2549892-B EN 2008

EC SERIES


# INSTALLATION AND OPERATING INSTRUCTIONS

Steam humidifier
Condair **EC**

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 **steam humidifier Condair EC**.

The steam humidifier Condair EC incorporates the latest technical advances and meets all recognized safety standards. Nevertheless, improper use of the Condair EC may result in danger to the user or third parties and/or impairment of material assets.

To ensure a safe, proper, and economical operation of the steam humidifier Condair EC, please observe and comply with all information and safety instructions contained in the present installation and operating instructions as well as the instructions given in the manuals for the components used in the humidification system.

If you have questions, which are not or insufficiently answered in this documentation, please contact your Condair supplier. They will be glad to assist you.

## 1.2 Notes on the installation and operating instructions

**Limitation**

**The subject of these installation and operating instructions is the steam humidifier Condair EC**. The various accessories (e.g. steam distributor, steam distribution system, etc.) are only described insofar as this is necessary for proper operation of the equipment. Further information on accessories can be obtained in the respective instructions.

These installation and operating instructions are restricted to the **installation, commissioning, operation**, **servicing** and **trouble shooting** of the steam humidifier Condair EC and is meant for **well trained personnel being sufficiently qualified for their respective work**.

These installation and operating instructions are supplemented by various separate items of documentation (spare parts list, manuals for accessories, etc.). Where necessary, appropriate cross-references are made to these publications in the present documentation.

**Symbols used in this manualSymbols used in this manual**

**CAUTION!**

The catchword “CAUTION” designates notes in this documentation that, if neglected, may cause **damage and/or malfunction of the unit or other material assets**.

**WARNING!**

The catchword “WARNING” used in conjunction with the general caution symbol designates safety and danger notes in this documentation that, if neglected, may cause to **injury to persons**.

**DANGER!**

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

### Safekeeping

Please safeguard these installation and operating instructions in a safe place, where it can be immediately accessed. If the equipment changes hands, the documentation should be passed on to the new operator.

If the documentation gets mislaid, please contact your Condair supplier.

### Language versions

The present installation and operating instructions are available in various languages. Please contact your Condair supplier for information.

### Copyright protection

# 2 For your safety

### General

Every person working with the Condair EC must have read and understood the present installation and operating instructions before carrying out any work.
Knowing and understanding the contents of the installation and operating instructions is a basic requirement for protecting the personnel against any kind of danger, to prevent faulty operation, and to operate the unit safely and correctly.

All ideograms, signs and markings applied to the unit must be observed and kept in readable state.

### Qualification of personnel

All actions described in the present Installation and operating instructions (installation, operation, maintenance, etc.) must be carried out only by **well trained and sufficiently qualified personnel authorised by the owner**.
For safety and warranty reasons any action beyond the scope of this manuals must be carried out only by qualified personnel authorised by the manufacturer.

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

This unit 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 unit.
Children must be supervised to make sure that they do not play with unit.

### Intended use

The steam humidifier Condair EC is intended exclusively for **air humidification via a steam distributor or a fan unit approved by the manufacturer within the specified operating conditions** (see chapter 10 “Product specifications”). Any other type of application without the express written consent of the manufacturer is considered as not conforming with the intended purpose and may lead to the Condair EC becoming dangerous.
Operation of the equipment in the intended manner requires **that all the information in these instructions is observed (in particular the safety instructions)**.

### Danger that may arise from the unit

**DANGER!**
**Danger of electrical shock!**

**The Condair EC is mains powered. One may get in touch with live parts 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 EC out of operation as described in chapter 6.5 (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 EC produces hot water vapour. There is danger of scalding when getting in touch with hot water vapour.**

**Prevention:** Do not carry out any work on the steam system during operation (steam lines, steam distributor, fan unit, etc.). If the steam system is leaky set the Condair EC immediately out of operation as described in chapter 6.5. Correctly seal the steam system before putting the unit into operation again.

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

**During operation the components of the steam system 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 EC out of operation as described in chapter 6.5, then wait until the components have cooled down sufficiently thus preventing danger of burning.

### Behaviour in case of danger

If it is suspected that **safe operation is no longer possible**, then the Condair EC should immediately **be shut down and secured against accidental power-up according to chapter 6.5**. This can be the case under the following circumstances:

– if the Condair EC or its mains cable is damaged
– if the Condair EC is no longer operating correctly
– if connections and/or piping are not sealed

All persons working with the Condair EC 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 EC without the express written consent of the manufacturer.

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

# 3 Product Overview

## 3.1 Models overview

Steam air humidifiers Condair EC are available with **different heating voltages** and **steam capacities ranging from 5 kg/h up to a max. of 45 kg/h**.

| Heating voltage ** | Max. steam capacity in kg/h | Model Condair EC | Unit size | |
|---|---|---|---|---|
| | | | Unit small | Unit large |
| 400V3 (400V/3~/50...60Hz) | 5 | 5 | 1 | |
| | 8 | 8 | 1 | |
| | 15 | 15 | 1 | |
| | 23 | 23 | | 1 |
| | 32 | 32 | | 1 |
| | 45 | 45 | | 1 |
| 230V3 (230V/3~/50...60Hz) | 5 | 5 | 1 | |
| | 8 | 8 | 1 | |
| | 15 | 15 | 1 | |
| | 23 | 23 | | 1 |
| | 32 | 32 | | 1 |
| 230V1 (230V/1~/50...60Hz) | 5 | 5 | 1 | |
| | 8 | 8 | 1 | |

** Other heating voltages on request

**Key model designation**

Example:
**Condair EC 45 400V3**

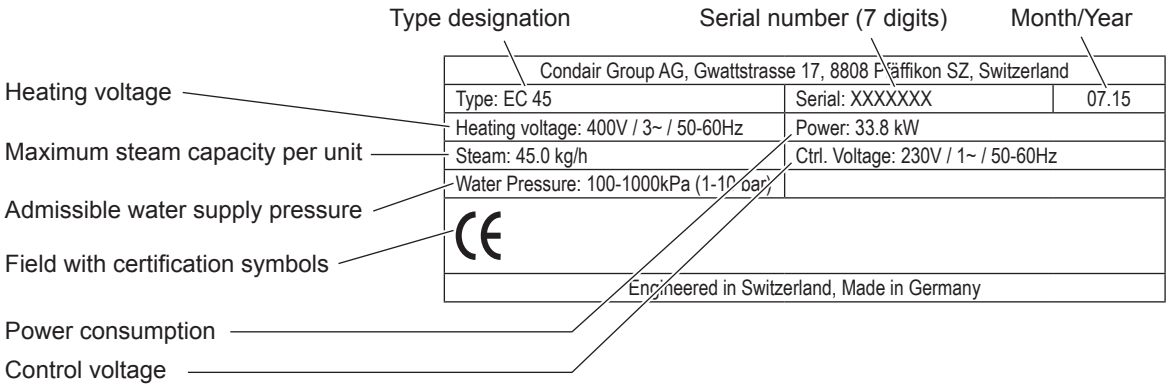
Product designation

Maximum steam capacity in kg/h:

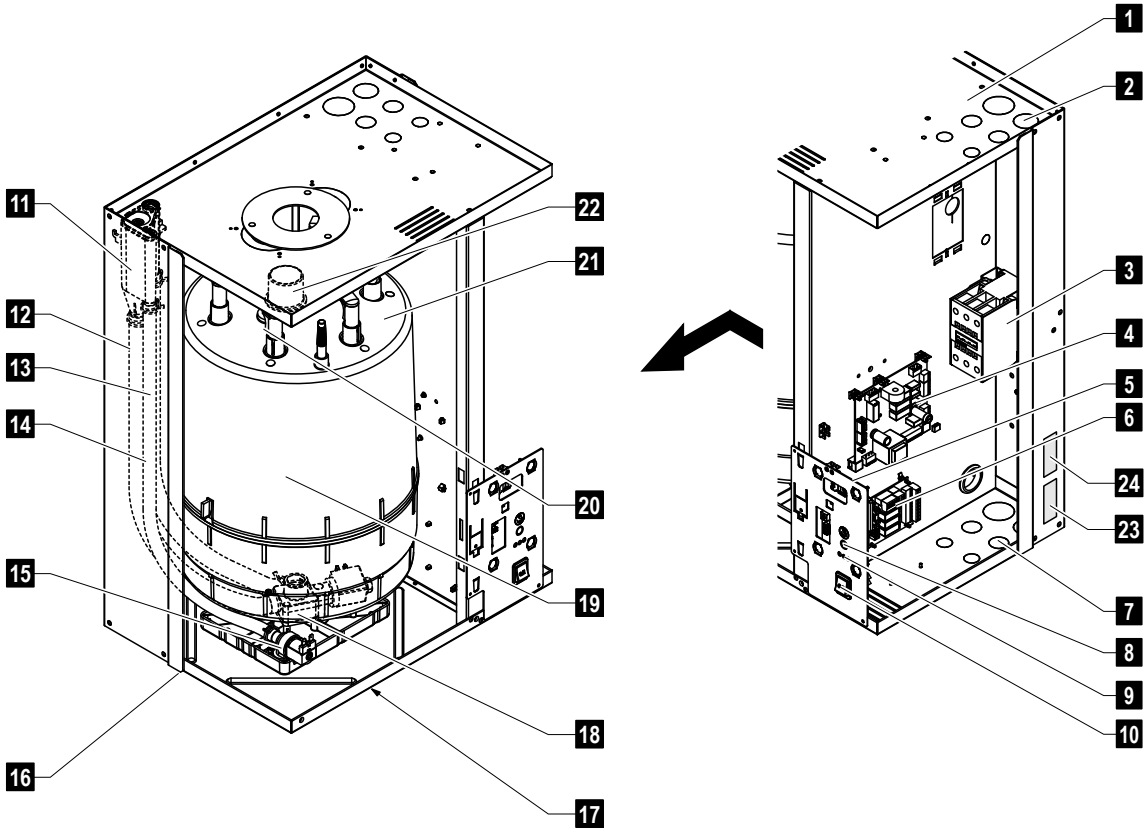
Heating voltage:
400V/3~/50...60Hz: **400V3**
230V/3~/50...60Hz: **230V3**
230V/1~/50...60Hz: **230V1**

## 3.2 Identification of the unit

The identification of the unit is found on the type plate:



## 3.3 Steam humidifier construction




The illustration above shows the large unit

1 Housing (small, large)
2 Cable openings, top side
3 Main contactor
4 Power board
5 Control board with EC Card
6 Remote operating and fault indication board (option)
7 Cable openings, bottom side
8 Drain/info key
9 Operation status indicators
10 Unit switch
11 Water cup
12 Filling hose
13 Water supply hose
14 Overflow hose
15 Inlet valve
16 water supply connector (not visible)
17 Drain connector (not visible)
18 Drain valve
19 Steam cylinder
20 Electrode plug
21 Level sensor
22 Steam outlet
23 Type plate
24 Data plate EC Card

## 3.4 Functional description

The steam humidifier Condair EC is a pressureless steam generator that utilizes an electrode heating. The steam humidifier Condair EC is designed for air humidification via a steam distributor (steam distribution pipe, fan unit or steam distribution system OptiSorp).

