

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

Outdoor gas-fired steam humidifier
Condair GS
Series II

Thank you for choosing Condair

Installation date (MM/DD/YYYY):

Commissioning date (MM/DD/YYYY):

Site:

Model:

Serial number:

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1 Introduction

1.1 Before You Start!

Thank you for purchasing the **Condair GS outdoor steam humidifier**.

The Condair GS outdoor steam humidifier incorporates the latest technical advances and meets all recognized safety standards. Nevertheless, improper use of the Condair GS outdoor steam humidifier may result in danger to the user or third parties and/or damage to property.

To ensure a safe, proper, and economical operation of the Condair GS outdoor steam humidifier, please observe and comply with all information and safety instructions contained in the present documentation as well as in the separate documentations of the components installed in the humidification system. Comply with all national and local regulations dealing with gas, combustion air, flue gas, water, steam and electrical installations.

If you have questions after reading this documentation, please contact your Condair representative. They will be glad to assist you.

1.2 Notes on the Installation, Operation and Maintenance manual

Limitation

The subject of this manual is the Condair GS outdoor steam humidifier in its different versions. It is intended as a supplement to the Condair GS indoor manuals (installation manual and operation manual).

The various options and accessories for the Condair GS outdoor steam humidifier may only be described in-so-far as is necessary for proper installation and operation of the equipment. Additional information on available options and accessories can be obtained in the instructions that are supplied with them.

This manual is intended for **trained personnel being sufficiently qualified for their respective tasks**.

About this Manual

This manual contains supplementary information that applies specifically to the Condair GS outdoor steam humidifier. The Condair GS indoor manuals included with the Condair GS outdoor steam humidifier shipment contain information on installation, operation and maintenance which apply to both the indoor and outdoor models.

For information on the installation of controls, interior piping, interior wiring and steam lines refer to the Condair GS indoor installation manual.

The operation of the Condair GS outdoor steam humidifier is identical to the indoor units. Refer to the Condair GS indoor operation manual for details.

The maintenance items described in this manual are specific to the outdoor model. This is **in addition** to the regular maintenance that is described in the Condair GS indoor operation manual.

All illustrations in this manual are for representation purposes only. Actual appearance may vary.

Symbols used in this manual



CAUTION!

The catchword "CAUTION" used in conjunction with the general caution symbol designates notes in this installation, operation and maintenance manual that, if neglected, may cause **damage and/or malfunction of the unit or damage to property**.



WARNING!

The catchword "WARNING" used in conjunction with the general caution symbol designates safety and danger notes in this installation, operation and maintenance manual that, if neglected, may cause **injury to persons**. Other specific warning symbols may also be used in place of the general symbol.



DANGER!

The catchword "DANGER" used in conjunction with the general caution symbol designates safety and danger notes in this installation, operation and maintenance manual that, if neglected, may lead to **severe injury or even death of persons**. Other specific warning symbols may also be used in place of the general symbol.

Storage of the manual

Please safeguard this installation, operation and maintenance manual in a safe place, where it can be immediately accessed. If the equipment is moved to another location, make sure that the manual is passed on to the new user.

If the manual is lost or misplaced, contact your Condair representative for a replacement copy.

Language versions

This installation, operation and maintenance manual is available in other languages. Please contact your Condair representative for information.

2 For your safety

General

Every person, who is in charge of any work on the Condair GS must have read and understood this installation, operation and maintenance manual as well as the Condair GS indoor manuals before carrying out any work.

Knowing and understanding the contents of this installation, operation and maintenance manual and the Condair GS indoor manuals is a basic requirement for protecting personnel against any kind of danger, to prevent faulty operation, and to operate the unit safely and correctly.

All labels, signs and markings applied to the Condair GS must be observed and kept in readable state.

Qualification of personnel

All procedures described in this installation, operation and maintenance manual **may only be carried out by specialists who are well trained and adequately qualified and are authorized by the customer.** For safety and warranty reasons any action beyond the scope of this manual must be carried out only by qualified personnel authorized by Condair.

All personnel working with the Condair GS outdoor steam humidifier must be familiar with, and comply with the appropriate regulations on work safety and the prevention of accidents.

Intended use

The Condair GS outdoor steam humidifier is intended exclusively for generating of steam for air humidification using a Condair-approved steam distributor within specified operating conditions (see [Section 10.3 on page 65](#)). Any other type of application, without the written consent of Condair, is considered as not conforming with the intended purpose, and may lead to dangerous operation and will void the warranty.

In order to operate the equipment in the intended manner **all the information contained in this manual, in particular the safety instructions, must be observed closely.**

Safety precautions that must be observed



DANGER!
Risk of electric shock!

The Condair GS outdoor steam humidifier is mains powered. Live parts may be exposed when the door panels are opened. Touching live parts may cause severe injury or even death.

Preventions:

The Condair GS outdoor steam humidifier must be connected to the mains only after all installation work has been completed, checked for correct workmanship, and the door panels are closed and fastened securely.

Before carrying out any work set the Condair GS outdoor steam humidifier out of operation (switch off the unit, disconnect it from the mains and stop the water and gas supply) and secure the unit against inadvertent power-up.

Do not carry out any work on the unit while standing on wet or icy surfaces, or in wet weather.

**WARNING!****Wiring errors can cause improper and dangerous operation of the humidifier!**

Prevention: Tag all wires before disconnecting them. Reconnect all wires correctly after servicing, and check the unit functions properly.

**CAUTION!****Electrostatic discharge (ESD)!**

The electronic components inside the control cabinet in the humidifier are sensitive to electrostatic discharge (ESD).

Prevention: Take appropriate measures to protect the electronic components inside the unit against damage caused by electrostatic discharge (ESD).

**DANGER!****Risk of fire or explosion!**

The Condair GS outdoor steam humidifier is a gas-fired humidifier. Improper operation and maintenance as well as incorrect settings and unauthorized alteration can cause carbon monoxide poisoning, explosion, fire or other hazards that can cause serious injury, death or property damage.

If over-heating occurs or if the gas fails to shut off: Shut off the gas supply at the manual gas shutoff valve before shutting off the electrical power supply

DO NOT use this appliance if any part has been under water. Call a qualified service technician immediately to inspect and replace any part of the control system or gas control that has been under water.

Any work on the gas system must only be performed by a qualified installer, service agency or your local gas supplier. Use only factory-authorized and listed kits or accessories when installing or modifying this appliance.

Use only factory-authorized and listed kits or accessories when replacing part or modifying this appliance.

DO NOT store or use gasoline or other flammable vapours and liquids in the vicinity of the humidifier.

What to do if you smell gas:

- **DO NOT** try to light any appliance.
- **DO NOT** touch any electrical switch.
- **DO NOT** use any phone in the building.
- Leave the building immediately.
- Call your gas supplier immediately from a location far away from the building with the gas leak. Follow the gas supplier's instructions. If you cannot reach your gas supplier, call the fire department.

**WARNING!****Risk of severe burns from contact with hot surfaces, steam or hot water!**

The steam tank may contain steam or hot water at up to 212 °F (100 °C). Contact with the hot surfaces, steam vapors or hot water can result in severe burns.

Prevention: Always drain the tank, and allow the unit to cool down to a safe temperature before cleaning the tank. Never open the tank until it has been fully drained. Never use the manual drain valve until the unit has cooled down. Use the manual drain valve to verify that the tank is empty before removing the tank cover.

**WARNING!****Risk of severe burns from contact with hot steam vapors!**

The Condair GS outdoor steam humidifier produces hot steam vapors for humidification. Bare skin in contact with hot steam vapors can result in severe burns.

Prevention: Never perform any work on the steam system (including the steam lines, steam distributors, etc.) while the humidifier is operating. Shut down the Condair GS outdoor steam humidifier, as described in the Condair GS indoor operation manual before carrying out any work on the steam system.

**WARNING!****Risk of severe burns from contact with hot surfaces!**

The water tank, steam line and exhaust system in the Condair GS outdoor steam humidifier get very hot during operation. Bare skin in contact with hot surfaces can result in severe burns.

Prevention: Shut down the Condair GS outdoor steam humidifier as described in the Condair GS indoor operation manual and wait for the components to cool down before performing any work on the unit. Never use the manual drain valve until the unit has cooled down. Use the manual drain valve to verify that the tank is empty before removing the tank cover. Drain the tank as described in the Condair GS indoor operation manual.

**WARNING!****Risk of personal injury!**

Wear a safety mask and clean the burner assembly in a well ventilated area.

**CAUTION!****Risk of damage to the humidifier components!**

Do not use solvents, aromatized or halogenized hydrocarbons, or other harsh chemicals for cleaning. Disinfectants may only be used if they do not leave behind toxic residue. Rinse all parts thoroughly with clean tap water after cleaning.

**WARNING!****Risk of fire!**

DO NOT clean the sacrificial anode with any chemicals. The anode can react with acids to create flammable hydrogen gas.

**WARNING!****Risk of damage to the humidifier components or injury!**

DO NOT over-torque the bolts. Ensure the proper order of torquing is followed. Failure to do so may cause damage to the humidifier components or injury.

**DANGER!****Risk of harm to personnel or damage to property.**

Operating a damaged or improperly secured humidifier presents a risk of danger to personnel or damage to property.

Prevention: Do not start a damaged or improperly secured humidifier.

Preventing Unsafe Operation

All persons working with the Condair GS outdoor steam humidifier must report any alterations to the unit that may affect safety to the owner without delay. If it is suspected that **safe operation is no longer possible**, the Condair GS outdoor steam humidifier should immediately **be shut down and secured against accidental power-up according to** Condair GS indoor operation manual. This can be the case under the following circumstances:

- if the Condair GS is damaged
- if the electrical installations are damaged
- if the Condair GS is no longer operating correctly
- if connections and/or piping (gas, water, flue gas) are not sealed

Prohibited modifications to the unit

No modifications must be undertaken on the Condair GS outdoor steam humidifier without the express written consent of Condair.

For the replacement of defective components use exclusively **original accessories and spare parts** available from your Condair representative.

Safety labels on the unit

Various safety and identification labels are attached to the Condair GS outdoor steam humidifier. Please note and comply with the relevant information on these labels.

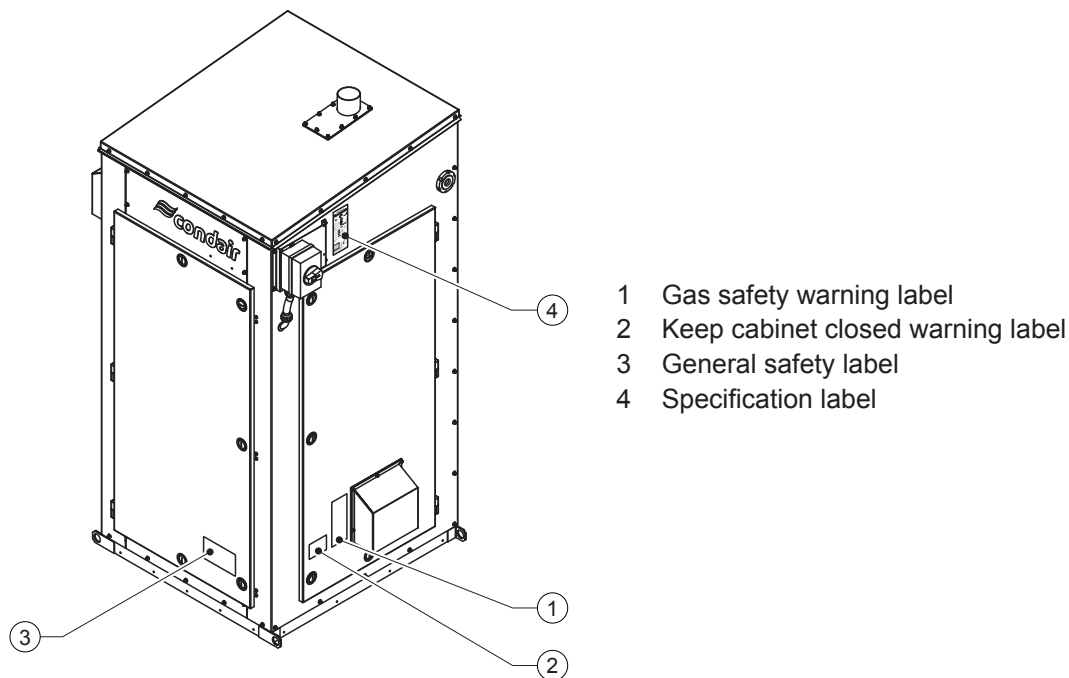


Fig. 1: Position of the safety and identification labels

3 Receiving and Storage

3.1 Inspection

All Condair products are shipped F.O.B at the factory. All damage, breakage or loss claims are the responsibility of the shipping company.

After receiving the shipment, inspect the goods as follows:

- Inspect the shipping boxes for damage. Report any shipping box damages to the shipping company without delay.
- Check the goods against the packing slip to ensure that all items have been delivered. Report any shortages to your Condair representative within 48 hours of receipt of the goods. Condair does not assume responsibilities for any shortages beyond this period.
- Unpack the parts/components and check for any damage.
If parts/components are damaged, notify the shipping company immediately.
- Verify the model type on the specification label to ensure that it is suitable for your installation. Refer to [Section 10.1 on page 64](#).

3.2 Storage and Transportation

Storage

Store the Condair GS humidifier in its original packaging inside a protected area that meets the following requirements until it is installed. These requirements also apply if the unit needs to be stored for an extended period of time.

- Room temperature: 5 to 40 °C
- Room humidity: 10 to 75% RH

Transportation

For optimum protection always transport the unit and components in their original packaging, and use appropriate lifting/transporting devices.

The Condair GS outdoor steam humidifier can be transported and lifted either with a forklift (when it is still strapped on the pallet) or with a crane using the four lifting lugs in the base of the unit. Please observe the following safety notes:



CAUTION!

When lifting the unit with a forklift make sure the forks extend across the entire base of the pallet to prevent tipping or damage to the unit.



CAUTION!

When lifting the unit with a crane use the four lifting lugs in the base of the unit and make sure the unit is not damaged by the lifting cables/chains.



WARNING!

It is the customer's responsibility to ensure that operators are trained in handling heavy goods and that the operators comply with the appropriate regulations on work safety and the prevention of accidents.

Packaging

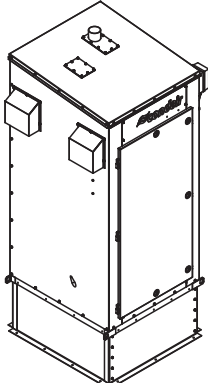
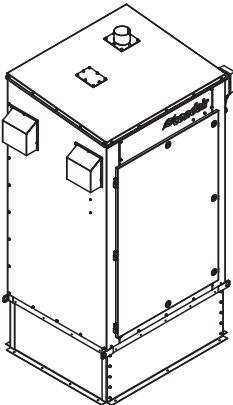
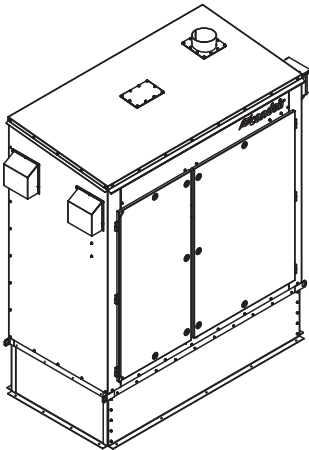
If the packaging needs to be disposed of, observe local regulations on waste disposal. Recycle packaging where possible.

4 Product Overview

4.1 Model Overview

Condair GS outdoor steam humidifiers are available in **three different housing sizes** ("Small" for GS 23 / GS 45 / GS 65, "Medium" for GS 90 / GS 130 and "Large" for GS 195 / GS 260), **two efficiency classes** (high efficiency: with condensing heat exchanger (option CS), standard efficiency: without condensing heat exchanger) and **maximum steam outputs ranging from 23 kg/h up to 260 kg/h**.

The humidifiers have an integrated controller that controls the humidifier, and also allows the humidifier to be connected to a building automation system (via BACnet, Lonworks, Modbus), or the internet so the humidifier can be controlled and monitored remotely. In addition, up to four humidifiers can be set up in a "Main-Extension" configuration using Condair's Linkup system to satisfy large humidification needs.

Small Housing	Medium Housing	Large Housing
		
GS unit type (max. steam capacity)		
GS 23 (23 kg/h) GS 45 (45 kg/h) GS 65 (65 kg/h)	GS 90 (90 kg/h) GS 130 (130 kg/h)	GS 195 (195 kg/h) GS 260 (260 kg/h)

Detailed information on the unit specifications can be found in [Section 10 on page 64](#).

[Fig. 3 on page 15](#) shows the major components of the Condair GS outdoor steam humidifier. The built-in heating system consists of one or two heater(s) that is/are controlled by an internal thermostat to maintain an appropriate operating temperature inside the enclosure. The heat control is automatic and cannot be activated manually.

A mechanical freeze protection valve drains all the water from the tank, fill cup, valves, and hoses to prevent freeze up when the temperature inside the enclosure is too cold.

During warm weather, a weather-shielded exhaust fan moves air through the enclosure to maintain an appropriate operating temperature. The exhaust fan is automatically controlled by a thermostat, and cannot be activated manually.

The Condair GS outdoor steam humidifier is also equipped with a remote fault indication board (standard, not shown) that can be used to remotely monitor the unit.

All other features of the Condair GS outdoor steam humidifier are similar to the Condair GS indoor units. Refer to the respective Condair GS indoor humidifier manuals for details.

4.2 Model Designation

The specification label on the right side of the Condair GS shows the model number, the serial number and the nominal values of the device (position of the specification label see [Fig. 2](#)).

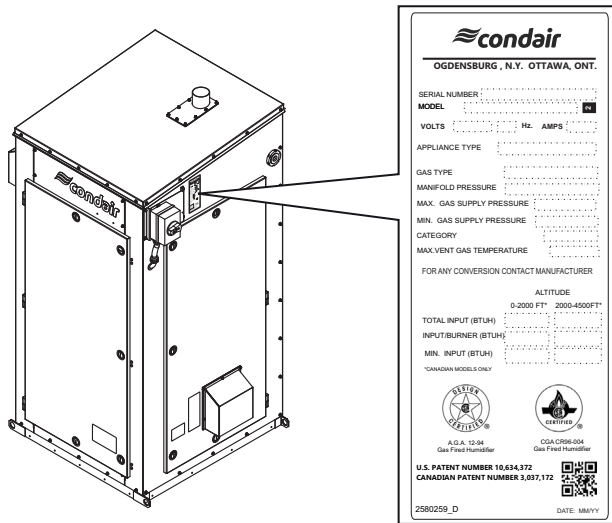


Fig. 2: Position of the specification label

Key model designation

Example:
Condair GS 65 CS OC

Product series (gas fired): _____

Steam capacity in kg/h: _____

23
45
65
90
130
195
260

Efficiency: _____

CS: Condensing High Efficiency
Blank: Standard Efficiency

Housing: _____

OC: Outdoor housing
Blank: Indoor housing

Climate packages

As **standard** the Condair GS outdoor steam humidifier is equipped with a **moderate climate package** with a **low-temperature rating of -20 °C**.

