2599347-0 EN 2005

RS SERIES


# INSTALLATION AND OPERATION MANUAL

Steam humidifier
Condair **RC**

Humidification and Evaporative Cooling

condair

# Thank you for choosing Condair

| |
|---|
| Installation date (MM/DD/YYYY): |
| Commissioning date (MM/DD/YYYY): |
| Site: |
| Model: |
| Serial number: |

# Contents

# 1 Introduction

## 1.1 To the very beginning

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

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

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 and operation manual

**Limitation**

**The subject of this installation and operation manual is the Condair RC steam humidifier in its different versions**. The various options and accessories are only described insofar as is necessary for proper operation of the equipment. Further information on options and accessories can be obtained in their respective instructions.

This installation and operation manual is restricted to the **planning, installation, commissioning, operation, maintenance and trouble shooting** of the Condair RC steam humidifier and is meant for **well trained personnel being sufficiently qualified for their respective work**.

This installation and operation manual is supplemented by various separate items of documentation (e.g. spare parts list), which are included in the delivery as well. Where necessary, appropriate cross-references are made to these publications in the installation and operation 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 and operation 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 and operation manual that, if neglected, may cause **injury to persons**.

**DANGER!**

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

### Safekeeping

Please safeguard this installation and operation manual in a safe place, where it can be immediately accessed. If the equipment changes hands, the documentation must be passed on to the new operator.

If the documentation gets misplaced, please contact your Condair representative.

### Language versions

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

# 2 For your safety

### General

Every person working with the Condair RC must have read and understood the Condair RC installation and operation manual before carrying out any work.
Knowing and understanding the contents of the installation and operation 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 icons, signs and markings applied to the Condair RC must be observed and kept in readable state.

### Qualification of personnel

All work described in this installation and operation 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 authorised by Condair.

It is assumed that all persons working with the Condair RC are familiar and comply with the appropriate regulations on work safety and the prevention of accidents.

The Condair RC steam humidifier may not be used by persons (including children) with reduced physical, sensory or mental abilities or persons with lacking experience and/or knowledge, unless they are supervised by a person responsible for their safety or they received instructions on how to operate the system. Children must be supervised to make sure that they do not play with the Condair RC steam humidifier.

### Intended use

The Condair RC steam humidifier is intended exclusively for air humidification via a steam distributor approved by Condair within specified operating conditions. 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 RC becoming dangerous and will void any warranty.
Operation of the equipment in the intended manner requires **that all the information contained in this installation and operation manual are observed (in particular the safety instructions)**.

### Danger that may arise from the Condair RC

**DANGER!**
**Danger of electric hazard!**

**The Condair RC is mains powered. Live parts may be exposed when the unit is open. Touching live parts may cause severe injury or danger to life**.

**Prevention**: Before carrying out any work set the Condair RC out of operation as described in *chapter 6.3* (switch off the unit, disconnect it from the mains and stop the water supply) and secure the unit against inadvertent power-up.

**WARNING!**
**Hot water vapour - Danger of scalding!**

**The Condair RC produces hot water vapour. There is danger of scalding when coming in contact with hot water vapour.**

**Prevention:** Do not carry out any work on the steam system during operation (steam lines, steam distributor, etc.). If the steam system is leaky set the Condair RC immediately out of operation as described in *chapter 6.3*. Correctly seal the steam system before putting the unit into operation again.

**WARNING!**
**Danger of burning!**

**During operation the components of the steam system (steam tank, steam distributor, etc.) get very hot (up to 100 °C). There is danger of burning when touching the hot components.**

**Prevention:** Before carrying out any work on the steam system set the Condair RC out of operation as described in *chapter 6.3*, then wait until the components have cooled down sufficiently thus preventing danger of burning.

### Preventing unsafe operation

If it is suspected that **safe operation is no longer possible**, the Condair RC should immediately **be shut down and secured against accidental power-up according to** *chapter 6.3*. This can be the case under the following circumstances:

– if the Condair RC is damaged
– if the electrical installations are damaged
– if the Condair RC is no longer operating correctly
– if connections and/or piping are not sealed

All persons working with the Condair RC must report any alterations to the unit that may affect safety to the owner without delay.

### Prohibited modifications to the unit

**No modifications must be undertaken** on the Condair RC 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.

# 3 Product Overview

## 3.1 Models overview

Condair RC steam humidifiers are available with **tow different housing sizes (Small and Medium)**, a **heating voltage of 380V/3~/50Hz** and **steam capacities ranging from 5 kg/h up to a maximum of 40 kg/h**.

| | Condair RC | | | | |
|---|---|---|---|---|---|
| Model | RC 5 | RC 10 | RC 20 | RC 30 | RC 40 |
| Housing size | Small | | | Medium | |
| Humidification capacity | 5 kg/h | 10 kg/h | 20 kg/h | 30 kg/h | 40 kg/h |
| Heating voltage | 380V/3~/50Hz | | | | |
| Control voltage | 220V/1~/50Hz | | | | |

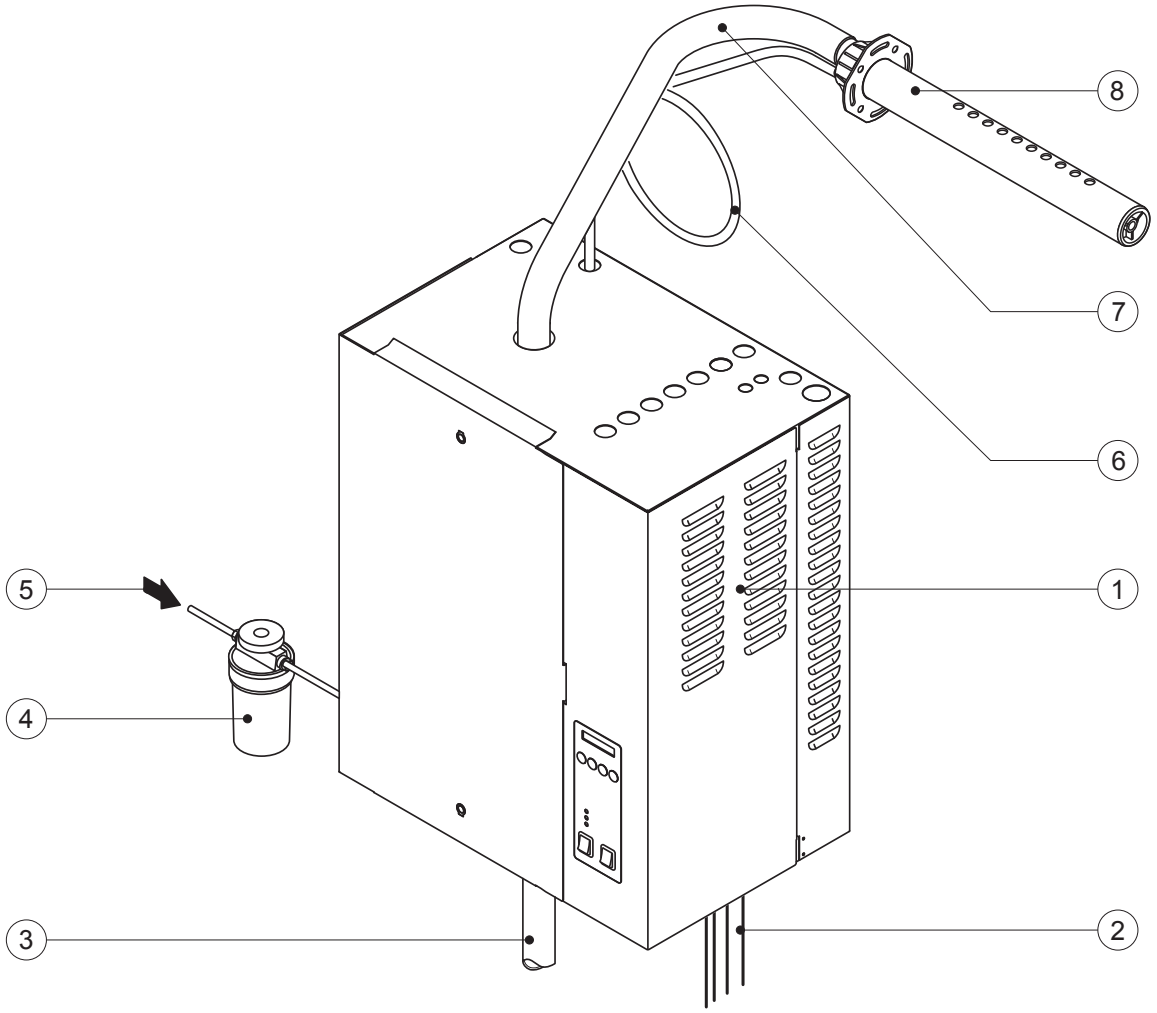
The Condair RC can be operated with tap water, softened water or deionized water. All modells are equipped as standard with an integrated PI controller and an operating and display unit, which allows you to read current operating parameters and to configure the Condair RC for operation.

## 3.2 Standard delivery

The standard delivery includes:

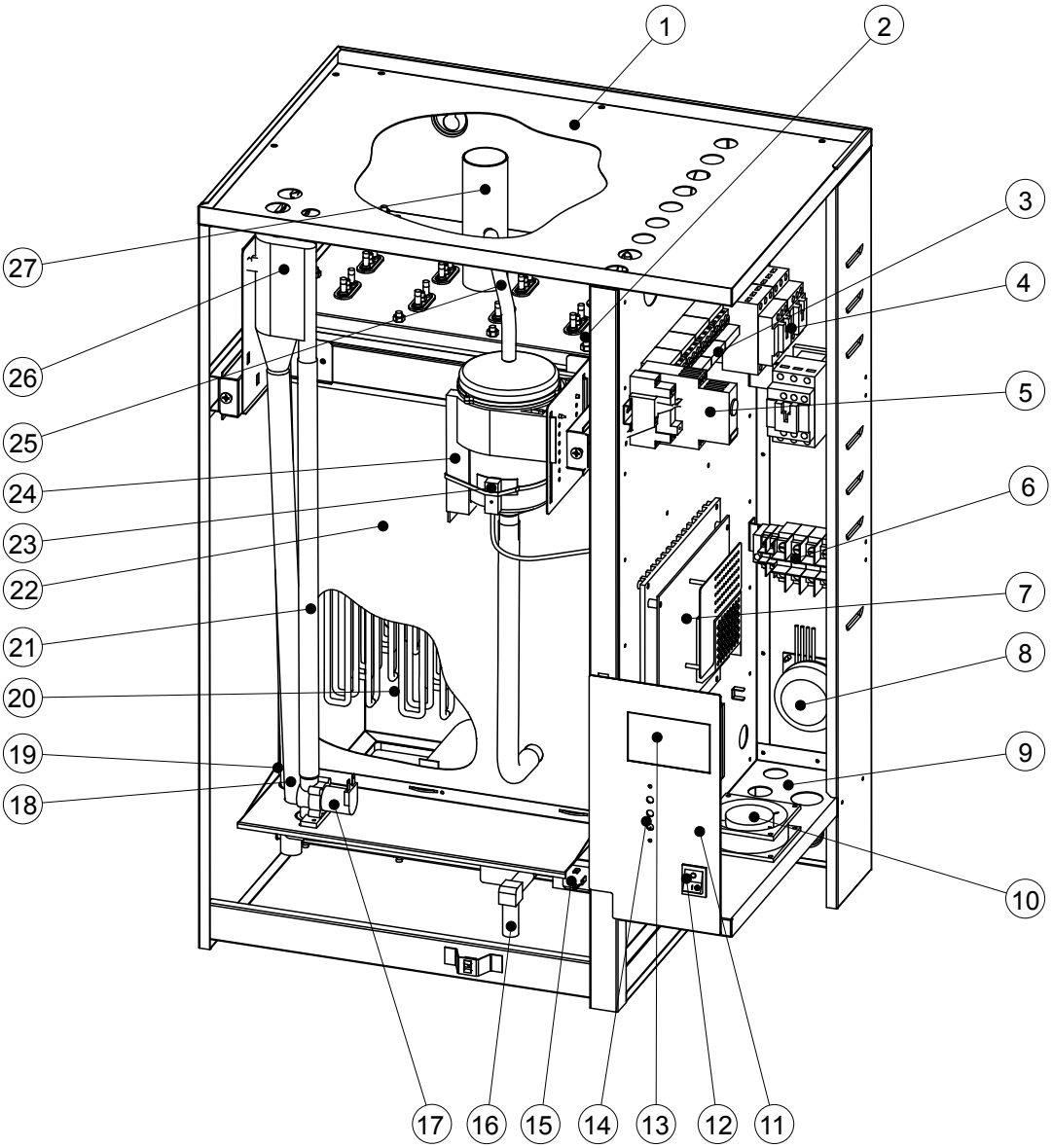
- Condair RC steam humidifier complete (according to the model selected) equipped with the selected options according to *chapter 4.2*
- Fixing set including dowels and fixing screws
- Installation and operating instructions (this document)
- Ordered accessories (steam distribution pipe, steam hose, etc.) according to *chapter 4.3*.

## 3.3 Humidifying system overview




1 Condair RC steam humidifier
2 Power supply and control wiring
3 Drain line
4 Filter valve (Accessory "Z261")
5 Water supply line
6 Condensate hose "KS10"
7 Steam hose "DS80"
8 Steam distributor "DV81-…"

## 3.4 Construction of Humidifier




1 RC Housing
2 Overtemperature switch
3 Terminal block for neutral wires
4 Main contactor
5 Timer relay and middle relay
6 Terminal block for mains supply
7 Main control board
8 Transformer
9 Entry hole for mains cable
10 Ventilation fan
11 Drain switch
12 Unit switch
13 LC Display
14 Status indicator
15 Drain valve
16 Drain hose
17 Inlet valve
18 Overflow pipe
19 Water filling pipe
20 Heating element
21 Water supply pipe
22 Steam tank
23 Water level sensor
24 Electronic water level unit
25 Pressure-equalizing pipe
26 Fill cup
27 Steam outlet connector

## 3.5 Functional description

The Condair RC steam humidifier is an atmospheric steam generator. It operates on the resistance heating principle and generates steam for indirect humidification (with steam distributor) in ventilating and air handling units.

**Water supply**

The water is supplied via a filter valve (accessory) to the steam humidifier. It reaches the steam tank via the level controlled inlet valve and the open fill cup. The Condair RC can be operated with tap water, softened water, reverse osmosis water or deionized water.