**Steam generation**

Any time steam is requested, the electrodes are supplied with voltage via main contactor. Simultaneously, the inlet valve opens and water enters the steam cylinder from the bottom via water cup and supply line. As soon as the electrodes come in contact with the water, current begins to flow between the electrodes, eventually heating and evaporating the water. The more the electrode surface is exposed to water, the higher is the current consumption and thus the steam capacity.
Upon reaching the requested steam capacity, the inlet valve closes. If the steam generation decreases below a certain percentage of the required capacity, due to lowering of the water level (e.g. because of the evaporation process or drainage), the inlet valve opens until the required capacity is available again.
If the required steam capacity is lower than the actual output, the inlet valve is closed until the desired capacity is achieved by lowering of the water level (evaporation process).

**Level monitoring**

A sensor provided in the steam cylinder cover detects when the water level gets too high. The moment the sensor comes in contact with water, the inlet valve closes.

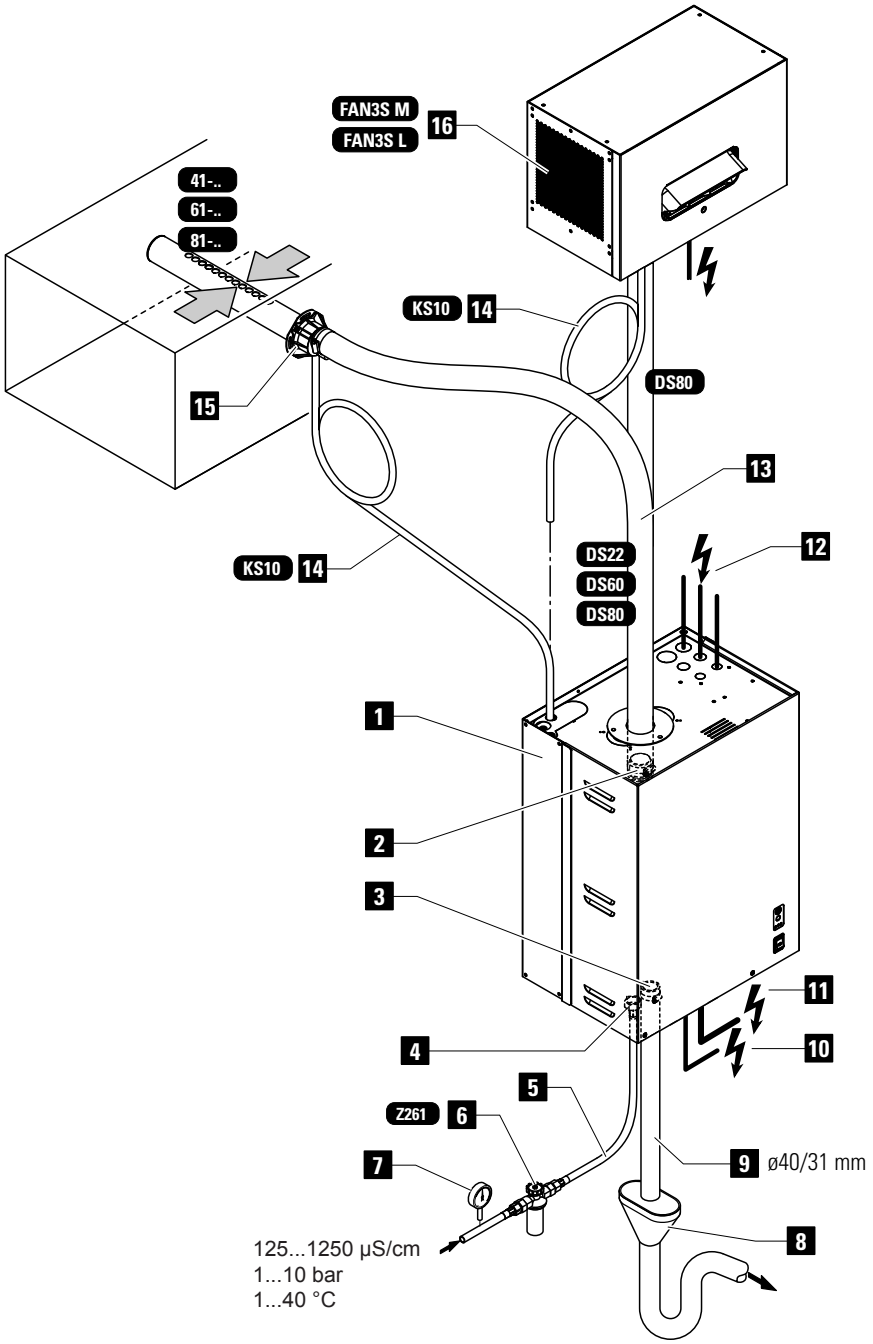
**Drainage**

As a result of the evaporation process, the conductivity of the water increases due to an escalating mineral concentration. Eventually, an inadmissibly high current consumption would take place if this concentration process were permitted to continue. To prevent this concentration from reaching a value, unsuitably high for the operation, a certain amount of water is periodically drained from the cylinder and replaced by fresh water.

**Control**

The steam production can be controlled with an external continuous controller 0-10V (continuous control) or with an external humidistat (On/Off control).

## 3.5 Humidification system overview




1 Steam humidifier
2 Steam connector
3 Water drain connector
4 Water supply connector
5 Water connection hose G 3/4"- G 3/8" (included in the delivery)
6 Filter valve (accessory “Z261”)
7 Manometer (installation recommended)
8 Funnel with siphon (building side)
9 Water drain hose (included in the delivery)
10 Control voltage supply
11 Heating voltage supply
12 Cable openings
13 Steam hose (accessory “DS..”)
14 Condensate hose (accessory “KS10”)
15 Steam distribution pipe (accessory “41-..”/“61-..”/“81-..”)
16 Fan unit (accessory “FAN3S...”)

## 3.6 Options

### 3.6.1 Options overview

| | | | Condair EC... | |
|---|---|---|---|---|
| | | 230V1 | 5/8 | |
| | | 400V3 | 5/8 | 15 | 23/32/45 |
| | | 230V3 | 5/8 | 15 | 23/32 |
| **D...** | **Cleanable steam cylinder**<br>Cleanable steam cylinder as an alternative to the disposable steam cylinder built in as standard (see also chapter 3.6.2). | | **D3..** | **D4..** | **D6..** |
| **RFI** | **Remote operating and fault indication**<br>PCB with relay contacts for the connection of remote displays for “Operation”, “Steam”, “Fault” and “Service”. | | **RFI** | | |
| **OPS** | **Overpressure set**<br>Kit for mounting the water cup to the unit cover when operating the steam humidifiers in systems with a duct air pressure of up to 10 kPa. | | **OPS** | | |
| **THV** | **Terminals heating voltage**<br>Separate terminals for systems where direct connection of heating voltage to main contactor (standard version) is not permitted by local regulations. | | **M-THV** | **M-THV** | **L-THV** |
| **CG** | **Cable glands** (with metric thread) | | **CG** | | |
| **CVI** | **Internal control voltage** | | **M-CVI** | | **L-CVI** |
| **TRAFO** | **Transformer (400V/230V)** | | **M-Trafo** | | **L-Trafo** |

### 3.6.2 Option details

**Steam cylinder**

The steam humidifier is available with **two different types** of steam cylinders:

– **Exchangeable steam cylinder type A... (standard version)**

– **Cleanable steam cylinder type D... (option)**

The following tables present an overview of the steam cylinders used in the different models.

| **Condair EC...400V3** | **5/8** | **15** | **23** | **32/45** |
|---|---|---|---|---|
| For water conductivity from 125 to 1250 µS/cm | | | | |
| Exchangeable steam cylinder | A363 | A464 | A674 | A664 |
| Cleanable steam cylinder | D363 | D464 | D674 | D664 |
| For low water conductivity | | | | |
| Exchangeable steam cylinder | A343 | A444 | A 654 | A644 |
| Cleanable steam cylinder | D343 | D444 | D654 | D644 |

| **Condair EC...230V3** | **5/8** | **15** | **23/32** |
|---|---|---|---|
| For water conductivity from 125 to 1250 µS/cm | | | |
| Exchangeable steam cylinder | A343 | A444 | A644 |
| Cleanable steam cylinder | D343 | D444 | D644 |

| **Condair EC...230V1** | **5/8** |
|---|---|
| For water conductivity from 125 to 1250 µS/cm | |
| Exchangeable steam cylinder | A342 |
| Cleanable steam cylinder | D342 |

If you have questions regarding the steam cylinders please contact your Condair representative.

