing hose from safety relief valve*

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▶ Loosen/remove pipe connections.

*Fig. 86 Removing pipe connections*

▶ Remove the boiler pressure gauge from the Heatronic boiler control.

*Fig. 87 Removing the boiler pressure gauge*

▶ Loosen the quick releases (steps 1 and 2) and remove the hydraulic assembly in its entirety (step 3).

*Fig. 88 Removing the hydraulic assembly*

▶ Remove the plate type heat exchanger.

*Fig. 89 Removing the plate heat exchanger*

▶ Install new plate type heat exchanger with new gaskets and reconnect the hydraulic assembly in reverse order.

▶ Check all connections used during maintenance for leaks.

### 15.1.4 Checking the electrodes

▶ Remove electrode set (→ page 10 / 12) including gasket and check electrodes for contamination; clean or replace, if required.

▶ Reinstall electrode set with new gaskets and check for leaks.

*Fig. 90 Reinstalling the electrode set*

*Fig. 91 Check for leaks*

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### 15.1.5 Burner servicing

**DANGER:** Fire danger!
▶ Only operate the burner while installed in a boiler.

▶ Remove burner lid (steps 1 - 4).

*Fig. 92 Removing the burner cover*

▶ Remove burner and clean its components.

*Fig. 93 Burner*

▶ Reinstall burner in reverse order, including a new gasket if necessary.
▶ Adjust the gas-air ratio (→ page 66).

### 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 98).
▶ Only clean heat exchanger in case if soiling is clearly visible.

▶ Remove the inspection cover (→ page 10) 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.

*Fig. 94 Removing the condensate trap*

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

*Fig. 95 Cleaning the heat exchanger with the cleaning blade*

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

*Fig. 96 Cleaning the heat exchanger with the cleaning brush*

▶ Remove burner (→ Chapter 15.1.5 “Burner servicing”).

▶ Rinse the heat exchanger with water from the top.

*Fig. 97 Rinsing the heat exchanger*

▶ Clean the condensate tray (with reversed brush).

*Fig. 98 Cleaning the condensate tray*

▶ 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).

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### 15.1.7 Condensate trap cleaning

▶ Remove condensate trap (steps 1 and 2) and check heat exchanger orifice for clear passage.

*Fig. 99 Removing the condensate trap*

▶ Remove and clean the condensate trap lid.
▶ Check condensate hose and clean if necessary.
▶ Fill the condensate trap with approx. 1 cup (1/4 l) of water and reinstall it.

### 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.

*Fig. 100 Opening the mixer unit*

▶ Insert the diaphragm into the fan connector. Ensure the diaphr oriented properly.

The diaphragm flaps must open upwards.

▶ Close the mixer unit.

### 15.1.9 Expansion vessel

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 33).

### 15.1.10 Setting the boiler water pressure

| Display on the pressure gauge | |
|---|---|
| 14.5 psi (1 bar) | Minimum filling pressure (when system is cold) |
| **14.5 psi to 21.75 psi** (1 bar to 1.5 bar) | Optimal filling pressure |
| 30 psi (2.07 bar) | Maximum pressure at maximum heating water temperature must not be exceeded (safety valve will spill). |

*Table 33 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.

| pH-value | Water preparation |
|---|---|
| 7-8.5 | Not needed |
| 4.5-7 | Required |

*Table 34 Water preparation for filling and maintaining the heating system (pH-value)*

▶ If the value is outside of the permitted range, drain the system, flush, and refill with fresh water to prevent system damage or leaks.
▶ If the fill water does not meet the requirements of page 32, treat the water to bring it within the permissible range.
▶ 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.

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## 15.2 Checklist for 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.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Date →** | | | | | | | |
| 1 | Latest fault code from service function **6.A** (→ page 69). | | | | | | |
| 2 | Fresh water inlet filter (Combi boiler ZWB appliances only) (→ page 69). | | | | | | |
| 3 | Visual inspection of the combustion air pipes and vent pipes. | | | | | | |
| 4 | Dynamic gas pressure (→ page 67). | inches W.C. (mbar) | | | | | |
| 5 | Gas-air ratio at min./max. nominal output (→ page 66). | min. %<br>max. % | | | | | |
| 6 | Gas and water-side leak test (→ page 45). | | | | | | |
| 7 | Inspect electrodes (→ page 70). | | | | | | |
| 8 | Inspect heat exchanger block (→ page 71). | | | | | | |
| 9 | Check burner (→ page 71). | | | | | | |
| 10 | Inspect diaphragm in mixer unit (→ page 73). | | | | | | |
| 11 | Clean condensate trap (→ page 73). | | | | | | |
| 12 | With the system depressurized, check the expansion vessel pre-charge pressure vs. the static head of the heating system. | psi (bar) | | | | | |
| 13 | Check the heating system filling pressure. | psi (bar) | | | | | |
| 14 | Inspect electrical wiring for damage. | | | | | | |
| 15 | Check settings of the heating control. | | | | | | |
| 16 | Check set service functions according to commissioning report (→ page 81). | | | | | | |

*Table 35 Maintenance and inspection checklist*

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## 16 Readings on the display

The boiler display can provide the following information (Tab. 36 and 37):

| Value displayed | Description | Range |
|---|---|---|
| Number or letter, dot followed by letter | Service function (→ Tab. 28 / 29, page 58) | |
| Letter followed by number or letter | Fault code (→ Tab. 38, page 77) (exception: b.A = service function) | |
| Three numbers (≤ 199) | Decimal value, e.g. supply temperature | 00..199 |
| One number (displayed for longer) followed by two numbers (displayed briefly) | Decimal figure (three digits); first digit is shown alternating with two last digits (e.g. 2.69..69 for 269) | 0..999 |
| Two dashes followed by two pairs of numbers | Code is shown in three stages: 1. Two dashes 2. First two digits 3. Last two digits (e.g. -- 10 04) | 1000 ... 9999 |
| Two letters followed by two pairs of numbers | Code is shown in three stages: 1. Two letters 2. First two digits 3. Last two digits (e.g. CF 10 20) | |

*Table 36 Display readings*

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

*Table 37 Special displays*

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# 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 reconnection.

