

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 licensed contractor / gas fitter.

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.

These instructions are available in English and French.

Please keep these instructions for future reference.

Gas Condensing Stainless Steel Boiler

BUDERUS SSB BOILER

SSB85 | SSB120 | SSB160



BOSCH

Installation and Service Instructions for Contractors

6720818456 (2018/06) US



Contents

1	Key to symbols and safety instructions	3	5	Commissioning (for single application)	.34
1.1	Key to symbols	.3	5.1	Switching the appliance ON/OFF	.34
1.2	Safety instructions	.3	5.2	Setting date and time	.34
1.3	General warning	.3	5.3	Setting CH and DHW setpoint	.35
2	Product description	4	5.4	Boiler information	.35
2.1	Introduction	.4	5.5	Parameters list	.36
2.2	Scope of delivery	.4	5.6	Outdoor reset	.36
2.3	Proper use	.5	5.7	Adjusting and setting CO ₂ limits	.39
2.4	Environmental responsibility / disposal	.5	5.8	Setting frost protection	.40
2.5	Dimensions and Connections	.6	6	Troubleshooting	.40
2.6	Main components	.9	6.1	Error codes are shown on the display	.40
2.7	Technical data	.10	6.1.1	Lockout errors	.41
2.8	Efficiency Curves	.11	6.1.2	Blocking errors	.42
3	Regulations	.13	6.2	Errors not shown on display	.44
3.1	Compliance with standards and regulations	.13	6.3	Sensor Resistance table	.44
3.2	Operating limits of the boiler	.13	7	Maintenance	.45
3.3	Additional regulations for installation in Massachusetts	.13	7.1	General	.45
4	Installation	.14	7.2	Maintenance / inspection schedule for end user	.45
4.1	Packaging and product identification	.14	7.3	Maintenance / inspection schedule for licensed contractor / gas fitter	.45
4.2	Installation room	.14	7.3.1	Gas leaking inspection	.45
4.3	Water Chemistry Guidelines	.15	7.3.2	Check exhaust and combustion air pipe system	.45
4.4	Hydraulic connection	.15	7.3.3	Inspection of ignition electrode	.45
4.4.1	Low water cut off	.16	7.3.4	Checking for wiring and connections	.45
4.4.2	No Flow test procedure	.16	7.3.5	Burner gasket inspection	.45
4.4.3	High limit safety switch	.16	8	Installation schemes	.46
4.4.4	Pressure relief valve (PRV) ASME approved	.16	8.1	Multiple zone with indirect tank (pump for each zone)	.46
4.4.5	Expansion tank	.16	8.1.1	Settings	.47
4.4.6	Pump	.17	8.2	Multiple zone with indirect tank (valve for each zone)	.48
4.4.7	Condensate removal	.19	8.2.1	Settings	.49
4.5	Electrical connection	.19	8.3	Cascade	.50
4.5.1	Power supply cable connection	.19	8.3.1	Settings	.53
4.5.2	Access to the electrical terminal strip	.20	9	Commissioning log for the appliance	.54
4.5.3	Room thermostat connection	.20	10	Spare parts	.56
4.5.4	Outside temperature sensor	.20			
4.5.5	Electrical wiring diagram	.21			
4.6	Gas supply piping	.22			
4.6.1	Connection of gas supply piping	.22			
4.6.2	Gas type conversion	.22			
4.7	Venting and air piping system	.23			
4.7.1	General venting and combustion air piping system	.24			
4.7.2	Connecting flue gas accessories	.25			
4.7.3	Installation of the exhaust and air intake system	.25			
4.7.4	Vent and combustion air pipe length [For single boiler installations]	.28			
4.7.5	Approved examples of horizontal and vertical venting installation	.29			
4.7.6	Multiple boiler	.33			

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



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

1.2 Safety instructions

Observe these instructions for your safety.

The burner and control must be correctly installed and adjusted to ensure safe and economical operation of the gas boiler.

Read this installation and maintenance manual carefully and note the details on the boiler nameplate before placing the boiler in operation.

Risk of fatal injury from explosion of flammable gases

If you smell gas there is a danger of explosion.

- ▶ Never work on gas lines unless you are licensed contractor / gas fitter.
- ▶ Make sure that a licensed contractor / gas fitter installs the boiler, connects gas and vent, places the boiler in operation, connects the electrical power, and maintains and repairs the boiler.
- ▶ No open flame! No smoking! Do not use lighters.
- ▶ Prevent spark formation. Do not operate electrical switches, including telephones, plugs or door bells.
- ▶ Close main gas valve.
- ▶ Open doors and windows.
- ▶ Warn other occupants of the building, but do not use door bells.
- ▶ Call gas company from outside the building.
- ▶ If gas can be heard escaping, leave the building immediately, prevent other people from entering, notify police and fire departments from outside the building

Risk to life from electrical shock.

- ▶ Disconnect the power supply to the boiler heating system before conducting any work on it, e.g. turn off the heating system emergency switch outside the boiler room.
- ▶ It is not sufficient just to turn off the control.
- ▶ Do not carry out electrical work unless you are qualified for this type of work.
- ▶ Before servicing disconnect electrical power and lock out to prevent accidental reconnection.
- ▶ Observe and follow the local, state and federal installation regulations.

Risk of fatal injury from flue gas poisoning

Insufficient ventilation or combustion air availability may cause dangerous flue gas leaks or formation.

- ▶ Make sure that inlets and outlets are not reduced in size or closed.
- ▶ If faults are not corrected immediately, the boiler must not be operated until all faults have been corrected.
- ▶ Inform the system operator and/or owner of the fault and the danger in writing.
- ▶ When working on the flue gas venting leakage of flue gases may endanger the lives of people.
- ▶ Use only original parts when replacing vent system parts.

Risk to life by poisoning by spillage of flue gases

- ▶ If the blocked vent switch trips frequently the fault must be corrected and proper operation of the blocked vent switch test must be conducted.

Risk of fatal injury from neglecting your own safety in case of emergency, such as with a fire

- ▶ Never put yourself at risk. Your own safety must always take priority.

Fire danger due to flammable materials or liquids

- ▶ Make sure that there are no flammable materials or liquids in the immediate vicinity of the boiler.

Installation and maintenance

- ▶ Observe all current standards and guidelines applicable to the installation and operation of the boiler heating system as applicable in your state or local jurisdiction.
- ▶ Clean and service the boiler system once a year. Check that the complete heating system operates correctly.
- ▶ Immediately correct all faults to prevent system damage.
- ▶ Only use original Bosch spare parts. Losses caused by the use of parts not supplied by Bosch are excluded from the Bosch warranty.

1.3 General warning

The installation of the unit must comply with all local, state and federal applicable codes and regulation or, in absence of local codes in conformity with ANSI Z223.1 / NFPA 54 for gas-fired boilers and ANSI/NFPA 58 for LP gas-fired boilers. The equipment shall be installed in accordance with the current Installation Code for Gas Burning Appliances and Equipment, CSA B149.1 Canada. Authorities having jurisdiction and local inspection agencies must be informed before installation starts.

Where required by local, state and federal regulations, the system must comply with the American Society of Mechanical Engineers Safety Code for Controls and Safety Devices for Automatically Fired Boilers (ASME CSD-1). 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. Valves external to the boiler must be fitted with T-handles and condensate piping must be installed in accordance with the State Plumbing Code.

NOTICE:

- This boiler must be installed by a licensed contractor/ gas fitter. Failure to do so shall void the product warranty.
- The boiler is intended only for the use for which it was specifically designed and built. Bosch is hereby excluded from any liability for damages caused to persons, animals or property resulting from installation errors, improper adjustment, maintenance or use.
- In order to ensure safety and correct operation, the installation shall always take place in full compliance with the applicable Codes and following with the instructions provided by the manufacturer, and must always be carried out by a licensed contractor / gas fitter only.
- The equipment must be installed in appropriate place and in combination with appropriate systems as specified by code.
- The unit may be exposed to temperatures between 5° F (-15°C) and 150°F (65°C) in its original packaging. Do not expose the unit to weather without the protection of the original packaging until the boiler has been properly installed. Until then there is no frost protection for the boiler.
- After removing the packaging check the integrity and completeness of delivery and in case of non-compliance, contact your dealer.
- If there is a water loss, disconnect the boiler from the main power supply, close the water supply and immediately call technical assistance or installer/local contractor.
- Periodically check that the condensate drain is free from obstruction.
- Periodically check the system pressure. System pressure should be checked when the system is in standby mode and no call for heat is present.
- Maintenance is mandatory and shall be carried out at least once a year.
- This manual shall be read carefully, in order to install and operate the boiler appropriately, and safely.
- Boiler installations, settings and service should only be performed by experienced licensed contractor / gas fitter. End Users should only make adjustments with the assistance of a licensed contractor / gas fitter.
- Any maintenance operation or service before disconnecting the boiler from the main power supply is forbidden.
- Do not remove or modify safety equipment.
- Do not pull or twist the electrical wires, from the boiler, even if the device is disconnected from the main power supply.
- Do not obstruct or reduce the ventilation openings.
- Do not put the unit outdoors.
- Do not leave any combustibles or containers of flammable substances in the room where the boiler is installed.
- Do not dump the packing material. Keep out of reach of children the packing material because it can be potentially dangerous. It must be disposed of as required by law.
- The opening of metal casing of the device and removing of the cover are prohibited to the end user. Any service on the boiler must be carried out by qualified technician.
- Dispose of equipment in accordance with local codes, and in a environmentally responsible manner.

2 Product description

2.1 Introduction

- The gas-fired condensing SSB boilers are designed to be used in central heating systems. Any other use is prohibited.
- This boiler can be connected to an indirect storage tank for the production of domestic hot water.
- There are several options for venting including single pipe, two pipe and concentric. See section "4.7 Venting and air piping system" for details.
- The quality of the system water is very important. Poor water quality can damage heating systems and boilers due to scale formation and corrosion (see water quality section).
- The boilers can also function directly with any hydronic emitter. When installing the boiler and system connections, the installer must consider the total head loss and flow rates in order to adequately size piping and circulator pumps.
- The SSB boiler can be connected to a room thermostat.
- An outdoor air temperature sensor must also be connected to the boiler for an outdoor reset supply temperature control for increased fuel efficiency and comfort.

2.2 Scope of delivery

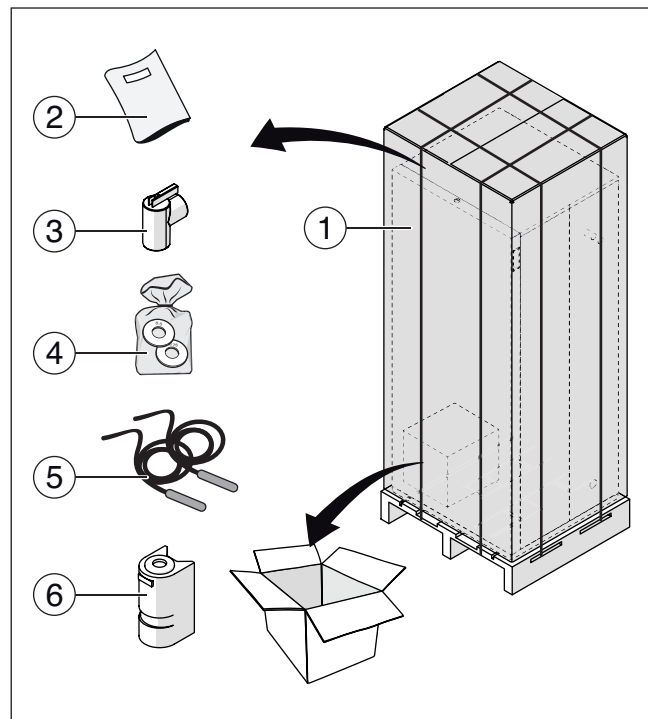


Fig. 1 Scope of delivery

Component	Qty	Packaging method
[1] Gas condensing boiler	1	Pallet
[2] Set of documents for appliance	1	Plastic package
[3] Safety relief valve	1	Cardboard box on pallet
[4] LP conversion kit	1	Plastic package
[5] Universal Sensor for LLH or DHW	2	Cardboard box on pallet
[6] Outdoor sensor	1	Cardboard box on pallet

2.3 Proper use

- ▶ The SSB Boilers are designed for residential, and light commercial applications.
- ▶ 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.
- ▶ In some heating applications like pool, spa snow melt or process water heating a heat exchanger must to be installed.

2.4 Environmental responsibility / disposal

Environmental responsibility is one of the fundamental company policies of the Bosch Group.

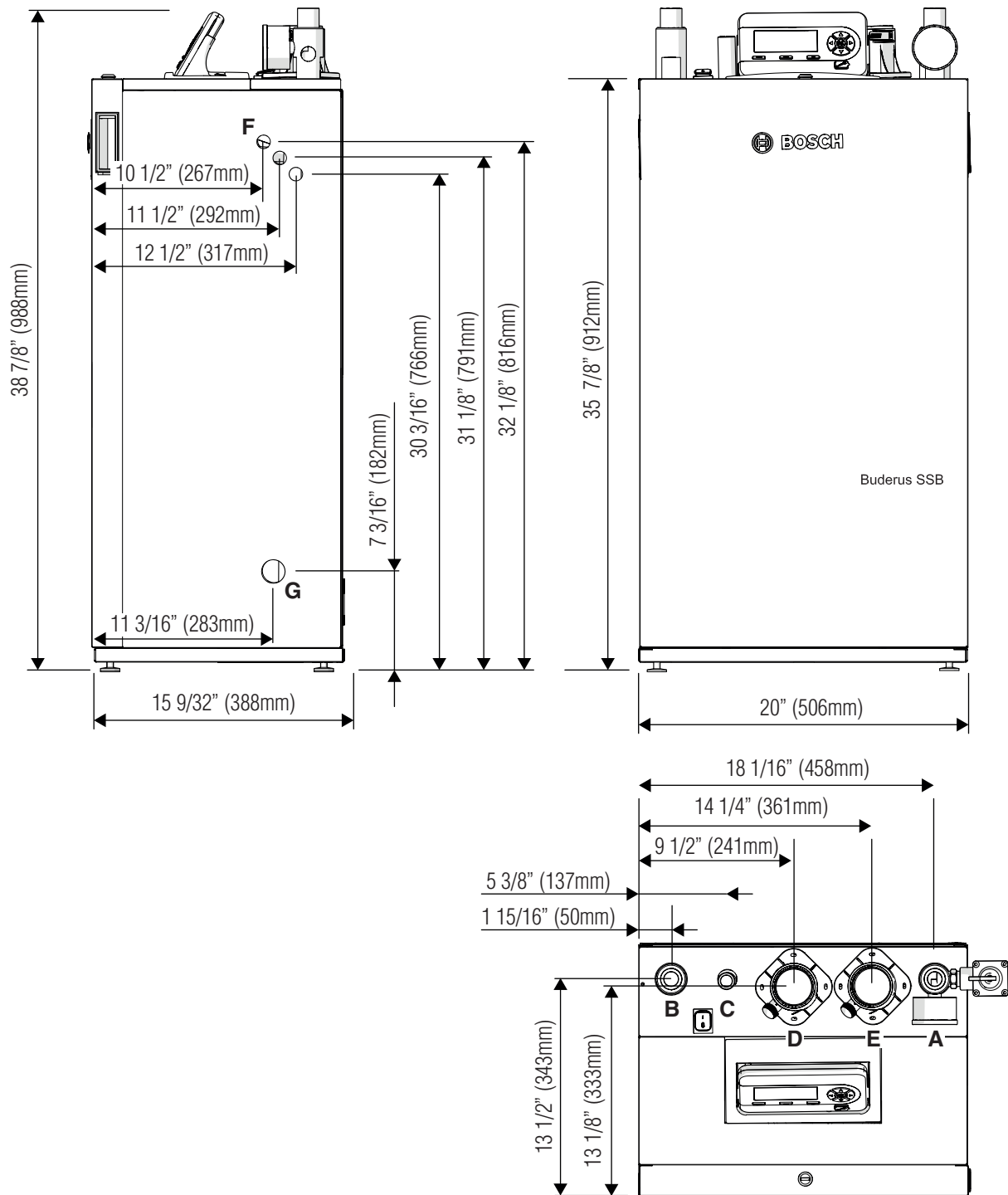
We regard quality of performance, economy and environmental responsibility as equal objectives. Environmental protection laws and regulations are strictly adhered to.

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.

2.5 Dimensions and Connections

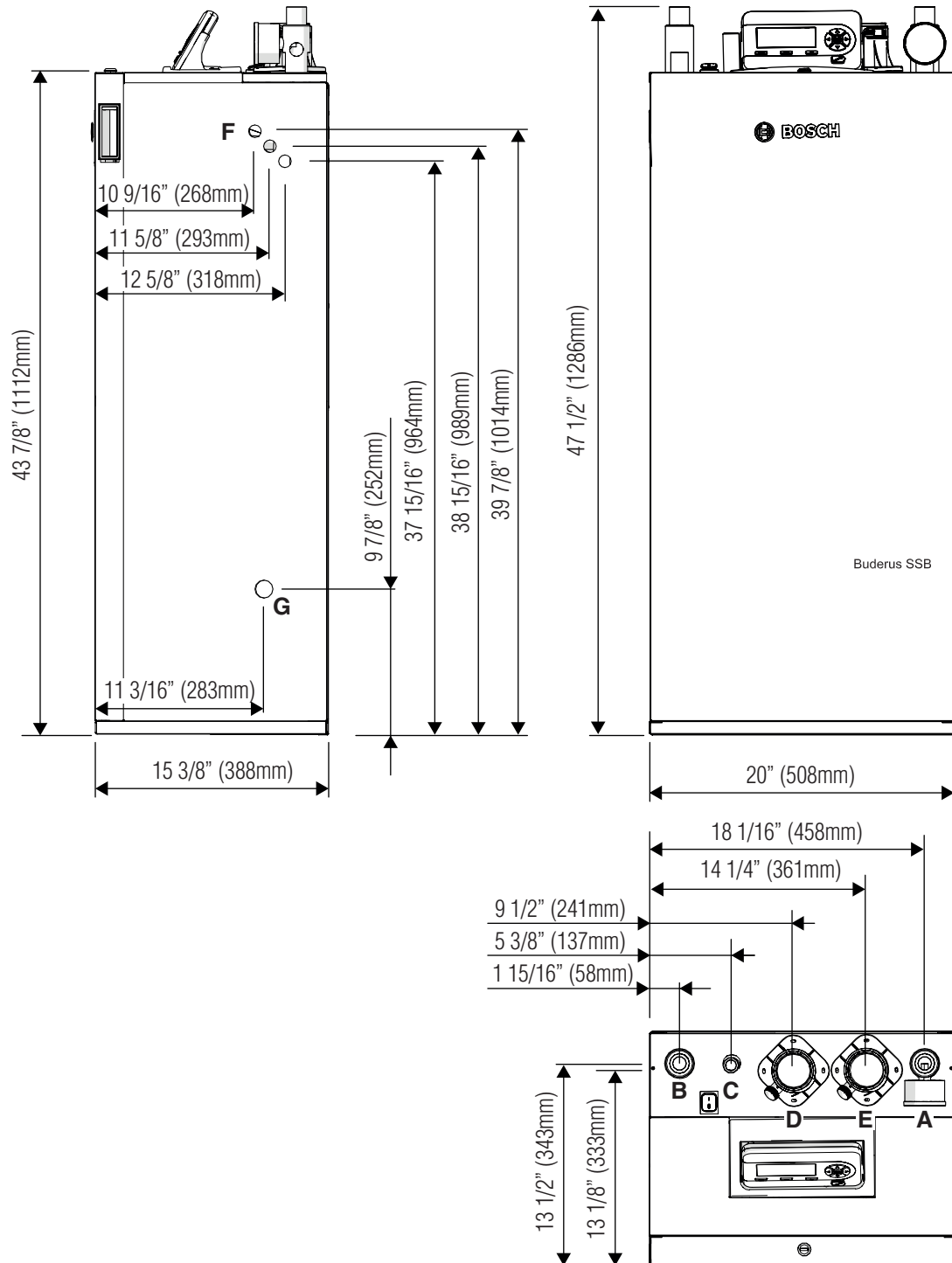


Tolerances on all dimensions shown is +/- 1/4" (6.35mm)

Fig. 2 SSB85 (dimension in inches [mm])

- A System supply - Ø 1" NPT
- B System return - Ø 1" NPT
- C Gas inlet - Ø 3/4" NPT
- D Flue exhaust - Ø 2" (60mm)

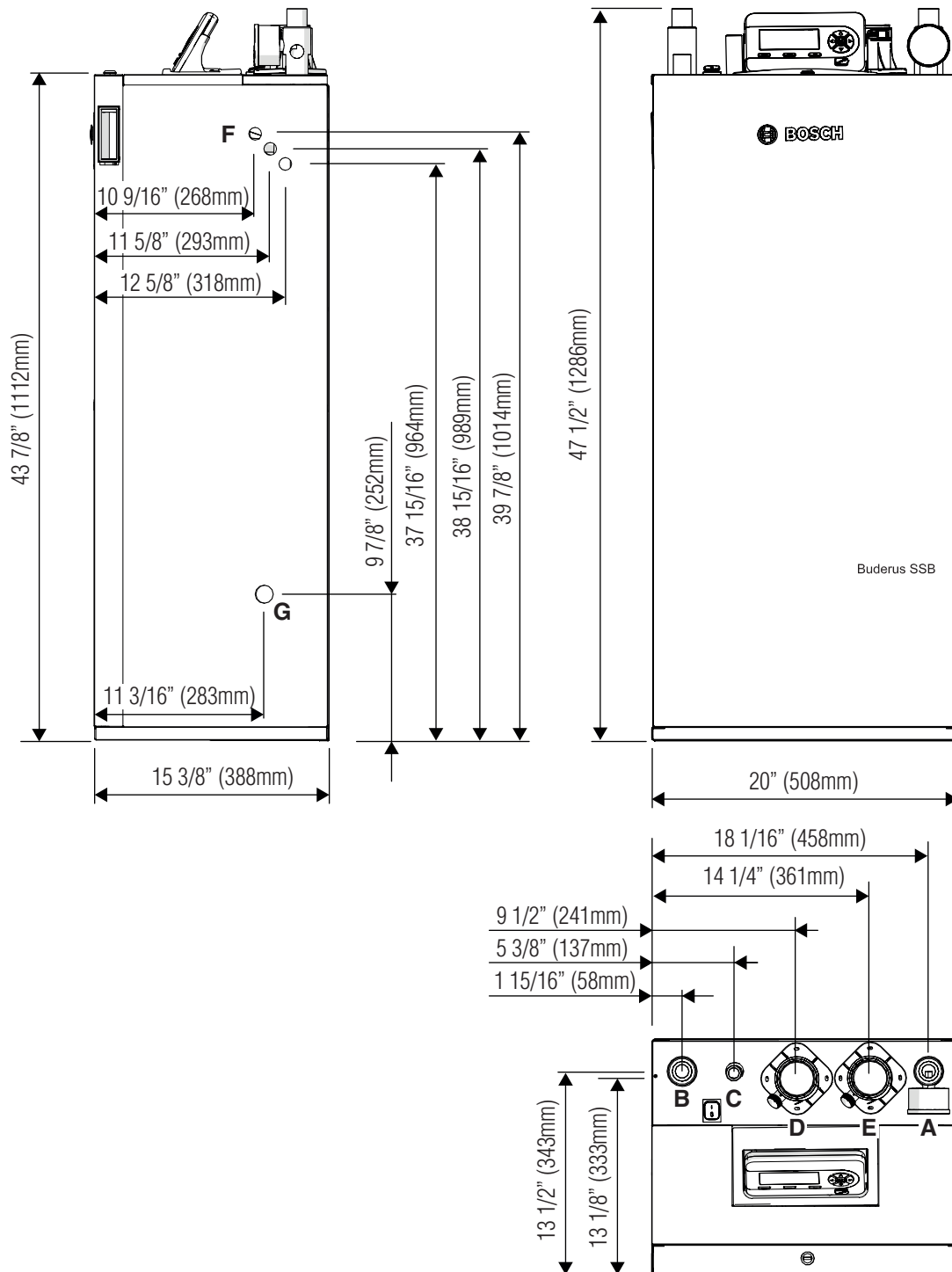
- E Intake air - Ø 2" (60mm)
- F Electrical connection knock outs
- G Condensate drain outlet - Ø 3/4"



Tolerances on all dimensions shown is +/- 1/4" (6.35mm)

Fig. 3 SSB120 (dimension in inches [mm])

- | | |
|-------------------------------|------------------------------------|
| A System supply - Ø 1" NPT | E Intake air - Ø 2" (60 mm) |
| B System return - Ø 1" NPT | F Electrical connection knock outs |
| C Gas inlet - Ø 3/4" NPT | G Condensate drain outlet - Ø 3/4" |
| D Flue exhaust - Ø 2" (60 mm) | |



Tolerances on all dimensions shown is $\pm 1/4"$ (6.35mm)

Fig. 4 SSB160 (dimension in inches [mm])

- A System supply - Ø 1" NPT
- B System return - Ø 1" NPT
- C Gas inlet - Ø 3/4" NPT
- D Flue exhaust - Ø 2" (60 mm)

- E Intake air - Ø 2" (60 mm)
- F Electrical connection knock outs
- G Condensate drain outlet - Ø 3/4"

2.6 Main components

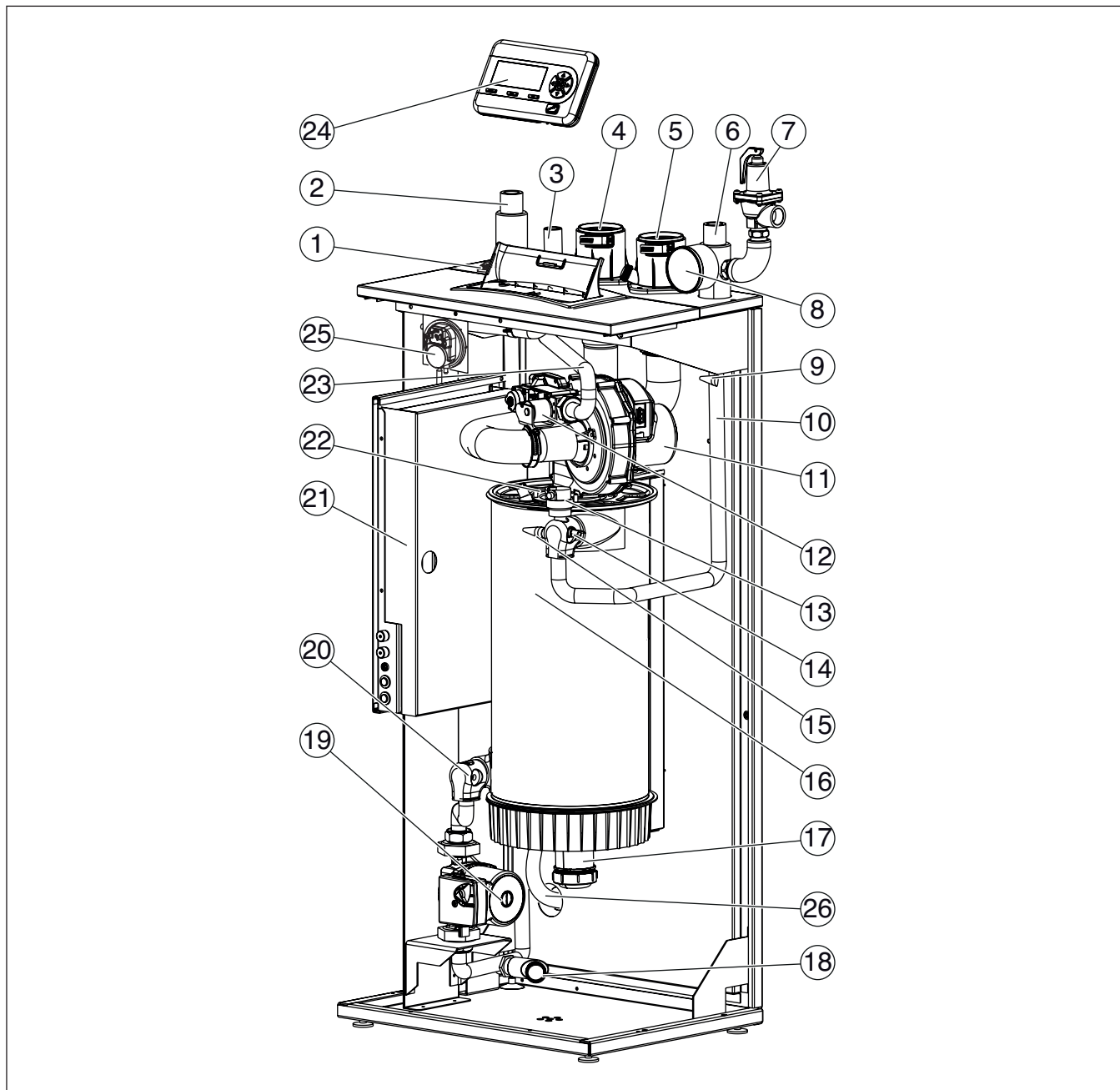


Fig. 5 SSB160 (main components)

- | | |
|---------------------------------|-------------------------------------|
| [1] Main power switch | [14] Supply temperature probe |
| [2] System return | [15] High limit temp. safety switch |
| [3] Gas inlet | [16] Heat exchanger |
| [4] Flue exhaust | [17] Condensate trap |
| [5] Intake air | [18] Low point drain valve |
| [6] System supply | [19] Circulation pump |
| [7] Pressure Relief Valve | [20] Return temperature probe |
| [8] Tridicator | [21] Wiring Control Panel |
| [9] Low water cut off probe | [22] Spark electrode |
| [10] Heat exchanger supply pipe | [23] Gas pipe |
| [11] Fan | [24] Removable display |
| [12] Gas valve | [25] Pressure differential switch |
| [13] Automatic air vent | [26] Condensate discharge pipe |

2.7 Technical data

	Unit	SSB85	SSB120	SSB160
Boiler Category		ASME Sect.IV	ASME Sect.IV	ASME Sect.IV
Type of Gas		Natural Gas, Propane *	Natural Gas, Propane *	Natural Gas, Propane *
Max input rate	BTU/hr (kW)	85,300 (25)	119,420 (35)	160,364 (47)
Min input rate	BTU/hr (kW)	17,060 (5)	23,884 (7)	32,073 (9.4)
Turndown	Rate (%)	5:1 (20 %)	5:1 (20 %)	5:1 (20 %)
Gas Connections (NPT)	Ø Inch	3/4"	3/4"	3/4"
Max. NG Pressure	Inch W.C. (mbar)	10.5 (26.15)	10.5 (26.15)	10.5 (26.15)
Min. NG Pressure	Inch W.C. (mbar)	3.5 (8.72)	3.5 (8.72)	3.5 (8.72)
Max. LPG Pressure	Inch W.C. (mbar)	13 (32.3)	13 (32.3)	13 (32.3)
Min. LPG Pressure	Inch W.C. (mbar)	8 (19.9)	8 (19.9)	8 (19.9)
Water Connections	Ø Inch	1"	1"	1"
Max. Allowable Working Pressure (MAWP)	PSI (bar)	80 (5.5)	80 (5.5)	80 (5.5)
Recommended water flow @ max power (ΔT 36 °F / 20 °C)	GPM (m³/h)	4.7 (1.1)	6.6 (1.5)	8.5 (1.9)
Max water flow @ max power (ΔT 27 °F / 15 °C)	GPM (m³/h)	6.3 (1.4)	8.8 (2.0)	11.4 (2.6)
Min water flow @ max power (ΔT 54 °F / 30 °C)	GPM (m³/h)	3.2 (0.7)	4.4 (1.0)	5.7 (1.3)
Min water flow @ min power (ΔT 27 °F / 15 °C)	GPM (m³/h)	1.3 (0.3)	1.8 (0.4)	2.3 (0.5)
Water Pressure Drop @ recommended water flow	Feet Head (mbar)	2.34 (70)	5.35 (160)	10.37 (310)
Water Pressure Drop @ max water flow	Feet Head (mbar)	3.81 (114)	9.20 (275)	18.40 (550)
Water Volume	Gallon (liter)	0.79 (3)	1 (3.8)	1.21 (4.6)
Vent/Air Intake Connections	Ø Inch (Ø mm)	2 (60)	2 (60)	2 (60)
Vent Materials		CPVC, PVC, PP, PP Flex, Stainless Steel AL29-4C IPEX type IIA & IIB	CPVC, PVC, PP, PP Flex, Stainless Steel AL29-4C IPEX type IIA & IIB	CPVC, PVC, PP, PP Flex, Stainless Steel AL29-4C IPEX type IIA & IIB
Max operating temperature	°F (°C)	194 (90)	194 (90)	194 (90)
Max HE allowable temperature	°F (°C)	210 (98.9)	210 (98.9)	210 (98.9)
Ambient storage temperature	°F (°C)	5 to 158 (-15 to 70)	5 to 158 (-15 to 70)	5 to 158 (-15 to 70)
Ambient functioning temperature	°F (°C)	32 to 120 (0 to 49)	32 to 120 (0 to 49)	32 to 120 (0 to 49)
Surface heat exchanger	SQFT (m²)	8.61 (0.8)	10.76 (1.0)	12.91 (1.2)
Standard Listings & Approvals		CSA, ASME, AHRI	CSA, ASME, AHRI	CSA, ASME, AHRI
Electrical Req. 120VAC/1PH/60Hz		1.5 FLA**	2.0 FLA**	3.4 FLA**
Noise rating	dB	45	44	49
Weight (dry)	lbs (kg)	110 (50)	132 (60)	154 (70)
Clearance to combustibles ***	Inch (mm)	2" (50.8)	2" (50.8)	2" (50.8)
Dimension WxHxD	Inch (mm)	20"x 39" 5/8 x 15" 3/8 (508x1006x388)	20"x 47" 1/2" x 15" 3/8 (508x1206x388)	20"x 47" 1/2" x 15" 3/8 (508x1206x388)

AHRI certified ratings

	Unit	SSB85	SSB120	SSB160
Input	MBH	85	119	160
Heating Capacity	MBH	79	110	148
AFUE	%	96	96	96
Net rating	MBH	69	96	129
CO ₂ (For Annual Validation program only)	%	10.4	10.4	10.4

(*) With conversion.