# 3.7 Accessories

## 3.7.1 Accessories overview

### Accessories for water installation

| | | Condair EC... | | |
|---|---|---|---|---|
| | **230V1** | **5/8** | | |
| | **400V3** | **5/8** | **15** | **23/32/45** |
| | **230V3** | **5/8** | **15** | **23/32** |
| **Filter valve** | | **Z261** (1 pcs. per system) | | |

### Accessories for steam installation

| | | Condair EC... | | |
|---|---|---|---|---|
| | **230V1** | **5/8** | | |
| | **400V3** | **5/8** | **15** | **23/32/45** |
| | **230V3** | **5/8** | **15** | **23/32** |
| **Steam distribution pipe** (details see chapter 3.7.2) | | 1x 41-... | 1x 61-... | 1x 81-... |
| **Steam distribution system OptiSorp** (details see chapter 3.7.2) | | — | System 1 | |
| **Fan unit** (details see chapter 3.7.2) | | FAN3S M | | FAN3S L |
| **Steam hose / meter** | | 1x DS22 | 1x DS60 | 1x DS80 |
| **Condensate hose / meter** | | 1x KS10 | | |

### Accessories for humidity control

| | | Condair EC... | | |
|---|---|---|---|---|
| | **230V1** | **5/8** | | |
| | **400V3** | **5/8** | **15** | **23/32/45** |
| | **230V3** | **5/8** | **15** | **23/32** |
| **Duct humidistat** | | **HBC** (1 pcs. per system) | | |
| **Room humidistat** | | **HSC** (1 pcs. per system) | | |

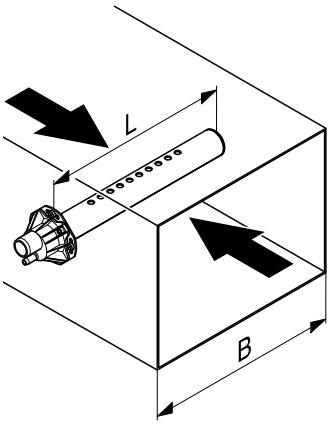
### General accessories

| | | Condair EC... | | |
|---|---|---|---|---|
| | **230V1** | **5/8** | | |
| | **400V3** | **5/8** | **15** | **23/32/45** |
| | **230V3** | **5/8** | **15** | **23/32** |
| **All-weather protective housing** | | Layout according to the separate data sheet | | |

## 3.7.2 Accessory details

### 3.7.2.1 Steam distribution pipe 41-.../61-.../81-...

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).



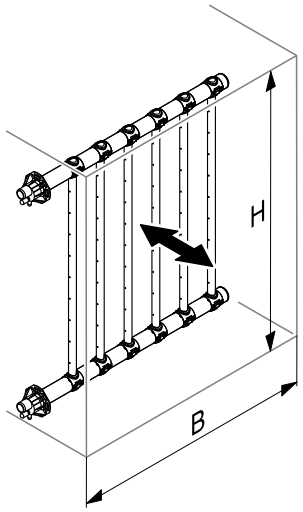

| Steam distribution pipes for Condair EC [1] | | | Length (L) steam distribution pipe | Duct width (B) |
|---|---|---|---|---|
| Type 41-.. | Type 61-.. | Type 81-.. | in mm [2] | in mm |
| **41-200** | | | 200 | 210...400 |
| **41-350** | **61-350** | **81-350** [3] | 350 | 400...600 |
| **41-500** | **61-500** | **81-500** [3] | 500 | 550...750 |
| **41-650** | **61-650** | **81-650** | 650 | 700...900 |
| **41-800** | **61-800** | **81-800** | 800 | 900...1100 |
| **41-1000** | **61-1000** | **81-1000** | 1000 | 1100...1300 |
| **41-1200** | **61-1200** | **81-1200** | 1200 | 1300...1600 |
| | **61-1500** | **81-1500** | 1500 | 1600...2000 |
| | **61-1800** | **81-1800** | 1800 | 2000.2400 |
| | **61-2000** | **81-2000** | 2000 | 2200...2600 |
| | | **81-2300** | 2300 | 2500...2900 |
| | | **81-2500** | 2500 | 2700...3100 |

[1] Material: CrNi steel
[2] special length on request
[3] up to max. 30 kg/h steam capacity

**Note**: If the humidification distance (see chapter 5.4.2) has to be reduced for technical reasons, the amount of steam per basic unit must be divided between **two steam distribution pipes** or the **steam distribution system OptiSorp** must be used. If this is the case, contact your Condair supplier.

### 3.7.2.2 OptiSorp steam distribution system

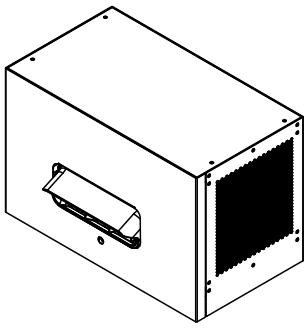
The OptiSorp steam distribution system is used in ventilation ducts with a short humidification distance (for the calculation of the humidification distance refer to chapter 5.4.2). When ordering an OptiSorp system the duct dimension must be specified. Please consult the data in the following table.




| OptiSorp | Number of steam connectors | Max. steam capacity in kg/h [1] | Duct dimensions Width in mm | Duct dimensions Height in mm |
|---|---|---|---|---|
| **System 1** | 1 | 45 (30) | 450-2700 | 450-1650 |

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

#### 3.8.2.3 Fan unit



The fan units FAN3S – in combination with the steam humidifiers Condair EC – are used for the direct room humidification. They are mounted **separately above the unit** to the wall.
The type of fan unit is dependent on the steam capacity and on the type of the basic unit and can be gathered from the table in chapter 3.7.1.

Note: Further information on the Condair FAN3S can be found in the separate manual supplied with the fan unit.

## 3.8 Standard delivery

The standard delivery includes:

- Steam humidifier Condair EC with water connection hose G 3/4" - G 3/8" and water drain hose ø40/31 mm equipped with the options ordered according to chapter 3.6, fixing set and installation and operating instructions (this document), packaged in cardboard box
  - Unit small (WxHxD): 445 mm x 755 mm x 360 mm, shipping weight: 26 kg
  - Unit large (WxHxD): 560 mm x 820 mm x 435 mm, shipping weight: 31 kg
- Ordered accessories with operating instructions according chapter 3.7, packed separately
- Spare parts list

## 3.9 Storing/Transportation/Packaging

**Storing**

Store the unit in a protected area meeting the following requirements:

- Room temperature: 1 ... 40 °C
- Room humidity: 10 ... 75 %rh

**Transportation**

For optimum protection always transport the unit in the original packaging.

The weight of the small and the large unit is more than 20 kg (weight without packaging: small unit 23 kg, large unit 28 kg). Therefore, always transport the unit with the help of another person or use a forklift or a crane. Always place the unit on its back side.

**Packaging**

Keep the original packaging of the Condair EC for later use.

In case you wish to dispose of the packaging, observe the local regulations on waste disposal. Never dispose of the packaging to the environment.

# 4 Notes for the planning engineer

## 4.1 Selecting the unit version

To select the unit version the following planning steps are required:

1. Calculating the required maximum steam capacity according chapter 4.1.1
2. Selecting the unit version from the table in chapter 4.1.2

### 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)
$\rho$: specific gravity of air in **kg/$m^3$**
$\varepsilon$: 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 $\rho$, $\varepsilon$, **$x_2$** and **$x_1$** can be gathered from the **h,x-diagram** or the **Carrier-Diagram** for moist air respectively.

**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 as well as any losses occur if the steam humidifier is operated on a mains circuit with a ground fault circuit interrupter.

  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 Condair 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 Condair supplier.

### 4.1.2 Selecting the unit

Condair EC **45** **400V3**

| Heating voltage ** | Max. steam capacity in kg/h | Model Condair EC .. | Unit size | |
|---|---|---|---|---|
| | | | Unit small | Unit large |
| 400V3 (400V/3~/50...60Hz) | 5 | 5 | 1 | |
| | 8 | 8 | 1 | |
| | 15 | 15 | 1 | |
| | 23 | 23 | | 1 |
| | 32 | 32 | | 1 |
| | 45 | 45 | | 1 |
| 230V3 (230V/3~/50...60Hz) | 5 | 5 | 1 | |
| | 8 | 8 | 1 | |
| | 15 | 15 | 1 | |
| | 23 | 23 | | 1 |
| | 32 | 32 | | 1 |
| 230V1 (230V/1~/50...60Hz) | 5 | 5 | 1 | |
| | 8 | 8 | 1 | |

** Other heating voltages on request

## 4.2 Selecting the options an accessories

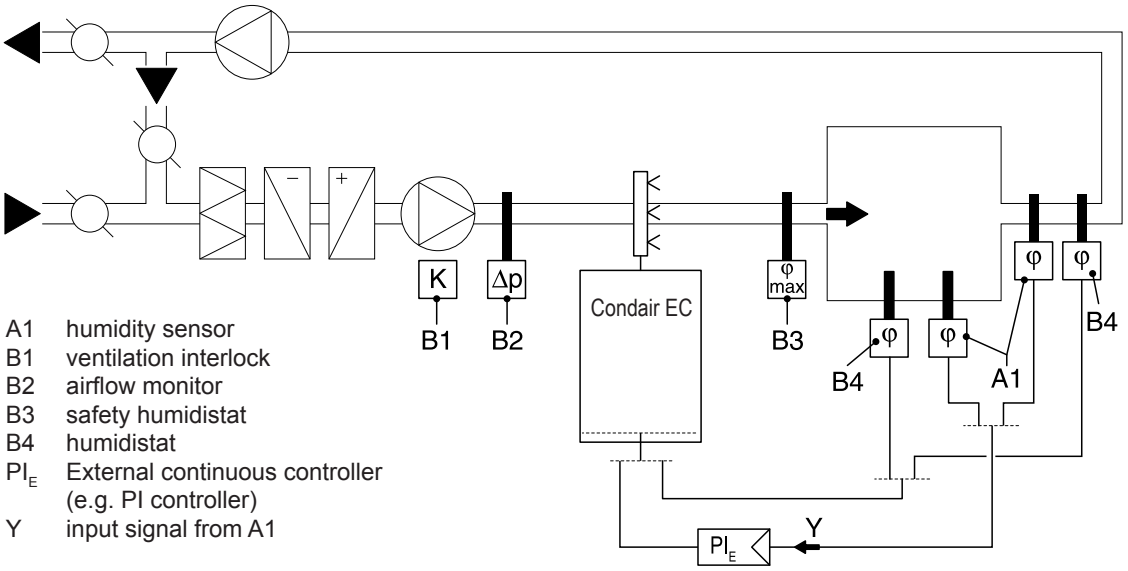
For selecting the options and accessories see chapter 3.6 and 3.7.