**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. E8) 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 77.
An overview of the status codes can be found on page 75.

If the fault persists:

- ▶ Check the PCB and replace if required. Adjust the service functions in accordance with the commissioning report (→ page 81).

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## 17.2 Faults that are shown on the display

| Display | Description | Elimination |
|---|---|---|
| **A7** | DHW temperature sensor defective. | ▶ Check temperature sensor and leads for interruptions or shorts, and replace if defective.<br>▶ Insert code plug correctly; replace if defective. |
| **A8** | Communication fault. | ▶ Check BUS communications wiring, replace if defective.<br>▶ Check control, replace if defective. |
| **Ad** | DHW tank temperature not detected.<br><br>The DHW tank temperature sensor was recognized before the connection was lost. | ▶ Check DHW tank temperature sensor and connecting lead, replace if defective.<br>▶ 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. |
| **b2/b3/b4/ b5/b6** | Internal data error. | ▶ Reset boiler to factory default setting (→ service function 8.E). |
| **b7** | Fault in the burner controls. | ▶ Reset boiler to factory to 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.<br>▶ Verify the outdoor temperature sensor is connected to terminals A and F. |
| **d3** | Temperature high limit defective.<br><br>External guard has tripped.<br><br>Temperature limiter locked out. | ▶ Check temperature sensor and leads for interruptions or shorts, and replace if defective.<br>▶ Temperature guard TB1 has tripped. Check if jumper across 8-9 or PR-P0 is missing.<br>▶ Reset external temperature limiter (if installed).Reset LWCO (if installed). |
| **d5** | External supply temperature sensor defective (low-loss header).<br><br>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.<br>▶ Check whether only one temperature sensor is connected; otherwise remove second temperature sensor.<br>▶ 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.<br>▶ Check heat exchanger safety high limit and leads for interruptions or shorts, and replace if defective.<br>▶ Check the operating pressure.<br>▶ Check temperature limit; replace if defective.<br>▶ Check pump capacitor; replace pump if defective.<br>▶ Check PCB fuse, replace if blown (6.3 A fuse according to IEC default).<br>▶ Purge the appliance<br>▶ Check heat exchanger on the DHW side; replace if clogged. |

*Table 38 Faults shown on the display*

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| Display | Description | Elimination |
|---|---|---|
| **EA** | No flame detected.<br><br>GFA: Safety time expired. | ▶ Check that ground lead is properly connected, replace if defective.<br>▶ Check that gas cock is open.<br>▶ Check inlet gas pressure; correct if needed.<br>▶ Check power supply.<br>▶ Check electrodes for visual damage; replace if defective.<br>▶ Check flue gas system; clean or repair if defective.<br>▶ Check gas/air ratio; correct if out of range.<br>▶ Check gas valve; replace if defective.<br>▶ In room air operation, check air supply or ventilation apertures.<br>▶ Clean the condensate trap.<br>▶ Remove diaphragm at fan inlet connection and check for contamination or cracks.<br>▶ Check heat exchanger for soiling (→ Chapter 15.1.6, page 71).<br>▶ Check gas cock; replace if defective.<br>▶ Insert code plug correctly; replace if defective. |
| **F0** | Internal fault | ▶ Press reset for 3 seconds and release. When the button is released, the appliance will restart.<br>▶ Check electrical plug-in contacts and ignition leads; replace PCB if defective.<br>▶ Check gas/air ratio; correct if out of specification. |
| **F1** | Internal data error. | ▶ Reset boiler to the factory default setting (→ service function 8.E). |
| **F7** | Flame detected even when burner is off. | ▶ Check electrodes; replace if defective.<br>▶ Check flue gas system; clean or repair if defective.<br>▶ Check PCB for moisture; dry if needed. |
| **FA** | After switching gas off: Flame is detected. | ▶ Check gas cock; replace if defective.<br>▶ Clean condensate trap.<br>▶ Check electrodes and leads; replace if defective.<br>▶ Check flue gas system; clean or repair if needed. |
| **Fd** | Reset button pressed by mistake. | ▶ Press reset button again.<br>▶ Check cable harness to safety high limit and gas cock for ground connection. |
| | Temperature gradient limiter: Temperature rise too fast | ▶ Fully open service shut-off valves.<br>▶ Check electrical connection between heating zone pump and Heatronic.<br>▶ Check pump plug connection per installation instructions.<br>▶ Manually test operation of heating zone pump and replace if defective.<br>▶ Set pump speed correctly to match maximum output. |