**Water level control**

The water level in the steam tank is continuously monitored with the level unit. If the water level reaches a preset level (due to the evaporation process) the level unit supplies a signal to the controller. This opens the inlet valve and the steam tank is filled up. When the preset operating level is reached, the level unit supplies another signal to the controller to close the inlet valve.
The pressure equalizing pipe between the steam connection and the level unit ensures that the water levels are the same in the steam tank and the level unit.

**Control of steam generation**

The steam is produced in the steam tank by several resistance heating elements. An external or the integrated continuous controller control the steam production fully variably from 0 to 100 %.
Alternatively the Condair RC can be controlled also via an On/Off controller.

**Flushing**

The evaporation process increases the concentration of minerals in the water of the steam tank. A suitable volume of water must be flushed out of the steam tank from time to time and replaced by fresh water to ensure that this concentration does not exceed a specific value unsuitable for operation.
The Condair RC consists of the following two forms of flushing:

– **Automatic flushing** takes place as soon as the water in the steam tank exceeds the upper operating level (e.g. by foaming of the water).
– **Flushing dependent on time** performs the flushing process at preselected time intervals.

Automatic or time-dependent flushing takes place depending on the water quality and the operating data. If the lowest operating level is reached during the flushing process, the inlet valve remains open until the water level in the steam tank has reached the normal working level again. If the lowest operating level is not reached, the inlet valve is closed.

# 4 Notes for the planning engineer

All the data necessary for the selection and layout of a Condair RC humidifier system are provided in the following chapters.

To select the unit model, the options and the accessories required the following planning steps are required:

1. Selecting the unit model according to *chapter 4.1*
2. Selecting the options according to *chapter 4.2*
3. Selecting the accessories according to *chapter 4.3*

## 4.1 Selecting the unit model

### 4.1.1 Calculating the maximum required steam capacity

The maximum required steam capacity must be calculated based on one of the following formulas:

$$m_D = \frac{V \cdot \rho}{1000} \cdot (x_2 - x_1) \quad \text{or} \quad m_D = \frac{V}{1000 \cdot \varepsilon} \cdot (x_2 - x_1)$$

**$m_D$**: maximum steam demand in **kg/h**
**V**: volume of supply air portion per hour in **$m^3$/h** (for indirect room humidification) or room volume to be humidified per hour in **$m^3$/h** (for direct room humidification)
**ρ**: specific gravity of air in **kg/$m^3$**
**ε**: specific volume of air in **$m^3$/kg**
**$x_2$**: desired absolute room air humidity in **g/kg**
**$x_1$**: minimum absolute supply air humidity in **g/kg**

The values for **ρ**, **ε**, **$x_2$** and **$x_1$** can be gathered from the **h,x-diagram** or the **Carrier-Diagram** for moist air respectively.

For a rough estimate of the calculated steam capacity, the following table can be used. The values listed in the table are based on a desired room air temperature of 20 °C and a desired relative room air humidity of 45 %rh.

| Max. portion of supply air in $m^3$/hr or room volume to be humidified per hour in $m^3$/hr | | | **Max. steam capacity in kg/h** |
|---|---|---|---|
| Temperature / rel. humidity of supply air | | | |
| -15 °C/90 %rh | -5 °C/80 %rh | 5 °C/60 %rh | |
| 650 | 850 | 1000 | 5 |
| 1000 | 1350 | 1600 | 8 |
| 2000 | 2650 | 3200 | 16 |
| 2500 | 3300 | 4000 | 20 |
| 3000 | 4000 | 4800 | 24 |
| 3750 | 5000 | 6000 | 30 |
| 5000 | 6600 | 8000 | 40 |
| 6250 | 8250 | 10000 | 50 |
| 7500 | 9900 | 12000 | 60 |
| 10000 | 13200 | 16000 | 80 |

Condair RC **20**

Example:
Max. portion of supply air 3000 m3/h, temperature/rel. humidity of supply air -15°C/90%rh

**Important notes:**

– The required maximum steam capacity depends on the specific application and the installation. The calculated steam capacity based on the above formulas, the h,x diagram and the condition of the air to be humidified does not consider any steam loss (e.g. due to condensation in the steam hoses and the steam distributors), any heat loss of the unit as well as any absorption or release of humidity of materials located in the room being humidified.
In addition, the calculated steam capacity does not consider any losses caused by the draining rate depending on the water quality.

The total amount of losses depends on the entire system and must be taken into consideration when calculating the required steam capacity. If you have any questions regarding the calculation of the steam capacity please contact your supplier.

– For systems where the max. required steam capacity varies extensively (e.g. for test facilities or for systems with variable air volume flow, etc.), please contact your supplier.

### 4.1.2 Selecting the unit

According to the calculated maximum steam capacity the unit version can be selected from the table below.

| | | Condair RC | | | | |
|---|---|---|---|---|---|---|
| Model | | **RC 5** | **RC 10** | **RC 20** | **RC 30** | **RC 40** |
| Housing size | | Small | | | Medium | |
| Humidification capacity | kg/h | 5 | 10 | 20 | 30 | 40 |
| Power consumption | kW | 3.9 | 7.6 | 15.0 | 22.8 | 30.2 |
| Phase current | A | 5.7 | 11.6 | 22.9 | 34.6 | 45.9 |
| Heating voltage | | 380V/3~/50Hz [1)] | | | | |
| Control voltage | | 220V/1~/50Hz | | | | |

[1)] Should you require a unit with a different heating voltage, please contact your supplier.

## 4.2 Options

The following table presents an overview of the available options for the Condair RC:

| | Condair RC | | | | |
|---|---|---|---|---|---|
| | **RC 5** | **RC 10** | **RC 20** | **RC 30** | **RC 40** |
| **Pressure compensation kit**<br>Assembly kit for the installation of the fill cup above the unit on the equipment cover, for the operation of the steam humidifier in installations with duct air pressures up to 10'000 Pa. | **1** | 1 | 1 | 1 | 1 |

## 4.3 Accessories

### 4.3.1 Accessories overview

The following table presents an overview of the available accessories for the Condair RC:

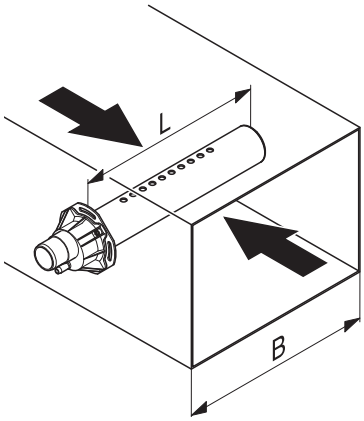
| | Condair RC | | | | |
|---|---|---|---|---|---|
| | **RC 5** | **RC 10** | **RC 20** | **RC 30** | **RC 40** |
| Steam distribution pipes DV81-<br>(see accessory details in *chapter 4.3.2*) | 1 | 1 | 1 | 1 | 1 |
| OptiSorp steam distribution system<br>(see accessory details in *chapter 4.3.2*) | 1 | 1 | 1 | 1 | 1 |
| Steam hose | 1 | 1 | 1 | 1 | 1 |
| Condensate hose | 1 | 1 | 1 | 1 | 1 |
| Filter valve [1)] | 1 | 1 | 1 | 1 | 1 |
| Humidity sensor, room | 1 | 1 | 1 | 1 | 1 |
| Humidity sensor, duct | 1 | 1 | 1 | 1 | 1 |

[1)] The filter valve can be installed in the main water supply line, and can supply more than one humidifier.

## 4.3.2 Accessory details

### Steam distribution pipes DV81-... for indirect room humidification

The steam distribution pipes are selected on the basis of the **duct width** (for horizontal installation) or the **duct height** (for vertical installation) and the capacity of the steam humidifier.
**Important!** Always select the longest possible steam distribution pipe (optimum humidification distance).



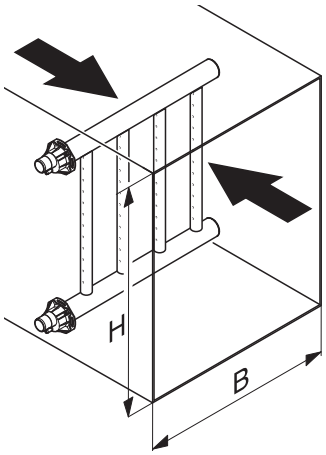

| Steam distribution pipes DV81-... for Condair RC (CrNi steel) | | Duct width (B) | Steam output |
|---|---|---|---|
| Type | Length in mm (L) [3] | in mm | max. in kg/h |
| **81-200** [1] | 200 | 210...400 | 10 |
| **81-350** [2] | 350 | 400...600 | 30 |
| **81-500** [2] | 500 | 600...750 | 30 |
| **81-650** | 650 | 750...900 | 50 |
| **81-800** | 800 | 900...1100 | 50 |
| **81-1000** | 1000 | 1100...1300 | 50 |
| **81-1200** | 1200 | 1300...1600 | 50 |
| **81-1500** | 1500 | 1600...2000 | 50 |
| **81-1800** | 1800 | 2000...2400 | 50 |
| **81-2000** | 2000 | 2200...2600 | 50 |
| **81-2300** | 2300 | 2500...2900 | 50 |
| **81-2500** | 2500 | 2700...3100 | 50 |

[1] Only for units with a max. steam capacity of 10 kg/h
[2] Only for units with a max. steam capacity of 30 kg/h
[3] Special length available on request

Note: If the humidification distance (see *chapter 5.3.1*) has to be reduced for technical reasons, the amount of steam per basic unit must be divided between two steam distribution pipes or the **OptiSorp steam distribution system must** be used. If this is the case, contact your supplier.

**OptiSorp steam distribution system**

The OptiSorp steam distribution system is used in ventilation ducts where only a short humidification distance is available (see *chapter 5.3.1* for calculation of humidification distance). Duct dimensions should be given when ordering. Please note the following data for this:




| OptiSorp | Number of steam connections | Max. steam capacity in kg/h [1)] | Duct dimension | |
|---|---|---|---|---|
| | | | Width in mm | Height in mm |
| **System 1** | 1 | 45 (30) | 450...2700 | 450...1650 |
| **System 2** | 2 | 90 (60) | 450...2700 | 450...2200 |

[1)] For duct width <600 mm the values in parenthesis are valid

Note: Further information on the OptiSorp steam distribution system can be found in the separate installation and operating instructions supplied with the product.

## 4.4 Additional planning instructions

In addition to the selection of the steam humidifier, the accessories and the options, other points should be considered during planning. Please note the information in the following chapters:

– Unit fitting (see *chapter 5.2*)
– Steam installation (see *chapter 5.3*)
– Water installation (see *chapter 5.4*)
– Electric installation (see *chapter 5.5*)

If you have other questions relating to planning that are not adequately covered by these installation and operating instructions, please contact your supplier. He will be happy to provide further assistance.

# 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 and operation 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!**
**Danger of electric shock!**

**The Condair RC is mains powered. Live parts may be exposed when the unit is open. Touching live parts may cause severe injury or danger to life.**

**Prevention:** The Condair RC 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 unit is closed and properly locked.

**CAUTION!**

**The electronic components inside the humidifier are very sensitive to electrostatic discharge.**

**Prevention:** To protect these components against damage caused by electrostatic discharge (ESD protection) appropriate measures must be taken when the unit is open for installation work.

## 5.2 Mounting the unit

### 5.2.1 Notes on locating the unit

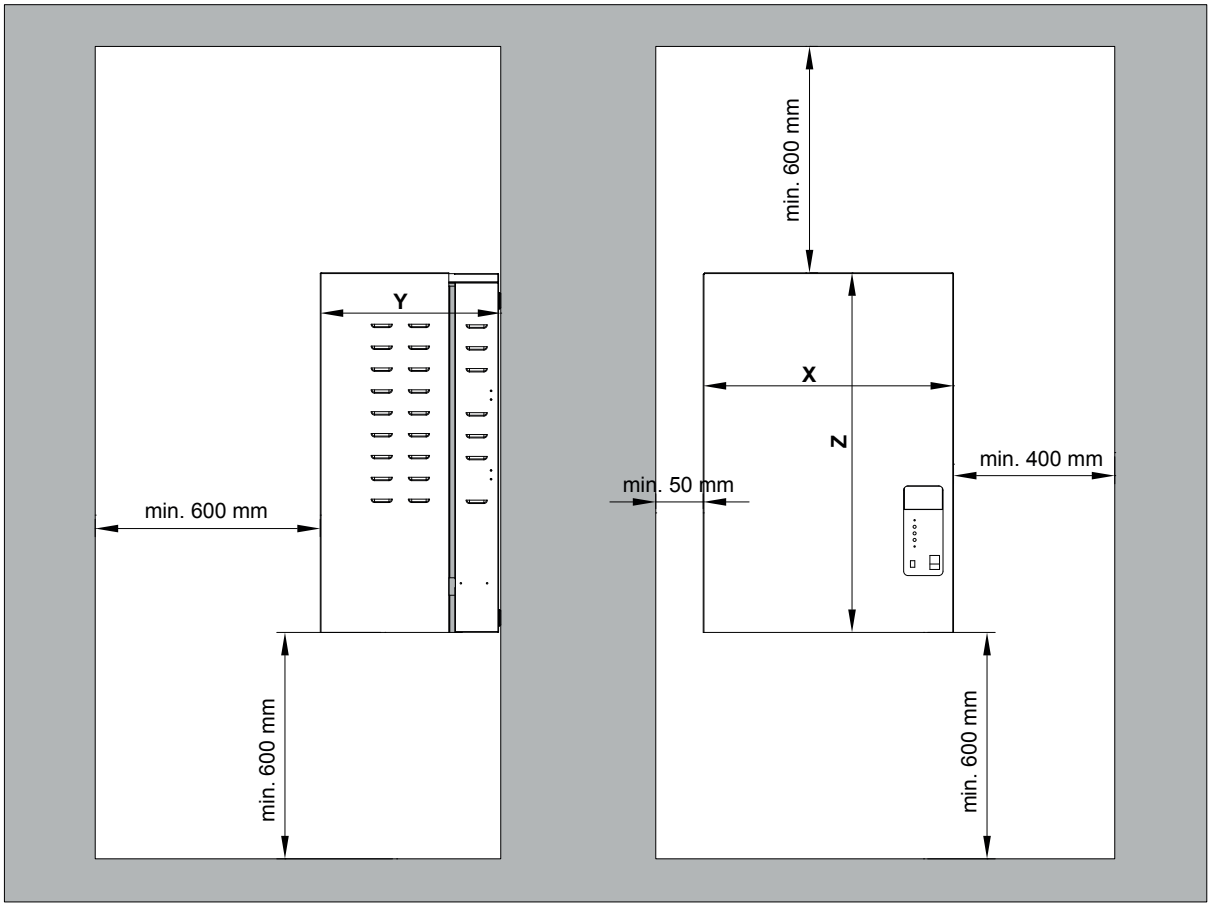



*Fig. 1: Distances to be observed*

| **Housing** | | **Small RC 5...20** | | | **Medium RC 30...40** | |
|---|---|---|---|---|---|---|
| Housing dimensions in mm | X | 470 | | | 570 | |
| | Y | 400 | | | 400 | |
| | Z | 820 | | | 820 | |
| Netweight in kg | | 35 | 35 | 37 | 40 | 42 |
| Operating weight in kg | | 63 | 63 | 65 | 79 | 81 |

The installation site of the Condair RC depends largely on the location of the steam distributor (see *chapter 5.3.1*). To **ensure proper functioning** of the steam humidifier and to **obtain an optimal efficiency**, the following points must be considered and observed when choosing the location for the steam humidifier:

- Install the steam humidifier so that:
  - the **length of the steam** line is kept as short as possible (**max. 4 m**),
  - the **minimum bend radius for steam hoses (R= 300 mm)** and for **solid steam pipes (R= 100 mm)** and the minimum **upslope** and **downslope (min. 15 %/8.5°)** of the steam lines is maintained (see *chapter 5.3.3*).
- The Condair RC is designed for wall-mounting in protected interiors. Make sure that the construction (wall, pillar, floor-mounted console, etc.) to which the humidifier is to be mounted, offers a **sufficiently high load-bearing capacity** (take notice of the weight information found in the dimensions and weights table), and is suitable for the installation.