## 4.3 Selecting the control system

**The various control systems**

– **System 1: Room humidity control**

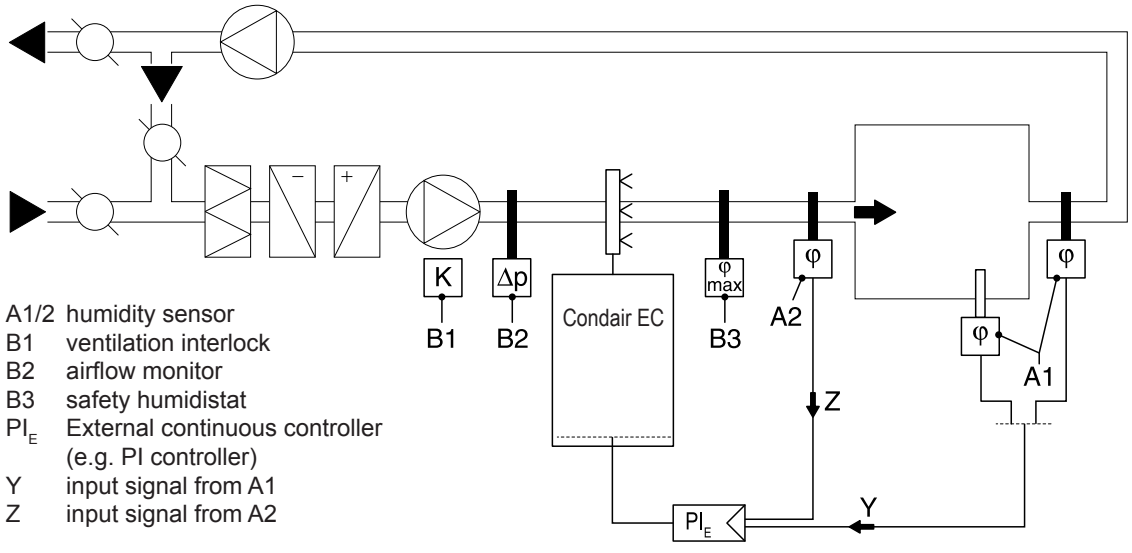
System 1 is suited for **direct room humidification** and **air conditioning systems with mainly recirculated air**. The humidity sensor or humidistat respectively is preferably located in the room itself or in the exhaust air duct.




A1 humidity sensor
B1 ventilation interlock
B2 airflow monitor
B3 safety humidistat
B4 humidistat
$PI_E$ External continuous controller (e.g. PI controller)
Y input signal from A1

– **System 2: Room humidity control with continuous limitation of the supply air humidity**

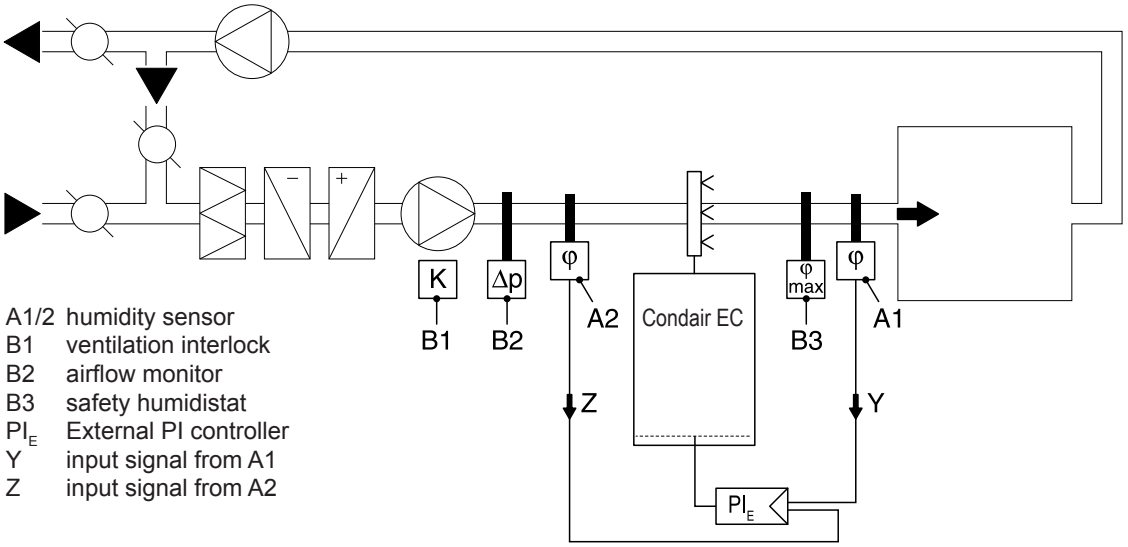
System 2 is suited for air conditioning systems with a **large portion of supply air**, **low supply air temperature**, **post-humidification**, or **variable airflow volume**. If the supply air humidity exceeds the preset value, the continuous limitation is effected prior to the room humidity control.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




A1/2 humidity sensor
B1 ventilation interlock
B2 airflow monitor
B3 safety humidistat
$PI_E$ External continuous controller (e.g. PI controller)
Y input signal from A1
Z input signal from A2

– **System 3: Supply air humidity control with continuous output limitation**

**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 systems always require a PI-controller.
The humidity sensor (A1) is located in the supply air duct after the steam distribution pipe. 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.




**Which humidity control system for which application?**

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

**Please contact your Condair supplier, if your application meets the following conditions:**
– Humidification of small rooms up to 200 $m^3$
– 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

**Admissible input signals**

– 0...10VDC (external continuous controller)
– 24 V On/Off (humidistat)

# 5 Mounting and installation work

## 5.1 Important notes for 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 note

Strictly observe and comply with all information given in the present installation and operating instructions regarding the location 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 cover. Please note the following:

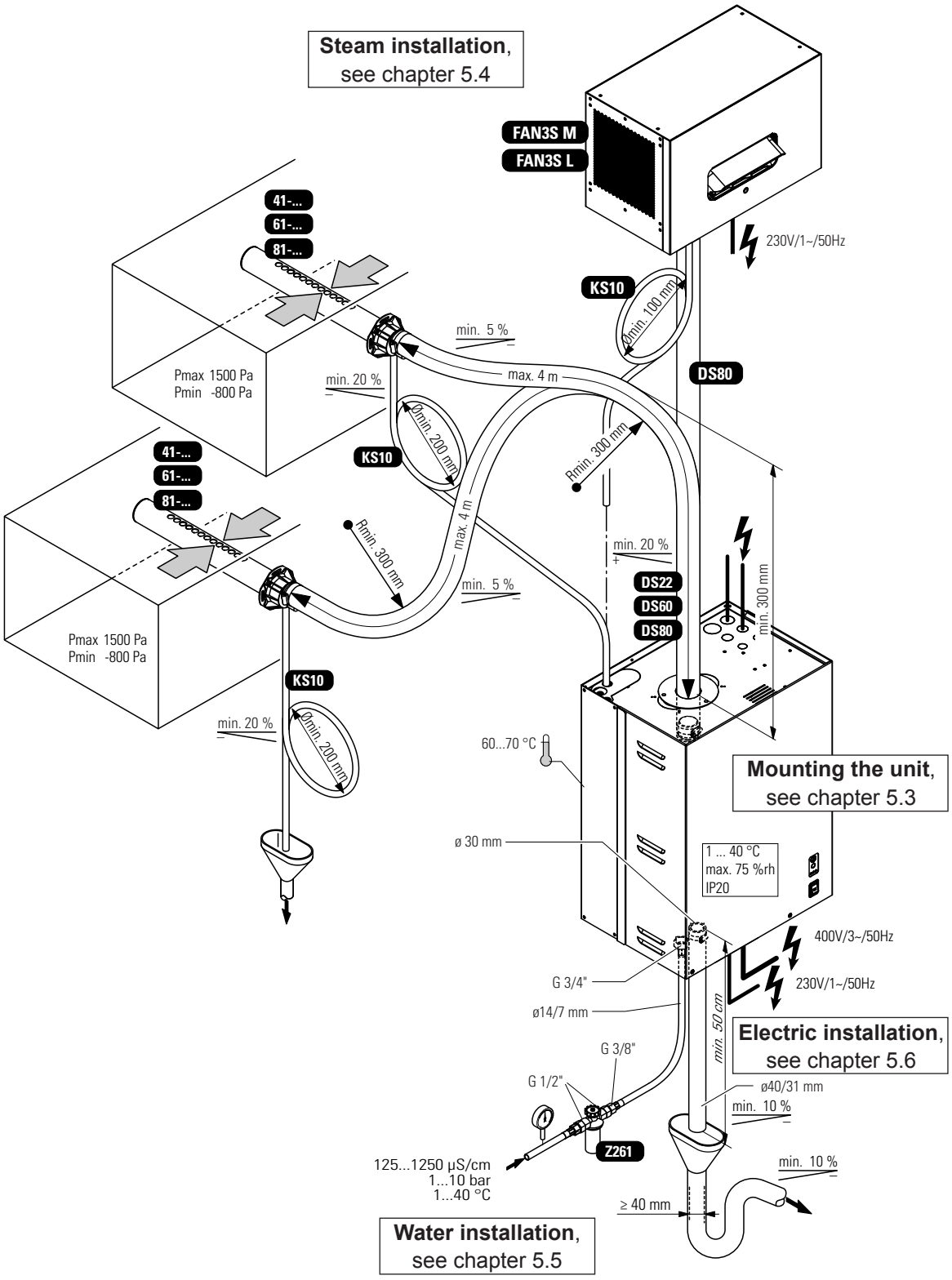
**DANGER!**
**Danger of electrical shock!**

You may get in touch with live parts when the unit is open. The steam humidifier must be connected to the mains only after all mounting and installation work has been completed and the cover has been relocated properly.