*Table 38 Faults shown on the display*

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## 17.3 Faults that are not shown on the display

| Appliance faults | Elimination |
|---|---|
| Combustion noise too loud; rumbling noises | ▶ Insert code plug correctly; replace if defective.<br>▶ Check gas type.<br>▶ Check inlet gas pressure; adjust if defective.<br>▶ Check flue gas system; clean or repair if defective.<br>▶ 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.<br>▶ Set pump mode. |
| Heating-up takes too long | ▶ Set pump speed correctly to match maximum output.<br>▶ Set pump mode. |
| Flue gas readings incorrect; CO levels too high | ▶ Check gas type.<br>▶ Check inlet gas pressure; adjust if defective.<br>▶ Check flue gas system; clean or repair if defective.<br>▶ Check gas/air ratio in flue gas; replace gas valve if defective. |
| Violent ignition, poor ignition | ▶ Check gas type.<br>▶ Check inlet gas pressure; adjust if defective.<br>▶ Check power supply.<br>▶ Check electrodes for visual damage; replace if defective.<br>▶ Check flue gas system; clean or repair if defective.<br>▶ Check gas/air ratio; replace gas valve if defective.<br>▶ Check gas valve; replace if defective.<br>▶ Check burner; replace if required. |
| DHW has unpleasant odor or has a dark color | ▶ Perform thermal disinfection of the DHW circuit.<br>▶ Replace sacrificial anode in the tank (if installed).<br>▶ 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.<br>▶ 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 ZWB..-3A only) | ▶ Insert code plug correctly; replace if defective.<br>▶ Check whether voltage (120 VAC) is present between terminal 1 and terminal 3; repair if defective.<br>▶ 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 39 Faults not shown on the display*

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## 17.4 Check sensor values

### 17.4.1 Outdoor temperature sensor

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

*Table 40 Resistance table outdoor temperature sensor*

### 17.4.2 Additional supply temperature limiter

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

*Table 41 Resistance table supply temperature limiter*

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

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

*Table 42 Resistance table NTCs*

## 17.5 Replacement code plug

| Appliance | Order number |
|---|---|
| ZBR16-3A NG | 8 714 43**2 501** 0 |
| ZBR16-3A LPG | 8 714 43**2 506** 0 |
| ZBR21-3A NG | 8 714 43**2 528** 0 |
| ZBR21-3A LPG | 8 714 43**2 529** 0 |
| ZBR28-3A NG | 8 714 43**2 502** 0 |
| ZBR28-3A LPG | 8 714 43**2 507** 0 |
| ZBR35-3A NG | 8 714 43**2 503** 0 |
| ZBR35-3A LPG | 8 714 43**2 508** 0 |
| ZBR42-3A NG | 8 714 43**2 504** 0 |
| ZBR42-3A LPG | 8 714 43**2 509** 0 |
| ZWB28-3A NG | 8 714 43**2 520** 0 |
| ZWB28-3A LPG | 8 714 43**2 521** 0 |
| ZWB35-3A NG | 8 714 43**2 524** 0 |
| ZWB35-3A LPG | 8 714 43**2 525** 0 |
| ZWB42-3A NG | 8 714 43**2 500** 0 |
| ZWB42-3A LPG | 8 714 43**2 505** 0 |

*Table 43 Code plugs for all appliances*

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## 18 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 | $ft^2$ ($m^2$) |
| Vent pipe routing: | ☐ Twin pipe system (Rigid) \| ☐ Twin pipe system (Flex) \| ☐ 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 | |
| | $CO_2$ value in the combustion air at maximum nominal output: | % |
| | $O_2$ 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) | Gas static supply pressure: | " W.C. (mbar) |
| Selected maximum output: | MBH (kW) | Selected minimum output: | MBH (kW) |
| Gas flow rate at maximum nominal output: | gpm (l/min) | Gas flow rate at minimum nominal output: | gpm (l/min) |
| Net calorific value $H_{iB}$ (per gas supplier): | MBTU/$ft^3$ (kWh/$m^3$) | | |
| $CO_2$ at max. nominal output: | % | $CO_2$ at minimum nominal output: | % |
| $O_2$ at maximum nominal output: | % | $O_2$ 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) | Flue gas temperature at minimum nominal output: | °F (°C) |
| Maximum measured supply temperature: | °F (°C) | Minimum measured supply temperature: | °F (°C) |

| | |
|---|---|
| **System hydraulics:** | |
| ☐ Low-loss header, type: | ☐ Additional expansion vessel |
| ☐ Heating pump: | Size/pre-charge pressure: |
| ☐ Primary secondary piping | Automatic air vent present? ☐ yes \| ☐ no |
| ☐ DHW tank/type/number/heating surface output: | |
| ☐ System hydraulics checked, notes: | |

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| **Modified service functions:** (Select the modified service functions and enter the values here.) | |
|---|---|
| Example: Service function 7.d changed from 00 to 01 | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |

**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 | ☐ Carry out a combustion air/flue gas test |
| ☐ Function check carried out | ☐ 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.<br><br>_____<br>Name of service installing contractor | 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.<br><br>_____<br>Date, owner/operator signature |
| _____<br>Date, system installer's signature | **Affix the test report here.** |

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## 19 Spare parts

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

| Designation | ZBR16-3A | ZBR21-3A | ZBR28-3A | ZBR35-3A | ZBR42-3A | ZWB28-3A | ZWB35-3A | ZWB42-3A | Spare parts list |
|---|---|---|---|---|---|---|---|---|---|
| Group 1 - Sheet metal | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | → page 84 |
| Group 2 - Burner/Heat exchanger | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | → page 86 |
| Group 3 - Gas valve | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | → page 88 |
| Group 4 - Pipes combi boiler ZWB..-3A | | | | | | ■ | ■ | ■ | → page 90 |
| Group 5 - Pipes heating boiler ZBR..-3A | ■ | ■ | ■ | ■ | ■ | | | | → page 92 |
| Group 6 - Control box | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | → page 94 |
| Group 7 - Hydraulic block combi boiler ZWB..-3A | | | | | | ■ | ■ | ■ | → page 96 |
| Group 8 - Accessories for service/installation | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | → page 98 |