(**) FLA (Full Load Amperage) - maximum current drawn by the boiler.

(***) The 2" minimum clearance is required for all sides of the boiler. The boiler may be installed on combustible (wood) floors excluding carpets. See Fig. 9 for minimum clearance recommendation for serviceability.

2.8 Efficiency Curves

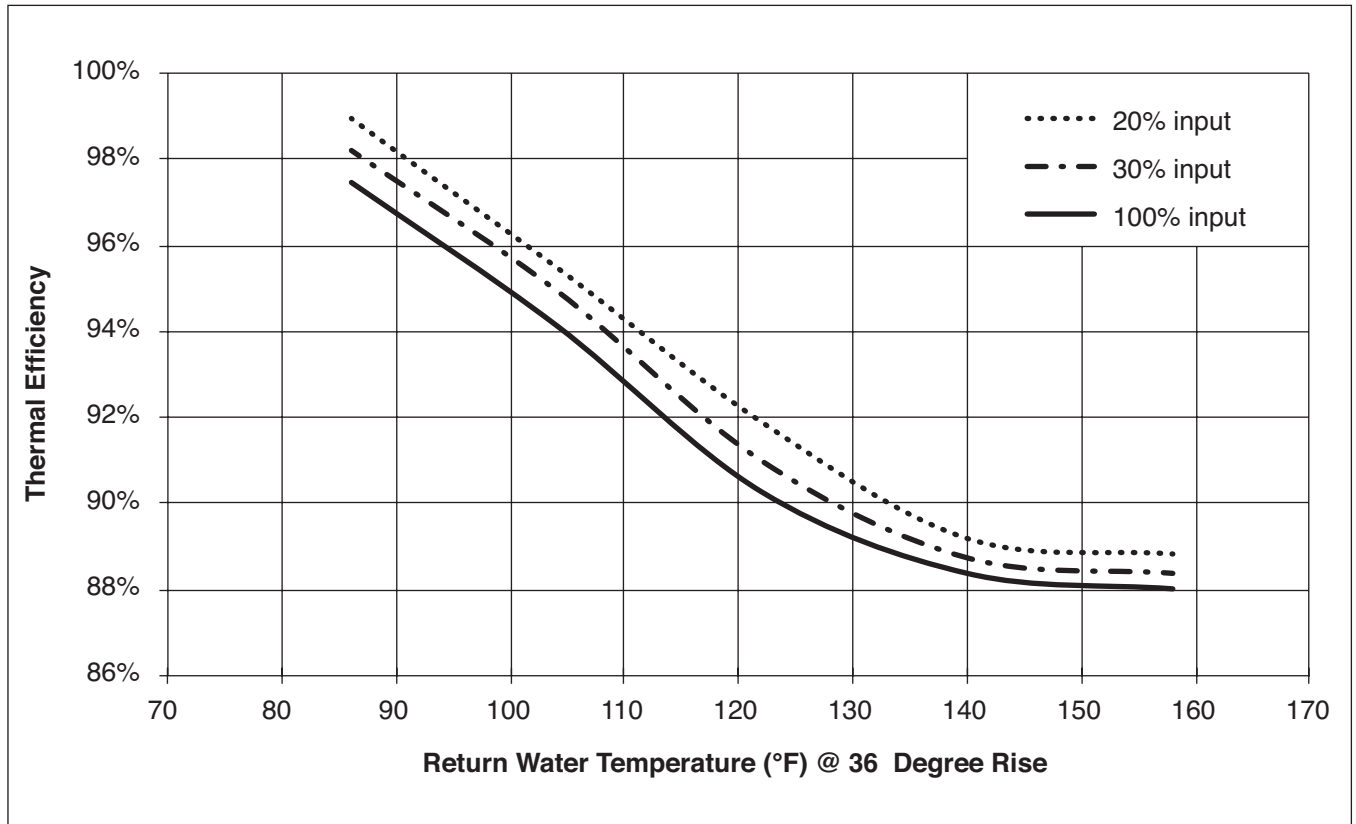


Fig. 6 Thermal Efficiency Curves SSB85*
 * Thermal Efficiency curve is for reference only as this is a residential boiler

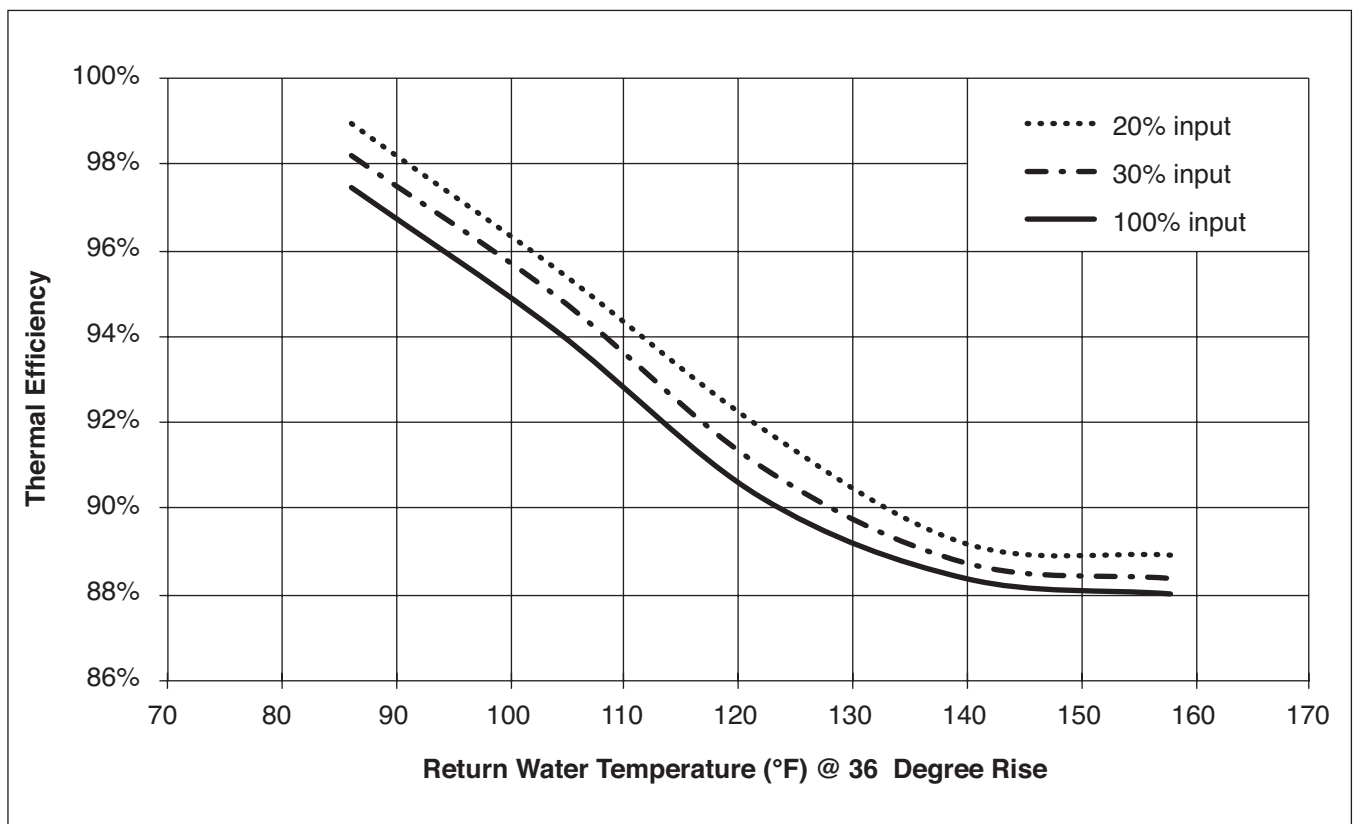


Fig. 7 Thermal Efficiency Curves SSB120*
 * Thermal Efficiency curve is for reference only as this is a residential boiler

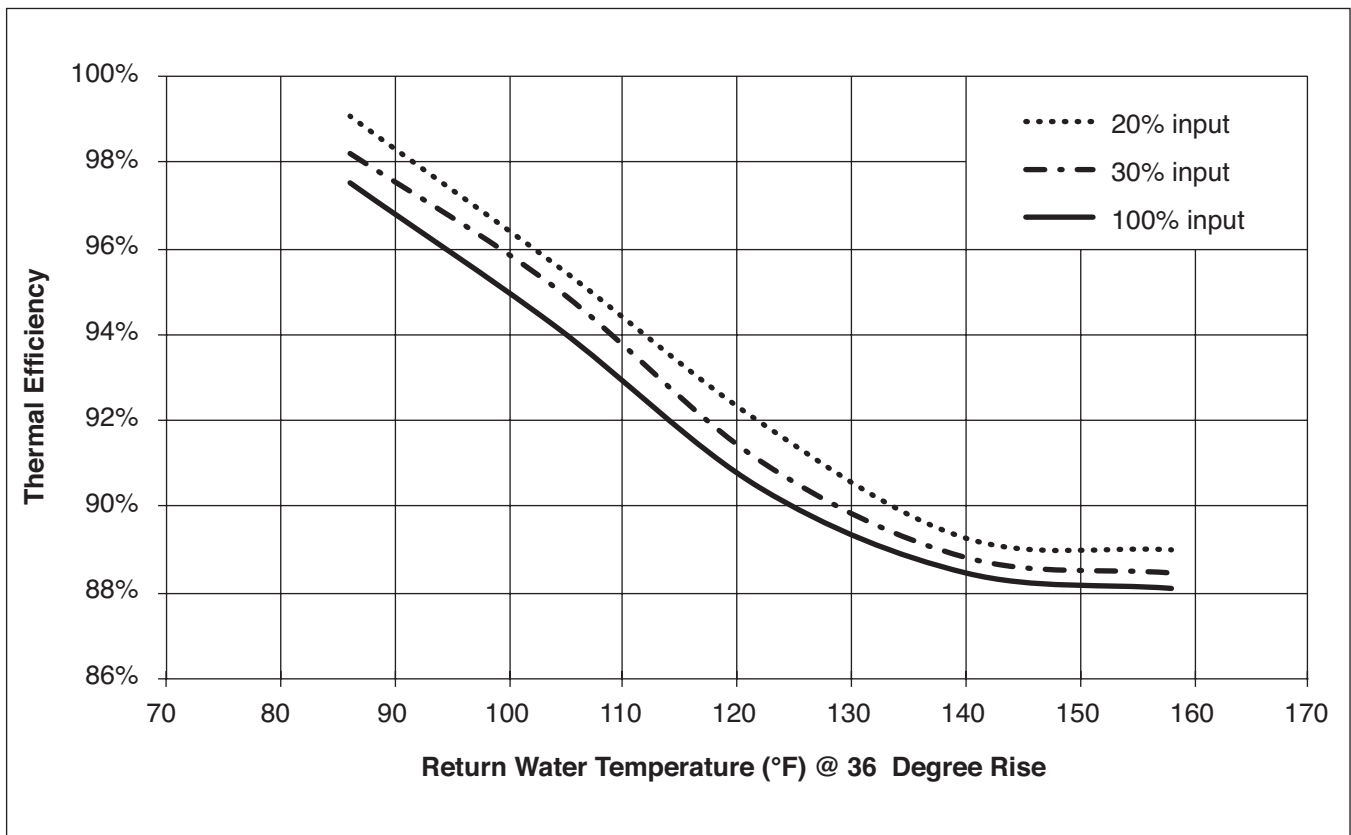


Fig. 8 Thermal Efficiency Curves SSB160*
* Thermal Efficiency curve is for reference only as this is a residential boiler

3 Regulations



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



Valves external to the boiler must be fitted with T-handles and condensate piping must be installed in accordance with the State Plumbing Code.

3.1 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 condensing gas boiler complies in its design and mode of operation with the American National Standard ANSI Z21.13/CSA 4.9, 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 (see section "7 Maintenance").

3.2 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.

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.

3.3 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 (.) 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 the equipment and venting shall include:

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

(d) **MANUFACTURERS REQUIREMENTS - GAS EQUIPMENT VENTING SYSTEM NOT PROVIDED.** When the manufacturer of Product Approved side wall horizontally vented gas fueled equipment does not provide the parts for the venting of flue gases, but identifies special venting systems, the following requirements shall be satisfied by the manufacturer:

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

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

4 Installation

4.1 Packaging and product identification

The SSB is delivered strapped to a pallet, packed and protected in a cardboard carton.

NOTICE: The packaging shows the characteristics of the product: model, power, fuel type and version. In case of deviation from the order, contact your local dealer. After removing the packaging check the condition and completeness of delivery.



WARNING: Keep the packing material out of reach of children as it may be dangerous. Dispose of packaging in an environmentally responsible manner.



In order to ensure proper product identification do not remove or tamper with any product identification tags or labels.

4.2 Installation room

The boiler must be installed in rooms that comply with all local, state and federal codes and laws. Before commissioning the boiler verify exhaust flue and terminations are properly sealed and secured.

- Adequate combustion air and ventilation is required for safe and proper installation of the boiler, regardless whether the combustion air is taken from the outside (Direct Vent, sealed combustion) or inside (room air for combustion).



WARNING: Insufficient ventilation of the boiler room can lead to high air temperatures and lead to risk of personal injury or death from flue gas poisoning!

- Make sure that intake and exhaust openings are sufficiently sized and no reduction or closure of openings takes place. If these are not provided, do not operate the boiler (see section "4.7.2 Connecting flue gas accessories").
- The heating units cannot be installed outdoors. NEVER place this appliance in a location that would subject it to temperatures at or near freezing or temperature that exceed 120°F (49°C) while in operation. Failure to properly locate this unit can result in premature failure.
- This appliance must be installed in a location so that any water leaking from the unit or piping connections or relief valve openings will not cause damage to the area surrounding the unit or any lower floors in the structure. When such locations cannot be avoided, it is recommended that a suitable drain pan, adequately drained, be installed under the boiler. The pan must not restrict combustion air flow.
- When installed in a room with thin flooring. Isolate the from direct contact with the floor to minimize noise transmission.
- Do not allow excessive dust to collect on the appliance.



WARNING: If the information in these instructions is not followed exactly, a fire or explosion may result causing property damage, personal injury or death.

- Do not store or use gasoline or other flammable vapors and liquids in the proximity of this or any other appliance.
- Installation and service must be performed by a qualified installer, service agency or the gas supplier.
- Please consider the space needed for accessibility to safety and control devices and for performing maintenance operations.

The recommended clearance for ease of installation and service are illustrated in the following picture:

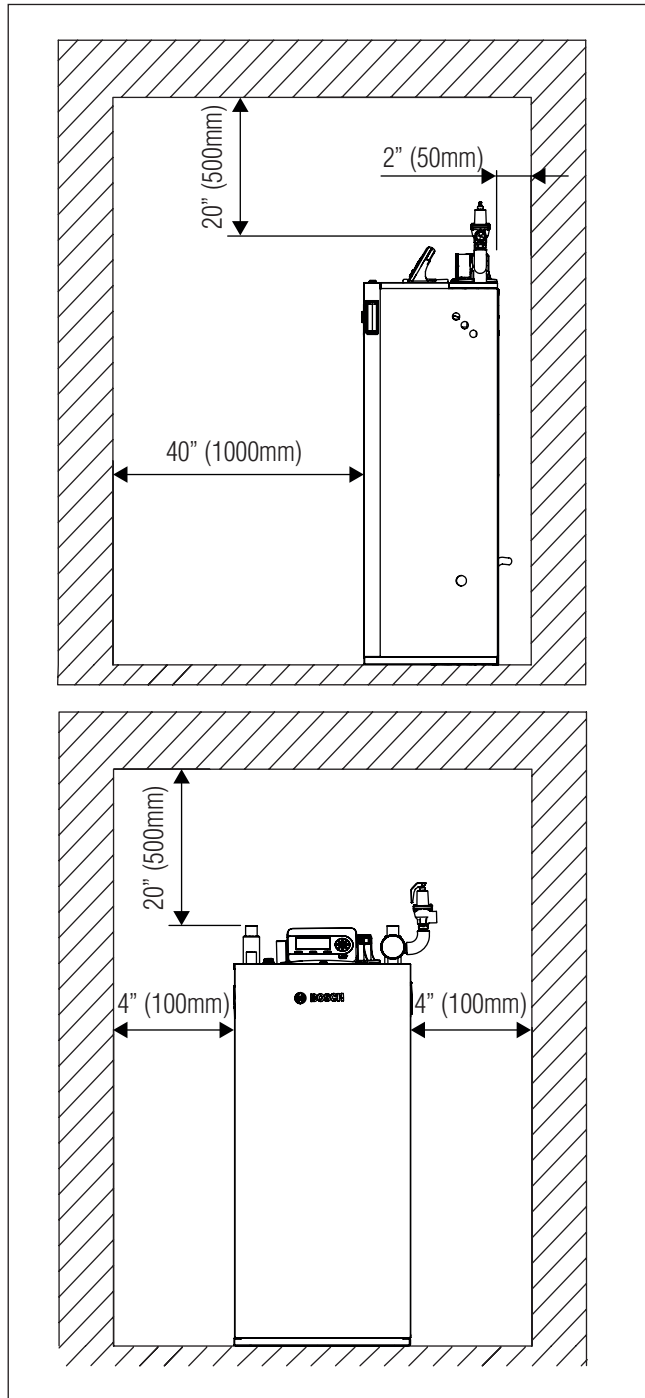


Fig. 9 Recommended minimum clearances for installation and servicing (dimension in inches [mm])

2" (50.8 mm) clearance from combustibles is permitted, but respect the clearance in Fig. 9 for serviceability". The boiler can be installed on a combustible (wood) floor excluding carpets.

NOTICE: This device is equipped with a freeze protection function. For further information see section "5.8 Setting frost protection".

4.3 Water Chemistry Guidelines

NOTICE: If using anti-freeze:

- ▶ For freeze protection use only propylene glycol, with scale inhibitors, with a maximum of 40% glycol.
- ▶ 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 6.5 and 9.

IMPORTANT: To avoid any presence of oxygen in the system, it is advised to prevent as little as possible air during installation. Usual spots where air is most likely to seep in are: gaskets, pumps, air vents and O-rings. Using an automatic water fill system exposes the system to fresh oxygenated water.

A minimum water pressure is required for optimum performance. Minimum water pressure required: 7.25 psi (0.5 bar).

Before and during assembly, the system must be kept free of impurities, construction dust, sand, copper dust, grease, carbon deposits, etc., as well as soldering flux residue. In any of these instances, the old system must be rinsed with clear water mixed with a highly concentrated rinse agent.

NOTICE: DO NOT use PVC for vent piping when using anti-freeze in the primary circuit of the boiler. Use CPVC, PP or stainless steel only!

Water hardness must fall within the following limits:

50 ppm of CaCO_3 < (alkali strength) < 150 ppm of CaCO_3 .

- ▶ 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.
- ▶ Consult a local water treatment specialist for recommendations if any of the above is outside the stated ranges.
- ▶ When using oxygen permeable PEX, the system must be separated from the boiler by a heat exchanger.
- ▶ A correctly sized and working expansion vessel must be installed.
- ▶ Do not exceed the maximum permissible flow rate through the boiler.
- ▶ Excessive flow can cause erosion damage to the heat exchanger.
- ▶ **Eliminate System Leaks:**
Continuous addition of make-up water will constantly add oxygen to the system and lead to corrosion. All system leaks must be repaired.

In the following table are listed the chemical water specifications.

Parameters	Units	Value
General feature	-	Colorless, no sediment
Dissolved Oxygen	mg/l	< 0,05
Total iron (Fe)	mg/l	< 0,3
Total copper (Cu)	mg/l	< 0,1
Na_2SO_3	mg/l	< 10
N_2H_4	mg/l	< 3
PO_4	mg/l	< 15

Tab. 1 Water specification

4.4 Hydraulic connection

Hydraulic connection are shown in Fig. 2, Fig. 3 and Fig. 4. In the following table are listed the pipe dimension for each model:

Model	Ø Water supply connection	Ø Water return connection
SSB85	1"	1"
SSB120	1"	1"
SSB160	1"	1"

NOTICE: Before connecting the boiler to the heating system, flush the heating system to remove sediment, flux, dirt, and other foreign matter. The heat exchanger may be damaged by sediment or corrosion.

- Do not use cleaning fluids that are not compatible with the boiler materials, including acids (e.g. hydrochloric acid and similar ones) at any concentration
- Introducing fresh water to the system increases the oxygen presence and can cause corrosion of metallic components. Immediately repair any drips or leaks in the system to avoid constant introduction of air into the system.
- Do not use the water contained in the boiler for domestic use or as drinking water or within swimming pools.
- Excessive fluctuation in pressure changes in the system can cause fatigue and stress on the heat exchanger. This is detrimental to the integrity of the boiler and system components, it is mandatory to maintain a constant operating pressure.

4.4.1 Low water cut off

A low water cut off (LWCO) is installed in the boiler, the manual reset button is located on the front of the internal control box.

To check the functionality of LWCO press the test button (the top button shown in Fig. 10). The LED on the block will light and in the screen will appear the error "MN: Low Water Cutoff Error". At this point press the reset button (the bottom button). The LED will turn off. Restart the boiler by pressing "reset" button on the removable display.

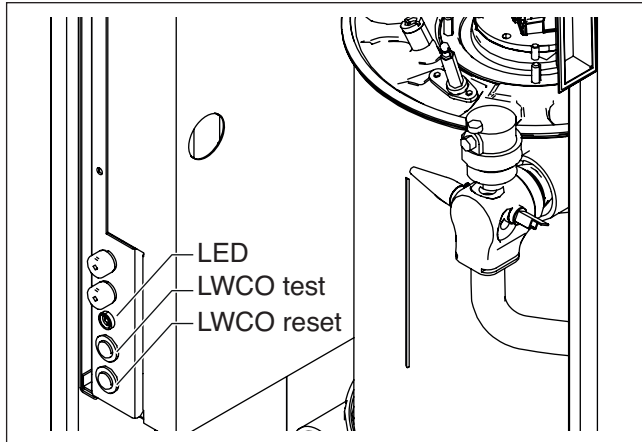


Fig. 10

4.4.2 No Flow test procedure

To simulate a no water flow condition, the following steps should be followed:

- Turn power off to boiler
- Disconnect boiler pump power (general pump)
- Turn power on to boiler
- Press "menu" button on display
- Select "system test"
- Select "high power"

The boiler will subsequently shut down as a result of overheat error.

4.4.3 High limit safety switch

A high limit safety switch is installed in the boiler. Refer to Fig. 11. To simulate a high limit lockout at 208°F press the "MENU" and "OK" buttons simultaneously for 10 seconds. The control will display "MN: Max. Thermostat Lock Error". At this point press the reset button on the removable display to restart the boiler.

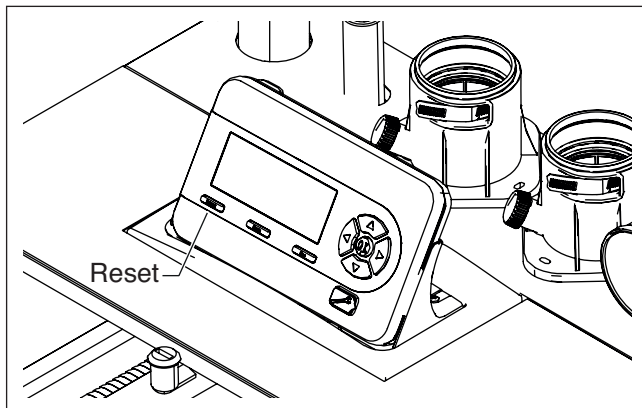


Fig. 11

4.4.4 Pressure relief valve (PRV) ASME approved

The boiler is supplied with a pressure relief valve (PRV). The relief pressure for each valve for each model of the boiler is shown in the following table:

Boiler model	Relief Pressure
SSB85	30 psi (2.07 bar)
SSB120	30 psi (2.07 bar)
SSB160	30 psi (2.07 bar)

The pressure relief valve (PRV) must be piped to a suitable drain to prevent injury if the valve opens due to an overpressure situation. Use a pipe of the same diameter of the outlet of the valve

4.4.5 Expansion tank

An expansion tank must be installed in the hydraulic system. The expansion tank must be properly sized for the boiler and the system volume, temperature and pressure.



WARNING: An undersized expansion tank will cause leakage of water from the pressure relief valve and introduce fresh water into the system. Excessive addition of makeup water can cause corrosion of metallic components and compromise the functionality of the boiler.

Refer to instructions provided by the manufacturer of the expansion tank for details on its installation and sizing.

4.4.6 Pump

SSB85/120/160 boilers are fitted with a circulator pump. The graph in the following figure shows the head range of the pump depending on the flow rate compared to the relevant pressure drop.

SSB85 – UPS15-58

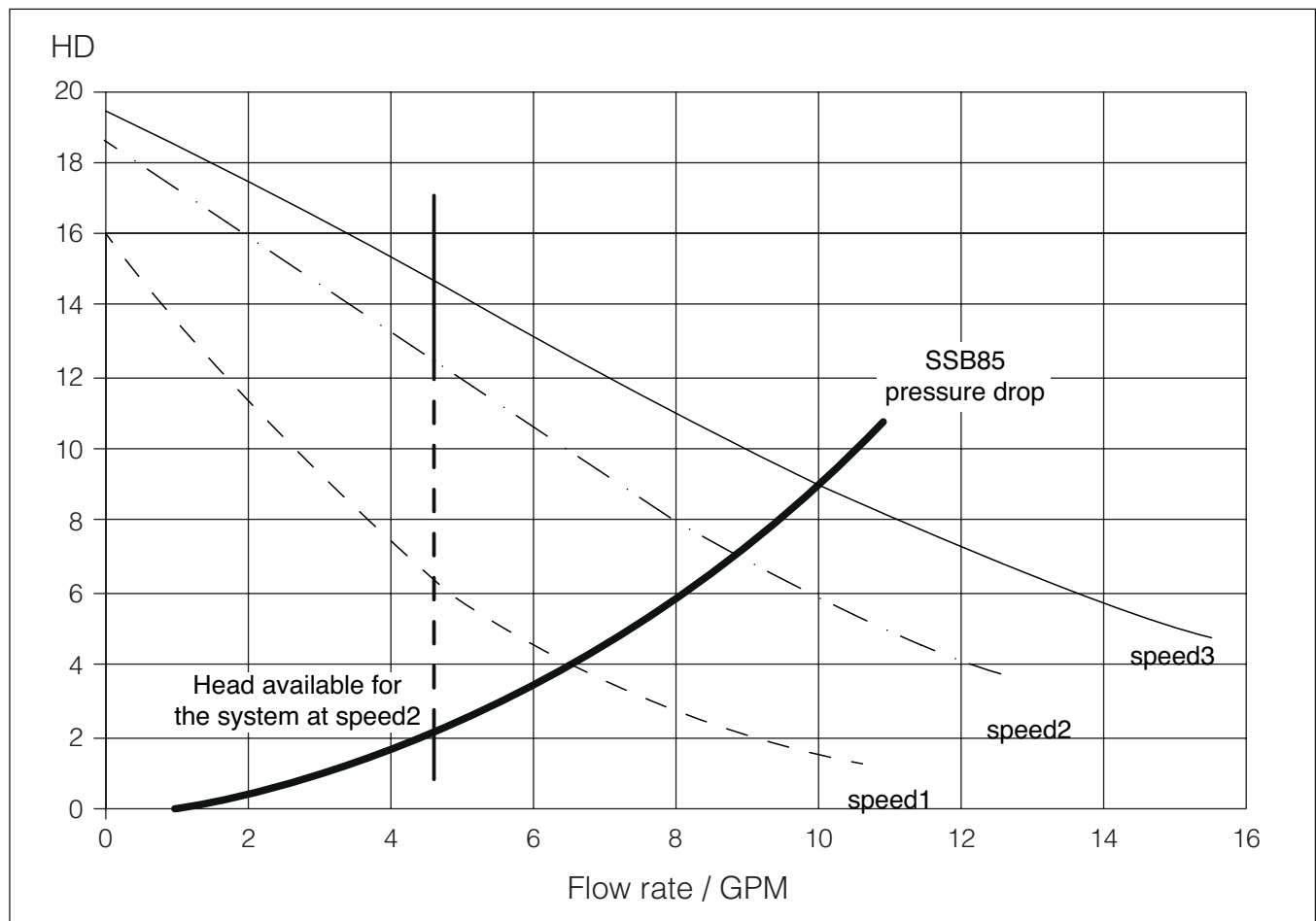


Fig. 12 SSB85 Pump curve



It is important to ensure the pump has the correct flow rate for the system to avoid a low water circulation situation. In event of an inadequate flow rate, the safety devices of the boiler will automatically stop the burner.