**CAUTION!**

Do **not** mount the steam humidifier directly to the ventilation duct (insufficient stability).

- The back panel of the Condair RC retains heat during operation (max. surface temperature of the metal housing approx. 60 - 70 °C). Make sure, therefore, that the construction (wall, pillar, etc.) to which the unit is to be mounted, does not consist of heat-sensitive material.
- Install the Condair RC in such a manner that it is **freely accessible** with sufficient space available for maintenance purposes. The **minimum distances** shown in *Fig. 1* **must be maintained**.
- The Condair RC is protected according to **IP21**. Make sure the unit is installed in a drip-proof location and the admissible ambient conditions are complied with.
- Do **not** mount the Condair RC to hot or very cold walls or near vibrating components.
- The steam humidifier Condair RC must only be installed in rooms with a floor drain.

**CAUTION!**

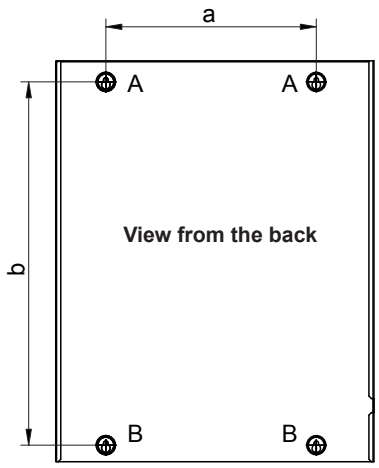
If for some reason the Condair RC must be installed in a location without floor drain, it is mandatory to provide a leakage monitoring device to safely interrupt the water supply in case of leakage.

- The Condair RC is designed for installation and operation within buildings (admissible temperature range 5...40 °C). For outdoor operation the Condair RC must be placed in a weather protective housing. If ambient temperatures near or below the freezing point have to be expected, the protective housing must equipped with a thermostat controlled heating of sufficient capacity. The water supply pipe must be equipped with a trace-heating and must be insulated up to the protective housing. The installation of a normally open valve inside the building envelope that will drain water in case of power failure is highly recommended.

### 5.2.2 Mounting the humidifier

**CAUTION!**

When mounting the Condair RC use **only the mounting materials supplied with the unit**. If mounting with the materials supplied is not possible in your particular case, select a method of mounting that is of similar stability.




| Measure | RC 5...20 | RC 30...40 |
|---|---|---|
| a | 310 mm | 380 mm |
| b | 725 mm | 725 mm |

*Fig. 2: Fixing points*

**Mounting procedure**

- Mark attachment points "A" on the wall.
  **Important! Observe location notes.**
- Drill holes ø10 mm (depth: 50 mm), insert the supplied plastic plugs, and screw in the supplied screws until the distance between the wall and the screw head is 5 mm.
- Unlock the front panel and remove it. Hang up the unit on the screws, and use the spirit level to adjust it horizontally and vertically.
- Mark attachment points "B". When finished, remove the unit again.
- Drill holes ø10 mm (depth: 50 mm) and insert the supplied plastic plugs.
- Hang the unit up on the screws ("A") again, then screw in the remaining two screws ("B"). Before tightening the screws, readjust the unit with the spirit level.
- Reattach the front panel and lock it.

### 5.2.3 Inspecting the installed unit

Check the following points:

☐ Is the unit installed in the correct place (see *chapter 5.2.1*)?

☐ Is the supporting surface stable enough?

☐ Is the unit correctly aligned, vertically and horizontally?

☐ Is the unit properly secured (see *chapter 5.2.2*)?

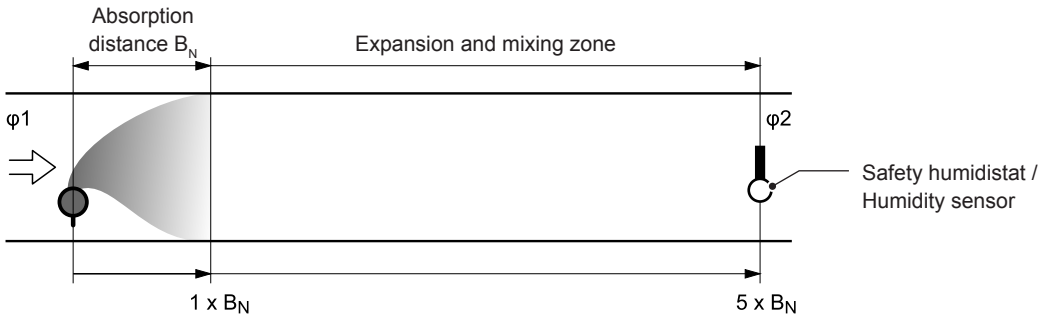
## 5.3 Steam installation

### 5.3.1 Positioning of the steam distributor

The location of the steam distributor should be determined at the time of dimensioning the air conditioning system. Please note the following instructions to ensure proper humidification of the duct air.

**Calculating the absorption distance**

The steam, emitting from the steam distributor, requires a certain distance to be absorbed by the air so that it is no longer visible as steam. This distance is referred to as **absorption distance "$B_N$"** and serves as a basis for the determination of the minimum distances from the upstream components in the system.




**φ1**: Supply air humidity **before** humidification
**φ2**: Supply air humidity **after** humidification

*Fig. 3: Absorption distance "$B_N$"*

The calculation of the absorption distance "$B_N$" is dependent on several factors. For a rough estimation of the absorption distance "$B_N$", the following table is useful. Recommended standard values listed in this table are based on a supply-air temperature range of 15 °C to 30 °C. The values given in bold type **apply to steam distribution pipes DV81-...**, the values **in brackets apply to the OptiSorp steam distribution system.**

| **Humidity at inlet φ1 in %rh** | **Length of absorption distance $B_N$ in m Humidity at outlet φ2 in %rh** | | | | | |
|---|---|---|---|---|---|---|
| | **40** | **50** | **60** | **70** | **80** | **90** |
| 5 | **0,9** (0,22) | **1,1** (0,28) | **1,4** (0,36) | **1,8** (0,48) | **2,3** (0,66) | **3,5** (1,08) |
| 10 | **0,8** (0,20) | **1,0** (0,26) | **1,3** (0,34) | **1,7** (0,45) | **2,2** (0,64) | **3,4** (1,04) |
| 20 | **0,7** (0,16) | **0,9** (0,22) | **1,2** (0,30) | **1,5** (0,41) | **2,1** (0,58) | **3,2** (0,96) |
| 30 | **0,5** (0,10) | **0,8** (0,17) | **1,0** (0,25) | **1,4** (0,36) | **1,9** (0,52) | **2,9** (0,88) |
| 40 | – | **0,5** (0,11) | **0,8** (0,20) | **1,2** (0,30) | **1,7** (0,45) | **2,7** (0,79) |
| 50 | – | – | **0,5** (0,13) | **1,0** (0,24) | **1,5** (0,38) | **2,4** (0,69) |
| 60 | – | – | – | **0,7** (0,16) | **1,2** (0,30) | **2,1** (0,58) |
| 70 | – | – | – | – | **0,8** (0,20) | **1,7** (0,45) |

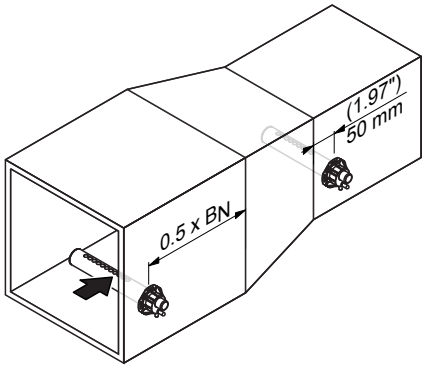
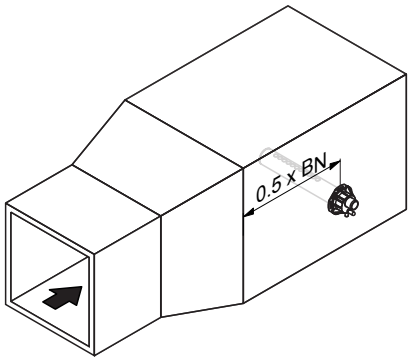
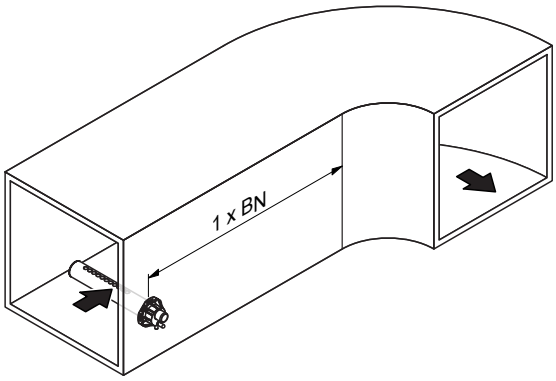
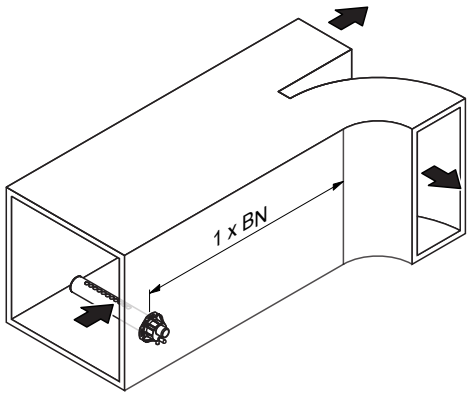
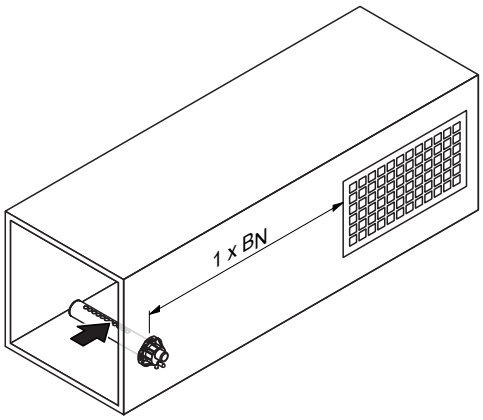
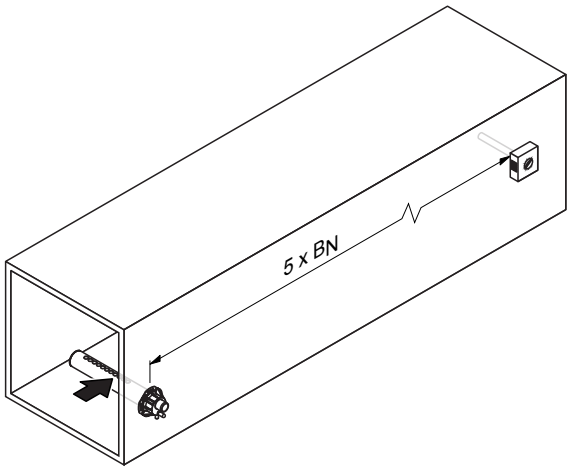
φ1 in %rh: Relative supply air humidity prior to humidification at the lowest supply air temperature
φ2 in %rh: Relative supply air humidity after the steam distribution pipe at maximum capacity
For duct widths <600 mm the absorption distance for the OptiSorp system increases by approx. 50%

| **Example** | |
|---|---|
| given | φ1= 30 %rh, φ2= 70 %rh |
| absorption distance $B_N$: | **1,4 m** (0.36 m for steam distribution system OptiSorp) |

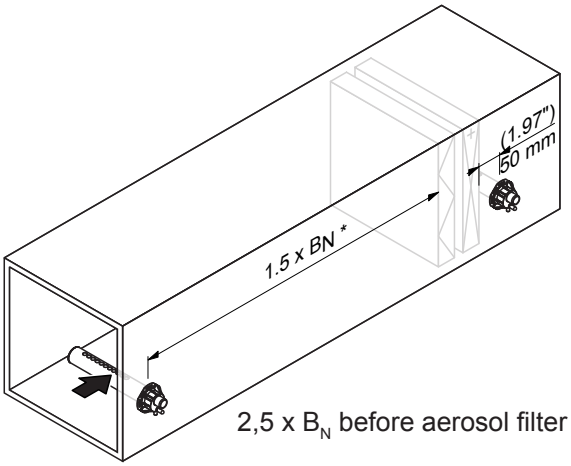
Note: If the absorption distance has to be reduced for technical reasons, the amount of steam per unit must be divided between several steam distribution pipes or the steam distribution system OptiSorp must be used. If this is the case, contact your Condair representative.

**Minimum distances to be observed**

To prevent the steam, that is emitting from the steam distributor, from condensing on downstream system components, a minimum distance to the steam distributor must be observed (depends on the absorption distance "$B_N$").