*Table 44 Spare part groups Greenstar*

Inspections Division
Date: 09/18/15

*Fig. 101 Group 1 - Sheet metal Greenstar*

Inspections Division
Date: 09/18/15

| Item (→ Fig. 101) | Designation | ZBR16-3A | ZBR21-3A | ZBR28-3A | ZBR35-3A | ZBR42-3A | ZWB28-3A | ZWB35-3A | ZWB42-3A | Order number |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Outer jacket complete | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 737 702 514 0 |
| 2 | Front cover | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 718 222 827 0 |
| 3 | Screw M5X22 (10x) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 713 403 026 0 |
| 4 | Trade mark badge | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 716 011 807 0 |
| 5 | Expansion vessel | | | | | | ■ | ■ | ■ | 8 715 407 328 0 |
| 7 | Washer 18.6 X 13.5 X 1.5 (10x) | | | | | | ■ | ■ | ■ | 8 710 103 045 0 |
| 8 | Brass adapter | | | | | | ■ | ■ | ■ | 8 710 103 209 0 |
| 9 | Flue connection | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 710 735 296 0 |
| 10 | Bracket | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 711 304 860 0 |
| 12 | Washer 80 mm | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 711 004 232 0 |
| 13 | Adapter USA | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 718 226 289 0 |
| 16 | Silencer complete | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 710 725 353 0 |
| 17 | Gasket | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 711 004 278 0 |
| 18 | Throttle disc | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 710 100 209 0 |
| 19 | Flue pipe gasket | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 722 933 330 0 |
| 20 | Latch (1x) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 718 224 302 0 |
| 21 | Damper (2x) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 718 224 267 0 |
| 22 | Junction box USA ZBR - heating boiler | ■ | ■ | ■ | ■ | ■ | | | | 8 737 701 425 0 |
| | Junction box USA ZWB - combi boiler | | | | | | ■ | ■ | ■ | 8 737 701 563 0 |
| 23 | Connection kit ZWB - combi boiler | | | | | | ■ | ■ | ■ | 8 718 661 616 0 |
| | Connection kit ZBR - heating boiler | ■ | ■ | ■ | ■ | ■ | | | | 8 718 661 617 0 |
| – | Acc.1681 (Mounting Kit > Appliance) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 7 738 111 163 |
| – | Acc.1684 (Mounting Kit>Connection Kit) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 7 738 111 217 |

*Table 45 Group 1 - Sheet metal Greenstar*

Inspections Division
Date: 09/18/15

*Fig. 102 Group 2 - Burner/Heat exchanger Greenstar*

Inspections Division
Date: 09/18/15

| Item (→ Fig. 102) | Designation | ZBR16-3A | ZBR21-3A | ZBR28-3A | ZBR35-3A | ZBR42-3A | ZWB28-3A | ZWB35-3A | ZWB42-3A | Order number |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Heat exchanger block (incl. set of gaskets) incl. flue gas and condensate collector (item 4) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 737 701 797 0 |
| 2 | Nut | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 713 301 196 0 |
| 3 | Set of gaskets | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 710 103 206 0 |
| 4 | Flue gas and condensate collector | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 718 006 944 0 |
| 5 | Temperature limit sensor | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 722 963 858 0 |
| 6 | Return pipe nut and safety pin | ■ | ■ | ■ | ■ | ■ | | | | 8 719 928 487 0 |
| 7 | Temperature sensor | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 714 500 087 0 |
| 8 | Cover | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 711 000 262 0 |
| 9 | Gasket | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 710 103 153 0 |
| 10 | Shield | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 718 003 836 0 |
| 11 | Clip (10x) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 710 100 190 0 |
| 12 | Set of electrodes complete | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 718 107 089 0 |
| 13 | Flame viewing window | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 715 600 018 0 |
| 14 | Gasket (10) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 711 004 264 0 |
| 15 | Burner | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 718 006 658 0 |
| 16 | Burner gasket | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 711 004 168 0 |
| 17 | Top burner cover complete | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 715 416 029 0 |
| 18 | Attachment nuts, washers, safety pins (set of 2) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 710 305 296 0 |
| 19 | Gasket | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 729 000 183 0 |
| 20 | Bracket | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 718 005 603 0 |
| 21 | Attachment bolt complete | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 710 305 297 0 |
| 22 | Temperature limiter assy | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 710 506 267 0 |
| 23 | Heat exchanger gasket | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 710 103 155 0 |

*Table 46 Group 2 - Burner/Heat exchanger Greenstar*

Inspections Division
Date: 09/18/15

*Fig. 103 Group 3 - Gas valve Greenstar*

Inspections Division
Date: 09/18/15

| Item (→ Fig. 103) | Designation | ZBR16-3A | ZBR21-3A | ZBR28-3A | ZBR35-3A | ZBR42-3A | ZWB28-3A | ZWB35-3A | ZWB42-3A | Order number |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Fan RG130 USA | ■ | ■ | ■ | | | ■ | | | 8 718 226 185 0 |
| 2 | Diaphragm | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 715 505 928 0 |
| 3 | Air limiter | | | | ■ | ■ | | ■ | ■ | 8 710 505 210 0 |
| | Air limiter | | ■ | ■ | | | ■ | | | 8 710 505 212 0 |
| 4 | Gas valve USA, incl. 9 Washer 18.3x24.3 (item 4) and Port screw (item 29). | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 718 226 391 0 |
| 7 | Gas pipe below USA | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 718 225 756 0 |
| 8 | Fibre gasket 25x30x1.5 (10x) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 710 103 014 0 |
| 9 | Washer 18.3x24.3 (10x) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 710 103 161 0 |
| 10 | Pipe | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 718 221 063 0 |
| 11 | Gas pipe top USA | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 718 225 762 0 |
| 12 | O-ring (10x) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 710 205 103 0 |
| 13 | Gas pipe | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 710 735 387 0 |
| 14 | Cover | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 712 305 092 0 |
| 15 | Safety clip 18mm (10x) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 716 771 169 0 |
| 16 | Gasket | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 729 000 183 0 |
| 17 | Fan RG128 USA | | | | ■ | ■ | | ■ | ■ | 8 718 226 184 0 |
| 18 | O-ring (10x) | | | | ■ | ■ | | ■ | ■ | 8 722 880 175 0 |
| 19 | Screw m4x6 taptite zc pl p/h | | | | ■ | ■ | | ■ | ■ | 2 914 411 424 0 |
| 20 | Air limiter | ■ | | | | | | | | 8 718 220 416 0 |
| 21 | Connecting flange | | | | ■ | ■ | | ■ | ■ | 8 710 506 279 0 |
| 29 | Port screw | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 718 222 744 0 |