SSB120 – UPS25-78

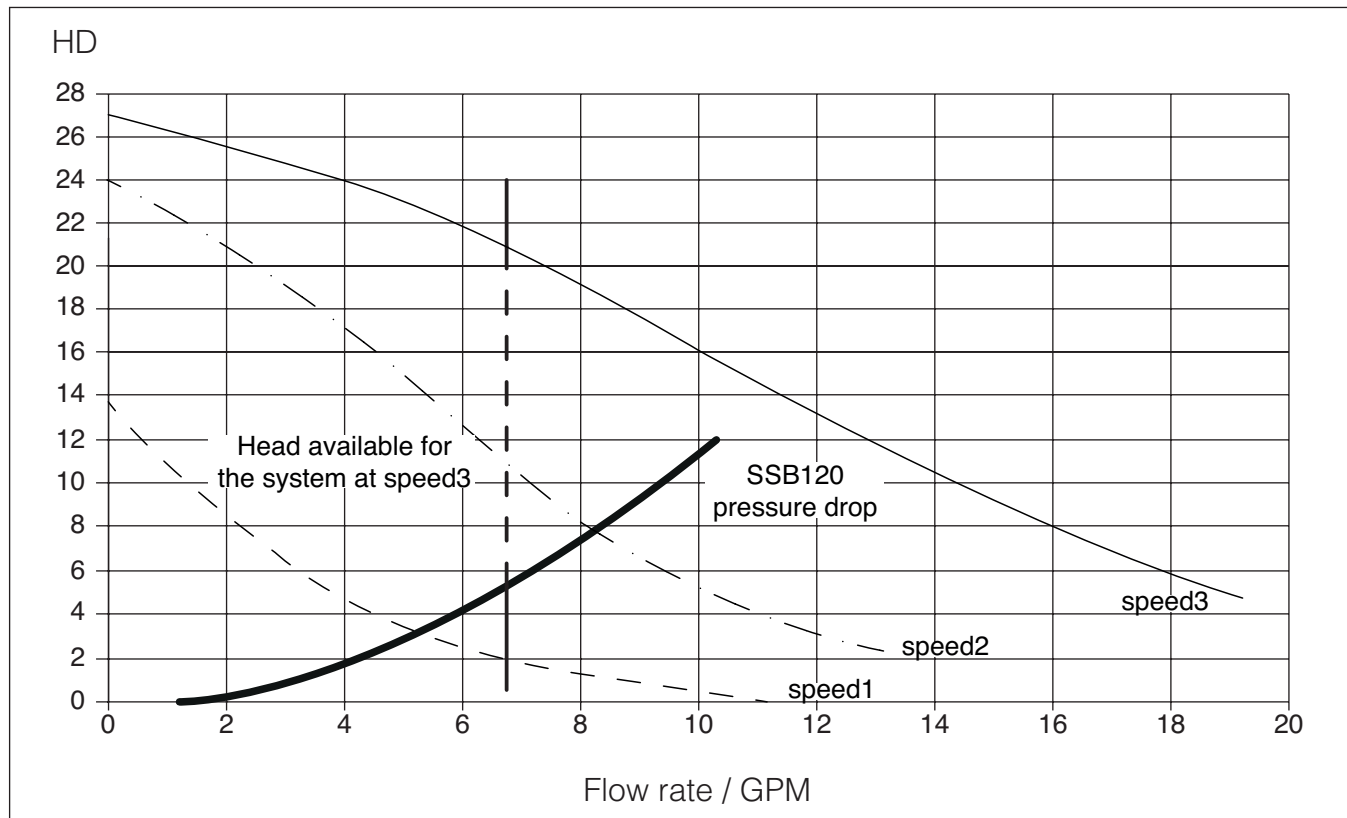


Fig. 13 SSB120 Pump curve

SSB160 – UPS25-78

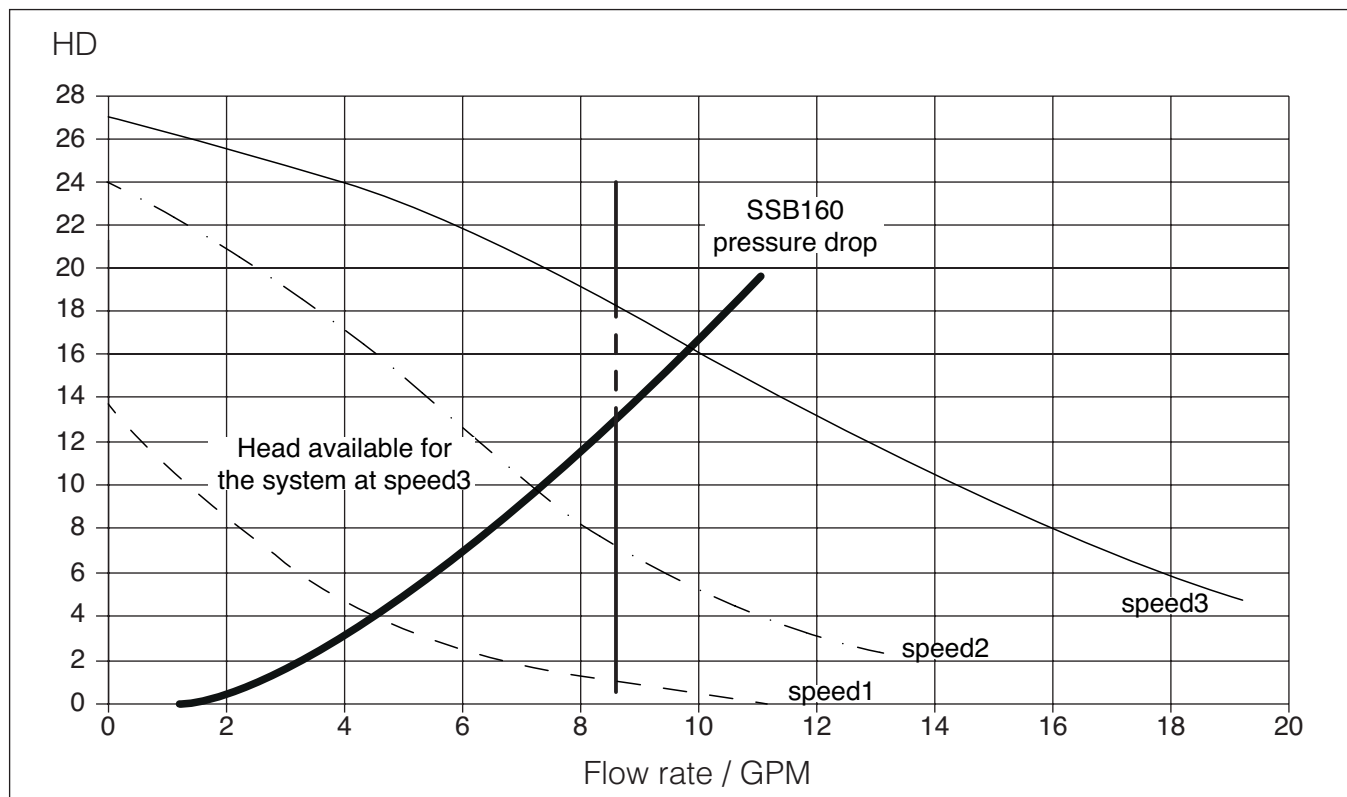


Fig. 14 SSB160 Pump curve

4.4.7 Condensate removal

The condensate water produced by the boiler during its normal operation is collected by a condensate trap (A) provided with the boiler and connected to the heat exchanger. Tube (B) is the condensate outlet.

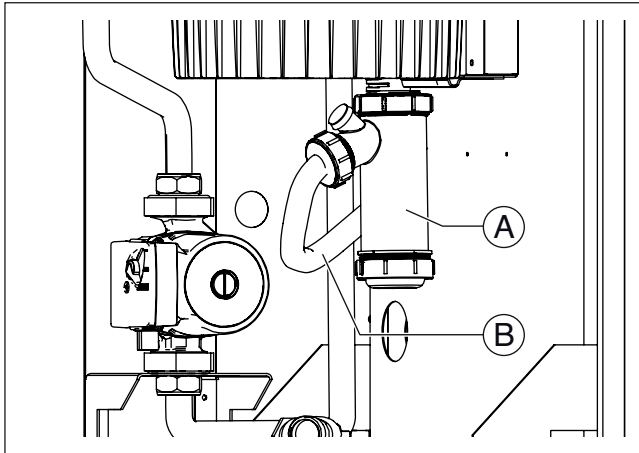


Fig. 15



DANGER: The condensate trap A shown on Fig. 15, must be filled with water or combustion gases will enter the room with a risk of an excessive level of carbon monoxide.

To fill the condensate trap add water to the vent (1) until you fill the condensate trap (3) with water.

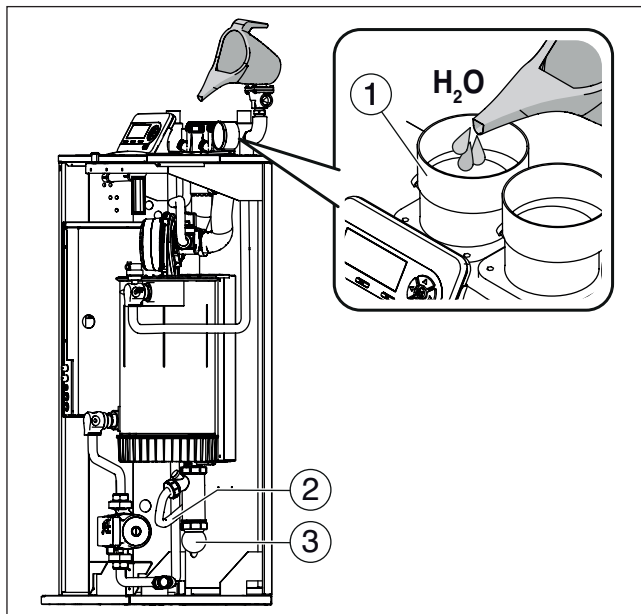


Fig. 16

The condensate is discharged at atmospheric pressure, i.e. by dripping to the home sewage drainage system or into a drain or drain pan.

The boiler is equipped with three holes (in the right, left and back side) to carry the condensate out the discharge pipe.

Install the condensate drain tube through the appropriate hole and be sure to pitch away from the boiler.

- Do not reduce the condensate drain pipe down stream.
- Please dispose of condensate in compliance per Federal, state and local code requirements.
- Never use copper pipes or of other material not intended for the

specific purpose, because the acidic action of condensate will cause a rapid deterioration.

- Pitch the condensate drain pipe towards the discharge point avoiding high points, which can inhibit the flow.
- Do not run the condensate pipe through unconditioned areas where it may freeze.

NOTICE: Verify condensate disposal / neutralization is in accordance with federal state and local regulations.

A condensate removal pump is required if the boiler is below the drain. When installing a condensate pump, select one approved for use with condensing boilers. The pump should have an overflow switch to prevent property damage from condensate leakage.

4.5 Electrical connection

4.5.1 Power supply cable connection

To connect the boiler to the electrical supply, as required by local, state and federal codes.

The power supply cable can be inserted into the boiler using one of the three knock out holes (A) on each side as shown in Fig. 17.



WARNING: All the electrical wiring must be secured by appropriate strain reliefs per electrical code requirements.

To secure the supply cable inside of the boiler use the cable clamp shown in position B shown in Fig. 18.

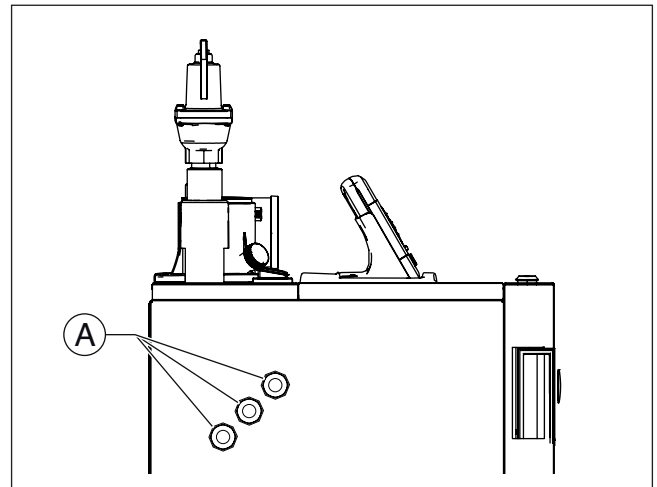


Fig. 17

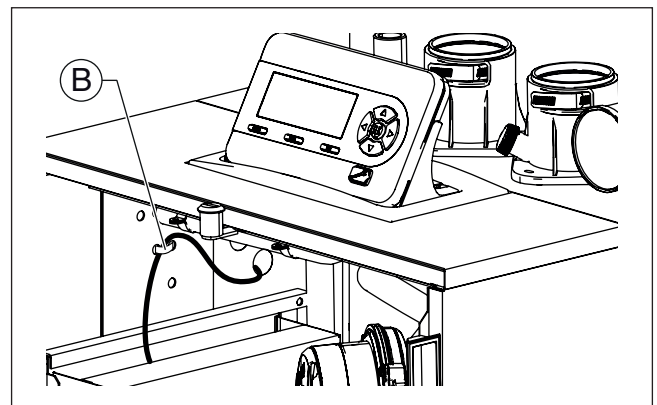


Fig. 18

The general electrical connection is shown in the following diagram :

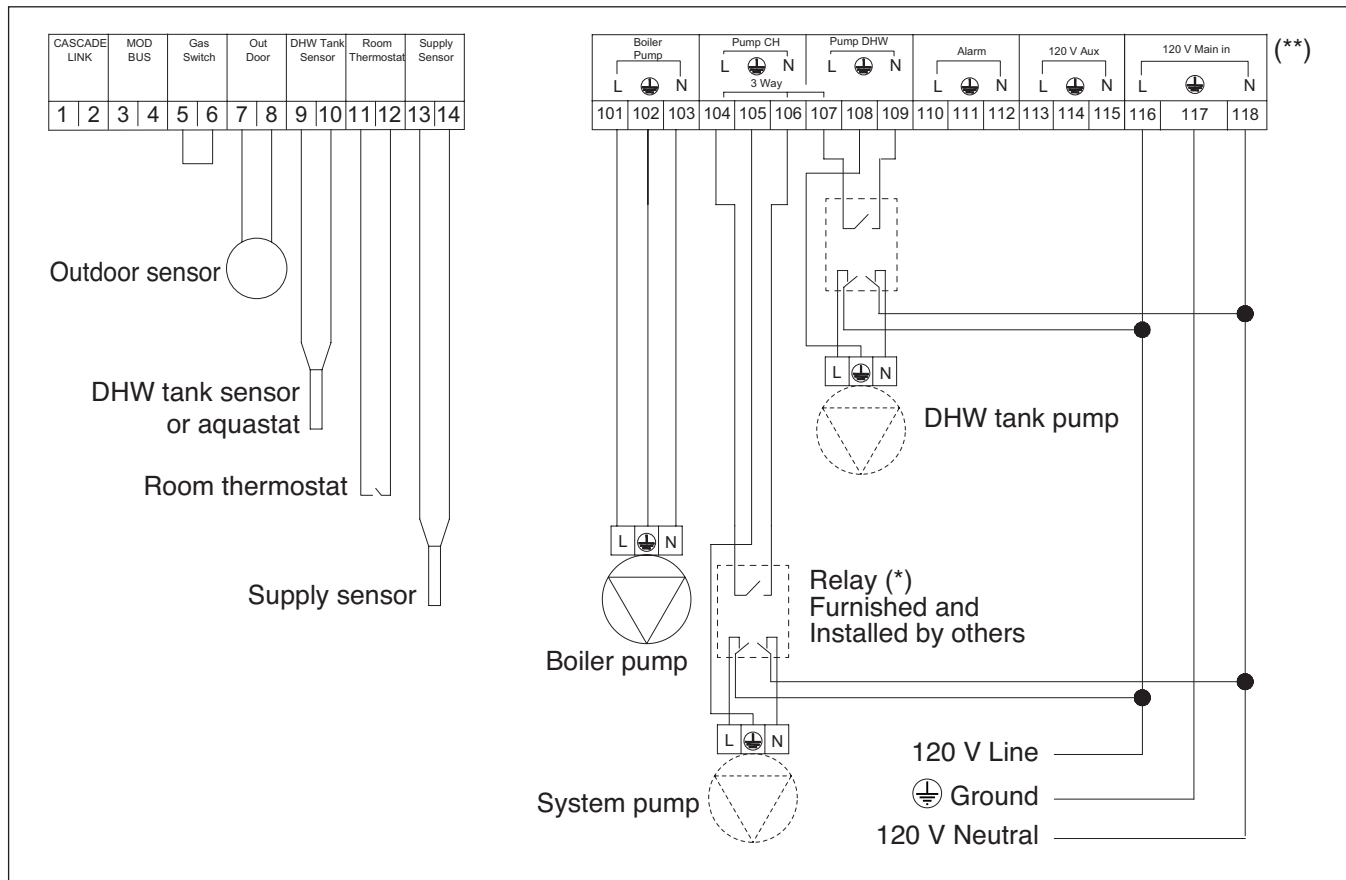


Fig. 19

(*) **NOTICE:** The maximum amp load for each pump (in addition to the boiler pump) is 2Amps when 1 pump is connected. For this reason, if the power consumption of each pump is higher than 84 watt, use a relay as shown in figure.

(**) **NOTICE:** line voltage.

4.5.2 Access to the electrical terminal strip

To have access to the internal terminal strip of the boiler follow the steps below (see Fig. 20).

- Rotate the lock at the top on the front panel and remove the front panel as shown.
- Slide out the electrical box and remove the two screw from the front.
- Remove the box cover to have access to the terminal strip.

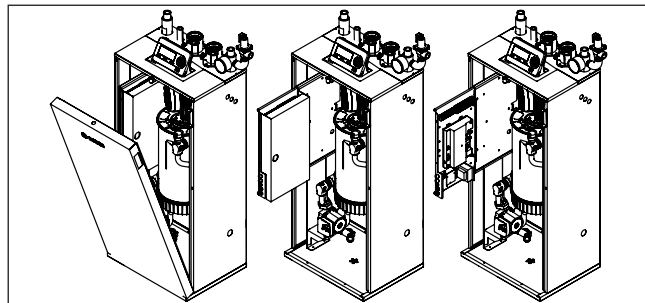


Fig. 20

4.5.3 Room thermostat connection

Connect the thermostat to terminals 11 and 12 as shown in Fig. 19.

4.5.4 Outside temperature sensor

If outside temperature control is to be used, the outside probe needs to be connected to terminals 7 and 8 as shown in Fig. 19. The outside probe shall be installed on an outer wall, North or North/East, away from windows, door, and ventilation grids. Never install the probe in a position exposed to the sun.

The maximum length is 300' (100 meter), if the cable length exceeds 32' (10 meters) a shielded cable is required and shall be connected to chassis ground.

NOTICE: All Sensors and low voltage wiring shall not be routed in direct contact or near high voltage power.

4.5.5 Electrical wiring diagram

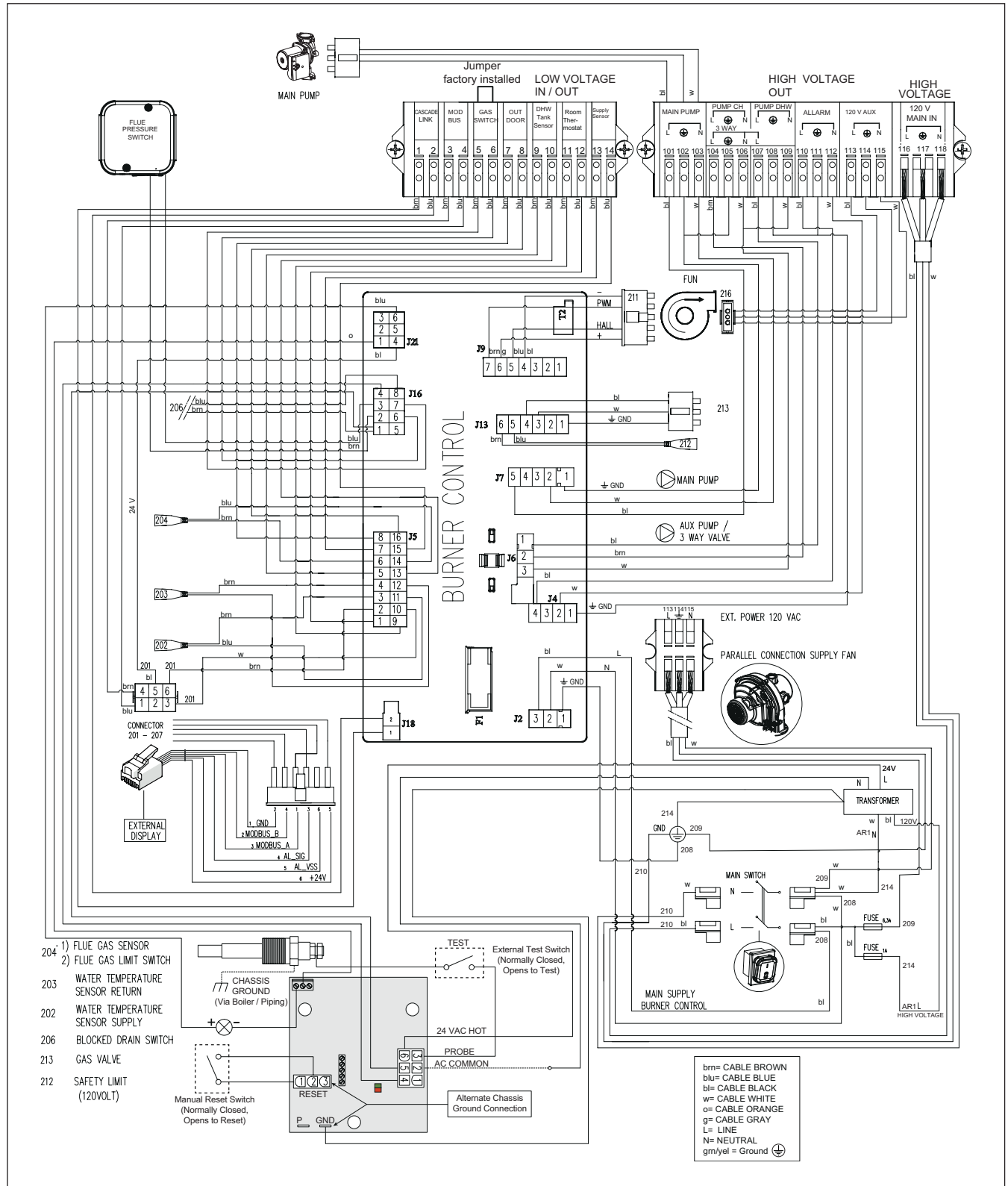


Fig. 21 Wiring diagram

4.6 Gas supply piping

Verify that the type and the pressure of the gas supplied correspond with those required for the boiler. When field converting the boiler from Natural to LP gas be sure to adhere the new gas label on the boiler [see section converting from Natural Gas to LP for details].

The minimum and maximum pressure for natural gas are 3.5" W.C. (8.72 mbar) and 10.5" W.C. (26.15 mbar) respectively.

The minimum and maximum pressure for LP gas are 8" W.C. (19.9 mbar) and 13" W.C. (32.3 mbar) respectively.

4.6.1 Connection of gas supply piping

Connect the gas supply to the unit as follows:

- ▶ Install a ground joint union for servicing as required.
- ▶ Install a manual shutoff valve in the gas supply piping
- ▶ Install a sediment trap/ drip leg
- ▶ Purge all air from the gas supply piping.
- ▶ Before placing the appliance in operation, check the appliance and its gas connection.
- ▶ Check the appliance and its gas connection with a leak test before placing in operation.



WARNING: Gas piping must be supported with proper hangers and not from the boiler itself or its devices and accessories.



DANGER: Never use an open flame to test for gas leaks. Always use an approved leak detection method.



WARNING: Failure to properly apply pipe sealing compound can result in severe personal injury, death, or substantial property damage.

The Commonwealth of Massachusetts prohibits the use of copper tubing for the gas line.

4.6.2 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 appliance from the power supply at the emergency shutoff switch or by disengaging the heating system circuit breaker. Take appropriate 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 CO₂ or O₂ reading taken at maximum nominal output and minimum nominal output using an electronic flue gas analyzer.

LP ORIFICE INSTALLATION (SSB85 – SSB120)

Natural Gas to LP conversion

The heating unit is factory preset for operating with natural gas. This set-up can be changed using the conversion kits supplied by the manufacturer with each boiler.

NOTICE: This change may only be performed by an Licensed contractor according to the following procedure.

Converting from NATURAL GAS to LP

- ▶ Close the gas cock
- ▶ Disconnect the electric power supply from the boiler



WARNING: to avoid electrical shock, it is mandatory to disconnect the boiler from the power supply using a service disconnect external switch.

- ▶ Remove the front panel
- ▶ Unscrew the 2 screws 'A' and the swivel joint 'B' indicated in Fig. 22 to separate the valve from the fan
- ▶ Separating the two components, you can see the hole where the gas passes with its gasket
- ▶ Remove the gasket 'D' and insert inside the provided metal orifice 'C'

Boiler model	Orifice Diameter (mm)
SSB85	5.5
SSB120	5.0

Tab. 2

- ▶ Reinstall gasket 'D' with LP metal orifice 'C'.
- ▶ Check the condition of the gasket 'E'. Replace if necessary
- ▶ Tighten the 2 screws 'A'
- ▶ Tighten the swivel joint 'B'
- ▶ Switch the main power supply to ON

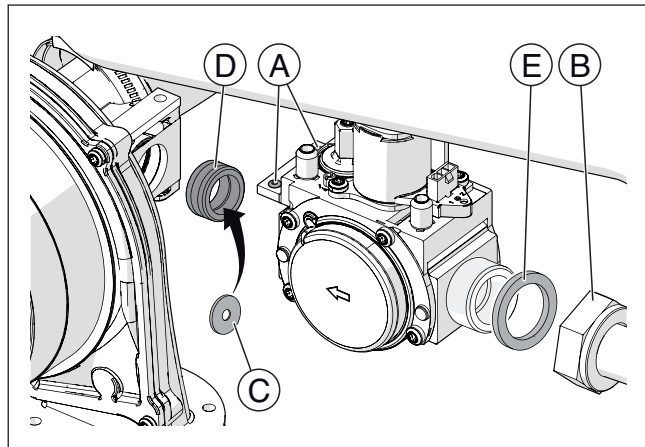


Fig. 22

NOTICE: Make sure there is no demand or call for heat.

- ▶ Use the control panel to enter in the parameter list and change the parameter N° 98 (Gas Type) from "NG" to "LPG"
- ▶ Reopen the gas shut-off cock
- ▶ Adjust the CO₂ parameter as explained in chapter "5.7 Adjusting and setting CO₂ limits"
- ▶ Affix the gas type label from the gas conversion kit to the appliance (Fig. 24).

LP ORIFICE INSTALLATION (SSB160)

Natural Gas to LP conversion

The heating unit is factory preset for operating with natural gas. This set-up can be changed using the conversion kits supplied by the manufacturer.

NOTICE: This change may only be performed by an authorized Servicing Center, according to the following procedure.

Converting from NATURAL GAS to LP

- ▶ Close the gas cock
- ▶ Disconnect the electric power supply from the boiler



WARNING: to avoid electrical shock, it is mandatory to disconnect the boiler from the power supply using a bipolar external switch..

- ▶ Remove the front panel
- ▶ Unscrew the 3 screws 'A' and the swivel joint 'B' indicated in Fig. 23 to separate the valve from the fan
- ▶ Separating the two components, you can see the hole where the gas passes with its gasket
- ▶ Insert the provided metal orifice 'C' into the gasket "D" without removing the gasket itself

Boiler model	Orifice Diameter (mm)
SSB160	6.25

Tab. 3

- ▶ Check the condition of the gasket 'E'. Replace if necessary
- ▶ Tighten the swivel joint 'B'
- ▶ Tighten the 3 screws 'A'
- ▶ Switch the main power supply to ON

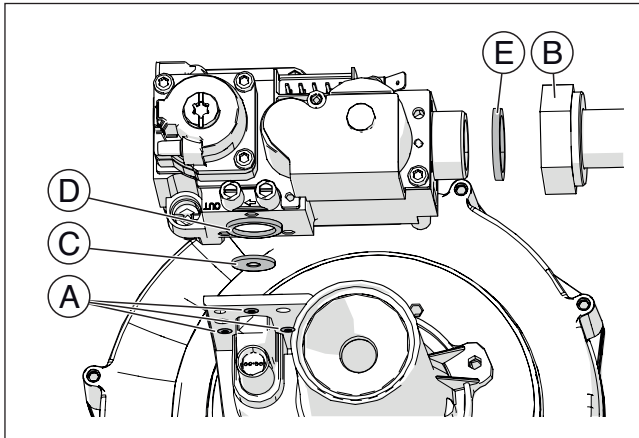


Fig. 23

IMPORTANT: Make sure there is no heat demand from the thermostat inputs.

- ▶ Reopen the gas shut-off cock
- ▶ Use the control panel to enter in the parameter list and change the parameter N° 98 (Gas Type) from "NG" to "LPG"
- ▶ Adjust the CO₂ parameter as explained in chapter "5.7 Adjusting and setting CO₂ limits"
- ▶ Affix the gas type label from the gas conversion kit to the appliance (Fig. 24).

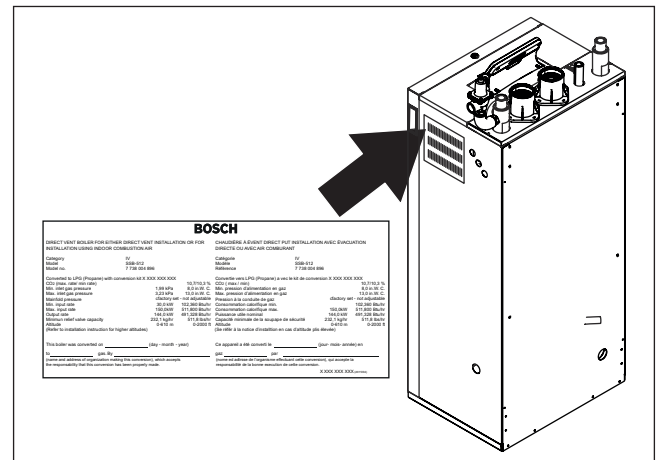


Fig. 24 Affixing the gas type label

4.7 Venting and air piping system



WARNING: Do not connect this gas appliance with any other appliance unless approved by manufacturer. Failure to comply with this WARNING could result in the accumulation of carbon monoxide gas which can cause severe personal injury or death.



WARNING: Do not connect SSB models 85, 120 and 160 to a shared/common or cascade vent system. Each boiler must have a separate, dedicated vent system.



DANGER: The condensate trap must be filled with water or combustion gases will enter the room with a risk of an excessive level of carbon monoxide. For instruction see section 4.4.7.

NOTICE: DO NOT use PVC for vent piping when using anti-freeze in the primary circuit of the boiler. Use CPVC, PP or stainless steel only!

Make sure that the combustion air is not contaminated by:

- Permanent wave solutions;
- Chlorinated waxes/cleaners;
- Chlorine-based swimming pool chemicals;
- Calcium chloride used for thawing
- Sodium chloride used for water softening;
- Refrigerant leaks;
- Paint or varnish removers;
- Hydrochloric acid/muriatic acid;
- Cements and glues;
- Antistatic fabric softeners used in clothes dryers;
- Chlorine-type bleaches, detergents, and cleaning solvents found in household laundry rooms;
- Adhesives used to fasten building products and other similar products.

In any case to prevent contamination do not connect the suction and discharge near:

- Dry cleaning/laundry areas and establishments;
- Swimming pools;
- Metal fabrication plants;
- Beauty shops;
- Refrigeration repair shops;

- Photo processing plants;
- Auto body shops;
- Plastic manufacturing plants;
- Furniture refinishing areas and establishments;
- Remodeling areas;
- Garages with workshops.