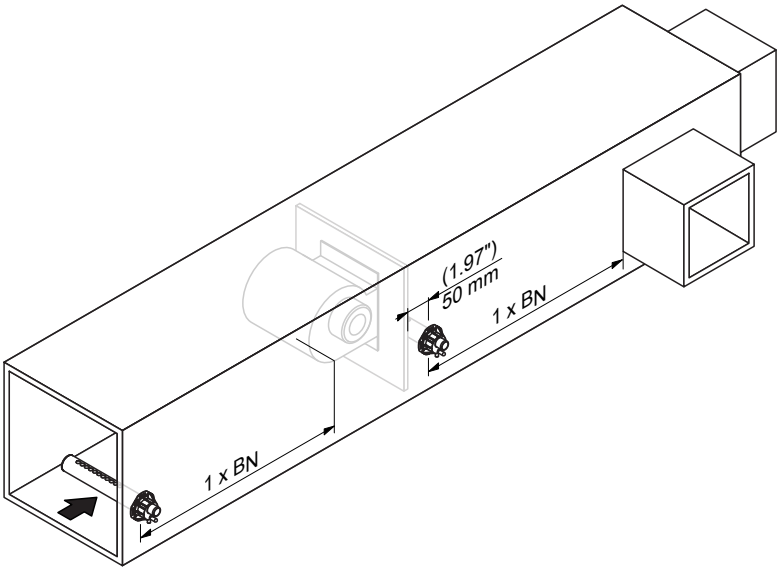
| before/after constriction | after expansion |
|---|---|
|  |  |
| **before bend** | **before branch** |
|  |  |
| **before diffuser** | **before humidity controller/ humidity sensor** |
|  |  |

**before/after filter/heater**




2,5 x $B_N$ before aerosol filter

**before/after fan, zone exit**




**Installation notes**

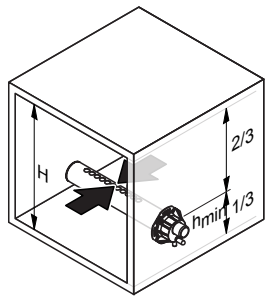
The steam distribution pipes are designed for either **horizontal** installation (on the duct wall) or, with accessories, for **vertical** installation (in the duct floor). The **outlet orifices should always point upwards and at right angles to the airflow**.

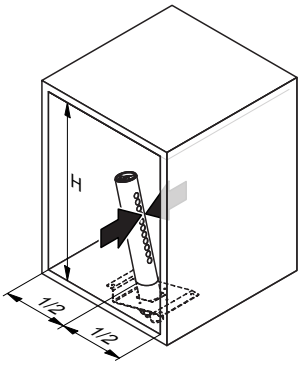
If possible, the steam distribution pipes should be installed on the **pressure side** of the duct (**max. duct pressure 1500 Pa**). If the steam distribution pipes are installed on the suction side of the duct, the **maximum vacuum must not exceed 1000 Pa**.

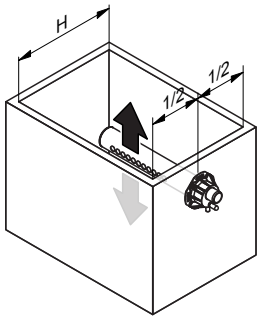
Select a location for the installation, tailored to suit your duct (see the following illustrations) and position the steam distribution pipes in the duct so that a uniform distribution of steam is achieved.

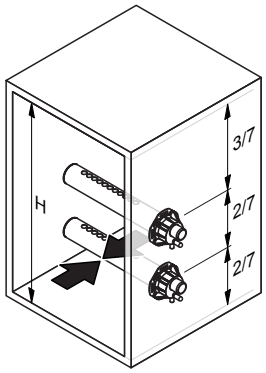
**Positioning the steam distribution pipes in the duct**

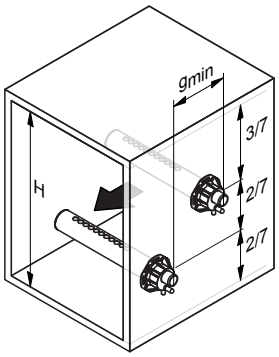
In positioning the steam distribution pipes, the following dimensions should be observed:

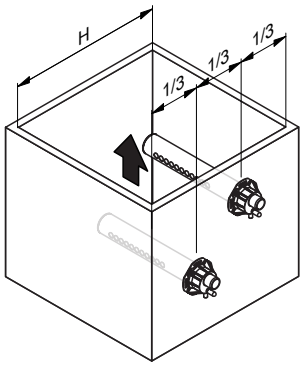
<table>
<tr>
<td> 

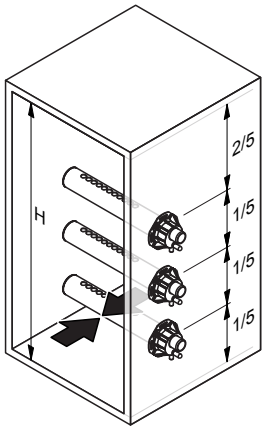
H min.= 250 mm<br>h min.= 85 mm</td>
<td> 

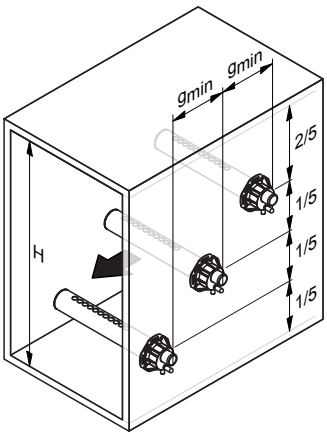
H ≥400 mm</td>
<td> 

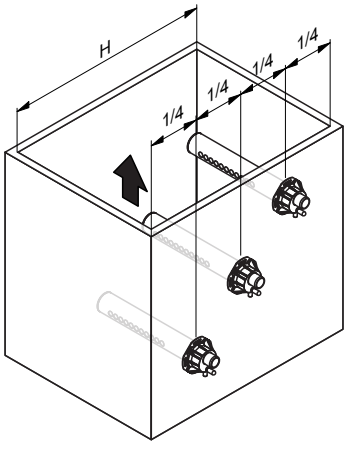
H min.= 200 mm</td>
</tr>
<tr>
<td> 

H min.= 400 mm</td>
<td> 

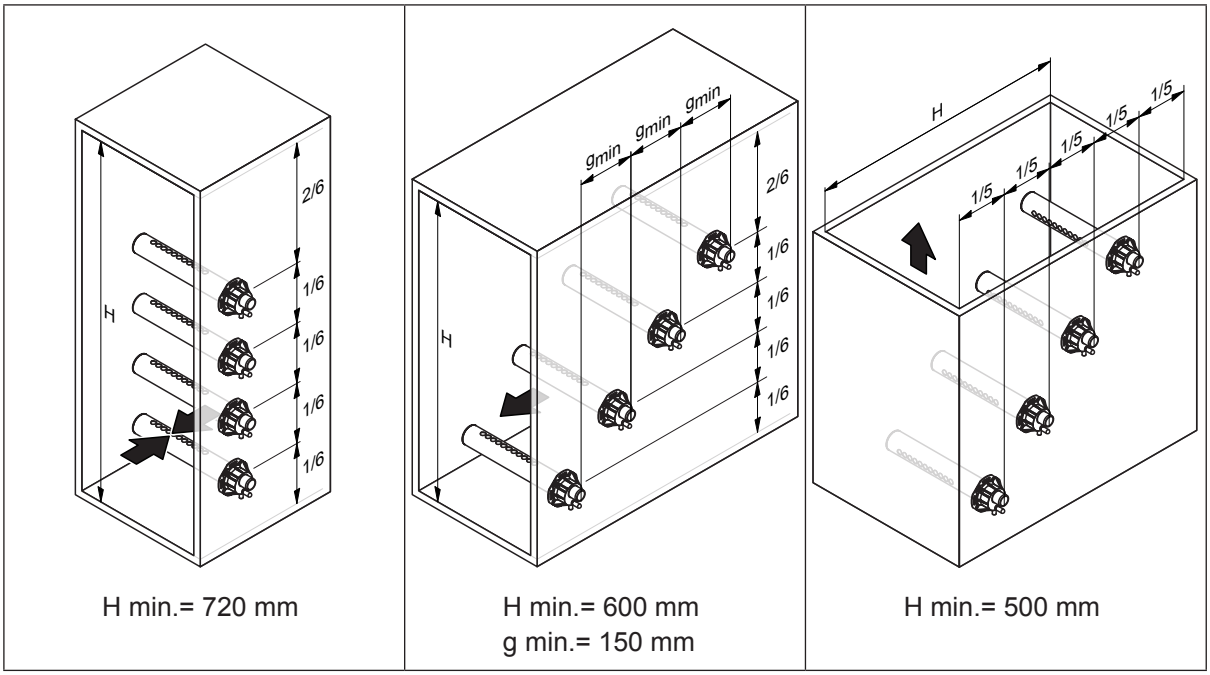
H min.= 350 mm<br>g min.= 150 mm</td>
<td> 

H min.= 300 mm</td>
</tr>
<tr>
<td> 

H min.= 600 mm</td>
<td> 

H min.= 500 mm<br>g min.= 150 mm</td>
<td> 

H min.= 400 mm</td>
</tr>
</table>




H min.= 720 mm

H min.= 600 mm
g min.= 150 mm

H min.= 500 mm

**Note**: When locating the OptiSorp steam distribution system please note the instructions in the separate documentation for this product.

**Guidelines for dimensioning the ventilation ducts**

– To facilitate the installation of the steam distribution pipes and for control purposes, a sufficiently sized control opening should be planned.

– Within the range of the absorption distance, the ventilation duct should be waterproofed.

– Air ducts passing through cold rooms should be insulated to prevent the humidified air from condensing along the duct wall.

– Poor airflow conditions within the air duct (e.g. caused by obstacles, tight bends, etc.) can lead to condensation of the humidified air.

– Steam distribution pipes must not be mounted to round ducts.

If you have questions relating to the dimensioning of ventilation ducts in combination with steam humidifiers Condair RC, contact your Condair representative.

## 5.3.2 Installing the steam distributors

Detailed information on the installation of steam distribution pipes DV81-... and OptiSorp steam distribution system can be found in the separate mounting instructions for these products.

### 5.3.3 Installing the steam and condensate lines

**CAUTION!**

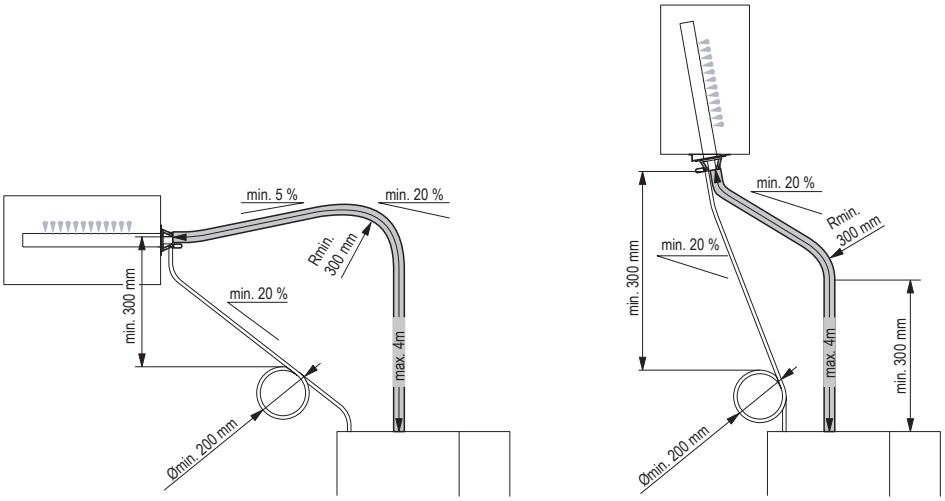
Use **original steam and condensate hose** from your Condair representative or **solid steam pipes from copper or stainless steel (min. DIN 1.4301) exclusively**. Steam and condensate lines from other material may cause undesired operational malfunctionsa

#### 5.3.3.1 Steam line with flexible hose

**Instructions for the hose layout**

The hose layout depends on the position of the steam distribution pipe:

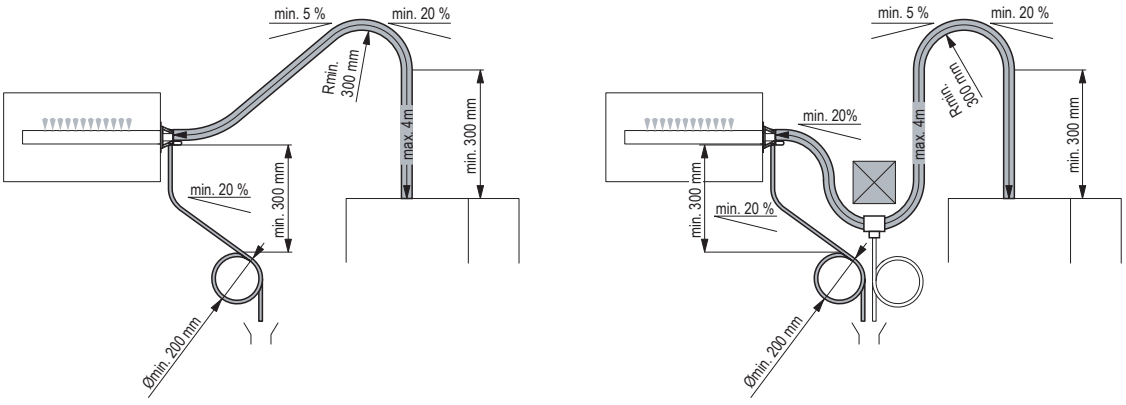
– Steam distribution pipe is mounted **more than 500 mm above the top edge of the humidifier**:




Initially, lead the steam hose **at least 300 mm perpendicularly upward above the top edge of the humidifier**, then lead the hose with a **minimum upslope of 20%** and/or a **minimum downslope of 5%** to the steam distribution pipe.

The condensate hose is led down to the humidifier with a **minimum slope of 20 %**, in the form of a **siphon (min. hose bend radius Ø200 mm )**, and inserted about 2 cm into the specified opening.
**Note**: If your unit feeds a number of steam distribution pipes, the individual condensate hoses are to be led into a discharge funnel with siphon.
**Important!** Before putting the unit into operation, the siphon of the condensate hose(s) must be filled with water.

