



INSTALLATION MANUAL

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 To the very Beginning

We thank you for having purchased the **Condair GS steam humidifier**.

The Condair GS steam humidifier incorporates the latest technical advances and meets all recognized safety standards. Nevertheless, improper use of the Condair GS 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 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 Manual

Limitation

The subject of this installation manual is the Condair GS steam humidifier in its different versions. The various options and accessories are only described insofar as is necessary for proper installation of the equipment. Further information on options and accessories can be obtained that are supplied with them.

This installation manual is restricted to the **installation** of the Condair GS steam humidifier and is meant for **well trained personnel being sufficiently qualified for their respective work**.

Other Related Publications

This installation manual is supplemented by various separate items of documentation (operation manual, spare parts list, etc.), which are included in the delivery as well. Where necessary, appropriate cross-references are made to these publications in the installation manual.

Symbols used in this manual



CAUTION!

The catchword "CAUTION" used in conjunction with the caution symbol in the circle designates notes in this installation 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 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 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 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 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 the installation work on the Condair GS must have read and understood this manual and the Condair GS operation manual before carrying out any work.

Knowing and understanding the contents of the installation manual and the operation manual 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 manual **may only be carried out by specialists who are well trained and adequately qualified and are authorised 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 humidifier must be familiar with, and comply with the appropriate regulations on work safety and the prevention of accidents.

Intended use

The Condair GS steam humidifier is intended **exclusively for air humidification via a steam distributor approved by Condair within specified operating conditions** (see Condair GS operation manual). Any other type of application, without the written consent of Condair, is considered as not conforming with the intended purpose and may lead to the Condair GS becoming dangerous and will void any 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 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.



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

Prevention: Tag all wires when performing the electrical installation. Reconnect all wires correctly after servicing and functional checks, 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 is a gas-fired humidifier. Improper installation, 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.

Work on the gas system may only be carried out by a qualified installer, an authorized service technician or by your local gas provider.

Before starting work on the gas system, make sure that the Condair GS is taken out of operation (device switched off, disconnected from the power supply and water and gas supply closed) and secured against unintentional power-up.

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

DO NOT store or use gasoline or other flammable vapors 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.**

Important! Also observe and comply with all safety notes regarding the operation in the Condair GS operation manual.

Preventing Unsafe Operation

All personnel working with the Condair GS must immediately report to the customer any alterations to the unit that may affect safety, and secure the unit against accidental power-up.

Prohibited modifications to the unit

No modifications must be undertaken on the Condair GS 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. Please note and comply with the relevant information on these labels.

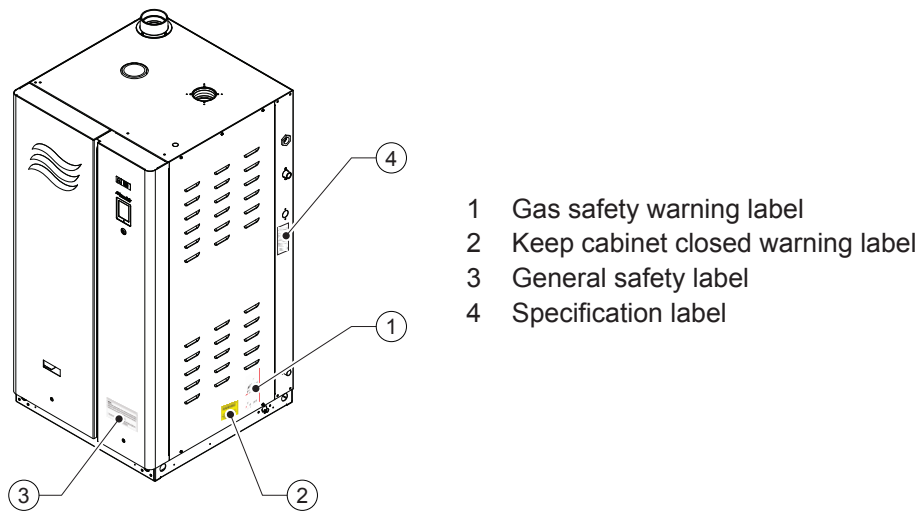
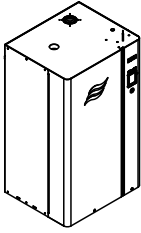
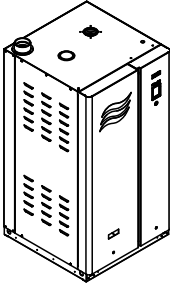
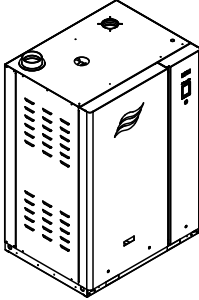
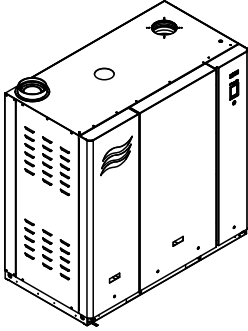
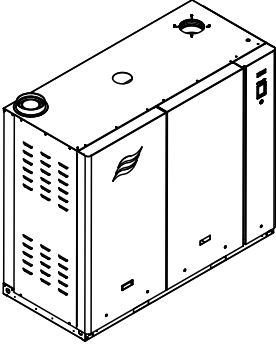


Fig. 1: Position of the safety and identification labels

3 Product Overview

3.1 Model overview

Condair GS are available in **two different housing designs** ("Compact" for wall mounting and "Standard" for floor mounting), **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**

Compact	Standard			
GS 23 GS 45	GS 65	GS 90 GS 130	GS 195	GS 260
				
max. steam capacity				
23 kg/h or 45 kg/h	65 kg/h	90 kg/h or 130 kg/h	195 kg/h	260 kg/h

Detailed information on the unit specifications can be found in [Section 6](#).

3.2 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](#)).

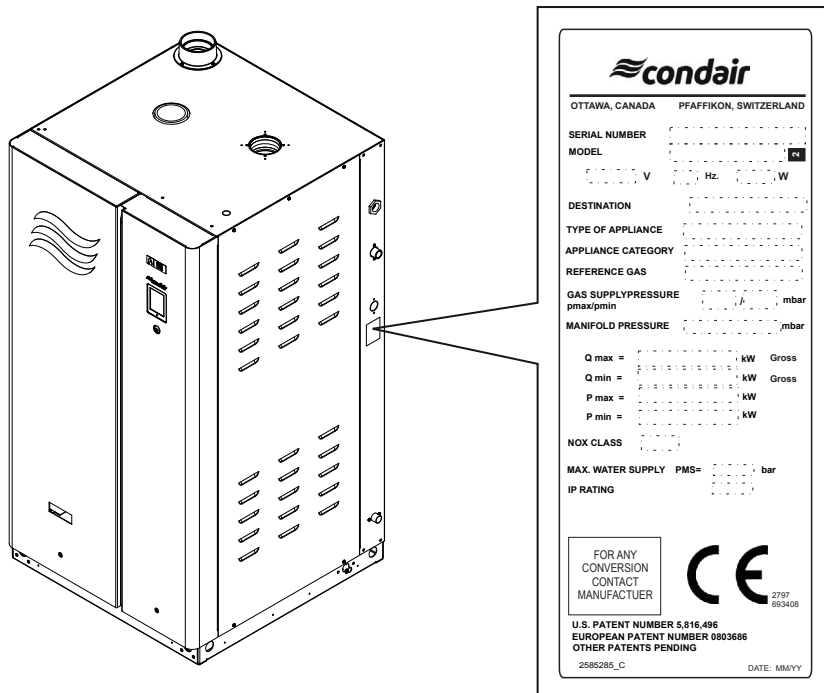


Fig. 2: Position of the specification label

Key model designation

Example:
Condair GS 130 - CS G20 200V - Series II

Product designation: _____

Steam capacity in kg/h: _____

23
45
60
90
130
195
260

Efficiency: _____

CS: High efficiency **with** condensing heat exchanger
: Standard efficiency **without** condensing heat exchanger

Fuel: _____

Natural gas H, E, E(S): **G20**
Natural gas L, ELL: **G25**
Natural gas HS: **G25.1**
Natural gas Lw: **G27**
Natural gas Ls: **G2.350**
Propane gas P: **G31**

Supply voltage: _____

Appliance series: _____

3.3 Accessories

3.3.1 Accessories overview

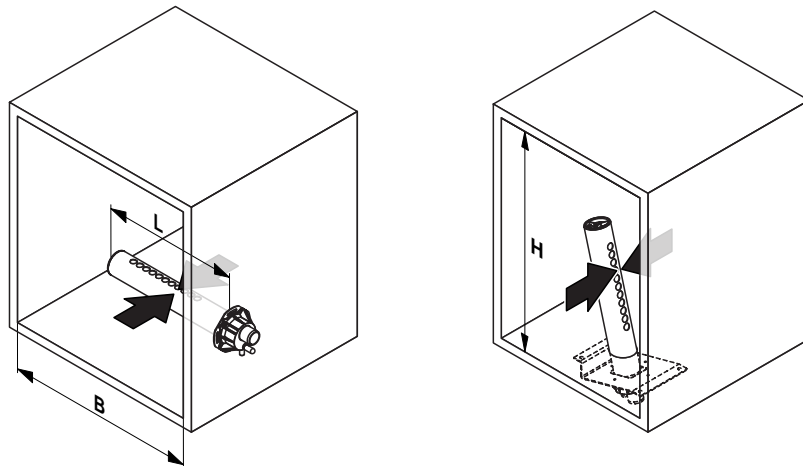
Model Condair GS	23 ...	45 ...	65 ...	90 ...	130 ...	195 ...	260 ...
Steam distribution pipe (see details in Section 3.3.2)	81-...						
Quantity	1	1	2	2	3	5	6
Steam distribution system OptiSorp (see details in Section 3.3.2)	System 1	System 1	System 2	System 2	System 3	System 3 System 2	System 3
Quantity	1	1	1	1	1	1 of each	2
Steam distribution system DR	DR73						
Quantity	—	—	—	—	1	1	1
Steam hose adapter	—	—	SA80 <small>(3" / 2x ø45 mm)</small>	SA80 <small>(3" / 2x ø45 mm)</small>	SA120 <small>(3" / 3x ø45 mm)</small>	SA200 <small>(4" / 5x ø45 mm)</small>	SA240 <small>(4" / 6x ø45 mm)</small>
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)						

3.3.2 Accessory details

3.3.2.1 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

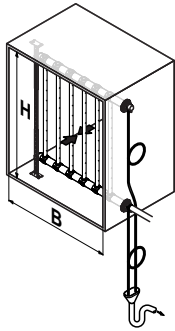
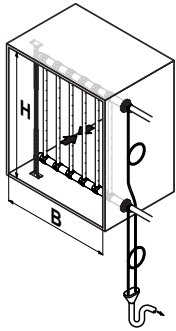
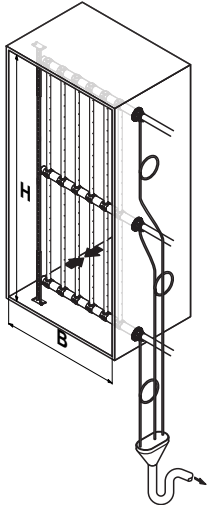
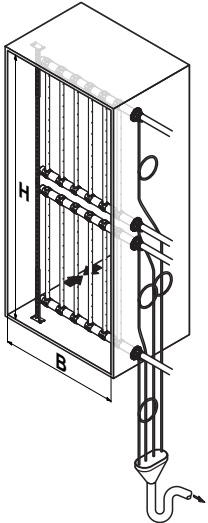
²⁾ To fully exploit the overall capacity of your humidifier, the output of each steam outlet may be fed to more than one steam distribution pipe. If more than one steam distribution pipe is fed per steam outlet the steam line must be divided into multiple branches. Appropriate adapters are available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

3.3.2.2 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.

4 Control of delivery / storage and transportation

4.1 Inspection

After receiving:

- Inspect shipping boxes for damage.
Any damages of the shipping boxes must be reported to the shipping company without delay.
- Check packing slip to ensure all parts has been delivered.
All material shortages are to be reported to your Condair supplier within 48 hours after receipt of the goods. Condair Group AG assumes no responsibility for any material shortages beyond this period.
The standard delivery includes:
 - Condair GS steam humidifier packed in cardboard box on shipping palette
 - Accessory box with:
 - Installation manual (this document), operation manual and spare parts list
 - Floor stand
 - Hose cuff and 2 hose clamps for steam outlet
 - BSPP gas line input adapter
 - DIN adapter for steam outlet (for GS 195 and GS 260 units only)
 - External condensate trap (GS 90 CS – 260 CS high efficiency units)
 - Drain hose \varnothing 25 mm ID, 305 mm long with hose clamp
 - Hose cuff for condensate trap
 - Wall mount brackets (for GS 23 and GS 45 units only)
 - Air intake adapter \varnothing 60 mm to \varnothing 80 mm (for GS 23, GS 45 and GS 45-CS units only)
- Note: For GS 23/45 models the accessory box is located inside the box of the humidifier. For all other models (GS 65-260) is shipped separately but on the same shipping pallet as the steam humidifier
- Ordered accessories with manual according [Section 3.3](#), packed separately.
- Unpack the parts/components and check for any damage.
If parts/components are damaged, notify the shipping company immediately.
- Check whether the components are suitable for installation on your site according to the unit data stated on the specification label.

4.2 Storage and Transportation

Storing

Until installation store the Condair GS in its original packaging in a protected area meeting the following requirements:

- Room temperature: 5 ... 40 °C
- Room humidity: 10 ... 75 %rh

Transportation

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



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

In case you wish to dispose of the packaging, observe the local regulations on waste disposal. Please recycle packaging where possible.

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-Series II 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).

5.2 Installation overviews

5.2.1 Typical installation compact units

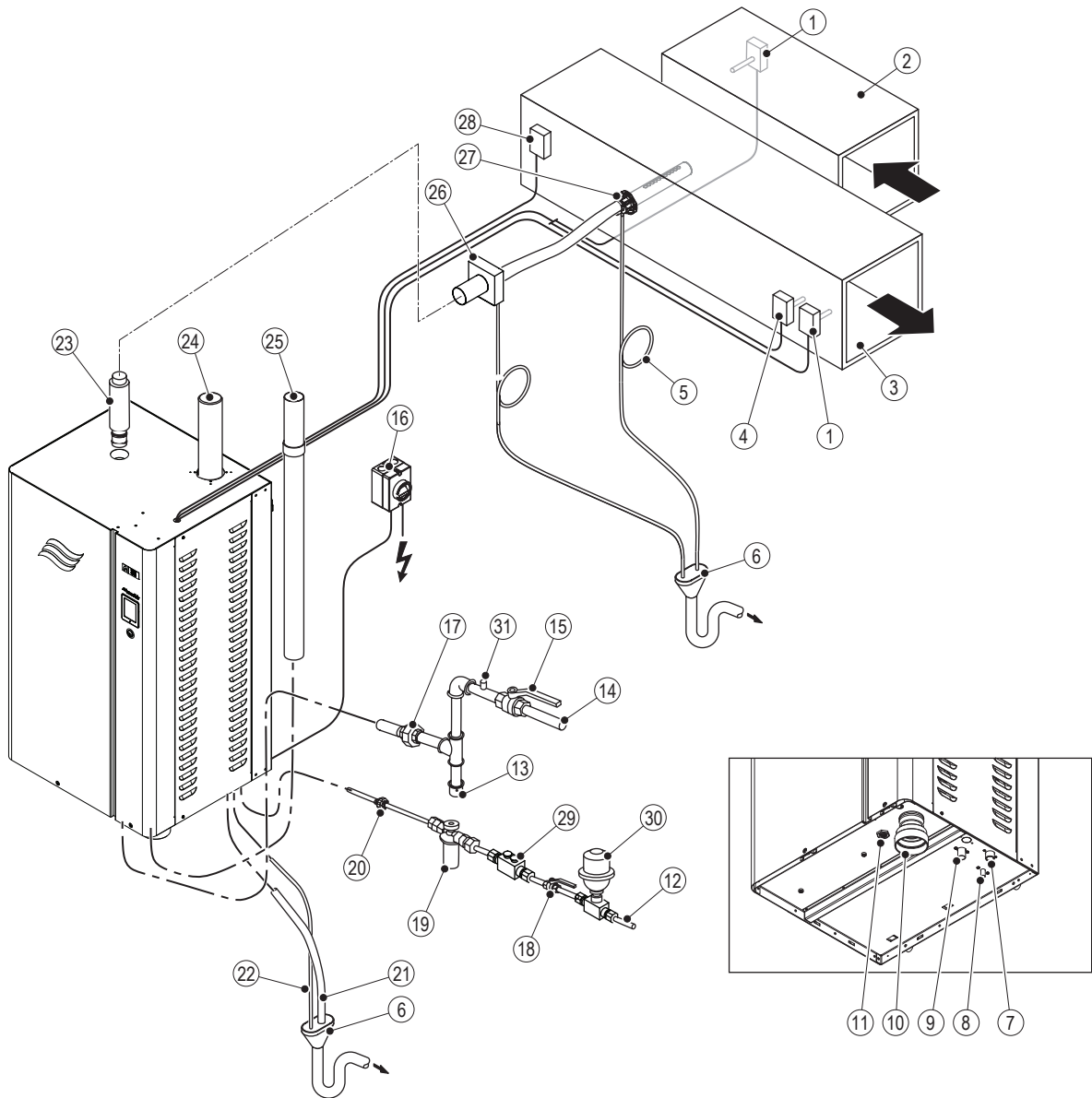


Fig. 3: Typical installation compact units

- | | | | |
|----|--|----|--|
| 1 | Humidity sensor or external humidity controller (installed in the extract air duct for extract air humidity control or in the supply air duct for supply air humidity control) | 17 | Connection fitting gas supply line |
| 2 | Extract air duct | 18 | Shutoff valve water supply line |
| 3 | Supply air duct | 19 | Water filter |
| 4 | Safety humidistat (external safety loop) | 20 | Connection fitting water supply line |
| 5 | Condensate drain line with trap | 21 | Water drain line |
| 6 | Open funnel with trap | 22 | Flue gas condensate drain (CS only) |
| 7 | Water supply connector | 23 | Steam line |
| 8 | Connector flue gas condensate drain | 24 | Flue gas pipe (connected to exterior) |
| 9 | Water drain connector | 25 | Combustion air supply pipe (connected to exterior – optional) |
| 10 | Combustion air supply connector | 26 | Steam hose adapter |
| 11 | Gas supply connector | 27 | Steam distribution pipe DV81-.. |
| 12 | Water supply line | 28 | Air flow monitor (external safety loop) |
| 13 | Sediment trap | 29 | Pipe disconnector as backflow preventer (optional, supplied by others) |
| 14 | Gas supply line | 30 | Water shock arrestor (supplied by others) |
| 15 | Shutoff valve gas supply line | 31 | Gas test port (supplied by others) |
| 16 | Electrical isolator voltage supply (mandatory) | | |

5.2.2 Typical installation standard units

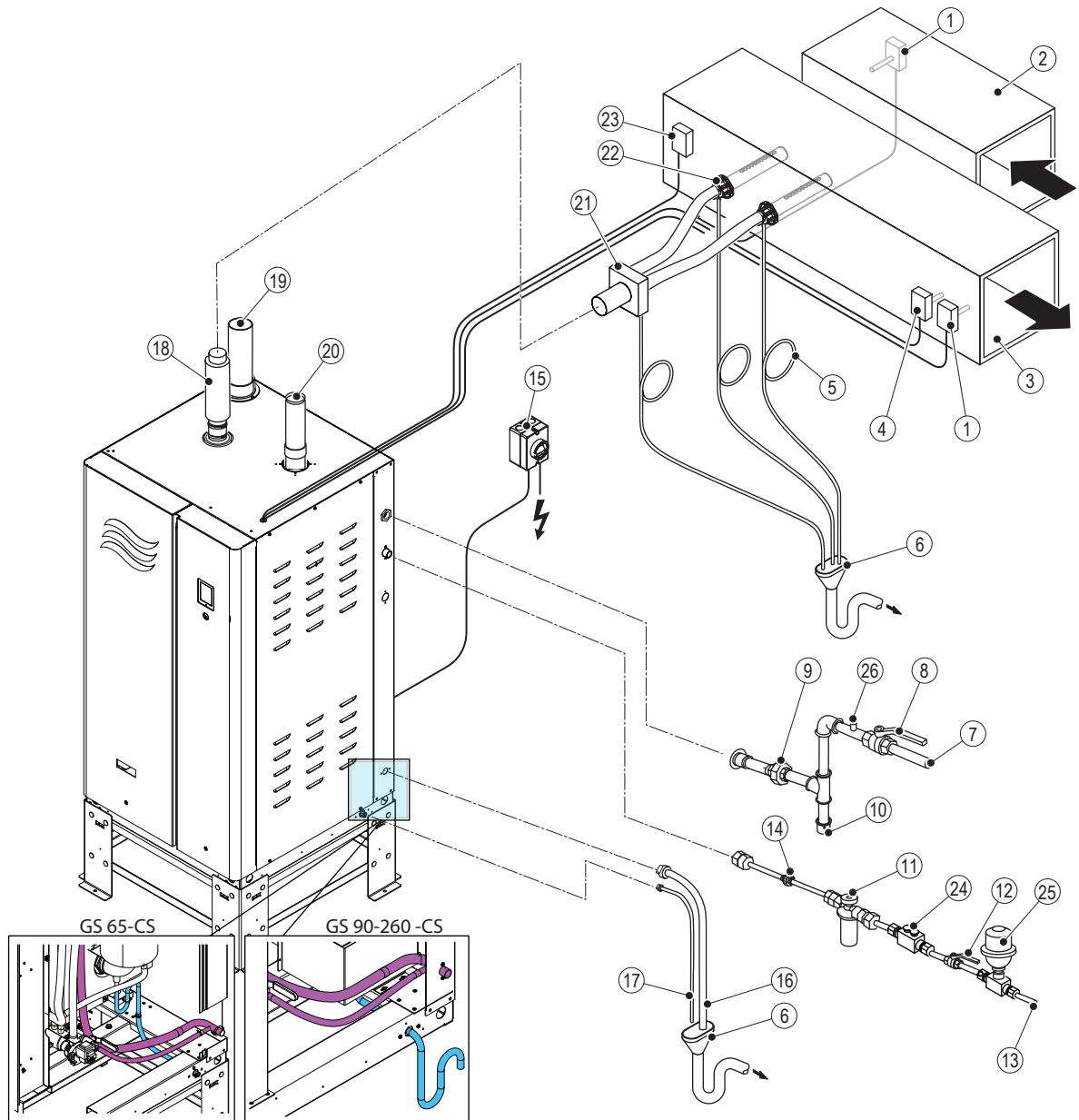


Fig. 4: Typical installation standard units (GS 65 unit is shown)

- | | | | |
|----|--|----|--|
| 1 | Humidity sensor or external humidity controller (installed in the extract air duct for extract air humidity control or in the supply air duct for supply air humidity control) | 14 | Connection fitting water supply line |
| 2 | Extract air duct | 15 | Electrical isolator voltage supply (mandatory) |
| 3 | Supply air duct | 16 | Water drain line |
| 4 | Safety humidistat (external safety loop) | 17 | Flue gas condensate drain line (CS only) |
| 5 | Condensate drain line with trap | 18 | Steam line |
| 6 | Open funnel with trap | 19 | Combustion air supply pipe (connected to exterior – optional) |
| 7 | Gas supply line | 20 | Flue gas pipe (connected to exterior) |
| 8 | Shutoff valve gas supply line | 21 | Steam hose adapter |
| 9 | Connection fitting gas supply line | 22 | Steam distribution pipe DV81-.. |
| 10 | Sediment trap | 23 | Air flow monitor (external safety loop) |
| 11 | Water filter | 24 | Pipe disconnector as backflow preventer (optional, supplied by others) |
| 12 | Shutoff valve water supply line | 25 | Water shock arrester (supplied by others) |
| 13 | Water supply line | 26 | Gas test port (supplied by others) |

5.3 Installation Space Requirements

In preparation for installation of the Condair GS humidifier ensure that the following installation space requirements are satisfied. Report any discrepancies to the site engineer.