4.7.1 General venting and combustion air piping system

- ▶ The SSB boilers require an approved vent system—designed for pressurized venting
- ▶ Vent connectors serving appliances vented by natural draft shall not be connected to any portion of mechanical draft systems operating under positive pressure.
- ▶ Ensure that the flue pipes and seals are not damaged.
- ▶ Use only sealing compounds (primer and glue) approved for use with the vent material.
- ▶ Never install a barometric or a thermally controlled vent damper with this boiler.
- ▶ 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.
- ▶ The unit is to be used for either direct vent installation or for installation using room air for combustion. When room air is used, it is necessary to provide an adequate opening for the fresh air intake.
- ▶ You must use any of the vent/air piping methods shown in this manual.
- ▶ Be sure to locate the unit such that the vent and combustion air piping can be routed through the building and properly terminated.
- ▶ The vent installation must be in accordance with Venting of Appliances, of the latest edition of the National Fuel Gas Code, ANSI Z223.1/ NFPA 54 or section, Venting Systems and Air Supply for Appliances, of the CAN/CSA 8149.1, Natural Gas and Propane Installation code or applicable provisions of the local, state and federal building codes.
- ▶ All vent pipes must be installed according to the vent manufacturer's instructions.

- ▶ The exhaust vent and the combustion air inlet lines must be supported to prevent sagging per the vent manufacturer's instructions.
- ▶ Do not mix components from different systems. The vent system could fail, causing leakage of flue products into the living space. Use only approved materials.
- ▶ Use of cellular core PVC and CPVC for venting system is not allowed.



WARNING: Improper venting due to failure to comply with the warnings above can result in excessive levels of carbon monoxide!

- ▶ The exhaust pipe must be pitched a minimum of a 1/4 inch per foot back to the boiler (to allow drainage of condensate).
- ▶ The vent system shall be installed so as to prevent the accumulation of condensate.
- ▶ Consult local and state codes pertaining to special building code and fire department requirements. Adhere to national code requirements.
- ▶ 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/CSA B149.1 Natural Gas and Propane Installation Code in Canada and in accordance with all applicable local building codes.
- ▶ Observe the listed maximum lengths of vent system, which are boiler model dependent
- ▶ To avoid moisture and frost build-up and to maintain clearances to openings on adjacent structures, 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.
- ▶ Due to the high efficiency of the unit it may discharge what looks like white smoke especially when the outside air temperature is cold. This is due to the presence of water vapor, normally present in the flue.
- ▶ The following figure shows the acceptable piping installation for venting and combustion air.

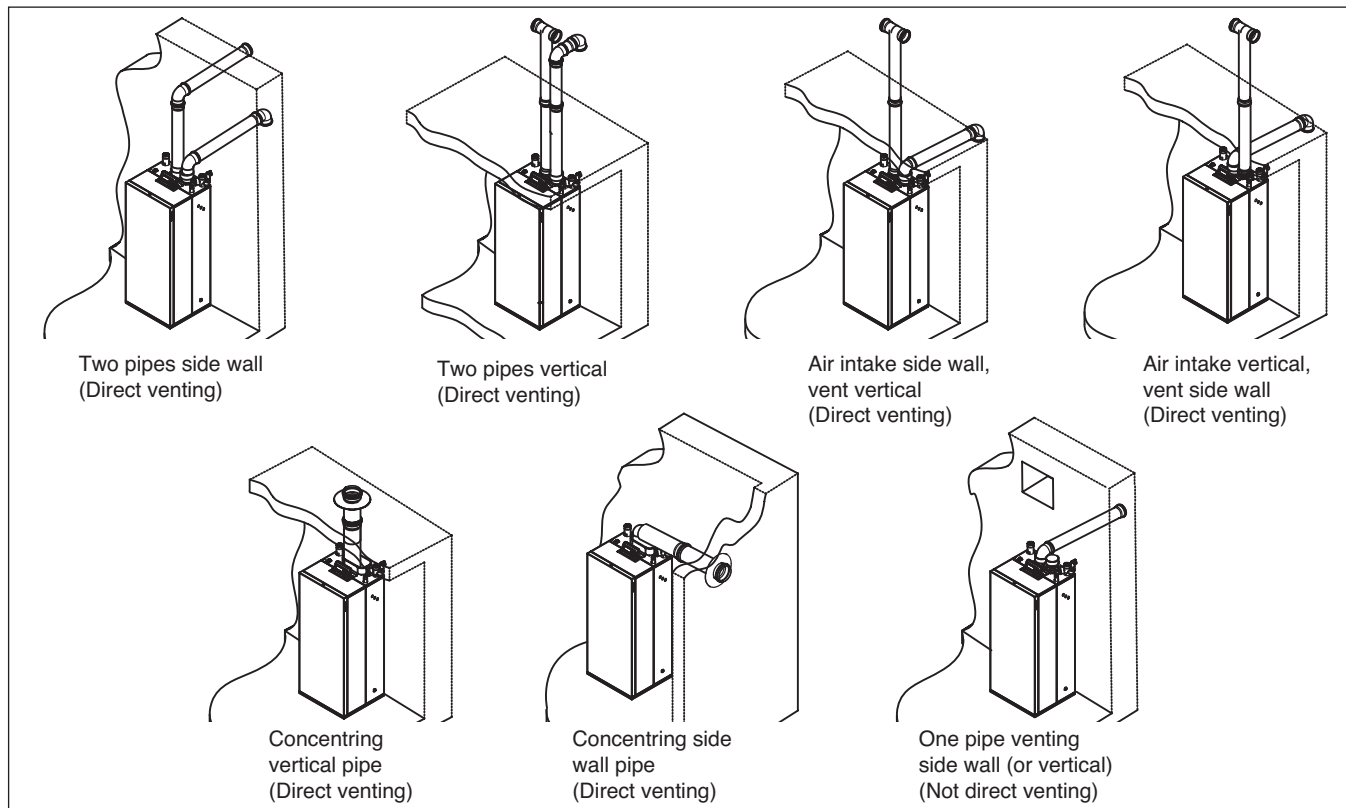


Fig. 25

4.7.2 Connecting flue gas accessories

Approved vent systems are:

- Twin pipe, concentric pipe and 1 pipe using room air PVC / CPVC /
- Stainless Steel
- Approved materials PVC, CPVC, Stainless Steel, PP and PP-Flex (M&G Duravent PolyPro and Centrotherm InnoFlue)
- Sealed combustion or room air intake
- Terminations can be either horizontal or vertical, see details following
- The diameters of the flue outlet and combustion air intake inlet are designed to fit standard PP, PVC, CPVC and stainless steel pipes. The following table gives the diameter of the flue adapter on the boiler.

Boiler	SSB85	SSB120	SSB160
Diameters	2" - 60mm	2" - 60mm	2" - 60mm

Tab. 4

Insert the exhaust pipe and the air intake pipe as shown in the following figure:

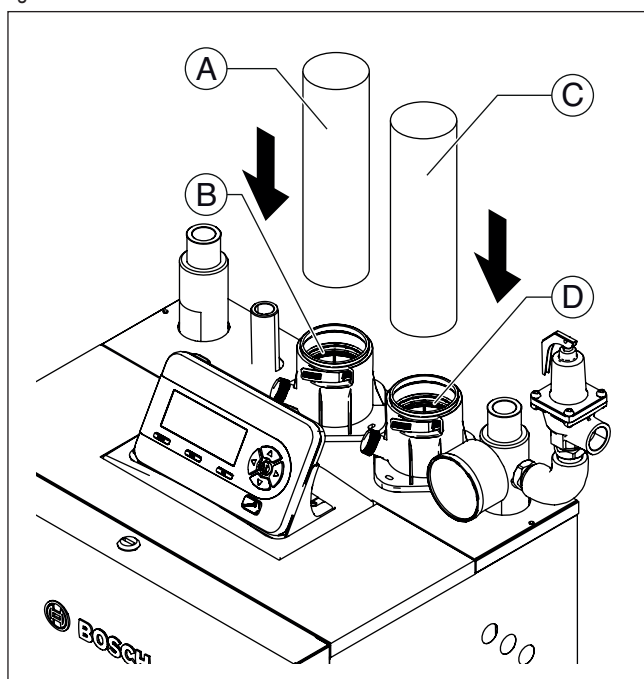


Fig. 26

Insert the flue exhaust pipe "A" completely into the adapter and tighten the clamp "B" present in the flue exhaust adapter.

Insert the air intake pipe "C" completely into the adapter and tighten the clamp "D" present in the air intake adapter.

The correct flow direction into two pipes is shown in Fig. 27.

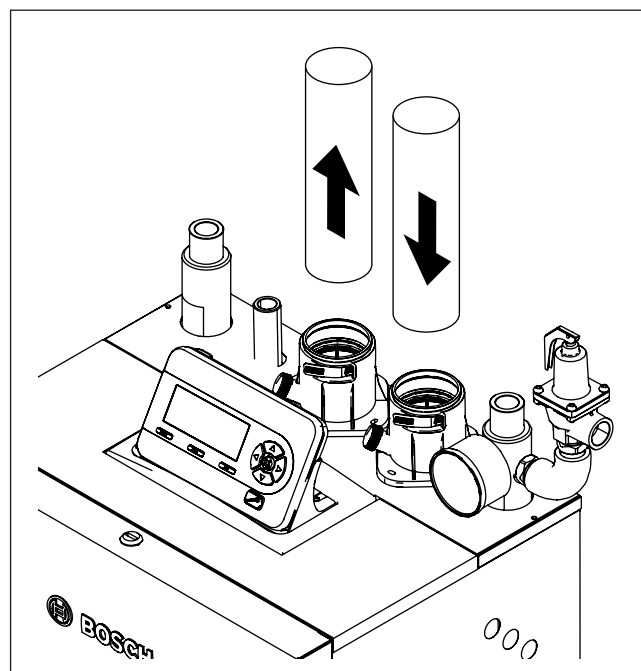


Fig. 27

4.7.3 Installation of the exhaust and air intake system

NOTICE: Do not extend exposed vent pipe outside the building beyond recommended distance of 39" or 1 meter. 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 ([X2], [X4], see Fig. 28)

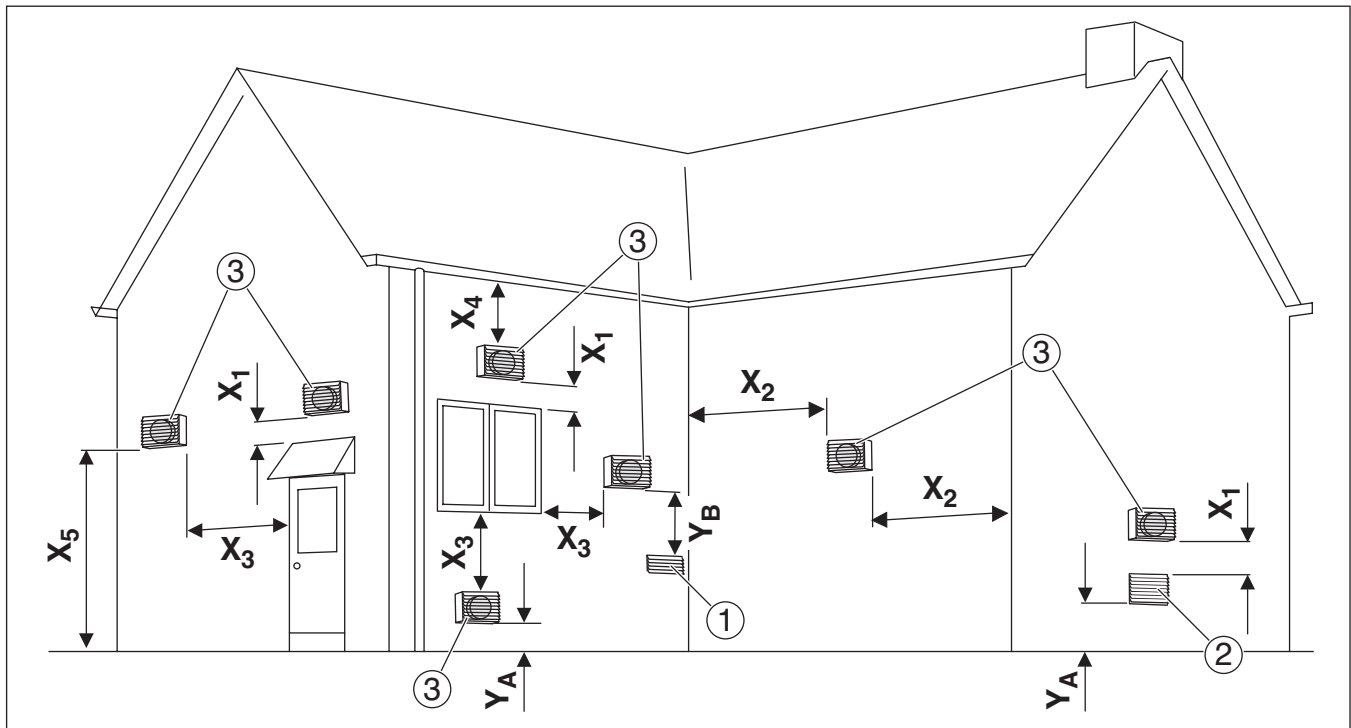


Fig. 28

Direct vent (sealed combustion)

- [1] Forced air inlet
- [2] Gravity air inlet
- [3] Exhaust terminal
- X1 1 foot (305 mm)
- X2 3 feet (915 mm) see Note 2)
- X3 1 foot (305 mm) USA
3 feet (915 mm) Canada
- X4 See Note 1)
- X5 7 feet (2135 mm) (see Note 2)
- YA At least 1 foot (305 mm) above grade or snow line
- YB 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 (Room air for combustion)

- [1] Forced air inlet
- [2] Gravity air inlet
- [3] Exhaust terminal
- X1 1 foot (305 mm)
- X2 See Note 1)
- X3 1 foot (305 mm) USA
3 feet (915 mm) Canada
- X4 See Note 1)
- X5 7 feet (2135 mm) see Note 2)
- YA At least 1 foot (305 mm) above grade or snow line
- YB 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

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.

NOTICE: DO NOT use PVC for vent piping when using anti-freeze in the primary circuit of the boiler. Use CPVC, PP or stainless steel only!.

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.

NOTES:

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.

Material	Item	Standard [USA]	Standard [Canada]	Pipe diameter per boiler		
				SSB 85	SSB 120	SSB 160
PVC schedule 40, 80 ¹	Flue gas or combustion air	ANSI/ASTM D1785	BH Gas venting systems, ULC S636 ² , Class IIA - PVC, Class IIB - CPVC, Class IIC - Polypropylene	2" (60mm) 3" (80mm) 4" (100mm)	2" (60mm) 3" (80mm) 4" (100mm)	2" (60mm) 3" (80mm) 4" (100mm)
PVC-DWV	Flue gas or combustion air	ANSI/ASTM D2665		2" (60mm) 3" (80mm) 4" (100mm)	2" (60mm) 3" (80mm) 4" (100mm)	2" (60mm) 3" (80mm) 4" (100mm)
CPVC schedule 40, 80	Flue gas or combustion air	ANSI/ASTM F441		2" (60mm) 3" (80mm) 4" (100mm)	2" (60mm) 3" (80mm) 4" (100mm)	2" (60mm) 3" (80mm) 4" (100mm)
PP [approved vendor(s)/ material - M&G Duravent PolyPro and Centrotherm InnoFlue SW]	Flue gas or combustion air	ANSI Cat IV Approved Polypropylene		2" (60mm) 3" (80mm) 4" (100mm)	2" (60mm) 3" (80mm) 4" (100mm)	2" (60mm) 3" (80mm) 4" (100mm)
PP-Flex [approved vendor(s)/part number - M&G Duravent 2PPS-FLEX (25, 50) or 3PPS-FLEX (25, 50)]	Flue gas or combustion air	ANSI Cat IV Approved Polypropylene		2" (60mm) 3" (80mm) 4" (100mm)	2" (60mm) 3" (80mm) 4" (100mm)	2" (60mm) 3" (80mm) 4" (100mm)
Stainless Steel AL29-4C	Flue gas or combustion air	UL1738		2" (60mm) 3" (80mm) 4" (100mm)	2" (60mm) 3" (80mm) 4" (100mm)	2" (60mm) 3" (80mm) 4" (100mm)
PVC	Pipe cement/ primer	ANSI/ASTM D2564		X	X	X
CPVC	Pipe cement/ primer	ANSI/ASTM F493		X	X	X

Tab. 5 Approved Flue gas or combustion air materials and fittings per boiler

- 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.

The supplied vent connector and separate available vent terminations are certified as a part of the boiler.

Standard straight pipes, 90°-elbows or Tees are approved as roof or wall terminations in all the approved materials. Furthermore the following terminations are approved. For details please refer to the supplier's information.

Roof Terminal	Material	Supplier	Part Number
Ø 2" (100 mm) Ø 3" (125 mm) Ø 4" (100mm) Concentric kits	PVC or CPVC	IPEX System 636 Type Ila & Iib	196005 (PVC) 196006 (PVC), 197009 (CPVC) 196021 (PVC), 197021 (CPVC)
Ø 2" / Ø 4" (Ø 60/100 mm) Concentric	PP	M&G Duravent PolyPro or Centrotherm InnoFlue	2PPS-VKL (-TCL) (M&G Duravent) or ICRT2439 (Centrotherm)
Ø 3" / Ø 5" (Ø 80/125 mm) Concentric	PP	M&G Duravent PolyPro or Centrotherm InnoFlue	3PPS-VKL (-TCL) (M&G Duravent) or ICRT3539 (Centrotherm)
Ø 4"/6" (100/150 mm) Concentric	PP	M&G Duravent PolyPro or Centrotherm InnoFlue	4PPS-VKL (-TCL) (M&G Duravent) or (ICRT4679)Centrotherm
Ø 2" (Ø 50 mm) Chimney Cap	PP Flex	M&G Duravent PolyPro or Centrotherm InnoFlue	2PPS-FCTL(M&G Duravent) or ISCP02 (Centrotherm)
Ø 3" (Ø 80 mm) Chimney Cap	PP Flex	M&G Duravent PolyPro or Centrotherm InnoFlue	3PPS-FTCL(M&G Duravent) or ISCP03 (Centrotherm)

Tab. 6 Roof terminals

Wall Terminal	Material	Supplier	Part Number
3" (80 mm)	parallel stainless steel	Fields	46546901
Ø 2" (60 mm) Ø 3" (80 mm) Concentric kits	PVC or CPVC	IPEX System 636	196005 (PVC) 196006 (PVC), 197009 (CPVC)
Ø 2" (60 mm) Ø 3" (125mm) Wall termination kit	PVC	IPEX System 636	081216 081219
Ø 2" (60 mm) Ø 3" (80 mm) Low profile termination kit	PVC	IPEX System 636	196984 196985
Ø 3" (Ø 80 mm) twin pipe termination	PVC/parallel stainless steel	ANSI/ASTM D1785 or Field Controls	46600203
Ø 4" (Ø 100 mm) twin pipe termination	PVC/parallel stainless steel	ANSI/ASTM D1785 or Field Controls	46600204
Ø 3" (Ø 80 mm) twin pipe termination	PP	M&G Duravent PolyPro or Centrotherm InnoFlue	3PPS-HTPL (M&G Duravent) Or ISLPT0303 (Centrotherm)
Ø 4" (Ø 100 mm) twin pipe termination	PP	M&G Duravent PolyPro	3PPS-HTPL (M&G Duravent)
2" (60mm) single pipe horizontal termination Ø 3" (Ø 80 mm) single pipe horizontal termination	PP	M&G Duravent PolyPro	2PPS-HSTL 3PPS-HSTL (M&G Duravent)
2" / 4" (80/125 mm) concentric termination 3" / 5" (80/125 mm) concentric termination	PP	M&G Duravent PolyPro or Centrotherm InnoFlue	2PPS-HSTL (M&G Duravent) or ICWT352 or ICWS3513 (Centrotherm) 3PPS-HKL (M&G Duravent) or ICWT352 or ICWS3513 (Centrotherm)

Tab. 7 Wall terminals

4.7.4 Vent and combustion air pipe length [For single boiler installations]

The maximum length for vent and combustion air pipes can be found in the following table. Please note the length is for each vent / combustion air pipe and not combined.

	SSB85	SSB120	SSB160
Ø2" (60 mm)	50 ft (15 m)	50 ft (15 m)	50 ft (15 m)
Ø3" (80 mm)	60 ft (18 m)	60 ft (18 m)	60 ft (18 m)
Ø4" (110 mm)	80 ft (24 m)	80 ft (24 m)	80 ft (24 m)

Tab. 8 Maximum length for air and combustion pipe

In the following tables are listed the equivalent length for PVC/CPVC pipes and PP pipes:

	Ø2" (60 mm)	Ø3" (80 mm)	Ø4" (100 mm)
1 ft vent pipe	1 ft	1 ft	1 ft
45° elbows	2.5 ft	3 ft	4 ft
90° elbows	5 ft	6 ft	7 ft

Tab. 9 Equivalent length for PVC and CPVC pipes

	Ø 2" (60 mm)	Ø 3" (80 mm)	Ø 4" (110 mm)	Ø 5" (130 mm)	Ø 6" (150 mm)	Ø 8" (200 mm)
1 ft vent pipe	1 ft	1 ft	1 ft	1 ft	1 ft	1 ft
1 ft flex pipe	2 ft	2 ft	2 ft	2 ft	N/A	N/A
45° elbows	3 ft	3 ft	5 ft	6 ft	6 ft	13 ft
90° elbows	5 ft	7 ft	12 ft	14 ft	14 ft	19 ft
Tee	9 ft	12 ft	19 ft	21 ft	22 ft	29 ft

Tab. 10 Equivalent length for PP pipes

For the equivalent vent length of Stainless Steel AL29-4C venting material and the roof and wall terminals please refer to the installation manual of the vent system supplier.

To calculate the allowed length of a vent and combustion air system follow this example:

When using a SSB85 with Ø 2" (Ø 60 mm) PP system with 3 x 45° -elbows and a 90° -elbow as termination, then the total venting length may not exceed 50 ft. (15 m).

$$3 \times 45^\circ\text{-elbow} = 3 \times 3 \text{ ft. (0.9 m)} = 9 \text{ ft. (2.7 m)}$$

$$1 \times 90^\circ\text{-elbow terminal} = 5 \text{ ft. (1.5 m)}$$

$$\text{Total friction loss equivalent} = 14 \text{ ft. (4.2 m)}$$

Total venting length for this example is:

$$\text{SSB85} = 50 \text{ ft. (15 m)} - 14 \text{ ft. (4.2m)} = 36 \text{ ft. (11 m)} \text{ each for the intake and exhaust piping.}$$

When the total flue system equivalent length is verified it is necessary to set the par N° 99 "**Flue length range**" according to the total length of the installed flue system as defined in the following table:

Value for par 99	2" System with Max. eq. length of	3" System with Max. eq. length of	4" System with Max. eq. length of
1	0 to 25 ft	0 to 30 ft	0 to 40 ft
2	26 to 50 ft	31 to 60 ft	41 to 80 ft
3	51 to 75 ft	61 to 90 ft	81 to 120 ft
4	76 to 100 ft	91 to 120 ft	121 to 160 ft

Tab. 11 Value for the par N° 99 depending on the sum of equivalent length of vent and combustion air pipe

Defining the correct value to assign to par N° 99 follow this example:

When using a SSB85 with 2" (60 mm) PP venting material the maximum equivalent length is 50 feet for both vent and combustion air piping. Consider the equivalent length of vent pipe is 36 ft. and the combustion air pipe is 22 ft. First step is to verify that both the vent and combustion air pipe is less than 50 ft:

36 < 50 : verified

22 < 50 : verified

The sum of equivalent length of vent and combustion air pipe is: 36+22=58 ft. See Tab. 9 for defining parameter 99.

Column 2 - System with Max eq. length of 50 ft + 50 ft. The example provided a total equivalent length of 58 ft. which falls in between 51 – 75 ft found on row 3. So par N° 99 = 3.

4.7.5 Approved examples of horizontal and vertical venting installation



Place pipe supports every 5 feet (1,525 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.

In the following figures the air intake pipe is indicated with the number 1 (one) and the vent pipe with the number 2 (two)

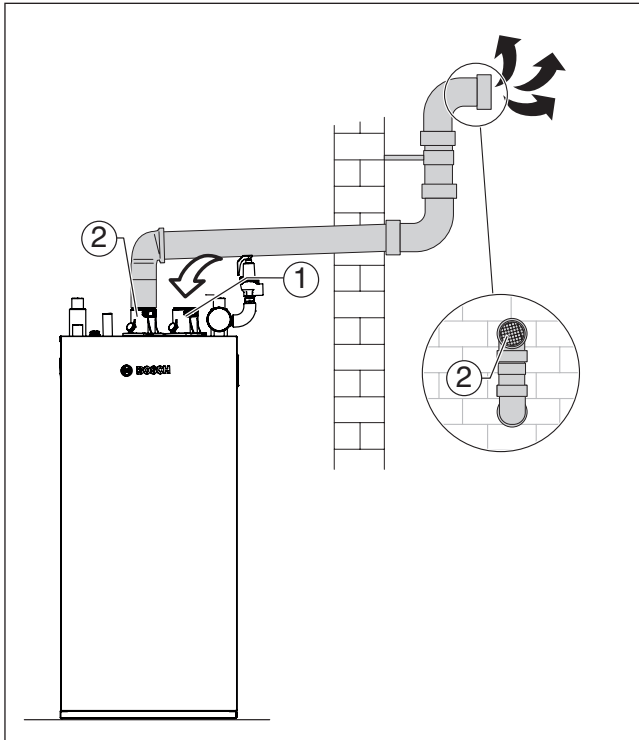


Fig. 29 Horizontal venting system (room air only)

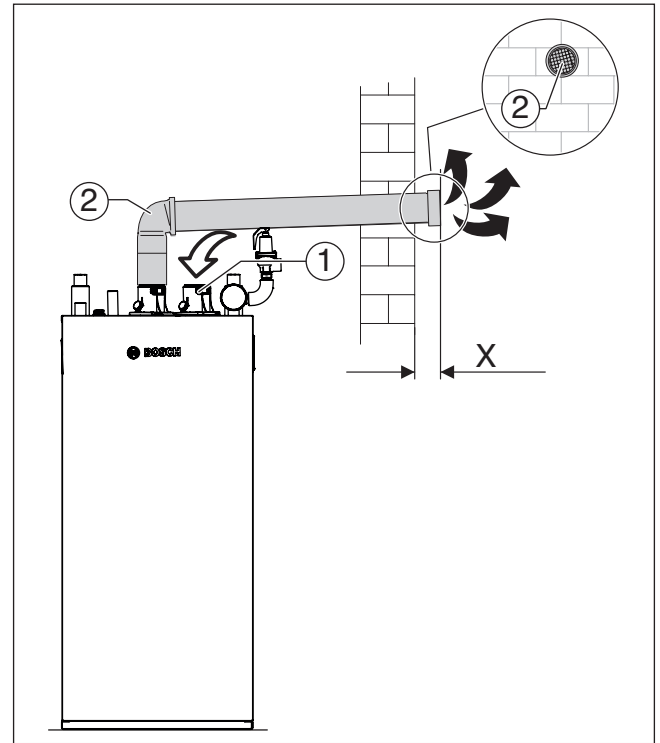


Fig. 30 Horizontal venting system (room air only); $X \geq 4"$ (102 mm)

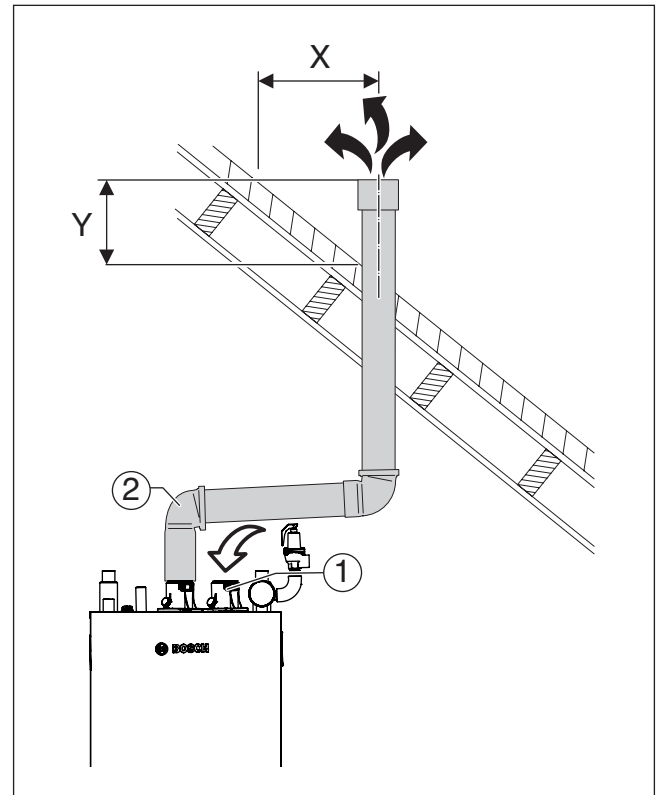


Fig. 31 Vertical venting system (room air only); $X > 12"$ (305 mm); Y 12" above maximum snow level or at least 24" whichever is greater

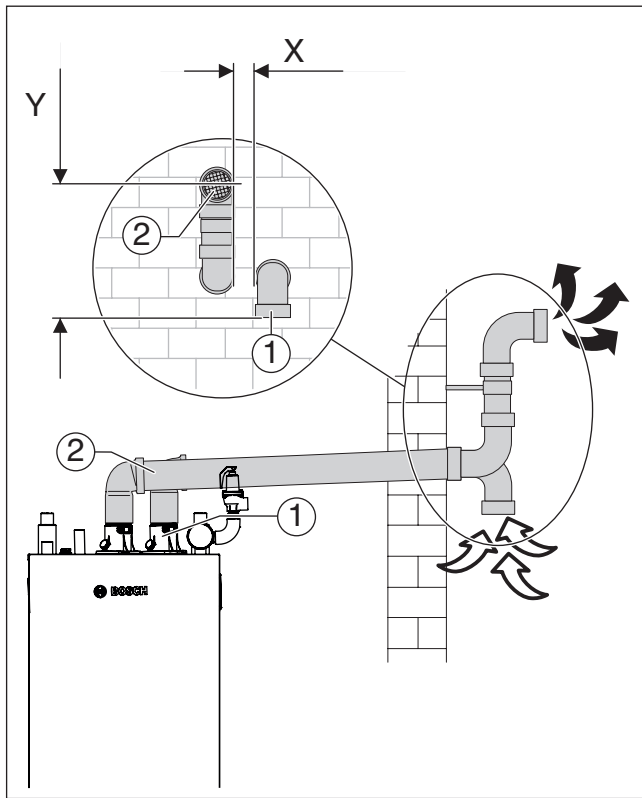


Fig. 32 Horizontal venting system (sealed combustion); $X \geq 4"$ (102 mm); $Y \geq 12"$ (305 mm)