– Steam distribution pipe is mounted **less than 500 mm above the top edge of the humidifier**:




Initially, lead the steam hose **at least 300 mm perpendicularly upward above the top edge of the humidifier**, then down to the steam distribution pipe with a **minimum slope of 5 %**.

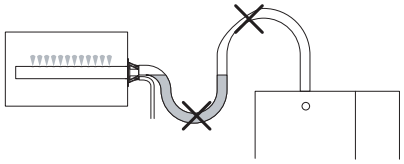
The condensate hose is led down with a **minimum slope of 20 %**, in the form of a **siphon (min. hose bend diameter Ø200 mm)**, directly into a discharge funnel.
**Important!** Before putting the unit into operation, the siphon of the condensate hose must be filled with water.

– The steam hose should be kept as short as possible (**max. 4 m**) while observing the **minimum bend radius of 300 mm**. **Important!** Allowance must be made for a **pressure loss of 10 mm water column (approx. 100 Pa)** per meter steam hose.
**Note**: If your particular installation exceeds the maximum steam hose length of 4 m contact your supplier. In any case, **steam hoses longer than 4 m must be insulated in their entire length**.

**CAUTION!**

**Reducing the cross section or the complete closure of the steam pipe will cause an excessive increase in pressure in the steam tank when the unit is operating and could lead to the risk of scalding accidents. Therefore you must comply with the following instructions:**

– When installing make sure the steam pipe is open over the entire length and through the whole cross section. Any sealing plugs, adhesive sealing sheets etc. must be removed before connecting the steam pipe and reductions in cross section by kinking, for example, must be avoided.



– Steam hoses must be prevented from sagging (condensate pockets); if necessary, support steam hose with pipe clamps, trough, or wall brackets, or install a condensate drain at lowest point in the steam hose.
– It is **not permitted to install a stop valve** (e.g. a manually controlled stop valve, solenoid valve, etc.) in the steam pipe.

– **Important!** When deciding on the length and layout of the hose, it should be noted that the steam hose may become somewhat shorter with progressive ageing.

**Securing the steam hose**

The steam hose must be secured to the steam distribution pipe and humidifier steam outlet by means of **hose clamps**.

### 5.3.3.2 Steam line with rigid piping

For steam lines with rigid piping, the same instructions apply to the layout of the piping as already described. The following additional notes should be observed:

– The **minimum internal diameter of 42 mm** must be applied over the whole length of the piping.

– Use exclusively copper pipe (operation with untreated drinking water) or stainless steel (min. DIN 1.4301, operation with fully demineralised or deionized water.

– To minimize the condensate formation (=loss), the steam pipes must be insulated over the entire length.

– The **minimum bend radius** for solid pipes is **100 mm**.

– Connection of the steam pipes to the steam distribution pipe and steam humidifier is effected by means of short lengths of steam hose secured with hose clamps.

– **Important!** Allowance must be made for a **pressure loss of approx. 100 Pa** per meter length or per 90° bend.

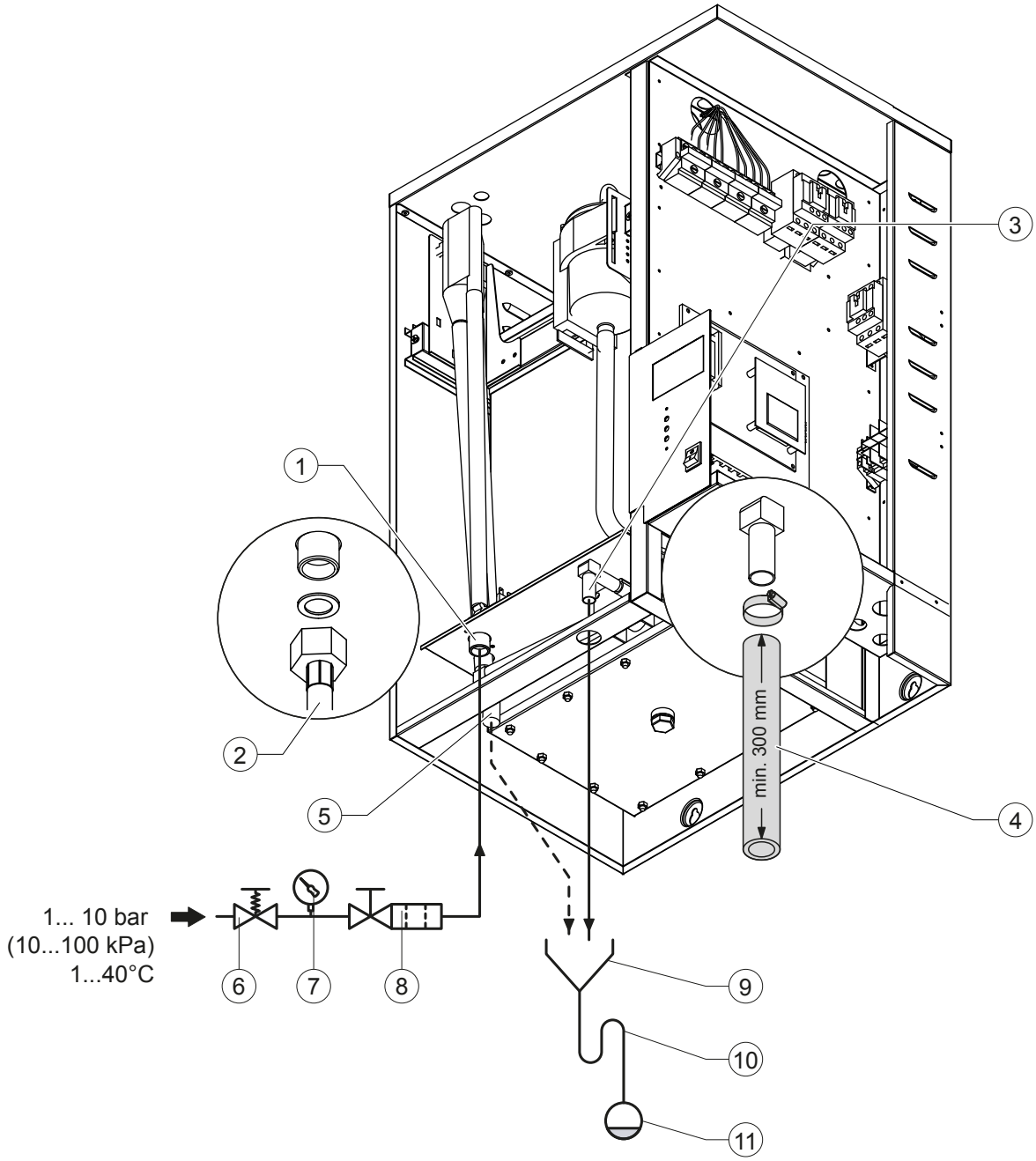
### 5.3.4 Inspecting the steam installation

Use the following check list to ascertain that the steam installation was performed correctly:

– Steam distribution pipe
  - ☐ Steam distribution pipe correctly positioned and secured (screws tightened)?
  - ☐ Are the outlet orifices at right angles to the air flow direction?
– Steam hose
  - ☐ Maximum length of 4 m?
  - ☐ Minimum bend radius of 300 mm (100 mm with fixed piping)?
  - ☐ Have the instructions for hose positioning been followed?
  - ☐ Is the steam pipe open over the entire length and through the whole cross section?
  - ☐ Steam hose: no sagging (condensate pocket)?
  - ☐ Rigid steam lines: properly insulated? Correct installation material used? Minimal internal diameter maintained?
  - ☐ Steam hose securely attached with clamps?
  - ☐ Heat expansion during operation and shortening of the hose with ageing taken into consideration?
– Condensate hose
  - ☐ Constant downslope of at least 20 %?
  - ☐ Siphon existing and filled with water?
  - ☐ Condensate hose correctly fixed?

## 5.4 Water installation

### 5.4.1 Overview water installation




1 Water supply connection G 3/2"
2 Water supply pipe (min. inner Ø: 8 mm)
3 Water drain connection Ø30 mm
4 Drain pipe (min. inner Ø: 30 mm, min. 300 mm directed vertically downwards)
5 Overflow connection Ø30 mm
6 Pressure reducing valve (mandatory for water pressures >5 bar, building side)
7 Manometer (installation recommended, building side)
8 Filter valve (accessory "Z261")
9 Open funnel (building side)
10 Siphon (min. inner Ø: 40 mm, building side)
11 Drain line, building side (min. inner Ø: 40 mm)

### 5.4.2 Notes on water installation

**Water supply**

The water supply is to be carried out according to the figure found in *chapter 5.4.1* and the applicable local regulations for water installations. The indicated connection specifications must be observed.

- The installation of the **filter valve** (accessory "Z261", alternatively a shut-off valve and a 125 µm water filter can be used) should be made as close as possible to the steam humidifier.
- Admissible water supply pressure: **1.0…5.0 bar (100...500 kPa)**

  Note: the supply water system must be hammer-free. For mains pressures >5 bar, the connection must be made via a pressure reducing valve (adjusted to 2.0 bar). For mains pressures <1.0 bar please contact your Condair supplier.
- Admissible supply temperature: **1…40 °C**
- **Notes on water quality**:
  - For the water supply of the Condair RC, use exclusively **untreated drinking water, water from a RO system** or **de-ionized water** with **maximum bacteria content of 1'000/ml (conductivity <15 µS/cm)**.
    Note: As softened or partly softended water may to generate foam when heated up in the steam tank, it is not recommended as supply water. For detailed information of water quality, please contact your Condair supplier.
  - The use of **additives** such as corrosion inhibitors, disinfectants, etc. is **not allowed**, since these additives may endanger health and affect proper operation.
- The connection material must be **pressure-proof** and **certified for use in drinking water systems**.
- **Important!** Before connecting the water line**, the line must be well flushed out**.

**CAUTION!**

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

**Water drain**

The water drain is to be carried out according to the figures found in *chapter 5.4.1* and the applicable local regulations for water installations. The indicated connection specifications must be observed.

- Reverse osmosis water and de-ionized water are corrosive. Use only drain lines made of stainless steel (min. DIN1.4301) or chemical and corrosion-resistance plastic (such as polypropylene).
- Make sure that the drain line, the funnel and the siphon are correctly fixed and easily accessible for inspections and cleaning purposes.
- The draining temperature is: 90…100 °C. Use temperature-resistant installation materials only!
- The drain line must be routed with a constant downslope of min. 10% down to the open funnel.
- Attach drain line in such a way, that it cannot slip out of the funnel and that it cannot bottom out in the funnel.
- The open end of the drain line must not touch the funnel (min. air gap 2 cm).

### 5.4.3 Inspecting the water installation

Check the following topics:

– Water supply
  - ☐ Has filter valve (accessory "Z261") or shut-off valve and 125 µm water filter respectively been installed in supply line to each unit module?
  - ☐ Has acceptable water pressure: 1 – 5 bar (100 – 500 kPa) and acceptable water temperature: 1 – 40 °C been connected?
  - ☐ Does the water supply capacity match the humidifier and is the minimum inside diameter of 8 mm of the supply pipe maintained throughout the entire length?
  - ☐ Are all components and pipes properly secured and are all threaded connections securely tightened?
  - ☐ Is the water system properly sealed?
  - ☐ Does the water supply installation meet the requirements of the local regulations for water installations?
– Water drain
  - ☐ Is the minimum inside diameter of the drain pipe of 30 mm maintained throughout the entire length?
  - ☐ Has drain pipe been installed with a downslope of at least 10%?
  - ☐ Has the heat resistance of the material used been verified to be at least 100 °C?
  - ☐ Has corrosion resistance material been used with reverse osmosis or de-ionized supply water?
  - ☐ Is/are the drain hose(s) properly secured (hose clamps at unit connection tightened)?
  - ☐ Is there an air gap (min 2 cm) between the open end of the drain line and the funnel?
  - ☐ Does the water drain installation meet the requirements of the local regulations for water installations?

## 5.5 Electrical installation

### 5.5.1 Notes on electrical installation

**DANGER!**
**Danger of electric shock**

**The Condair RC is mains powered. Live parts may be exposed when the unit is open. Touching live parts may cause severe injury or danger to life.**

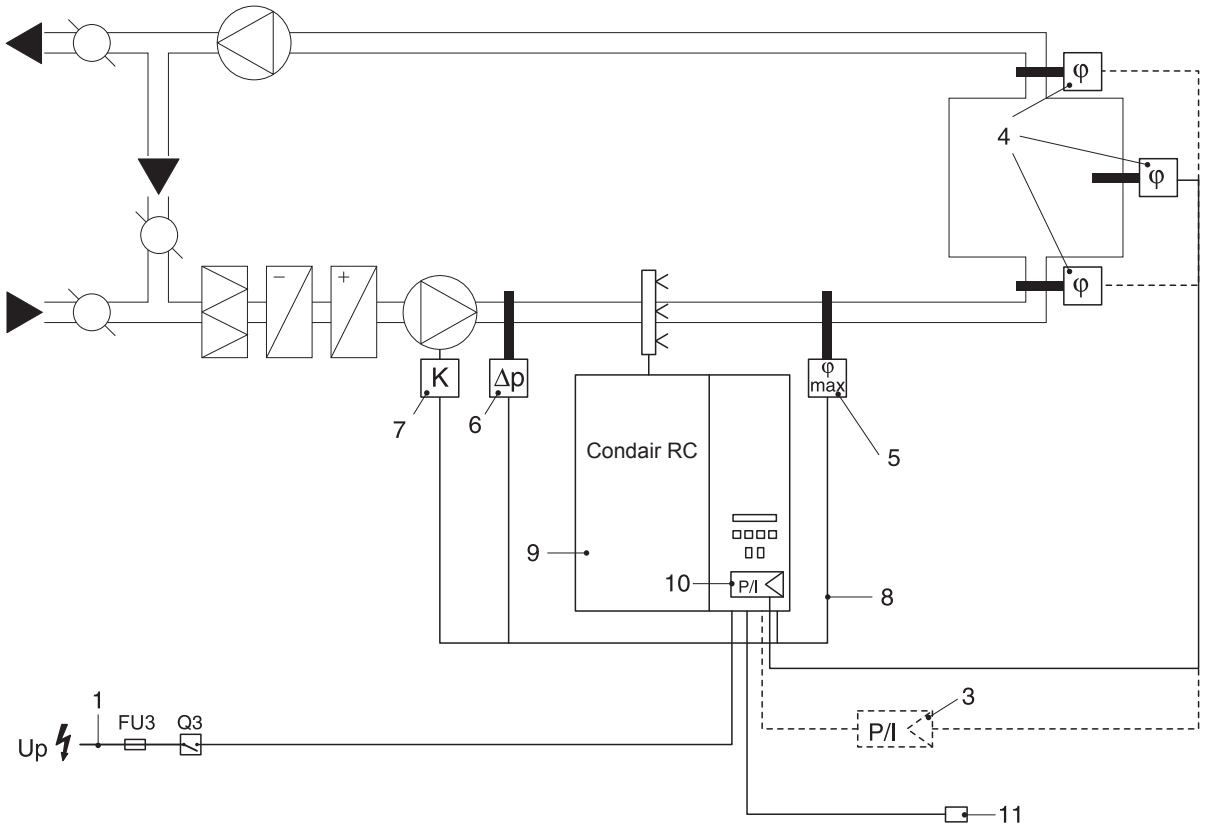
**Prevention:** The Condair RC unit must be connected to the mains only after all mounting and installation work has been completed, all installations have been checked for correct workmanship and the unit is closed and properly locked.