**CAUTION!**

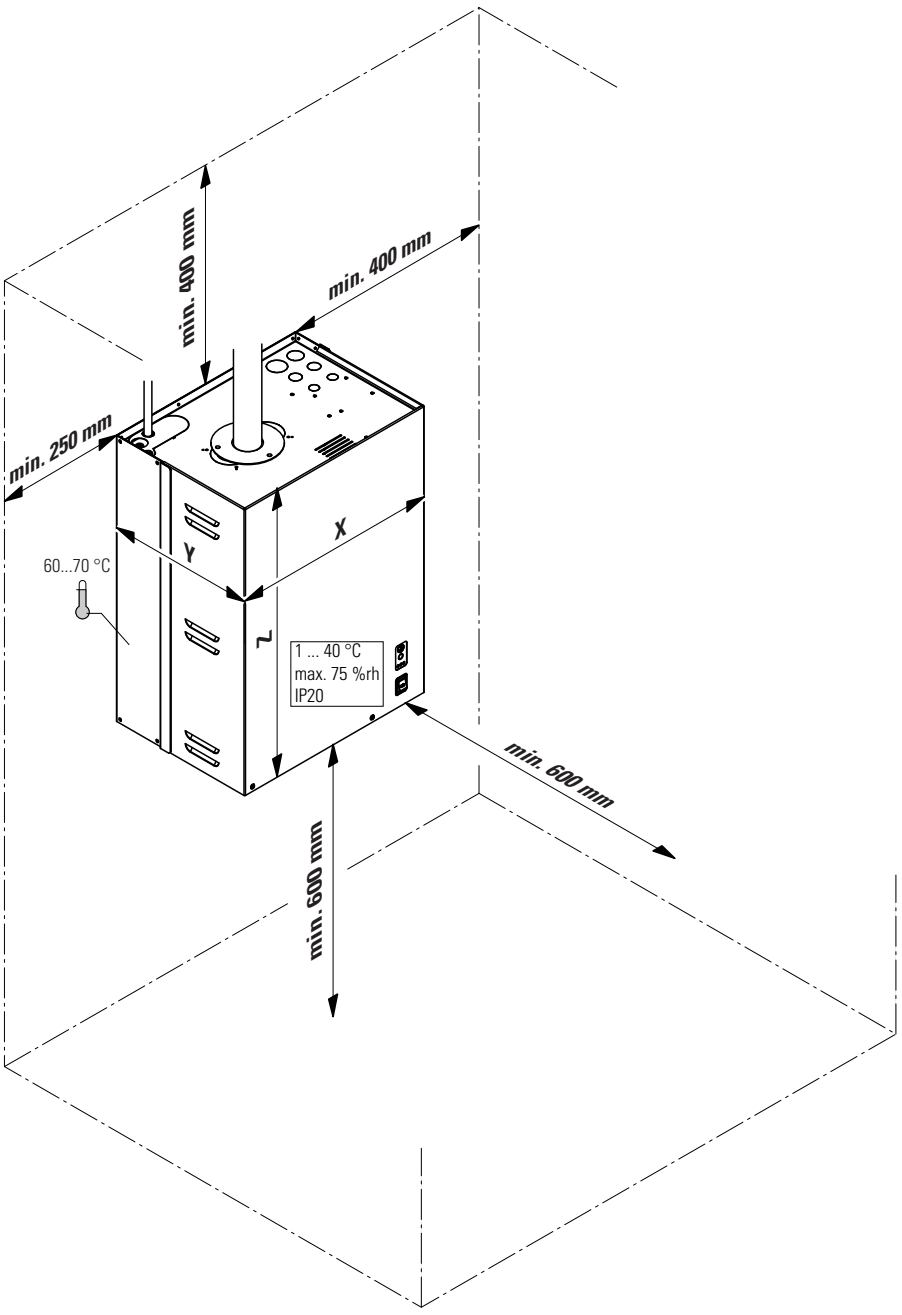
The electronic components inside the humidifier are very sensitive to electrostatic discharge. When the unit is open for installation work, appropriate measures must be taken to protect these components against damage caused by electrostatic discharge (ESD protection).

## 5.2 Installation overview



## 5.3 Mounting the unit

### 5.3.1 Notes on locating the unit




| | | | | |
|---|---|---|---|---|
| Condair EC ... 230V1 | | **5/8** | | |
| Condair EC ... 230V3 | | **5/8** | **15** | **23/32** |
| Condair EC ... 400V3 | | **5/8** | **15** | **23/32/45** |

| | | | | |
|---|---|---|---|---|
| Dimensions | | | | |
| Housing (XxYxZ) in mm | 377x279x612 | 1 | 1 | |
| | 492x351x670 | | | 1 |
| Weights | | | | |
| Net weight in kg | | 19 | 19 | 28 |
| Operating weight in kg | | 24 | 30 | 65 |

The installation site of the steam humidifier depends largely on the location of the steam distributor (see chapter 5.4). 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** hose is kept as short as possible (**max. 4 m**) and that the **minimum bend radius (R= 300 mm)** and **up-slope (20 %)** or **down-slope (5 %)** of the steam hose is observed (see chapter 5.4.5).

– The steam humidifiers Condair EC are designed for wall-mounting. Make sure that the construction (wall, pillar, floor-mounted console, etc.) to which the humidifiers are to be mounted, offers a **sufficiently high load-bearing capacity** (take notice of the weight information found in the dimension sand weights table above), 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 EC is retaining 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 units are to be mounted, does not consist of heat-sensitive material.

– Install the steam humidifier in such a manner that it is **freely accessible** with sufficient space available for maintenance purposes (refer to the above illustration for minimum distances).

– The Condair EC is protected according to **IP20**. Make sure the units are installed in a drip-proof location and the admissible ambient conditions are complied with.

– The steam humidifier Condair EC may only be installed in rooms with a floor drain.

**CAUTION!**

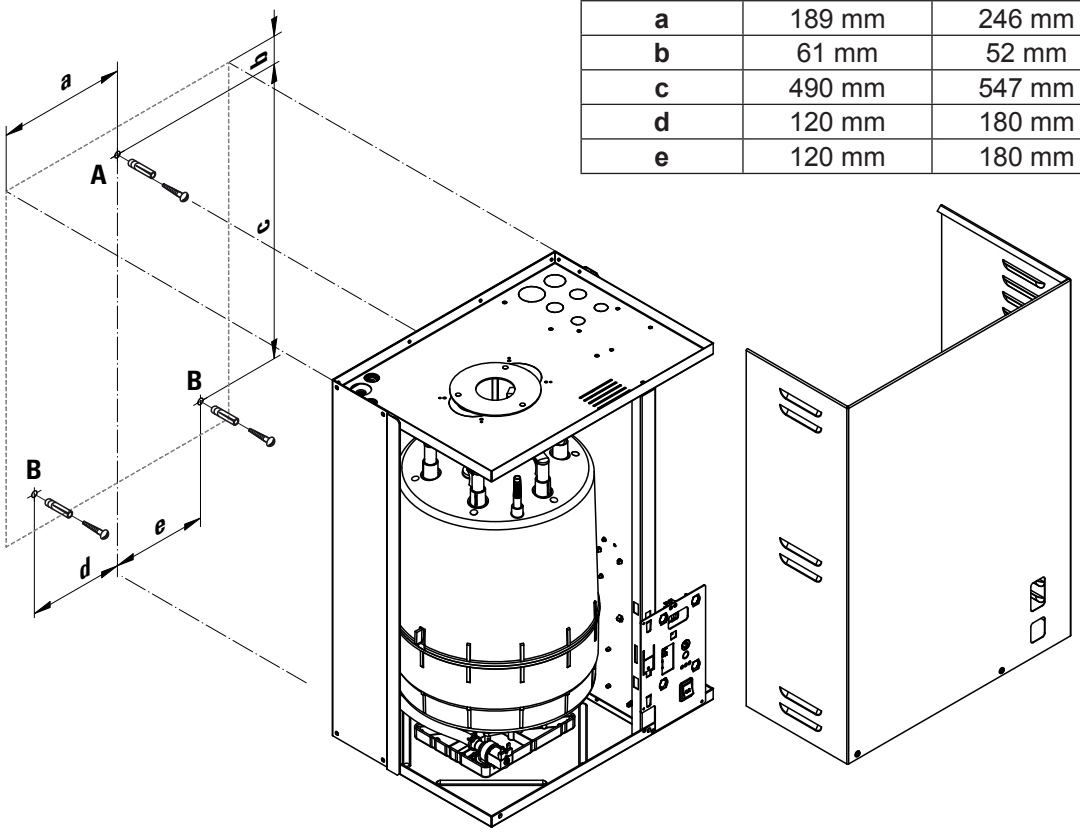
If for some reason the Condair EC must be installed in a location without floor drain, it is mandatory to provide a leakage monitoring device to safely interrupt the water supply in case of leakage.