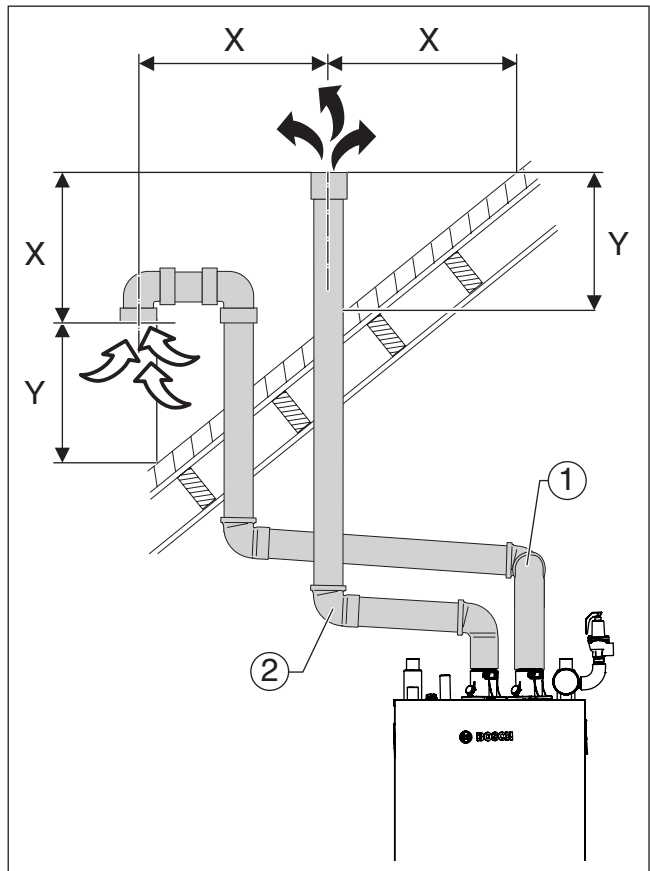


Fig. 34 Vertical venting system (sealed combustion); $X > 12"$; $Y 12"$ above maximum snow level or at least 24" whichever is greater

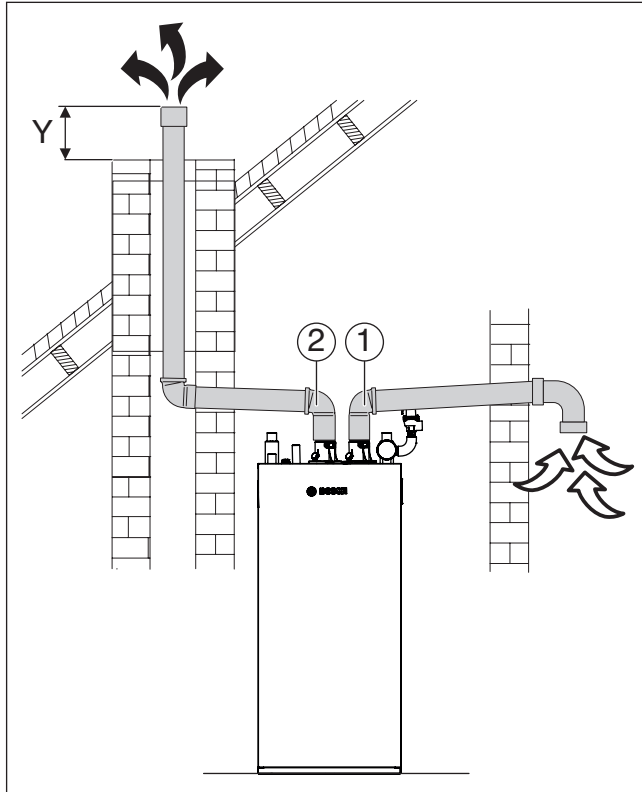


Fig. 33 Vertical venting system (sealed combustion); $Y 12"$ above maximum snow level or at least 24" whichever is greater

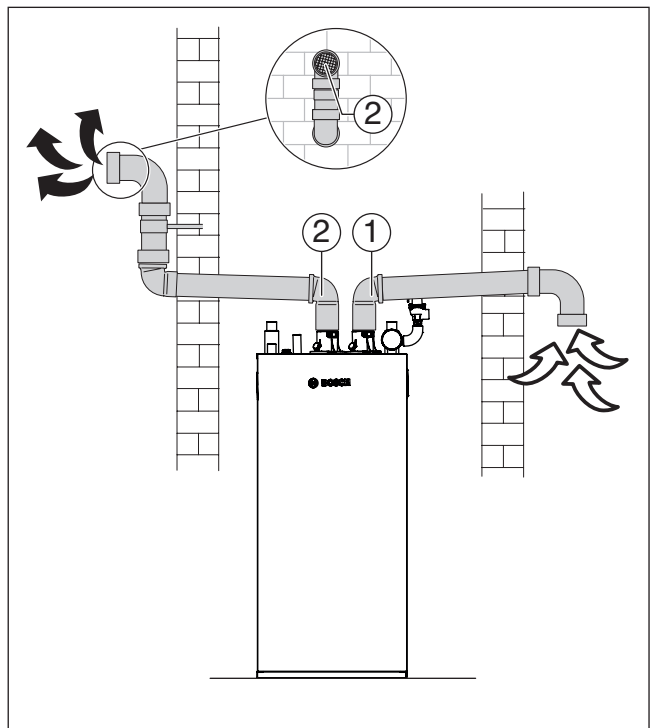


Fig. 35 Horizontal venting system (sealed combustion)

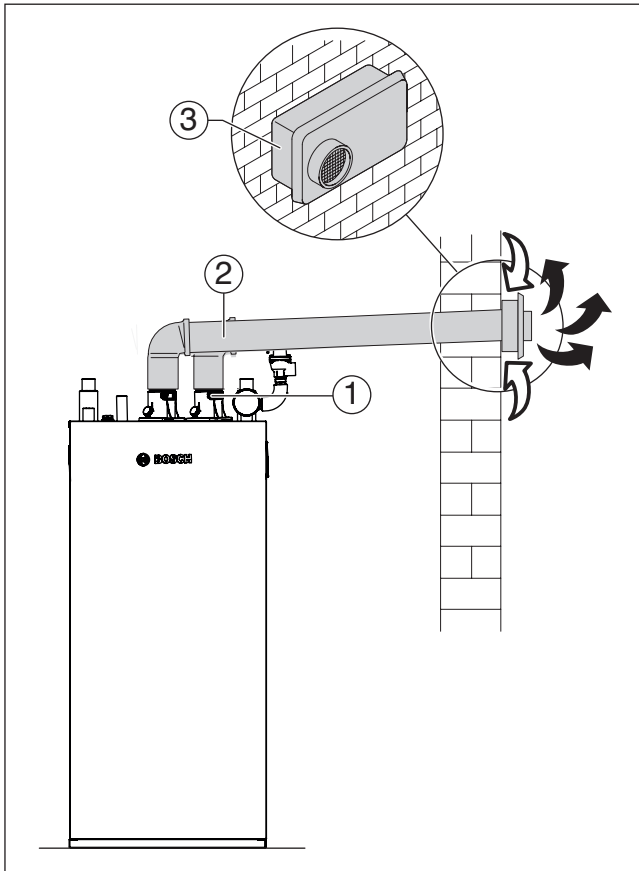


Fig. 36 Horizontal venting system (sealed combustion) ; 3 is a wall termination

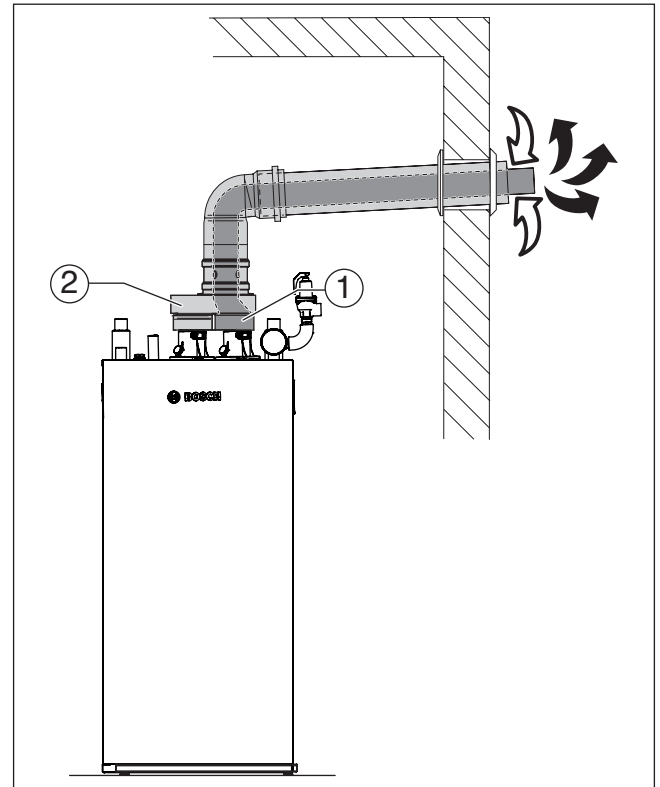


Fig. 38 Horizontal concentric system (sealed combustion)

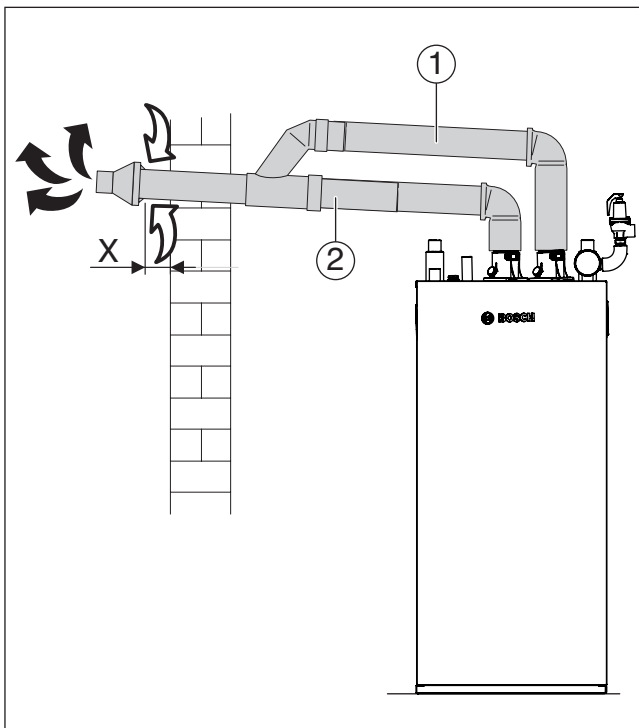


Fig. 37 Horizontal venting system (sealed combustion); $X \geq 4''$ (102 mm)

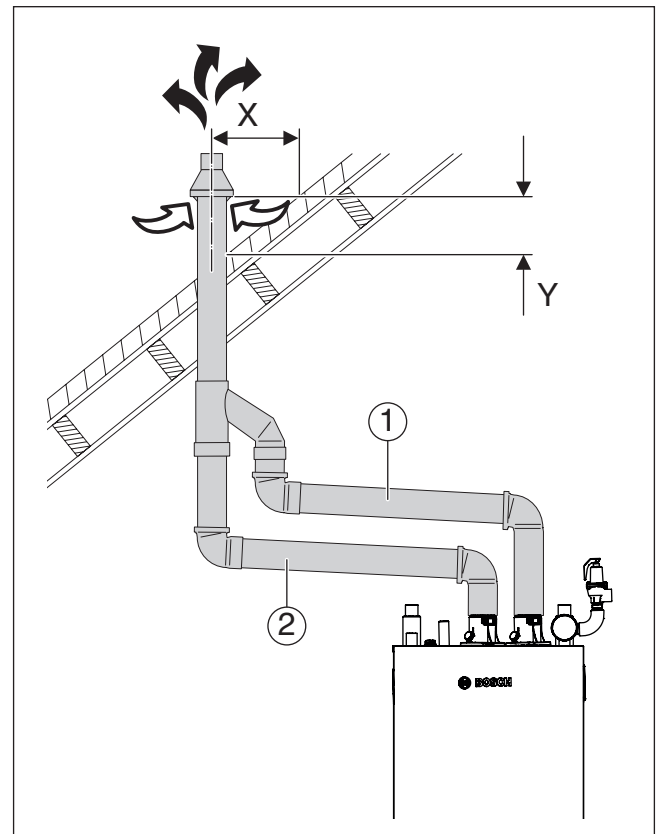


Fig. 39 Vertical venting system (sealed combustion) ; $X > 12''$ (305 mm); Y 12" above maximum snow level or at least 24" whichever is greater

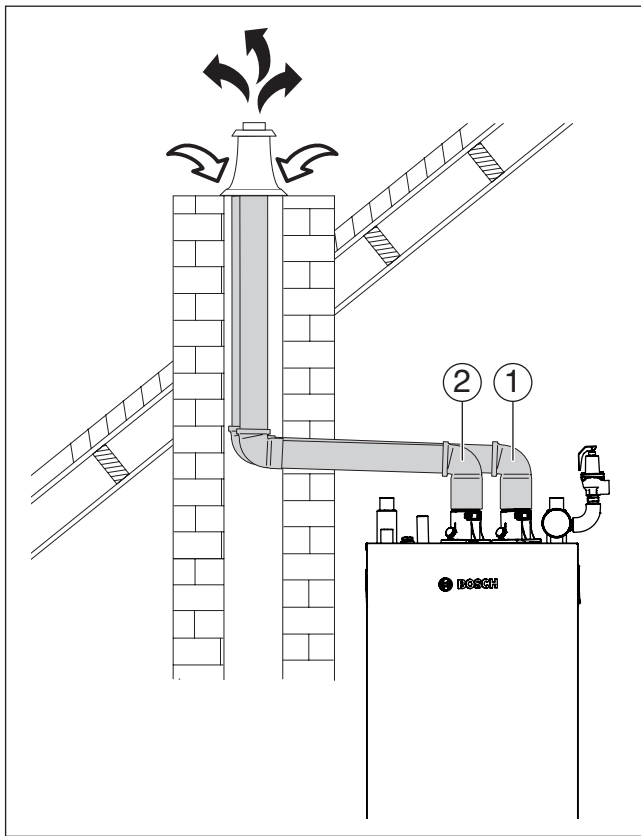


Fig. 40 Vertical venting system (sealed combustion)

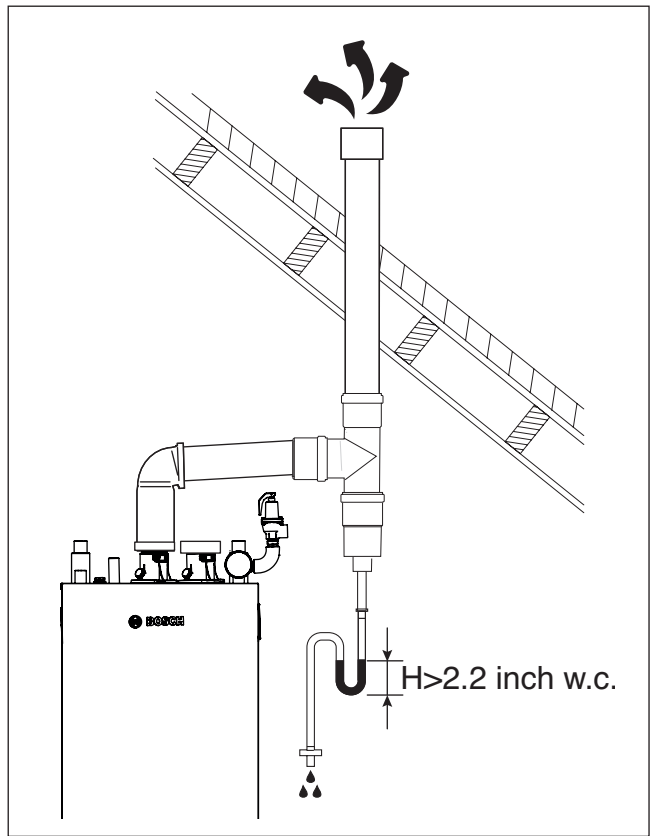


Fig. 42 Recommended additional condensate drain for high vent stack

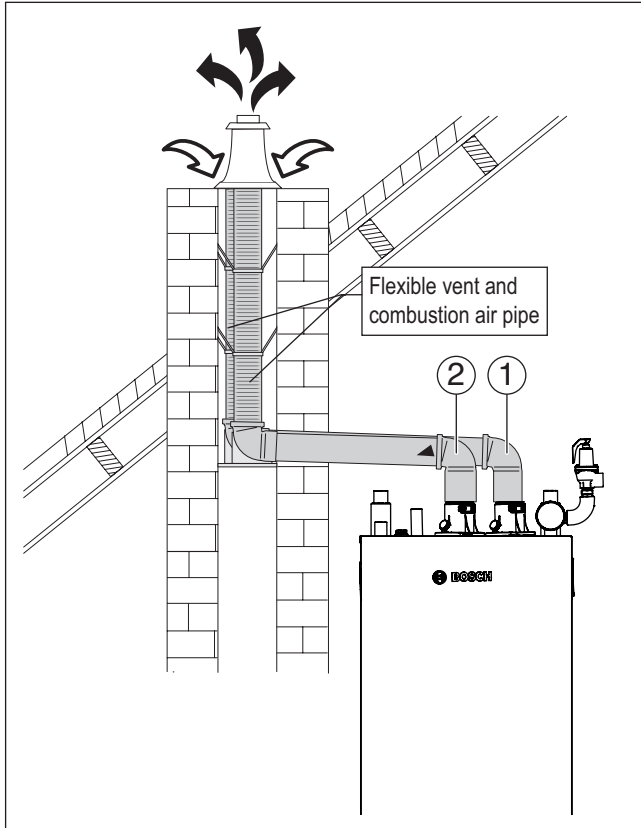


Fig. 41 Vertical venting system (sealed combustion)

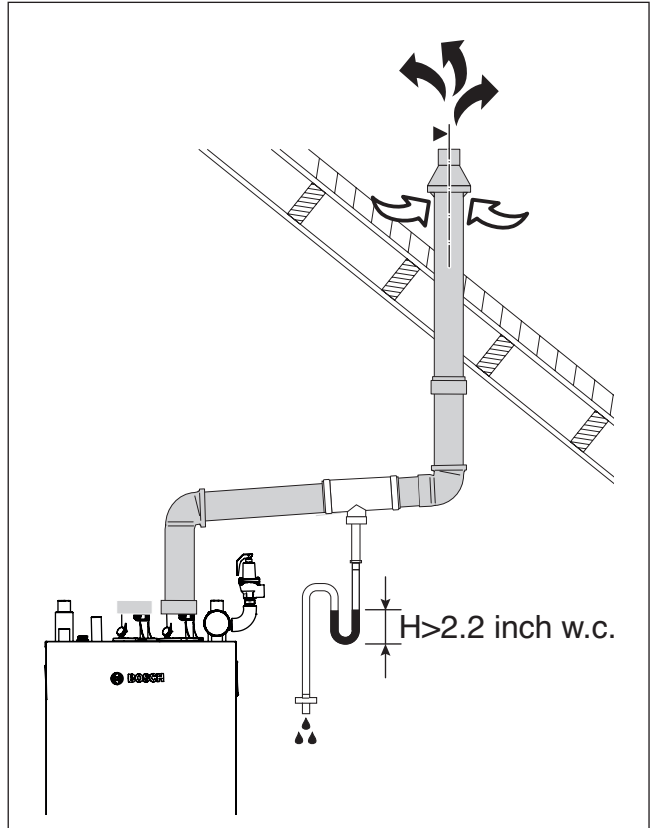


Fig. 43 Recommended additional condensate drain for long horizontal vent piping

4.7.6 Multiple boiler



WARNING: Do not connect SSB models 85, 120 and 160 to a shared/common or cascade vent system. Each boiler must have a separate, dedicated vent system.

When installing multiple air and vent terminations, be sure that:

- The clearance between the vent and air termination are in accordance with the figures shown in this chapter
- All vent pipes and air inlet must terminate at the same height

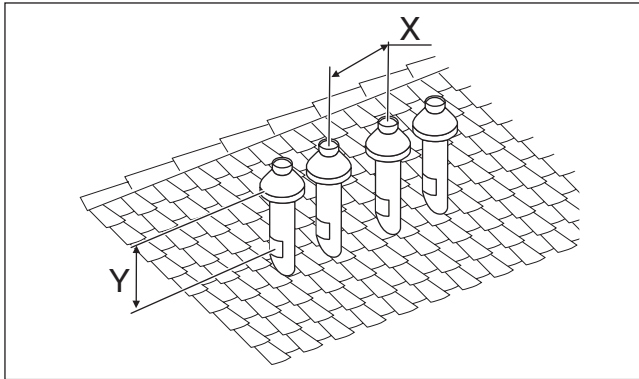


Fig. 44 Concentric vent and combustion air vertical termination; $X \geq 12"$; $Y \geq 12"$ (18" for Canada and/or per CAN/CSA B149.1) above highest snow level. Maximum 24" above roof

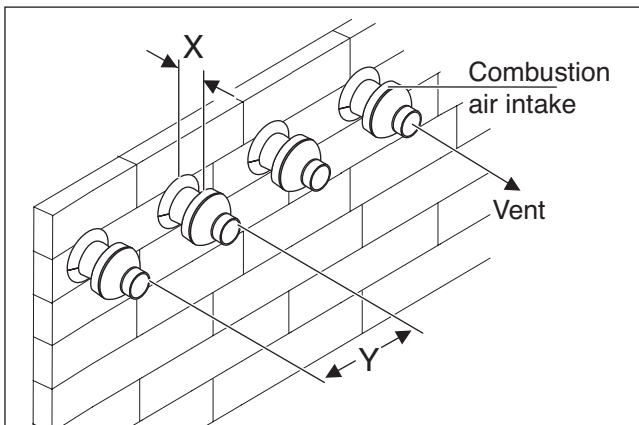


Fig. 45 Concentric vent and combustion air horizontal termination; $X \geq 1"$ min or 2" max; $Y \geq 24"$; Note: the level of the termination must be the same at 12" min from grade or snow line

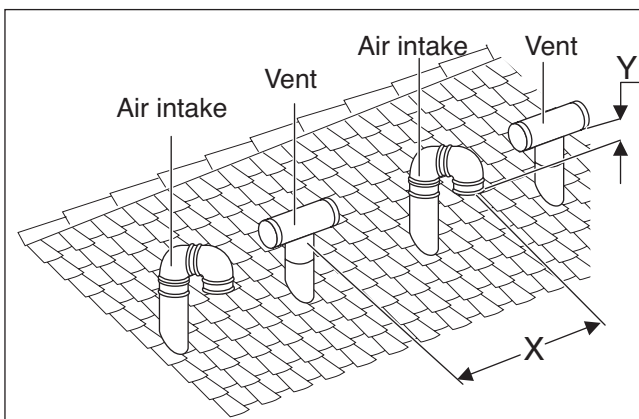


Fig. 46 Multiple air and vent vertical termination; $X \geq 12"$; $Y \geq 12"$

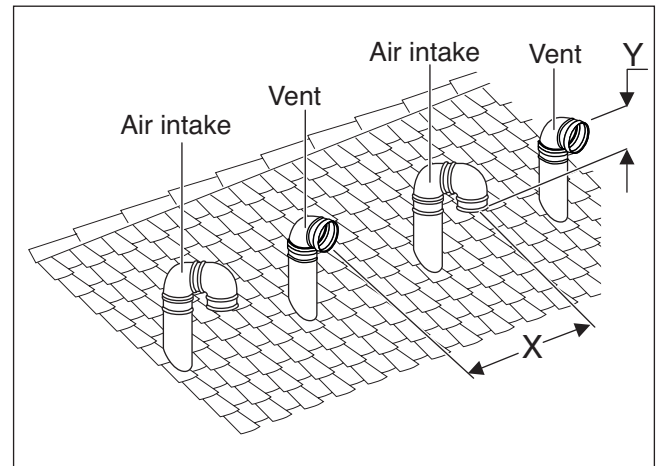


Fig. 47 Multiple air and vent vertical termination; $X \geq 12"$; $Y \geq 12"$

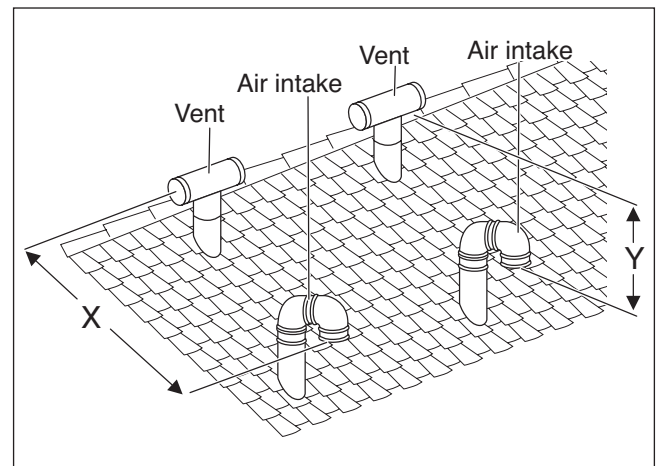


Fig. 48 Multiple air and vent vertical termination; $X \geq 12"$; $Y \geq 12"$

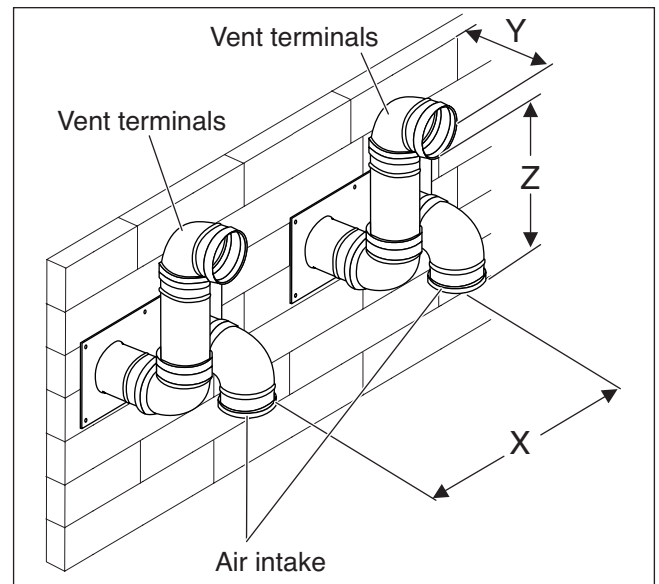


Fig. 49 Multiple air and vent vertical termination ; $X \geq 12"$; $Y \leq 25"$; $Z = 12"$ to 16"

5 Commissioning (for single application)

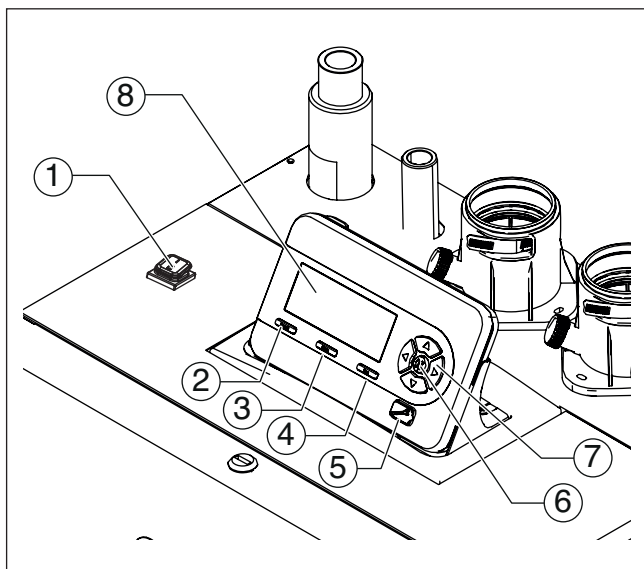


Fig. 50

No.	Description
1	ON/OFF power switch
2	Reset button
3	Menu button
4	ESC button
5	PC service connection
6	OK button
7	UP/DOWN/LEFT/RIGHT button
8	Display

5.1 Switching the appliance ON/OFF

Switch the appliance ON using the ON/OFF switch. The display will appear as follow:

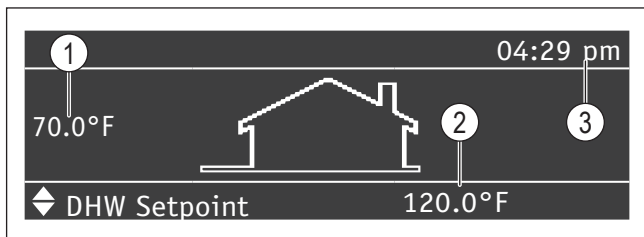


Fig. 51

In the left of the display is shown the external temperature 1 (if connected to an outdoor sensor).

In the right of the display is shown the set setpoint value 2.

In the top right side is displayed the time 3.

To switch off the appliance use the ON/OFF switch.

5.2 Setting date and time

Press the "menu" button and select "Settings" using the UP/DOWN button.

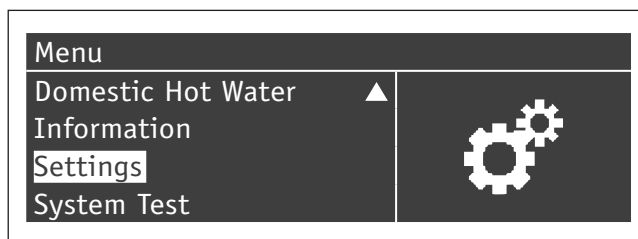


Fig. 52

Press the "OK" button and select "General Settings" using the UP/DOWN button.

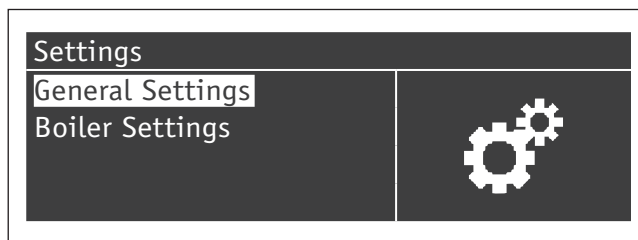


Fig. 53

Press the "OK" button and select "Date & Time" using the UP/DOWN button.

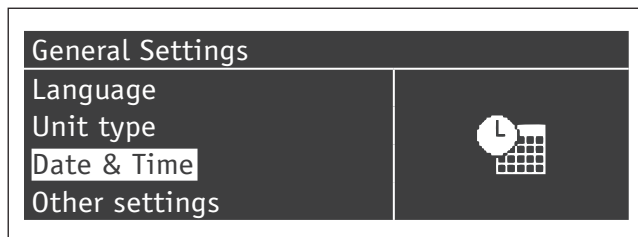


Fig. 54

Press the "OK" button. The display will appear as follow:

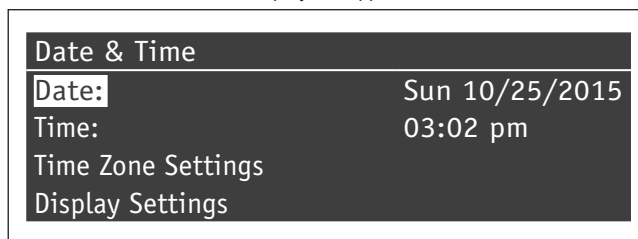


Fig. 55

Press the "OK" button to highlight the values. The values can be changed using the "UP"/"DOWN" keys. When the value entered is correct then press "OK" to insert the next value.

Entering in "Time Zone Settings" menu it is possible to set the time zone parameter as shown in the following figure:

Time Zone Settings	
Time Zone Correction	UTC +00.00
Daylight Savings Time	Disabled

Fig. 56

To modify the visualization of the date and time value, entering in the "Display Settings" menu it is possible to change the following features:

Display Settings	
Time Notation	24h
Date Order	DMY
Day Of Month	2Digits
Month	2Digits

Fig. 57

Display Settings	
Year	4Digits
Date Separation Character	"_"
Day Of Week	Short Text
Seconds	No

Fig. 58

5.3 Setting CH and DHW setpoint

To change the CH and DHW setpoint in the "Central Heating" and "Domestic Hot Water" menu, press "menu" select [see "Fig. 59" below] use UP/DOWN arrows to choose parameter and select by pressing the "OK" button. Once selected use the right arrow key to highlight the value, and use the UP/DOWN arrow to change selected value. Press "OK" to confirm/save new value.