**CAUTION!**

The electronic components inside the unit are very sensitive to electrostatic discharge. Before carrying out installations work inside the unit, appropriate measures must be taken to protect the electronic components against damage caused by electrostatic discharge (ESD protection).

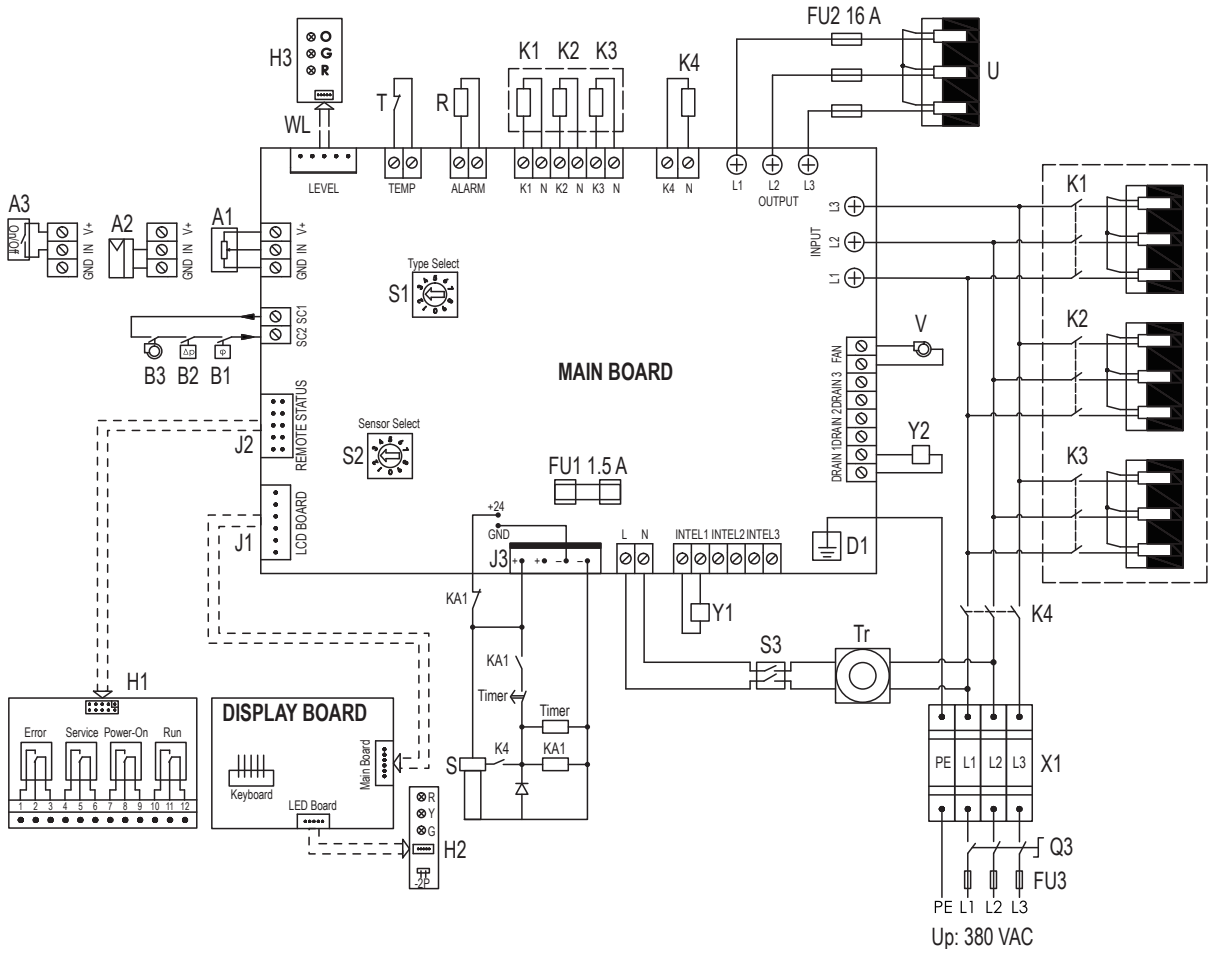
- All work concerning the electrical installation must be performed only by **skilled and qualified technical personnel (e.g. electrician with appropriate training) authorised by the owner.** It is the owner's responsibility to verify proper qualification of the personnel.
- The electrical installation must be carried out according to the wiring diagram (see *chapter 5.5.3*) and the applicable local regulations. All information given in the wiring diagrams must be followed and observed.
- All cables must be lead into the unit, via the cable feedthroughs on the bottom side of the unit.
- Please observe comply with the separate instructions relating to individual components.
- Make sure the cables are adequately clamped, do not rub on any components or become a tripping hazard.
- Observe and maintain maximum cable length and required cross section per wire according to local regulations.
- The mains supply voltage (heating voltage) must match the supply voltage stated on the specification label.

### 5.5.2 Electric installation overview




| | | | |
|---|---|---|---|
| 1 | Supply heating voltage Up | 7 | Ventilation interlock |
| 2 | Supply control voltage Uc | 8 | External safety loop |
| 3 | External continuous controller | 9 | Steam humidifier |
| 4 | Humidity sensor (supply air/room/exhaust) | 10 | Internal continuous controller |
| 5 | Safety humidistat | 11 | Remote operating and fault indication (option "RFI") |
| 6 | Airflow monitor | | |

## 5.5.3 Wiring diagram Condair RC




| | |
|---|---|
| A1 | Signal input mode 1: Potentiometer |
| A2 | Signal input mode 2: Analog |
| A3 | Signal input mode 3: On/Off |
| B1 | Safety humidistat |
| B2 | Air flow monitor |
| B3 | Ventilation interlock |
| D1 | Ground connection |
| FU1 | Main board fuse |
| FU2 | MOS heating circuit fuses |
| FU3 | Heating voltage supply fuse |
| H1 | Remote operating and fault indication board (Option RFI) |
| H2 | Indicator lights |
| H3 | Electronic water level monitoring unit |
| J1 | Display board connecting port |
| J2 | Connecting port for remote operating and fault indication board (Option RFI) |
| J3 | DC power supply connecting port |
| KA1 | Water level relay |
| K1 | Contactor of heating circuit 1 |
| K2 | Contactor of heating circuit 2 |
| K3 | Contactor of heating circuit 3 |
| K4 | Main contactor |
| Q3 | External electrical isolator heating voltage supply |
| R | Warning feedback (dry contact) |
| S | Water level sensor |
| S1 | Rotary switch humidifier type setting |
| S2 | Rotary switch control signal setting |
| S3 | Unit switch |
| T | Temperature switch (normally closed) |
| Tr | Transformer control voltage |
| Timer | Timer relay |
| U | Heating element |
| V | Housing fan |
| WL | Connecting port for electronic water level monitoring unit |
| X | Terminals |
| Y1 | Inlet valve |
| Y2 | Drain valve |

### 5.5.4 Notes on component installation

#### 5.5.4.1 Heating voltage supply Up

**CAUTION!**

Before connecting, ensure that the mains voltage corresponds with the **heating voltage of the unit (380 V/3~/50...60 Hz).**

The heating voltage supply (380 V/3~/50...60 Hz) is to be connected in accordance with the corresponding wiring diagram to **terminal block "X1"** via the **electrical isolator "Q3"** (an all pole disconnecting device with a minimum contact opening of 3 mm is an essential requirement) and a **"FU3" fuse group** (essential requirement: fuses are to be as detailed in the following table). The supply wiring is to be fed into the unit via the tension-relieving device on the bottom of the unit.

The cross-section of the heating voltage supply cable must comply with the applicable local regulations.

| | **Condair RC** | | | | |
|---|---|---|---|---|---|
| | **5** | **10** | **20** | **30** | **40** |
| Steam capacity [kg/h] | 5 | 10 | 20 | 30 | 40 |
| Heating voltage | 380 V/3~/50...60 Hz | | | | |
| Power consumption [kW] | 3.9 | 7.6 | 15.1 | 22.8 | 30.2 |
| Nominal current [A] | 5.7 | 11.6 | 22.9 | 34.6 | 45.9 |
| Fuses "FU3" [A] | ? | ? | ? | ? | ? |

#### 5.5.4.2 Control voltage supply Uc

The control voltage supply (200…240 V, 50…60 Hz) is already internally wired ex factory via the transformer "Tr" and the unit switch "S3" to terminal block "X1" (see wiring diagram).

### 5.5.4.3 External safety loop

To ensure the safety of the humidifier system, it is essential that a so-called external safety loop be provided to monitor the operation.

To this end, the **potential-free contacts (max. contact loading 250V/5A)** of the external monitoring devices (e.g. maximum humidistat, flow monitor, ventilation interlock, etc.) are connected **in series to the terminals SC**, in accordance with the connection schematic.

**DANGER!**
**Danger of electric hazard!**

**There is mains voltage (up to 240 V) on terminals "SC1" and "SC2"**.

**Prevention**: The steam humidifier must therefore be isolated from the mains supply (power and control voltage), before starting the connection work.

If, for whatever reason, no external monitoring devices are connected to terminals "SC1" and "SC2", a jumper wire must be connected on the contacts "SC1" and "SC2".

**CAUTION!**

**Do not apply any external voltage to contacts "SC1" and "SC2" via the contacts of the external monitoring devices.**

The cross-section of the cable must comply with the applicable local regulations (minimum of 1 $mm^2$).

### 5.5.4.4 Control devices

Depending on the type of humidity control the control devices are connected in accordance with the wiring diagram:

– an external ohmic humidity controller "A1" is connected to terminals "V+", "IN" and GND".
– an external continous controller or humidity sensor (if the internal P/PI controller is used) "A2" is connected to terminals "IN" and GND".
– an external On/Off Humidistat "A3" is connected to terminals "V+" and "IN" in accordance with the wiring diagram.

### 5.5.4.5 Remote operating and fault indication H1 (Option "RFS")

The optional remote operating and fault indication PCB is to be connected via the connection socket "J2" on the control board. The remote operating and fault indication PCB contains the potential-free relay contacts K1… K4 for the connection of the following operating and fault indications:

– "Error": This relay is activated if there is a fault.
– "Service": This relay is activated when the set service interval has expired.
– "Power-On": This relay closes as soon as the unit is switched on via the main switch.
– "Run": This relay closes as soon as the unit produces steam.

The **maximum contact loading** is **250V/5A**.

Appropriate suppressor modules are to be used for the switching of relays and miniature contactors.

### 5.5.5 Inspecting the electrical installation

Check the following points:

- ☐ Does the heating voltage supply comply with the voltage stated on the specification label?
- ☐ Is the heating voltage suppy correctly fused?
- ☐ Is the electrical isolator "Q3" installed in the heating voltage supply?
- ☐ Are all components correctly connected according to the wiring diagram?
- ☐ Are all connecting cables fastened?
- ☐ Are the connecting cables free of tension (passed through cable glands)?
- ☐ Does the electric installation meet the applicable local regulations for electric installations?
- ☐ Is the unit reassembled correctly and the front panel fixed with the screw?

# 6 Operation

## 6.1 Unit configuration

**DANGER!**
**Danger of electric hazard!**

**Disconnect the steam humidifier from the mains** supply (heating and control voltage) before opening the unit.

**WARNING!**

Electronic components inside the unit are very susceptible to electrostatic discharges. For the protection of these components, measures must be taken during all installation work to prevent damage caused by electrostatic discharge (ESD–protection)

All adjusting elements are situated on the control board:

– Rotary switch "S1": Humidifier model
– Rotary switch "S2": Control signal

**Setting the humidifier model ("S1")**

The humidifier model is set to the corresponding model ex factory. You can check correct setting according to the table below.

| Position rotary switch "S1" | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| Humidifier model Condair RC | 5 | 10 | 20 | 30 | 40 | – | – | – | – | – |

**Setting the control signal ("S2")**

| Position rotary switch "S2" | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| Control signal | | On/off | 0-10V | 4-20mA | 0-20mA | – | – | – | – | – |

## 6.2 Putting into operation

The following procedure is carried out in order to operate the Condair RC steam humidifier:

- **Examine the steam humidifier and installation for possible damage**.

**CAUTION!**

**Damaged units** and units with damaged or defective installations **must not be operated.**

- Mount front door of the unit and lock it.
- Open the **filter valve** / **shut-off valve** in the water supply line.
- Switch on the electrical isolators in the mains supply lines (heating and control voltage).
- Switch on the steam humidifier unit switch.

| | |
|---|---|
| Booting | The steam humidifier carries out a **system test**. The adjacent display appears. |
| RC-20<br>Filling | **If the system test is successful**, the steam tank fills up and a float test is carried out (function check on the level unit). The adjacent display appears.<br>Note: If a fault is detected during the float test, an appropriate fault message is triggered (see *chapter 8.2*). |
| RC-20<br>Ready/Humidifying | If the float test is successful, the Condair RC will be in **normal operating mode**. The display shows the current operating status (Ready or Humidifying). |

- **The following procedure should be carried out only on the first occasion that the unit is operated**:
  - Carry out the software-dependent equipment settings (by the service technician of the supplier). Note: Information on the settings that can be made by the customer is provided in *chapter 6.1*).
  - Check for correct functioning of the monitoring equipment (external safety circuit).
  - Check the function of the steam humidifier:
    **Switch on the humidification** by raising the set humidity value on the humidity controller/ humidistat.
    **Switch off the humidification** by lowering the set humidity value on the humidity controller/ humidistat.
  - Set the desired humidity value on the humidity controller/humidistat.