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

– The Condair EC is designed for installation and operation within buildings (admissible temperature range see chapter 10.1). For outdoor operation the Condair EC 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.

### 5.3.2 Mounting the humidifier

| Dimension | Housing size | |
|---|---|---|
| | small | large |
| a | 189 mm | 246 mm |
| b | 61 mm | 52 mm |
| c | 490 mm | 547 mm |
| d | 120 mm | 180 mm |
| e | 120 mm | 180 mm |




**Procedure**

1. Mark the attachment point “A” on the wall.
2. Drill hole for attachment point “A” (diameter: 8 mm, depth: 40 mm).
3. Insert the supplied plastic plug, and tighten the screw until the distance between the wall and the screw head is 4 mm.
4. Unlock the two screws fixing the front panel to the unit, then remove the front panel.
5. Hang up the unit onto the screw and adjust it horizontally and vertically using a spirit level. Then, mark the fixing points “B”.
6. Drill the holes for the fixing points “B” (diameter: 8 mm, depth: 40 mm).
7. Insert the supplied plastic plugs, and tighten the screws until the distance between the wall and the screw head is 4 mm.
8. Hang the unit up onto the screws. Before tightening the screws, readjust the unit with the spirit level.
9. Reattach the front panel and secure it with the two screws.

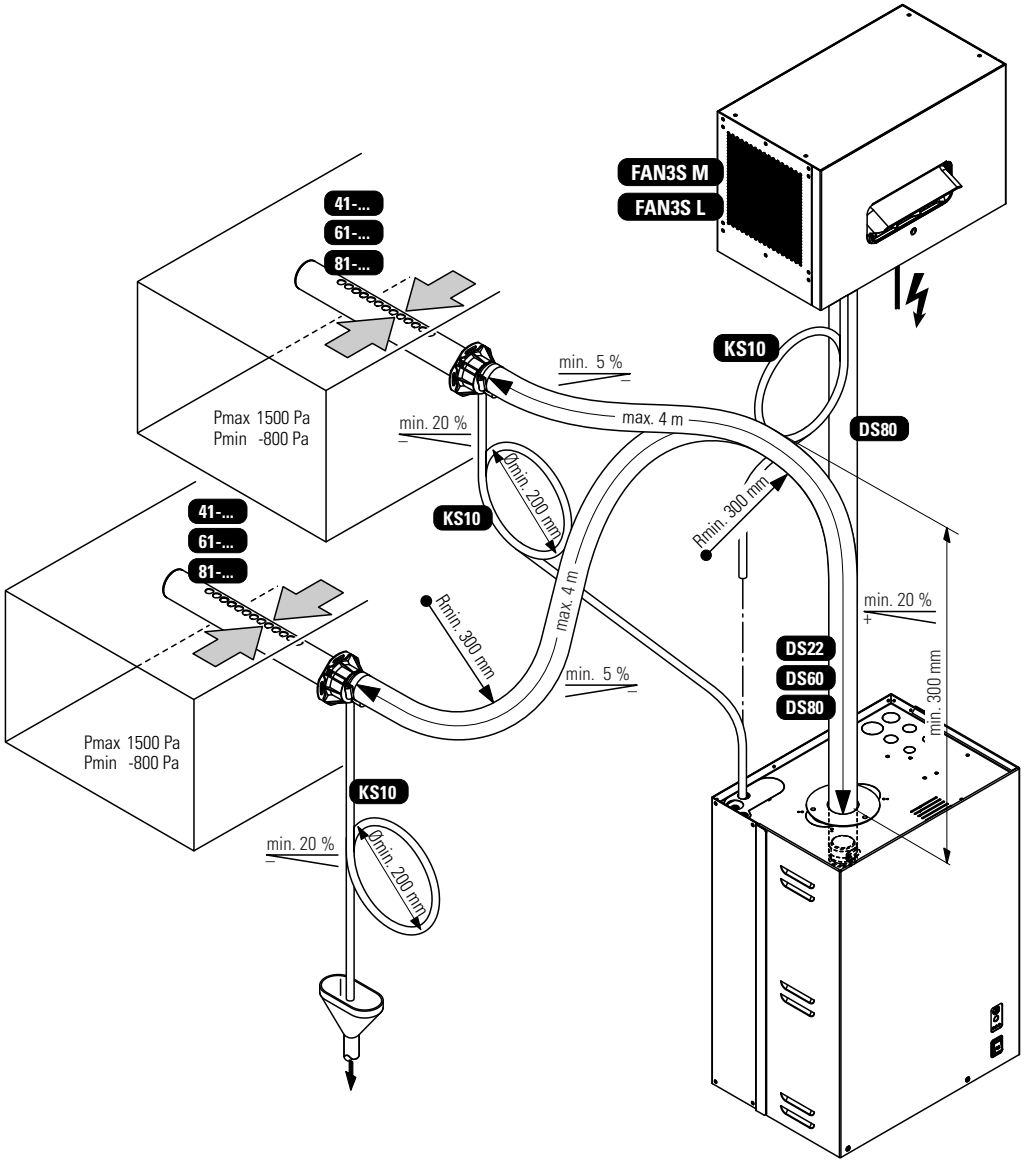
### 5.3.3 Inspecting the installed unit

Check the following points:

- ☐ Is the unit installed in the correct place (see chapter 5.3.1)?
- ☐ Is the supporting surface stable enough?
- ☐ Is the unit correctly aligned, vertically and horizontally?
- ☐ Is the unit properly secured (see chapter 5.3.2)?
- ☐ Has the front panel of the unit been relocated and correctly fixed with the two screws?

## 5.4 Steam installation

### 5.4.1 Overview steam installation

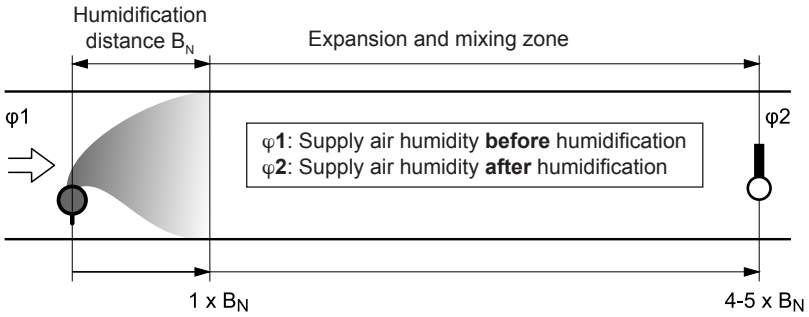


## 5.4.2 Positioning and mounting of the steam distribution pipes

The location for the steam distribution pipes 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 humidification distance

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




The calculation of the humidification distance "$B_N$" is dependent on several factors. For a rough estimation of the humidification 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 **only apply to steam distribution pipes 41-..., 61-... and 81-...**, the values **in brackets apply to the OptiSorp steam distribution system.**

| **Humidity at inlet φ1 in %rh** | **Length of humidification 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) |

For duct widths <600 mm the humidification distance for the OptiSorp system increases by approx. 50%

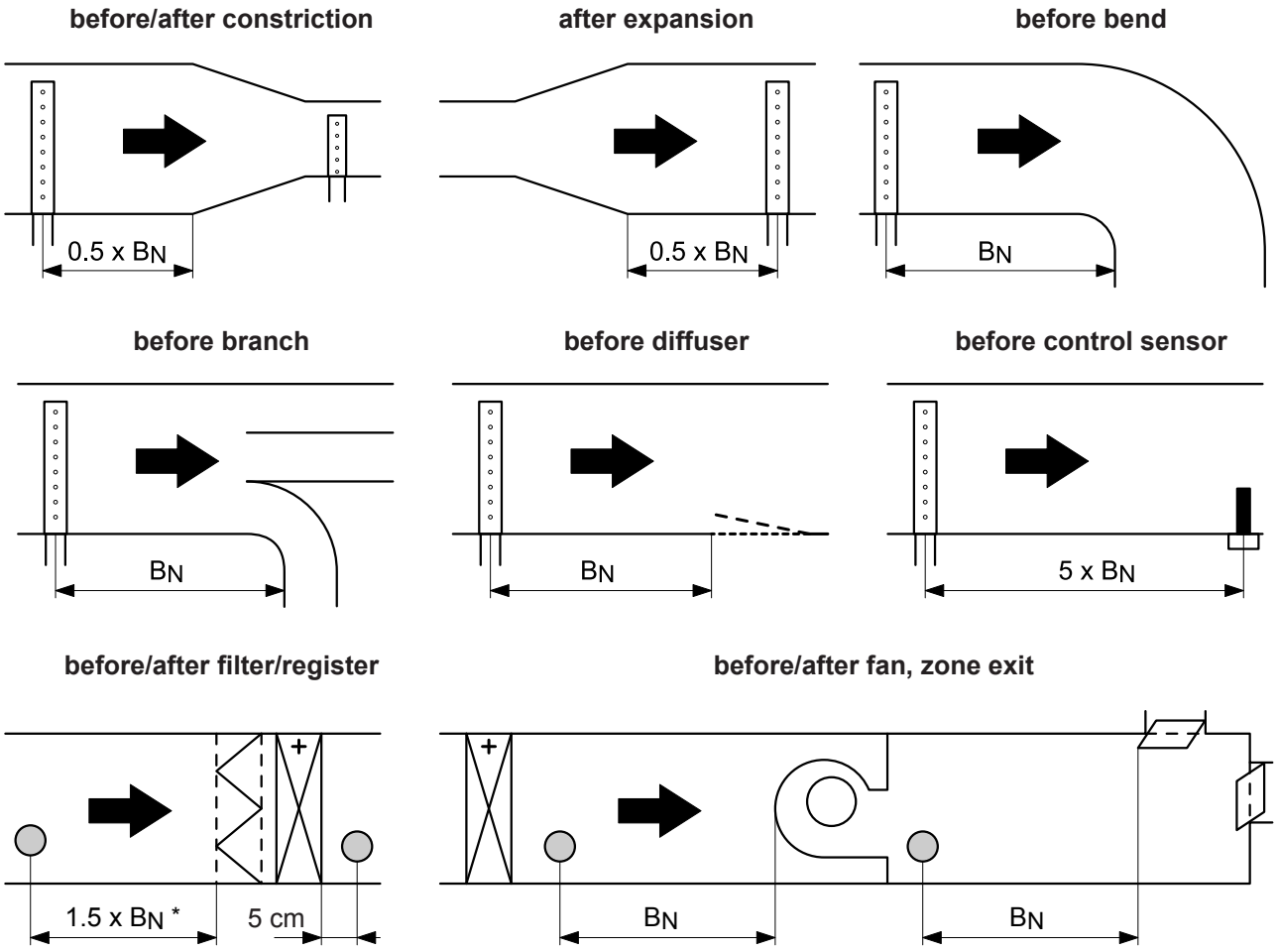
φ1 in %rh: Relative supply air humidity prior to humidification at the lowest supply air temperature
φ2 in %rh: Relative supply air humidity after the steam distribution pipe at maximum capacity