Menu	
Central Heating	
Domestic Hot Water	
Information	
Settings	

Fig. 59


Menu	
Central Heating	
Domestic Hot Water	
Information	
Settings	

Fig. 60



CH setpoint cannot be changed when outdoor reset function is enabled. See section "5.5 Parameters list" for detailed instructions regarding outdoor reset.

The DHW setpoint can only be changed, when the DHW function is enabled. See section "5.5 Parameters list".

It is possible to change the CH and the DHW setpoint directly from the first display page; logically the change of the two setpoint must to be enabled: when the text in the lower left side is "CH Setpoint" press the "RIGHT" button. The value shown in the lower right side will be highlighted; using the "UP/DOWN" keys it is possible to change the value. Once assigned the value desired press the "RIGHT" button. The new value will be stored. To change the DHW setpoint press the "UP/DOWN" keys. The string in the lower left side will change in "DHW Setpoint". Now it is possible to change the DHW setpoint in the same way in which we described the other operation.


04:29 pm	
70.0°F	
◆ DHW Setpoint	120.0°F

Fig. 61

5.4 Boiler information

To show in the screen the most important system information press "menu" button and select "Information" using the "UP/DOWN" keys.


Menu	
Central Heating	
Domestic Hot Water	
Information	
Settings	

Fig. 62

Press "OK" and the screen below will appear:


Information	
Software Versions	
Boiler Status	

Fig. 63

Selecting “Boiler Status” and pressing “OK” for the following values:

- Flow Temperature
- Return Temperature
- DHW Temperature [Sensor must be connected to show a value. If not, the default value will appear]
- Outside Temperature
- Flue Temperature [Sensor must be connected to show a value. If not, the default value will appear]
- System Temperature [Sensor must be connected to show a value. If not, the default value will appear]
- Fan Speed
- Ionization
- State
- Error

The display shows four lines at a time:

Boiler Status	
Flow Temperature	115.0 °F
Return Temperature	110.0 °F
DHW Temperature	111.0 °F
Outside Temperature	50.0 °F

Fig. 64

Using the “UP/Down” button it is possible to scroll list.

5.5 Parameters list

To have access to the parameter list press “menu” button and select “Settings” using the UP/DOWN button:


Menu	
Domestic Hot Water	▲ 
Information	
Settings	
System Test	

Fig. 65

Press the “OK” button and select “Boiler Settings” using the UP/DOWN button.


Settings	
General Settings	
Boiler Settings	

Fig. 66

Press the “OK” button. At this point is request a password [Password is required for boiler settings only]:

Password

0
*
*
*

Fig. 67

Enter one digit at a time using the UP/DOWN button to increase/decrease the value. When the value is correct then press “OK”.

In the system there is a password for the three levels:

- Level 1: (no password needed i.e. password N° 0000) USER
- Level 2: (password “0300”) INSTALLER

5.6 Outdoor reset

To set the outdoor reset curve enter in “Central Heating (CH)” menu and press “OK”.

The display will appear as follow:

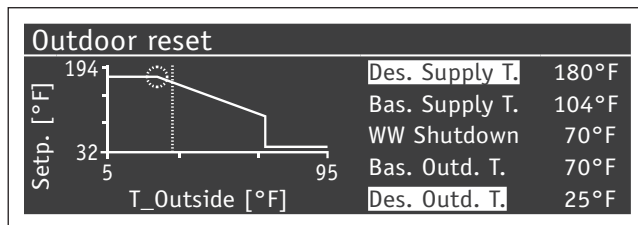


Fig. 68

Des. Supply T and Des. Outd T will be highlighted to change either value press “OK”:

- Use up/down arrows to change the Des. Supply T. Use the left/right arrows to change the Des Outd. T
- 2 Press ok to save changes
- 3 Use the left/right arrows to select the other values

Repeat steps 1 thru 3 to make additional changes

Once set the parameters press “Esc” to exit the menu.

Below is a list of parameters:

Number	Description	Unit	Default	Min	Max	Step
3	CH Setpoint	°C / °F	176 °F	68 °F	194 °F	0.9 °F
19	Design Supply Temp	°C / °F	176 °F	68 °F	194 °F	1.8 °F
21	Baseline Supply Temp	°C / °F	104 °F	68 °F	194 °F	1.8 °F
48	DHW/Tank Setpoint	°C / °F	120.2 °F	104 °F	140 °F	0.9 °F
64	Preheat Mode	-	Comfort	Eco	Comfort	-
72	Permit emergency mode	-	Yes	No	Yes	-

Tab. 12 Level 1 parameters

Number	Description	Unit	Default	Min	Max	Step
1	Central Heating (CH) Mode	-	1	0	5	1
2	Pump Mode	-	0	0	4	1
4	System Pump Overrun	Seconds	300	0	900	10
5	Boiler Pump Overrun	Seconds	300	0	900	10
7	CH Hysteresis	°C / °F	5.4 °F	0	36 °F	0.9 °F
9	Anti Cycle Period	Seconds	180	10	900	10
10	Anti Cycle Temp Diff	°C / °F	12.6 °F	0 °F	36 °F	0.9 °F
11	Ramp Delay Step Mod.	On / Off	Disabled			
14	Max Power CH	%	100	50	100	1
15	Min Power CH/DHW	%	1	1	30	1
20	Design Outdoor Temp	°C / °F	24.8 °F	-13 °F	77 °F	1.8 °F
22	Baseline Outdoor Temp	°C / °F	69.8 °F	35.6 °F	86 °F	1.8 °F
23	Design Supply Min Limit	°C / °F	68 °F	39.2 °F	179.6 °F	1.8 °F
24	Design Supply Max Limit	°C / °F	194 °F	80.6 °F	194 °F	1.8 °F
25	Warm Weather Shutdn	°C / °F	69.8 °F	35.6 °F	95 °F	1.8 °F
26	Boost Temp Increment	°C / °F	0 °F	0 °F	54 °F	0.9 °F
27	Boost Time Delay	Minutes	20	1	120	1
28	Night Setback Temp.	°C / °F	18 °F	0 °F	90 °F	0.9 °F
29	Weather Setpoint	°C / °F	68 °F	32 °F	122 °F	0.9 °F
35	DHW Mode	-	0	0	2	1
36	DHW Tank Hyst. Down	°C / °F	7.2 °F	0 °F	36 °F	0.9 °F
37	DHW Tank Hyst. Up	°C / °F	0 °F	0 °F	36 °F	1.8 °F
38	DHW Tank Supply Extra	°C / °F	54 °F	0 °F	54 °F	0.9 °F
42	DHW Priority	-	0	0	2	1
43	DHW Max Priority Time	Minutes	30	1	255	1
44	DHW Pump Overrun	Seconds	15	0	255	1
73	Boiler Address	-	0	0	16	1
74	Emergency Setpoint	°C / °F	113 °F	68 °F	149 °F	0.9 °F
75	Delay Per Start Next Dep.	Seconds	15	5	300	5
76	Delay Per Stop Next Dep.	Seconds	15	5	300	5
77	Hyst Down Start Boiler	°C / °F	9 °F	0 °F	36 °F	0.9 °F
78	Hyst Up Stop Boiler	°C / °F	3.6 °F	0 °F	36 °F	0.9 °F
79	Max Setp Offset Down	°C / °F	7.2 °F	0 °F	36 °F	0.9 °F
80	Max Setp Offset Up	°C / °F	18 °F	0 °F	36 °F	0.9 °F
81	Start Mod Delay Fact	Minutes	5	0	60	1
82	Next Boiler Start Rate	%	80	10	100	1
83	Next Boiler Stop Rate	%	30	10	100	1
84	Boiler Rotation Interval	Days	1	0	30	1
85	DHW Boiler Assign	-	0	0	16	1

Tab. 13 Level 2 parameters

Number	Description	Unit	Default	Min	Max	Step
89	Frost Protection	Off / On	Disabled	Disabled	Enabled	-
90	Frost Protection Setpoint	°C / °F	50 °F	33.8 °F	68 °F	0.9 °F
91	DHW Max Limit	°C / °F	140 °F	104 °F	158 °F	0.9 °F
92	Fan Speed Maximum	RPM	*	*	*	60
93	Fan Speed Minimum	RPM	*	*	*	60
94	Fan Speed Ignition	RPM	*	*	*	60
97	Appliance Model **	-	*	1	6	1
98	Gas Type	-	NG	NG	LPG	
99	Flue length range	-	1	1	4	1

Tab. 13 Level 2 parameters

(*) Depend on appliance type

(**) The value for this parameter is:

- 4 for SSB160
- 5 for SSB120
- 6 for SSB85

5.7 Adjusting and setting CO₂ limits

NOTICE:

Please verify parameter 99 is to be set first.

Insert a combustion analyzer probe into the test port "A" as shown in Fig. 69.

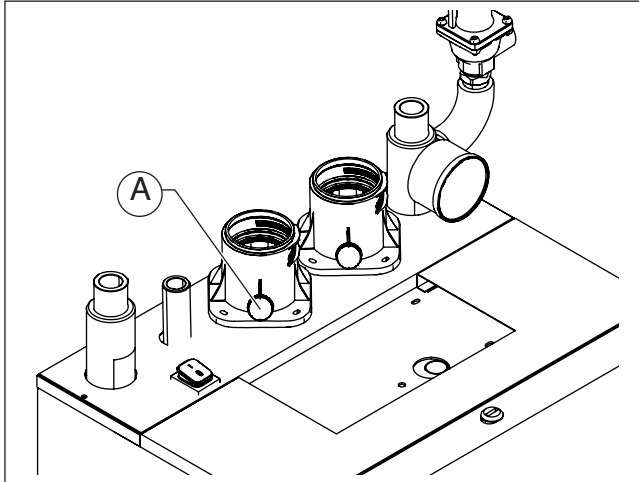
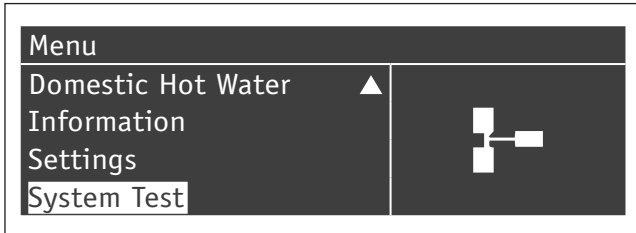


Fig. 69

- Press "Menu" key.
- Select "System Test":



- In "System test" menu select "High Power" using "Up/Down" keys and press "OK":



To adjust the CO₂ value at the maximum power turn the screw "A" shown in Fig. 70 (for SSB85 and SSB120) and in Fig. 71 (for SSB160), allen type wrench is necessary for this adjustment.

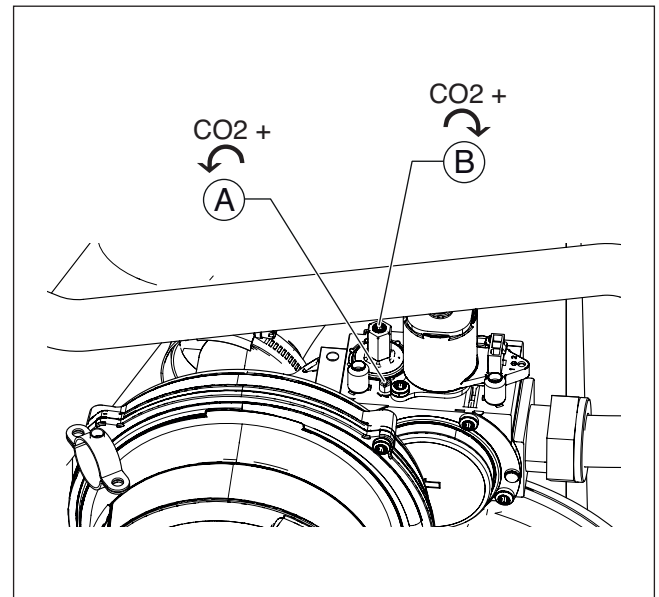


Fig. 70 Gas valve screw regulation for SSB85 and SSB120

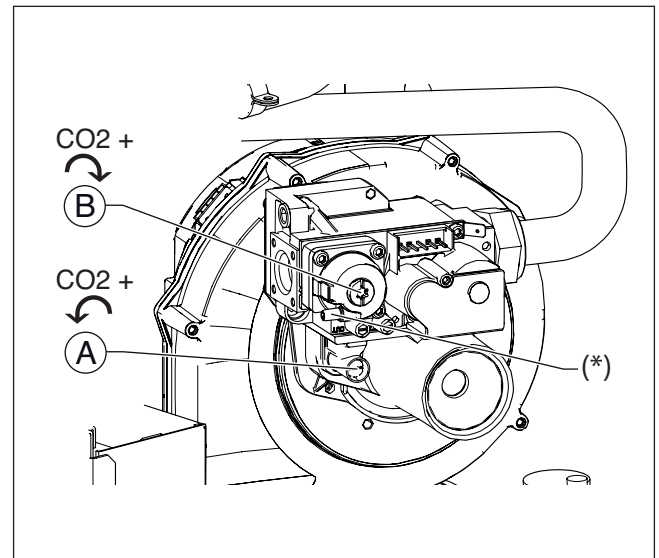


Fig. 71 Gas valve screw regulation for SSB160

Verify that the value of CO₂ is stable and is within the range indicated in the following table (be careful to make small changes and confirm that the value is stable before making additional adjustment).

Select "Low Power" using "UP/Down" button and press "OK":

System Test	
Test State	Low Power
Fan Speed	0 rpm
Ionisation	0.0 µA

The fan will run at the minimum speed.

To adjust the CO₂ value at the minimum power turn the screw "B" shown in Fig. 70 and in Fig. 71.

Verify that the value of CO₂ is stable and is within the range indicated in the following table (be careful to make small changes and confirm that the value is stable before making additional adjustment).

Select "OFF" using "UP/Down" button and press "OK":

System Test	
Test State	Off
Fan Speed	0 rpm
Ionisation	0.0 µA

The "Test State" switches to OFF and the boiler return to the "stand by" mode.

Gas Type	Max. power CO ₂ %	Min. power CO ₂ %
Natural gas	8.8-9.2	8.8-9.2
LP gas	10.3-10.7	10.3-10.7

Tab. 14 CO₂ value for gas valve calibration

A combustion analyzer must be used to set maximum and minimum CO₂ as listed in table Tab. 14.

5.8 Setting frost protection

The boiler is equipped with a system frost protection function, see section "5.5 Parameters list" for a list of all parameters and settings.

The factory default setting Frost Protection (parameter # 89) is "DISABLED". To enable frost protection simply adjust parameter # 89 to "ENABLE". When the frost protection is enabled, Parameter #90 (Frost Protection Setpoint) has to be set. Parameter #90 has a default setting of 50°F and can be adjusted from 33-68 °F.

When the supply temperature falls below the value set by the parameter #90, the boiler pump starts.

If the supply temperature continues to fall and reaches 9 °F (5 °C) below the value set by the parameter #90 the burner will switch on at minimum power.

When the supply temperature increases to a temperature of 9 °F (5°C) greater than the value of the parameter # 90 the burner will switch off. Then after the post circulation time has elapsed the pump will stop (parameter #5 adjustable from 300-900 seconds. Default is 300 seconds).

For example, parameter #90 is set at 50 °F (10 °C), when the Supply temperature is lower than 50 °F (10 °C) the pump starts. If the supply temperature is lower than 41 °F (5 °C) the burner starts at the minimum power. The burner switches off when a temperature of 59 °F (15 °C) is achieved.

NOTICE: This sequence protects the boiler only from freezing. Be sure adequate measures are in place to protect the system.

6 Troubleshooting



WARNING: Close the gas cock prior to working on the gas train or "boiler".



WARNING: Check for gas leaks after carrying out work on the gas train.



WARNING: Check for leaks after carrying out work on the venting system.




DANGER: Always disconnect the appliance from the main power before performing any work. Disconnect the emergency shutoff switch or disengage the heating system circuit breaker. Take measures to prevent accidental reconnection.



WARNING: Hot water can scald. Drain the appliance before working on components that are filled with water.

6.1 Error codes are shown on the display

If the symbol  appears on the screen as follow:

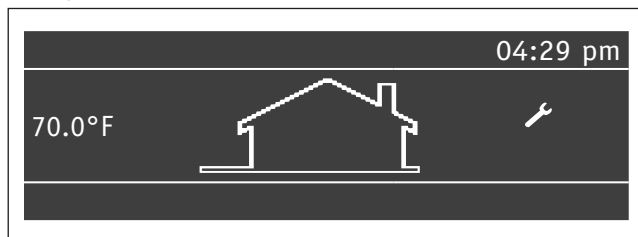


Fig. 72

an error has occurred in the system that is displayed on the screen. The bottom row in the display will show the description of the error occurred.

6.1.1 Lockout errors

If an error is a "Lockout" error, it is necessary to press "RESET" button (after eliminating the reason for the failure) to restart the boiler.

In the following table the "Lockout" errors are listed:

Error	Int. nr.	Description	Checks	Solutions
"Ignit Error"	1	Three unsuccessful ignition attempts in a row	a- Check gas supply pressure; b- Check ignition spark c- Correct amount of gas; d- Check for 120VAC at the gas valve;	a- If the gas supply pressure is incorrect, it must be adjusted to the correct pressure; b- If spark is not present check for correct ignition electrode position; c- If the combustion air pressure is incorrect, inspect the vent system and eliminate any obstructions; d- If the voltage to the gas valve is not 120Vac the power control board must be replaced.
"Gv Relay Error"	2	Failure detected in the GV (gas valve) Relay	a- Check the integrity of the wire connections between gas valve and control board.	a- If wires are damaged, replace them b- If wires are ok, replace the gas valve or the power control board.
"Gv Relay Not Open"	3	Failure detected in the GV (gas valve) Relay	a- Check the integrity of the wire connections between gas valve and control board.	a- If wires are damaged, replace them; b- If wires are ok, replace the gas valve or the power control board.
"Gv Relay Not Close"	4	Failure detected in the GV (gas valve) Relay	a- Check the integrity of the wire connections between gas valve and control board.	a- If wires are damaged, replace them; b- If wires are ok, replace the gas valve or the power control board.
"Safety Relay Error"	5	Failure detected in the Safety Relay		Replace the power control board
"Safety Relay Open"	6	Failure detected in the Safety Relay		Replace the power control board
"Safety Relay Closed"	7	Failure detected in the Safety Relay		Replace the power control board
"Blocking Too Long Error"	11	Control had a blocking error for more than 20 hours in a row	Press RESET button to display the Blocking error description	Remove the cause of the Blocking error
"Fan Error"	12	Fan MF deviation for more than 60 sec	a- Check for 120 Vac power connection of the fan. b- Check PWM connection of the fan.	a- If no 120 VAC voltage is present, replace the power control board. b- If no PWM signal is present, replace power control board. c- Replace the fan
"Ram Error"	13	Internal software error		Replace the power control board
"Wrong E2prom Signature"	14	Contents of E2prom is not up-to-date		Replace the power control board
"X Ram Error"	15	Internal software error		Replace the power control board
"E2Prom Error"	16	No communication with E2prom		Replace the power control board
"E2Prom Error C"	17	Wrong safety parameters in E2prom		Replace the power control board
"E2Prom Error Cal Table"	18	Wrong calibration table parameters		Replace the power control board
"State Error"	19	Internal software error		Replace the power control board
"Rom Error"	20	Internal software error		Replace the power control board
"Rom Error C"	21	Internal software error		Replace the power control board
"Air Sw Not Open"	22	Air pressure switch not working		
"15Ms Xrl Error"	23	Internal software error		Replace the power control board
"Air Sw Not Closed"	24	Air pressure switch not working		
"Max. Thermostat Lock Error"	25	The external overheat protection is activated	a- Check the pump to verify the flow circulation b- Check if the valves on hydraulic circuit are open c- Check the high limit switch d- To reset - see "Fig. 10", section 4.4.3	a- Change the pump or restart it b- Open the valves on hydraulic circuit c- Change the high limit switch
"Stack Error"	26	Internal error		Replace the power control board
"Flame Out Too Late Error"	27	Flame still present 10 sec. after closing the gas valve		Replace the gas valve
"Flame Error 1"	28	Flame is detected before ignition		Replace the gas valve
"20Ms Xrl Error"	29	Internal software error		Replace the power control board
"41Ms Error"	30	Internal software error		Replace the power control board

Tab. 15 Lockout codes

Error	Int. nr.	Description	Checks	Solutions
"Too Many Flame Failures"	31	Three times flame lost during one demand	a- Check the integrity of the wire connections of the spark and the earth on heat exchanger	a- If wires are damaged, replace them
"Flow Switch Not Closed Error"	32	Flow switch not working / No flow		
"Flow Switch Not Open Error"	33	Flow switch not working / No flow		
"Flag Byte Integrity Error"	34	Internal software error		Replace the power control board
"Ad Hi Cpl Error"	35	Internal software error		Replace the power control board
"Ad Lo Cpl Error"	36	Internal software error		Replace the power control board
"Register Error"	37	Internal software error		Replace the power control board

Tab. 15 Lockout codes

6.1.2 Blocking errors

If it is "Blocking" error the boiler will go back to normal operation, with no need to press the "RESET" button, once the reason for the failure has been eliminated.

In the following table the "Blocking" errors are listed:

Error	Int. nr.	Description	Checks	Solutions
"WD Error Ram"	45	Internal software error		Replace the power control board
"WD Error Rom"	46	Internal software error		Replace the power control board
"WD Error Stack"	47	Internal software error		Replace the power control board
"WD Error Register"	48	Internal software error		Replace the power control board
"WD Error Xrl"	49	Internal software error		Replace the power control board
"Refhi Too Lo Error"	50	Internal software error		Replace the power control board
"Refhi Too Hi Error"	51	Internal software error		Replace the power control board
"Reflo Too Lo Error"	52	Internal software error		Replace the power control board
"Reflo Too Hi Error"	53	Internal software error		Replace the power control board
"Flame Error 2"	54	Flame is detected in a state in which no flame is allowed to be seen		Replace the power control board
"Water Level Detect"	55	Low water level detected		
"Water Level Meas"	56	Low water level measurement error		
"Low Water Cutoff Error"	57	Low water sensor error	Check the LWCO	If the LWCO is in alarm, try to reset it.
"Low Water Pressure Error"	58	Low water pressure error		
"Low Water Pressure Sensor"	59	Low water pressure		
"Flue Gas Error"	60	Flue gas pressure error	a- Check the flue gas pressure switches b- Check the gas pressure	a- If the flue gas pressure switches don't work, replace them b- If the gas supply pressure is incorrect, it must be adjusted to the correct pressure
"Return Temp Error"	61	Return temperature is higher than stay burning temperature	a- Check the return temperature sensor b- Verify the pump for flow circulation	a- Verify that the temperature sensor has the correct resistance values. If values are incorrect sensor must be replaced. b- Change the pump or restart it
"Blocked Drain Error"	62	Block drain switch is active		
"Wd Freq Error"	64	Incorrect Frequency signal or no communication with the WD	Verify the supplied 120 V ac current	a- If the supplied 120 V ac current has a frequency of 60HZ +/- 2% , replace the power control board b- If the frequency is out of range, consult electrician
"Phase Error"	65	Hot neutral reversed	Check the supply 120 V ac connection	Reverse the supply voltage polarity
"Net Freq Error"	66	Net freq. error detected in the main	Check the frequency of the supply 120 V ac connection	a- If the supplied 120 V ac current has a frequency of 60HZ +/- 2% , replace the power control board b- If the frequency is out of range, consult electrician
"Faulty Earth Error"	67	Faulty earth connection	Check the earth connection to the appliance	Restore the earth connection
"WD Communication Error"	68	Watchdog communication error		Replace the power control board

Tab. 16 Blocking errors

Error	Int. nr.	Description	Checks	Solutions
"Overheat Error"	70	Supply temp exceed the limit	a- Check the pump to verify the flow circulation b- Check if the valves on hydraulic circuit are open c- Check the supply temperature sensor	a- Change the pump or restart it b- Open the valves on hydraulic circuit c- Verify that the temperature sensor has the correct resistance values. If values are incorrect sensor must be replaced.
"T Supply Open"	72	Supply sensor open	a- Check the integrity of the wire connections b- Check the supply temperature sensor	a- If the wiring is damaged, replace it b- Verify that the temperature sensor has the correct resistance values. If values are incorrect sensor must be replaced.
"T Return Open"	73	Return sensor open	a- Check the integrity of the wire connections b- Check the return temperature sensor	a- If the wiring is damaged, replace it b- Verify that the temperature sensor has the correct resistance values. If values are incorrect sensor must be replaced.
"T Dhw Out Open"	76	DHW sensor open	a- Check the integrity of the wire connections b- Check the DHW temperature sensor	a- If the wiring is damaged, replace it b- Verify that the temperature sensor has the correct resistance values. If values are incorrect sensor must be replaced.
"T Supply Shorted"	80	Supply sensor shorted	a- Check the integrity of the wire connections b- Check the supply temperature sensor	a- If the wiring is damaged, replace it b- Verify that the temperature sensor has the correct resistance values. If values are incorrect sensor must be replaced.
"T Return Shorted"	81	Return sensor shorted	a- Check the integrity of the wire connections b- Check the return temperature sensor	a- If the wiring is damaged, replace it b- Verify that the temperature sensor has the correct resistance values. If values are incorrect sensor must be replaced.
"T Dhw Out Shorted"	84	DHW sensor shorted	a- Check the integrity of the wire connections b- Check the DHW temperature sensor	a- If the wiring is damaged, replace it b- Verify that the temperature sensor has the correct resistance values. If values are incorrect sensor must be replaced.
"T Flue Shorted"	86	Flue sensor shorted	a- Check the integrity of the wire connections b- Check the flue temperature sensor	a- If the wiring is damaged, replace it b- Verify that the temperature sensor has the correct resistance values. If values are incorrect sensor must be replaced.
"Reset Button Error"	87	Reset button error	Too many reset button pushes in a 60 sec period	
"Appliance Selection"	93	Appliance selection error		Replace the power control board
"Gas Pressure Error"	107	Gas pressure too low or too high		
"Flue Press Error"	108	Flue gas pressure error	a- Check for any obstruction in the exhaust system b- Check the condensate discharge	a- Remove any obstructions from the exhaust system b- Remove any obstruction from condensate discharge and verify if the condensate can flow freely

Tab. 16 Blocking errors

6.2 Errors not shown on display

Symptoms	Possible solutions
Combustion noise too loud; rumbling noises	Check gas type. Check inlet gas pressure; adjust as needed. Check flue gas system; clean or repair as needed. Check gas/air ratio in the combustion air and flue gas; replace gas valve as needed.
Flow noises	Set pump speed correctly to match maximum output. Set pump mode. Purge system.
Heating-up takes too long	Set pump speed correctly to match maximum output. Set pump mode.
Flue gas readings incorrect; CO levels too high	Check gas type. Check inlet gas pressure; adjust as needed. Check flue gas system; clean or repair as needed. Check gas/air ratio in flue gas; replace gas valve as needed.
Hard ignition, poor ignition	Check gas type. Check inlet gas pressure; adjust as needed. Check power supply. Check electrodes for visual damage; replace as needed. Check flue gas system; clean or repair as needed. Check gas/air ratio; replace gas valve as needed. Check gas valve; replace as needed. Check burner; replace if required.

Tab. 17

6.3 Sensor Resistance table

Temperature °F (°C) Testing tolerance ±10%	Resistance [Ω]
32 (0)	27396
41 (5)	22140
50 (10)	17999
59 (15)	14716
68 (20)	12099
77 (25)	10000
86 (30)	8308
95 (35)	6936
104 (40)	5819
113 (45)	4904
122 (50)	4151
131 (55)	3529
140 (60)	3012
149 (65)	2582
158 (70)	2221
167 (75)	1918
176 (80)	1663
185 (85)	1446
194 (90)	1262
203 (95)	1105
212 (100)	970
221 (105)	855
230 (110)	755
239 (115)	669
248 (120)	594
257 (125)	529

Tab. 18 Resistance table for: Supply temperature sensor, Return sensor, Flue sensor, DHW tank temperature sensor, LLH sensor, Outdoor temperature sensor

7 Maintenance

7.1 General

NOTICE: The installer must inform the user about the contents of this section. The user must make the necessary arrangements with qualified service agency for the care and periodic maintenance of the boiler.



CAUTION: Lack of care and maintenance of this boiler and equipment may cause an unsafe condition.



A qualified and adequately trained technician must perform the inspection as specified in these instructions and in the Service Manual (provided separately) before each heating season and at regular intervals.



WARNING: Servicing, inspection and adjustment must be done by a trained technician in accordance with all applicable local and national codes. Improper servicing or adjustment could damage the boiler and result in equipment damage or a dangerous condition!

7.2 Maintenance / inspection schedule for end user

Time interval	Maintenance
Annually	Verify the cleanliness of the area around the boiler
Annually	Check the pressure of the hydraulic system
Annually	Check vent piping and verify if leaks are present
Annually	Check air piping and verify if leaks are present
Annually	Check relief valve
Monthly (follow local, state, federal or local authority having jurisdiction guidelines)	Verify the condensate discharge system
Every two months	Test low water cut off
Every two months	Verify the reset button of low water cut off
Every six months	Check all piping (gas and water) for leaks
End of heating season	Shut off the boiler

Tab. 19 User maintenance / inspection schedule

7.3 Maintenance / inspection schedule for licensed contractor / gas fitter

Time interval	Maintenance
Annually *	Combustion test
Annually *	Verify condition of flue and air system (including Venturi and fan)
Annually *	Check ignition electrode
Annually *	Cleaning the combustion chamber (including the burner tube)
Annually *	Clean condensate discharge
Annually *	Safety block check, modulation range check, gas valve closing after burner stop
Annually *	Check control parameters
Annually *	Check for gas piping leak
Annually *	Check wiring and connection

(*) Annually or every 2000 hours. Which occurs first.

Tab. 20 Licensed contractor / gas fitter maintenance / inspection schedule

Time interval	Maintenance
Annually *	Verify startup
Annually *	Verify the flame
Annually *	Check relief valve
Annually *	Inspect the burner gasket

(*) Annually or every 2000 hours. Which occurs first.

Tab. 20 Licensed contractor / gas fitter maintenance / inspection schedule

7.3.1 Gas leaking inspection

Verify all gas piping to ensure that there are no leaks.



DANGER: To verify the gas leaks use a soap solution or a gas leak detector. Do not use methods that can cause explosions!

7.3.2 Check exhaust and combustion air pipe system

Clear vent systems of any obstructions, corrosion, physical damage, water stains, rust. Verify the connection between the single components. Verify the outside terminations are clear. Clean the screens and the louvers if there is any debris.

7.3.3 Inspection of ignition electrode

Verify that the electrode is clean of deposits and use a dollar bill or other material to remove deposits as required.

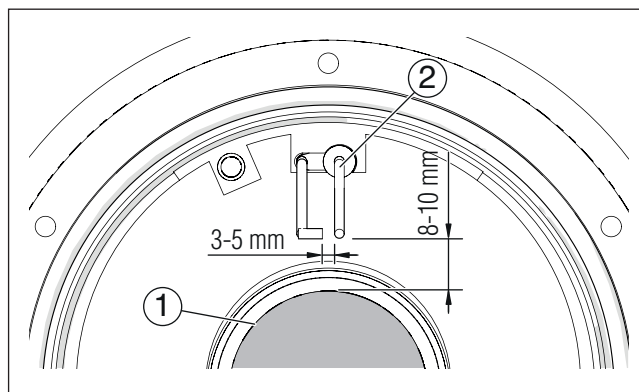


Fig. 73 Inspection of ignition electrode

No.	Description
1	Burner tube
2	Ignition electrode

7.3.4 Checking for wiring and connections

Check that all wiring is securely fastened and in good condition without any cracking or alteration of isolation or presence of corrosion in metallic connection.