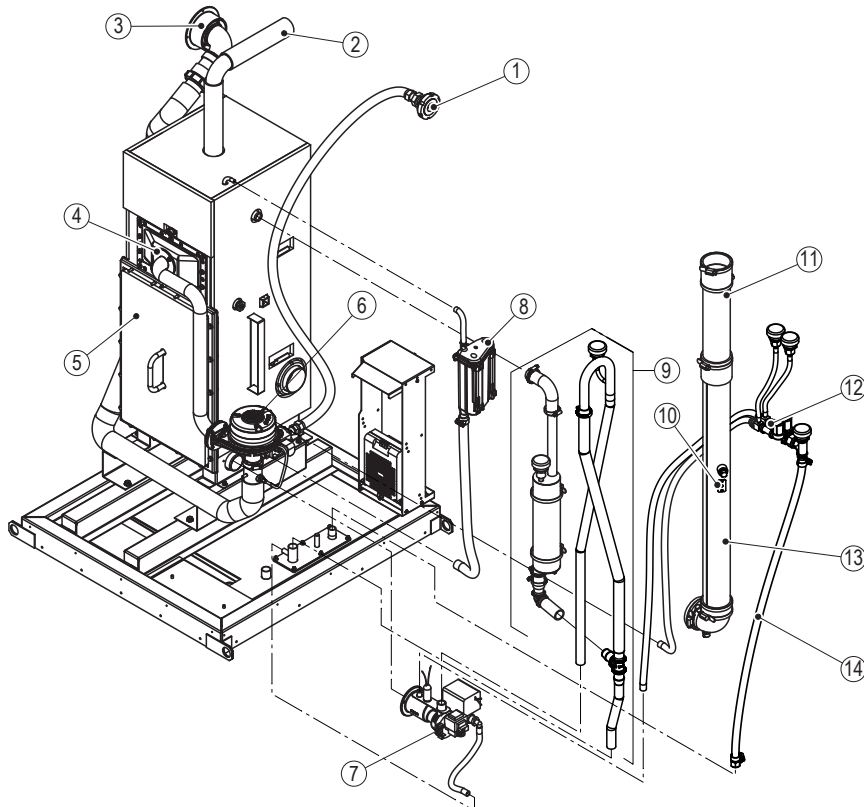
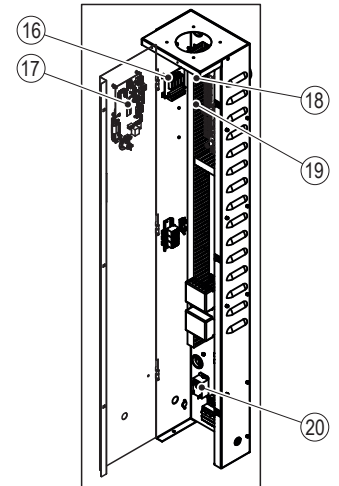
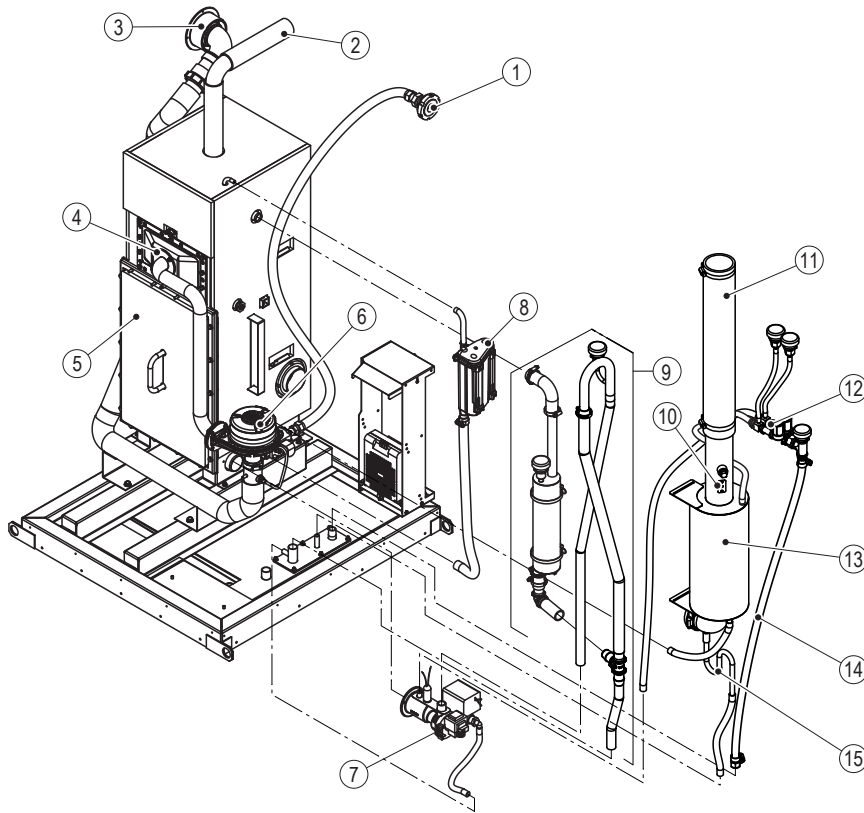


Fig. 3: Humidifier Components GS 23-65 units, top CS model, bottom standard efficiency model) front, side and top panels removed in the figure for clarity

Note: On Condair GS 65 OC models the blower is located above the burner.

Legend

- | | | | |
|----|--|----|---|
| 1 | Gas inlet | 11 | Flue gas vent |
| 2 | Steam outlet | 12 | Dual fill valve |
| 3 | Combustion air inlet | 13 | Secondary heat-exchanger (CS models only) |
| 4 | Burner | 14 | Water supply hose |
| 5 | Tank door | 15 | Flue gas condensate trap (CS models only) |
| 6 | Blower | 16 | Remote fault board |
| 7 | Drain pump with drain valve | 17 | Control board |
| 8 | Level control unit | 18 | Driver board |
| 9 | Overflow | 19 | Control terminals (low voltage) |
| 10 | Flue gas high limit temperature sensor | 20 | Terminal block mains voltage supply |

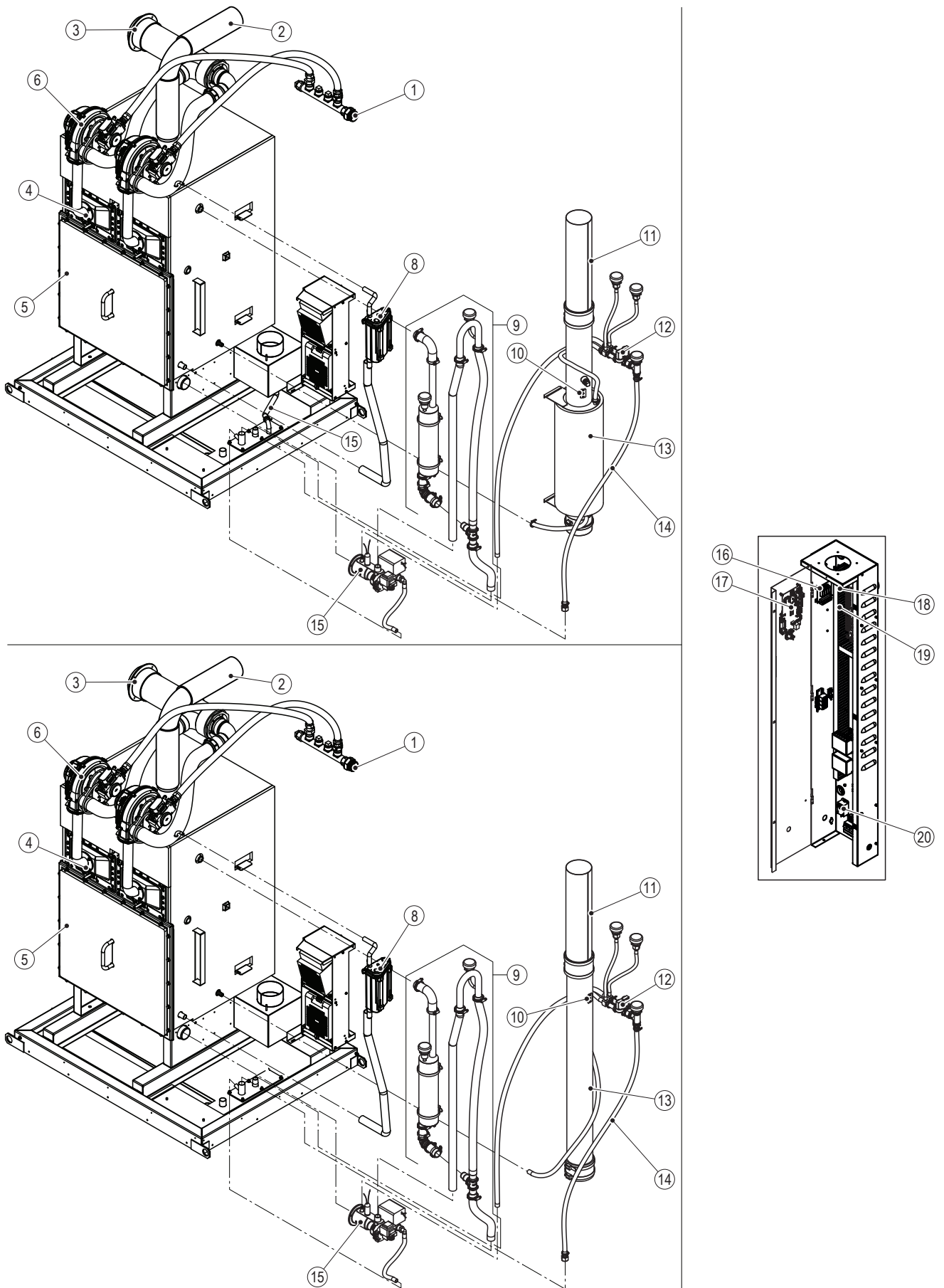


Fig. 4: Humidifier Components GS 90-260 units, top CS model, bottom MT model)
front, side and top panels removed in the figure for clarity

Legend

- | | | | |
|----|--|----|---|
| 1 | Gas inlet | 11 | Flue gas vent |
| 2 | Steam outlet | 12 | Dual fill valve |
| 3 | Combustion air inlet | 13 | Secondary heat-exchanger (CS models only) |
| 4 | Burner | 14 | Water supply hose |
| 5 | Tank door | 15 | Flue gas condensate hose (CS models only) |
| 6 | Blower | 16 | Remote fault board |
| 7 | Drain pump with drain valve | 17 | Control board |
| 8 | Level control unit | 18 | Driver board |
| 9 | Overflow | 19 | Control terminals (low voltage) |
| 10 | Flue gas high limit temperature sensor | 20 | Terminal block mains voltage supply |

Table 1: Components installed by models

Component	Quantity				
	GS 23/45	GS 65	GS 90/130	GS 195	GS 260
Primary heat-exchanger	1	1	2	3	4
Secondary heat-exchanger ¹⁾	1	1	1	2	2
Water tank	1	1	1	1	1
Burner	1	1	2	3	4
Blower	1	1	2	3	4
Gas valve	1	1	2	3	4
Ignition control module	1	1	2	3	4
Spark-igniter and flame sensor	1	1	2	3	4
Dual fill valve	1	1	1	–	–
Quad fill valve	–	–	–	1	1
Heaters ²⁾	Refer to Table 2 in Section 4.3 for quantity and type of heaters.				

¹⁾ Secondary heat-exchanger on CS models only.

4.3 Electrical

Table 2: Quantity and type of heaters

Model	Power Supply	Heaters (qty x rating)	Internal Breaker Ratings	Full Load Amps (A)	Circuit Protection (A)	Power Consumption (kW)
GS 23-OC (ST, CS)	230V/1ph/50Hz	1 x 700W	5A, 5A	7.4	10	1.48
	200V/1ph/50Hz	1 x 700W	5A, 5A	6.4	10	1.28
GS 45-OC (ST, CS)	230V/1ph/50Hz	1 x 700W	5A, 5A	7.4	10	1.48
	200V/1ph/50Hz	1 x 700W	5A, 5A	6.4	10	1.28
GS 65-OC (ST, CS)	230V/1ph/50Hz	1 x 700W	5A, 5A	7.9	10	1.60
	200V/1ph/50Hz	1 x 700W	5A, 5A	6.9	10	1.40
GS 90-OC (ST, CS)	230V/1ph/50Hz	1 x 1200W	5A, 10A	10.5	15	2.07
	200V/1ph/50Hz	1 x 1200W	5A, 10A	10.5	15	2.07
GS 130-OC (ST, CS)	230V/1ph/50Hz	1 x 1200W	5A, 10A	11.4	15	2.28
	200V/1ph/50Hz	1 x 1200W	5A, 10A	11.4	15	2.28
GS 195-OC (ST, CS)	230V/1ph/50Hz	1 x 1200W	10A, 10A	12.2	20	2.46
	200V/1ph/50Hz	1 x 1200W	10A, 10A	12.2	20	2.46
GS 260-OC (ST, CS)	230V/1ph/50Hz	1 x 1200W	10A, 10A	13.1	20	2.67
	200V/1ph/50Hz	1 x 1200W	10A, 10A	13.1	20	2.67

4.4 Functional Description

Powering up the unit

When power is supplied to the humidifier for start-up, the humidifier checks the state of two thermostats before proceeding to normal operation. The first thermostat activates the internal heaters. If the temperature is too low, the heaters will automatically engage, and will switch off once the appropriate temperature is reached. The second thermostat determines whether the cabinet temperature is warm enough to power on the rest of the electronics, e.g. the circuit card, blowers, and valves. Because of this, the display screen may not illuminate immediately on a cold start-up.

Combustion

The combustion system consists of a fully modulating forced-draft combustion air blower(s), a negative pressure regulated gas valve(s), and a premix burner(s). On a call for humidity, the blower is energized to purge the system. During this time the control software performs diagnostic checks of the safety systems – the air proving switch (not shown), the high limit temperature switch in the exhaust vent, as well as the blowers. If the air proving switch is open, the warning message "AP Open Warn" appears, and escalates to the fault message "AP Open Fault" if three consecutive warnings occur. At the same time, if the over-temperature switch is open, the fault message "Over-Temperature Fault" appears. In addition, if any of the blowers fail to operate during this time, the fault message "Blower Not Operating" appears. When the functions of the safety systems have been verified successfully, the gas valve(s) open(s) and the gas-air mixture is pushed through the burner ports into the combustion chamber(s). The spark-igniter(s) is/are simultaneously activated to ignite the gas-air mixture.

If a flame is not sensed by the flame sensor(s), the above sequence is repeated after 15 seconds. The sequence is repeated up to a maximum of three times, after which the ignition control module(s) locks out and the fault message "Ignition Fail" appears. If a flame is sensed by the flame sensor(s), the gas valve(s) remain(s) open and combustion continues. The gas valve(s) continue(s) to maintain a constant air-to-gas ratio independent of the blower speed or external conditions.

On the CS models, the hot flue gases pass through the primary heat-exchanger then the secondary heat-exchanger, where it is cooled further before it exits through the exhaust vent. The heat recovered by the secondary heat-exchanger is used to warm up the feed water. On the standard-efficiency model, the hot flue gases pass through the primary heat-exchanger and exit through the exhaust vent.

Water Management

The humidifier is equipped with a level control unit that monitors the water level in the tank. The tank is supplied with water from the water supply, and from the secondary heat exchanger in CS models. A vacuum break valve is used to prevent siphoning in the drain connection.

In the CS model, a secondary heat-exchanger promotes higher efficiencies. This is achieved by using the heat from the flue gas to pre-heat the cold fill water entering the tank.

The level control unit is connected to the top and bottom of the tank to monitor water level inside the tank. The level control unit is equipped with a control board and consists of two magnetic floats (one is the level float and one is the safety float) that measure the water level. The water levels in the tank are indicated with 3 LEDs on the control board and are monitored by the control software.

Water Levels:

- L5 (yellow LED lights) – high water level
- L4 (green and yellow LED light) – intermediate water level
- L3 (green LED lights) – middle water level
- L2 (green and red LED light) – intermediate water level
- L1 (red LED lights) – low water level

On initial start-up, the dual fill valve fills the tank and the level control unit. A start-up test monitors the water level as the tank and level control unit fills, and ensures proper functioning of the unit.

Note: A fault message "Float Level" may appear at any time. This indicates an invalid combination of readings from the control software (for example, if L5 and L1 LEDs activate at the same time).

1. Water enters the level control unit via the hose connected to the tank. The water level reaches first the safety float, then the level float.
2. As water fills the level control unit and reaches the L1 level, the control software performs a test to verify proper functioning of the dual fill valve and the drain pump.
 - a) The fill valves fills the tank until the water level L5 is reached (detected by the level control unit).
 - b) Then, the drain pump energizes to lower the water level to just below L3.

Note: The water levels should appear in ascending then descending order; L1, L2, L3, L4, L5, L4, L3. A fault message "Fill Check Fault" appears if the water level does not rise to level L5. A fault message "Drain Check" appears if the water level does not drop below the level L3.

3. When the test is complete, the dual fill valve activates and the water level should rise to level L3.
4. If a demand signal is present, the humidifier begins the combustion sequence.
5. The drain pump and dual fill valves maintain the water level between levels L2 and L5.

If "Float Check" is enabled during steam production, the control software will activate the drain sequence every 24 hours (adjustable to any time of day) to verify proper functioning of the level control unit, dual fill valve, and the drain pump.

4.5 Options

[Table 3](#) shows the list of options for the Condair GS Outdoor Humidifier. Contact your local Condair representative for details.

Table 3: Condair GS Outdoor Humidifier Options

Option	Application
Gas Type (country-dependent)	Natural gas H, E, E(S): G20 * Natural gas L, ELL: G25 Natural gas HS: G25.1 Natural gas EK: G25.3 Natural gas Lw: G27 Natural gas Ls: GZ350 Natural gas Japan: 13A Propane gas P: G31 * permissible for Hydrogen blends up to 20% content by volume
Top Steam Outlet	All outdoor cabinets come as standard with the steam connection exiting through the back of the enclosure. All models can be factory-configured with a vertical steam outlet through the top of the enclosure.

4.6 Accessories

[Table 4](#) shows the list of accessories for the Condair GS Outdoor Humidifier. Contact your local Condair representative for details. To install and operate the accessories, please refer to the instructions supplied with the accessories.

Table 4: Condair GS Outdoor Humidifier Accessories

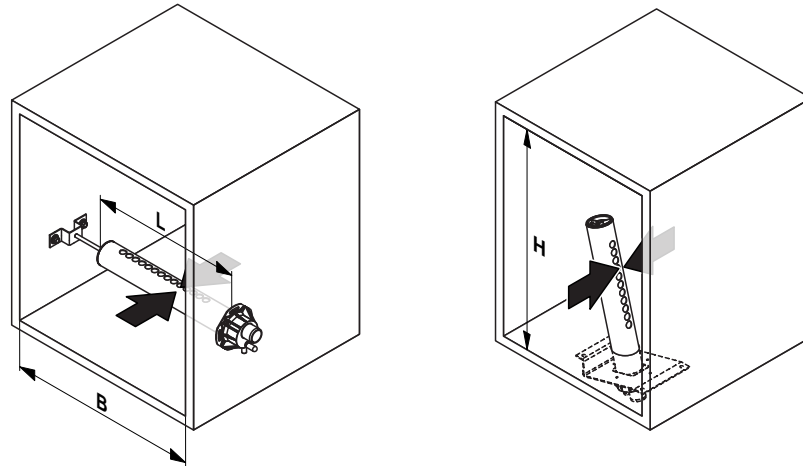
Model Condair GS OC	23 ...	45 ...	65 ...	90 ...	130 ...	195 ...	260 ...
Steam distribution pipe (see details in Section 4.6.1.1)	81-...						
Quantity	1	1	2	2	3	5	6
Steam distribution system OptiSorp (see details in Section 4.6.1.2)	System 1	System 1	System 2	System 2	System 3	System 3 System 2	System 4 System 3
Quantity	1	1	1	1	1	1 of each	1 of each
Steam distribution system DR	DR73						
Quantity	—	—	—	—	1	1	1
Steam hose adapter	—	—	SA80 (3" / 2x ø45 mm)	SA80 (3" / 2x ø45 mm)	SA120 (3" / 3x ø45 mm)	SA200 (4" / 5x ø45 mm)	SA240 (4" / 6x ø45 mm)
Quantity	—	—	1	1	1	1	1
Steam hose / meter	DS80						
Quantity	1	1	2	2	3	4	6
Condensate hose / meter	KS10						
Quantity	1	1	2	2	3	4	6
Filter valve	Z261 (1 Stk. per system)						
Roof Curb	Roof Curb with humidifier attachment points to raise the humidifier an additional 14 inches (36 cm) above the roof level. All roof curbs come with an access panel for easy access to service connections below the humidifier (supply water, drain water, condensate drain, electrical and controls wiring). Note: Roof curbs are shipped independently of the humidifier and must be assembled on location.						
Top steam outlet	A field kit is available to convert the factory installed rear steam outlet to a vertical steam connection exiting through the top of the enclosure.						
Drain water mixing valve	Thermostatically controlled mixing valve to be installed inside the building on the drain line. Used to temper drains below 60C in the event of a power outage.						
Fill water protection kit	2 valves (normally open & normally closed) to be installed on the water supply lines inside the building to protect water lines feeding the humidifier in the event of a power outage.						

4.6.1 Accessory details

4.6.1.1 DV81-... steam distribution pipe

The steam distribution pipes are selected on the basis of the **duct width "B"** (for horizontal installation) or the **duct height "H"** (for vertical installation) and the **capacity of the steam humidifier**.