- The installation space must comply with the applicable local and national regulations for the installation of gas-fired appliances.
- The room in which the Condair GS is to be installed should be lockable if possible.
- The installation room must be protected against dripping water and must have the following temperature and humidity values throughout the year:
Room temperature: +15°C to +30°C
Room humidity: 15 %rh to 75 %rh (non condensing)
- There must be no flammable materials (e.g. wooden floors, carpets, etc.) or other sensitive materials in the installation room.
- Sufficient space must be available for operation and maintenance at the place of installation of the Condair GS humidifier.
- The floor surface or wall surface on which the Condair GS humidifier is mounted must be level, have sufficient load-bearing capacity (for maximum operating weights, see [Table 2](#)) and be suitable for mounting (no vibrating, hot or very cold surfaces).
- The floor surface or wall surface on which the Condair GS humidifier is mounted must be able to withstand temperatures of 60-70 °C.
- There should be a **floor drain** in the installation room that is connected to the building's waste water line. If there is no floor drain in the room, the room must be equipped with a leakage monitoring device which automatically shuts off the water supply in the event of a water leak.
- It must be possible to install the Condair GS humidifier in the room in such a way that the maximum permissible length of the steam line between the humidifier and the steam distributor(s) is not exceeded, the minimum bend radii of the steam line are observed and that the steam pipe/steam hoses can be laid with a constant upslope or downslope (see notes on steam installation in [Section 5.6](#)).
- A water supply connection (drinking water, RO water or deionized water) must be available or be made in the installation room. Please note the information on water supply in [Section 5.7](#).
- In the installation room, depending on the location of the Condair GS humidifier and the steam distributor(s), there must be one or two open drain funnels with trap, which is/are connected to the building's waste water line (see notes on water installation in [Section 5.7](#)).
- The building's waste installation must be made of heat-resistant material that is designed for drainage water of up to 100 °C.
- The room in which the Condair GS humidifier is to be installed must have a sufficiently large air supply opening (in-room air installation) or a combustion air supply via a pipe from the outside (room seal installation). Please note the information in [Section 5.8](#).
- The room in which the Condair GS humidifier is to be installed must allow exhaust gas discharge to the outside. Please note the information on exhaust gas installation in [Section 5.9](#).
- In the installation room a gas supply connection must be available or be made. Please note the information on gas installation in [Section 5.10](#).
- The installation room must be equipped with a 230V/1~/50-60 Hz power supply. Please note the information on electrical installation in [Section 5.12](#).

5.4 Mounting the Humidifier

5.4.1 Notes on positioning the humidifier

- Before mounting the Condair GS humidifier, ensure that the requirements for the installation space are met (see [Section 5.3](#)).
- Place the Condair GS humidifier so that:
 - there is enough space for operation and maintenance (for minimum clearances, see [Section 5.4.2](#)),
 - the length of the steam line is as short as possible (max. length see [Section 5.5](#)).
 - the minimum bending radii and the minimum upslope or downslope of the steam pipes/steam hoses can be maintained (see [Section 5.6.1](#)).
 - the combustion air supply line (room seal installation only) and the flue gas discharge line can be routed from the outside to the device in accordance with the information in [Section 5.8](#) and [Section 5.9](#) and the applicable local and national regulations.

5.4.2 Clearances to be observed / Dimensions and weights

5.4.2.1 Clearances to be observed

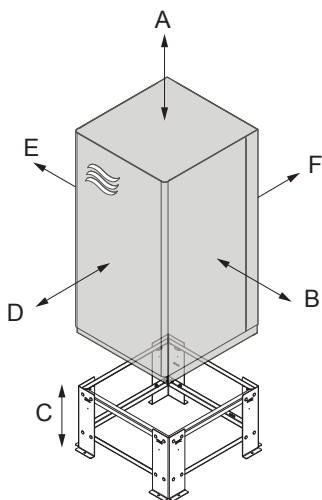


Fig. 5: Clearances to be observed

Table 1: Clearances to be observed *

Model	Overhead Clearance "A" in mm	Right Side Clearance "B" in mm	Floor Stand Height "C" in mm	Front Clearance "D" in mm	Left Side Clearance "E" in mm	Rear Clearance "F" in mm
GS 23	406	610	670	914	0	0
GS 45	406	610	670	914	0	0
GS 65	406	610	426	914	0	0
GS 90	406	610	426	914	0	0
GS 130	406	610	426	914	0	0
GS 195	406	610	426	914	0	0
GS 260	406	610	426	914	0	0

* Local and national installation codes must be observed and followed.

5.4.2.2 Dimensions and Weights

The dimensions and weights shown below do not include the wall mount bracket. See also dimensional drawings in [Section 6.5](#).

Table 2: Overall dimensions and weights Condair GS CS

Model	Dimensions in mm				Weights in kg		
	Height	Height (with floor stand)	Width	Depth	Net	Operating	Floor stand
GS 23 CS	1103	1741	640	542	80	167	21.5
GS 45 CS	1103	1741	640	542	89	176	21.5
GS 65 CS	1387	1792	717	738	140	267	18
GS 90 CS	1387	1792	967	738	193	432	19
GS 130 CS	1387	1792	967	738	198	437	19
GS 195 CS	1387	1792	1382	738	248	662	26
GS 260 CS	1387	1792	1632	738	372	892	27

Table 3: Overall dimensions and weights Condair GS Standard

Model	Dimensions in mm				Weights in kg		
	Height	Height (with floor stand)	Width	Depth	Net	Operating	Floor stand
GS 23	1103	1741	640	542	73	160	21.5
GS 45	1103	1741	640	542	82	169	21.5
GS 65	1387	1792	717	738	131	258	18
GS 90	1387	1792	967	738	184	423	19
GS 130	1387	1792	967	738	189	428	19
GS 195	1387	1792	1382	738	226	640	26
GS 260	1387	1792	1632	738	350	870	27

5.4.3 Removing the Humidifier from the Shipping Pallet

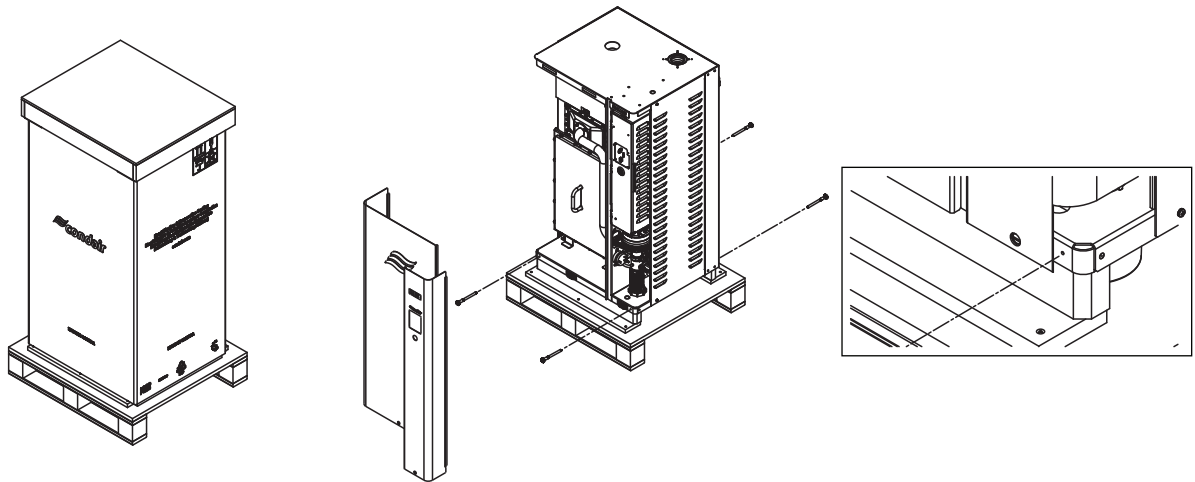


Fig. 6: Removing the Shipping Pallet Screws (compact unit shown)

1. Remove cardboard protection from the humidifier.
2. Remove both door panels from the humidifier, and remove and discard the shipping screws that secure the unit to the shipping pallet.
3. Reattach and secure the door panels.
4. Lift the humidifier by its base frame and raise it off the shipping pallet. The unit may now be mounted.



WARNING!

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

Prevention: Use an appropriate lifting device to lift the humidifier. Lift the unit always from the bottom by its base frame, and not on the side or top panels.

5.4.4 Wall Mounting – Condair GS 23/45 compact units only

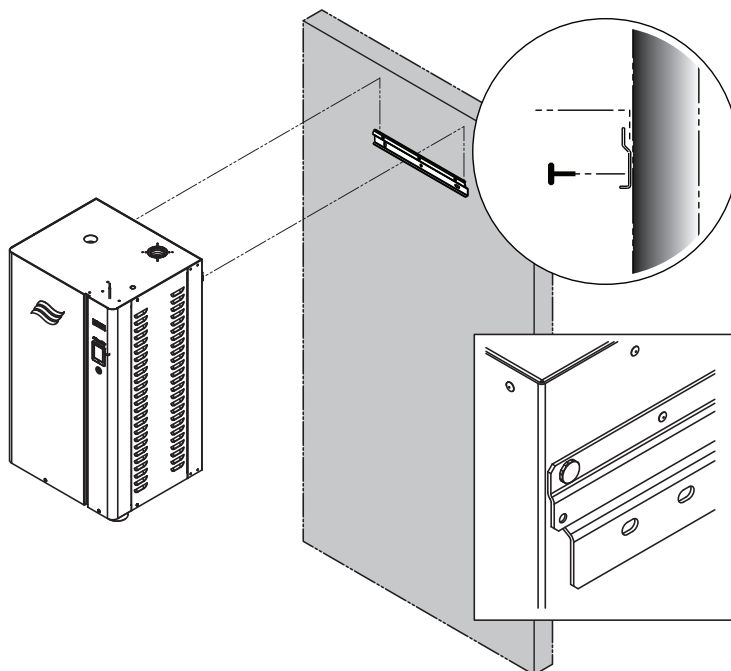


Fig. 7: Wall mounting compact unit Condair GS 23/45

Proceed as follows to mount the GS 23/45 compact devices to a wall (see [Fig. 7](#)):

1. Check that the selected mounting location provides adequate clearances for maintenance, and is at an easily serviceable height (clearances to be observed see [Section 5.4.2.1](#)).
2. Ensure that the mounting surface has adequate structural strength to support the operating weight of the unit (unit weights see [Section 5.4.2.2](#)).
3. Open the accessory box supplied.
4. Install the mounting bracket to the wall using suitable $\varnothing 10$ mm screws and plastic plugs (not supplied). Ensure that the fixing material is capable of supporting the weight of the humidifier:
 - At the desired position on the vertical mounting surface, secure one end of the mounting bracket to the wall using a suitable $\varnothing 10$ mm screw and a plastic plug.
 - Level the mounting bracket, and mark the locations of the remaining attachment points.
 - Secure the mounting bracket to the wall at the remaining attachment points using suitable $\varnothing 10$ mm screws and appropriate plastic plugs. Before tightening the screws level the mounting bracket.
5. Carefully lift the humidifier by its base frame and raise it off the shipping pallet.
6. Carefully lower the humidifier onto the mounting bracket that is secured to the wall
7. Remove the door panels. Secure humidifier through the back panel to the mounting rail using the supplied screws. Relocate front panels.

5.4.5 Floor Stand Mounting

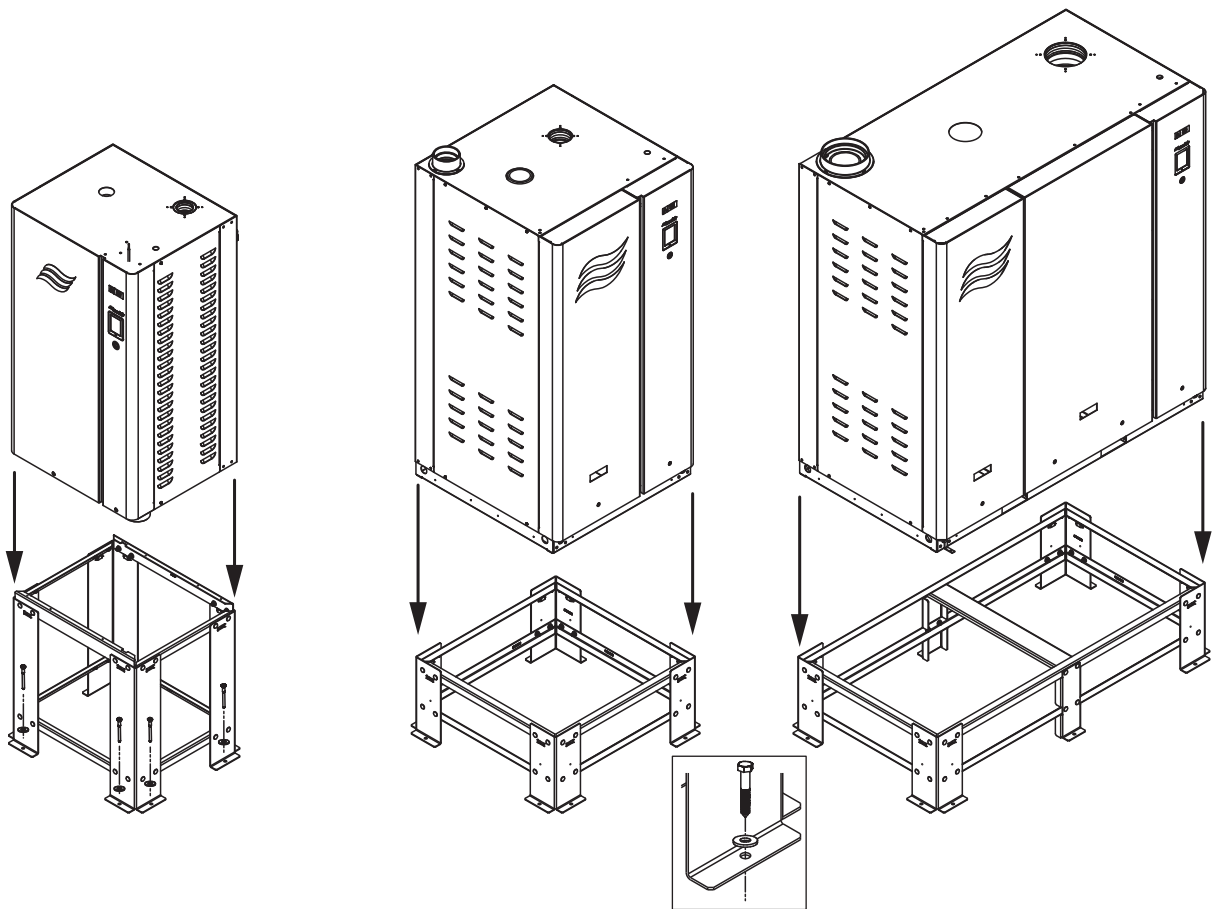


Fig. 8: Floor stand mounting

The standard units GS 65-260 must be and the compact devices GS 23/45 can be mounted on the floor using the supplied floor stand. For floor stand mounting with the supplied floor stand, proceed as follows (see [Fig. 8](#)):

1. Check that the selected mounting location provides adequate clearances for maintenance (clearances to be observed see [Section 5.4.2.1](#))
2. Open the accessory box supplied. Assemble the floor stand using the instructions in the accessory box.
3. Ensure that the mounting surface has adequate structural strength to support the operating weight of the unit (unit weights see [Section 5.4.2.2](#)) and level.
4. Place the floor stand at the desired position on the floor. Align floor stand horizontally in both directions using shims. If desired, secure the stand to the floor with $\varnothing 10$ mm bolts and washers (not supplied).
5. Carefully lift the humidifier by its base frame and raise it off the shipping pallet. Gently lower the humidifier on the stand.



WARNING!

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

Prevention: Use an appropriate lifting device to lift the humidifier. Lift the unit always from the bottom by its base frame, and not on the side or top panels.

5.4.6 Mounting Checklist

Check the following to ensure that the humidifier has been mounted correctly:

- Unit installed in the correct location (refer to [Section 5.3](#))?
- Adequate clearance for servicing unit (refer to [Section 5.4.2.1](#))?
- Mounting surface stable, and capable of supporting the full operating weight of the humidifier?
- Unit level and secured properly?

5.5 Steam Installation

Steam generated by the humidifier can be distributed into a conditioned space through an air handling unit (AHU) using Condair steam distributors or OptiSorp steam distribution systems. Refer to their respective manuals for installation details.

5.6 Installing the Main Steam Pipe

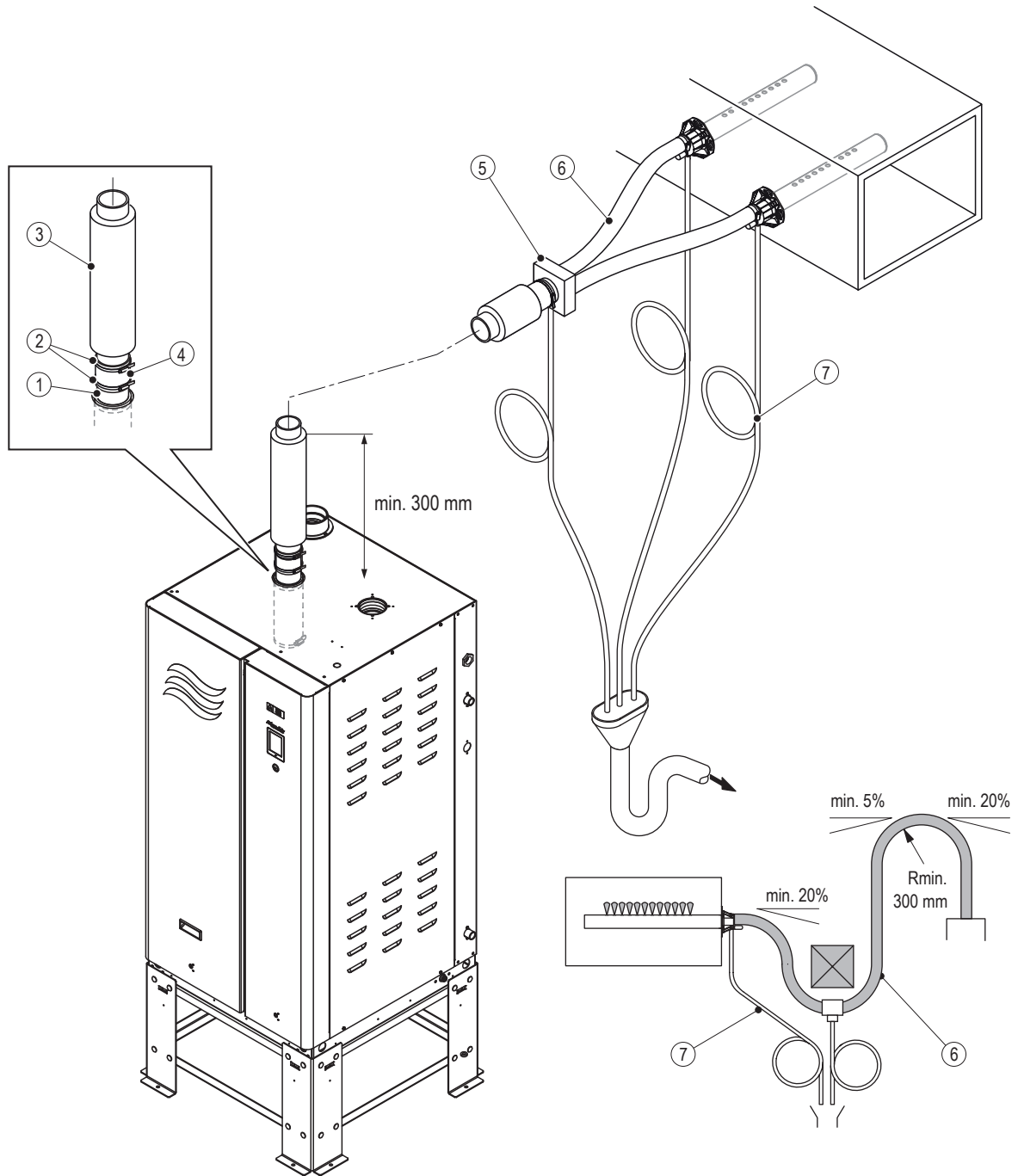


Fig. 9: Main Steam Line Installation

- | | |
|--|---|
| <ul style="list-style-type: none"> 1 Steam outlet humidifier
(DN100 adapter supplied with Condair GS 195/260) 2 Worm gear hose clamp (supplied) 3 Insulated rigid steam pipe
(main steam pipe, max. 6 m long, must rise straight up minimum 300 mm above steam outlet before continuing to steam distributor) 4 Hose cuff (supplied) 5 Steam distribution adapter (accessory) | <ul style="list-style-type: none"> 6 Steam hose
(Maximum length 4 m, minimum bend radius 300 mm, must be led with a minimum upslope of 20% or minimum downslope of 5% to steam distributor, steam hose must not sag, add condensate drain line, as shown, if necessary) 7 Condensate drain line
(Must be led with a minimum downslope of 2% via a trap - hose bend with min. \varnothing300 mm - into an open drain funnel connected to the building waster water line. The trap should be located minimum 300 mm below the steam distributor) |
|--|---|

Table 4: Steam Outlet Diameter

Model	Steam outlet diameter	Nominal diameter
GS 23/45	ø45 mm	use Condair steam hose
GS 65/90/130	ø76.2 mm	DN65
GS 195/260	ø101.6 mm	DN100

5.6.1 Best Practices for Installing Steam and Condensate Lines

Condair recommends that you observe the following best practices for installing atmospheric steam lines and condensate lines. Refer also to [Fig. 9](#).