7.3.5 Burner gasket inspection

You must maintain the boiler as outlined in this manual and have the boiler started up and serviced at least annually by a qualified service technician to ensure boiler/system reliability. This includes a combustion test and the cleaning of the combustion chamber.

When disassembling the heat exchanger it is crucial to inspect the Burner Gasket (green: part number 7738004985) for damage.

It is a must to replace the burner gasket when servicing and required if there is any signs of wear, deformity or discoloration of the gasket and in any case not later than every two years.

8 Installation schemes

The following shows possible system diagrams.

NOTICE: Application drawings in this manual are conceptual only and do not purport to address all design, installation, code, or safety considerations. The diagrams in this manual are for reference only for code officials, designers and licensed installers. It is expected that installers have adequate knowledge of national and local codes, as well as accepted industry practices, and are trained on equipment, procedures, and applications involved. Drawings are not to scale. Refer to the boiler, control and module installation manuals for additional detailed information.

The following system diagrams are showing primary/secondary piping. As alternative a appropriate sized low loss header can also be used. When using primary/secondary piping please follow the following guidelines:

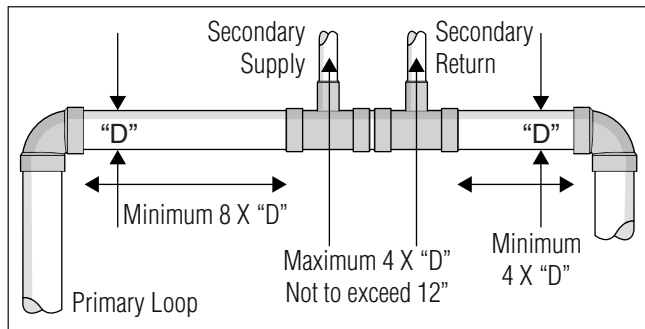


Fig. 75

8.1 Multiple zone with indirect tank (pump for each zone)

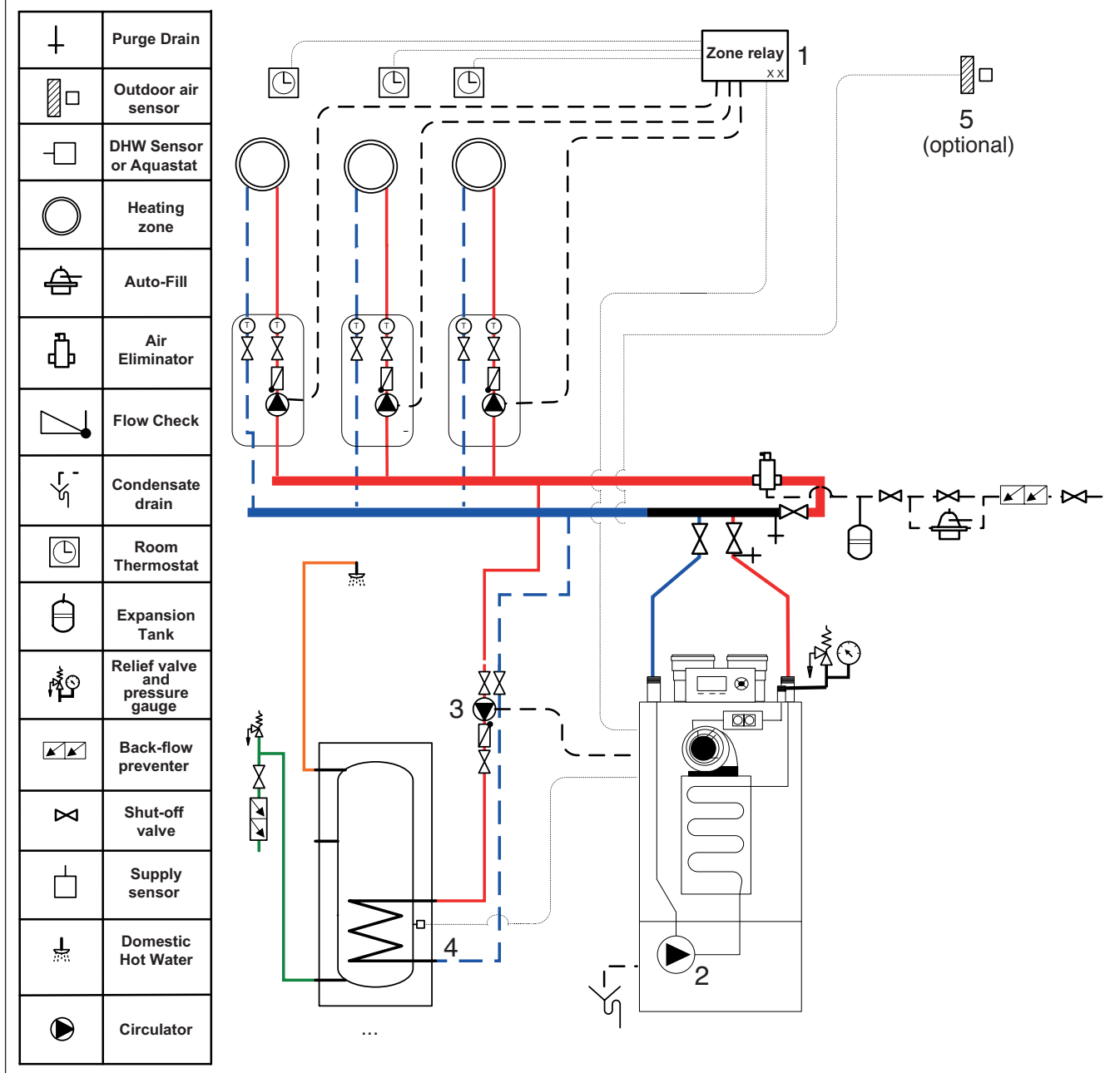


Fig. 74

Wiring diagram for multiple zone with indirect tank (pump for each zone):

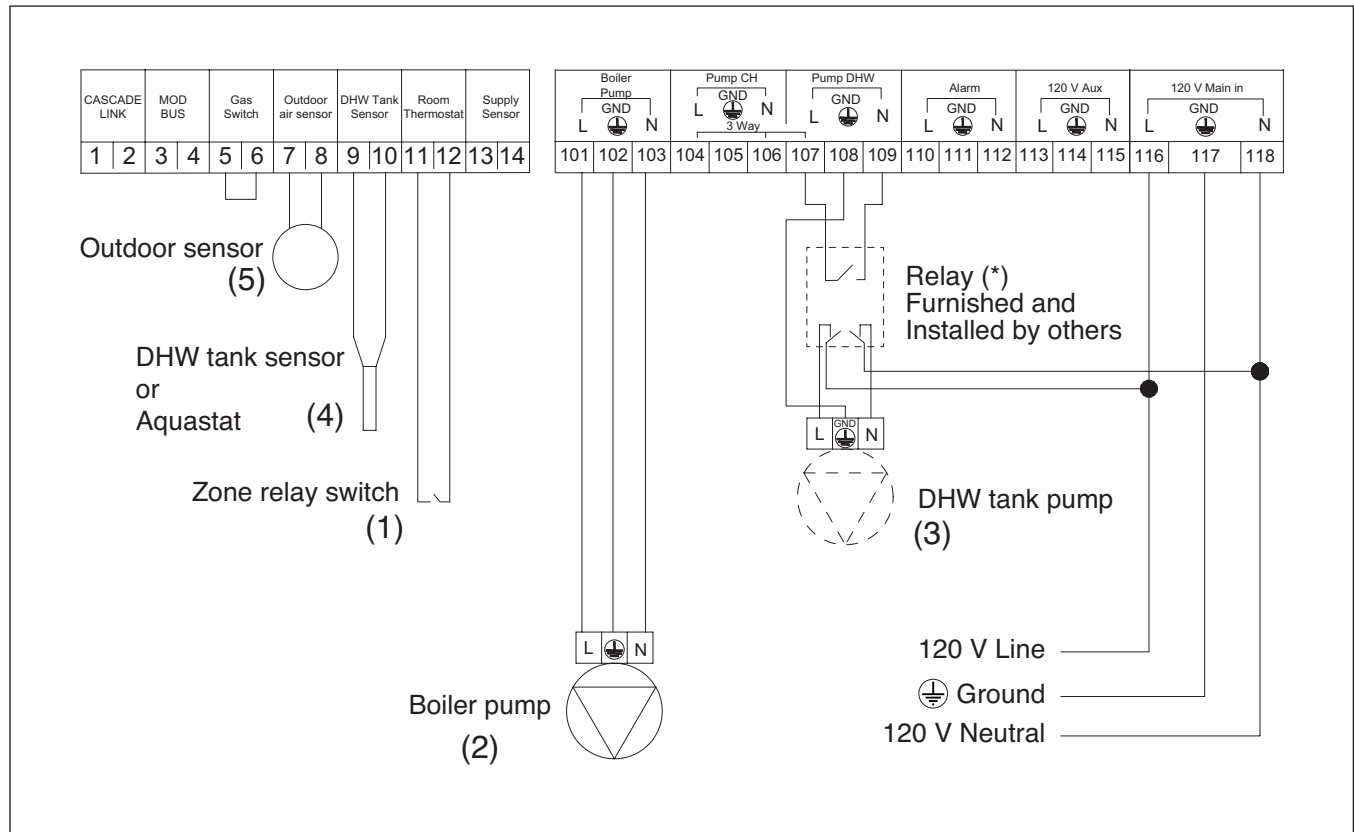


Fig. 76

(*) NOTICE: The maximum amp load for each pump (in addition to the boiler pump) is 1 A when 1 or 2 pumps are connected. For this reason, if the power consumption of each pump is higher than 84 watt, use a relay as shown in figure.

► Connect the following low voltage connection:

Terminal Number.	Device
11-12	Zone relay end switch
9-10	DHW tank sensor or Tank Thermostat (Aquastat)
7-8	Outdoor air sensor (optional)

► Connect the following high voltage pin:

Terminal Number.	Device
107-108-109	DHW tank pump

8.1.1 Settings

Set the parameters as indicated in the following table (for the parameter list see section "5.5 Parameters list"):

No.	Description	Value	Comment
1	Central Heating Mode	0	Outdoor air sensor not present
		1	Outdoor air sensor present. Reset curve activated
2	Mod Pump Mode	2	Enabled CH pump and DHW pump
35	DHW mode	0	No indirect sanitary water installed
		1	Indirect sanitary water with sensor
		2	Indirect sanitary water with tank thermostat

If CH mode is set to 1 and an outdoor air sensor is present, set the reset curve parameter as follows (to set these values see also section "5.6 Outdoor reset"):

No.	Description	Value (°F)
19	Design Supply Temp	180
20	Design Outdoor Temp	25
21	Baseline Supply Temp	104
22	Baseline Outdoor Temp	70
23	Design Supply Min Limit	40
24	Design Supply Max Limit	180
25	Warm Weather Shutdn	68

8.2 Multiple zone with indirect tank (valve for each zone)

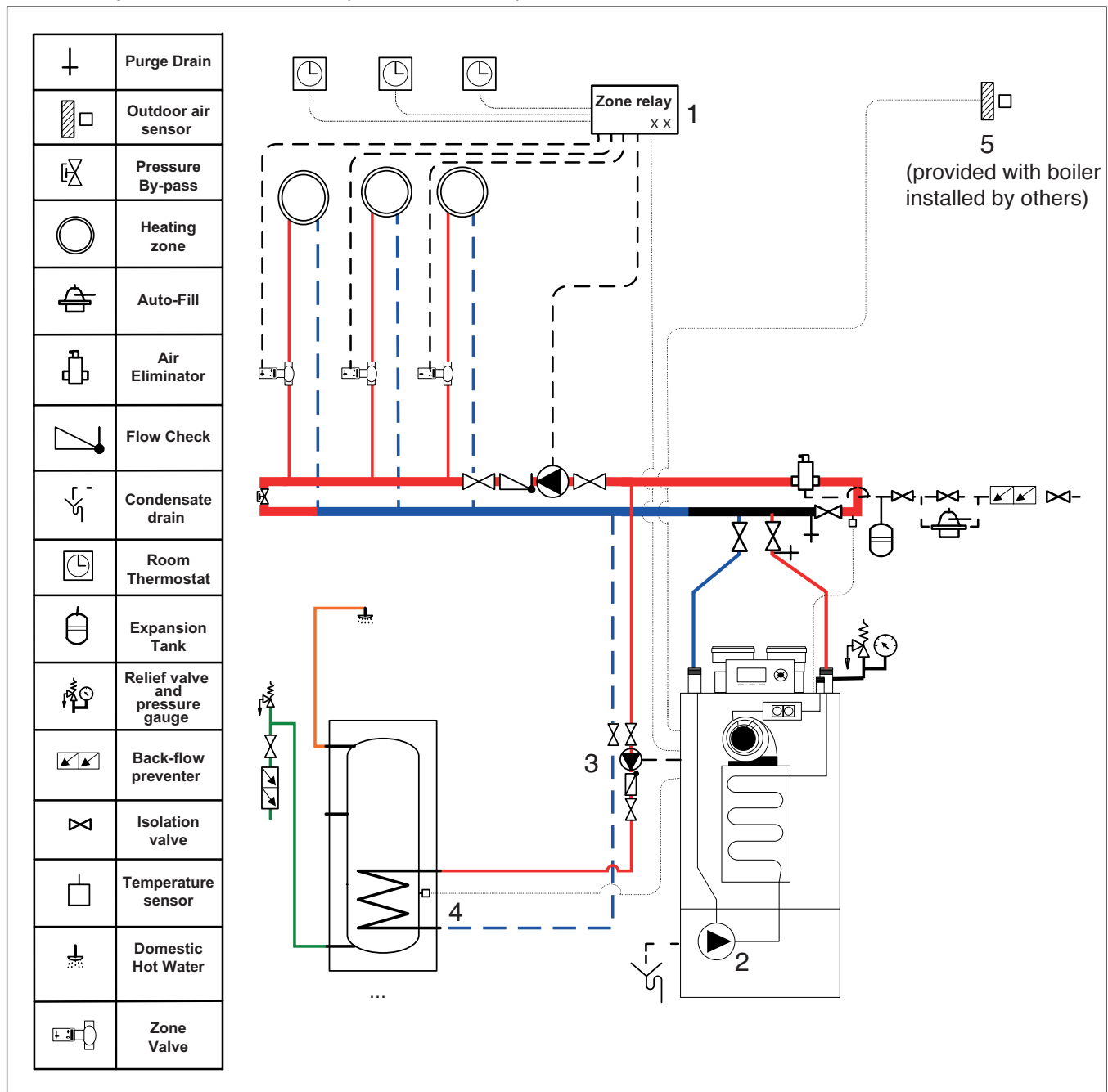


Fig. 77

Wiring diagram for multiple zone with indirect tank (valve for each zone):

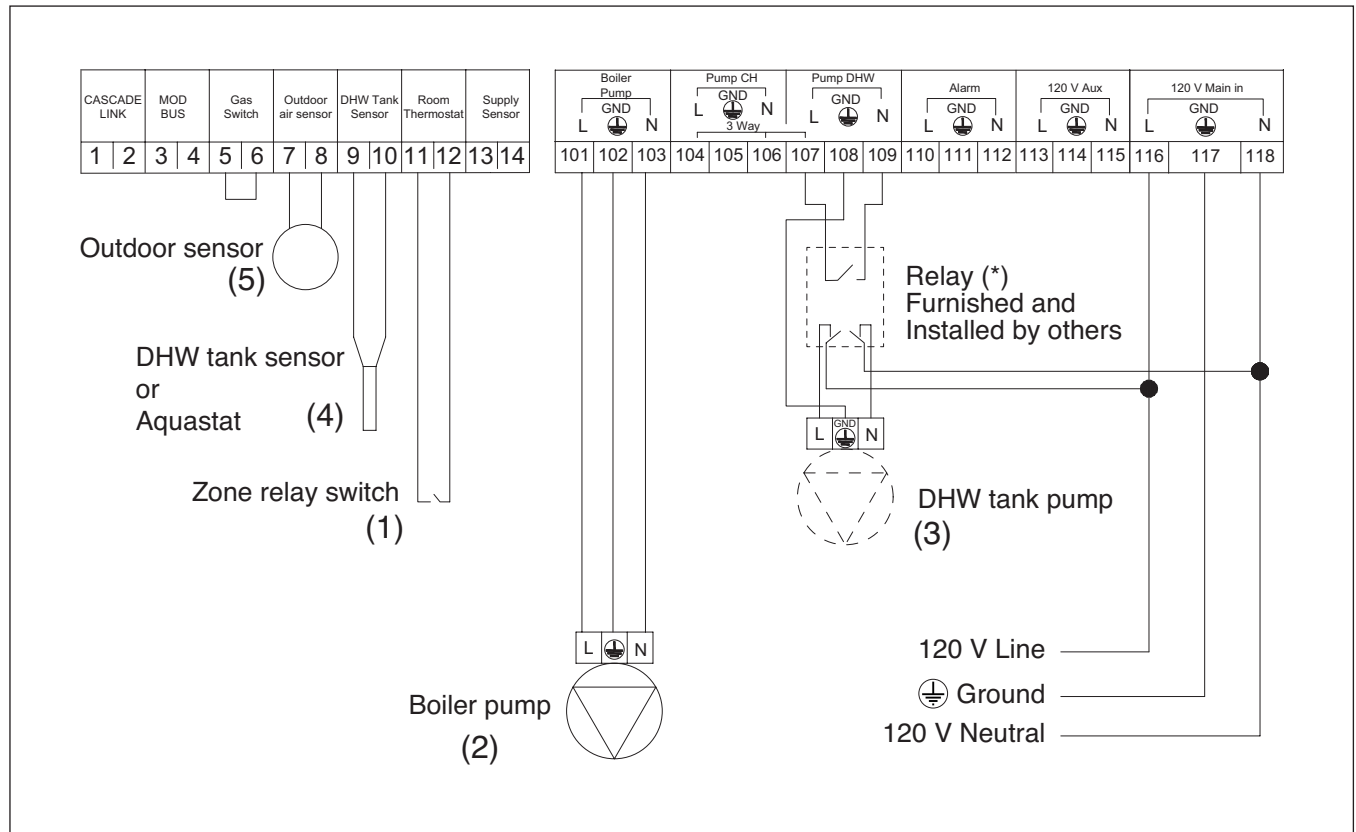


Fig. 78

(*) NOTICE: The maximum amp load for each pump (in addition to the boiler pump) is 1 A when 1 or 2 pumps are connected. For this reason, if the power consumption of each pump is higher than 84 watt, use a relay as shown in figure.

► Connect the following low voltage connection:

Terminal Number.	Device
11-12	Zone relay end switch
9-10	DHW tank sensor or Tank Thermostat (Aquastat)
7-8	Outdoor air sensor (optional)

► Connect the following high voltage pin:

Terminal Number.	Device
107-108-109	DHW tank pump

8.2.1 Settings

Set the parameters as indicated in the following table (for the parameter list see section "5.5 Parameters list"):

No.	Description	Value	Comment
1	Central Heating Mode	0	Outdoor air sensor not present
		1	Outdoor air sensor present. Reset curve activate
2	Mod Pump Mode	2	Enabled CH pump and DHW pump
35	DHW mode	0	No indirect sanitary water installed
		1	Indirect sanitary water with sensor
		2	Indirect sanitary water with tank thermostat

If CH mode is set to 1 and an outdoor air sensor is present, set the reset curve parameter as follows (to set these values see also section "5.6 Outdoor reset"):

No.	Description	Value (°F)
19	Design Supply Temp	180
20	Design Outdoor Temp	25
21	Baseline Supply Temp	104
22	Baseline Outdoor Temp	70
23	Design Supply Min Limit	40
24	Design Supply Max Limit	180
25	Warm Weather Shutdn	68

8.3 Cascade

The SSB boilers can be connected together to form a cascade with a maximum of 16 boilers. In this case, one boiler will be the manager of the other boilers connected. This boiler is named "Primary". The other one(s) are named "Secondary".

To have a cascade it is necessary to connect together the boilers using the "Cascade link" (pin 1-2) in parallel as shown in the following figure:

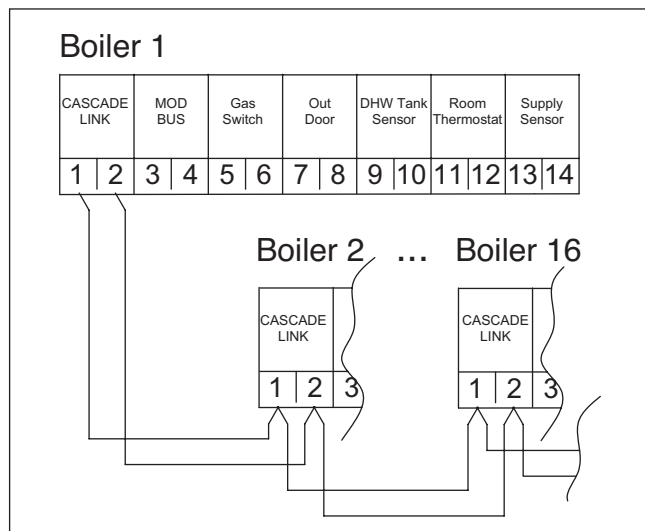


Fig. 79

To define the "Primary" boiler of the cascade set to "ON" the "S4 switch". This switch has to be set "OFF" in all the "Secondary" boilers (see the following figure).

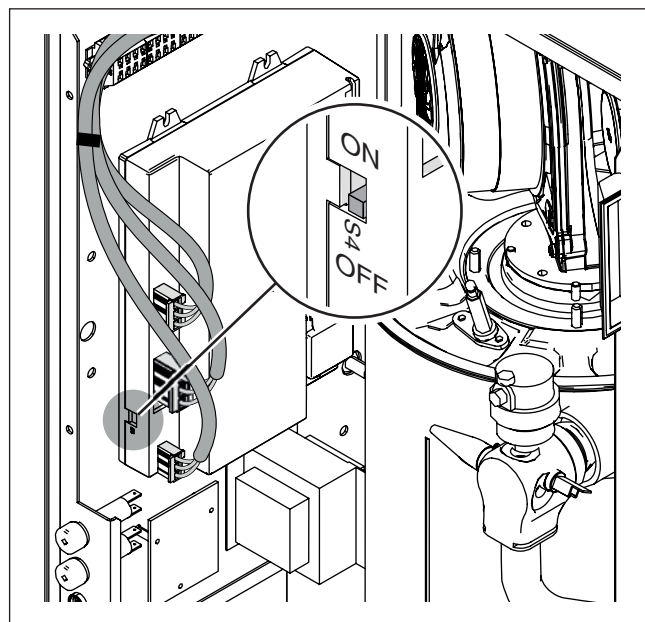


Fig. 80



CAUTION: Change the position of the S4 switch only when the boiler is off.

Each cascade boiler has to be identified by an address (parameter N° 73 "Boiler Address") different from the others. To define these address follow the steps below:

- ▶ Switch on the "Primary boiler" and set the parameter N°73 ("Boiler Address") to 1
- ▶ Switch off the "Primary boiler"
- ▶ Switch on the second boiler and set the parameter N°73 to 2.
- ▶ Switch off the second boiler
- ▶ Continue with steps 3 and 4 for each boiler (each "Secondary" boiler has to be a different number from 2 to 16 and the "Primary" must be number 1)
- ▶ Switch on all boilers starting with the "Primary boiler"

A recommended scheme for cascade installation is as follow:

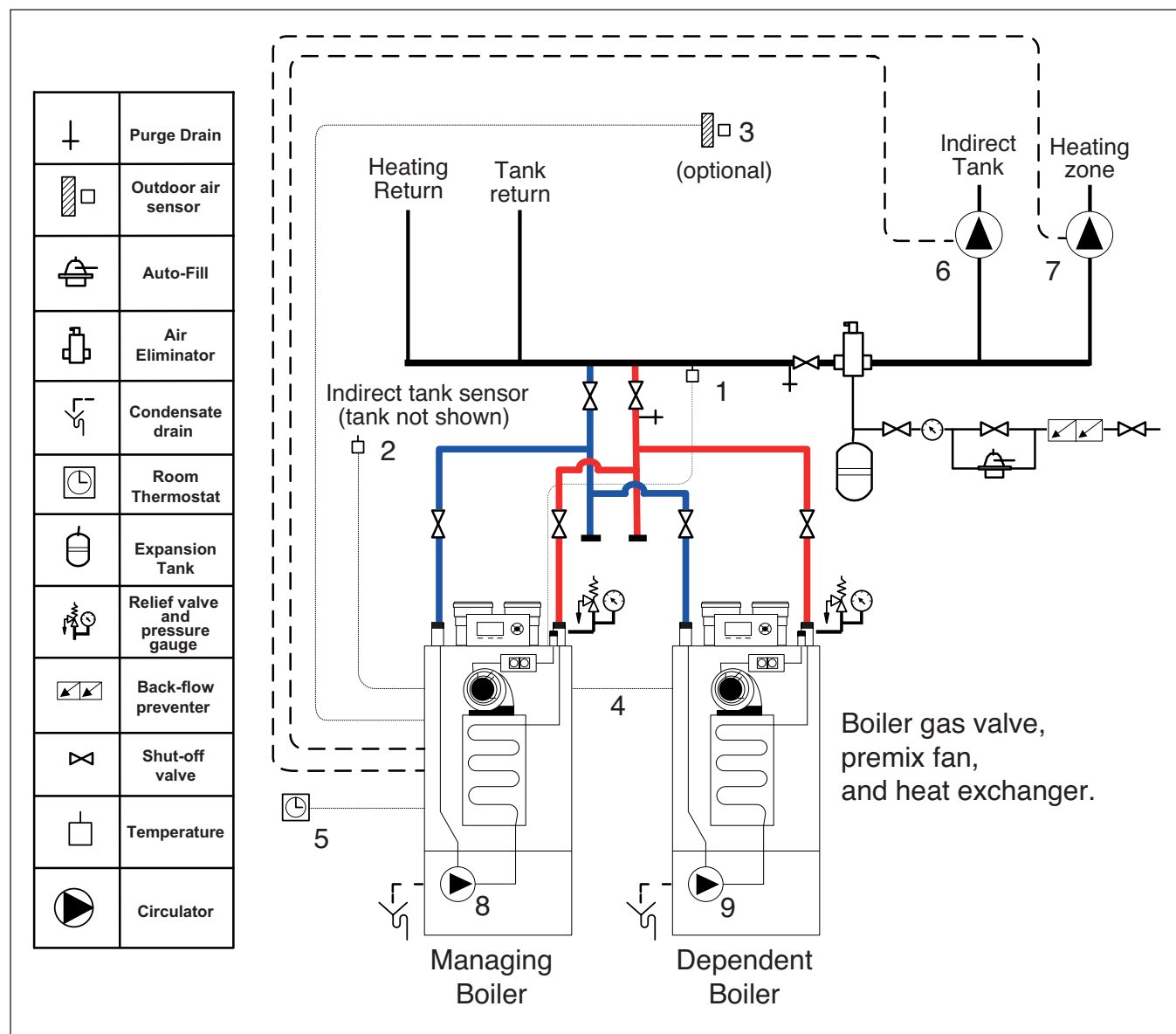


Fig. 81

For this installation the wiring is shown in figure below:

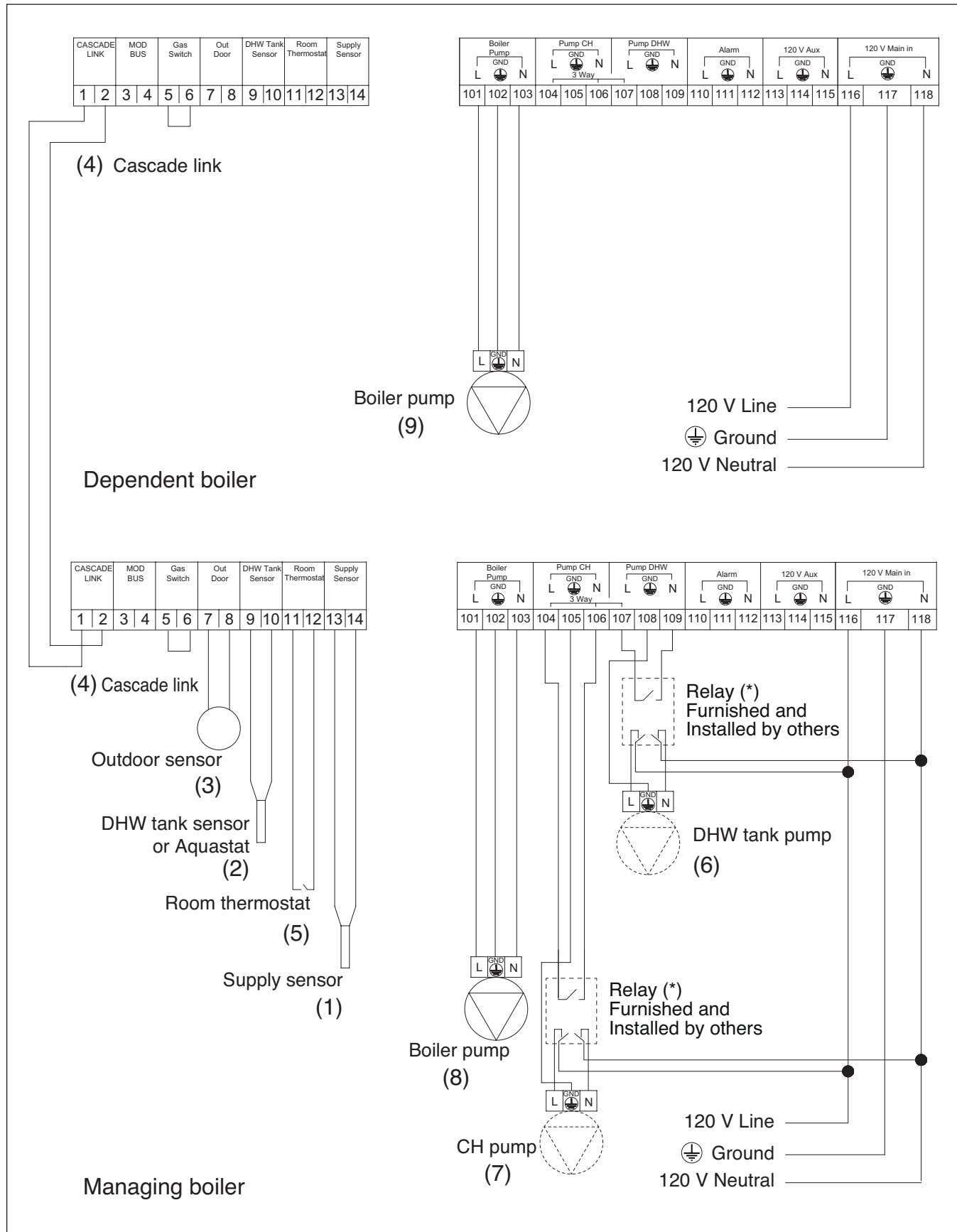


Fig. 82

(*) NOTICE: The maximum amp load for each pump (in addition to the boiler pump) is 1 A when 1 or 2 pumps are connected. For this reason, if the power consumption of each pump is higher than 84 watt, use a relay as shown in figure.