Important! Always select the longest possible steam distribution pipe (optimum humidification distance).



Steam distribution pipe DV81-... made of CrNi steel		Duct width/duct height	Max. Steam capacity
Type	Length in mm (L) ¹⁾	in mm	in kg/h ²⁾
DV81-350	350	400...600	30
DV81-500	500	600...750	30
DV81-650	650	750...900	50
DV81-800	800	900...1100	50
DV81-1000	1000	1100...1300	50
DV81-1200	1200	1300...1600	50
DV81-1500	1500	1600...2000	50
DV81-1800	1800	2000...2400	50
DV81-2000	2000	2200...2600	50
DV81-2300	2300	2500...2900	50
DV81-2500	2500	2700...3100	50

¹⁾ Special length on request

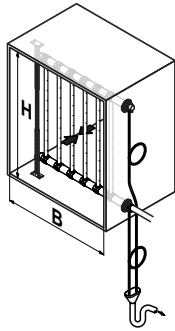
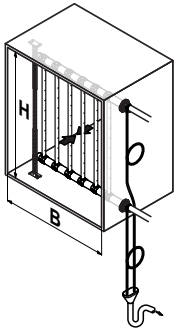
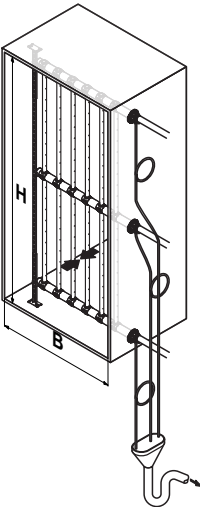
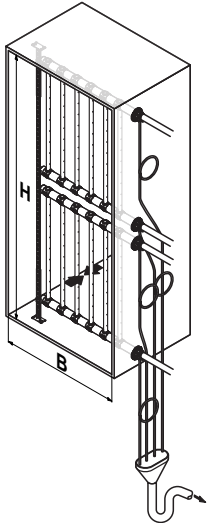
²⁾ To fully exploit the overall capacity of your humidifier, the output of each steam outlet may be fed to more than one steam distribution pipe. If more than one steam distribution pipe is fed per steam outlet the steam line must be divided into multiple branches. Appropriate adapters are available on request.

Note: If the absorption distance has to be reduced for technical reasons, the amount of steam per unit must be divided between several steam distribution pipes or the steam distribution system OptiSorp must be used. If this is the case, contact your Condair representative.

Note: for further information regarding the DV81-... steam distribution pipe please refer to the separate installation and operating instructions of this product.

4.6.1.2 OptiSorp steam distribution system

The OptiSorp steam distribution system is used in ventilation ducts with a short humidification distance. When ordering an OptiSorp system the duct dimension must be specified. Please consult the data in the following table:

	System 1	System 2	System 3	System 4
				
Number of steam connectors	1	2	3	4
Max. steam capacity	45 (30) kg/h ¹⁾	90 (60) kg/h ¹⁾	135 (90) kg/h ¹⁾	180 (120) kg/h ¹⁾
Duct width (B)	450...2700 mm			
Duct height (H)	450...1650 mm	450...2200 mm	800...3200 mm	800...3200 mm

¹⁾ For duct widths <600 mm the value in brackets apply

Note: further information on the OptiSorp steam distribution system can be found in the separate manual supplied with the OptiSorp steam distribution system.

5 Mounting and Installation Work

5.1 Safety Notes on Mounting and Installation Work

Qualification of personnel

All mounting and installation work must be carried out only by **well qualified personnel authorised by the owner**. It is the owner's responsibility to verify proper qualification of the personnel.

General notes

Strictly observe and comply with all information given in the present installation manual regarding the mounting of the unit and the installation of water, steam and electricity.

Observe and comply with all local regulations dealing with water, steam and electrical installations.

Safety

Some installation work requires removal of the unit covers. Please note the following:



DANGER!
Risk of electric shock!

The Condair GS is mains powered. Live parts may be exposed when the unit is open. Touching live parts may cause severe injury or even death.

Prevention: The Condair GS must be connected to the mains only after all mounting and installation work has been completed, all installations have been checked for correct workmanship and the access panels are installed and properly locked.



DANGER!
Risk of explosion and fire!

The Condair GS is a gas-fired humidifier. Improper installation or non authorized alterations can cause later during operation carbon monoxide poisoning, explosion, fire or other hazards that can cause serious property damage, injury or death. If assistance is required, contact a qualified installer, service agency or your local gas supplier.

Use only factory-authorized and listed kits or accessories when installing or modifying this appliance.



CAUTION!
Electrostatic discharge (ESD)!

The electronic components inside the control cabinet in the humidifier are sensitive to electrostatic discharge (ESD).

Prevention: Take appropriate measures to protect the electronic components inside the unit against damage caused by electrostatic discharge (ESD).



CAUTION!
Electrostatic discharge (ESD)!

Incorrectly executed installations can result in personal injury and/or damage to property through explosions, fires, carbon monoxide poisoning, electric shock, etc. If you require assistance, please contact a qualified installer, your local gas supplier or your Condair representative. In the installation itself, use only materials available from your Condair representative and accessories approved by him.

5.2 Installation Overview

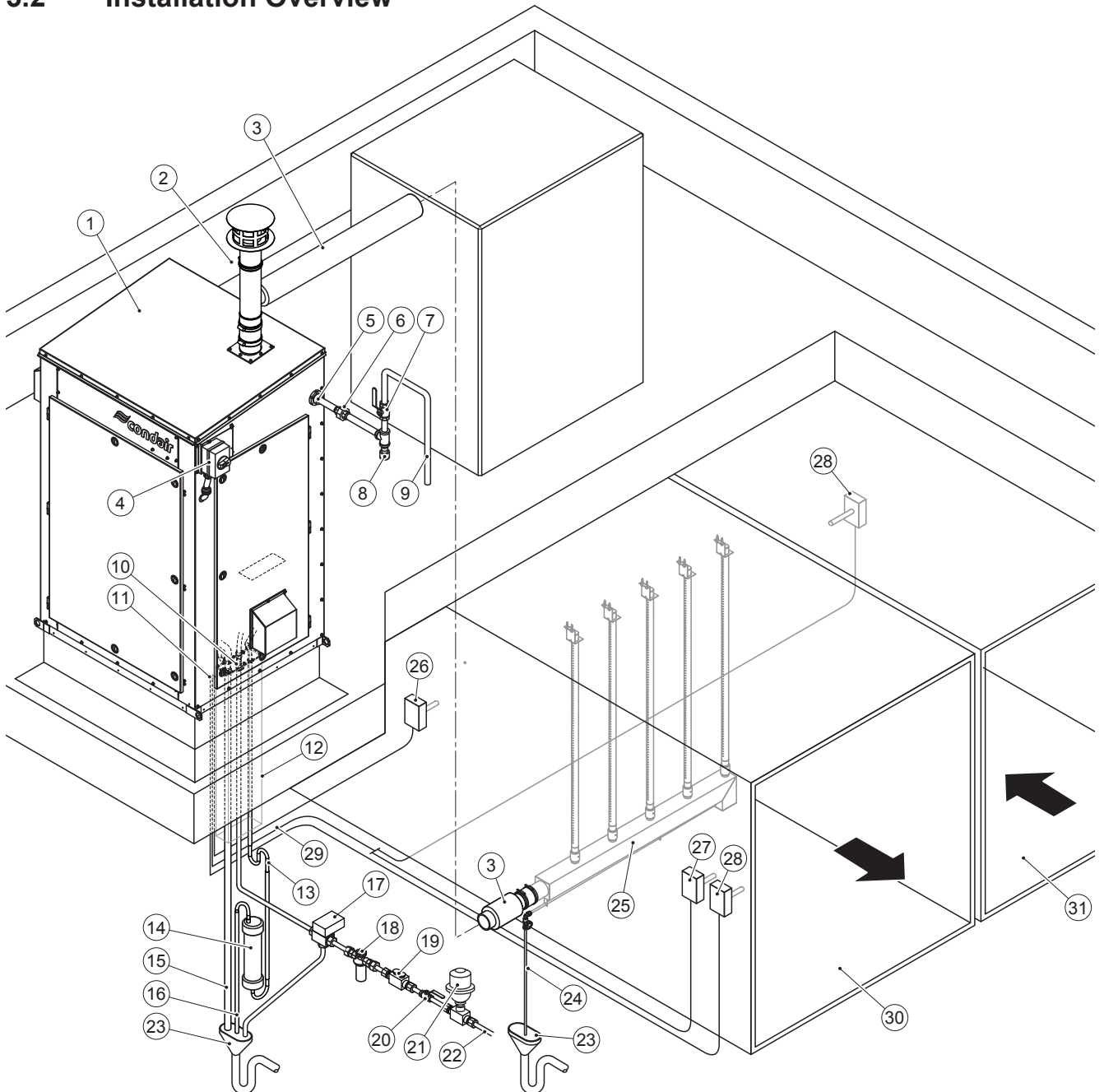


Fig. 5: Typical installation Condair GS outdoor steam humidifier

- | | | | |
|----|--|----|--|
| 1 | Condair GS outdoor gas-fired steam humidifier | 18 | Water filter (supplied by others) |
| 2 | Flue gas pipe with rain cap and storm collar (included in the delivery) | 19 | Pipe disconnectors as backflow preventer (optional, supplied by others) |
| 3 | Main steam pipe (supplied by others) | 20 | Shut-off valve water supply (supplied by others) |
| 4 | Electrical isolator voltage supply (mandatory, included in the delivery) | 21 | Water shock arrestor (supplied by others) |
| 5 | Gas supply connection (supplied by others) | 22 | Water supply line (supplied by others) |
| 6 | Connection fitting gas supply line (supplied by others) | 23 | Funnel with trap (supplied by others) |
| 7 | Shut-off valve gas supply line (supplied by others) | 24 | Condensate trap |
| 8 | Sediment trap (supplied by others) | 25 | Steam distributor (Condair accessory *) |
| 9 | Gas supply line (supplied by others) | 26 | Air flow monitor (optional, Condair accessory *) |
| 10 | Connection plate | 27 | Safety humidistat (optional, Condair accessory *) |
| 11 | Control cable feedthrough | 28 | Humidity sensor or external humidity controller (Condair accessories *).
Installed in the extract air duct for extract air humidity control or in the
supply air duct for supply air humidity control. |
| 12 | Pipe chase | 29 | Control cabling (supplied by others) |
| 13 | Condensate trap (GS 90-260 CS models only, supplied by others) | 30 | Supply air duct |
| 14 | Condensate neutralization device (CS models, supplied by others) | 31 | Extract air duct |
| 15 | Water drain line (supplied by others) | | |
| 16 | Flue gas condensate drain (CS models only, supplied by others) | | |
| 17 | 3-way freeze protection valve (supplied by others) | | |

* for Condair accessories, refer to Help, or contact your local Condair sales representative.

5.3 Unit Fitting

5.3.1 Humidifier Location

To ensure proper functioning of the Condair GS outdoor steam humidifier and to obtain optimum efficiency, the following points must be considered and observed when choosing the location for the humidifier:

- The Condair GS outdoor steam humidifier must be mounted only **outside of buildings** where the flue gases can escape freely.
- The **local and national regulations** for installation of gas-fired equipment must be observed and followed. The manufacturer accepts no liability for non-compliance with these regulations.
- Install the steam humidifier so that the requirements for routing the main steam line (rigid steam pipe) and the steam hoses can be maintained (see Condair GS installation manual).
Note: Long steam lines reduce the maximum steam output of the humidifier, due to the heat loss involved. The static pressure also increases.
- Install the steam humidifier so that the flue gas outlet meets the following minimum distances:
 - at least 0.6 m above any ridge located within 3 m
 - at least 1 m above any forced air inlet located within 3 m
 - at least 1 m below and 1 m horizontally away from, or 0.5 m above any door, window, or gravity air inlet of any adjacent building.
 - at least 1 m horizontally away from electric meters, gas meters, regulator and relief equipment.
 - at least 2.5 m above grade when it is adjacent to public walkways.

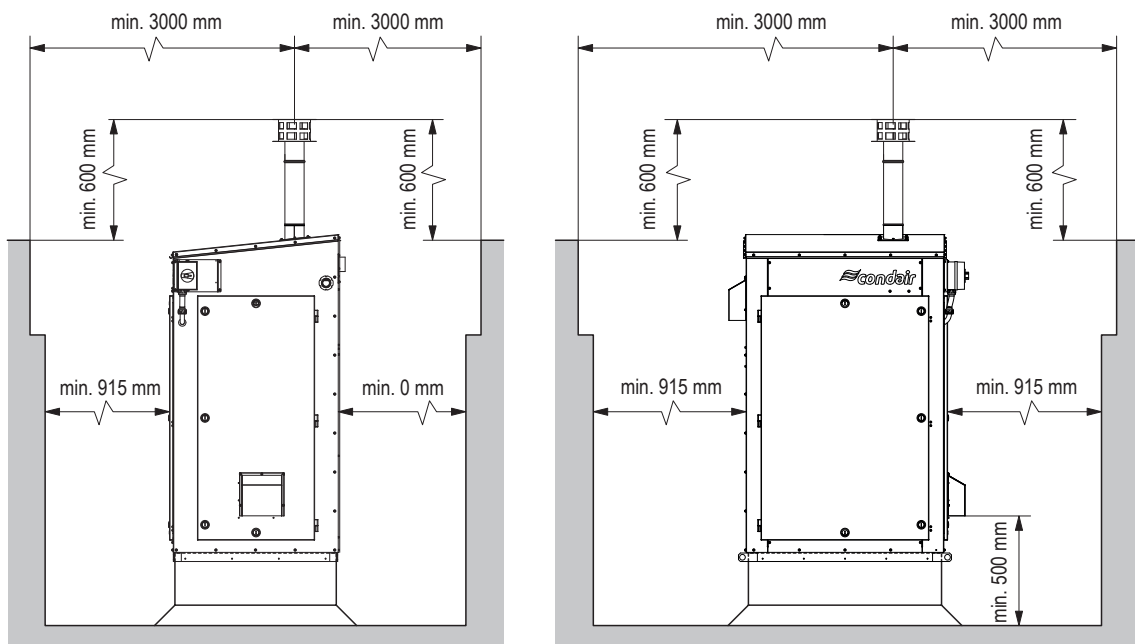


Fig. 6: Clearances to be observed

- Make sure in the place of location of the Condair GS outdoor steam humidifier the supply of clean fresh air is provided. The unit must be placed at least 3 m away from any mechanical exhaust outlet.



CAUTION!

Operation of the humidifier with unclean air can lead to safety problems and reduce the output of the unit. Impurities in the air are, for example: Halogens, ammonia, chloride, excessive dust, lime and dirt. For questions about air quality, please refer to the technical service department of your Condair distributor.

- The Condair GS outdoor steam humidifiers are **designed for mounting on a concrete curb (supplied by others), or a metallic curb/stand, available as a Condair accessory.**



CAUTION!

The curb and the place of installation must be built to structurally support the entire weight of the humidifier when in operation

- The sheet covering of the Condair GS outdoor steam humidifier heats up during operation (max. surface temperature approx. 60 - 70 °C). Therefore make sure that no heat-sensitive materials are placed in the immediate vicinity of the humidifier.
- **No combustible materials** must be placed in the **immediate vicinity** of the Condair GS...OC outdoor steam humidifier (insulation materials, wooden floor coverings, etc.). **Observe local regulations!**
- **Do not mount** the humidifier on a base that is subject to vibration. If necessary, please contact your Condair representative.
- Do not cover the air openings (louvers) in the panels of the unit, otherwise the air flow may be insufficient.
- Do not place the unit in a narrow niche or a closed compartment. Place the humidifier so that the **unit is easily accessible** and there is sufficient space for maintenance work. The **minimum distances** shown in the following illustration **must be maintained.**

5.3.2 Dimensions and Weights

See also dimensional drawings in [Section 10.5 on page 67](#).

Table 5: Overall dimensions and weights Condair GS CS OC

Model	Dimensions in mm				Weights in kg		
	Height	Height with roof curb	Width	Depth	Net	Operating	Roof curb
GS 23 CS OC	1729	2089	995	892	140	227	39
GS 45 CS OC	1729	2089	995	892	148	235	39
GS 65 CS OC	1729	2089	995	892	165	292	39
GS 90 CS OC	1729	2089	1246	892	220	460	45
GS 130 CS OC	1729	2089	1246	892	225	465	45
GS 195 CS OC	1729	2089	1910	892	388	803	65
GS 260 CS OC	1729	2089	1910	892	432	953	65

Table 6: Overall dimensions and weights Condair GS OC - standard efficiency

Model	Dimensions in mm				Weights in kg		
	Height	Height with roof curb	Width	Depth	Net	Operating	Roof curb
GS 23 OC	1729	2089	995	892	132	219	39
GS 45 OC	1729	2089	995	892	140	227	39
GS 65 OC	1729	2089	995	892	157	284	39
GS 90 OC	1729	2089	1246	892	209	449	45
GS 130 OC	1729	2089	1246	892	214	454	45
GS 195 OC	1729	2089	1910	892	348	763	65
GS 260 OC	1729	2089	1910	892	412	913	65

5.3.3 Removing the Humidifier from the Shipping Pallet

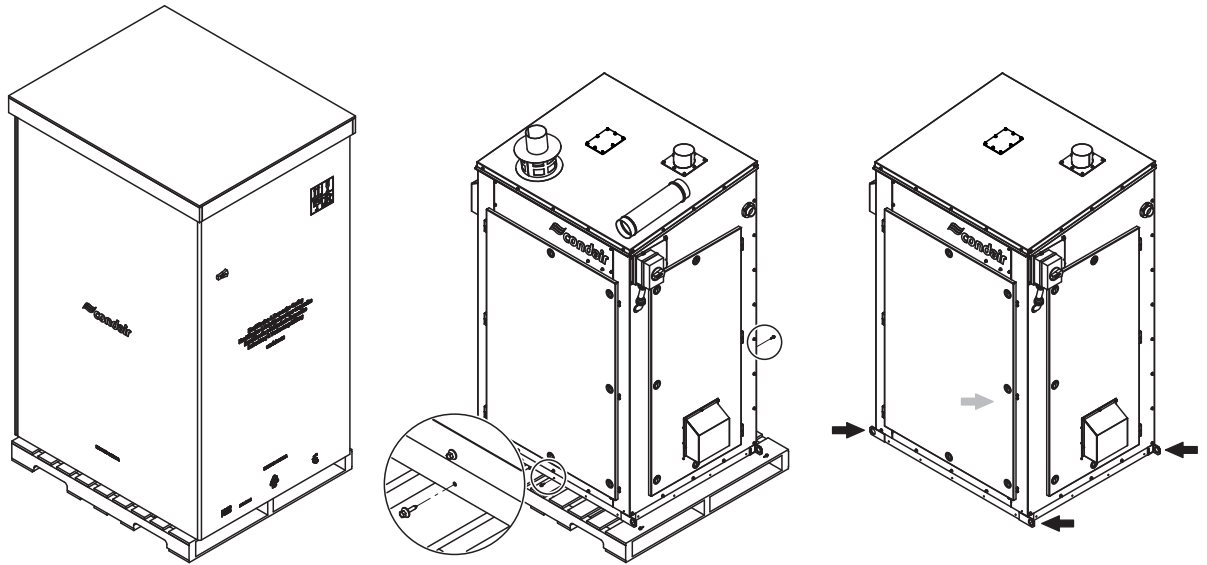


Fig. 7: Removing the humidifier from the shipping pallet

1. Remove cardboard protection from the humidifier.
2. Remove flue gas pipe, storm collar and rain cap which are placed on top of the humidifier.
3. Remove and discard the shipping screws that secure the unit to the shipping pallet.
4. Attach an appropriate 4-strand hanger with shackles to the lifting lugs in the base of the unit. Lift the unit from the shipping pallet and transport it to the place of installation.



WARNING!

Heavy object – risk of personal injury, or damage to equipment!

When lifting the unit with a crane make sure the unit is not damaged by the lifting cables/chains.

It is the customer's responsibility to ensure that operators are trained in handling heavy goods and that the operators comply with the appropriate regulations on work safety and the prevention of accidents.