5.6.1.1 Steam line

- Use only rigid steam pipes made of copper (MED Type-L) or stainless steel (at least DIN 1.4301) for the main steam pipe of the Condair GS 65-260 devices and only the Condair steam hose or also a rigid steam pipe made of copper (MED Type-L) or stainless steel (at least DIN 1.4301) for the steam line of the Condair GS 23/45 devices. Other steam pipes/Steam hoses made of any other materials may adversely affect the operation of the unit.
- Refer to [Table 5](#) for the required minimum internal diameter of the steam pipe/steam hose. The internal diameter of the steam pipe/steam hose can be expanded, but once expanded a reduction in diameter is not permitted, except at the steam distributor.

Table 5: Steam pipe/steam hose diameter

Model	Minimum internal diameter	Loss of steam due to condensation in copper MED type L pipes		Max. equivalent steam line length	Maximum allowable backpressure
		not isolated	isolated		
GS 23	45 mm	0.15 kg/m	0.04 kg/m	6 m (Steam hose)	1.49 kPa
GS 45	45 mm	0.15 kg/m	0.04 kg/m		1.49 kPa
GS 65	76 mm	0.24 kg/m	0.06 kg/m	10 m Main steam pipe: max 6 m Distribution hoses: max. 4 m	2.49 kPa
GS 90	76 mm	0.24 kg/m	0.06 kg/m		2.49 kPa
GS 130	76 mm	0.24 kg/m	0.06 kg/m		2.49 kPa
GS 195	102 mm	0.30 kg/m	0.07 kg/m		2.49 kPa
GS 260	102 mm	0.30 kg/m	0.07 kg/m		2.49 kPa
see also Table 6					

- The backpressure in the steam line, in addition to the duct static pressure, **must not exceed** the maximum allowable backpressure, as indicated in the table above.
- The length of the steam line should be kept as short as possible. It should not exceed the maximum equivalent length shown in [Table 5](#). Exceeding the maximum length can affect performance of the unit. Also refer to [Table 6](#) for equivalent length of typical steam line fittings.

Table 6: Equivalent length of typical steam line fittings

Nominal tube diameter in mm	Equivalent Length		
	Standard 90° Elbow in m	Standard 45° Elbow in m	Side-Outlet Tee in m
45	1.1	0.5	2.2
75	1.5	0.8	3.4
100	2.4	1.2	4.6

- Use long radius elbows for steam pipes and avoid 90° bends. This minimizes backpressure and formation of condensation.

IMPORTANT! When determining the length and routing of steam lines, allowances must also be made for thermal expansion. Allowances must also be made for shrinkage in the length of the steam hoses due to aging.

- The steam line must lead straight upwards from the humidifier connection for at least 300 mm, before continuing on to the steam distribution system – refer to [Fig. 9 on page 26](#). The steam line must have a minimum upslope of 20%, or a minimum downslope of 5% to the steam distributor – refer to [Fig. 10 on page 29](#).
- Only use Condair steam hoses for steam lines made with hoses. Other types of steam hoses can affect performance of the unit. The minimum bend radius of the steam hose is 300 mm. The steam hose must not sag, and must have a minimum upslope of 20%, or a minimum downslope of 5% to the steam distributor.
- Use short steam hoses to connect rigid steam lines to the humidifier, the steam distribution adapter and the steam distributor. Secure the steam hoses with gear clamps.



CAUTION!
Risk of damage to the gear clamp!

Do not over-tighten the gear clamp.

-
- Steam lines may not be combined, except at the steam distributor. Use a Condair adapter specifically designed for that purpose, and only if the humidifiers connected to the adapter operate in parallel.
 - To minimize formation of condensation, the steam line must be insulated with a minimum of 25 mm of pipe insulation over its entire length.
 - The weight of the steam pipe must be supported so there is no load on the humidifier.



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

Restrictions in the cross-section of the steam line will cause excessive backpressure in the steam tank when the unit is operating, which may cause unexpected release of hot steam vapors. Bare skin exposed to the hot steam vapors can result in severe burns. In addition, excess backpressure also affects performance of the unit.

Prevention: Observe the following:

- Upon completion of the installation, clean the steam line to remove any contaminants and installation materials.
 - The steam hose (if used) must not have any kinks or other restrictions.
 - To prevent condensate pockets, the steam line must not sag. If necessary, support the steam line with pipe clamps, ducts, or wall brackets, and install a condensate drain at all lowest points in the steam line.
 - **DO NOT** install a shutoff valve (e.g. a manually operated shutoff valve, solenoid valve, etc.) in the steam line.
-

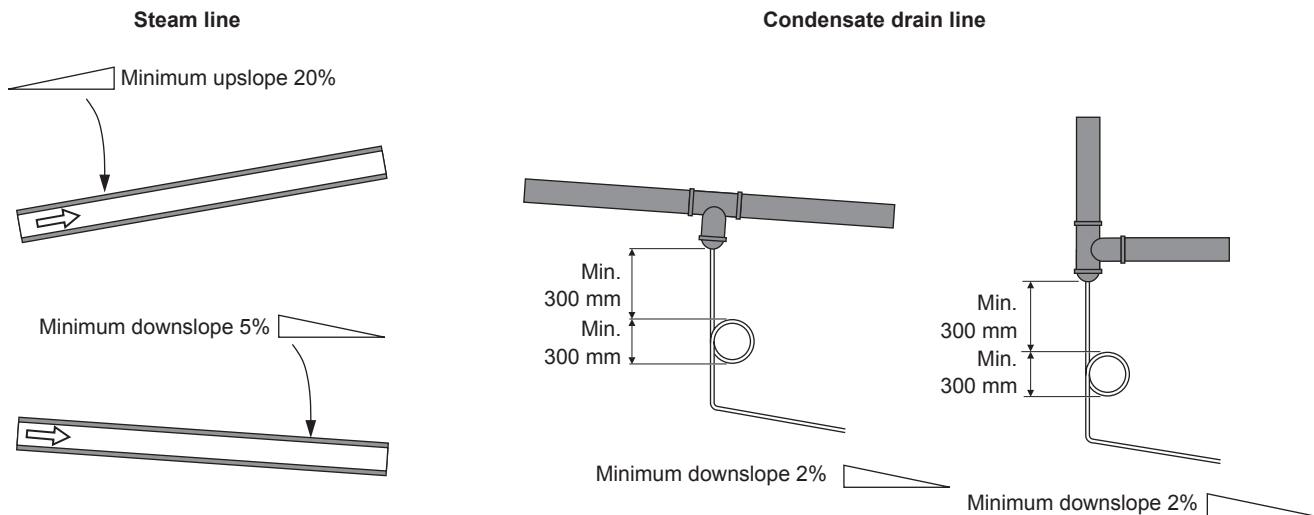


Fig. 10: Steam and Condensate Line

5.6.1.2 Condensate drain lines



WARNING!

Risk of severe burns from contact with hot water or steam!!

The condensate lines may be filled with hot water or steam. Bare skin in contact with hot fluids or steam can result in severe burns.

Prevention: Never lead the condensate drain lines into a sink that is used by people. Always run the condensate drain lines into an open funnel with trap, which is connected to the sewage line of the building. The applicable national and local plumbing codes must be observed and adhered to.

- Condensate traps must also be installed at all low points and at horizontal-to-vertical transitions in the steam line. The condensate drain lines should always connect to full-size "Tee" connectors in the steam line. Refer to [Fig. 10 on page 29](#).
- The condensate lines must have a minimum downslope of 2% and a minimum 300 mm diameter condensate trap, and must be connected via an open funnel to the building sewage line (with condensate cooler, if required). The condensate trap must be at least 300 mm below the condensate "Tee" or the steam distributor.
- For a steam line that is longer than 4.5 m up to the maximum recommended length, install condensate lines and traps at regular intervals. The maximum distance between condensate lines for long steam line runs is 4.5 m.
- Each condensate line must have individual trap before emptying into a common drain funnel. The diameter of the drain pipe after the common drain funnel must be sized appropriately to handle all the condensate.
- Make sure that the condensate lines allow proper flow.
- Do not over-tighten the hose clamps on the condensate lines.

IMPORTANT! Before starting up the unit, fill the condensate traps with water.

5.6.1.3 Common Steam and Condensate Line Installation Mistakes

Some common steam and condensate line installation mistakes are shown in [Fig. 11 on page 30](#).

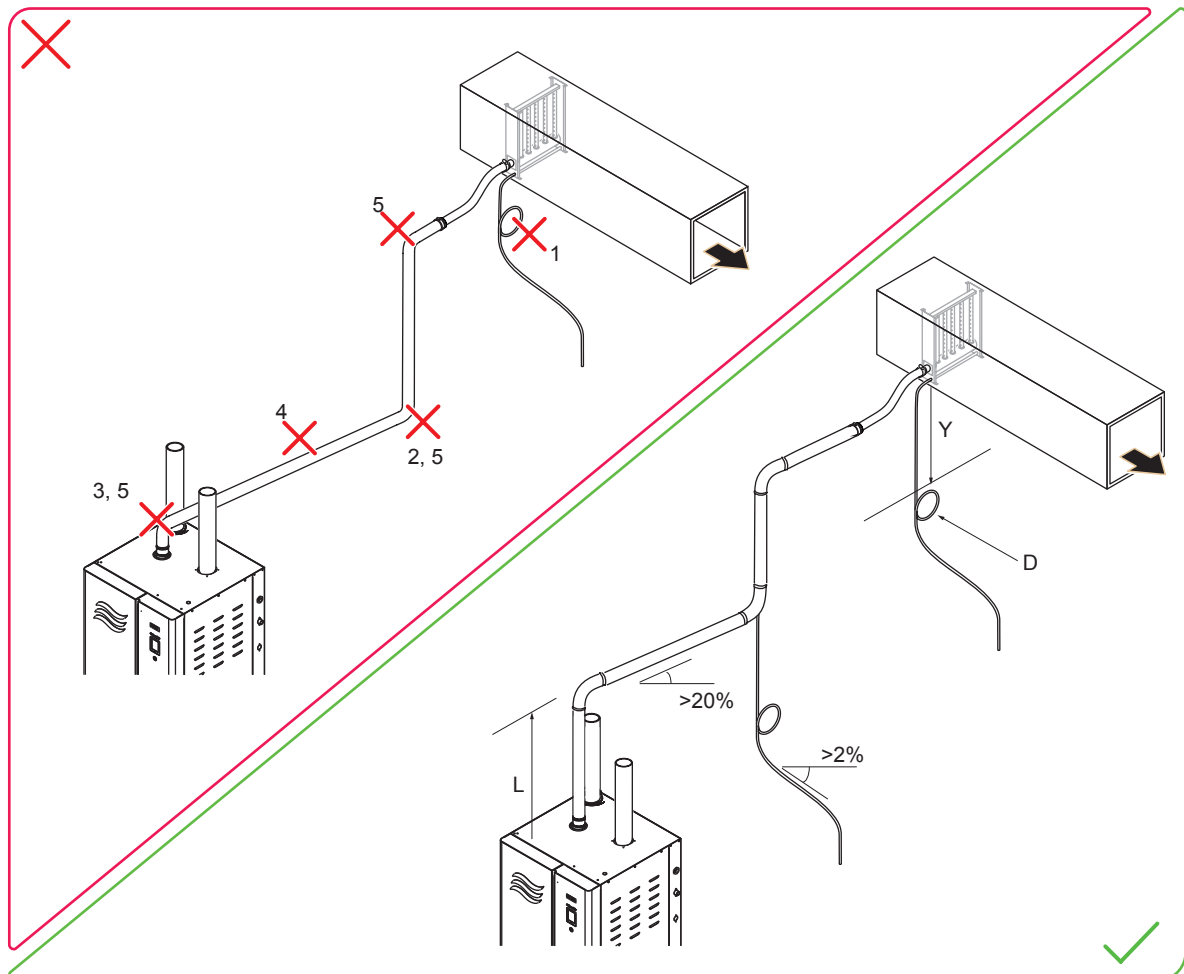


Fig. 11: Common steam and condensate line installation mistakes

- 1 The condensate trap is located less than the required minimum 300 mm below the steam distributor.
- 2 No condensate trap is installed at the horizontal-to-vertical transition.
- 3 The steam line does not run straight up for the required minimum 300 mm before continuing on to the steam distributor.
- 4 Steam line is not sloped – upslope minimum 20% downslope minimum 5% is not maintained.
- 5 The radius of the elbow used (for rigid steam pipes) is too small.
- D The minimum diameter of the condensate trap must be 300 mm.
- L The steam line must be routed vertically upwards of at least 300 mm from the connection to the steam humidifier before the first elbow.
- Y Condensate trap distance below the steam distributor must be at least 300 mm

5.6.2 Steam Installation Checklist

Check the following to ensure that the steam connections for the humidifier have been installed correctly:

Steam Line

- Observed all best practices notes according [Section 5.6.1?](#)
- Steam pipe sized correctly?
- The steam line does not exceed maximum equivalent length listed in [Table 5 on page 27?](#)
- Long radius elbows (for rigid pipes) used for rigid pipes?
- Backpressure in the steam line combined with duct static pressure does not exceed 1.49 kPa for compact units, or 2.49 kPa for full-size units?
- Steam line runs straight up from the humidifier steam outlet for at least 300 mm before bend?
- Steam line has minimum upslope of 20%, or minimum downslope of 5%?
- Steam line does not reduce in diameter except at the steam distributor; and condensate drain line installed just before the restriction?
- Steam lines do not merge except at the steam distributor through a Condair adapter?
- Steam line does not sag?
- Steam connections secured with clamps and clamps torqued adequately?
- Allowances made for thermal expansion of rigid pipes, and shrinkages of steam hose?
- Steam line insulated over its entire length?

Condensate Line

- Local regulations on drain water temperature requirements have been satisfied?
- Condensate traps installed at all low points, and at horizontal-to-vertical transitions in the steam line?
- Condensate lines in the steam line always connect via full-size "Tee" connectors?
- Condensate traps have a minimum loop diameter of 300 mm and installed at least 300 mm below the condensate "Tee" and the steam distributor?
- All condensate lines have a minimum downslope of 2%?
- Condensate traps installed at regular intervals on long steam line runs exceeding 4.5 m?
- Condensate lines have individual traps before emptying to a common condensate drain funnel?
Condensate drain sized appropriately to handle all the condensate?
- Condensate traps filled with water?

5.7 Water Installation

The water installation must be carried out in accordance with [Fig. 12](#) and the notes on water installation in [Section 5.7.3](#).

5.7.1 Water installation overview

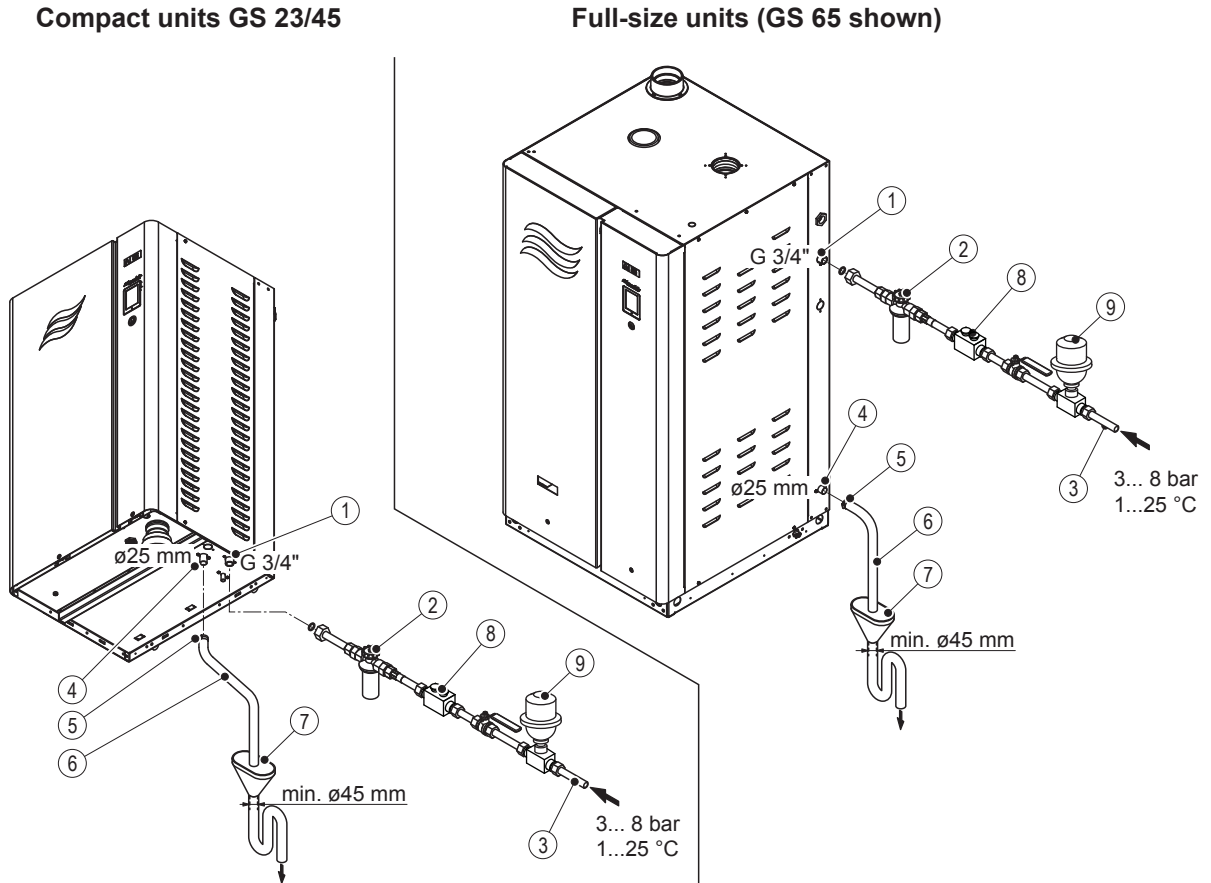
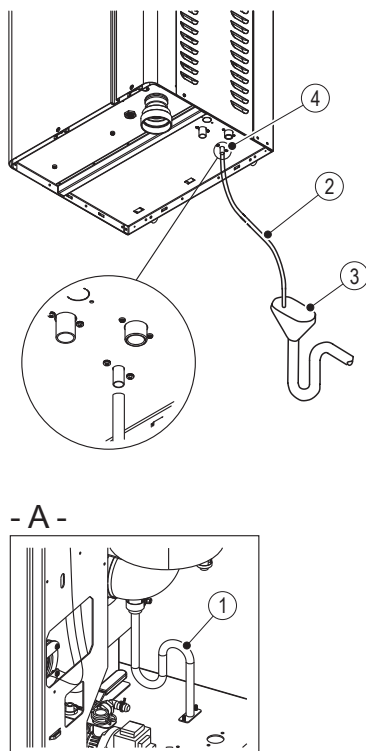


Fig. 12: Water Installation overview

- | | |
|---|--|
| <ol style="list-style-type: none"> 1 Water supply connector (Inlet valve) – 3/4" BSPP (plastic thread) 2 Filter valve (accessory) 3 Water supply line – minimum internal diameter 12 mm 4 Drain connector $\varnothing 25$ mm O.D. 5 Hose clamp (not supplied) 6 Drain hose – must not touch sides or bottom of funnel | <ol style="list-style-type: none"> 7 Open funnel with trap – pipe/trap connected to funnel should have minimum internal diameter of 45 mm. Funnel must be located within 1 m from the unit (or according to code). 8 Pipe disconnector as backflow preventer (optional, supplied by others) 9 Water shock arrester (optional, supplied by others) |
|---|--|

5.7.2 Exhaust Condensate Drain Installation Overview (CS Model Only)

Compact units (GS 23/45)



Full-size units (GS 65-260)

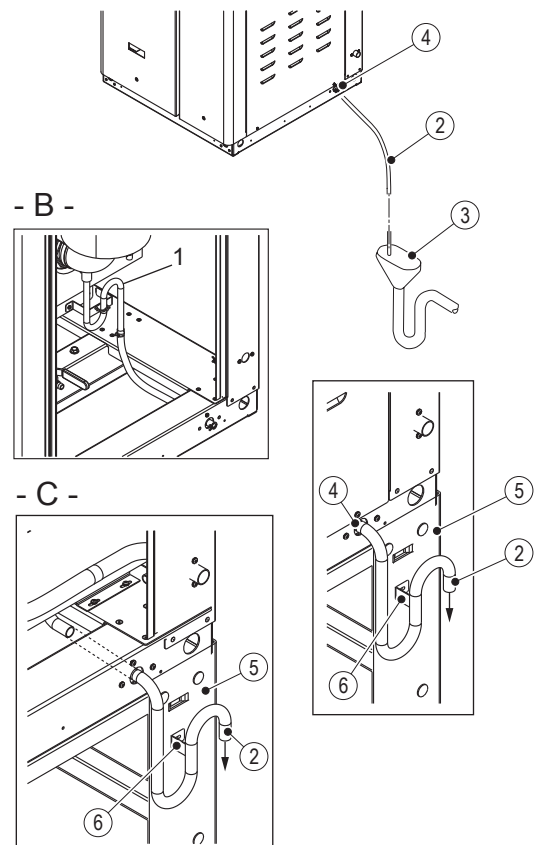


Fig. 13: Exhaust Condensate Drain Line for CS Models (A - GS 23-45, B - GS 65, C - GS 90-260)

- | | | | |
|---|--|---|-------------------------------------|
| 1 | Internal condensate trap (GS 23-65) – must be filled with water prior to operation | 4 | Condensate drain outlet |
| 2 | Exhaust condensate drain hose (supplied by others) – must have minimum downslope of 2%, and must not touch sides or bottom of funnel. Use Condair condensate hose. | 5 | Floor stand (default for GS 65-260) |
| 3 | Open funnel with trap – funnel must be located below the condensate outlet and within 1 m of the unit (or according to code) | 6 | Bracket to fix trap to floor stand |

5.7.3 Notes on water installation

Note on water supply

The water supply is to be carried out according to [Fig. 12 on page 32](#) and the applicable local plumbing codes.