The heating current switches on as soon as the humidity controller/humidistat **demands humidity**. The green LED lights and steam is produced after a short delay (approx. 5 minutes).

**Operating status display on the unit**

The operating status is displayed in the LED on the unit as follows:

– **Green LED lit**: Unit producing steam

– **Yellow LED flashing**: Major or minor servicing due. The relevant notice is shown in the display (see *chapter 7.2*).

– **Red LED flashing**: There is a problem. The unit is trying to solve the problem. The relevant **warning message** appears in the display (see *chapter 8.3*).

– **Red LED lit**: Insoluble problem. The relevant **error message** appears in the display (see *chapter 8.3*).

## 6.3 Taking out of operation

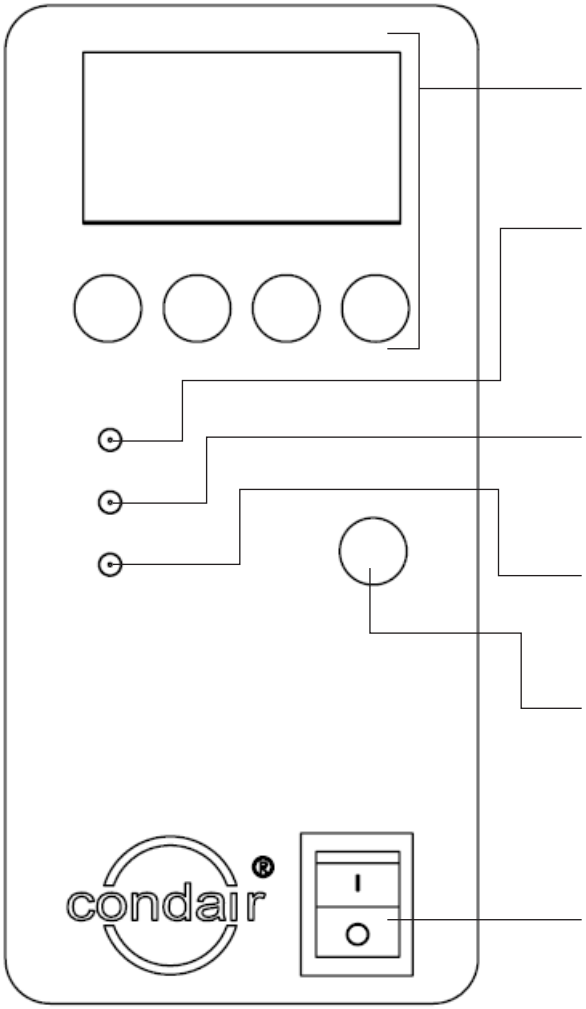
The following procedure is followed when it is required to shut down the steam humidifier, e.g. for maintenance work:

- Close the filter valve/shut-off valve in the water feed line.
- Briefly depress the drain switch for more than 7 seconds. The heating voltage is isolated and the steam tank empties.
- Wait until the steam tank is empty (approx. 5-10 minutes), then operate the off-switch on the steam humidifier.
- Isolate the steam humidifier from the mains supply: Switch off the electrical isolator in the mains supply line (heating voltage) and secure it in the off position.

**WARNING!**
**Danger of burning!**

If steam was produced just before the unit is taken out of operation, wait before opening the unit and let the steam tank cool down to prevent danger of burning

## 6.4 Function of the display and operating elements




**Display and control unit**
Function: Configuration of the Condair RC.
Indication of operating parameters.

**red LED "Error"**
Function: The LED lights in case of a malfunction of the unit and the unit is stopped. The type of malfunction is shown in the display.

**yellow LED "Warning"**
Function: The LED lights if the cylinder maintenance is due.

**green LED "Steam"**
Function: The LED lights if the unit produces steam.

**Drain key**
Function: Manual draining of the steam tank. After having pressed the drain key, the draining is controlled via the display and control unit.

**Unit switch**
Function: Switches the unit on and off.

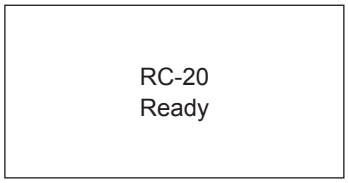
## 6.5 Setting the operating parameters

You can adapt various operating parameters of the Condair RC steam humidifier to the operating requirements in the setting level of the display and control unit. The setting level is protected by an access code to protect the settings level against unauthorized access.

**CAUTION!**

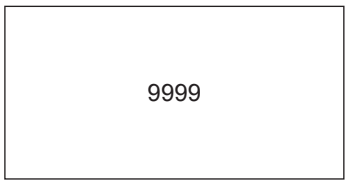
The settings on the setting level have a direct influence on the operating behavior of the Condair RC steam humidifier. The settings must therefore only be made by personnel who are familiar with the techniques of humidification and climatic control and with the Condair RC.

**Call-up of the setting level**




With the Condair RC in normal operation:

- Press the **<Enter>** key.




You are now prompted ("9999") to enter the four digit access code **"8808".** The digit on the far left flashes.

- Enter the access code "**8808**" as follows:

  Change the first digit with the keys **<↓>** and **<↑>**. Confirm your input with the **<Enter>** key. The next digit starts to flash.

  Repeat this step for the remaining digits.

After confirmation of the last digit, the first menu item appears on the display.

**Adjusting set values in the setting level**

- Press the **<Enter>** key, if you wish to change the current setting.
  - **Menu items with selected values**
    - Press the key **<↓>** or **<↑>**, in order to select the desired setting from the list.
    - Confirm your input with the **<Enter>** key.
  - **Menu item with numerical set value**

    The digit on the far left starts to flash.
    - Press the key **<↓>**, in order to reduce the value of the selected digit or the key **<↑>**, in order to increase the value of the digit.
    - Confirm your entry with the **<Enter>** key.
      Note: If the value to be entered is a multi-digit value, the next digit starts to flash. You can change this digit as described above.

  After confirming the last digit (numerical set value) or the selected set value, the selected menu item with the adjusted setting is shwown again.
  Note: If an invalid value has been entered in a numerical input, the adjacent message appears.

  The process of changing the value can be interrupted at any point by pressing the **<Menu>** key. The last stored set value then remains unchanged.

**Description of the menu items on the setting level**

The following lists all the menu items that can be selected and changed after activation of the setting level.

Language:
Current: English
Range: CN/EN/FR
Factory: English

– **Language**

Dialogue language of the display unit.

Factory setting: **depends on the country**

Options: **german**, **english**, **french**

Note: The display unit switches to the selected language immediately after the suitable language option has been confirmed.

Current: 100%
Range: 10-100%
Factory: 100%

– **Steam capacity limitation**

Limitation of the steam capacity (in %) in reference to the maximum steam capacity.

Factory setting: **100 %**

Setting range: **10…100 %**

Note: This parameter is used to limit the maximum performance in case the steam capacity exceeds the humidification required by your installation.

Internal PI
Current: off
Range: on/off
Factory: off

– **Controller setup**

Activation ("on")/Deactivation ("off") of the internal PI controller.

Factory setting: **off**

Options: **on** (PI controller activated),
**off** (PI controller deactivated)

Note: If an external PI controller is connected to the humidifier the internal PI controller must be deactivated. Because the internal controller would interpret the analog signal of the external controller as the actual humidity value detected by a humidity sensor. This would cause the internal controller to switch the humidifier to 100% steam capacity if the input signal drops to 0% which, in turn, would lead to over-humidification.

Humid. Setting:
Current: 45%rh
Range: 10-100%
Factory: 45%

– **Nominal humidity value**

Nominal humidity value in % rh.

Note: This menu option is available only if the internal PI controller is active.

Factory setting: **45 %rh**

Setting range: **10…100 %rh**

P-band:
Current: 100%rh
Range: 4-100%
Factory: 30%

– **Proportional range** (P-band) of the internal PI controller

Proportional range of the internal PI controller in %.

Note: This menu option is available only if the internal PI controller is active.

Factory setting: **30 %**

Setting range: **4…100 %**

Integr.-time:
Current: 10s
Range: 2-50000s
Factory: 600s

– **Integral time** of the internal PI controller

Integral time of the internal PI controller in seconds.

Note: This menu option is available only if the internal PI controller is active.

Factory setting: **600 s**

Options: **2...5000 s**

Heat insulation:
Current: off
Range: on/off
Factory: off

– **Keep warm function**

Enabling (on) or disabling (off) the keep warm function.

Factory setting: **off**

Options: **on** (keep warm function enabled),
**off** (keep warm function disabled)

Note: Enable the keep warm function if you want to improve the response time of the device if a new humidity demand is present.

Max inlet:
Current: 10 min
Range: 10-100 min
Factory: 60 min

– **Maximum filling time**

Maximum filling time in minutes.

Factory setting: **60 minutes**

Setting range: **10…100 minutes**

Drain interval:
Current: 60 min
Range: 10-999 min
Factory: 60 min

– **Drain interval time**

Drain interval of the steam tank in minutes.

Factory setting: **60 minutes**

Setting range: **10…999 minutes**

Drain:
Current: 50s
Range: 1-1000
Factory: 5s

– **Draining time**

Draining time in seconds.

Factory setting: **5 s**

Setting range: **1...1000 s**

Main. time:
2000h

– **Remaining time until next maintenance**

Shows the remaining time until the next maintenance of the unit in hours.

Steam time:
1050h

– **Running hours**

Shows the actual running hours of the unit.

# 7 Maintenance

## 7.1 Important notes on maintenance

**Qualification of personnel**

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

**General note**

The instructions and details for maintenance work must be followed and upheld.

Only the maintenance work described in this documentation may be carried out.

Only use original Condair spare parts to replace faulty parts.

**Safety**

Some maintenance work requires removal of the unit cover. Please note the following:

**DANGER!**
**Danger of electric hazard!**

You may get in touch with live parts when the unit is open. Touching live parts may cause severe injury or even lethal violation.

Prevention: Before carrying out any maintenance work set the Condair RC out of operation as described in *chapter 6.3* (switch off the unit, disconnect it from the mains and stop the water supply) and secure the unit against inadvertent power-up.

**CAUTION!**

The electronic components inside the humidifier are very sensitive to electrostatic discharge.

Prevention: Before carrying out any maintenance work to the electrical or electronic equipment of the humidifier, appropriate measures must be taken to protect the respective components against damage caused by electrostatic discharge (ESD protection).

**WARNING!**
**Danger of burning!**

The water in the steam tank can be hot (up to 95 °C). There is danger of burning when the steam tank is dismounted shortly after steam has been produced.

Prevention: Before carrying out any work on the steam system set the Condair RC out of operation as described in *chapter 6.3*, then wait until the components have cooled down sufficiently thus preventing danger of burning.

## 7.2 Maintenance intervals

In order to ensure safe and reliable operation, the maintenance of the Condair RC should be devised in three stages. A distinction is made here between periodic inspections, small maintenance and extended maintenance of the steam humidifier.

The intervals required between small maintenance and extended maintenance depend on the water quality and the quantity of steam generated. The maintenance counter for the extended maintenance is set to 2000 hours. After expiry of the maintenance interval, the yellow LED flashes and an appropriate message is shown in the display.
Note: We recommend to carry out an extended maintenance at least once a year, independently from the maintenance counter.

The following is an overview of the work that should be undertaken for the three maintenance stages.

– **Periodic inspections**

  When: **once per week**

  Work:
  - Inspect the water and steam installations for correct sealing and damage.
  - Inspect the drain line for soiling.
  - Inspect the electrical installation for loose cables and damaged components.
  - Inspect the steam humidifier for damage.

– **Small maintenance**

  When: **Quarterly**

  Work:
  - Carry out the periodic inspection items
  - Empty the steam tank.

– **Extended maintenance**

  When: When the **yellow LED lights** and the maintenance appears (**or at least one a year**).

  Work:
  - Carry out the periodic inspection items
  - Empty the steam tank.
  - Dismantle and clean the steam tank, Check heating elements and replace if necessary
  - Clean the unit inner chamber
  - Inspect the components inside the unit for damage (e.g. heating cable connectors on the steam tank, level unit, etc.)

## 7.3 Dismantling and re-assembly work

**DANGER!**
**Danger of electric hazard!**

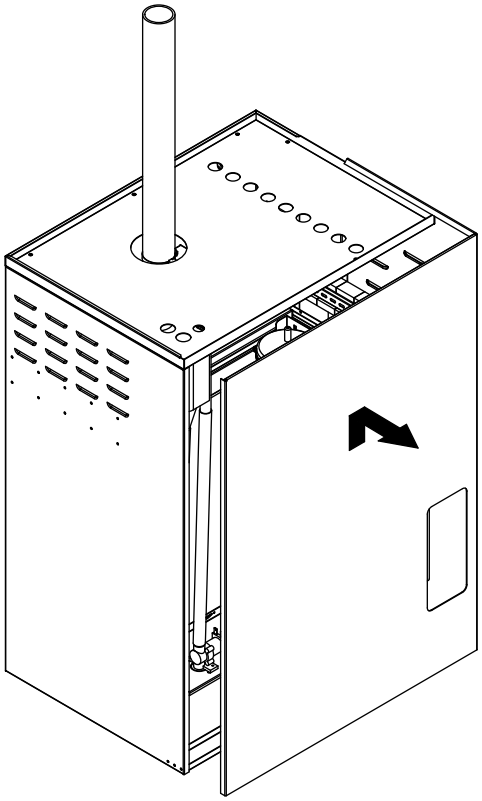
Before carrying out any maintenance work set the Condair RC out of operation as described in *chapter 6.3* (switch off the unit, disconnect it from the mains and stop the water supply) and secure the unit against inadvertent power-up.