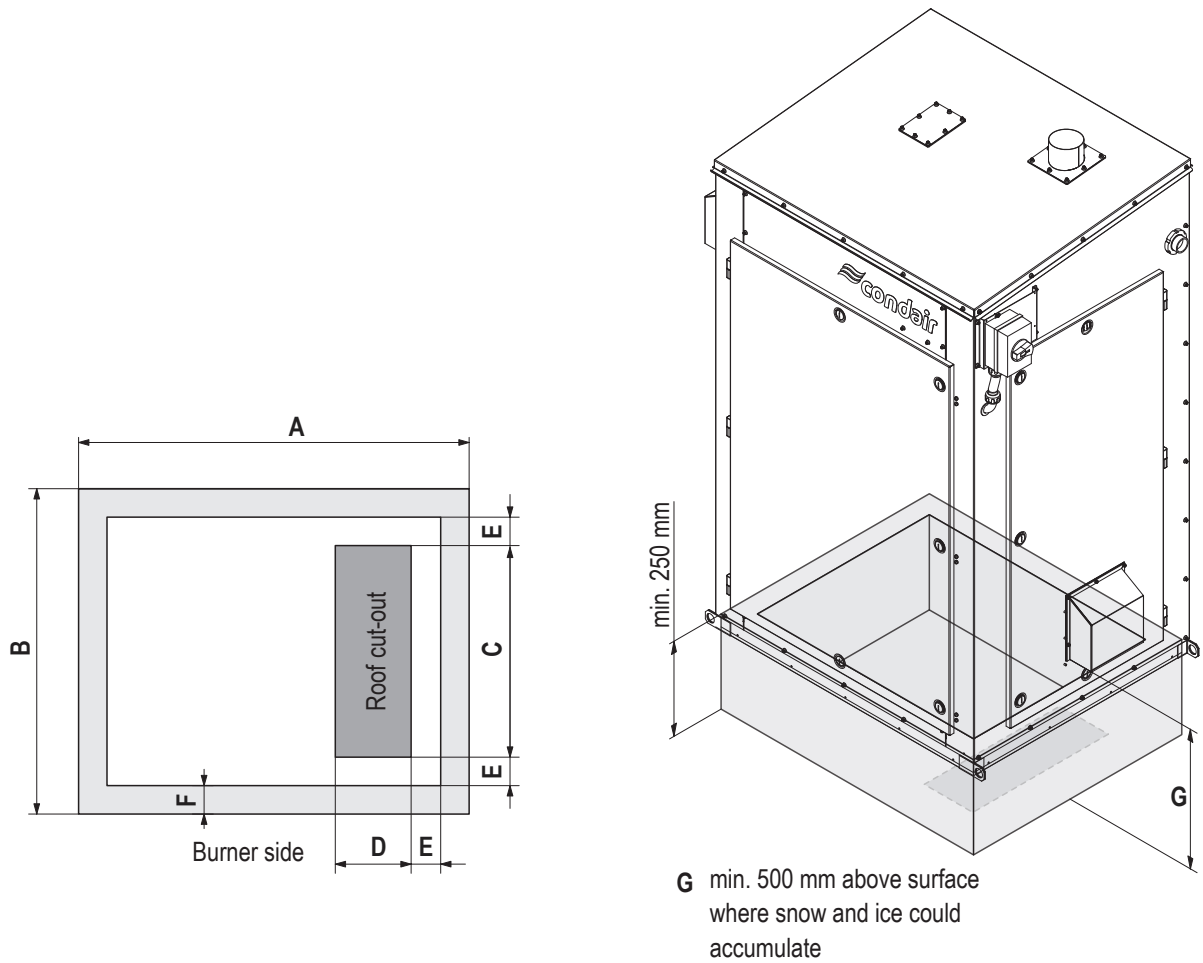
5.3.4 Mounting the Humidifier

5.3.4.1 Mounting the Humidifier on a Concrete Curb

1. At the place of installation make a curb (foundation) according to the following drawing. Make sure the top of the curb is level in all directions.

CAUTION!

Make sure the curb and the place of installation are solid enough to structurally support the entire weight of the humidifier when in operation.



GS housing size	Dimension mm					
	A	B	C	D	E	F
Small (GS 23 / GS 45 / GS 65)	780	858	558	200	75	75
Medium (GS 90 / GS 130)	1030					
Large (GS 195 / GS 260)	1692					

Fig. 8: Concrete curb dimensions

2. Cut out the hole in the roof for routing the water piping and the electrical wiring into the unit (dimensions see above).
3. Attach an appropriate 4-strand hanger with shackles to the lifting lugs in the base of the unit. Lift the unit onto the curb and fix it to the curb with appropriate fixing material according to local codes.



WARNING!

Heavy object – risk of personal injury, or damage to equipment!

When lifting the unit with a crane make sure the unit is not damaged by the lifting cables/chains.

It is the customer's responsibility to ensure that operators are trained in handling heavy goods and that the operators comply with the appropriate regulations on work safety and the prevention of accidents.

5.3.4.2 Mounting the Humidifier on the Optional Roof Curb

1. Assemble the optional roof curb stand according to the instructions supplied with the roof curb.
2. Place the roof curb at the desired position to the floor/roof and attach it to the floor/roof with appropriate fixing materials.



CAUTION!

Make sure the place of installation is solid enough to structurally support the entire weight of the humidifier when in operation.

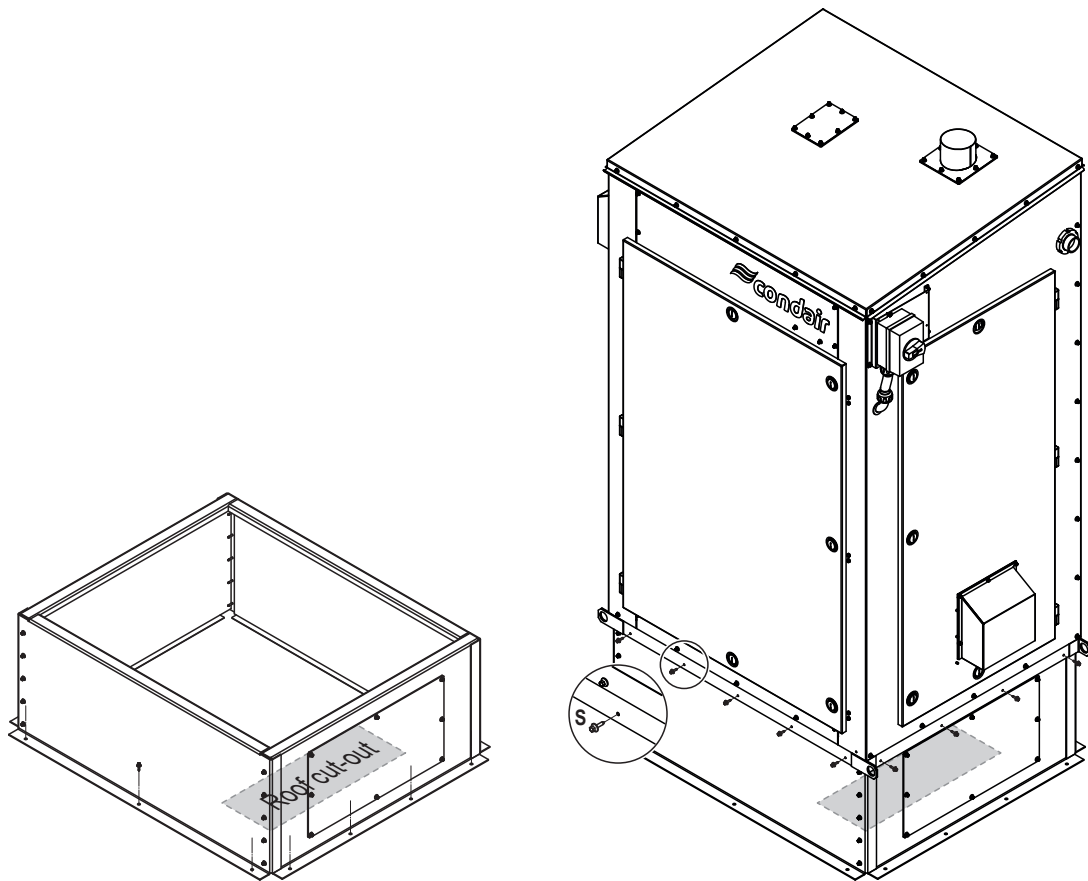


Fig. 9: Mounting on the optional roof curb

3. Cut out a hole in the roof for routing the water piping and the electrical wiring into the unit (dimensions see table in [Fig. 8 on page 32](#)).
4. Attach an appropriate 4-strand hanger with shackles to the lifting lugs in the base of the unit. Lift the unit onto the roof curb and fix it to the roof curb with appropriate self-tapping screws "S".



WARNING!

Heavy object – risk of personal injury, or damage to equipment!

When lifting the unit with a crane make sure the unit is not damaged by the lifting cables/chains.

It is the customer's responsibility to ensure that operators are trained in handling heavy goods and that the operators comply with the appropriate regulations on work safety and the prevention of accidents.

5.3.5 Mounting Checklist

After mounting the humidifier, check the following:

- Unit mounted in an outdoor environment where it is not exposed to severe weather, or where the temperature drops below -20 °C, or where strong winds may cause the unit to fall. External bracing (supplied by others) will be required for units exposed to strong winds.
- Adequate clearances maintained and in accordance with [Section 5.3.1 on page 28](#), and all local and national installation codes?
- Mounting surface stable and reinforced to reduce vibrations and support the full operating weight of the humidifier?
- Unit level?
- Unit fastened securely?

5.4 Flue Gas Installation



WARNING!

Warning! Since the regulations for the installation of flueing systems differ from country to country, **the relevant local regulations must be adhered to without reservation.**

All work concerning the flue pipe installation must be performed **only by adequately qualified personnel**. Ascertaining the qualifications is the customer's responsibility.

5.4.1 Overview Flue Gas Installation

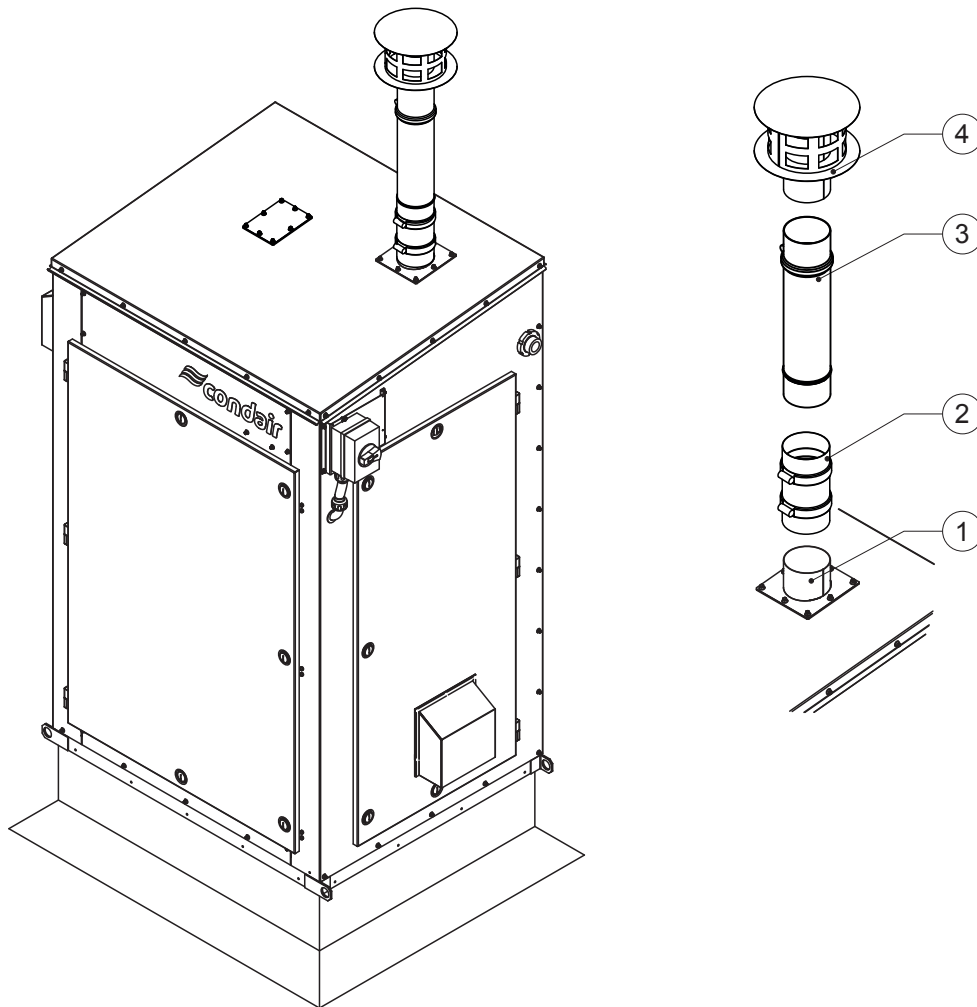


Fig. 10: Overview flue gas installation

- 1 Flue gas connection on the unit
 - GS 23 OC / GS 45 OC / GS 65 OC (Small): $\varnothing 76.2$ mm
 - GS 90 OC / GS 130 OC (Medium): $\varnothing 101.6$ mm
 - GS 195 OC/GS 260 OC (Large): $\varnothing 152.4$ mm
- 2 Appliance adapter (included in the delivery)
- 3 Flue gas pipe extension (included in the delivery)
- 4 Rain cap (included in the delivery)

5.4.2 Notes on Flue Gas Installation

The installation instruction notes must be observed:

- **Flue gas specifications:** ---> see table in [Section 10.3 on page 65](#).
- The flue gas temperature during normal application and when the maintenance schedule is fulfilled is between 140 - 150 °C for standard efficiency units or 49 - 60 °C for condensing high-efficiency Models.
If the unit is not maintained properly the flue gas temperature could increase. In this case the temperature switch would shut down the unit if the temperature exceeds 160 °C for standard efficiency units or 70 °C for condensing high-efficiency models for safety reasons.
- Use the supplied flue gas pipe with rain cap and flue extension exclusively.
- The supplied flue pipe extension and the rain cap have built-in mechanical locking band and gasket. Simply push each component to the stop bead, which provides an air- and water-tight seal. Then, tighten the integrated locking band on each component to complete the installation of the flue gas venting.
- Make sure the rain cap is at least 60 cm above any ridge within 3 m of the humidifier.
Note: if the flue gas venting needs to be longer for any reason please contact your Condair representative.

5.4.3 Flue Gas Installation Checklist

Check the following to ensure that the flue gas vent has been installed correctly:

- Supplied flue gas pipe (with storm collar and rain cap) installed?
- Rain cap of the flue gas pipe at least 60 cm above any ridge within 3 m of the humidifier?
- Proper clearances maintained between flue gas pipe and combustible materials?

5.5 Steam Installation

5.5.1 Overview Steam Installation

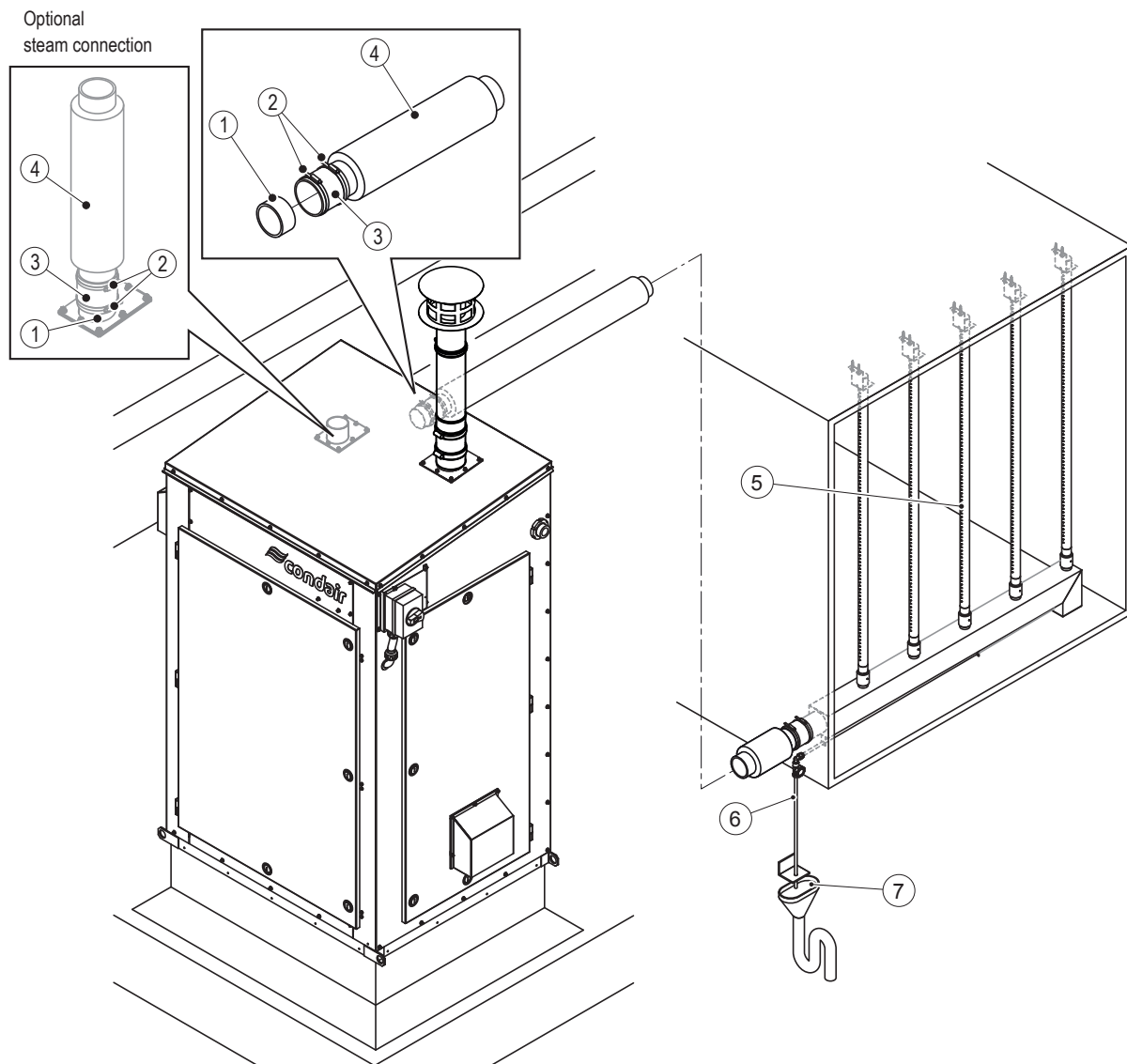


Fig. 11: Overview Steam Installation

- | | | | |
|---|---|---|--|
| 1 | Steam outlet humidifier (steam outlet diameter see Table 7 on page 39) | 4 | Insulated rigid steam pipe (main steam pipe) |
| 2 | Worm gear hose clamp (supplied) | 5 | Steam distributor (Condair accessory) |
| 3 | Hose cuff (supplied) | 6 | Condensate drain line with trap |
| | | 7 | Open funnel with trap connected to building water water system |

5.5.2 Notes on Steam Installation

The main steam line is to be connected to the corresponding steam connection on the humidifier according to [Fig. 11 on page 38](#).

Table 7: Steam Outlet Diameter

Model	Steam outlet diameter
GS 23 OC to GS 45 OC	ø45 mm Note: Use Condair steam hose
GS 65 OC to GS 130 OC	ø76.2 mm
GS 195 OC to GS 260 OC	ø108 mm

If main steam line is connected to the optional vertical steam outlet the steam line must be raised minimum 300 mm straight up above steam outlet before any radius.

Refer to the Condair GS indoor installation manual for best practice of steam and condensate line routing, radius and connection details, as well as sizing and materials.

The main steam pipe can be routed to an air handling unit, or into the building through a pipe chase in the roof or exterior wall.

The main steam line **must** be insulated over the entire length to minimize condensation and maximize efficiency.

Important: After completion check the steam installation according to the checklist in the Condair GS indoor installation manual.

5.6 Water Installation

The water installation must be carried out in accordance with [Fig. 12](#), the notes on water installation in [Section 5.6.2 on page 41](#) and the applicable local codes on water installation.