- The low voltage connections for “Managing boiler” are:

Terminal Number.	Device
1-2	Cascade link
7-8	Outdoor air sensor (optional)
9-10	DHW tank sensor or Tank Thermostat (Aquastat)
11-12	Room thermostat
13-14	Supply sensor

- The low voltage connections for “Dependent boiler” are:

Terminal Number.	Device
1-2	Cascade link

- The high voltage connections for “Managing boiler” are:

Terminal Number.	Device
104-105-106	CH pump
107-108-109	DHW tank pump

8.3.1 Settings

Set the parameters as indicated in the following table (for the parameter list see section “5.5 Parameters list”):

No.	Description	Value	Comment
1	Central Heating Mode	0	Outdoor air sensor not present
		1	Outdoor air sensor present. Reset curve activate
2	Mod Pump Mode	2	Enabled CH pump and DHW pump
35	DHW mode	0	No indirect sanitary water installed
		1	Indirect sanitary water with sensor
		2	Indirect sanitary water with tank thermostat

If CH mode is set to 1 and an outdoor air sensor is present, set the reset curve parameter as follows (to set these values see also section “5.6 Outdoor reset”):

No.	Description	Value (°F)
19	Design Supply Temp	180
20	Design Outdoor Temp	25
21	Baseline Supply Temp	104
22	Baseline Outdoor Temp	70
23	Design Supply Min Limit	40
24	Design Supply Max Limit	180
25	Warm Weather Shut down	68

9 Commissioning log for the appliance



Please complete a separate log for each appliance.

Home owner/operator:

Last name, first name

Number, Street

Telephone/fax

ZIP code, town

System installer:

Order number:

Appliance type

FD (Date of manufacture):

Date commissioned:

☐ Individual appliance

Installation location: ☐ Basement | ☐ Garage | ☐ other:

Room air only: Number and size of ventilation openings

Vent pipe routing: ☐ Twin pipe system (Rigid) | ☐ Twin pipe system (Flex) | ☐ Concentric pipe system | ☐ Room air | ☐ Sealed combustion

☐ PVC | ☐ CPVC | ☐ PP | ☐ 2" | ☐ 3" | ☐ 4" | ☐ other:

Total length: Approx. ft (m) | Elbows 90°: Qty | Elbows 15 - 45°: Qty

Flue tightness test completed: ☐ yes | ☐ no

CO₂ value in the combustion air at maximum nominal output:

O₂ value in the combustion air at maximum nominal output:

Notes regarding under or over pressure operation:

Get setting and flue gas test:

Gas conversion: ☐ NG | ☐ LPG (propane)

Gas pressure	"W.C. (mbar)	Gas static supply pressure:	"W.C. (mbar)
Selected maximum output:	MBH (KW)	Selected minimum output:	MBH (KW)
Flow rate at maximum nominal output:	gpm (l/min)	Flow rate at minimum nominal output:	gpm (l/min)
Net calorific value H ₁₈ (per gas supplier):	MBTU/ft ³ (kwh/m ³)		
CO ₂ at maximum 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:

☐ Heating pump:

☐ Primary secondary piping

☐ Additional expansion vessel

Size/pre-charge pressure:

Automatic air vent present?

☐ yes | ☐ no

☐ DHW tank/type/number/heating surface output:

☐ System hydraulics checked, notes:

☐ Boiler pump; speed set at ☐ 1 ☐ 2 ☐ 3 (circle one)

Modified service functions: (select the modified service functions and enter the values here).

[illegible]

Heating control 850 MIN:

Vent length setting (par.99 "Flue length range") ☐ 1 | ☐ 2 | ☐ 3 | ☐ 4

Gas type setting (par 98 "Gas Type") ☐ NG | ☐ LPG

CH set point (par. 3) :

DHW set point (par. 48) :

Other: _____

☐ Heating control programmed, notes:

☐ Documented the modified setting 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 setting, a visual heating leak test and a functional check of the boiler and control. The system installer conducts a test of the heating system.

This system has been checked to the extent described.

The documents have been handed over to the home owner/operator. The

Name of service installing contractor

Date, owner/operator signature

Affix the test report here.

Date, system installer's signature

10 Spare parts

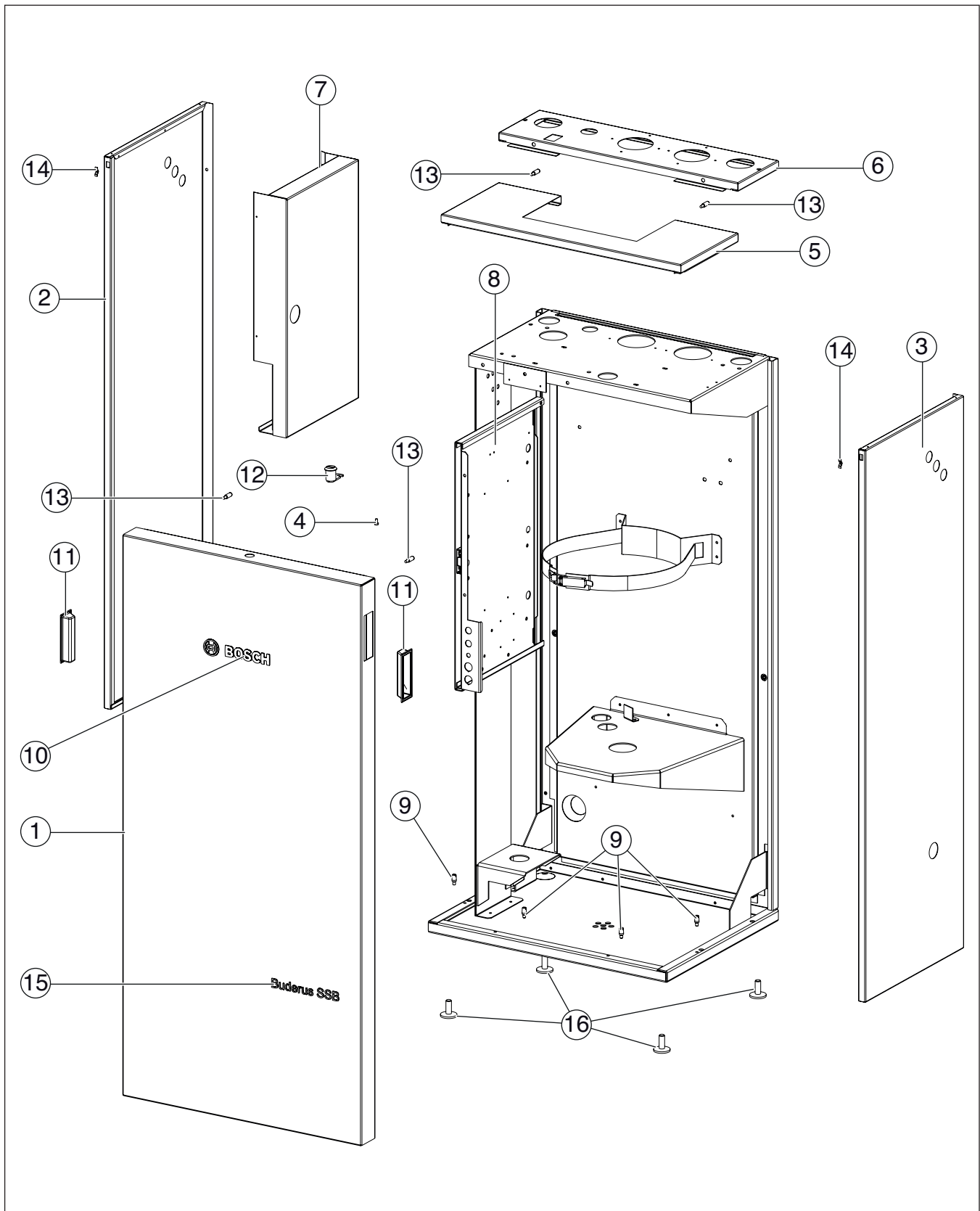


Fig. 83

Item (→ Fig. 83)	Description	SSB85	SSB120	SSB160	Order number
1	Panel front	■			7-738-005-108
1	Panel front		■	■	7-738-005-109
2	Panel left side	■			7-738-005-110
2	Panel left side		■	■	7-738-005-111
3	Panel right side	■			7-738-005-112
3	Panel right side		■	■	7-738-005-113
4	Lock pin panel top front	■	■	■	7-738-004-923
5	Panel top front	■	■	■	7-738-005-116
6	Panel top rear	■	■	■	7-738-005-117
7	Cover control board	■	■	■	7-738-004-907
8	Mounting bracket control board panel	■	■	■	7-738-004-908
9	Alignment pin front side panels	■	■	■	7-738-004-924
10	Logo Bosch front door	■	■	■	7-738-005-176
11	Handle front panel	■	■	■	7-738-004-920
12	Lock and lever front panel	■	■	■	7-738-004-921
13	Alignment pin front panel	■	■	■	7-738-004-944
14	Receiver alignment pin front panel	■	■	■	7-738-004-945
15	Logo Buderus SSB	■	■	■	7-738-005-177
16	Adjustable leveling leg	■	■	■	7-738-004-910

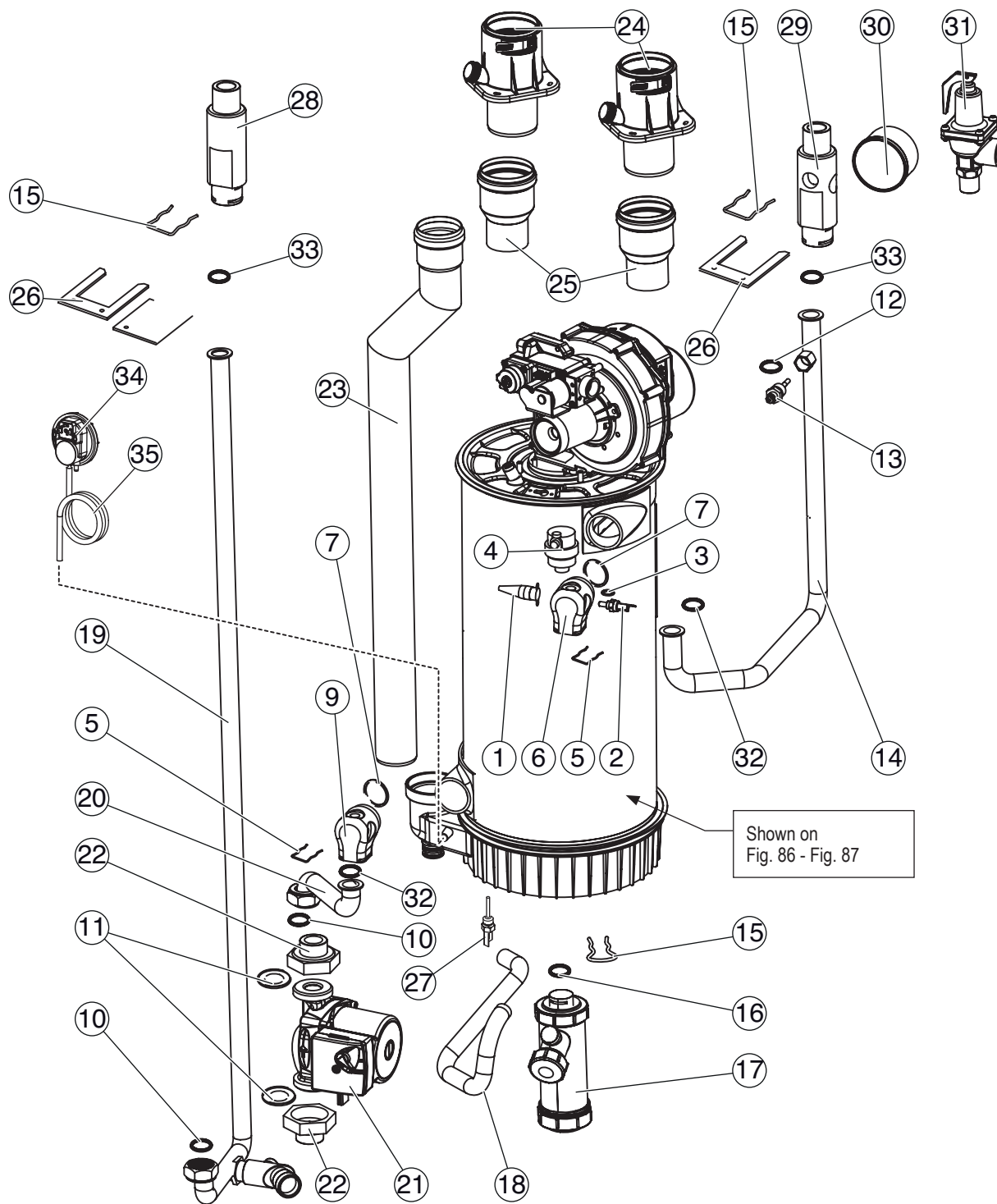


Fig. 84

Item (→ Fig. 84)	Description	SSB85	SSB120	SSB160	Order number
1	High limit sensor and screws	■	■	■	7-738-004-926
2	Universal temperature detector and washer	■	■	■	7-738-004-930
3	O-ring temperature detector 0.51x0.1in 13x2.62mm	■	■	■	7-738-004-931
4	Automatic air vent 3/8"	■	■	■	7-738-005-385
5	U-clip boiler supply/return manifold 1.67x1.02in 42.5x26mm AISI302	■	■	■	7-738-005-122
6	Boiler supply manifold	■	■	■	7-738-005-123
7	O-ring on HE connection 1.11x0.07 in 28,3x1,78 mm NBR	■	■	■	7-738-005-386
9	Boiler return manifold	■	■	■	7-738-005-387
10	Washer 3/4"	■			7-738-005-023
10	Washer 1"		■	■	7-738-005-014
11	Pump washer 1"1/2		■	■	7-738-005-388
12	Washer LWCO adapter 3/8"	■	■	■	7-738-004-929
13	LWCO probe	■	■	■	7-738-004-927
14	Boiler supply pipe 0.79in 20mm	■	■	■	7-738-005-135
15	U-clip condensate trap 1.61x0.96in 41x24.5mm AISI302	■	■	■	7-738-005-131
16	O-ring condensate trap 0.71x0.14in 18x3.53mm	■	■	■	7-738-005-129
17	Condensate trap	■	■	■	7-738-005-130
18	Condensate discharge pipe 0.71in 18mm	■	■	■	7-738-005-126
19	Boiler Return pipe 0.79in 20mm	■			7-738-005-144
19	Boiler Return pipe 0.79in 20mm		■	■	7-738-005-145
20	Pump return pipe	■		■	7-738-005-389
20	Pump return pipe		■		7-738-005-390
21	Pump UPS15/58	■			7-738-005-134
21	Pump UPS25-78		■	■	7-738-005-391
22	Adapter 1"1/2 F/ 1" M		■	■	7-738-005-392
23	PP boiler combustion pipe 1.97in 50mm	■			7-738-005-148
23	PP boiler combustion pipe 1.97in 50mm		■		7-738-005-149
23	PP boiler combustion pipe 1.97in 50mm			■	7-738-005-150
24	PP PVC vent / air intake adapter 2in/60 mm	■	■	■	7-738-005-140
25	PP Flue gas reducer 2-1.97in 60-50mm	■	■	■	7-738-005-147
26	Frame support system supply / return adapters	■	■	■	7-738-005-143
27	Flue gas temperature sensor	■	■	■	7-738-005-125
28	System return adapter 1"	■	■	■	7-738-005-141
29	System supply adapter 1"	■	■	■	7-738-005-139
30	T&P Gauge 0 – 105 psi	■	■	■	7-738-004-940
31	Safety relief valve 30psi 2.07bar	■	■	■	7-738-004-946
32	O-ring on pipe HE connection 0.79x0.12 in 20x3 mm NBR	■	■	■	7-738-005-393
33	O-ring 0.86x0.14in 21.82x3.53mm NBR	■	■	■	7-738-005-138
34	Pressure differential switch	■	■	■	7-738-005-410
35	Silicone hose for pressure differential switch	■	■	■	7-738-005-411

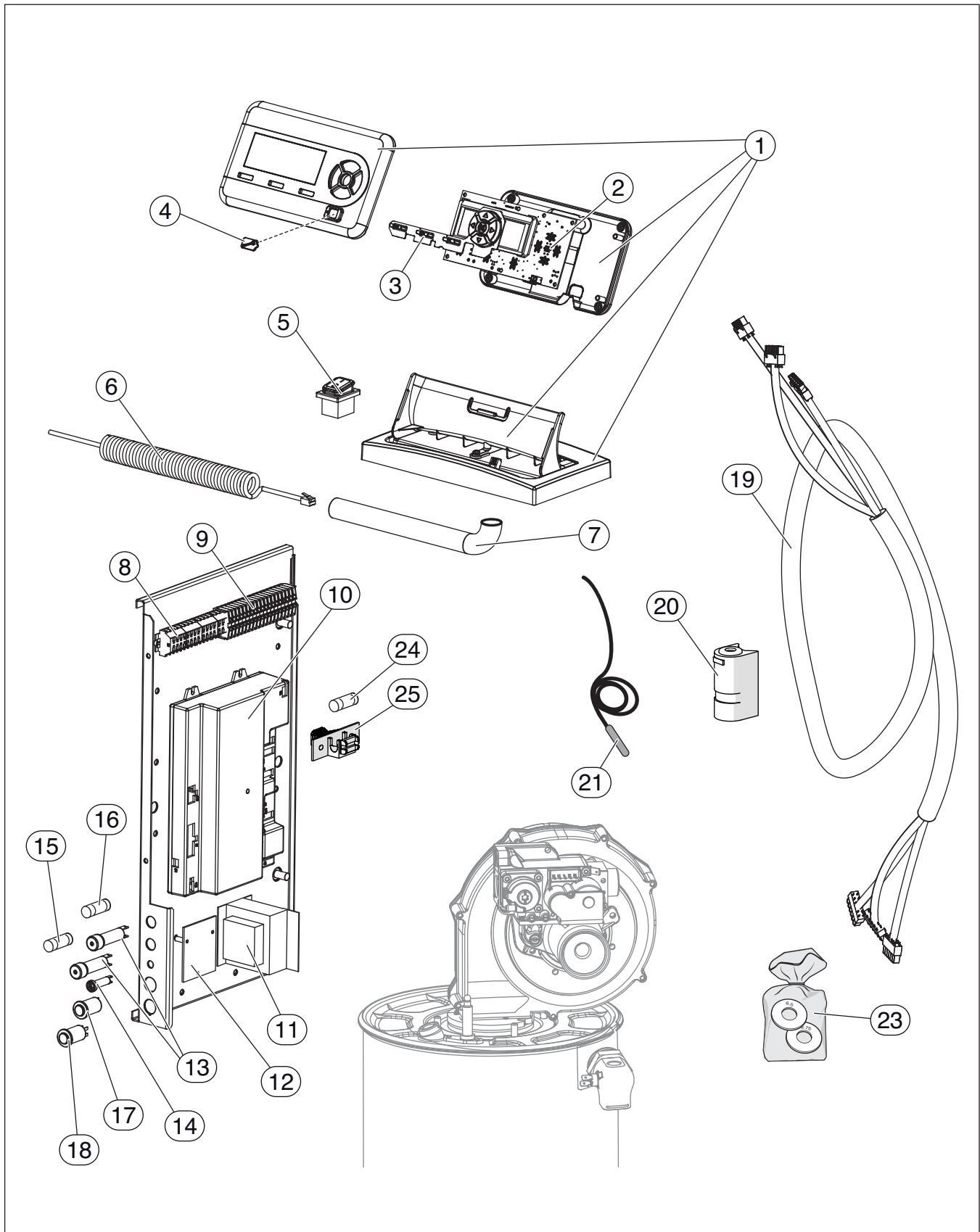


Fig. 85

Item (→ Fig. 85)	Description	SSB85	SSB120	SSB160	Order number
1	Enclosure user interface	■	■	■	7-738-005-037
2	Circuit Board user interface	■	■	■	7-738-005-038
3	Keypad	■	■	■	7-738-005-039
4	Service plug cover	■	■	■	7-738-005-040
5	On Off power switch	■	■	■	7-738-005-041
6	Display cable	■	■	■	7-738-005-042
7	Conduit for display cable	■	■	■	7-738-005-043
8	Terminal block low voltage	■	■	■	7-738-005-044
9	Terminal block line voltage	■	■	■	7-738-005-045
10	Control Board	■	■	■	7-738-005-046
11	Transformer 24V 0.6 amps	■	■	■	7-738-005-047
12	LWCO circuit board	■	■	■	7-738-005-048
13	Fuse carrier	■	■	■	7-738-005-049
14	Red LED light	■	■	■	7-738-005-050
15	Fuse 6 A	■	■	■	7-738-005-051
16	Fuse 0.125 A	■	■	■	7-738-005-052
17	Test push button	■	■	■	7-738-005-053
18	Manual reset push button	■	■	■	7-738-005-054
19	Wiring harness	■	■	■	7-738-005-151
19	Wiring harness			■	7-738-005-153
20	Outdoor sensor 10 k ohm	■	■	■	7-738-005-057
21	Universal sensor for LLH or DHW 10 k ohm	■	■	■	7-738-005-058
23	LPG gas conversion kit	■			7-738-005-394
23	LPG gas conversion kit		■		7-738-005-395
23	LPG gas conversion kit			■	7-738-005-396
24	Fuse 3.15 A	■	■	■	7-738-005-059
25	Fuse holder	■	■	■	7-738-005-060

SSB85 - SSB120

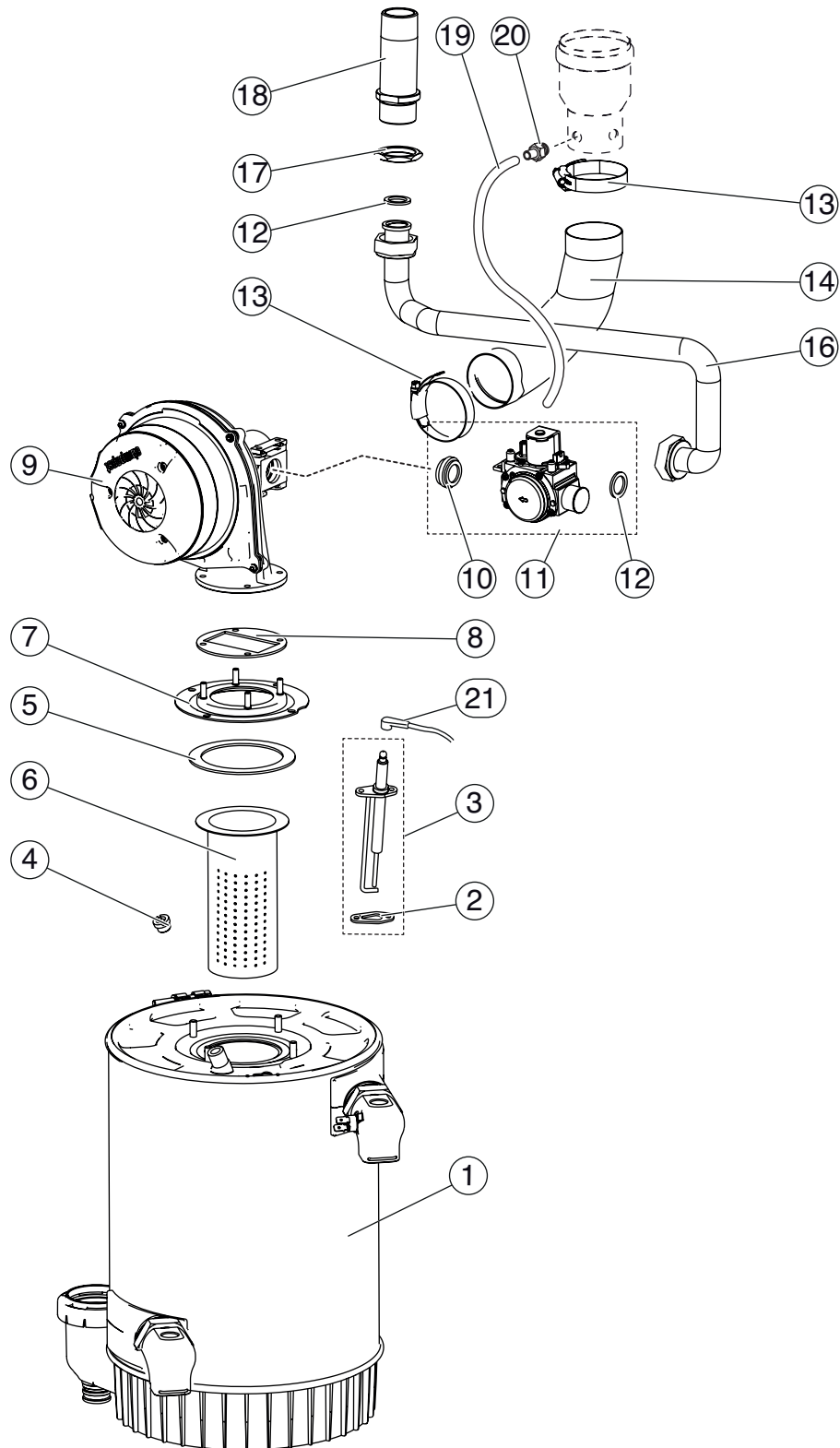


Fig. 86

Item (→ Fig. 86)	Description	SSB85	SSB120	Order number
1	Heat exchanger SSB85	■		7-738-005-154
1	Heat exchanger SSB120		■	7-738-005-155
2	Washer for ignition electrode	■	■	7-738-005-034
3	Ignition electrode with washer	■	■	7-738-005-397
4	Sight glass for combustion	■	■	7-738-005-031
5	Gasket premix burner tube	■	■	7-738-004-985
6	Premix burner tube	■		7-738-005-398
6	Premix burner tube		■	7-738-005-399
7	Burner flange (inner ring)	■	■	7-738-005-400
8	Gasket burner flange inner ring to fan	■	■	7-738-004-990
9	Fan + Venturi	■	■	7-738-005-159
10	Gasket venturi tube / gas valve SSB85/120	■	■	7-738-005-409
11	Gas valve and washers	■	■	7-738-005-160
12	Washer gas pipe 3/4" 19.05mm	■	■	7-738-005-023
13	Circular clamp 1.97in 50mm	■	■	7-738-005-015
14	Flexible pipe air intake	■	■	7-738-005-166
16	Gas pipe	■	■	7-738-005-414
17	Frame support gas pipe	■	■	7-738-005-172
18	Gas connection 3/4"	■	■	7-738-005-173
19	Balancing tube	■	■	7-738-005-401
20	Male adapter Ø 0.2 inch hose barb x M5 thread	■	■	7-738-005-270
21	Ignition cable red	■	■	7-738-005-032

SSB160 ONLY

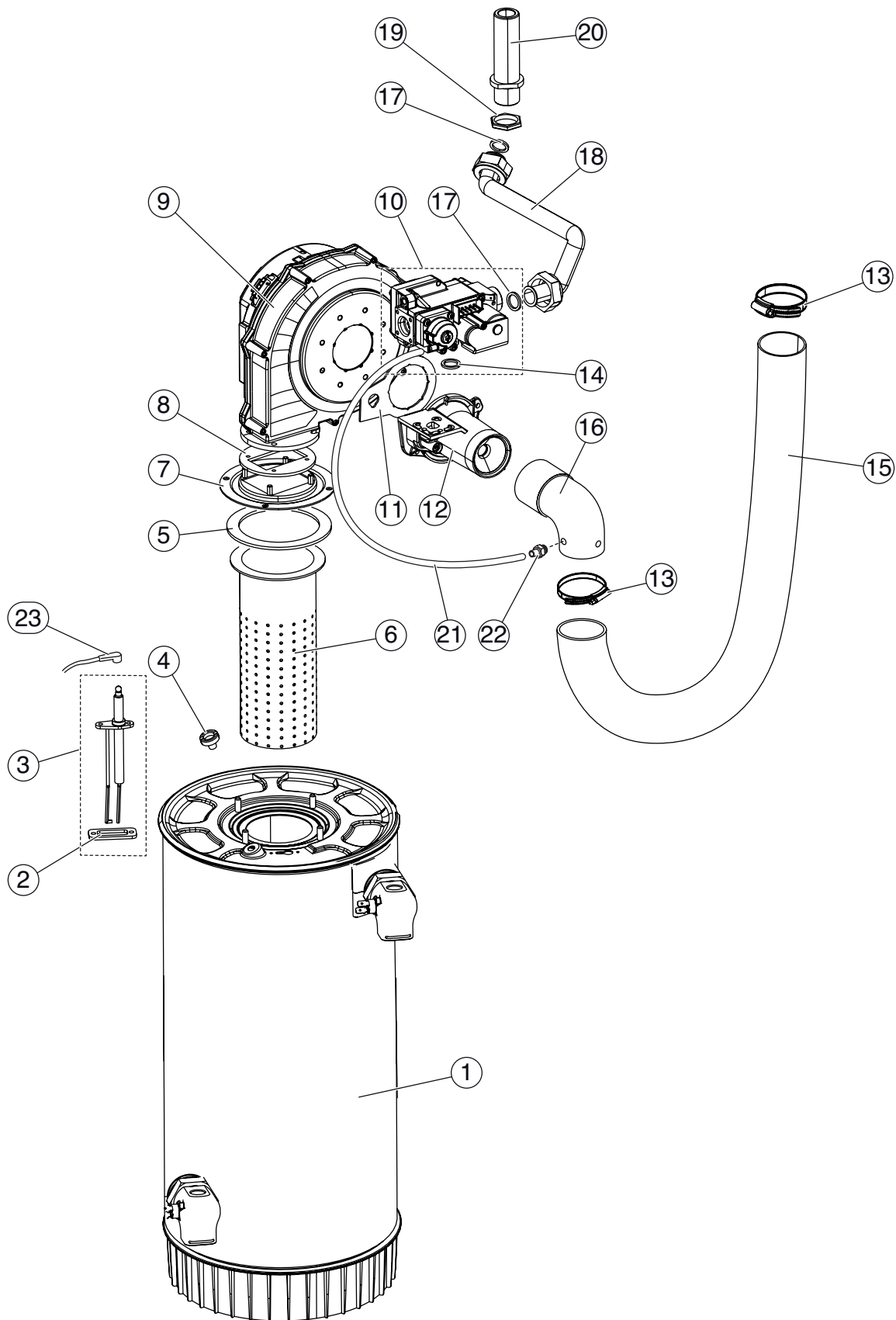


Fig. 87

Item (→ Fig. 87)	Description	SSB160	Order number
1	Heat exchanger SSB160	■	7-738-005-156
2	Washer for ignition electrode	■	7-738-005-034
3	Ignition electrode with washer	■	7-738-005-397
4	Sight glass for combustion	■	7-738-005-031
5	Gasket premix burner tube	■	7-738-004-985
6	Premix burner tube	■	7-738-005-157
7	Burner flange (inner ring)	■	7-738-005-403
8	Gasket burner flange inner ring to fan	■	7-738-004-990
9	Fan	■	7-738-005-007
10	Gas valve and washers	■	7-738-005-009
11	Gasket venturi tube / fan	■	7-738-004-950
12	Venturi	■	7-738-005-163
13	Circular clamp 1.97in 50mm	■	7-738-005-015
14	Venturi tube / gas valve washer	■	7-738-005-011
15	Flexible pipe air intake	■	7-738-005-167
16	90° PP air intake elbow	■	7-738-005-404
17	Washer gas pipe 3/4" 19.05mm	■	7-738-005-023
18	Gas pipe	■	7-738-005-171
19	Frame support gas pipe	■	7-738-005-172
20	Gas connection 3/4"	■	7-738-005-173
21	Balancing tube	■	7-738-005-401
22	Male adapter Ø 0.2 inch hose barb x M5 thread	■	7-738-005-270
23	Ignition cable red	■	7-738-005-032

Notes

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