- The installation of the **filter valve** (accessory "Z261", alternatively a shut-off valve and a 125 µm water filter can be used) is mandatory and should be made as close as possible to the humidifier.
- Admissible water supply pressure is: **3.0...8.0 bar** (300...800 kPa)
Note: For mains pressures >8 bar a pressure reducing valve (adjusted to 3.0 bar) must be installed in the water supply line.
- Admissible water supply temperature is: **1...25 °C** (recommended: 1...15 °C)
- **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 7](#).

Table 7: Water Quality Requirements

Water type	Hardness °dH (PPM)	Alkalinity pH	Chloride PPM	Conductivity µS/cm	Silica PPM
Potable drinking water	0-14,5 °dH (0-256)	6.5-7.5	0-40	0-1500	0-14
Treated water	0-0,95 (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 12 mm with a G 3/4" 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 10 bar) and **certified for use in drinking water systems**.
- The water supply system must be free of pressure bumps (hammer-free). The installation of a check valve in the water supply line is therefore not permitted, as this can lead to pressure bumps in the water system and damage the inlet valve(s). 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.**

CAUTION!

The thread at the humidifier connection (inlet valve) is made of plastic. To avoid overtightening, the union nut of the water pipe must be **tightened by hand only**.

Notes on water drain

The water drain is to be carried out according to [Fig. 12 on page 32](#) 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. 2 cm air gap). 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 away (min. 0.5 m to max. 1 m from the unit) from the control cabinet to keep any rising steam from damaging the electrical components in the control cabinet.
- 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 exhaust condensate drain

The exhaust condensate drain is to be carried out according to [Fig. 13 on page 33](#) and the applicable local plumbing codes.

- Install the condensate drain hose (CS models only), and secure it with a hose clamp – refer to [Fig. 13 on page 33](#). The hose must be rated to 100 °C. Connect the hose to a condensate neutralization device, if required by local code, before connecting the hose to a drain.
- Fill the condensate trap inside the unit (CS model only) with water.

5.7.4 Water Connections 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 7 on page 34](#)?
 - Filter valve (or shutoff valve and 125 µm filter) 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 arrester (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 (3... 8 bar) and pressure surge-protected?
 - Admissible water supply temperature 1...25 °C (recommended 1...15 °C) maintained?
 - Is the minimum inside diameter of 12 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 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 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?
- Exhaust condensate drain (CS models only)
 - Condensate hose correctly installed?
 - Hose rated for 100 °C?
 - Condensate trap inside unit filled with water?

5.8 Combustion Air Installation

The combustion air regulations for gas-fired appliances vary from country to country. Adhere to all relevant national and local regulations. If assistance is required, consult your local Condair representative.

The installation must only be performed by a qualified technician, who is well versed with the national and local regulations of the jurisdiction

Excess exposure to contaminated combustion air will result in safety and performance-related problems with the humidifier. Known contaminants include: halogens, ammonia, and chlorides, excessive dust, lime or dirt. Excess exposure to these contaminants will also affect the on-board electronics. Contact Condair if you have any questions. If necessary, isolate the unit from the contaminated space.

The maximum temperature of the combustion air supply should be 30 °C.

Select the type of installation required for combustion air: for **in-room air installations** refer to [Section 5.8.1](#), for **space seal installations** refer to [Section 5.8.2](#).

5.8.1 In-Room Air Installation

This type of installation draws combustion air from inside the room/space where the humidifier is installed. Refer to [Table 8](#) for the required minimum cross-sectional area for the fresh air intake in the room/space. An appropriate opening to the outside of the building must be provided to allow fresh combustion air into the space. Adhere to all local and national installation regulations.

Note: Condair requires installing an elbow (fitted with a screen) at the intake air inlet on all GS 65-260 (full size) units to prevent dirt and debris from being drawn into the combustion chamber. Seal the connection with silicone sealant. Keep the area around the air intake clear of all obstructions. Refer to [Fig. 15 on page 39](#). Refer to [Table 10 on page 39](#) for outside diameter of elbow.

Table 8: Room fresh air intake cross-sectional area

Model	Minimum cross-sectional area in cm ²
Condair GS 23 / GS 23-CS	50
Condair GS 45 / GS 45-CS	88
Condair GS 65 / GS 65-CS	120
Condair GS 90 / GS 90-CS	150
Condair GS 130 / GS 130-CS	225
Condair GS 195 / GS 195-CS	350
Condair GS 260 / GS 260-CS	460

Note: Permanent low and high level openings communicating directly with the outside air shall be fitted with grilles having a total minimum free area as follows.

Table 9: Grille sizes for low and high level openings

Model	Free area grille sizes (cm ²)	
	Low Level	High Level
Condair GS 23 / GS 23-CS	164	82
Condair GS 45 / GS 45-CS	328	164
Condair GS 65 / GS 65-CS	491	246
Condair GS 90 / GS 90-CS	654	327
Condair GS 130 / GS 130-CS	981	491
Condair GS 195 / GS 195-CS	1472	736
Condair GS 260 / GS 260-CS	1962	981

For installations in the UK where BS5440 part II or BS6644 applies, please refer to and follow the requirements or recommendations detailed in BS5440 part II or BS6644 (where applicable)

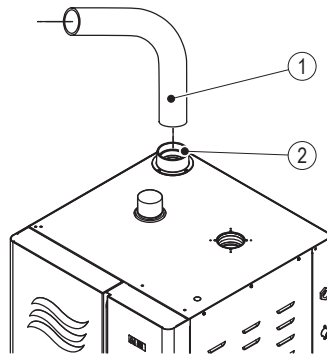


Fig. 14: In-room air installation – GS 65-260

- 1 Elbow, fitted with screen (not supplied)
- 2 Intake air inlet (full-size unit)

5.8.2 Room Seal Installation

A room seal installation draws fresh combustion air from the outside. Sealed combustion requirements for combustion air are governed by national and local installation codes, as stated at the beginning of this section. The vent diameter listed in [Table 10](#) must be maintained over the entire length of the vent. Adhere to all local and national installation codes.

In addition, refer to [Section 5.8.3](#).

Table 10: Air Intake Vent Connection Diameter

	GS 23 in mm	GS 23-CS in mm	GS 45 GS 45-CS in mm	GS 65 GS 65-CS in mm	GS 90 GS 90-CS in mm	GS 130 GS 130-CS in mm	GS 195 GS 195-CS in mm	GS 260 GS 260-CS in mm
Air Intake Vent Connection Diameter	80	60	80	80	100	100	150	150

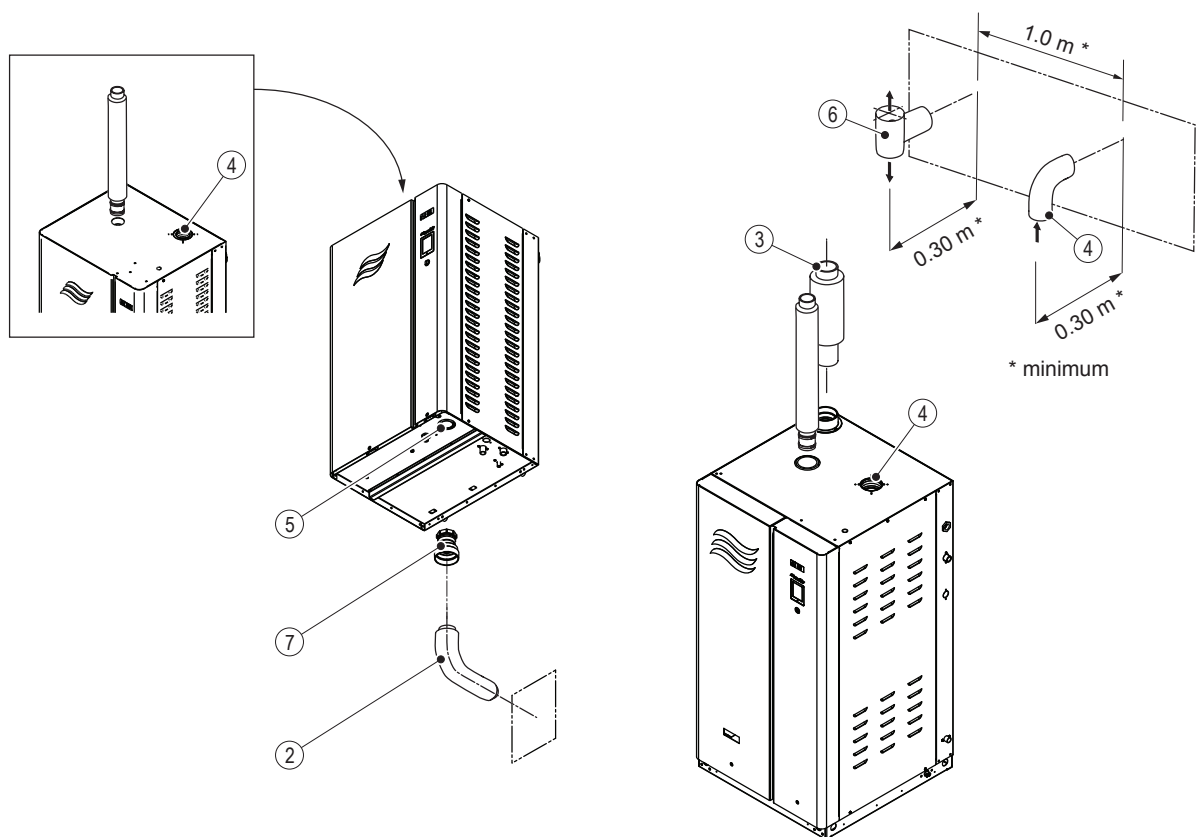


Fig. 15: Sealed Combustion Air Connection (compact shown left)

- | | |
|--|--|
| 1 Air intake terminal (elbow) – terminal located outside building and facing down (not supplied), 30 cm from wall. | 5 Intake air inlet (compact unit) |
| 2 Air intake vent – wrapped with insulation (not supplied) | 6 Exhaust gas terminal ("Tee") – terminal located outside building and opening vertical (not supplied), 30 cm from wall. |
| 3 Intake air inlet (full-size unit) | 7 Air intake adapter (compact unit) |
| 4 Exhaust gas outlet | |

5.8.3 Room Seal Installation Requirements

In addition to the requirements of the applicable national and local codes for sealed combustion installations, the following requirements must also be satisfied:

- The intake vent must not exceed an equivalent length of 33 m, except for the GS 23 using propane gas which is limited to 15 m.
Note: Each 90° bend is equal to 3 m of straight pipe, and each 45° bend is equal to 1.5 m of straight pipe. The intake vent should not have more than six bends.
- The intake vent diameter is listed in [Table 10 on page 39](#). The vent diameter must remain uniform over the entire run.
- Intake vent pipes can be made of stainless steel, ABS, PVC, CPVC or poly-propylene. All joints and seams must be sealed with an appropriate sealant.

IMPORTANT! Route the intake vent so that it does not obstruct access to any of the services to the humidifier. On the compact unit, make sure that the maintenance access for the drain pump is not obstructed.

- The intake vent must be supported every 1.5 m, and at every pipe bend.
- An intake (elbow) terminal must be installed on the outside termination of the air intake vent, with the elbow facing down – refer to [Fig. 15 on page 39](#). The location and spacing between the air intake terminal and exhaust vent terminal must comply with all local and national regulations, with at least a minimum spacing of 1 m between them.
- At low temperatures, water condensation can occur on the outside of the air intake vent. To prevent this, Condair suggests adding in-line heating and insulation on the intake vent.

5.8.4 Combustion Air Checklist

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

- Combustion air installation for the type of installation selected meet all national and local regulations?
- In-Room Air Installation
 - Fresh combustion air requirements for the room/space (see [Table 8 on page 37](#)) and all national and local regulations) satisfied?
 - Elbow installed at the intake air inlet on full size units (not GS 23/45)?
- Room Seal Installation
 - All relevant national and local regulations for room seal installation satisfied?
 - Intake vent length does not exceed an equivalent length of 33 m? If unit is GS 23 using propane gas, is it limited to 15 m? Maximum six bends used?
 - Vent diameter as listed in [Table 10 on page 39](#), and uniform over the entire run?
 - All joints and seams sealed with appropriate sealant?
 - Intake vent correctly supported?
 - Spacing between air intake terminal and exhaust vent terminal minimum 1 m?
 - Intake vent heated and insulated in cold climates?

5.9 Exhaust Vent Installation

Exhaust venting regulations for gas-fired appliances also vary from country to country. Adhere to all relevant national and local regulations. If assistance is required, consult your Condair representative.

The Condair GS CS models use a condensing type exhaust venting system.

The general requirements and the different exhaust venting types are described in the following chapter.

5.9.1 General Requirements

The exhaust vent system used with the Condair GS series humidifier must satisfy the following general requirements:

- The exhaust vent systems must meet the installation requirements of local regulations related to exhaust venting systems .
- In applying the codes, refer to the vent system manufacturer's instructions, the local gas supplier regulations, and the specific instructions in this manual.
- This appliance must be installed in compliance with national regulations and codes. The installation must only be performed by a qualified technician who is well versed with these codes and the local requirements of the jurisdiction.
- Proper removal of combustion gases must be assured, and building materials must be protected from degradation by flue gases.
- Never mix venting types. Never use two different manufacturer's equipment for the same exhaust vent.
- All horizontal exhaust vent runs must maintain a constant minimum upslope of 3.5% (35 mm/m) to prevent accumulation of condensate.
- All horizontal runs must be adequately supported every 1.5 m to prevent sagging, with support at every bend.
- When an exhaust vent run exceeds 7 m, insulate the exhaust vent pipe (type-F90) to reduce the amount of condensate that could form in the flue gases.
- When an exhaust vent passes through a cold area or a location that has large amounts of air flow over the vent, insulate the exhaust vent pipe (type-F90) to prevent condensation inside the vent.
- When an exhaust vent passes through walls, floors, and ceilings, proper clearances must be maintained around combustible materials and venting manufacturer's fire stop equipment.
- The exhaust vent must not pass through any air circulation duct or plenum.



WARNING!

Risk of severe burns from contact with hot exhaust vent!

Prevention: Install a screen or barrier (minimum 50 mm) around the exhaust vent to prevent contact with it.

- Exhaust condensate management is required on all GS CS models installations.

IMPORTANT! Before starting up the unit, fill all condensate traps with water

- A chimney or exhaust vent should extend at least 1 m above the roof, and at least 1 m above any ridge within 2.5 m of the chimney. Local codes apply. The exhaust vent must terminate at a sufficient height above the roof to prevent blockage due to accumulation of snow.
- All exhaust vents must be made of corrosion-resistant materials, and all sealing materials must be tested and approved for exhaust venting systems.
- Recommended: Seal all exhaust vent pipes with high temperature RTV silicone rated for at least 250 °C
- The vent run should be as direct as possible with no more than six elbows in the system.

- [Table 11](#) lists the diameter of the exhaust vent. The vent diameter must remain uniform over the entire run. Adhere to all local and national installation codes.

Table 11: Exhaust Vent Diameters

	Model													
	GS 23	GS 23-CS	GS 45	GS 45-CS	GS 65	GS 65-CS	GS 90	GS 90-CS	GS 130	GS 130-CS	GS 195	GS 195-CS	GS 260	GS 260-CS
Exhaust Vent Diameter in mm	80	60	80	80	80	80	100	100	100	100	150	150	150	150

Additional Requirements for Sidewall Venting

The following additional requirements must be satisfied if the exhaust vent terminates through a sidewall:

- Locate the humidifier as close as possible to the wall that is used for termination of the vent.
- Locate the exhaust terminal at least 1 m above any forced air inlet located within 3 m; or at least 1 m below, and 1 m horizontally from, or 0.5 m above any door, window, or gravity air inlet into any building.
- Maintain a minimum horizontal clearance of 1 m from electric meters, gas meters, regulator and relief equipment.
- Install certified vent terminals at the vent terminations.
- Locate the vent terminal at least 2.5 m above grade when it is adjacent to public walkways.
- Locate the bottom of the vent terminal at least 450 mm above grade or ground, or normally expected snow accumulation level. The snow level may be higher on walls exposed to prevailing winds.
- Avoid areas where experience shows that condensate drip may cause problems – such as above planters, patios, or over public walkways, or over an area where condensate or vapor could create a nuisance or hazard, or could be detrimental to the operation of regulators, relief valves, or other equipment. Refer to the vent manufacturer's installation instructions.
- The vent terminal must be installed in the same atmospheric pressure zone as the combustion air inlet for the humidifier. If that is not possible (as in cases of positive or negative room pressures), sealed combustion must be utilized.

Additional Requirements for Room Seal Exhaust Venting

The Condair GS humidifiers are certified as a C13, C33, and a C53 appliance. Where local regulations permit, the humidifier can be installed as a C6 appliance. Refer to [Section 5.9.1.1](#) for the requirements). Contact your Condair representative for installation assistance.

- The equivalent length of the exhaust vent should be minimum 1.5 m and maximum 33 m.
- An air intake (elbow) must be installed in the intake vent, with the elbow facing down. The air intake terminal and exhaust vent terminal must be located on an exterior surface. The location and spacing between the terminals must comply with all local and national regulations, with at least a minimum spacing of 1 m between them.

For type C13 and C33 installations, refer to [Table 12](#) for diameters of the concentric terminations.

Table 12: Concentric Termination Diameters for C13 and C33 installations

	Model							
	GS 23	GS 23-CS	GS 45 GS 45-CS	GS 65 GS 65-CS	GS 90 GS 90-CS	GS 130 GS 130-CS	GS 195 GS 195-CS	GS 260 GS 260-CS
Concentric Terminal Diameters	ø80/125 mm	ø60/100 mm	ø80/125 mm	ø80/125 mm	ø100/150 mm	ø100/150 mm	ø150/200 mm	ø150/200 mm

[Fig. 16 on page 43](#), [Fig. 17 on page 44](#), [Fig. 18 on page 45](#), and [Fig. 19 on page 48](#) show the general types of venting arrangements. Adhere to all national or local codes.

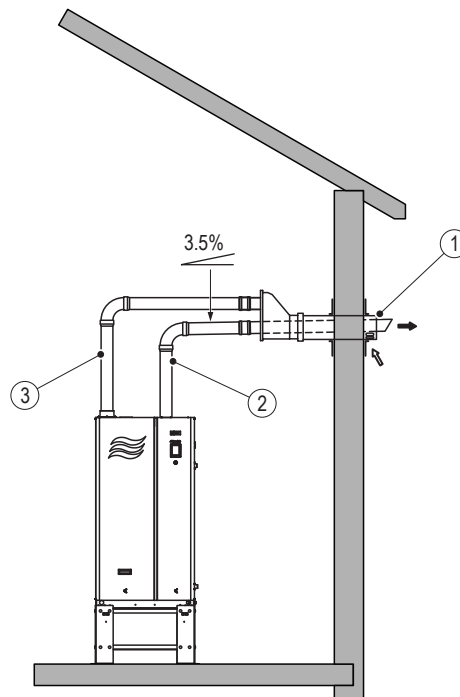


Fig. 16: Type C13 exhaust venting for room seal installations

- | | | | | | |
|---|------------------------------------|---|--|---|---|
| 1 | Concentric terminal (not supplied) | 2 | Exhaust vent (not supplied) – minimum 1.5 m, maximum 33 m long | 3 | Air intake vent (not supplied) – minimum 1.5 m, maximum 33 m long |
|---|------------------------------------|---|--|---|---|

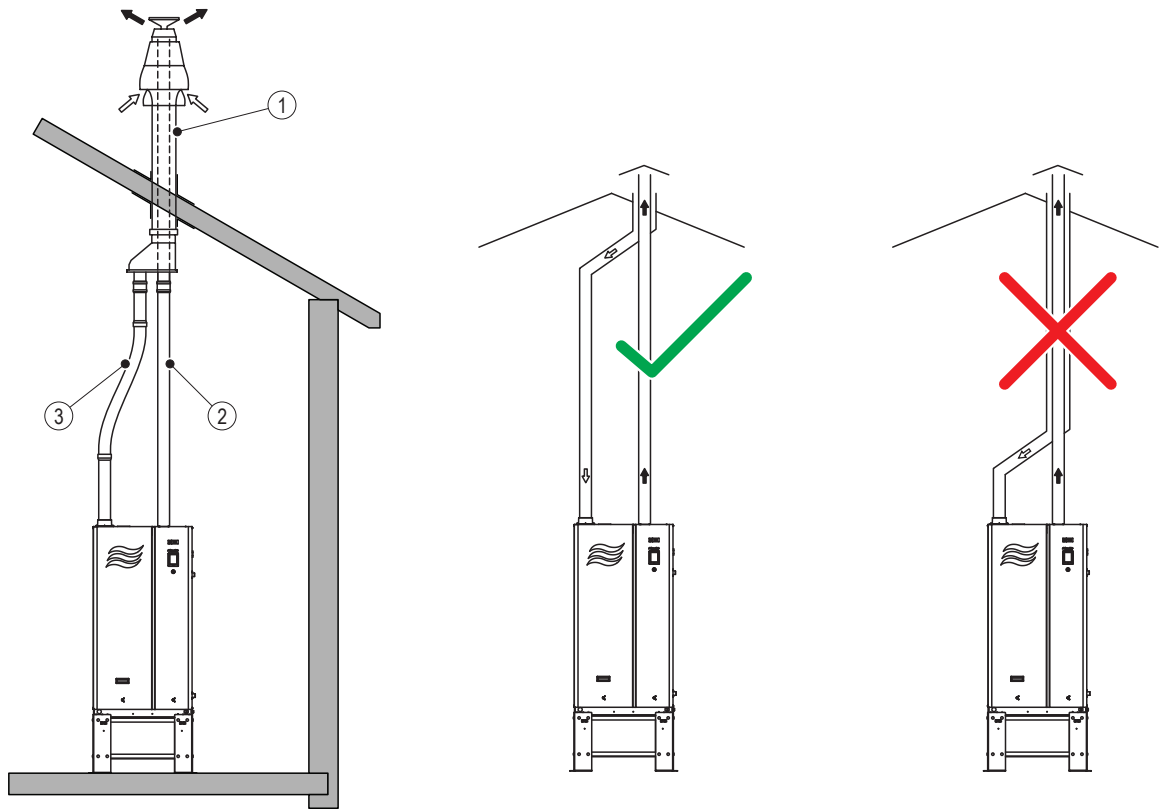


Fig. 17: Type 33 Exhaust Venting for Room Seal Installations

- | | | | | | |
|---|------------------------------------|---|--|---|---|
| 1 | Concentric terminal (not supplied) | 2 | Exhaust vent (not supplied) – minimum 1.5 m, maximum 33 m long | 3 | Air intake vent (not supplied) – minimum 1.5 m, maximum 33 m long |
|---|------------------------------------|---|--|---|---|