5.6.1 Overview Water Installation

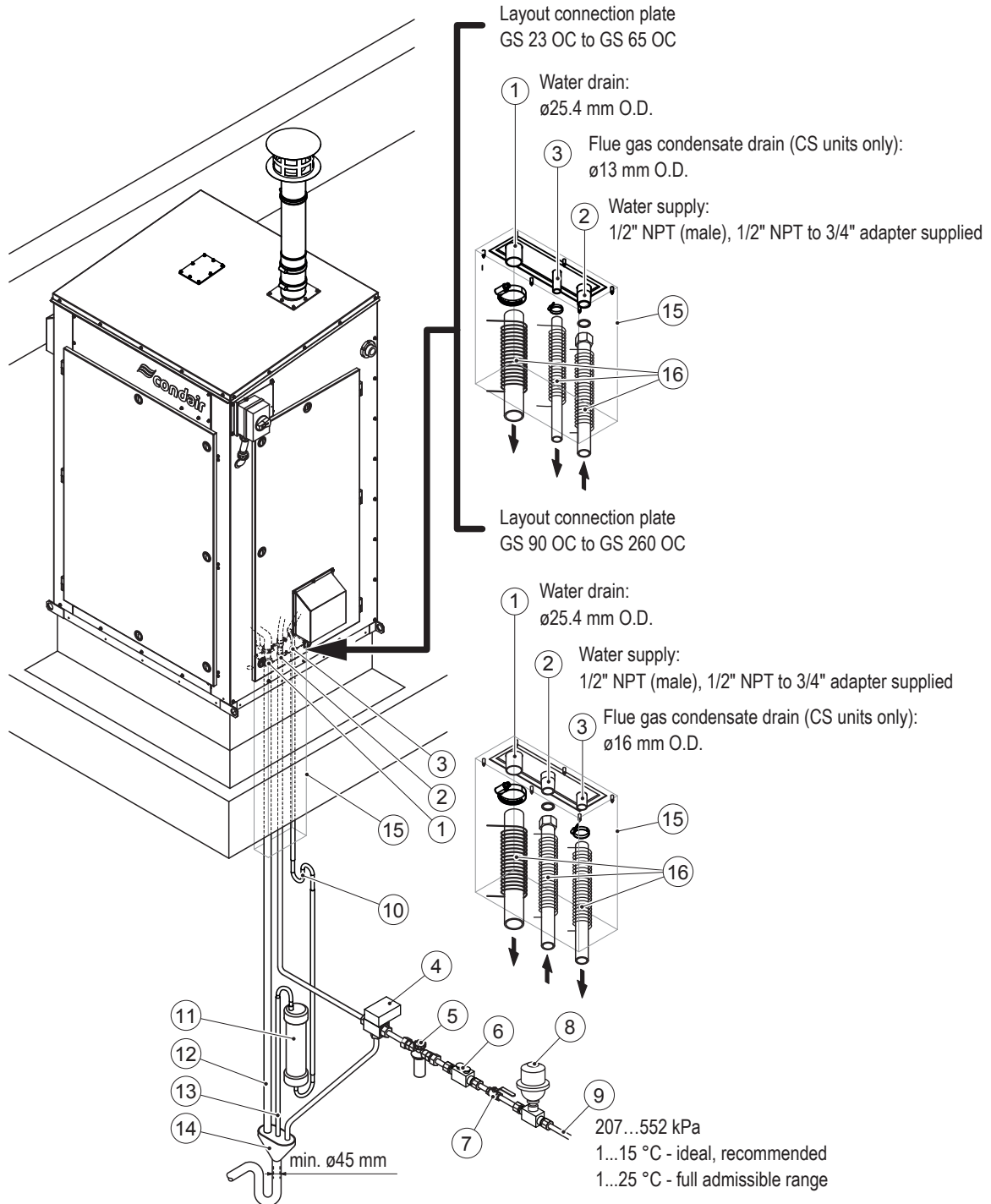


Fig. 12: Overview water installation (Condair GS 65 CS unit shown)

Legend

- | | |
|--|---|
| <ul style="list-style-type: none"> 1 Water drain connector: ø25.4 mm O.D. 2 Water supply connector 1/2" NPT (male) 3 Exhaust condensate drain connector (CS units only):
GS 23 OC - GS 65 OC: ø13 mm O.D.
GS 90 OC - GS 260 OC: ø16 mm O.D. 4 3-way freeze protection valve (supplied by others) 5 Water filter (5 µm, recommended, supplied by others) 6 Pipe disconnecter as backflow preventer (optional, supplied by others) 7 Shut-off valve (mandatory, supplied by others) 8 Water shock arrestor (optional, supplied by others) 9 Water supply line – minimum internal diameter ø13 mm 10 Condensate trap (Condair GS 90-260 CS models, mandatory, supplied by others) | <ul style="list-style-type: none"> 11 Condensate neutralization device (CS models, supplied by others) 12 Water drain line – minimum internal diameter ø25.4 mm, minimum downslope 2° 13 Exhaust condensate drain line (CS units only) – minimum internal diameter:
GS 23 OC - GS 65 OC: 13 mm
GS 90 OC - GS 260 OC: ø16 mm, minimum downslope 2° 14 Open funnel with trap – pipe/trap connected to funnel should have minimum internal diameter of ø45 mm. Funnel must be located within 1 m from the unit (or according to code). 15 Pipe chase 16 Trace Heatings water lines |
|--|---|

5.6.2 Notes on Water Installation

General notes on water installation

- The water supply, the water drain and the exhaust condensate drain line should be routed in a pipe chase.
- The water supply as well as the drain lines should be equipped with a trace heating and should be isolated.

Notes on water supply

The water supply is to be carried out according to [Fig. 12 on page 40](#) and the applicable local plumbing codes. Refer also to [Section 5.6.3 on page 43](#) regarding freeze protection of the supply line.

- The installation of a **5 µm water filter** (recommended) and a **shut-off valve** (mandatory) in the water supply line should be made as close as possible to the humidifier.
- Admissible water supply pressure is: **207...552 kPa**
Note: For mains pressures >552 kPa a pressure reducing valve (adjusted to 207 kPa) must be installed in the water supply line.
- Admissible water supply temperature is: **1...25 °C**, recommended 1...15 °C, specially for CS models to improve operational efficiency.
- The water supply line should be equipped with a trace heating and should be isolated to prevent freezing of the water in the supply line.
- **Notes on water quality:**
 - The water supply to the humidifier must be cold potable drinking water, reverse osmosis (RO) water or de-ionized water (DI), with a flow rate of 10 l/min for GS 23-130 unit or 20 l/min for Condair GS 195-260 units. The water quality must meet the requirements as listed in [Table 8](#).

Table 8: Water Quality Requirements

Water type	Hardness PPM	Alkalinity pH	Chloride PPM	Conductivity µS/cm	Silica PPM
Potable drinking water	0-256	6.5-7.5	0-40	0-1500	0-14
Treated water	0-17	7-7.5	0-40	0-100	0-1

- The use of **additives** such as corrosion inhibitors, disinfectants, etc. is **not allowed**, since these additives may endanger health and affect proper operation.

- The water supply piping to the humidifier should have a minimum internal diameter of $\varnothing 13$ mm with a NPT 1/2" union nut at the end. The water supply pipe can be made of plastic, copper (not permitted for deionized water) or stainless steel (minimum DIN 1.4301), and must be **pressure-proof** (up to 100 kPa) and **certified for use in drinking water systems**.
- Install a double check valve backflow preventer in the water supply line to the unit according to all applicable local and national plumbing codes.
- The water supply system must be free of pressure bumps (hammer-free). If a pipe disconnecter is to be installed in the inlet water system, a model with overpressure protection must be installed. If water hammers cannot be avoided in the supply line, a water shock arrestor must be installed.
- **Important!** Before connecting the water supply line to the unit, **the line must be well flushed out**.

Notes on water drain

The water drain is to be carried out according to [Fig. 12 on page 40](#) and the applicable local plumbing codes.

- The drain hose from the humidifier should be as short as possible, and empty into the open funnel with trap without touching its sides or bottom (min. air gap 2.5 cm). The drain hose must have a minimum constant downslope of 2% and must be secured with a hose clamp to the connector on the unit. The drain hose must be rated for 100 °C.

Attach drain hose in such a way, that it cannot slip out of the funnel.

- The open funnel with trap in the floor should be located min. 0.5 m to max. 1 m away from the unit to keep any rising steam from damaging the electrical components in the control cabinet. The open funnel should be located inside the building.
- The drain pipe connecting the open funnel to the building waste water line should have a minimum inner diameter of 45 mm (minimum drainage rate of 20 l/min) and should be made of copper (not permitted for deionized water) or stainless steel (minimum DIN 1.4301).
- The building waste water installation (including funnel and trap) should be made of a material rated to handle high temperature discharge water at 100 °C.
- Make sure that the drain hose, the funnel and the siphon are correctly fixed and easily accessible for inspections and cleaning purposes.

Notes on flue gas condensate drain

The flue gas condensate drain is to be carried out according to [Fig. 12 on page 40](#) and the applicable local plumbing codes.

- Connect a flue gas condensate drain hose (CS models only) to the corresponding connector of the connection plate in the base of the unit, and secure it with a hose clamp – refer to [Fig. 12 on page 40](#). The hose must be rated to 100 °C.
- For Condair GS CS 90-260 units: Install a trap with a min. height of 92 mm in the flue gas condensate line before the condensate neutralization device.
- Connect the flue gas condensate drain hose to a condensate neutralization device, before routing the hose down to the funnel.
- Fill the flue gas condensate trap inside the unit (CS 23-65 models) or outside the unit (CS 90-260 models) with water.

5.6.3 External Freeze Protection System

In cold climates, the external freeze protection system (supplied by others) is an important part of the protection for the Condair GS Outdoor humidifier against freezing. The external freeze protection system must be installed correctly and fully functional at all times.

IMPORTANT! The warranty does not cover damage to the humidifier resulting from freezing.

5.6.3.1 Normally-Open and Normally-Closed Valves

This arrangement consists of a normally-open and a normally-closed valve installed inside the building to protect the water supply line from freezing. Refer to [Fig. 13](#).

The water supply flows to the fill valve through the normally-closed valve and a tee. This valve remains closed unless it is energized by the humidifier. This stops the water flow into the humidifier when there is no demand, or in the event of a power failure.

At the same time, a normally-open valve which is also connected to the tee remains open unless it is energized by the humidifier. This allows any water in the line (from the tee to the fill valve) to drain as long as there is no demand on the humidifier, or in the event of a power failure. The water supply line must be sloped downward from the humidifier toward the building to allow the water to drain properly.

The electrical connections are shown in [Fig. 13](#).

When the enclosure temperature is warm enough, both valves will be energized by the humidifier controls to permit water flow to the fill valve.

In the event that the enclosure temperature drops or the power to the humidifier is interrupted, the water supply to the unit is shut off. Any water in the line is then allowed to drain.

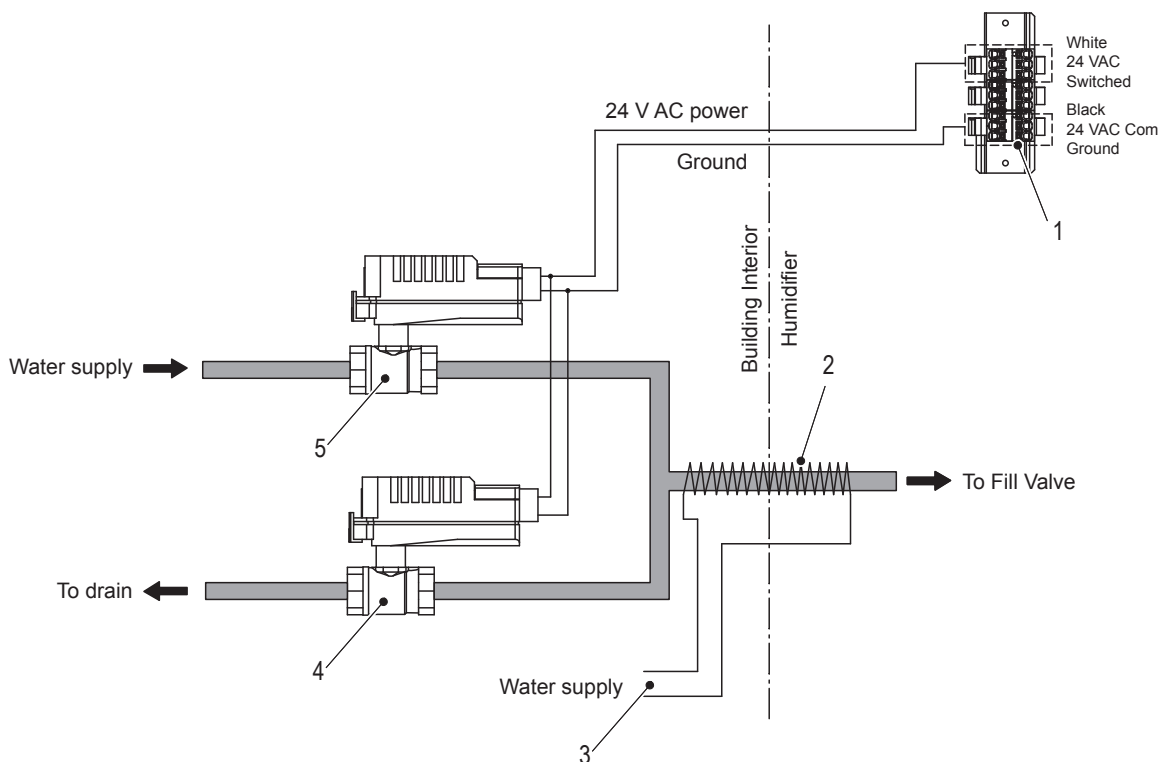


Fig. 13: Normally-Open and Normally-Closed Valve Arrangement

- 1 Low voltage terminal strip in the humidifier
- 2 Trace heating (supplied by others), minimum 3-5 °C
- 3 Exterior power supply, trace heating (supplied by others)
- 4 24 V normally-open valve (supplied by others)
- 5 24 V normally-closed valve (supplied by others)

5.6.3.2 3-Way Normally-Closed Valve

This arrangement consists of a normally-closed 3-way valve (instead of the ["Normally-Open and Normally-Closed Valve Arrangement" on page 43](#)) installed inside the building to protect the water supply line from freezing. Refer to [Fig. 14](#).

The water supply flows to the fill valve when the 3-way valve is energized by the humidifier. When there is no demand, or in the event of a power failure, the valve is de-energized and the water in the line is allowed to drain. The water supply line must be sloped downward from the humidifier toward the building to allow the water to drain properly.

The electrical connections are shown in [Fig. 14](#).

When the enclosure temperature is warm enough, the valve will be energized by the humidifier controls to permit water flow to the fill valve.

In the event that the enclosure temperature drops or the power to the humidifier is interrupted, the water supply to the unit is shut off. Any water in the line is then allowed to drain.

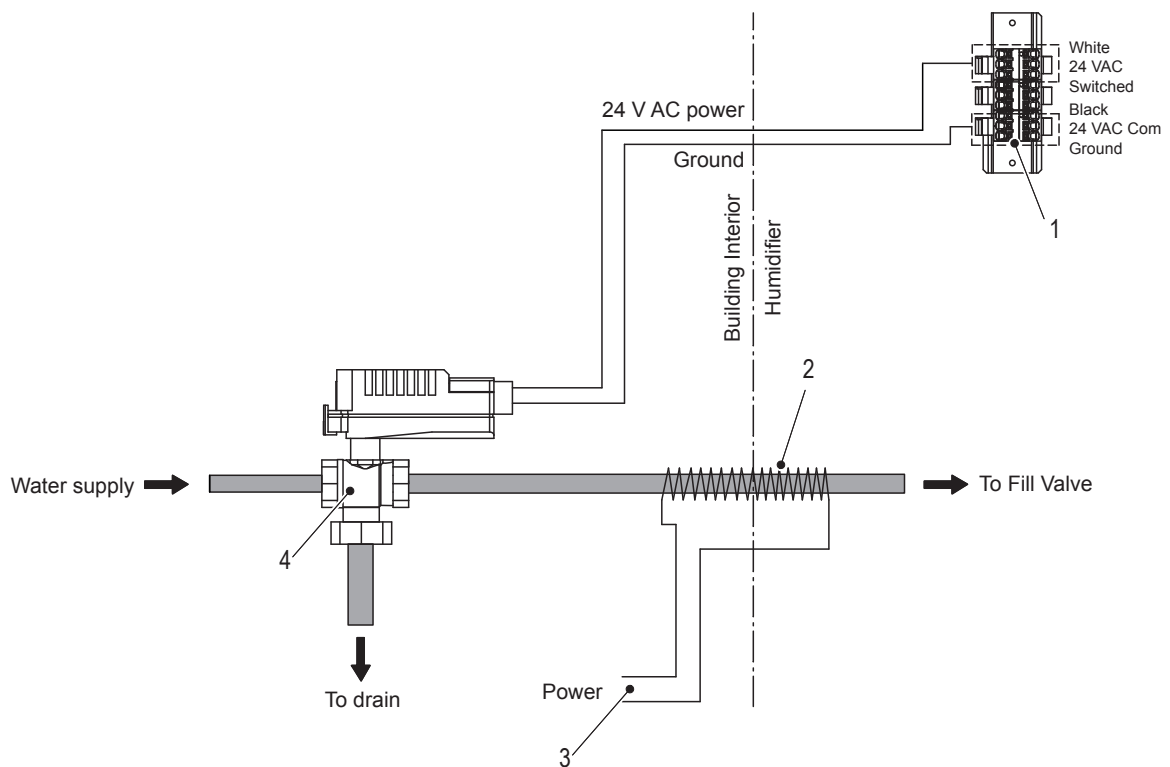


Fig. 14: 3-Way Normally-Closed Valve Arrangement

- 1 Low voltage terminal strip in the humidifier
- 2 Trace heating (supplied by others), minimum 3-5 °C
- 3 Exterior power supply, trace heating (supplied by others)
- 4 24 V normally-closed 3-way valve (supplied by others)

5.6.4 Water Installation Checklist

Check the following to ensure that the water installations for the humidifier carried out correctly:

- Water supply
 - Water quality meets the requirements listed in [Table 8 on page 41](#)?
 - Shut-off valve and 5 µm filter (recommended) installed in the supply line close to the humidifier?
 - Double check valve backflow preventer is installed in the water supply line to the unit according to all applicable local and national plumbing codes?
 - Water shock arrestor (supplied by others) installed in the water supply line to the unit (if pressure surges occur) according to all applicable local and national plumbing codes.
 - Water pressure within admissible range of 207...552 kPa and pressure surge-protected?
 - Admissible water supply temperature 1...25 °C (recommended 1...15 °C) maintained?
 - Is the minimum inside diameter of 13 mm of the supply piping maintained throughout the entire length?
 - Are pressure-proof materials certified for drinking water systems been used? Copper or stainless steel if using potable drinking water or RO water? Plastic or stainless steel pipe if using DI water?
 - Water supply system tight?
 - Water supply line flushed? Strainer in the fill valve free of debris?
 - Water supply line freeze protected in cold climates?
- Water drain
 - Open drain funnel in the floor located away (min. 0.5 m to max. 1 m from the unit) from the control cabinet in the humidifier?
 - Drain pipe connecting the open funnel to the building waste water line has a minimum internal diameter of 45 mm?
 - Has copper or stainless steel piping been used if potable drinking water or RO water are used or stainless steel piping if DI water is used?
 - Drain hose from humidifier empty into the open funnel without touching its sides or bottom (min. air gap 2.5 cm)?
 - Drain hose has a minimum constant downslope of 2%, and is secured with hose clamp to drain connector of the unit?
 - Drain hose and building waste water installation rated for 100 °C?
 - Water drain line flushed?
- Flue gas condensate drain (CS models only)
 - Condensate hose correctly installed?
 - Condensate hose rated for 100 °C?
 - Condensate trap installed in the flue gas condensate drain line before the condensate neutralization device (Condair GS CS 90-260 units only)?
 - Condensate trap inside/outside unit filled with water?
 - Condensate neutralization device installed?