*Table 47 Group 3 - Gas valve Greenstar*

Inspections Division
Date: 09/18/15

*Fig. 104 Group 4 - Pipes combi boiler ZWB..-3A Greenstar*

Inspections Division
Date: 09/18/15

| Item (→ Fig. 104) | Designation | ZBR16-3A | ZBR21-3A | ZBR28-3A | ZBR35-3A | ZBR42-3A | ZWB28-3A | ZWB35-3A | ZWB42-3A | Order number |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Condensate trap complete | | | | | | ■ | ■ | ■ | 8 710 506 271 0 |
| 2 | Cup incl. gasket | | | | | | ■ | ■ | ■ | 8 710 506 273 0 |
| 3 | Drain hose | | | | | | ■ | ■ | ■ | 8 710 703 178 0 |
| 4 | Drain Tee | | | | | | ■ | ■ | ■ | 8 710 735 076 0 |
| 5 | Expansion vessel connecting pipe complete | | | | | | ■ | ■ | ■ | 8 710 735 318 0 |
| 6 | Safety clip 10mm (10x) | | | | | | ■ | ■ | ■ | 8 716 771 167 0 |
| 7 | Gasket 18.6 X 13.5 X 1.5 (10x) | | | | | | ■ | ■ | ■ | 8 710 103 045 0 |
| 8 | O-ring 12.5x3 WRAS / KTW (10x) | | | | | | ■ | ■ | ■ | 8 716 107 437 0 |
| 9 | Supply pipe USA ZWB - combi boiler | | | | | | ■ | ■ | ■ | 8 737 701 821 0 |
| 10 | Gasket 18.5x24.3 (10x) | | | | | | ■ | ■ | ■ | 8 716 771 259 0 |
| 11 | O-ring 17x4 (10x) | | | | | | ■ | ■ | ■ | 8 716 771 154 0 |
| 12 | Safety clip (10x) | | | | | | ■ | ■ | ■ | 8 711 200 024 0 |
| 13 | Upper heating return pipe complete | | | | | | ■ | ■ | ■ | 8 710 735 324 0 |
| 14 | Lower heating return pipe complete | | | | | | ■ | ■ | ■ | 8 710 735 396 0 |
| 15 | Fibre gasket 23.9 X 17.2 X 1.5 (10x) | | | | | | ■ | ■ | ■ | 8 710 103 043 0 |
| 16 | Safety clip inlet adapter | | | | | | ■ | ■ | ■ | 8 716 106 432 0 |
| 17 | Fresh water inlet pipe | | | | | | ■ | ■ | ■ | 8 710 735 430 0 |
| 18 | Safety clip supply sensor | | | | | | ■ | ■ | ■ | 8 716 106 488 0 |
| 19 | DHW outlet pipe | | | | | | ■ | ■ | ■ | 8 710 735 427 0 |
| 20 | Wire form spring 18mm (10x) | | | | | | ■ | ■ | ■ | 8 716 771 169 0 |
| 21 | Supply pipe | | | | | | ■ | ■ | ■ | 8 710 735 428 0 |
| 22 | Pressure gauge USA complete | | | | | | ■ | ■ | ■ | 8 718 226 104 0 |
| 23 | O-ring 2.62 x 6.02 ID EPDM (10x) | | | | | | ■ | ■ | ■ | 8 716 140 810 0 |
| 24 | Gasket 1" (10x) | | | | | | ■ | ■ | ■ | 8 710 103 046 0 |
| 25 | O-ring 26.34 x 5.33 (5X) | | | | | | ■ | ■ | ■ | 8 710 205 098 0 |
| 26 | Gasket set | | | | | | ■ | ■ | ■ | 8 710 103 154 0 |
| 27 | O-ring 13.87 x 3.53 (10X) | | | | | | ■ | ■ | ■ | 8 716 771 155 0 |
| 28 | Adapter LWCO | | | | | | ■ | ■ | ■ | 8 718 226 386 0 |
| 29 | Temperature sensor | | | | | | ■ | ■ | ■ | 8 714 500 117 0 |