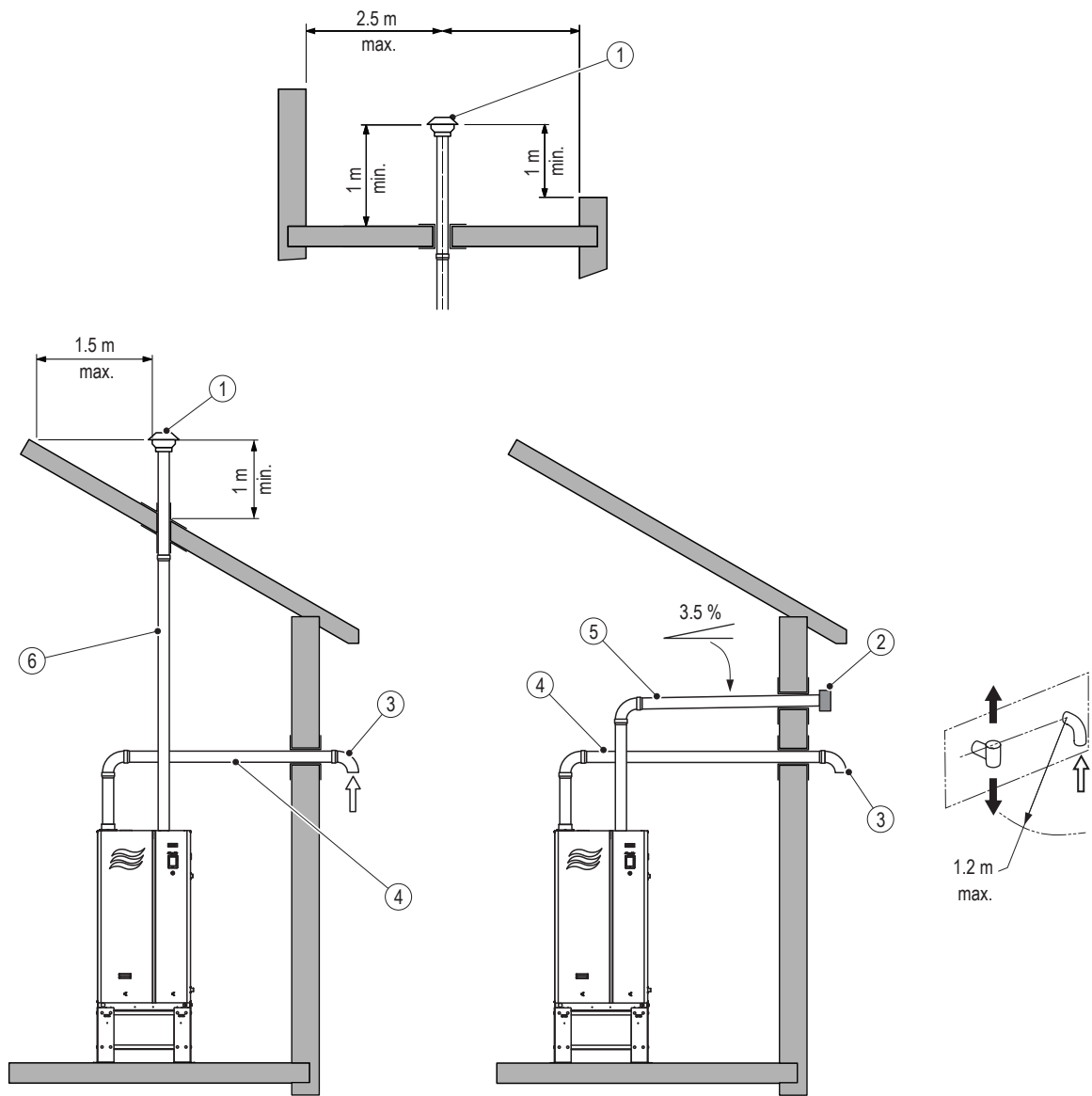


Fig. 18: Type C53 exhaust venting for room seal installations

- | | | |
|--|--|--|
| 1 Rain cap (not supplied) | 3 Air intake terminal (not supplied) - refer to local regulations | 5 Horizontal exhaust vent (not supplied) - minimum 1.5 m, maximum 33 m long with a constant minimum upslope of 3.5 % |
| 2 Exhaust terminal (not supplied) - refer to local regulations | 4 Horizontal air intake vent (not supplied) - minimum 1.5 m, maximum 33 m long | 6 Vertical exhaust vent (not supplied) - minimum 1.5 m, maximum 33 m long |

5.9.1.1 Installation as a C6 Appliance

Where local regulations permit, the Condair GS humidifier may be installed as a C6 appliance. When installed as a C6 appliance, the humidifier must be connected to a separately approved and marketed system for the supply of combustion air and discharge of flue gases. The exhaust vent, intake vent and terminals used in such an installation must meet the following requirements:

Exhaust vent requirements

- The exhaust vent must be installed according to the supplier’s certified instructions.
- Unless specified by the vent manufacturer, the length of the exhaust vent must meet the requirements shown in [Table 13](#). Refer to vent manufacturer’s literature for recommended pressure loss for elbows, fittings and terminations.
- When installed, the equivalent length of the intake and exhaust vents must be the equal.
- The exhaust vent material must be suitable for the operating temperature of the humidifier.
- Connect the exhaust vent to the exhaust outlet in the humidifier as shown in [Fig. 20 on page 49](#). Refer also to [Fig. 19 on page 48](#).

Table 13: Allowable Pressure Loss

Model	Exhaust vent			Air intake vent			Total Pressure Losses (Exhaust vent, Intake Vent and Terminals)	
	Vent diameter	Allowable equivalent Length		Vent diameter	Allowable equivalent Length		Minimum	Maximum
		Minimum	Maximum		Minimum	Maximum		
GS 23	80 mm	1.5 m	33 m	80 mm	1.5 m	33 m	0 mbar	0.74 mbar
GS 23-CS	60 mm			60 mm				
GS 45	80 mm	1.5 m	33 m	80 mm	1.5 m	33 m	0 mbar	0.74 mbar
GS 45-CS								
GS 65	80 mm	1.5 m	33 m	80 mm	1.5 m	33 m	0 mbar	1.2 mbar
GS 65-CS								
GS 90	100 mm	1.5 m	33 m	100 mm	1.5 m	33 m	0 mbar	0.74 mbar
GS 90-CS								
GS 130	100 mm	1.5 m	33 m	100 mm	1.5 m	33 m	0 mbar	1.2 mbar
GS 130-CS								
GS 195	150 mm	1.5 m	33 m	150 mm	1.5 m	33 m	0 mbar	1.2 mbar
GS 195-CS								
GS 260	150 mm	1.5 m	33 m	150 mm	1.5 m	33 m	0 mbar	1.2 mbar
GS 260-CS								

Intake vent requirements

- Room seal installations must use a sealed intake vent to supply fresh combustion air from the outside.
- Unless specified by the vent manufacturer, the length of the intake vent must meet the requirements shown in [Table 13 on page 46](#). Refer to vent manufacturer’s literature for recommended pressure loss for elbows, fittings and terminations.
- When installed, the equivalent length of the intake and exhaust vents must be the equal.
- The intake vent material may be made of plastic or smooth-walled metal.
- In colder climates, insulate the intake vent to prevent condensation inside the vent.
- Connect the intake vent to the air intake inlet in the humidifier as described in [Section 5.8.2](#). Refer also to [Fig. 19 on page 48](#).

Total Pressure Loss Requirements

The total admissible pressure losses in the exhaust vent, intake vent and terminals must meet the requirements shown in [Table 13 on page 46](#).

Use the following formulas to calculate the total pressure losses. Refer to [Table 14 on page 48](#) for the mass flow rates used in the calculations.

$P_r = P_r + P_t$ <p style="text-align: center;">↓</p> $P_r = \frac{0.246 \times L \times V_a \times V_f}{d}$ $V_a = \frac{354 \times Q}{d^2} \times \left[\frac{100 \times A}{x} + B \right]$ $V_f = V_a \times \frac{(t_f + 273)}{(t_a + 273)}$	<p>Where,</p> <p>PT = total pressure (mbar)</p> <p>Pr = pressure loss due to resistance (mbar)</p> <p>Pt = pressure loss caused by exhaust terminal (mbar) – refer to literature supplied with terminal</p> <p>L = equivalent length of all pipes (m)</p> <p>d = internal diameter of pipe (mm)</p> <p>Va = velocity of flue products (m/s) at ambient temperature</p> <p>Vf = actual velocity of flue products (m/s)</p> <p>Q = appliance input (kW)</p> <p>tf = temperature of flue products (°C)</p> <p>ta = ambient temperature (°C)</p> <p>A = CO₂ produced by combustion gas (0.095 for natural gas)</p> <p>B = water vapour produced by combustion of gas (0.190 for natural gas)</p> <p>x = 9.5 (actual % of CO₂ in flue products)</p>
--	--

Table 14: Flue products

Model	Minimum heat input		Maximum heat input	
	Flue temperature (°C)	Mass flow rate (kg/min)	Flue temperature (°C)	Mass flow rate (kg/min)
GS 23	80	0.10	135	0.50
GS 23-CS	57	0.09	57	0.44
GS 45	80	0.20	135	1.00
GS 45-CS	57	0.18	57	0.88
GS 65	80	0.30	135	1.49
GS 65-CS	57	0.27	57	1.32
GS 90	50	0.39	135	2.00
GS 90-CS	39	0.35	57	1.76
GS 130	50	0.59	135	2.98
GS 130-CS	39	0.52	57	2.64
GS 195	40	0.87	135	4.47
GS 195-CS	32	0.77	57	3.96
GS 260	35	1.16	135	5.96
GS 260-CS	29	1.03	57	5.28

Intake terminal and exhaust terminal requirements

- The intake and exhaust terminals must comply with the requirements of EN 1856-1.
- The intake and exhaust terminals must be located and installed according to the supplier's certified instructions.
- A protective guard must be installed over the exhaust terminal if the terminal is located less than 2.4 m above the ground.

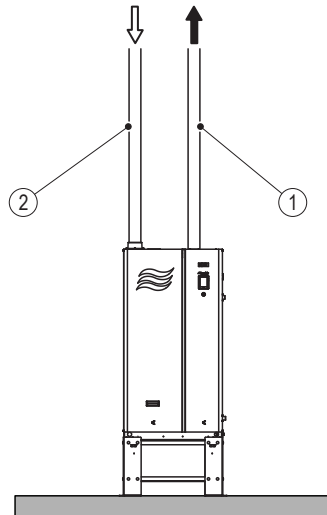


Fig. 19: Type C6 intake and exhaust venting for room seal installations

1 Air intake vent – refer to local regulations

2 Exhaust vent – refer to local regulations

5.9.2 Exhaust Vent Installation

All vent installations must be in accordance with national and the local regulations.

Connect the stainless steel (or plastic, only for CS models) exhaust vent directly to the exhaust outlet.

The exhaust outlet has internal gaskets, hence a sealant is not required. An adapter may be used, but is not required or supplied.

Ensure that the exhaust vent is supported by hangers or pipe straps so that there is no load on the humidifier.

To connect the exhaust vent, slide the exhaust vent into the exhaust outlet connection of the unit until it bottoms out (refer to [Fig. 20](#)). A sealant is not required.

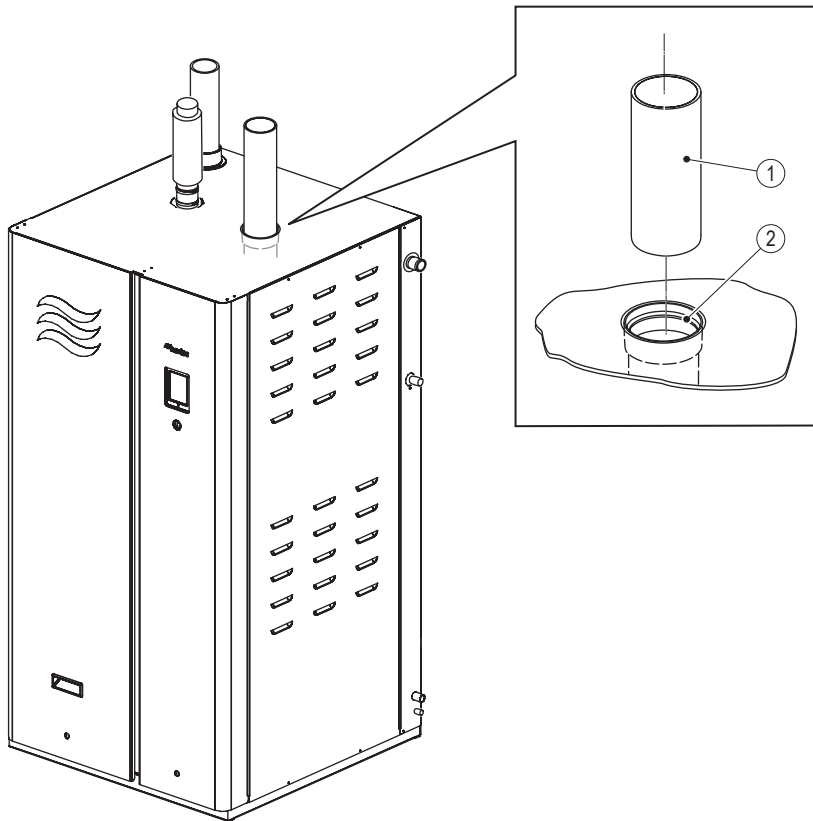


Fig. 20: Exhaust vent connection

- 1 Exhaust vent – stainless steel (for standard efficiency and CS models), and plastic (for CS models only)
- 2 Exhaust outlet humidifier

5.9.2.1 Exhaust Venting Requirements, Standard-Efficiency Models

The exhaust venting for the GS standard-efficiency model humidifier must be designed for negative pressure utilizing suitable high temperature venting material with condensate drainage.

In addition to the notes in [Section 5.9.1](#), the following requirements must also be satisfied for the exhaust vent installation in a GS standard-efficiency models:

- All vent installation must be in accordance with the national and local regulations.
- Adhere to all local regulations for routing of the vent pipe and under-pressure requirements.
- Stainless steel venting material used in the installation must comply with all national and local regulations.
- Adhere to the vent manufacturer's installation instructions.
- Normal operating temperature range of the flue gases is 140 to 150 °C. The maximum permissible flue gas temperature is 160 °C. If the maximum temperature is exceeded, the humidifier will shut down for safety reasons.
- The exhaust vent must not exceed an equivalent length of 33 m, and the pipe diameter must be maintained over the entire run.
- The exhaust vent run should be as direct as possible with no more than six elbows in the system. Each 90° elbow is equivalent to 3 m of straight pipe, and each 45° elbow is equivalent to 1.5 m of straight pipe.

5.9.2.2 Exhaust Venting Requirements, Condensing High-Efficiency Models

The exhaust venting for the GS condensing high-efficiency (CS) model humidifier must be designed for overpressure utilizing either low or high temperature venting material.

In addition to the general requirements stated in [Section 5.9.1](#), the following requirements must also be satisfied for the exhaust vent installation in a GS CS model:

- Plastic venting material used in the installation must comply with all national and local regulations.
- The plastic vent pipe must be connected to the exhaust outlet on the humidifier – refer to [Fig. 20 on page 49](#).
- The exhaust vent pipe must not exceed an equivalent length of 33 m, and the pipe diameter must remain uniform over the entire run.
- The exhaust vent run should be as direct as possible with no more than six elbows in the system. Each 90° elbow is equivalent to 3 m of straight pipe, and each 45° elbow is equivalent to 1.5 m of straight pipe.
- The maximum permissible flue gas temperature is 70 °C. Normal operating range is 49...60 °C.

5.9.3 Exhaust Vent Checklist

Check the following to ensure that the exhaust vent for the humidifier has been installed correctly:

- Exhaust vent installed to meet all national and local codes, exhaust vent manufacturer and Condair requirements?
- Proper clearances maintained between exhaust vent and combustible materials?
- Exhaust vent diameter as listed in [Table 11 on page 42](#), and uniform over the entire run?
- The equivalent length of the exhaust vent minimum 1.5 m and maximum 33 m? Maximum six elbows in the exhaust vent?
- Exhaust vent secured properly with hangers or pipe straps?

5.10 Gas Installation

5.10.1 Overview Gas Supply Installation for Compact and Full-Size Unit

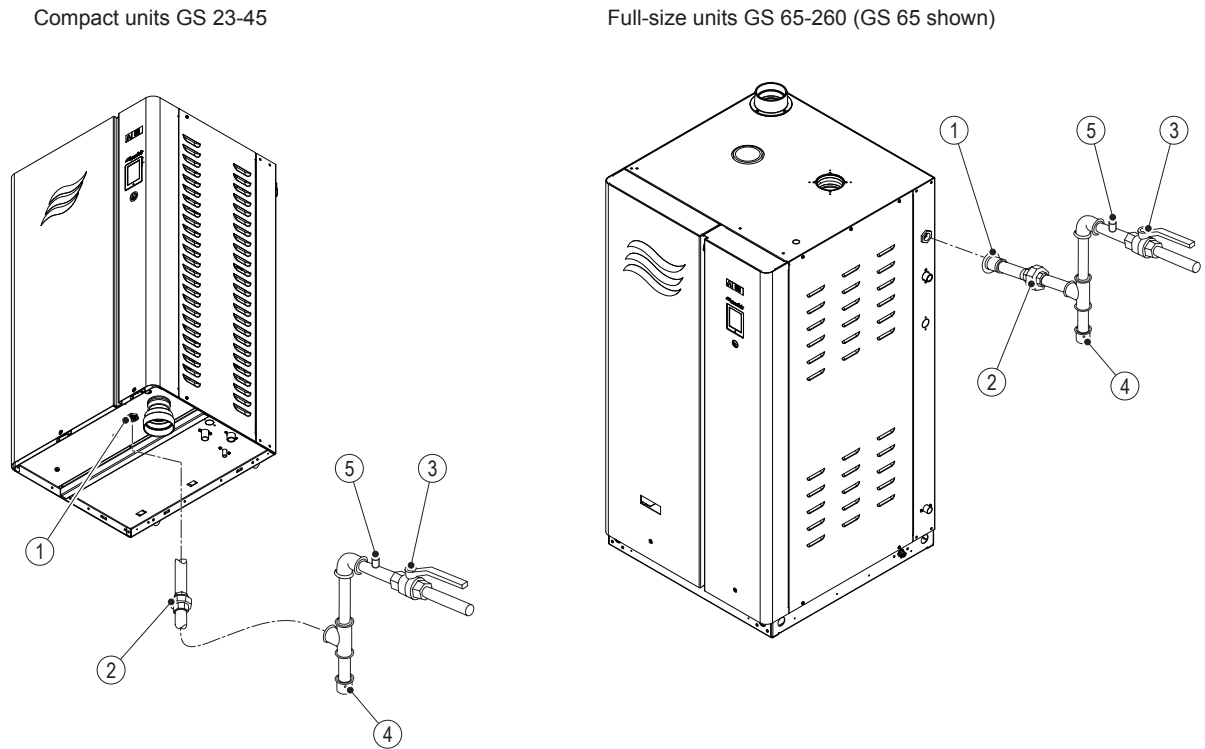


Fig. 21: Gas supply installation overview

- | | |
|---|--------------------------------|
| 1 Gas inlet connector
(NPT to BSBP adapter supplied) | 3 Sediment trap (not supplied) |
| 2 Union fitting (not supplied) | 4 Test port (not supplied) |

Note: Where measuring of the gas firing rate of the humidifier is necessary, installing a gas meter (supplied by others) at the gas supply line is recommended.

5.10.2 Gas Supply Installation Requirements

The gas supply installation must be carried out in accordance with [Fig. 21](#) and the applicable national and local codes for gas supply installations. In addition, the following requirements must be satisfied:

- A certified manual gas shutoff valve 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 black 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. On the compact units, make sure that the maintenance access for the drain pump is not obstructed
- The operating pressure of the gas supply to the humidifier must in accordance with the values listed in [Table 15](#).

Table 15: 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 Lw	G27	2.0 kPa (20 mbar)	1.7 kPa (17 mbar)	2.3 kPa (23 mbar)
Natural gas Ls	G2.350	1.3 kPa (13 mbar)	1.1 kPa (11 mbar)	1.6 kPa (16 mbar)
Propane gas P	G31	3.7 kPa (37 mbar) or 5.0 kPa (50 mbar)	2.5 kPa (25 mbar)	5.7 kPa (57 mbar)

- The gas supply line must be sized as listed in [Table 16](#). The pipe connection should have male BSPP threads.