5.7 Gas Installation

5.7.1 Overview Gas Installation

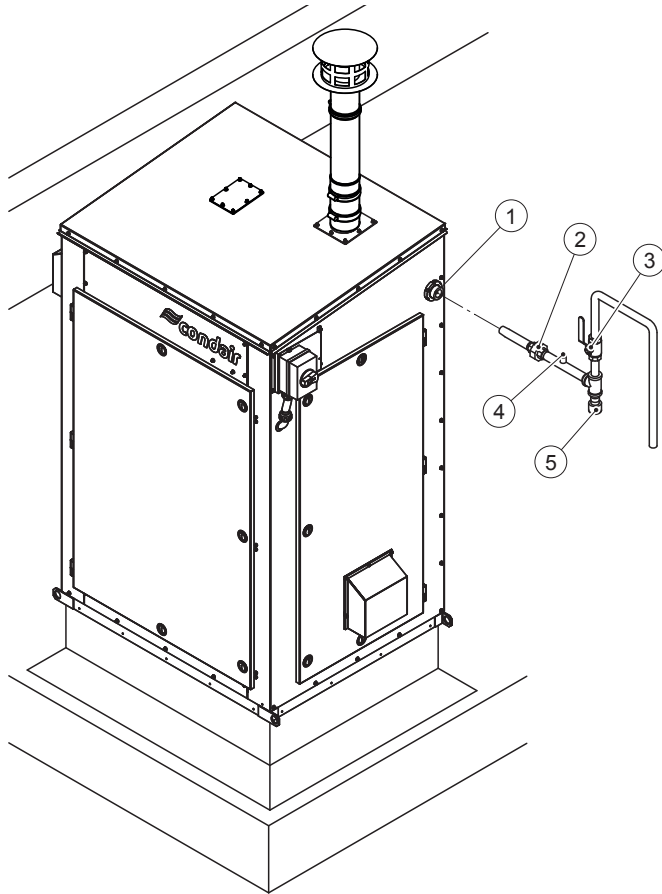


Fig. 15: Overview Gas installation

- | | |
|---|--|
| <p>1 Gas supply connection</p> <ul style="list-style-type: none">- GS 23 OC to GS 65 OC:
3/4" NPT (3/4" BSP adapter supplied)- GS 90 OC to GS 260 OC:
1 1/4" NPT (1 1/4" BSP adapter supplied) <p>2 Union fitting (supplied by others)</p> | <p>3 Gas shut-off valve (supplied by others)</p> <p>4 Test port (supplied by others)</p> <p>5 Sediment trap (supplied by others)</p> <p>Note: Installation essential in the case of the use of steel gas pipes</p> |
|---|--|

5.7.2 Notes on Gas Installation

The gas supply installation must be carried out in accordance with [Fig. 15 on page 46](#) and the applicable national and local codes for gas supply installations. In addition, the following requirements must be satisfied:

- A certified manual gas shut-off valve (see [item 3 in Fig. 15 on page 46](#)) must be installed immediately upstream from the humidifier. A thermally actuated gas shut-off device may also be installed upstream from the humidifier. Install such a device following all local codes and regulations.
- If steel gas pipe is used, a sediment trap must also be installed immediately upstream from the humidifier.
- A test port $\varnothing 3$ mm equipped with a sealing cap must be installed in the gas line immediately upstream from the humidifier gas connection.
- A union fitting must be supplied in the gas line immediately upstream from the humidifier gas connection.
- Only use sealants that are approved for natural gas or propane gas to seal the gas supply line.
- All gas piping must be adequately supported to prevent any strain on the humidifier gas connection.
- Route the gas line so that it does not obstruct access to any of the services to the humidifier.
- The operating pressure of the gas supply to the humidifier must in accordance with the values listed in [Table 9](#).

Table 9: Gas Operating Pressure

Gas type		Operating pressure		
		Nominal	Minimum	Maximum
Natural gas H, E, E(S)	G20 *	2.0 kPa (20 mbar)	1.7 kPa (17 mbar)	2.5 kPa (25 mbar)
Natural gas L, ELL	G25	2.5 kPa (25 mbar)	2.0 kPa (20 mbar)	3.0 kPa (30 mbar)
Natural gas HS	G25.1	2.5 kPa (25 mbar)	2.0 kPa (20 mbar)	3.0 kPa (30 mbar)
Natural gas EK	G25.3	2.5 kPa (25 mbar)	1.7 kPa (17 mbar)	3.0 kPa (30 mbar)
Natural gas Lw	G27	2.0 kPa (20 mbar)	1.7 kPa (17 mbar)	2.3 kPa (23 mbar)
Natural gas Ls	GZ350	1.3 kPa (13 mbar)	1.1 kPa (11 mbar)	1.6 kPa (16 mbar)
Natural gas (Japan)	13A	2.0 kPa (20 mbar)	1.5 kPa (15 mbar)	2.5 kPa (25 mbar)
Propane	G31	3.7 kPa (37 mbar) or 5.0 kPa (50 mbar)	2.5 kPa (25 mbar)	5.7 kPa (57 mbar)

* permissible for Hydrogen blends up to 20% content by volume

- The gas supply line must be sized as listed in [Table 10](#). The pipe connection should have male BSPP threads.

Table 10: Gas Line Size

Model	Min. diameter gas supply line in mm	Gas inlet connection
GS 23 OC to GS 65 OC	20	3/4" BSPP
GS 90 OC to GS 130 OC	25	1 1/4" BSPP
GS 195 OC to GS 260 OC	32	1 1/4" BSPP

- Upon completion of the gas installation, perform the gas leakage test (see [Section 5.7.3 on page 48](#)).

5.7.3 Gas Leakage Test



DANGER!
Risk of explosion or fire!

Prevention: NEVER use an open flame to check for gas leaks (Risk of injury, death or property damage). Use a commercial soap solution or a gas sniffer to check for leaks.



CAUTION!
Risk of damage to the gas pressure regulating valve!

Prevention: Before performing the leakage test described below, close the manual gas shutoff valve at the humidifier to isolate the gas pressure regulating valve from system pressure. Failure to do so may damage the gas pressure regulating valve, and will void warranty.

1. Close the manual gas shutoff valve at the humidifier.
2. Pressurize the gas supply line to a maximum of 3.5 kPa, and test all gas connections external to the humidifier for leaks using a commercial soap solution or a gas sniffer. Seal all leaks before operating the humidifier.
3. After completing the leakage test, de-pressurize the gas supply line BEFORE opening the manual gas shutoff valve.

5.7.4 Gas Supply Installation Checklist

Check the following to ensure that the gas connection for the humidifier has been installed correctly:

- Certified manual gas shutoff valve installed immediately upstream from the humidifier?
- Does a possibly installed thermally actuated gas shut-off device following all local codes and regulations?
- Sediment trap installed (if using steel gas pipe)?
- Gas pipe routing allow free access to other service connections at humidifier?
- Gas piping adequately supported?
- Gas leakage test completed, and all leaks fixed?
- Gas supply line de-pressurized after leak test?

5.8 Electrical Installations

5.8.1 General Information on Electrical Installation

Safety

The electrical installation work requires removal of the access panels in the humidifier. Observe the following safety precautions:



DANGER!
Risk of electric shock!

The Condair GS is mains powered. Live parts may be exposed when the unit is open. Touching live parts may cause severe injury or even death.

Prevention: The Condair GS must be connected to the mains only after all mounting and installation work has been completed, all installations have been checked for correct workmanship and the access panels are installed and properly locked.



CAUTION!
Electrostatic discharge (ESD)!

The electronic components inside the control cabinet in the humidifier are sensitive to electrostatic discharge (ESD).

Prevention: Take appropriate measures to protect the electronic components inside the unit against damage caused by electrostatic discharge (ESD). Refer to ANSI/ESD-S20.20.

- All electrical installation work must be performed only by a licensed electrician authorized by the customer. It is the customer's responsibility to verify qualifications of the personnel.
- The electrical installation must be performed according to the wiring diagrams in this manual, the instructions in this section, as well as the applicable national and local codes.
- Route the power cable via a cable gland into the electrical isolator and connect it to the corresponding terminals according to the appropriate wiring diagrams (see [Fig. 19 on page 53](#)).
Important: Ensure that power supply voltage and current ratings match the requirements shown on the specification label. Refer to [Fig. 2 on page 14](#).
- Make sure that the power cable is properly grounded through the ground lug inside the control cabinet. When installed, the appliance must be electrically grounded in accordance with local codes.
- All cables must lead into the unit, via the cable feedthrough on the bottom of the unit, and be secured with clamp straps.
- Make sure the cables are secured, and do not rub on any components or become a tripping hazard.
- Adhere to national and local codes for maximum cable length and required wire sizes for cables.

Refer to the Condair GS indoor installation manual for details on connecting the controls to the Condair GS OC units.

5.8.2 Wiring Diagrams

Internal Wiring Diagram Condair GS 23 OC / GS 45 OC / GS 90 OC

Legend:
 Wire Colours
 R - Red
 W - White
 Bk - Black
 Bl - Blue
 Br - Brown
 O - Orange
 Y - Yellow
 Gr - Green
 Gr/Y - Green & Yellow

--- indicates optional wiring and controls

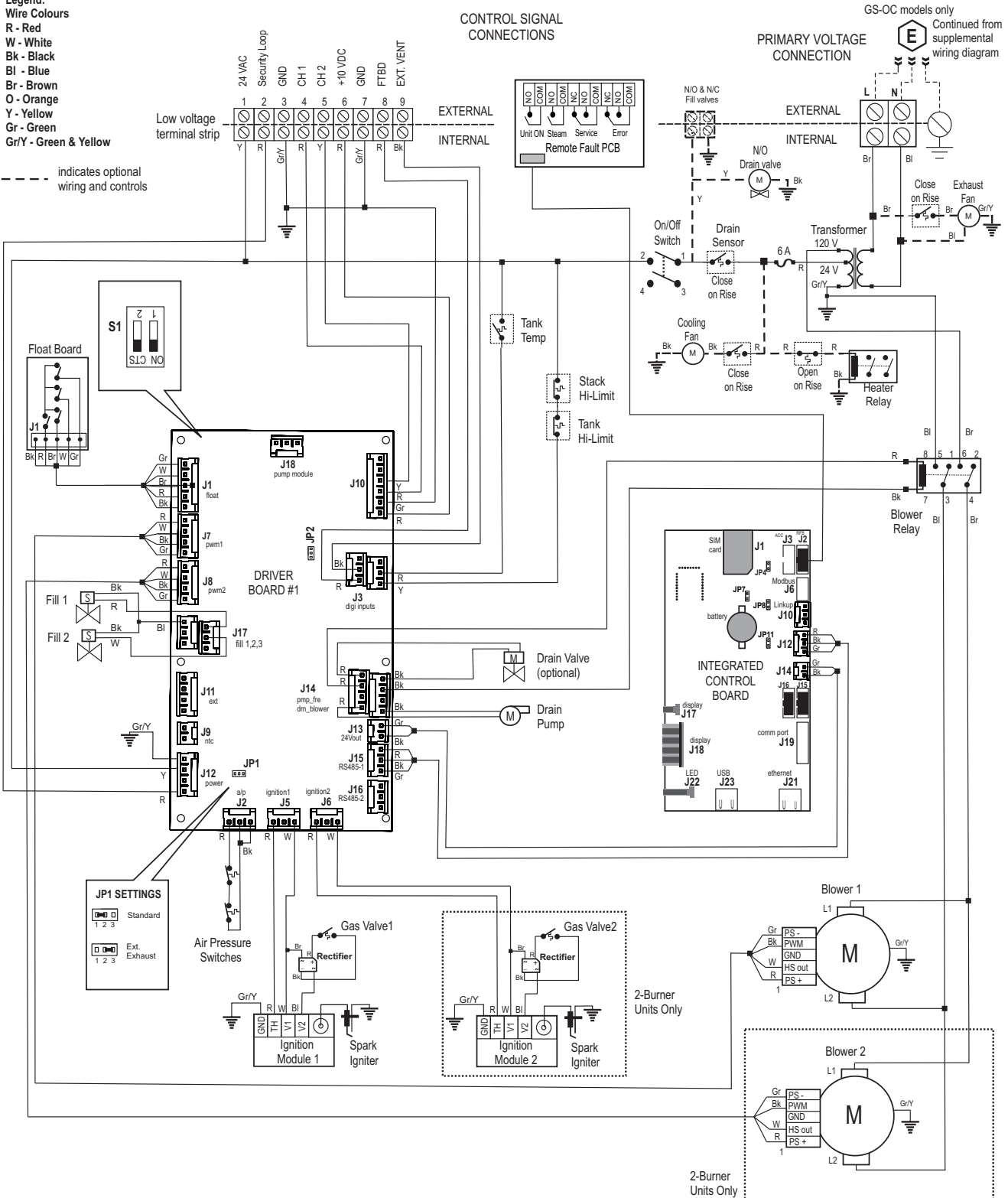


Fig. 16: Internal Wiring Diagram Condair GS 23 OC / GS 45 OC / GS 90 OC
 (reference document 2585449, revision G)

Internal Wiring Diagram Condair GS 65 OC / GS 130 OC / GS 195 OC / GS 260 OC

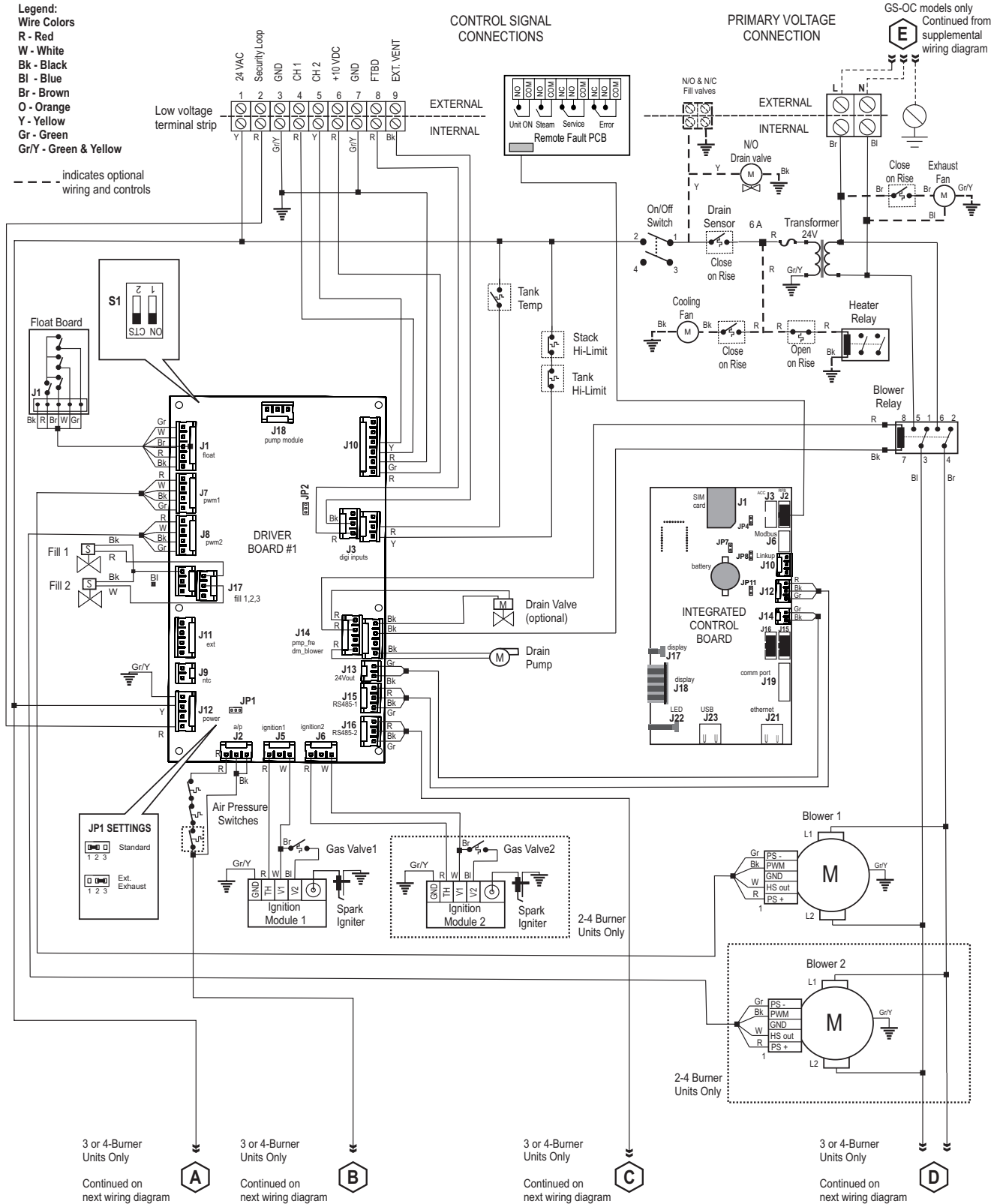


Fig. 17: Internal Wiring Diagram Condair GS 65 OC / GS 130 OC / GS 195 OC / GS 260 OC (reference document 2585450, revision G)

Supplementary Wiring Diagram Condair GS 195 OC - GS 260 OC

Fig. 18 shows the supplementary wiring diagram for the Condair GS 195 OC - GS 260 OC. The connections are carried over from Fig. 17 on page 51.

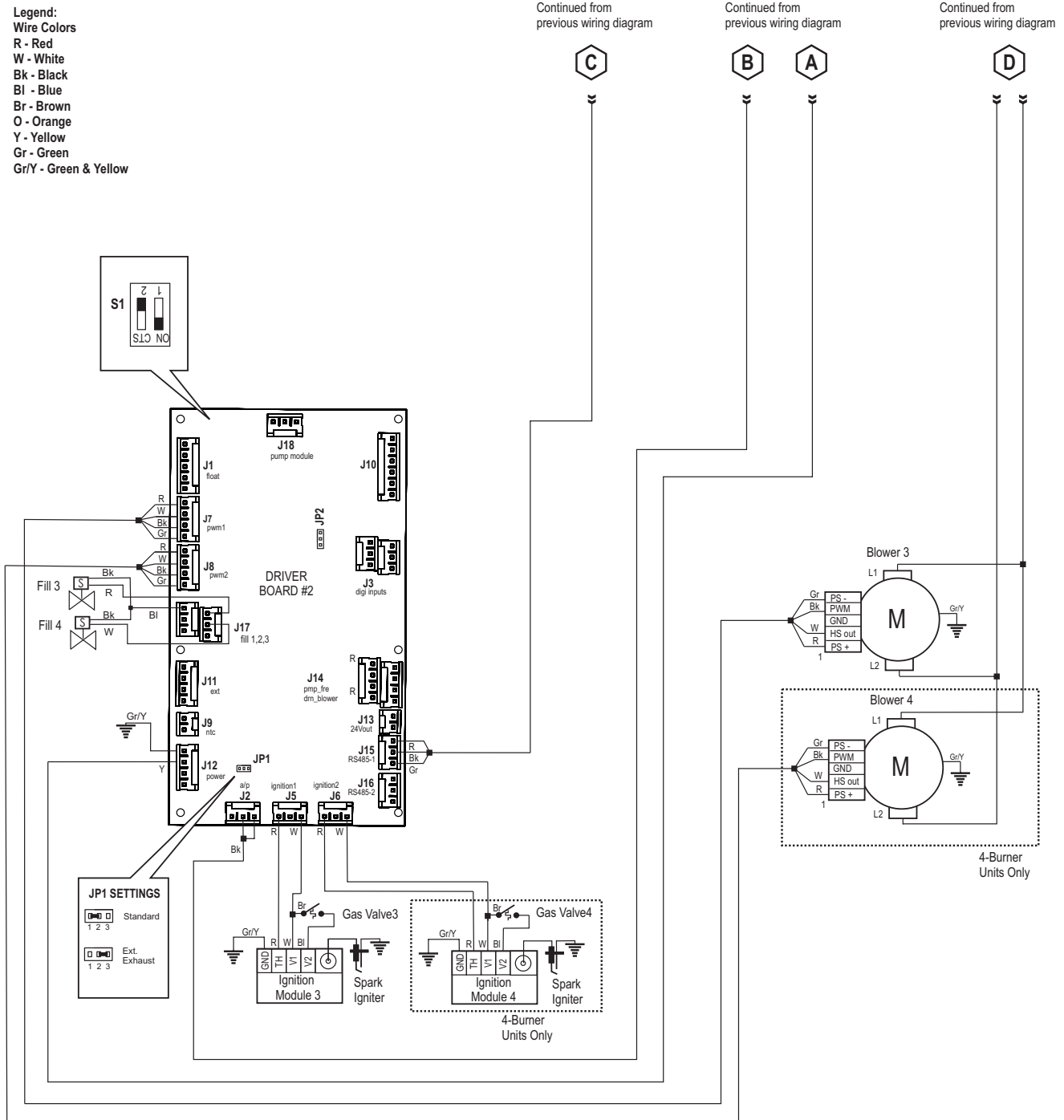


Fig. 18: Supplementary Wiring Diagram Condair GS 195/260 OC (reference document 2585451, revision E)

Legend Wiring Diagrams

- JP2 Jumper (on driver board)– for selecting the output voltage on terminal "6" of the low voltage terminal strip (10 VDC or 24 VDC)
- JP1 Jumper (on driver board) – for activating/deactivating the monitoring of the optional flue gas management system via terminal "9" of the low voltage terminal strip
- JP4 Jumper (on control board) – for activating/deactivating the termination resistor for Modbus or BACnet MSTP network.
- JP7 Jumper (on control board) – for activating/deactivating Modbus or BACnet MSTP communication via connector J6.