*Table 48 Group 4 - Pipes combi boiler ZWB..-3A Greenstar*

Inspections Division
Date: 09/18/15

*Fig. 105 Group 5 - Pipes heating boiler ZBR..-3A Greenstar*

Inspections Division
Date: 09/18/15

| Item (→ Fig. 105) | Designation | ZBR16-3A | ZBR21-3A | ZBR28-3A | ZBR35-3A | ZBR42-3A | ZWB28-3A | ZWB35-3A | ZWB42-3A | Order number |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Condensate trap complete | ■ | ■ | ■ | ■ | ■ | | | | 8 710 506 271 0 |
| 2 | Cup incl. gasket | ■ | ■ | ■ | ■ | ■ | | | | 8 710 506 273 0 |
| 3 | Drain hose | ■ | ■ | ■ | ■ | ■ | | | | 8 710 703 178 0 |
| 4 | Drain Tee | ■ | ■ | ■ | ■ | ■ | | | | 8 710 735 076 0 |
| 5 | Pressure gauge USA complete | ■ | ■ | ■ | ■ | ■ | | | | 8 718 226 104 0 |
| 6 | Safety clip 10mm (10x) | ■ | ■ | ■ | ■ | ■ | | | | 8 716 771 167 0 |
| 7 | O-ring 2.62 x 6.02 ID EPDM (10x) | ■ | ■ | ■ | ■ | ■ | | | | 8 716 140 810 0 |
| 8 | Supply pipe USA ZB complete | ■ | ■ | ■ | ■ | ■ | | | | 8 737 701 819 0 |
| 9 | Gasket 1" (10x) | ■ | ■ | ■ | ■ | ■ | | | | 8 710 103 046 0 |
| 10 | PRV group USA complete USA | ■ | ■ | ■ | ■ | ■ | | | | 8 718 226 182 0 |
| 11 | Safety clip 18mm (10x) | ■ | ■ | ■ | ■ | ■ | | | | 8 716 771 169 0 |
| 12 | Safety clip 10mm (10x) | ■ | ■ | ■ | ■ | ■ | | | | 8 716 771 167 0 |
| 13 | Dummy plug | ■ | ■ | ■ | ■ | ■ | | | | 8 718 226 183 0 |
| 14 | Safety relief valve USA 30 psi | ■ | ■ | ■ | ■ | ■ | | | | 8 737 703 427 0 |
| 15 | O-ring 13.87x3.53 (10x) | ■ | ■ | ■ | ■ | ■ | | | | 8 716 771 155 0 |
| 16 | PRV drain adapter and hose complete | ■ | ■ | ■ | ■ | ■ | | | | 8 710 725 760 0 |
| 17 | Fill and drain valve | ■ | ■ | ■ | ■ | ■ | | | | 8 738 505 955 0 |
| 18 | Pump ZBR USA complete - heating boiler | ■ | ■ | ■ | ■ | ■ | | | | 8 718 226 172 0 |
| 19 | Adapter pipe | ■ | ■ | ■ | ■ | ■ | | | | 8 710 735 450 0 |
| 20 | Gasket 18.6 X 13.5 X 1.5 (10x) | ■ | ■ | ■ | ■ | ■ | | | | 8 710 103 045 0 |
| 21 | Pump power cord USA | ■ | ■ | ■ | ■ | ■ | | | | 8 718 660 838 0 |
| 22 | Plug complete | ■ | ■ | ■ | ■ | ■ | | | | 8 713 301 152 0 |
| 23 | O-ring 26.34 x 5.33 (5X) | ■ | ■ | ■ | ■ | ■ | | | | 8 710 205 098 0 |
| 24 | Gasket set | ■ | ■ | ■ | ■ | ■ | | | | 8 710 103 154 0 |
| 25 | Temperature sensor | ■ | ■ | ■ | ■ | ■ | | | | 8 714 500 117 0 |
| 26 | Air vent valve | ■ | ■ | ■ | ■ | ■ | | | | 8 716 838 449 0 |
| 28 | Adapter LWCO | ■ | ■ | ■ | ■ | ■ | | | | 8 718 226 386 0 |
| 29 | O-ring 17 x 4 (10x) | ■ | ■ | ■ | ■ | ■ | | | | 8 716 771 154 0 |
| 30 | Safety clip (10x) | ■ | ■ | ■ | ■ | ■ | | | | 8 711 200 024 0 |