Table 16: Gas Line Size

Model	Min. diameter gas supply line	Gas Connection Adapter (supplied)
GS 23	15 mm	1/2" NPT to 1/2" BSPP
GS 45	15 mm	1/2" NPT to 1/2" BSPP
GS 65	20 mm	3/4" NPT to 3/4" BSPP
GS 90	25 mm	1" NPT to 1" BSPP
GS 130	25 mm	1" NPT to 1" BSPP
GS 195	32 mm	1" NPT to 1" BSPP
GS 260	32 mm	1" NPT to 1" BSPP

- Upon completion of the gas installation, perform the gas leakage test (see [Section 5.10.3](#)).

5.10.3 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 350 mm H₂O (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.

5.10.4 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 black 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?

5.11 Humidity Control Systems

5.11.1 Humidity Control Configurations

Three different humidity control configurations are described below – refer to:

- Configuration 1:
Room humidity control (see [Section 5.11.1.1](#))
- Configuration 2:
Room humidity control with continuous supply air humidity limitation (see [Section 5.11.1.2](#))
- Configuration 3:
Supply air humidity control with continuous output limitation (see [Section 5.11.1.3](#))

[Table 17](#) shows the suggested applications for each configuration.

Table 17: Humidity control applications

Application	Location of the humidity sensor	
	room or exhaust air duct	supply air duct
Air conditioning systems with:		
– fresh supply air portion up to 33%	Configuration 1	Configuration 1
– fresh supply air portion up to 66%	Configuration 1 or 2	Configuration 2 or 3
– fresh supply air portion up to 100%	Configuration 2	Configuration 3
– fresh supply air humidity control	—	Configuration 3
Direct room humidification	Configuration 1	—

Please contact your Condair representative for assistance if you have other requirements such as:

- Humidification of rooms up to 200 m³
- Air conditioning systems with a high number of air exchanges
- Systems with variable air volume flow
- Test facilities with extreme control accuracy requirements
- Rooms with a high variation in max. steam capacity
- Systems with temperature fluctuations
- Cold rooms and systems with dehumidification

5.11.1.1 Configuration 1 – Room humidity control

Configuration 1 is suitable for **direct room humidification** and **air conditioning systems with mainly recirculated air**. The humidity sensor or humidistat respectively is preferably located in the room itself or in the exhaust air duct.

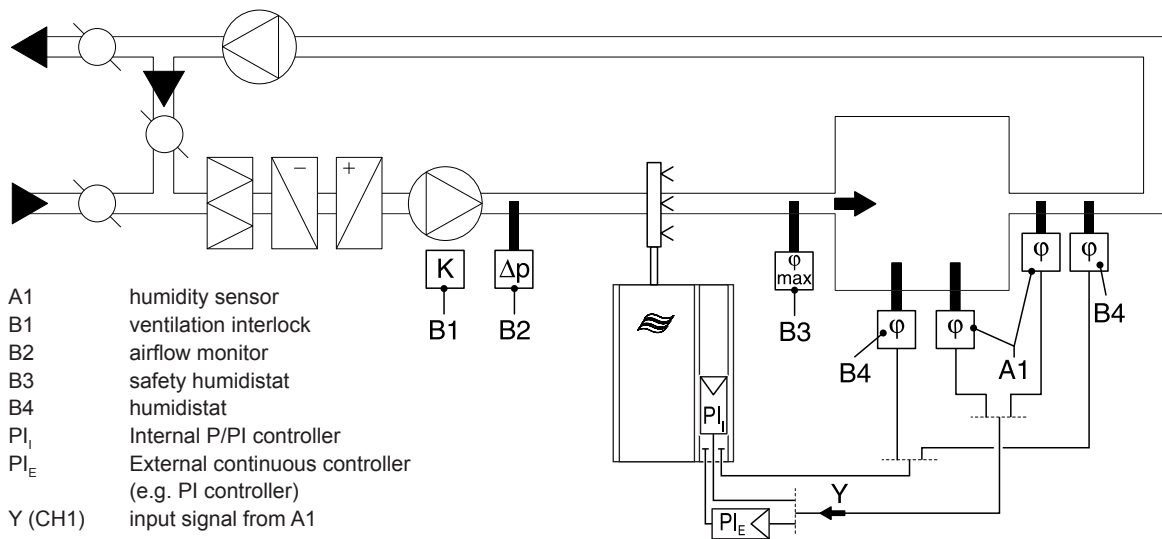


Fig. 22: Configuration 1 – Room humidity control

5.11.1.2 Configuration 2 – Room humidity control with continuous supply air humidity limitation

Configuration 2 is suitable for air conditioning systems with a **large portion of supply air, low supply air temperature, post-humidification, or variable airflow volume**. If the supply air humidity exceeds the preset value, the continuous limitation is effected prior to the room humidity control.

The humidity sensor (A1) is preferably located in the exhaust air duct or in the room itself. The humidity sensor (A2) for the limitation of the supply air humidity is located in the supply air duct after the steam distributor. This control system requires a continuous controller with the option to connect a second humidity sensor.

Attention! The continuous limitation of the supply air humidity is no substitute for the safety humidistat.

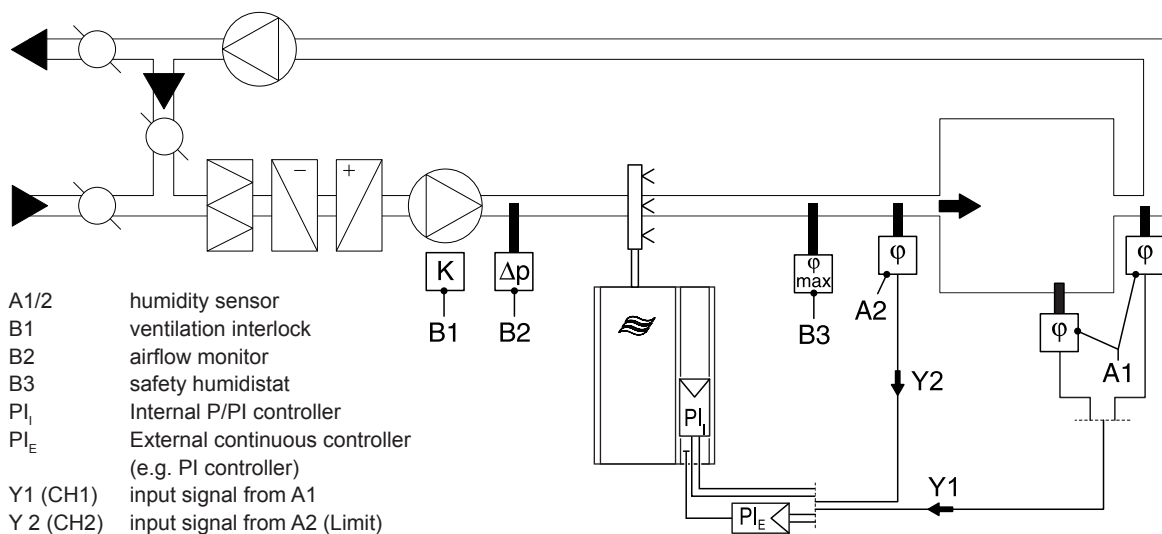


Fig. 23: Configuration 2 – Room humidity control with continuous supply air humidity limitation

5.11.1.3 Configuration 3 – Supply air humidity control with continuous output limitation

Configuration 3, Supply air humidity control (humidity sensor installed in supply air duct) should be used only where room humidity control is impracticable for technical reasons. Such configurations always require a PI-controller.

The humidity sensor (A1) is located in the supply air duct after the steam distributor. The humidity sensor (A2) for the continuous output limitation is located in the supply air duct before the steam distribution pipe. Such a system requires a PI-controller with the option to connect a second humidity sensor.

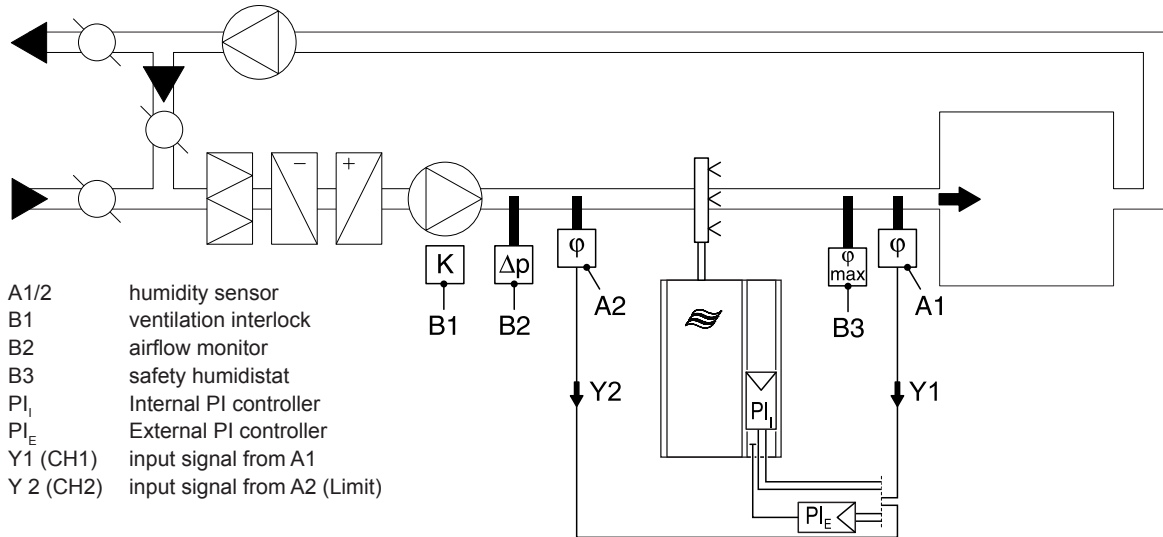


Fig. 24: Configuration 3 – Supply air humidity control with continuous output limitation

5.11.2 Permissible Control Signal Inputs

Table 18 shows the different permissible control signal inputs the GS humidifier can handle.

Table 18: Permissible control signal inputs

Control signals for humidity control with external controller	Humidity sensor signals for humidity control with internal PI controller	Digital inputs (via Modbus, BACnet IP/MSTP slave)
0-5 VDC (Potentiometer 135-10kΩ)	0-5 VDC (Potentiometer 135-10kΩ)	BACnet IP
1-5 VDC	1-5 VDC	BACnet MSTP
0-10 VDC	0-10 VDC	Lonworks (Option)
2-10 VDC	2-10 VDC	BACnet MSTP BTL certified (Option)
0-20 VDC	0-20 VDC	BACnet IP BTL certified (Option)
0-16 VDC	0-16 VDC	
3,2-16 VDC	3,2-16 VDC	
0-20 mA	0-20 mA	
4-20 mA	4-20 mA	
Humidistat (24 V On/Off)		

5.12 Electrical Installations

5.12.1 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.
- Make sure that the main 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 appropriate strain relief connectors, 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.

5.12.2 Wiring Diagrams

Wiring Diagram Condaair GS - 23/45/90

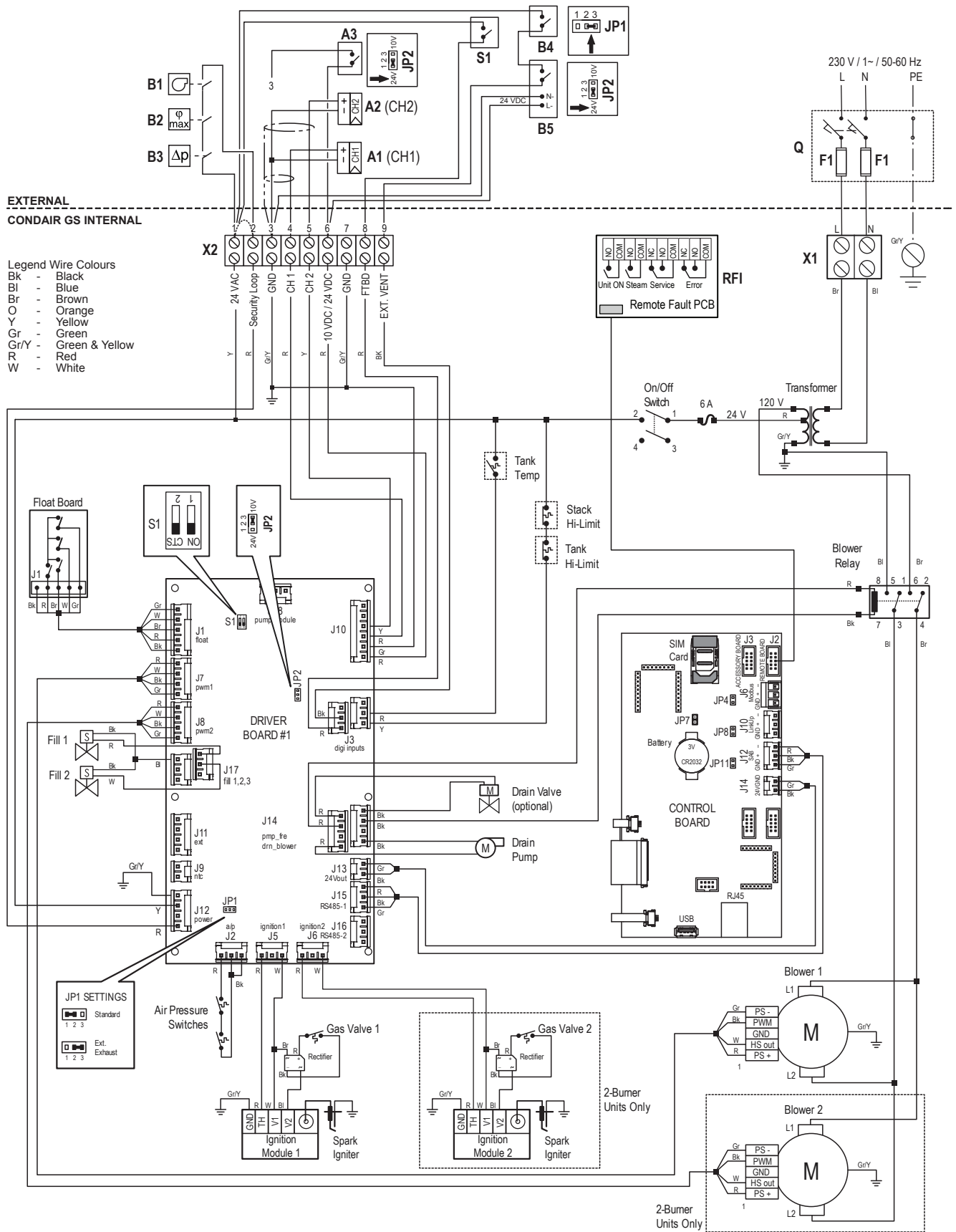


Fig. 25: Wiring Diagram - Condaair GS 23/45/90

Supplementary Wiring Diagram Condair GS 195/260

Fig. 27 shows the supplementary wiring diagram for the GS 195 and GS 260. The connections are carried over from **Fig. 26 on page 60**.

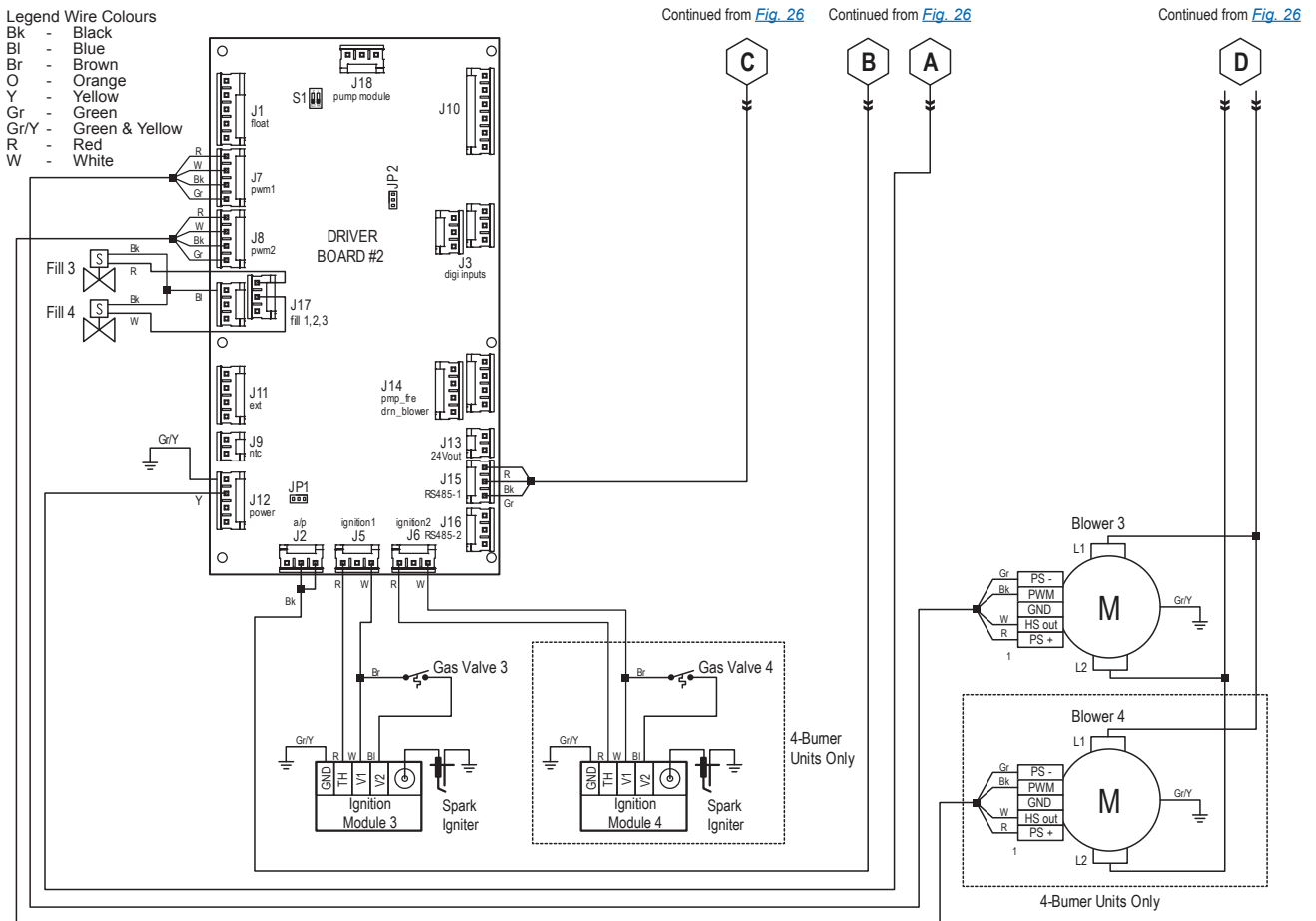


Fig. 27: Supplementary Wiring Diagram Condair GS 195/260

Legend Wiring Diagrams

- A1 External humidity controller or humidity sensor (signal CH1)
- A2 External humidity limiter controller or humidity limiter sensor (signal CH2), additional for Dual channel control
- A3 24 VDC On/Off humidistat (instead of A1 and A2)
- B1 Ventilation interlock (safety loop)
- B2 Safety humidistat (safety loop)
- B3 Air flow monitor (safety loop)
- B4 Differential pressure switch exhaust gas management system (option)
- B5 Air flow monitor exhaust gas management system (option)
- F1 Fuses external disconnect switch
- J6 Modbus connector (on control board)
- J10 Linkup connector (on control board)
- JP2 Jumper (on driver board)– for selecting the output voltage on terminal X2-6 (10 VDC or 24 VDC)
- JP1 Jumper (on driver board) – for activating/deactivating the monitoring of the optional flue gas management system via terminal X2-9
- 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.
- JP8 Termination Linkup system (on control board)
- Q External fused disconnect switch
- RFI Remote fault PCB
- S1 Full tank blowdown switch
- X1 Voltage supply terminal
- X2 Low voltage terminal strip (controls)

5.12.3 External Connections

This section describes the different external control signal and power connections to the Condair GS humidifier.

5.12.3.1 External Security Loop

The external security loop consists of dry contacts of the external safety monitoring devices (for example, ventilation interlock, high limit humidistat, air proving switch, etc.). Connect the external safety monitoring devices in series to terminals "1" and "2" of the low voltage terminal strip "X2". Refer to [Fig. 28](#).

The connecting cables must lead into the control cabinet through a cable gland or grommet.

IMPORTANT! Keep length of the 24 V security loop (safety chain) as short as possible. The length of security loop depends on the cross section of the wires used.

IMPORTANT! A high limit humidistat (3) is highly recommended to prevent over-humidification and potential damage to property.

IMPORTANT! Install a jumper (6) between terminals "1" and "2" in the low voltage terminal strip if no external safety monitoring devices are connected to the security loop.

CAUTION!
Risk of damage to internal components!

Prevention: DO NOT apply voltage to low voltage terminal strip terminals "1" and "2" through the contacts of the external safety monitoring devices.

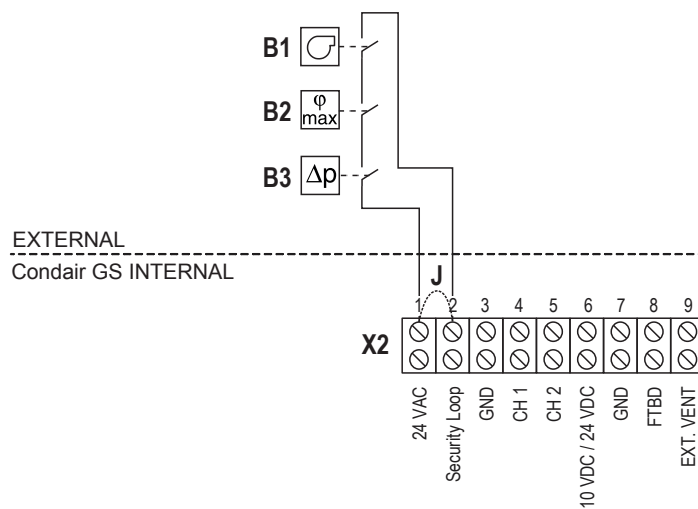


Fig. 28: External security loop connections

- B1 Ventilation interlock
- B2 High limit humidistat
- B3 Air proving switch
- J Jumper (installed if no safety monitoring devices are connected to security loop)

5.12.3.2 Humidity Demand or Humidity Sensor Signal / Limiter Signal

Connect the signal cables of an external humidity sensor or external humidity controller (CH1) to terminals "3" and "4" of the low voltage terminal strip "X2". Refer to [Fig. 29](#). The permissible control signal input values are shown in [Table 18 on page 57](#).