Supplementary Wiring Diagram 120V/1ph Voltage Supply for Condair GS 23 OC - GS 260 OC

Fig. 19 shows the supplementary wiring diagram for the 230V/1ph voltage supply for the Condair GS 23 OC - GS 260 OC.

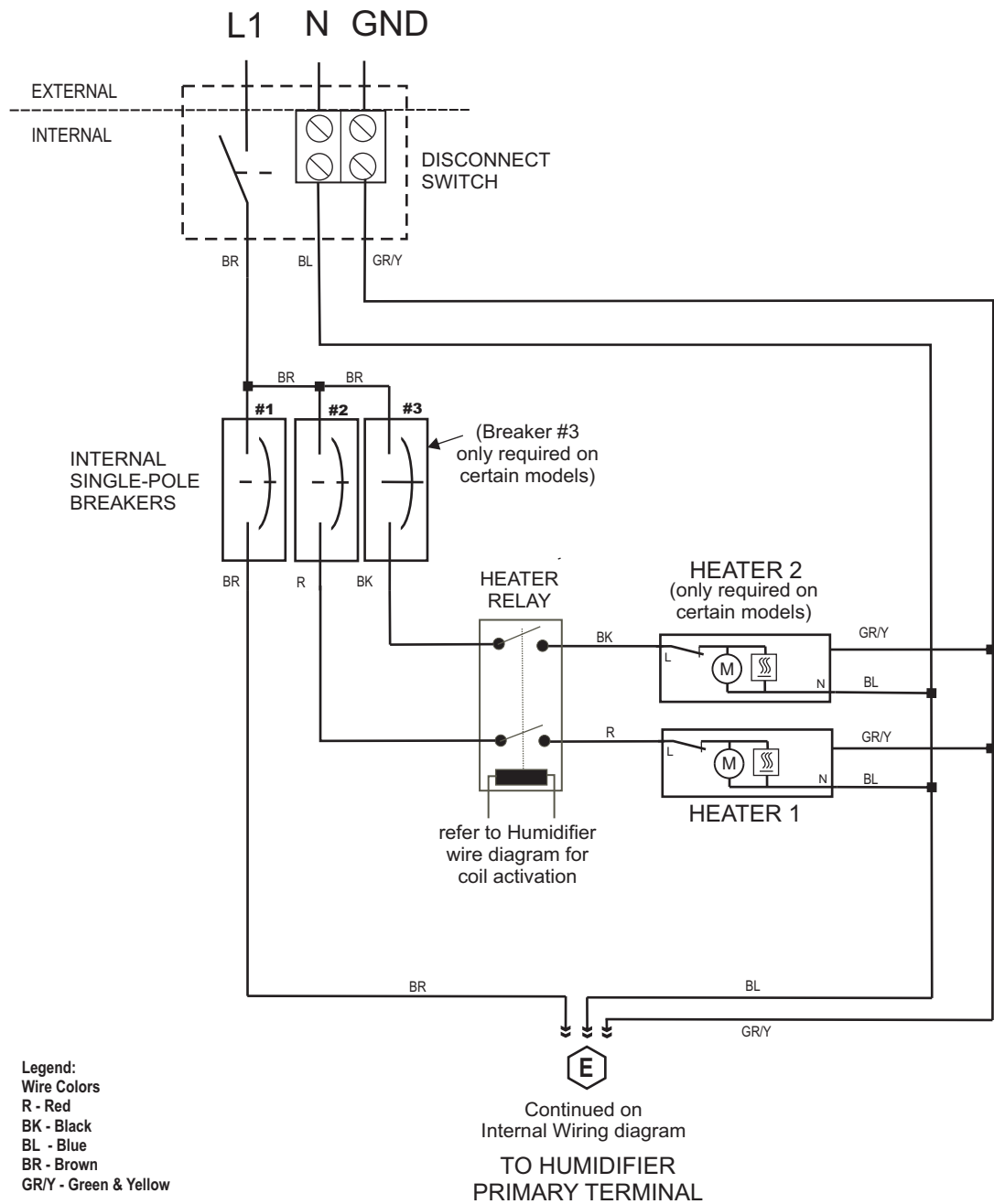


Fig. 19: Supplementary wiring diagram 120V/1ph Voltage Supply for Condair GS 23 OC - GS 260 OC (reference document 2604703, revision A)

5.8.3 Electrical Connections Checklist

Check the following to ensure that the electrical connections for the humidifier have been installed properly:

- Power supply meet the voltage and current requirements shown on the specification label ([Fig. 2 on page 14](#))?
- Power supply connected via the electrical isolator on the humidifier according to the appropriate wiring diagram (see [Fig. 19 on page 53](#))?
- All wiring done according to the wiring diagrams and instructions in this manual as well as the corresponding wiring diagrams (controls) the Condair GS indoor installation manual?
- Power cable properly grounded through the ground lug inside the electric cabinet?
- All cables fastened securely?
- All control cables free of tension and pass through cable feedthrough on the bottom of the unit? Cable feedthrough properly sealed?
- Electrical installation meet the applicable national and local codes?
- All access panels closed and fastened securely?

6 Operation

6.1 General

The Condair GS outdoor steam humidifier must only be operated by personnel who is adequately qualified, well trained and are authorized by the customer.

Observe all safety precautions described in [Section 2 on page 7](#) and in the Condair GS indoor operation manual.

6.2 Initial Commissioning

The humidifier must always be commissioned for the first time by a service technician from your local Condair representative, by a Condair employee, or by personnel who are well trained and authorized by the customer. It is the customer's responsibility to verify the qualifications of personnel.

During the initial commissioning, the following steps are carried out in the order shown. This is to check whether the humidification system was installed according to the information in the installation manual:

1. Verify the site requirements have been satisfied.
2. Inspect the outdoor steam humidifier mounting.
3. Inspect the gas supply installation.
4. Inspect the electrical installations, and check for correct voltage.
5. Inspect the water and drain installations.
6. Inspect the steam and condensate line installations.
7. Inspect the combustion air inlet.
8. Inspect circulation air inlet and outlet.
9. Inspect the flue gas outlet vent.
10. Flush the water supply and drain lines.
11. Configure the controls and the Condair GS outdoor steam humidifier.
12. Conduct performance tests, including control and monitoring devices.
13. Fill out the commissioning protocol documents.

6.3 Operating the Unit

The Condair GS outdoor steam humidifiers operate in the same manner as the Condair GS indoor humidifiers. Refer to the Condair GS indoor humidifier operation and maintenance manual for details.

To operate the display and control unit of the humidifier open the door panel on the tank side of the unit. Close door panel after necessary settings or operations have been made.

6.4 Inspections During Operation

Perform regular inspection of the Condair GS outdoor steam humidifier and the humidification system when it is in operation. Inspect the following:

- Check the gas supply line for any leaks.
- Check the water, drain and steam lines for any leakages.
- If applicable, check the humidifier and other system components have not shifted from their mountings, and are fastened securely.
- Check the flue gas outlet vent for any leaks. Check that there are no obstructions anywhere in the flue gas pipe.
- Keep the area around the combustion air intake on the unit clear of all obstructions.
- Check the area around the unit is clear of all insulating and combustible materials.
- Visually check the electrical wiring for any damage.
- Check the Home screen on the humidifier for any service or system warning messages.

If any irregularities (leakages, fault messages or damaged components) are found, shut down the Condair GS outdoor steam humidifier before carrying out any work – refer to the Condair GS indoor operation manual. Contact your Condair representative if assistance is required.

7 Maintenance

7.1 General

To ensure proper performance and long operating life of the Condair GS outdoor steam humidifier, Condair recommends regular inspections of the appliance and installation according to the **notes found in Section 6 of the Condair GS indoor operation manual**.

Observe all safety precautions described in [Section 2 on page 7](#), as well as in the Condair GS indoor operation and maintenance manual.

During cold weather, all maintenance on the unit must be performed in a heated service tent.

For maintenance under wet conditions, precautions should be taken to prevent water contacting any of the electronics or electrical components.

The maintenance items discussed in this section are in addition to those listed in the Condair GS indoor operation and maintenance manual. Refer to the Condair GS indoor operation and maintenance manual for other maintenance requirements.



CAUTION!

Damage caused by use of non-approved parts by Condair is not covered by warranty. Use only original Condair replacement parts according to the spare parts list

Personnel Qualifications

Maintenance on the Condair GS outdoor steam humidifier must only be performed by well qualified and properly trained personnel authorized by the customer. It is the customer's responsibility to verify qualifications of the personnel.

Safety



DANGER! Risk of electric shock!

The Condair GS outdoor steam humidifier is mains powered. Live parts may be exposed when the door panels are opened. Touching live parts may cause severe injury or even death.

Preventions:

Before carrying out any work set the Condair GS outdoor steam humidifier out of operation (switch off the unit, disconnect it from the mains and stop the water and gas supply) and secure the unit against inadvertent power-up.

Do not carry out any work on the unit while standing on wet or icy surfaces, or in wet weather.

7.2 Cleaning the Heater(s)

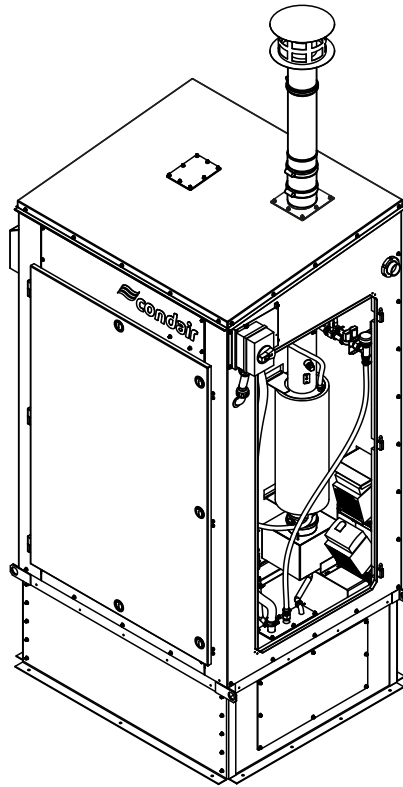


Fig. 20: Cleaning the heaters

Proceed as follows to clean the heater(s):

1. Open the service panel on the plumbing side.
2. Use a vacuum cleaner or compressed air to remove all dirt and pollen from the heater(s) and fan(s).
3. Close service panel on the plumbing side and lock it.

7.3 Cleaning the Circulation Air Intake and Air Outlet

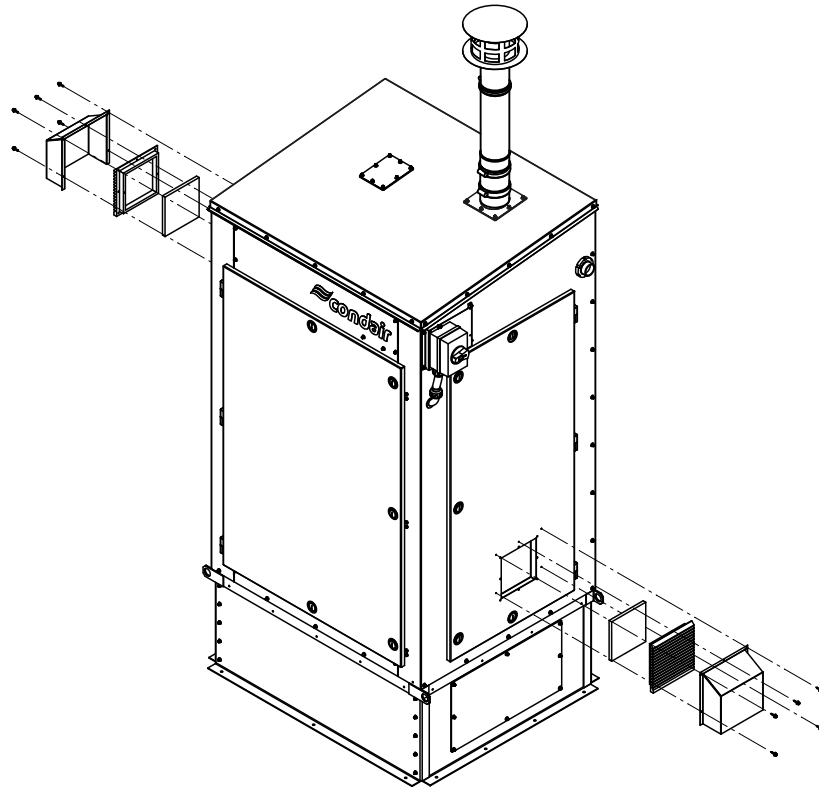


Fig. 21: Cleaning the circulation air intake and air outlet

Proceed as follows to clean the circulation air intake and air outlet:

1. Undo 5 screws and remove the circulation air intake shroud assembly.
2. Remove filter media from the circulation air intake shroud.
3. Clean parts of the circulation air intake.
4. Assemble circulation air intake shroud with new filter media and fix it with the 5 screws.
5. Undo 5 screws and remove the circulation air outlet shroud assembly.
6. Remove filter media from the circulation air outlet shroud.
7. Clean parts of the circulation air outlet. Ensure that the fan spins freely.
8. Assemble circulation air outlet shroud with new filter media and fix it with the 5 screws.

7.4 Cleaning the Combustion Air Intake

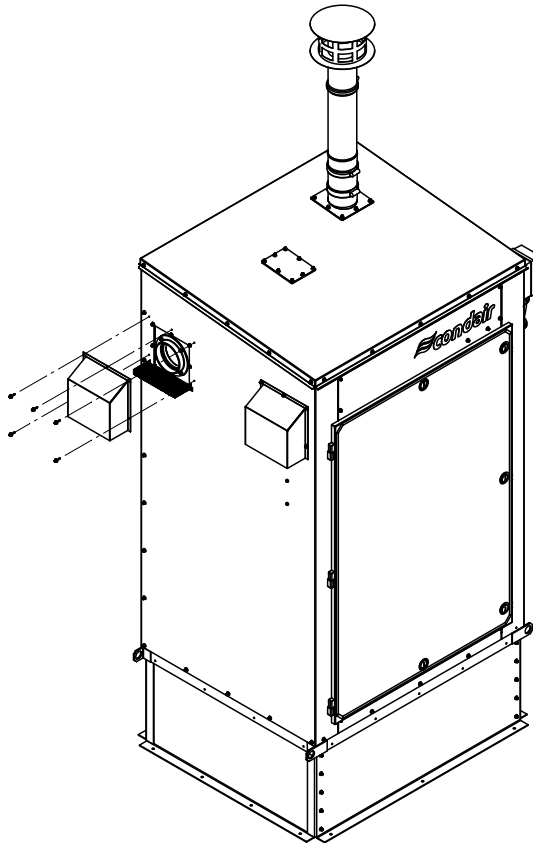


Fig. 22: Cleaning the combustion air intake

Proceed as follows to clean the heater(s) and fans(s):

1. Undo 5 screws and remove the combustion air intake shroud.
2. Vacuum the mesh screen (must not be removed), the intake shroud and the intake port.
3. Relocate combustion air intake shroud and fix it with the 5 screws.

7.5 Cleaning the Inside of the Outdoor Unit

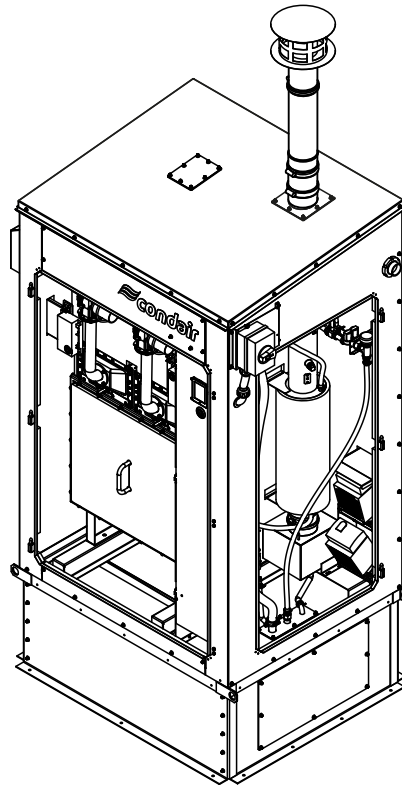


Fig. 23: Cleaning the inside of the outdoor unit

Proceed as follows to clean the inside of the outdoor unit:

1. Open the service panels on the burner and on the plumbing side.
2. Open the control cabinet door.
3. Use a vacuum cleaner or compressed air to remove all dirt and pollen from inside the unit.
4. Close and lock control cabinet door.
5. Relocate service panels on the burner and on the plumbing side and lock them.

8 Fault Isolation

8.1 General

Personnel Qualifications

Troubleshooting of the Condair GS humidifier must only be performed by well qualified and properly trained personnel authorized by the customer. It is the customer's responsibility to verify qualifications of the personnel.

Electrical repairs must only be performed by a licensed electrician authorized by the customer or by Condair service technicians.

Safety

Troubleshooting the Condair GS humidifier may require personnel to access the inside of the control cabinet in the humidifier which may expose personnel and equipment to the hazards. Make sure that the Condair GS humidifier is shut down properly as described in Condair GS II operation manual, and observe all safety precautions described in [Section 2 on page 7](#) before performing any work on the humidifier.

8.2 Troubleshooting

Refer to the Condair GS indoor humidifier operation and maintenance manual for details on troubleshooting.

8.3 Restarting After a Freeze-up

In the event of a freeze-up, inspect then restart the unit as follows:

1. Inspect all hoses, fittings, valves and seals for cracks or damage. Contact your Condair representative to order replacement parts. Check all connections after replacing damaged parts.
2. Inspect the water supply line and all drain lines and ensure that the trace heating is working and the insulation around the piping is undamaged.
3. Ensure that the exhaust condensate line and trap are not ruptured. Prime the exhaust condensate trap.
4. Power up the humidifier. The heater will automatically turn on and begin to warm up the humidifier enclosure. Once the temperature inside the enclosure has risen to the appropriate level, the unit will automatically resume normal operation.

9 Decommissioning of the Condair GS

9.1 General

If the Condair GS outdoor steam humidifier needs to be removed from service (for disposal or long-term storage), strictly follow all instructions in the following chapters.

Personnel Qualifications

Decommissioning of the Condair GS outdoor steam humidifier must only be performed by a qualified service technician authorized by the customer. It is the customer's responsibility to verify qualifications of the personnel.

Safety

Decommissioning of the Condair GS outdoor steam humidifier may require personnel to access the inside of the control cabinet in the humidifier which may expose personnel and equipment to the hazards. Make sure that the Condair GS outdoor steam humidifier is shut down properly as described in the Condair GS indoor operation manual, and observe all safety precautions described in [Section 2 on page 7](#) before performing any work on the humidifier.

9.2 Removal from Service for Disposal or Long-term Storage

Remove the Condair GS outdoor steam humidifier from service (for disposal or long-term storage) as follows:

1. Drain the tank, and shut down the humidifier as described in the Condair GS indoor operation manual. Follow all safety precautions.
2. Close the gas supply and disconnect the gas connection to the humidifier.
3. Disconnect and remove the power supply to the Condair GS outdoor steam humidifier. Refer to the appropriate "Wiring Diagram" (see [Fig. 19 on page 53](#)).
4. Disconnect and remove the control signal inputs to the humidifier.
5. Disconnect the steam and condensate lines, and empty out all fluids.
6. Disconnect the water and drain connections to the humidifier.
7. Remove the humidifier from its mounting surface.
8. If the Condair GS outdoor steam humidifier is to be put into long-term storage, store the humidifier in its original packaging inside a protected area that meets the following requirements:
 - Room temperature 41 to 104 °F (5 to 40 °C)
 - Room humidity: 10 to 75% RH
9. If the Condair GS outdoor steam humidifier is to be disposed of, refer to [Section 9.3](#).