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

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

**Minimum distances to be observed**

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




2,5 x $B_N$ before aerosol filter

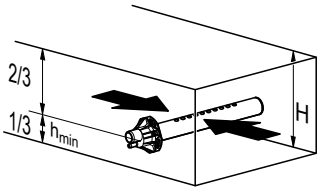
**Installation notes and dimensions**

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**.

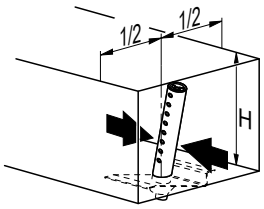
If possible, the steam distribution pipes should be installed on the **pressure side** of the duct (**max. duct pressure 1500 Pa**). If the steam distribution pipes are installed on the suction side of the duct, the **maximum vacuum must not exceed 800 Pa**.

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.

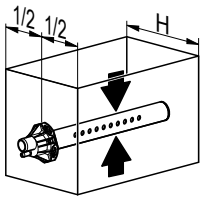
In positioning the steam distribution pipes, the following dimensions should be observed:



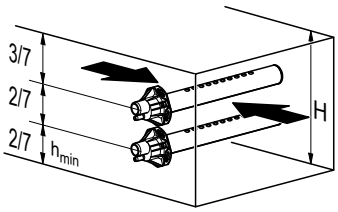

H min.= 250 mm



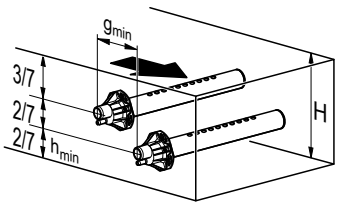

H ≥400 mm



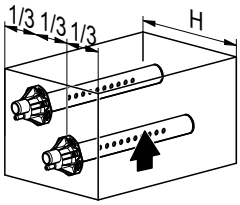

H min.= 200 mm




H min.= 400 mm




H min.= 350 mm




H min.= 300 mm

g min.= 100 mm
h min.= 85 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 humidification 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.

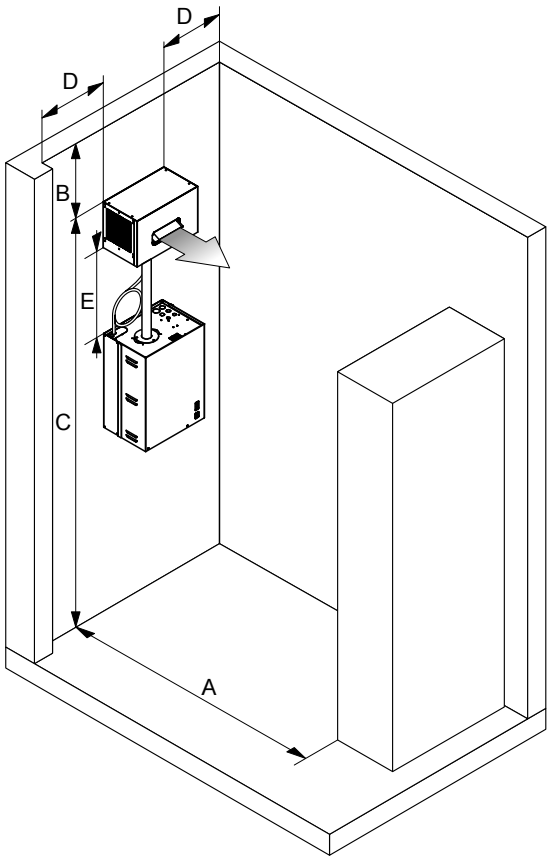
If you have questions relating to the dimensioning of ventilation ducts in combination with steam humidifiers Condair EC, contact your Condair supplier.

## 5.4.3 Installing the steam distributors

Detailed information on the installation of steam distribution pipes 41-.., 61-.../81-... and OptiSorp steam distribution system can be found in the separate mounting instructions for this products.

### 5.4.4 Positioning and mounting of the fan unit

The fan unit is mounted on the wall **separately above the unit**. To allow the steam coming from the fan unit to spread out evenly, without condensing on obstacles (ceilings, joists, pillars, etc.), the following minimum dimensions must be observed when selecting the location for the fan unit.




| | FAN3S M | | FAN3S L | |
|---|---|---|---|---|
| $m_D$ max. | 8 kg/h | 15 kg/h | 32 kg/h | 45 kg/h |
| **A min.** | **4.0 m** | **6.0 m** | **8.0 m** | **10.0 m** |
| **B min.** | **1.0 m** | **1.0 m** | **1.0 m** | **1.5 m** |
| **C min.** | **2.2 m** | **2.2 m** | **2.2 m** | **2.2 m** |
| **D min.** | **1.0 m** | **1.0 m** | **1.0 m** | **1.5 m** |
| **E min.** | **0.15 m** | | | |
| **E max.** (max. steam hose length) | **4.0 m (recommended: 2.0 m)** | | | |

Note: The minimum spaces in the table apply for a room atmosphere of 15 °C and max. 60 %rh. For lower temperatures and/or higher humidity the values should be adjusted accordingly

Note: In order to achieve a uniform distribution of the humidity within the room, additional factors such as the room size, the room height, etc., must be taken into consideration besides observing the minimum distances. If you have questions concerning the direct room humidification, please contact your Condair supplier.

Further information is provided in the separate installation and operating instructions for the fan unit.

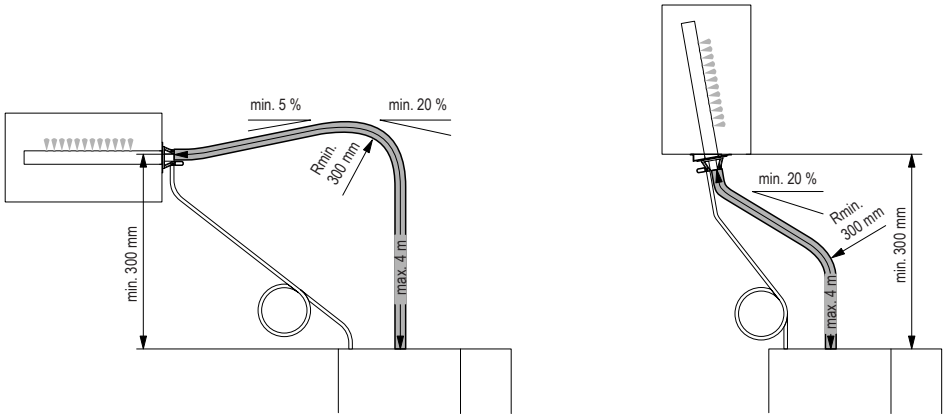
## 5.4.5 Installing the steam hose

**Important!** Use original Condair steam hose exclusively. Other types of steam hoses can cause undesired operational malfunctions.

**Instructions for the hose layout**

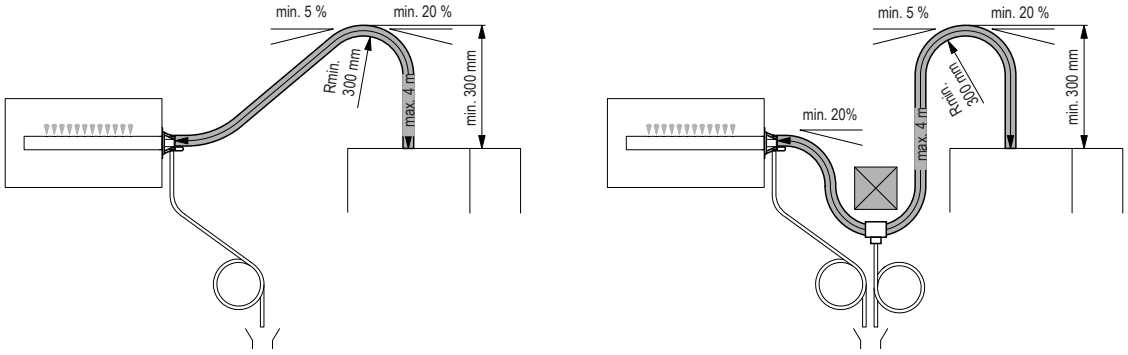
The hose layout depends on the position of the steam distribution pipe:

– Steam distribution pipe is mounted **more than 300 mm above the top edge of the humidifier**:




Initially, lead the steam hose with an **upslope of at least 20% over a minimum height of 300 mm**, then lead the hose with a **minimum upslope of 20%** and/or a **minimum downslope of 5%** to the steam distribution pipe.