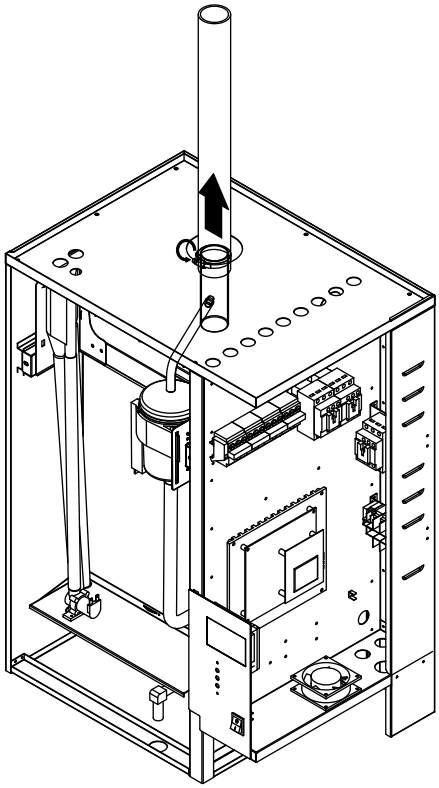
**WARNING!**
**Danger of burning!**

**The water in the steam tank can be hot (up to 95 °C). There is danger of burning when the steam tank is dismounted shortly after steam has been produced.**

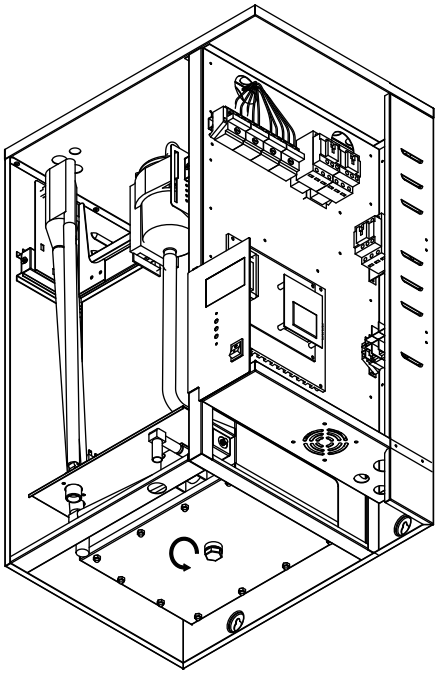
**Prevention:** Before carrying out any work on the steam system set the Condair RC out of operation as described in *chapter 6.3*, then wait until the components have cooled down sufficiently (see temperature indication adhesive on the scale collector tank) thus preventing danger of burning.

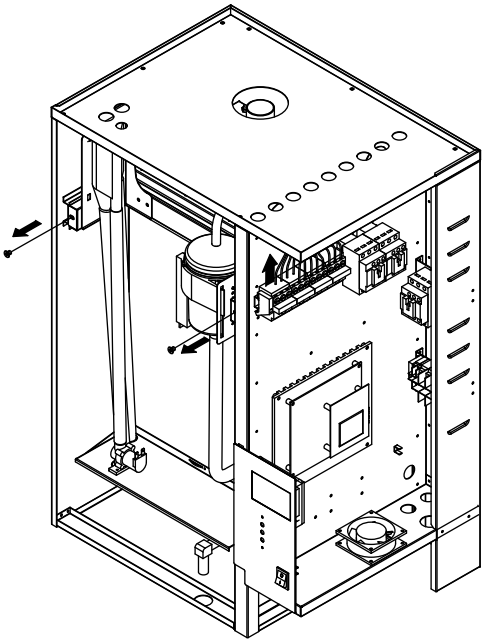
### 7.3.1 Removal and dismantling of the steam tank



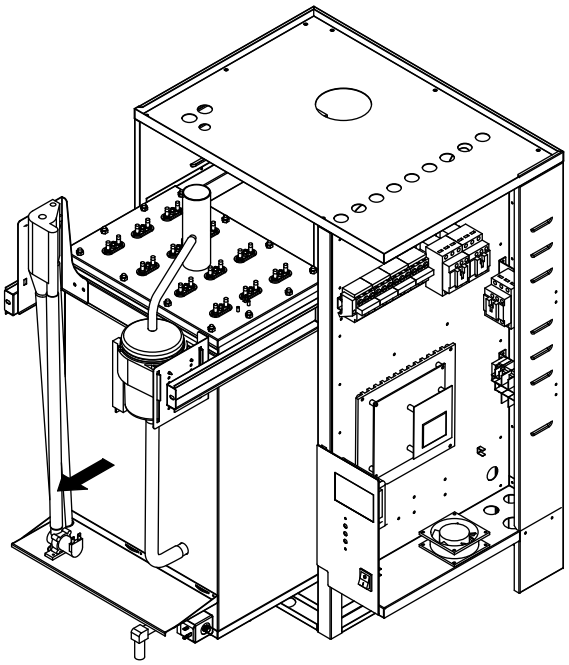


1. Remove the front cover.
2. Free the upper hose clamp of the steam hose using a screwdriver and pull the hose from the steam connection.





3. Screw out the drainage plug at the bottom of the water tank and drain the water tank. Remove water supply hose and the drain hose.
4. Remove the cable of the heating elements, the inlet valve, the drain valve and water level unit. **Important: Before removing the cables mark them for correct reconnetion.**



5. Remove the screws which fix the steam tank in the housing. Then, remove the steam tank.

**Assembly and installation of the steam tank**

Assembly of the steam tank takes place in reverse sequence. Please note the following instructions:

– When Installation of any heating elements which have been removed should follow figure 9. Make sure that any replaced heating elements are correctly positioned and the cables are correctly connected (according to your notes in step 4).

– Insert steam tank in the unit correctly and fasten with the screws.

– Fasten steam hose with hose clamp to the steam tank. A leaky steam hose can cause damp damage in the interior of the unit.

## 7.4 Notes on cleaning

**Cleaning the steam tank**

- Wherever possible, remove the lime coating that has formed using a brush (do not use a wire brush).
- Wash parts with lukewarm soap solution and rinse well with tap water.
  Note: If the components are heavily scaled, carefully fill steam tank with 8-percent formic acid until the scale has dissolved. Then treat components as previously described.

**Cleaning the heating elements**

- Immerse heating elements in a container filled with 8-percent formic acid. Allow the acid to take effect until the scale coating has dissolved.
  Note: The heating elements do not have to be entirely free from scale.

**CAUTION!**

**Ensure that the electrical connections remain dry.**

**On no account remove scale coating on the heating elements with tools (screwdriver, scraper, etc.) or by striking. This could damage the heating elements.**

- Then rinse heating elements thoroughly with fresh water.

**Cleaning the water drain line and drain valve**

- Clean the drain line, funnel ans siphon and the drain valve using commercially available cleaning and descaling agents.

**Cleaning the interior of the unit**

- Wipe down components in the steam tank compartment with a damp cloth (clean water).
- If necessary, carefully remove any dust in the electrical compartment with a brush or a dry cloth.

**CAUTION!**

**Ensure that the electrical connections in the compartments remain dry.**

## 7.5 Notes on cleaning agents

**Only use cleaning agents stated in** *chapter 7.4*. The use of disinfectants is only permitted if they do not leave any toxic residues. In any case the parts must be thoroughly rinsed with clean drinking water after cleaning.

**WARNING!**

Formic acid is indeed harmless to the skin, but it attacks the mucous membranes. Therefore prevent your eyes and respiratory tracts from getting in touch with the acid and its vapours (wear goggles and work in a well ventilated room or outside).

**CAUTION!**

**Do not use any solvents, aromatized or halogenized hydrocarbons or other aggressive substances** as they may cause damage to the components of the unit.

It is mandatory to observe and comply with the information and instructions regarding cleaning agents. Observe in particular: all information relating to the protection of personnel, environmental protection and restrictions regarding usage.

## 7.6 Reset the maintenance counter

When maintenance work has been completed, the **maintenance counter (maintenance display)** can be reset as follows:

- Switch on the electrical isolators in the voltage supply lines to the unit.
- Press the buttons of <↓> and <↑>, and simultaneously switch on the unit via the unit switch.
- The code entry display appears showing "9999". The digit on the far left flashes. Enter the access code "**8120**" as follows:

  Change the first digit with the keys **<↓>** and **<↑>**. Confirm your input with the **<Enter>** key. The next digit starts to flash.

  Repeat this step for the remaining digits.

  After confirmation of the last digit the maintenance counter is reset and the unit restarts.

# 8 Fault elimination

## 8.1 Important notes on fault elimination

**Qualification of personnel**

Repair work must be carried out only by **qualified and well trained professionals authorised by the owner**.

Repair work relating to the electrical installation must be carried out by an electrician or professionals authorised by the owner.

**General notes**

Only use original spare parts from your Condair representative to replace defective parts.

**Safety**

Before starting repair work on the Condair RC set the unit out of operation and disconnect it from the mains (see *chapter 6.3*).

**DANGER!**

Make sure the Condair RC is separated from the mains (check with voltage detector) and the shut-off valve in the water supply line is closed.

**CAUTION!**

The electronic components inside the control compartment of the Condair RC are very sensitive to electrostatic discharge.

**Prevention:** Before carrying out any repair work to the electrical or electronic equipment of the Condair RC, appropriate measures must be taken to protect the respective components against damage caused by electrostatic discharge (ESD protection).

## 8.2 Fault indication

In case of malfunction during operation, an alarm message appears and the red LED lights.

## 8.3 Malfunction list

Most operational malfunctions are not caused by faulty equipment but rather by improper installation or disregarding of planning guidelines. Therefore, a complete fault diagnosis always involves a thorough examination of the entire system. Often, the steam hose connection has not been properly executed, or the fault lies with the humidity control system.
The following table gives a list of possible malfunctions, the appropriate fault message, details of their cause, and notes on how to deal with each problem.

| Malfunction/Indication | Cause | Remedy |
|---|---|---|
| External safety chain interrupted<br>Error 01<br>Safety interlock disconnected | Automatic flow monitoring device has responded | Switch on ventilator/ventilation system |
| | Ventilation interlock open. | Switch on ventilator/ventilation system |
| | Maximum humidistat has responded | Check humidity. Check/replace maximum humidistat. |
| | Pressure in the air duct too high (>1500 Pa). | Inspect ventilator/filter of ventilation system. Servicing, inspect system if necessary. |
| Max. filling time exceeded<br>Error 02<br>Max. filling time exceeded | Water supply blocked (main water tap closed, filter valve closed or blocked). | Check water feed (open main water tap, open or clean filter valve. |
| | Water pressure too low. | Raise water pressure (range 1-10 bar). |
| | Inlet valve does not open, filter sieve in Inlet valve blocked or inlet valve faulty | Inspect electrical connections and fuse. Clean filter sieve or replace Inlet valve. |
| | Feed hoses into steam humidifier not connected or kinked | Inspect hoses into level unit and connect if necessary. Replace Faulty Hoses. |
| | Level unit not connected | Connect level unit |
| | Float in the level unit sticking or level unit faulty. | Clean or replace level unit. |
| Over-temperature protection<br>Error 03<br>Over-temperature protection | Connection to over-temperature switch on steam tank broken or over-temperature switch faulty. | Check connections or replace over-temperature switch. |
| | Steam tank overheating, over-temperature switch has responded. | Inspect steam tank, clean if necessary. replace over-temperature switch. |
| Extended maintenance due<br>Error 04<br>Extended maintenance due | Maintenance counter for the extended maintenance has elapsed. | Perform extended maintenance according to *chapter 7.2*. |
| Control signal fault<br>Error 05<br>Control signal fault | Control signal faulty or sensor defective. | Check the control signal or the humidity sensor |
| | The control signal rotary switch "S2" is incorrectly set. | Adjust rotary switch "S2" to correct control signal type (see *chapter 6.1*). |
| Wrong unit type<br>Error 06<br>Wrong unit type | The unit model rotary switch "S1" is incorrectly set. | Adjust rotary switch "S1" to correct unit model (see *chapter 6.1*). |

## 8.4 Replacing unit fuses

**DANGER!**
**Danger of electric hazard!**

Before replacing the unit fuses set the Condair RC out of operation as described in *chapter 6.3* (switch off the unit, disconnect it from the mains and stop the water supply) and secure the unit against inadvertent power-up.

**CAUTION!**

The electronic components inside the humidifier are very sensitive to electrostatic discharge.

Prevention: Before carrying out any maintenance work to the electrical or electronic equipment of the humidifier, appropriate measures must be taken to protect the respective components against damage caused by electrostatic discharge (ESD protection).

The unit fuses may only be replaced by trained and qualified personnel.

**Important!** If the unit fuse blows this is generally due to a faulty unit component. Therefore you should check these components before replacing the fuse (see table below).

Only use the correct type of fuse according to the following table.

**WARNING!**

It is not permitted to use repaired fuses!

| Fuse | Specification | Before replacing, check |
|---|---|---|
| FU1 | Control voltage fuse<br>220V 1.5A | Control power<br>Drain valve pump (blockage or burnout of coil)<br>Inlet valve (blockage of burnout of coil) |
| FU2 | Heating unit fuse<br>380V 16A | Heating power<br>Heating element |

## 8.5 Resetting fault indication "Error"

In order to return the steam humidifier to operation after fault elimination, the steam humidifier must be switched off for approx. 5 seconds and then switched on again.

# 9 Technical data

| | Condair RC | | | | |
|---|---|---|---|---|---|
| | 5 | 10 | 20 | 30 | 40 |
| Steam capacity | Adjustable between 0 and 100% | | | | |
| Number of humidifiers | 1 | 1 | 1 | 1 | 1 |
| Steam connecting pipe | ø45 mm | | | | |
| Admissible control signals | 0…10 VDC,<br>0…20 mA DC,<br>4…20 mA DC,<br>On/Off control | | | | |
| Pressure of air duct | Maximum positive pressure: 1'500 Pa,<br>Maximum negative pressure: 1'000 Pa<br>(If pressure is beyond the above value, please contact with your Condair supplier) | | | | |
| Ambient temperature | 1…40 °C | | | | |
| Ambient humidity | 1…75%rh, without condensation | | | | |
| Water supply<br>- connecting pipe<br>- water supply pressure<br>- water supply temperature<br>- water quality | G3/4"<br>1... 5 bar (100…500 kPa)<br>1…40 °C<br>Tap water, softened water, RO water or deionized water | | | | |
| Drainage<br>- Connecting pipe<br>- Drainage temperature | Open funnel, with internal diameter of 40 mm<br>Maximum temperature: >90 °C | | | | |
| Weight<br>- operating weight<br>- net weight | 63 kg<br>35 kg | 63 kg<br>35 kg | 65 kg<br>37 kg | 79 kg<br>40 kg | 81 kg<br>42 kg |
| Dimensions<br>- height<br>- width<br>- depth | 820 mm<br>470 mm<br>400 mmm | | | 820 mm<br>570 mm<br>400 mmm | |
| Protection level | IP21 | | | | |

Notes

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