Do not connect multiple modulating signals to the same modulating input on the humidifier. If necessary, connect the limiter signal (CH2) to pin "5" and "3", using pin "3" as common. Make sure that "Control Channels" is set to "Dual" in the control software to utilize the limiter signal – refer to the Condair GS operation manual.

Alternately, transducer signals or demand signals can be written to the humidifier via a valid digital communication protocol.

The signal cable must lead into the control cabinet through an appropriate strain relief connector.

If a shielded signal cable is used, connect the shielding to pin "3".



CAUTION!

If the shielding of the signal is already connected to a potential or a grounded conductor, do not connect it to pin "3".

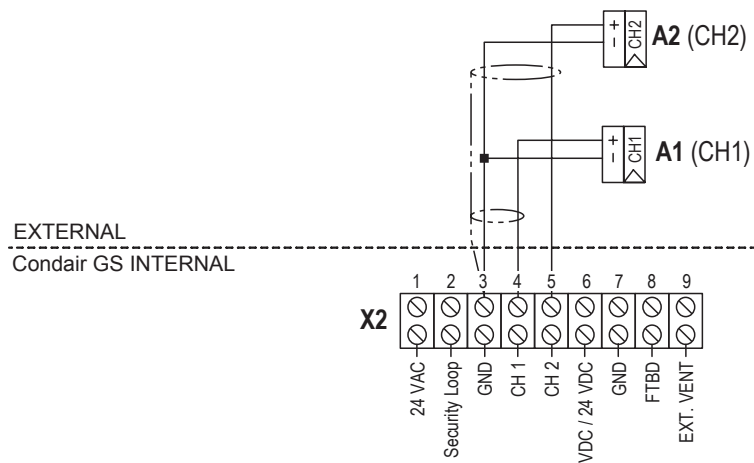


Fig. 29: Modulating demand or humidity signal / limiter connections

- A1 Modulating demand or humidity sensor signal (CH1)
- A2 Limiter signal of a humidity sensor or an external controller (CH2), additional for Dual channels

5.12.3.3 On/Off Humidistat Signal

If an On/Off humidistat is used, connect the signal cable to terminal terminals "4" and "6" of the low voltage terminal strip "X2". Refer to [Fig. 30](#).

The "Control Mode" must be set to "On/Off" in the control software – refer to the Condair GS operation manual.

IMPORTANT! When connecting a 24 VDC On/Off humidistat, jumper "JP2" on the driver board #1 must be set to 24 V (so that pin "6" will output 24 VDC).

Note: By default the jumper JP2 is set to 10 VDC, so that the output can also be used for test purposes.

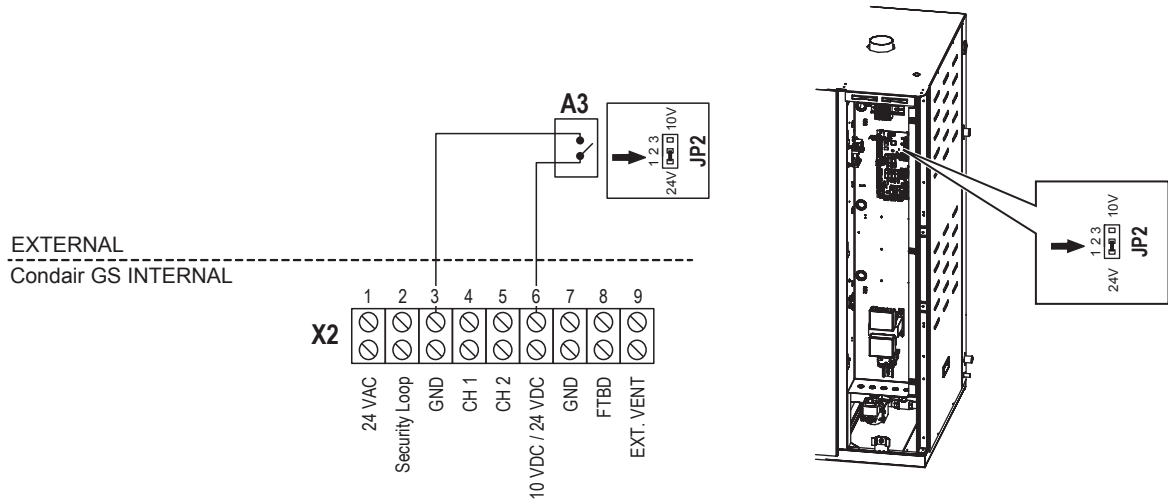


Fig. 30: 24 V On/Off Humidistat Connection

A3 24 VDC On/Off humidistat

5.12.3.4 Full Tank Blowdown Signal Connection

If an external full tank blowdown signal is used, connect the 24 VAC input signal to terminals "1" and "8" of the low voltage terminal strip "X2". Refer to [Fig. 31](#).

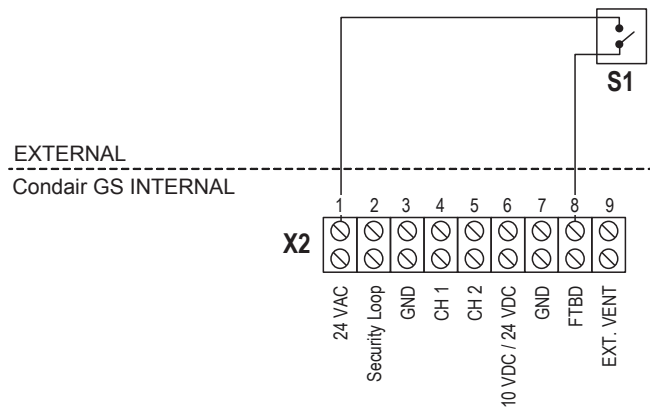


Fig. 31: Full Tank Blowdown Signal Connection

S1 Full tank blowdown switch

5.12.3.5 Monitoring Devices Exhaust Gas Management System

Connect the monitoring devices "B4" (differential pressure switch) and "B5" (air flow monitor) for monitoring the certified exhaust gas management system in series to terminals "1" and "9" of the low voltage terminal strip "X2". The 24 VDC power supply for the air flow monitor "B5" is established via the terminals "3" and "6" of the low voltage terminal strip "X2". Refer to [Fig. 32](#).

IMPORTANT! The jumper "JP1" for activating the input "X2-9" for monitoring the exhaust gas management system must be set to pins "2" and "3" and the jumper "JP2" for setting the output voltage of connection X2-6 to 24 VDC on pins "1" and "2".

Note: On a GS 130/195/260 units with two driver boards, the jumpers "JP1" and "JP2" only need to be set onto the corresponding pins on driver board #1.

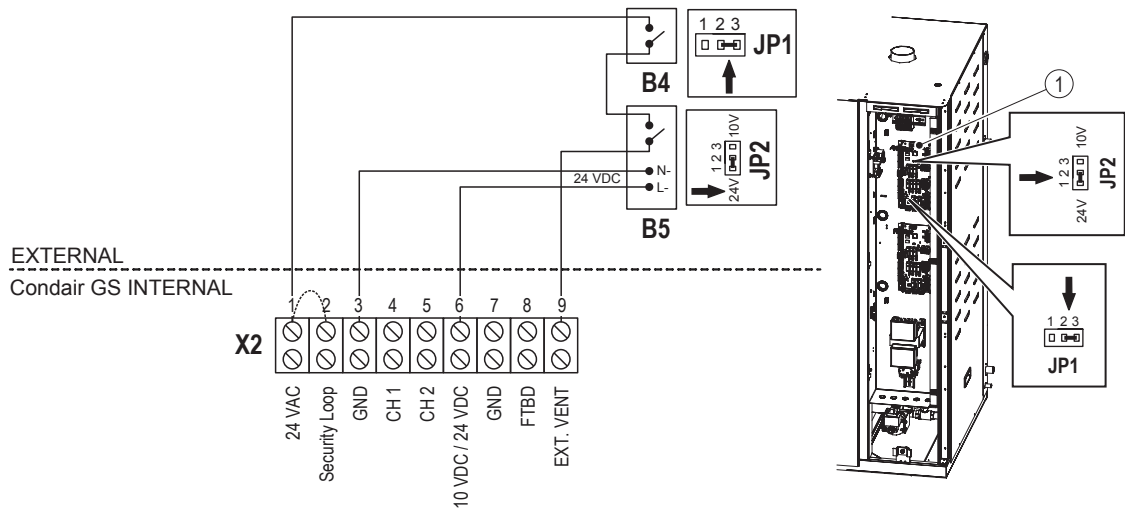


Fig. 32: Monitoring Devices Exhaust Gas Management System

- 1 Driver board (#1)
- B4 Differential pressure switch exhaust gas management system
- B5 Air flow monitor extract air/exhaust air exhaust gas management system
- JP1 Jumper - for the activation of terminal "X2-9" for monitoring the exhaust gas system (must be set to pins 2 and 3)
- JP2 Jumper – for setting the output voltage of terminal X2-6 (must be set to pins 1 and 2 (24 VDC))

5.12.3.6 Remote Fault PCB Connections

The remote fault PCB connected to the connector "J2" on the Condair GS control board in the humidifier has the following four dry relay contacts for remote display of humidifier status and fault conditions. Refer to [Fig. 33](#) for the relevant terminal contacts.

- Error – this relay can be wired to open (NC) or close (NO) when a fault is detected by the humidifier controls.
- Service – this relay is activated when the set maintenance interval elapses. It can be wired to open (NC) or close (NO) when a warning appears on the touchscreen panel of the humidifier and the status LED turns yellow in color.

Note: This relay can be configured in the control software to indicate status updates or system warnings. Refer to the "Remote Fault Board" tab in the Condair GS operation manual.

- Steam – this normally open (NO) relay closes when the unit is producing steam.
- Unit on – this normally open (NO) relay closes when the humidifier has power, and the On/Off switch is in the On position.

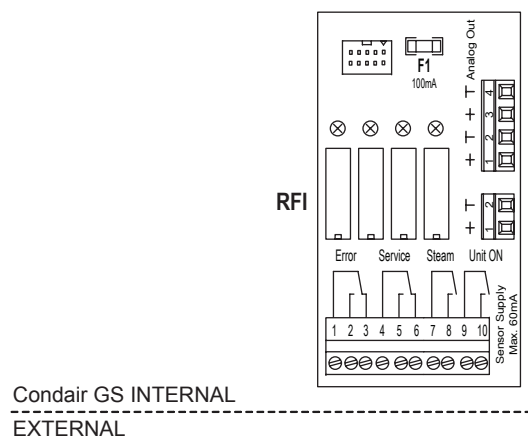


Fig. 33: Remote fault PCB connections

5.12.3.7 Single-Phase Power Supply Connection

Connect the single-phase power supply (230 V / 1~ / 50-60 Hz) to the Condair GS humidifier as shown in [Fig. 34](#). The installation of an **external fused disconnect switch "Q"** (all pole disconnecting device with a minimum contact clearance of 3 mm, supplied by others) with **10 A, slow acting fuses "F1"** in the mains supply line are mandatory.

IMPORTANT! Make sure that the main power cable is proper grounded through the ground lug inside the control cabinet.

All wiring must be in accordance with national and local electrical codes.

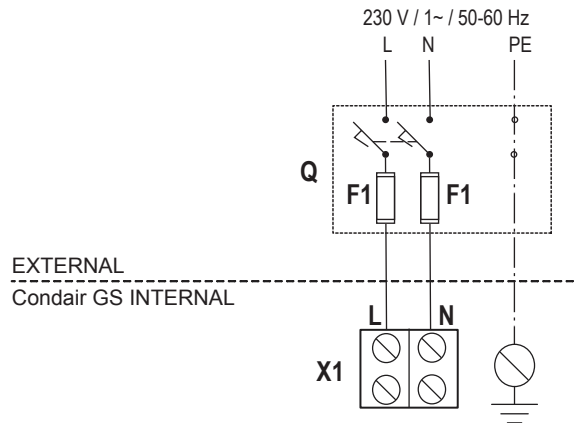


Fig. 34: Single-phase power supply connections

- F1 Fuses 10 A, slow acting
- Q External fused disconnect switch
- X1 Terminal block power supply

5.12.3.8 Modbus Connection

The Condair GS humidifier comes standard with a Modbus communications interface, which can be used to remotely control its output or monitor its operation.

Refer to [Fig. 35 on page 68](#) and connect the Modbus communication cable to the Condair GS humidifier as follows:

1. Connect the Modbus cable to the connector "J6" on the Condair GS control board. Refer to [Table 19](#) for Modbus cable requirements, and [Table 20](#) for communication parameters. Contact your Condair representative if assistance is needed to change the default communication parameters.
Note: The jumper "JP7" on the control board must be installed to activate Modbus or BACnet MSTP communication via RS485 interface "J6". If the jumper is not installed, no communication will take place through "J6".
2. Install the jumper "JP4" on the control board if the humidifier is the first or last unit in the network.

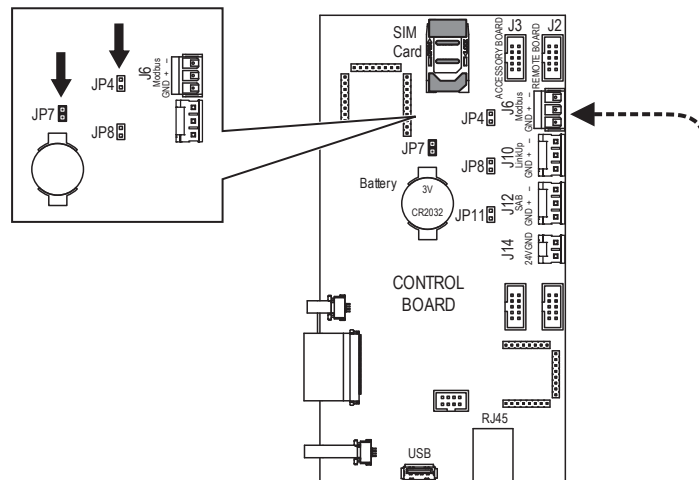


Fig. 35: Modbus connection on Condair GS humidifier

- JP4 Jumper – for activating the termination resistor for Modbus or BACnet MSTP network
- J6 Modbus connector (RS485 interface)
- JP7 Jumper – for activating Modbus or BACnet MSTP communication via RS485 interface "J6"

Table 19: Modbus Cable Requirements

BMS Protocol	Signal type	Recommended cable *	Maximum Distance from humidifier to BMS in m
Modbus	EIA-485, 2-wire	Modbus EIA-485, 2-wire 18-24 AWG shielded, twisted pair, 120Ω	670

* Connect humidifiers in a daisy chain to the Modbus RTU. Ground shield at on end only – either at the BMS or the humidifier.

Table 20: Modbus Communication Parameters

Parameter	Default	Adjustable range
Signal type	EIA-485	–
Transmission mode	RTU	–
Baud rate	9600	110, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 76800 or 115200
Data bits	8	–
Stop bits	1	–
Parity	Even	Odd, Even, None
Address	10	1-247
Time out	300 s	1-300 s

5.12.3.9 Connecting Multiple Units Using Linkup

The integrated control board in the humidifier allows up to four integrated controllers to connect in a "main-extension" configuration using Condair's Linkup system. All the humidifiers within this setup must share the same environment, and be controlled by one set of control signals connected to the main unit. Refer to [Fig. 36](#) and connect multiple unit using Linkup as follows:

1. Connect all control signals for the entire Linkup configuration to the low voltage terminal strip in the main unit.
2. Install a jumper wire (4) between the terminals "1" and "2" in the low voltage terminal strip on all extension units.
3. Connect all humidifiers in the Linkup system using multi-strand twisted pair shielded cable (18-24 AWG, 120 Ω) connected to "J10" on the control board of each humidifier.
Note: Maximum recommended distance between units is 30 m.

IMPORTANT! Do not reverse polarity.

4. Install the termination jumper "JP8" in the control board of the last extension unit in the Linkup system.
5. Finally, refer to the Condair GS operation manual to set up the multi-unit configuration in the control software.

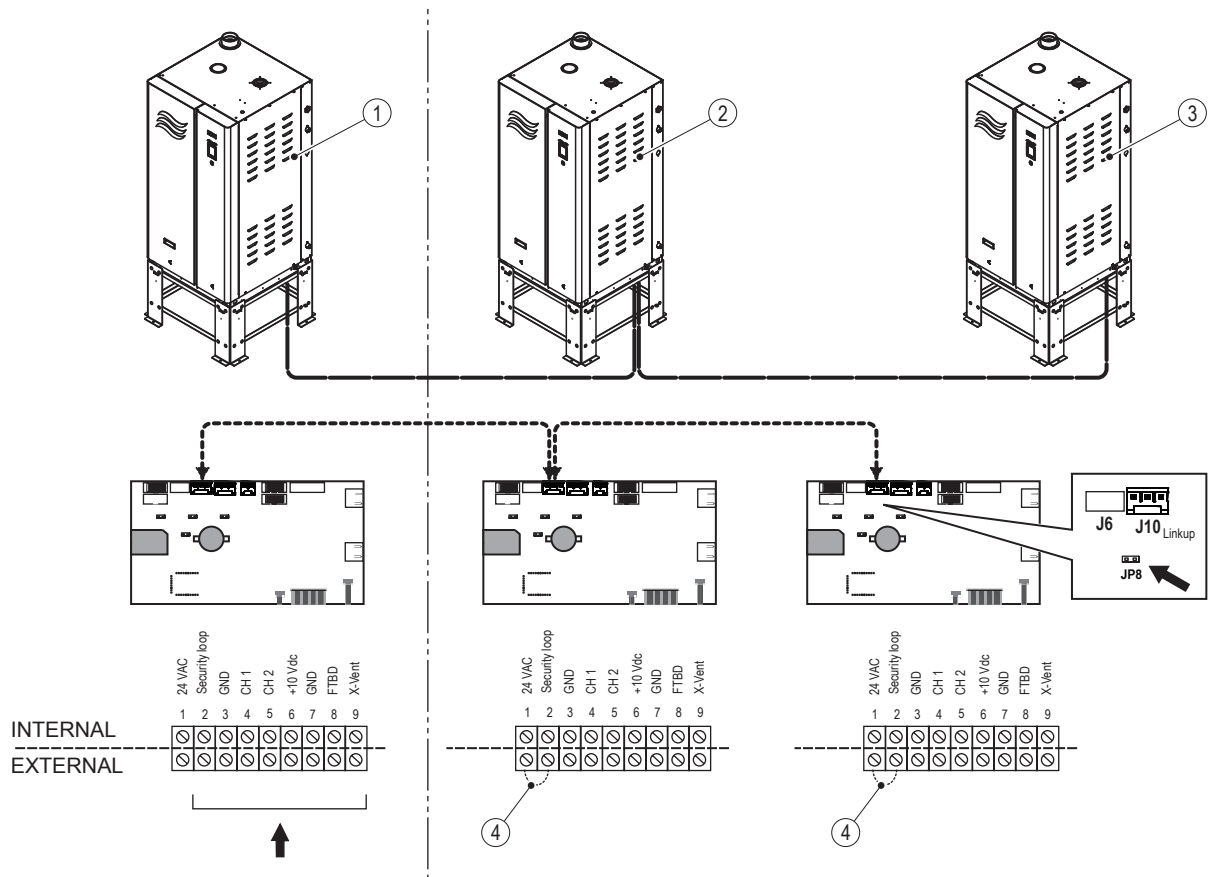


Fig. 36: Multi-Unit Linkup Connections

- | | | | |
|---|--|---|--|
| 1 | Main unit (all control signals connected to main unit) | 3 | Extension unit #X (no control signals to unit) |
| 2 | Extension unit #1 (no control signals to unit) | 4 | Jumper (on first and last extension unit) |

5.12.4 Electrical Connections Checklist

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

- Power supply meet the rated current draw limits shown on the specification label (see [Section 3.2](#))?
- Power supply have an external dedicated 10 A slow acting fused disconnect switch?
- All wiring done according to the wiring diagram and instructions in this manual?
- Main power cable proper grounding through the ground lug inside the electric cabinet?
- All cables fastened securely?
- All cables free of tension and pass through cable glands or grommets?
- Electrical installation meet the applicable national and local codes?
- All access panels closed and fastened securely?

6 Product specifications

6.1 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)	Propane (G31)	Natural gas (G20)	Propane (G31)		
GS 23-CS	3.6	3.6	18.2	18.2	-2.5	4.6-23
GS 23	4.1	4.1	20.5	20.5	-2.5	4.6-23
GS 45-CS	7.3	7.3	36.4	36.4	-2.5	9-45
GS 45	8.2	8.2	41.0	41.0	-2.5	9-45
GS 65-CS	10.9	10.9	54.5	54.5	-2.5	13-65
GS 65	12.3	12.3	61.5	61.5	-2.5	13-65
GS 90-CS	7.3	7.3	72.7	72.7	-2.5	9-90
GS 90	8.2	8.2	82.0	82.0	-2.5	9-90
GS 130-CS	10.9	10.9	109.0	109.0	-2.5	13-130
GS 130	12.3	12.3	123.0	123.0	-2.5	13-130
GS 195-CS	10.9	10.9	163.5	163.5	-2.5	13-195
GS 195	12.3	12.3	184.5	184.5	-2.5	13-195
GS 260-CS	10.9	10.9	218.0	218.0	-2.5	13-260
GS 260	12.3	12.3	246.0	246.0	-2.5	13-260

6.2 Gas consumption at maximum power

Model	Power consumption at minimum demand [kW]	Gas consumption at maximum demand [m³/h]		
		Natural gas (G20)	Natural gas (G25)	Propane (G31)
GS 23-CS	18.2	1.7	2.0	0.7
GS 23	20.5	1.9	2.3	0.8
GS 45-CS	36.4	3.5	4.0	1.4
GS 45	41.0	3.9	4.5	1.5
GS 65-CS	54.5	5.2	6.0	2.1
GS 65	61.5	5.9	6.8	2.3
GS 90-CS	72.7	6.9	8.1	2.7
GS 90	82.0	7.8	9.1	3.1
GS 130-CS	109.0	10.4	12.1	4.1
GS 130	123.0	11.7	13.6	4.6
GS 195-CS	163.5	15.6	18.1	6.2
GS 195	184.5	17.6	20.4	6.9
GS 260-CS	218.0	20.8	26.2	8.2
GS 260	246.0	23.4	29.5	9.3

6.3 Operating Data

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 VDC (Off) 2.5-20 VDC (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	5-40 °C
Relative humidity	5-80 % (non-condensing)

Combustion Air	
Combustion air maximum temperature	30 °C

Backpressure steam line	
Maximum permissible backpressure (duct static pressure and line backpressure)	1.49 kPa for compact unit 2.49 kPa for full-size unit

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)
	Lw G27	1.7-2.3 kPa (17-23 mbar)
	Ls G2.350	1.1-1.6 kPa (11-16 mbar)
Propane:	G31	2.5-5.7 kPa (25-57 mbar)

CO ₂ levels in flue 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		
G27		
G2.350		
G31	10.4 ± 0.2 %	9.5 ± 0.2 %

Water Supply	
Water pressure (regulated)	3.0-8.0 bar (300-800 kPa)
Flow rate	10 l/min for GS 23-130, 20 l/min for GS 195-260
Water temperature	1-25 °C, recommended maximum: 15 °C
Water quality	Cold potable water filtered to 125 µm, hardness of 0-205 ppm, pH level between 5-8 and chloride 0-40 ppm

Drain water	
Drain water temperature	60 °C maximum (with drain water cooling), 100 °C (without drain water cooling)
Drainage capacity	20 l/min

Power				
Model	230 V/1~50 Hz			
	Pn max. in kW	In max. in A	Cable cross section in mm ²	Fuse "F1" in A slow acting (aM)
GS 23-CS	0.23	1.0	1.5	10
GS 45-CS	0.23	1.0	1.5	10
GS 65-CS	0.35	1.5	1.5	10
GS 90-CS	0.32	1.4	1.5	10
GS130-CS	0.53	2.3	1.5	10
GS 195-CS	0.72	3.1	1.5	10
GS 260-CS	0.92	4.0	1.5	10

IP Rating	IP20 for all units
------------------	--------------------

6.4 Weights

For the weights of the Condair GS humidifier models refer to [Table 2 on page 22](#) and [Table 3 on page 22](#).