9.3 Disposal/Recycling

The Condair GS outdoor steam humidifier should not be disposed of in domestic waste, and should only be disposed of in accordance with local regulations at authorized collection facilities.

If you have any questions, contact the appropriate local authorities or your local Condair representative.

10 Product specifications

10.1 Performance Data

Model	Power consumption at minimum demand [kW]		Power consumption at maximum demand [kW]		Manifold Pressure in Pa	Min./Max. Steam Capacity in kg/h
	Natural gas (G20) / (G20 H2 Blend)	Propane (G31)	Natural gas (G20) / (G20 H2 Blend)	Propane (G31)		
GS 23-CS	3.6 / 3.3	3.6	18.2 / 16.4	18.2	-2.5	4.6-23
GS 23	4.1 / 3.7	4.1	20.5 / 18.5	20.5	-2.5	4.6-23
GS 45-CS	7.3 / 6.6	7.3	36.4 / 32.8	36.4	-2.5	9-45
GS 45	8.2 / 7.4	8.2	41.0 / 36.9	41.0	-2.5	9-45
GS 65-CS	10.9 / 9.8	10.9	54.5 / 49.1	54.5	-2.5	13-65
GS 65	12.3 / 11.1	12.3	61.5 / 55.4	61.5	-2.5	13-65
GS 90-CS	7.3 / 6.6	7.3	72.7 / 65.4	72.7	-2.5	9-90
GS 90	8.2 / 7.4	8.2	82.0 / 73.8	82.0	-2.5	9-90
GS 130-CS	10.9 / 9.8	10.9	109.0 / 98.1	109.0	-2.5	13-130
GS 130	12.3 / 11.1	12.3	123.0 / 110.7	123.0	-2.5	13-130
GS 195-CS	10.9 / 9.8	10.9	163.5 / 147.2	163.5	-2.5	13-195
GS 195	12.3 / 11.1	12.3	184.5 / 166.1	184.5	-2.5	13-195
GS 260-CS	10.9 / 9.8	10.9	218.0 / 196.2	218.0	-2.5	13-260
GS 260	12.3 / 11.1	12.3	246.0 / 221.4	246.0	-2.5	13-260

10.2 Gas Consumption at Maximum Power

Model	Power consumption at maximum demand [kW]	Gas consumption at maximum demand [m³/h]			
		Natural gas (G20)	Natural gas (G25)	Natural gas (13A)	Propane (G31)
GS 23 CS	18.2 (16.4 *)	1.7	2.0	1.5	0.7
GS 23	20.5 (18.5 *)	1.9	2.3	1.7	0.8
GS 45 CS	36.4 (32.8 *)	3.5	4.0	3.0	1.4
GS 45	41.0 (36.9 *)	3.9	4.5	3.4	1.5
GS 65 CS	54.5 (49.1 *)	5.2	6.0	4.5	2.1
GS 65	61.5 (55.4 *)	5.9	6.8	5.1	2.3
GS 90 CS	72.7 (65.4 *)	6.9	8.1	6.0	2.7
GS 90	82.0 (73.8 *)	7.8	9.1	6.8	3.1
GS 130 CS	109.0 (98.1 *)	10.4	12.1	9.0	4.1
GS 130	123.0 (110.7 *)	11.7	13.6	10.2	4.6
GS 195 CS	163.5 (147.2 *)	15.6	18.1	13.5	6.2
GS 195	184.5 (166.1 *)	17.6	20.4	15.3	6.9
GS 260 CS	218.0 (196.2 *)	20.8	26.2	18.0	8.2
GS 260	246.0 (221.4 *)	23.4	29.5	20.4	9.3

* Power consumption at maximum demand for hydrogen blended G20 natural gas

10.3 Operating Data for Condair GS Serie II Outdoor Models

Control signal input types	
Active	0-5 VDC, 1-5 VDC, 0-10 VDC, 2-10 VDC, 0-20 VDC, 0-16 VDC, 3,2-16 VDC, 0-20 mADC, 4-20 mADC
Passive	135-10 kΩ ohmic humidity sensor
On/Off control	<2.5 VAC (Off) 2.5-20 VAC (On)
Digital (via Modbus, BACnet IP/MSTP)	BACnet IP, BACnet MSTP, Modbus, LonWorks (Option), BACnet MSTP BTL-Certified (Option), BACnet IP BTL-Certified (Option)

Ambient Conditions	
Ambient temperature (moderate climate package)	-20 °C to 50 °C
Relative humidity	5-80 % (non-condensing)

Combustion Air	
Combustion air maximum temperature	50 °C

Backpressure steam line	
Maximum permissible backpressure (duct static pressure and line backpressure)	2.49 kPa - all units

Gas operating pressure		
Natural gas:	H *, E, E(S) G20 *	1.7 – 2.5 kPa (17-25 mbar)
	L, ELL G25	2.0 – 3.0 kPa (20-30 mbar)
	HS G25.1	2.0 – 3.0 kPa (20-30 mbar)
	EK G25.3	1.7 – 3.0 kPa (17-30 mbar)
	Lw G27	1.7 – 2.3 kPa (17-23 mbar)
	Ls GZ350	1.1 – 1.6 kPa (11-16 mbar)
	Japan 13A	1.5 – 2.5 kPa (15-25 mbar)
Propane:	G31	2.5 – 5.7 kPa (25-57 mbar)

* permissible for hydrogen blends up to 20% content by volume

CO ₂ levels in exhaust gas products		
Gas type	CO ₂ at maximum rate	CO ₂ at minimum rate
G20	9.5 ± 0.2 %	8.5 ± 0.2 %
G25		
G25.1		
G25.3		
G27		
GZ350		
13A		
G31	10.4 ± 0.2 %	9.5 ± 0.2 %

Water Supply	
Water pressure (regulated)	207...552 kPa
Flow rate	10 l/min for GS OC 23-130 OC 20 l/min for GS OC 195-260 OC
Water temperature	1-25 °C, recommended maximum: 15 °C
Water quality	Cold potable water filtered to 5 µm, hardness of 0-205 ppm, pH level between 6.5-7.5 and chloride 0-40 ppm

Drain water	
Drain water temperature	60 °C maximum with drain water cooling, 212 °F without drain water cooling
Drainage capacity	20 l/min

Power						
Model	Power Supply	Heaters (qty x rating)	Internal Breaker Ratings	Full Load Amps (A)	Circuit Protection (A)	Power Consumption (kW)
GS 23-OC (ST, CS)	230V/1ph/50Hz	1 x 700W	5A, 5A	7.4	10	1.48
	200V/1ph/50Hz	1 x 700W	5A, 5A	6.4	10	1.28
GS 45-OC (ST, CS)	230V/1ph/50Hz	1 x 700W	5A, 5A	7.4	10	1.48
	200V/1ph/50Hz	1 x 700W	5A, 5A	6.4	10	1.28
GS 65-OC (ST, CS)	230V/1ph/50Hz	1 x 700W	5A, 5A	7.9	10	1.60
	200V/1ph/50Hz	1 x 700W	5A, 5A	6.9	10	1.40
GS 90-OC (ST, CS)	230V/1ph/50Hz	1 x 1200W	5A, 10A	10.5	15	2.07
	200V/1ph/50Hz	1 x 1200W	5A, 10A	10.5	15	2.07
GS 130-OC (ST, CS)	230V/1ph/50Hz	1 x 1200W	5A, 10A	11.4	15	2.28
	200V/1ph/50Hz	1 x 1200W	5A, 10A	11.4	15	2.28
GS 195-OC (ST, CS)	230V/1ph/50Hz	1 x 1200W	10A, 10A	12.2	20	2.46
	200V/1ph/50Hz	1 x 1200W	10A, 10A	12.2	20	2.46
GS 260-OC (ST, CS)	230V/1ph/50Hz	1 x 1200W	10A, 10A	13.1	20	2.67
	200V/1ph/50Hz	1 x 1200W	10A, 10A	13.1	20	2.67

IP Rating	IP45 for all units
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10.4 Weights

For the weights of the Condaire GS humidifier models refer to [Table 5 on page 30](#) and [Table 6 on page 30](#).

10.5 Dimensions

10.5.1 Dimensions Condair GS 23 OC / GS 45 OC / GS 65 OC

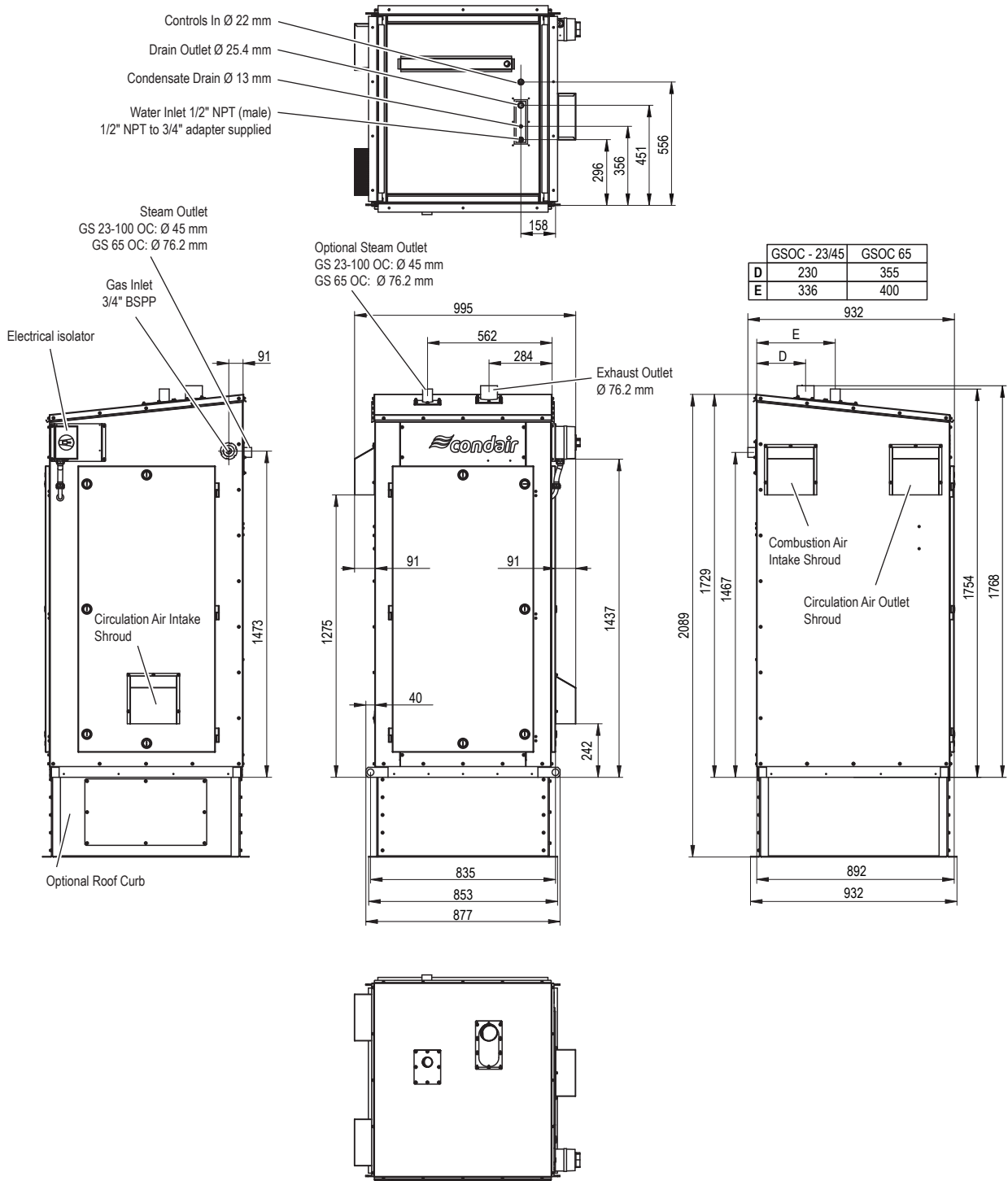


Fig. 24: Dimensions Condair GS 23 OC / GS 45 OC / GS 65 OC (Dimensions in mm)

Roof curb optional. The humidifier may also be installed onto an appropriate concrete curb according local guidelines.

10.5.2 Dimensions Condair GS 90 OC / GS 130 OC

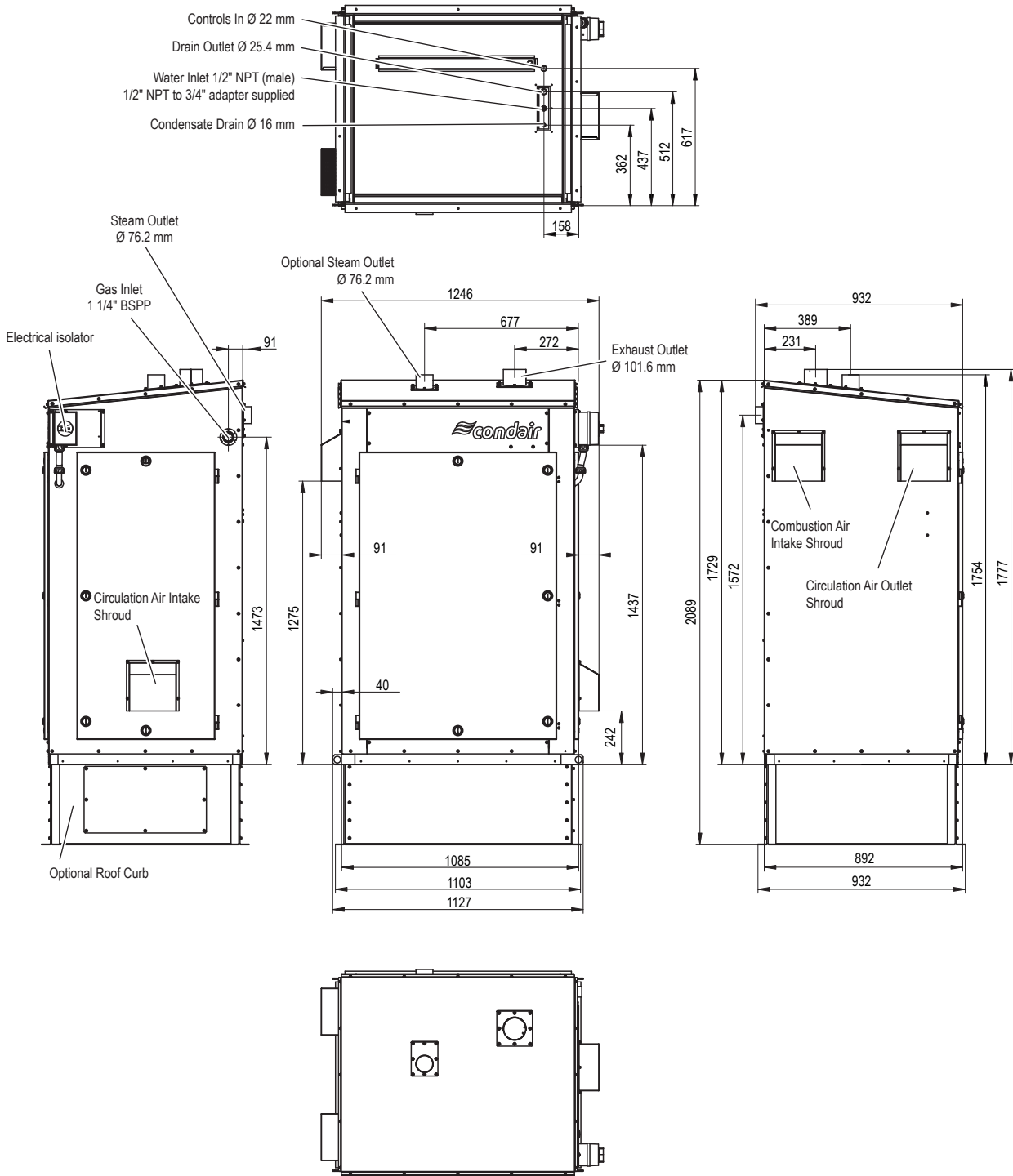


Fig. 25: Dimensions Condair GS 90 OC / GS 130 OC (Dimensions in mm)

Roof curb optional. The humidifier may also be installed onto an appropriate concrete curb according local guidelines.

10.5.3 Dimensions Condair GS 195 OC / GS 260 OC

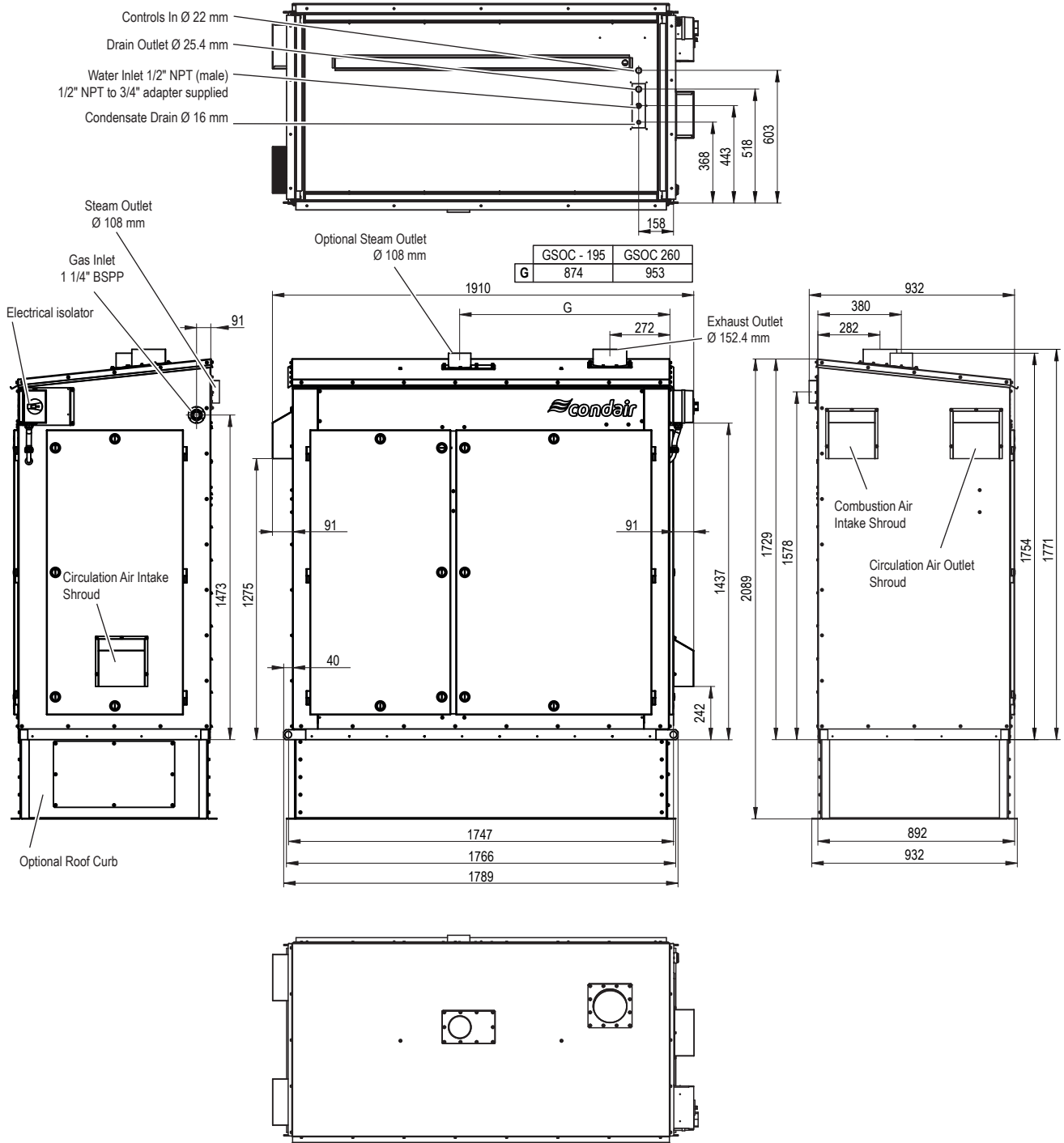


Fig. 26: Dimensions Condair GS 195 OC / GS 260 OC (Dimensions in mm)

Roof curb optional. The humidifier may also be installed onto an appropriate concrete curb according local guidelines.

Notes

CONSULTING, SALES AND SERVICE:



CH94/0002.00

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The Condair logo, consisting of a stylized wave symbol followed by the word 'condair' in a bold, lowercase, sans-serif font.