*Table 49 Group 5 - Pipes heating boiler ZBR..-3A Greenstar*

Inspections Division
Date: 09/18/15

*Fig. 106 Group 6 - Control box Greenstar*

Inspections Division
Date: 09/18/15

| Item (→ Fig. 106) | Designation | ZBR16-3A | ZBR21-3A | ZBR28-3A | ZBR35-3A | ZBR42-3A | ZWB28-3A | ZWB35-3A | ZWB42-3A | Order number |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Heatronic control unit complete | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 737 704 671 0 |
| 2 | Dial | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 716 011 785 0 |
| 3 | Blind cover | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 711 000 302 0 |
| 4 | Top cover | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 717 207 680 0 |
| 6 | Set of connectors | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 714 404 348 0 |
| 7 | Main circuit board | ■ | | ■ | ■ | ■ | ■ | | ■ | 8 748 300 651 0 |
| | Main circuit board | | ■ | | | | | ■ | | 8 748 300 739 0 |
| 8 | Plastic screw (10x) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 713 403 029 0 |
| 9 | Backpanel | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 613 560 409 0 |
| 10 | Code plug 2501 (ZBR16-3A NG) | ■ | | | | | | | | 8 714 432 501 0 |
| | Code plug 2528 (ZBR21-3A NG) | | ■ | | | | | | | 8 714 432 528 0 |
| | Code plug 2502 (ZBR28-3A NG) | | | ■ | | | | | | 8 714 432 502 0 |
| | Code plug 2503 (ZBR35-3A NG) | | | | ■ | | | | | 8 714 432 503 0 |
| | Code plug 2504 (ZBR42-3A NG) | | | | | ■ | | | | 8 714 432 504 0 |
| | Code plug 2520 (ZWB28-3A NG) | | | | | | ■ | | | 8 714 432 520 0 |
| | Code plug 2524 (ZWB35-3A NG) | | | | | | | ■ | | 8 714 432 524 0 |
| | Code plug 2500 (ZWB42-3A NG) | | | | | | | | ■ | 8 714 432 500 0 |
| | Code plug 2506 (ZBR16-3A LPG) | ■ | | | | | | | | 8 714 432 506 0 |
| | Code plug 2529 (ZBR21-3A LPG) | | ■ | | | | | | | 8 714 432 529 0 |
| | Code plug 2507 (ZBR28-3A LPG) | | | ■ | | | | | | 8 714 432 507 0 |
| | Code plug 2508 (ZBR35-3A LPG) | | | | ■ | | | | | 8 714 432 508 0 |
| | Code plug 2509 (ZBR42-3A LPG) | | | | | ■ | | | | 8 714 432 509 0 |
| | Code plug 2521 (ZWB28-3A LPG) | | | | | | ■ | | | 8 714 432 521 0 |
| | Code plug 2525 (ZWB35-3A LPG) | | | | | | | ■ | | 8 714 432 525 0 |
| | Code plug 2505 (ZWB42-3A LPG) | | | | | | | | ■ | 8 714 432 505 0 |
| 11 | Front cover | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 737 702 329 0 |
| 12 | Grommet (10x) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 710 506 185 0 |
| 13 | Fan harness | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 718 660 837 0 |
| 14 | Ignition harness | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 716 106 799 0 |
| 15 | Ground cable | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 716 106 980 0 |
| 16 | Pump power cord USA | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 718 660 838 0 |
| 17 | Cable harness ZWB - combi boiler | | | | | | ■ | ■ | ■ | 8 718 226 066 0 |
| | Cable harness ZBR - heating boiler | ■ | ■ | ■ | ■ | ■ | | | | 8 718 226 067 0 |
| 20 | Fuse | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 744 503 045 0 |
| 21 | Internal main power cord complete (white plug) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 737 701 320 0 |
| 22 | Internal tank loading pump power cord complete (red plug) | ■ | ■ | ■ | ■ | ■ | | | | 8 737 701 321 0 |
| 23 | Internal system pump power cord complete (black plug) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 737 701 322 0 |
| 24 | DHW tank temperature sensor | ■ | ■ | ■ | ■ | ■ | | | | 8 737 701 343 0 |
| 25 | System supply temperature sensor | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 737 700 289 0 |
| 30 | FW200 Bosch USA en-us, fr, es, de | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 718 226 215 0 |
| 31 | Outdoor temperature sensor | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 747 207 101 0 |
| 35 | Clip | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 8 718 225 176 0 |
| – | Gas conversion kit ZBR16-3A from LPG (31) to NG (23) | ■ | | | | | | | | 8 737 701 741 0 |
| – | Gas conversion kit ZBR21-3A from LPG (31) to NG (23) | | ■ | | | | | | | 8 737 704 884 0 |
| – | Gas conversion kit ZBR28-3A from LPG (31) to NG (23) | | | ■ | | | | | | 8 737 701 742 0 |
| – | Gas conversion kit ZBR35-3A from LPG (31) to NG (23) | | | | ■ | | | | | 8 737 701 743 0 |
| – | Gas conversion kit ZBR42-3A from LPG (31) to NG (23) | | | | | ■ | | | | 8 737 701 744 0 |
| – | Gas conversion kit ZWB28-3A from LPG (31) to NG (23) | | | | | | ■ | | | 8 737 701 745 0 |
| – | Gas conversion kit ZWB35-3A from LPG (31) to NG (23) | | | | | | | ■ | | 8 737 704 867 0 |
| – | Gas conversion kit ZWB42-3A from LPG (31) to NG (23) | | | | | | | | ■ | 8 737 701 740 0 |
| – | Gas conversion kit ZBR16-3A from NG (23) to LPG (31) | ■ | | | | | | | | 8 737 701 747 0 |
| – | Gas conversion kit ZBR21-3A from NG (23) to LPG (31) | | ■ | | | | | | | 8 737 704 883 0 |
| – | Gas conversion kit ZBR28-3A from NG (23) to LPG (31) | | | ■ | | | | | | 8 737 701 748 0 |
| – | Gas conversion kit ZBR35-3A from NG (23) to LPG (31) | | | | ■ | | | | | 8 737 701 749 0 |
| – | Gas conversion kit ZBR42-3A from NG (23) to LPG (31) | | | | | ■ | | | | 8 737 701 750 0 |
| – | Gas conversion kit ZWB28-3A from NG (23) to LPG (31) | | | | | | ■ | | | 8 737 701 751 0 |
| – | Gas conversion kit ZWB35-3A from NG (23) to LPG (31) | | | | | | | ■ | | 8 737 704 684 0 |
| – | Gas conversion kit ZWB42-3A from NG (23) to LPG (31) | | | | | | | | ■ | 8 737 701 746 0 |