6.5 Dimensions

6.5.1 Dimensions Condair GS 23/45

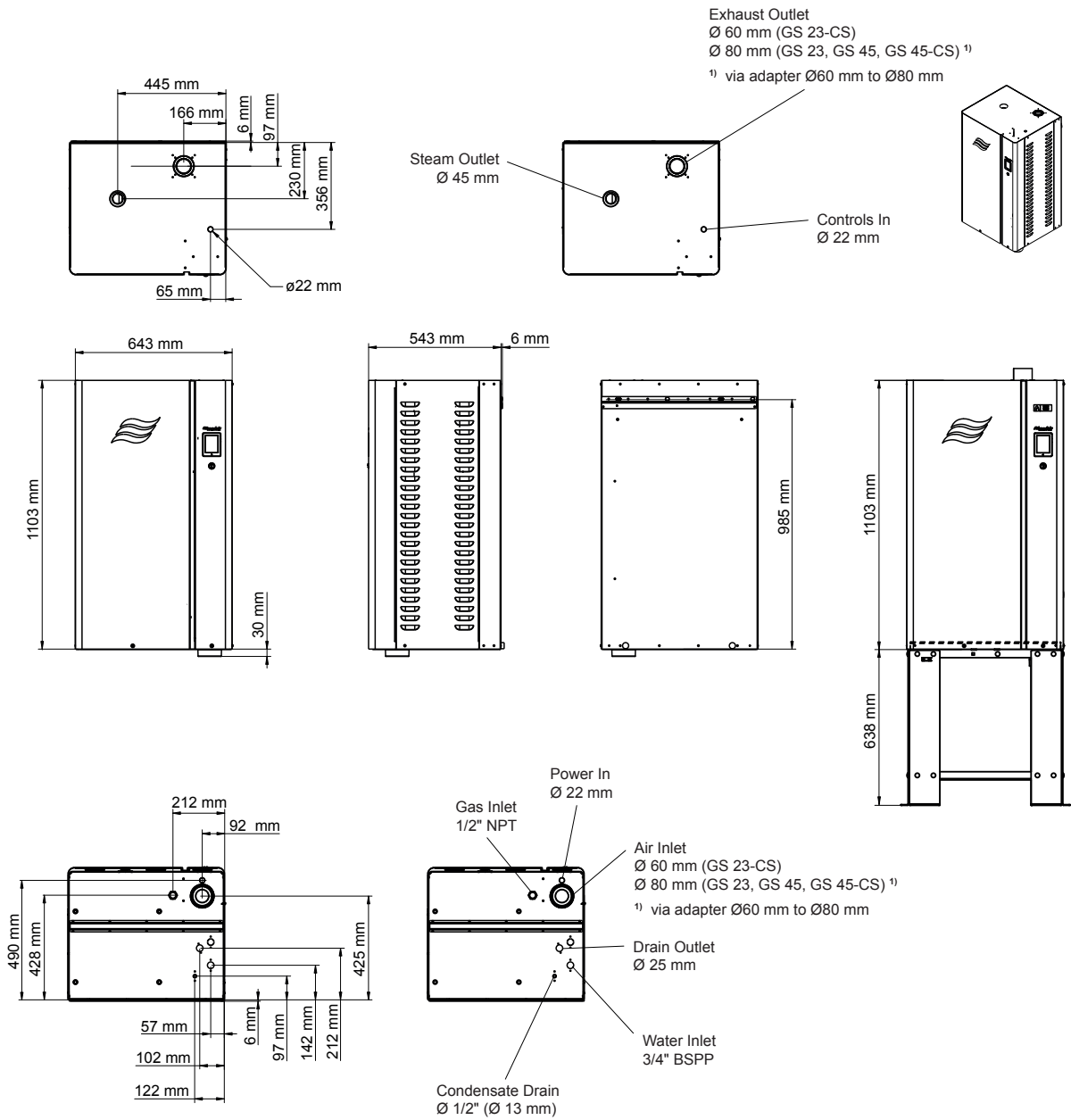


Fig. 37: Dimensions Condair GS 23/45

Wall mount is default. Floor stands come with the compact unit.

6.5.2 Dimensions Condair GS 65

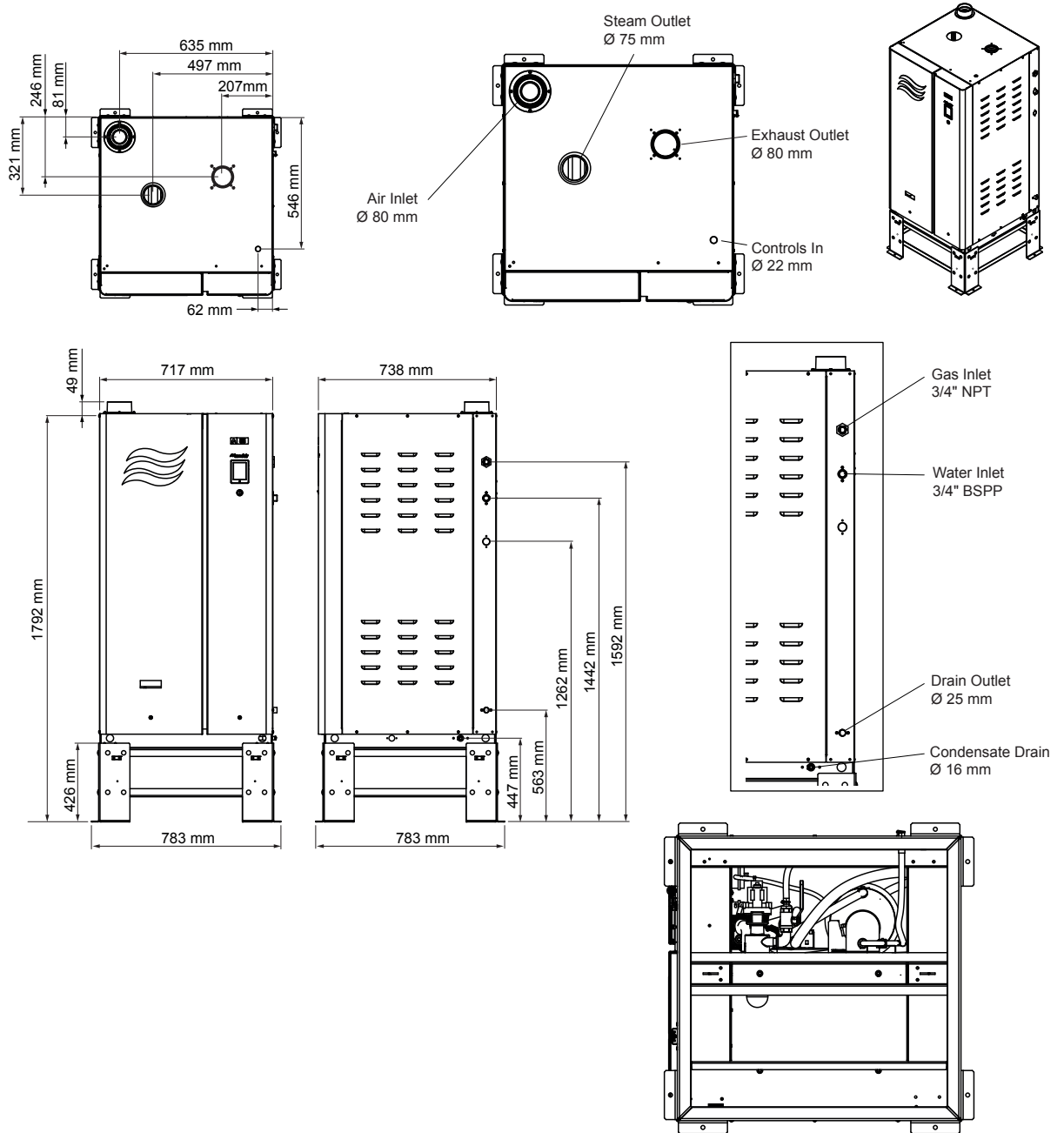


Fig. 38: Dimensions Condair GS 65

Mounting stand supplied. The humidifier may also be installed directly onto the floor. Follow local guidelines. The condensate drain (via secondary heat-exchanger) at the bottom of the unit is applicable to CS units only.

6.5.3 Dimensions Condair GS 90/130

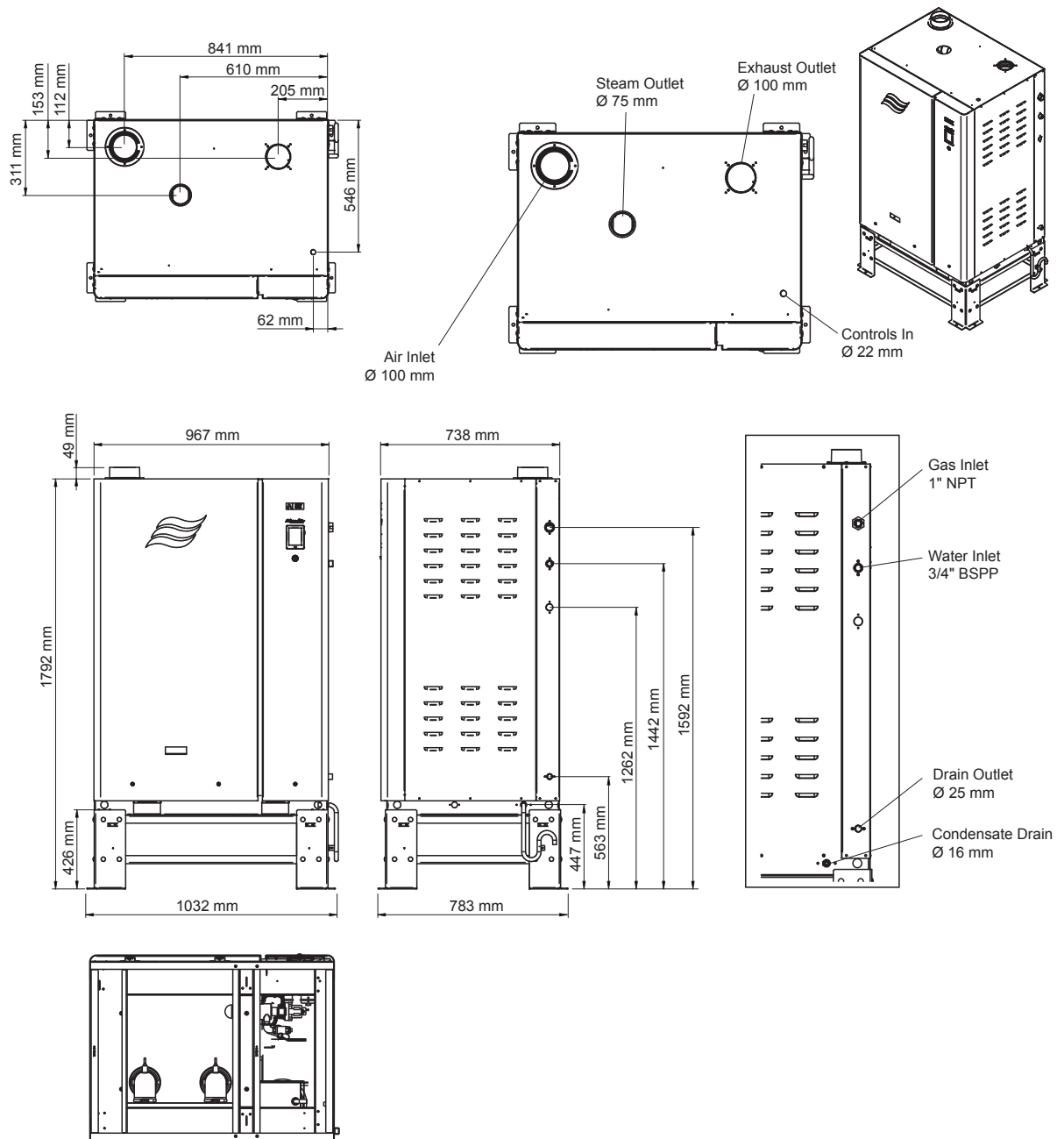


Fig. 39: Dimensions Condair GS 90/130

Mounting stand supplied.

The condensate drain (via secondary heat-exchanger) at the bottom of the unit is applicable to CS units only.

6.5.4 Dimensions Condair GS 195

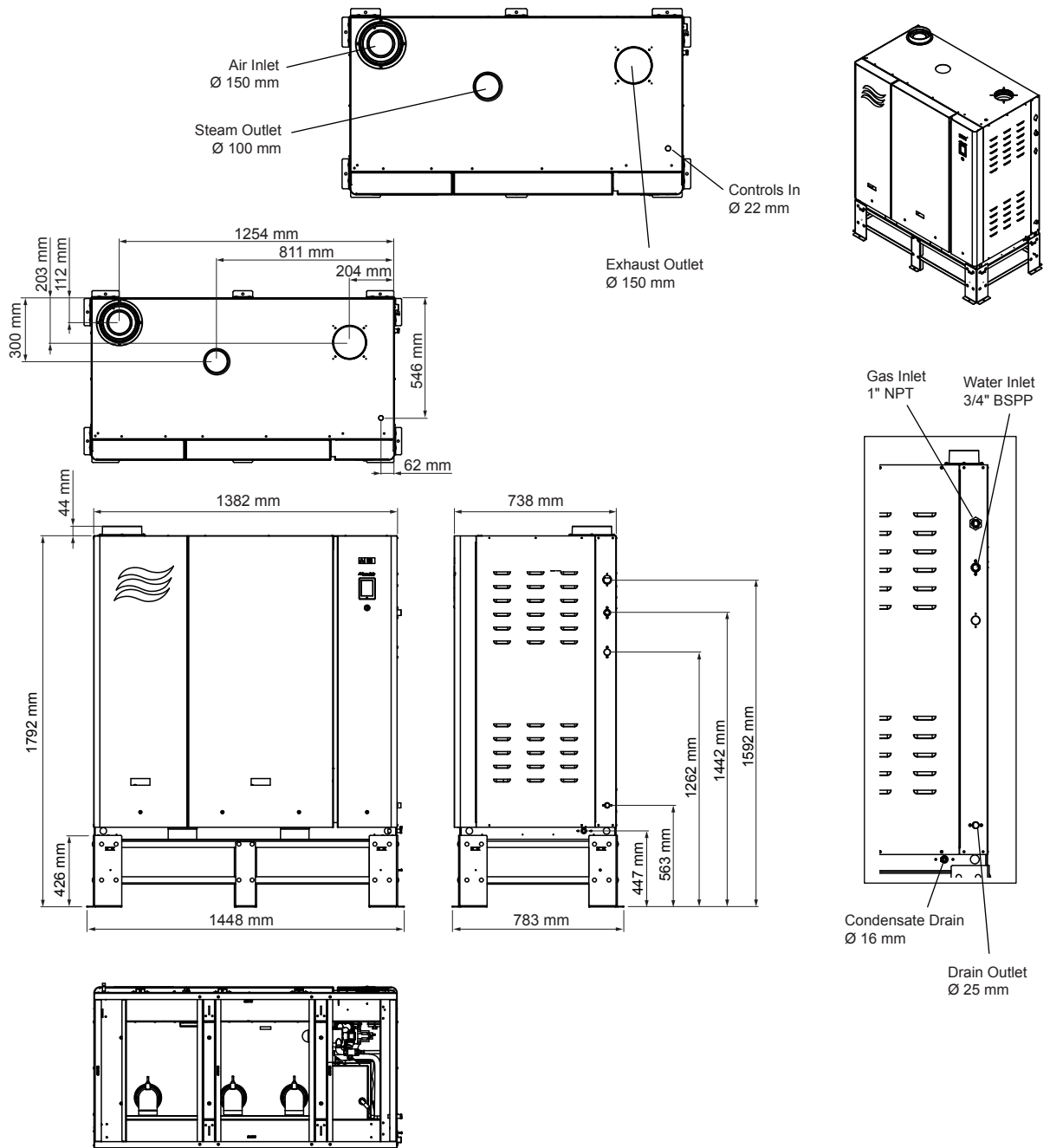


Fig. 40: Dimensions Condair GS 195

Mounting stand supplied.

The condensate drain (via secondary heat-exchanger) at the bottom of the unit is applicable to CS units only.

Note: Gas inlet 1 1/4" to 1" BSP adapter (required), **not** supplied with unit.

6.5.5 Dimensions Condair GS 260

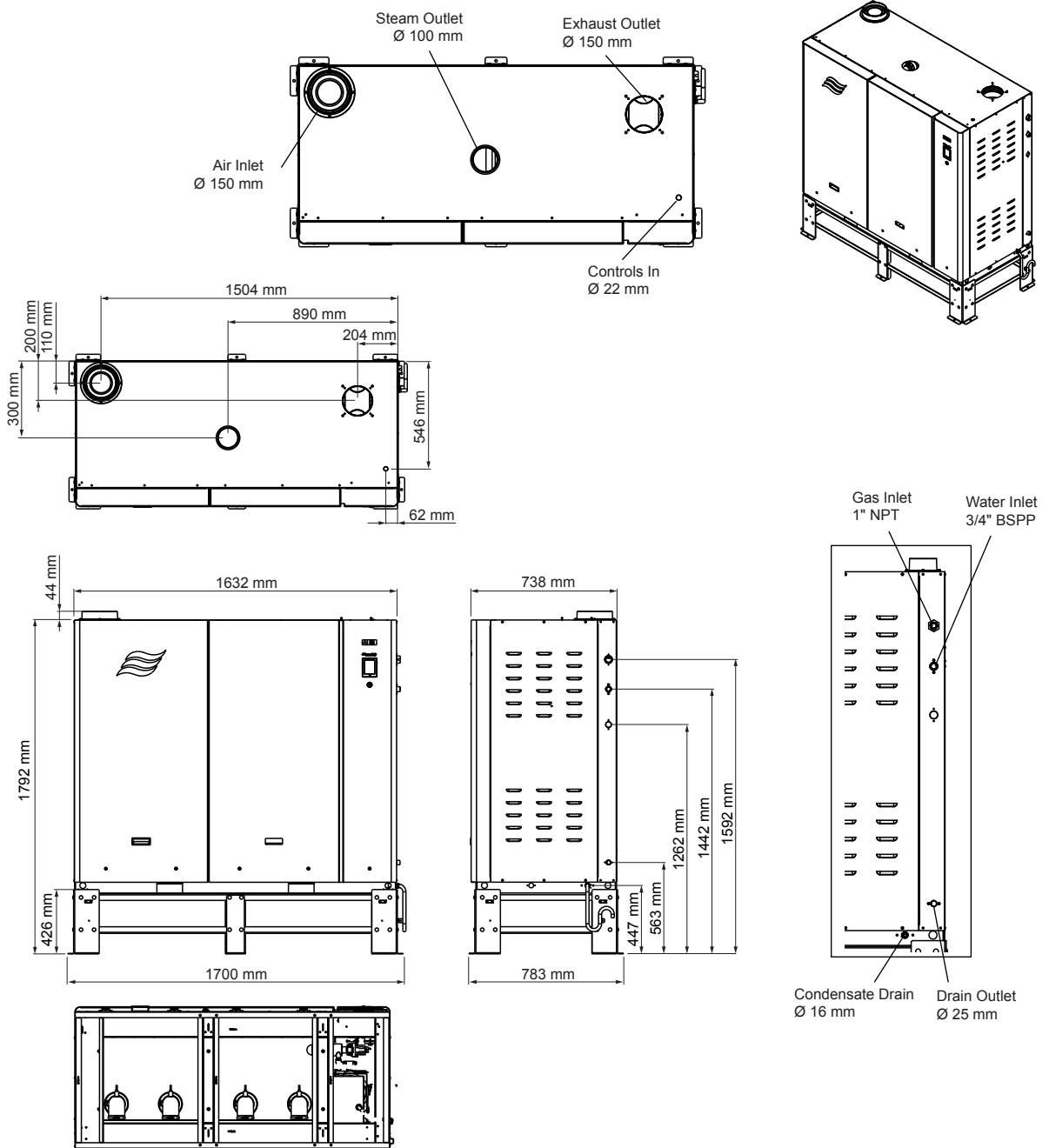


Fig. 41: Dimensions Condair GS 260

Mounting stand supplied.

The condensate drain (via secondary heat-exchanger) at the bottom of the unit is applicable to CS units only.

Note: Gas inlet 1 1/4" to 1" BSP adapter (required), **not** supplied with unit.

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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.