*Table 50 Group 6 - Control box Greenstar*

Inspections Division
Date: 09/18/15

*Fig. 107 Group 7 - Hydraulic block combi boiler ZWB..-3A Greenstar*

Inspections Division
Date: 09/18/15

| Item (→ Fig. 107) | Designation | ZBR16-3A | ZBR21-3A | ZBR28-3A | ZBR35-3A | ZBR42-3A | ZWB28-3A | ZWB35-3A | ZWB42-3A | Order number |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Flat plate heat exchanger 20 plates | | | | | | ■ | ■ | ■ | 8 716 108 212 0 |
| 2 | Flat plate heat exchanger gasket 15mm | | | | | | ■ | ■ | ■ | 8 716 106 435 0 |
| 3 | Supply manifold complete | | | | | | ■ | ■ | ■ | 8 716 106 356 0 |
| 4 | Screw M5x32 | | | | | | ■ | ■ | ■ | 8 716 771 687 0 |
| 5 | Rubber bushing | | | | | | ■ | ■ | ■ | 8 716 106 425 0 |
| 6 | Gasket 18.5x24.3 (10x) | | | | | | ■ | ■ | ■ | 8 716 771 259 0 |
| 7 | DHW temperature sensor | | | | | | ■ | ■ | ■ | 8 714 500 081 0 |
| 8 | O-ring 7.75x2.1 (10x) | | | | | | ■ | ■ | ■ | 8 710 205 080 0 |
| 9 | Safety clip 10mm (10x) | | | | | | ■ | ■ | ■ | 8 716 771 167 0 |
| 10 | Screw & Gasket assembly M5x30 | | | | | | ■ | ■ | ■ | 8 716 106 452 0 |
| 11 | O-ring 12.5x3 WRAS / KTW (10x) | | | | | | ■ | ■ | ■ | 8 716 107 437 0 |
| 12 | Safety clip 18mm (10x) | | | | | | ■ | ■ | ■ | 8 716 771 169 0 |
| 13 | Safety clip 13mm (1x) | | | | | | ■ | ■ | ■ | 8 716 106 549 0 |
| 14 | Dummy plug complete | | | | | | ■ | ■ | ■ | 8 716 106 566 0 |
| 15 | O-ring 13.87 x 3.53 (10x) | | | | | | ■ | ■ | ■ | 8 716 771 155 0 |
| 16 | PRV Tee complete | | | | | | ■ | ■ | ■ | 8 715 502 114 0 |
| 17 | O-ring 17 x 4 (10x) | | | | | | ■ | ■ | ■ | 8 716 771 154 0 |
| 18 | Boiler pump USA complete | | | | | | ■ | ■ | ■ | 8 718 226 173 0 |
| 19 | Safety clip pump | | | | | | ■ | ■ | ■ | 8 716 106 438 0 |
| 21 | O-ring 23x4 (10x) | | | | | | ■ | ■ | ■ | 8 716 771 353 0 |
| 22 | Air vent valve | | | | | | ■ | ■ | ■ | 8 716 106 445 0 |
| 23 | Return assembly complete | | | | | | ■ | ■ | ■ | 8 716 106 844 0 |
| 24 | Safety clip supply sensor | | | | | | ■ | ■ | ■ | 8 716 106 488 0 |
| 25 | Pressure relief valve DHW | | | | | | ■ | ■ | ■ | 8 717 401 029 0 |
| 26 | O-ring 2.62 x 6.02 ID EPDM (10x) | | | | | | ■ | ■ | ■ | 8 716 140 810 0 |
| 27 | Drain valve | | | | | | ■ | ■ | ■ | 8 716 771 432 0 |
| 28 | Pressure relief valve USA complete | | | | | | ■ | ■ | ■ | 8 737 703 427 0 |
| 29 | O-ring 13.87x3.53 (10x) | | | | | | ■ | ■ | ■ | 8 716 771 155 0 |
| 30 | Safety clip inlet adapter | | | | | | ■ | ■ | ■ | 8 716 106 432 0 |
| 31 | Diverter valve assembly | | | | | | ■ | ■ | ■ | 8 716 106 845 0 |
| 32 | Diverter valve actuator motor | | | | | | ■ | ■ | ■ | 8 716 106 847 0 |
| 33 | Screw M5 Stainless | | | | | | ■ | ■ | ■ | 8 716 106 848 0 |
| 34 | Flow turbine adapter | | | | | | ■ | ■ | ■ | 8 716 106 433 0 |
| 35 | Flow turbine complete | | | | | | ■ | ■ | ■ | 8 716 107 223 0 |
| 36 | DHW filter insert | | | | | | ■ | ■ | ■ | 8 716 106 486 0 |
| 37 | O-ring 22x3 EPDM (10x) | | | | | | ■ | ■ | ■ | 8 716 106 747 0 |
| 38 | Flow regulator 15 l/m 4 gpm | | | | | | | | ■ | 8 716 105 869 0 |
| | Flow regulator 12 l/m 3.2 gpm | | | | | | | ■ | | 8 716 141 061 0 |
| | Flow regulator 10 l/m 2.6 gpm | | | | | | ■ | | | 8 737 702 418 0 |
| 39 | Silencer body | | | | | | ■ | ■ | ■ | 8 716 106 485 0 |
| 40 | Dummy plug complete | | | | | | ■ | ■ | ■ | 8 716 106 567 0 |
| 41 | O-ring (10x) | | | | | | ■ | ■ | ■ | 8 716 107 436 0 |
| 42 | O-ring 12.5x3 WRAS / KTW (10x) | | | | | | ■ | ■ | ■ | 8 716 107 437 0 |
| 45 | O-ring 17x4 (10x) | | | | | | ■ | ■ | ■ | 8 716 771 154 0 |
| 46 | Diverter valve housing | | | | | | ■ | ■ | ■ | 8 716 112 786 0 |
| 47 | PRV drain adapter and hose complete | | | | | | ■ | ■ | ■ | 8 710 725 760 0 |

*Table 51 Group 7 - Hydraulic block combi boiler ZWB..-3A Greenstar*

Inspections Division
Date: 09/18/15

| Item | Designation | ZBR16-3A | ZBR21-3A | ZBR28-3A | ZBR35-3A | ZBR42-3A | ZWB28-3A | ZWB35-3A | ZWB42-3A | Order number |
|---|---|---|---|---|---|---|---|---|---|---|
| – | Brush set WB5 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 7 719 002 502 |
| – | Cleaning blade WB5 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 7 719 002 503 |

*Table 52 Group 8 - Accessories for service/installation Greenstar*

Inspections Division
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