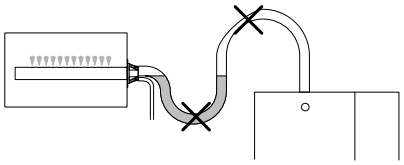
– Steam distribution pipe is mounted **less than 300 mm above the top edge of the humidifier**:




Initially, the steam hose is led with an **upslope of at least 20 % over a minimum height of 300 mm** above the top edge of the humidifier and then down to the steam distribution pipe with a **minimum slope of 5 %**.

– 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 Condair representative. In any case, steam hoses longer than 4 m must be insulated in their entire length.

– Reductions in the cross section such as kinks should be avoided throughout the entire length of the hose. The installation of a stop cock in the steam hose is not permissible.



– Steam hoses must be prevented from sagging (condensate pockets); if necessary, support with pipe clamps, trough, or wall brackets, or install a condensate drain in the steam hose.
– **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 hose**

The steam hose must be secured to the steam distribution pipe and humidifier steam outlet by means of **hose clamps**.
**Caution!** Do not overtighten the hose clamp on the steam connector of the steam humidifier.

**Steam line with fixed piping**

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

– The **minimum internal diameter of 30 mm or 45 mm** respectively should be applied over the whole length of the piping.
– Use exclusively Cu pipe or stainless steel (min. DIN 1.4301).
– To minimize the condensate formation (=loss), the steam pipes must be insulated.
– The **minimum bend radius** for solid pipes is **4-5 x internal diameter**.
– 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. Connection to the steam humidifier is secured via a G 2” coupling.
– **Important!** Allowance must be made for a **pressure loss of 10 mm water column (approx. 100 Pa)** per meter length or per 90° bend.

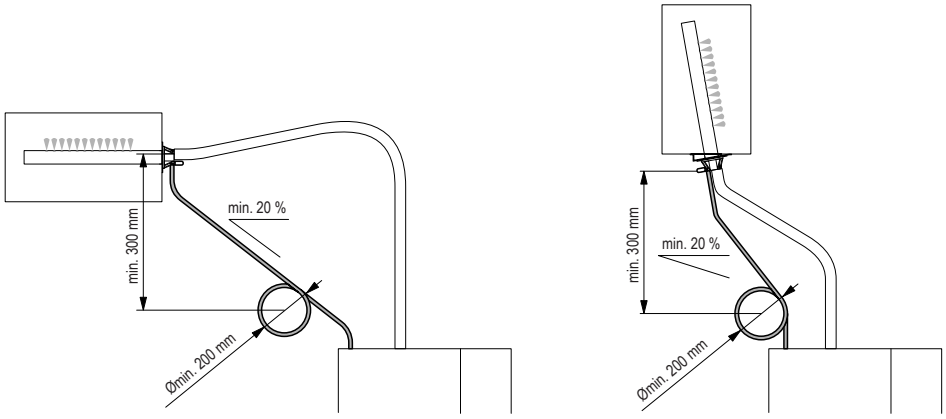
## 5.4.6 Installing the condensate hose

**Important!** Use original Condair condensate hose exclusively. Other types of hoses can cause operational malfunctions.

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

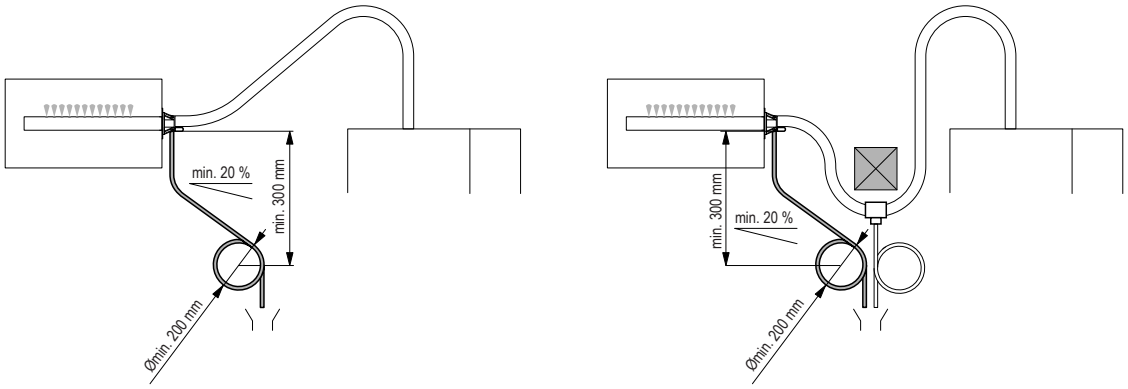
– Steam distribution pipe is mounted **more than 300 mm above the top edge of the humidifier**:

  Condensate hose is led down to the humidifier with a **minimum slope of 20 %**, in the form of a **siphon (min. hose bend diameter Ø200 mm )**, and inserted about 2 cm into the specified opening.



– Steam distribution pipe is mounted **less than 300 mm above the top edge of the humidifier**:

  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.




**Note**: If your unit feeds a number of steam distribution pipes, the individual condensate hoses are to be led into the discharge funnel.

**Important!** Before putting the unit into operation, the siphon of the condensate hose must be filled with water.

### 5.4.7 Inspecting the steam installation

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

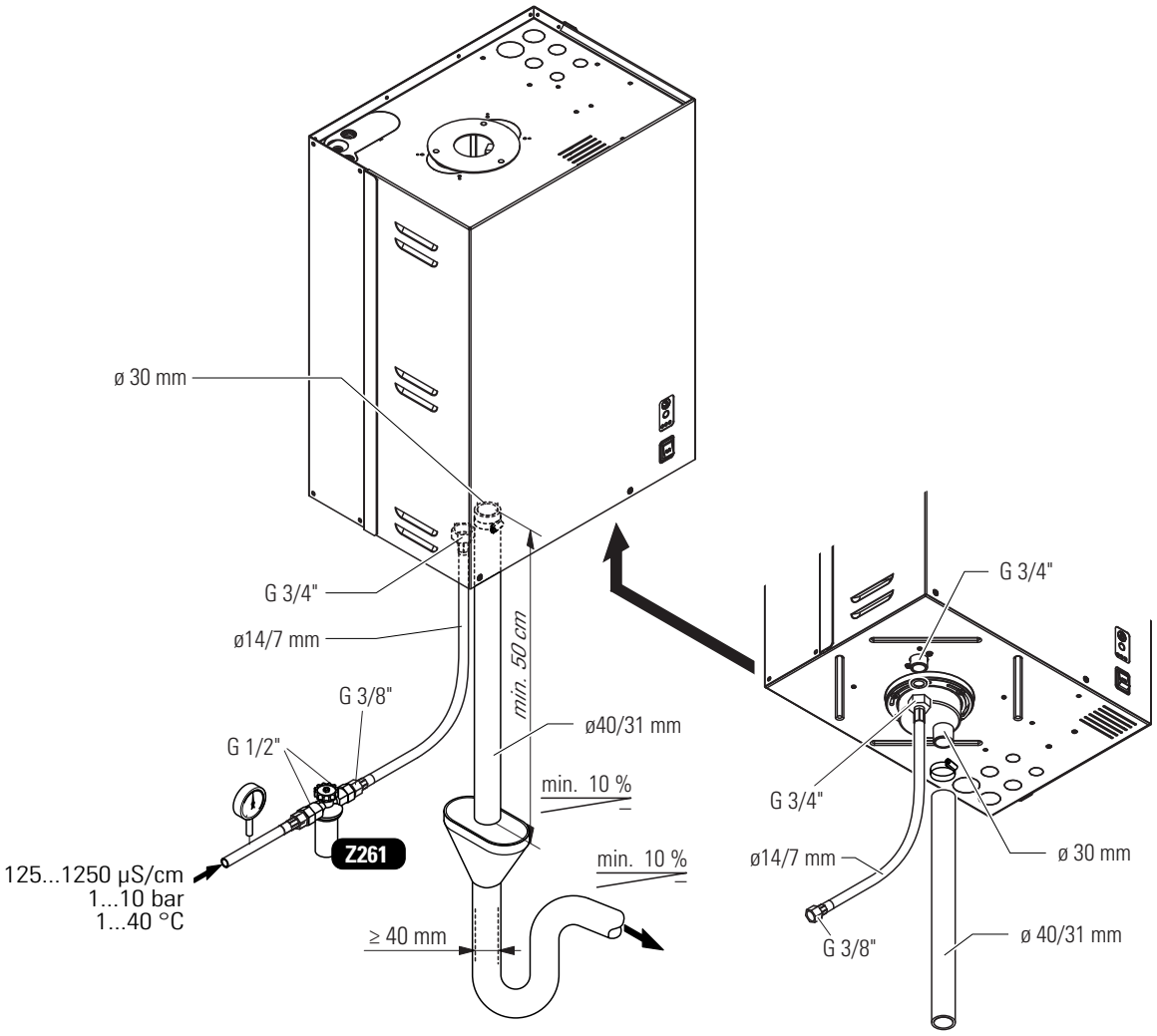
– Steam distribution pipe
  - ☐ Steam distributors (steam distribution pipe or OptiSorp steam distribution system) correctly positioned and secured (screws tightened)?
  - ☐ Are the outlet orifices at right angles to the air flow direction?

– Steam hose
  - ☐ Maximum length of 4 m?
  - ☐ Minimum bend radius of 300 mm (4-5 x internal diameter with fixed piping)?
  - ☐ Have the instructions for hose positioning been followed?
  - ☐ Steam hose: no sagging (condensate pocket) or condensate drain with siphon (hose bend with a minimum diameter of 200 mm) installed at the lowest point?
  - ☐ Rigid steam lines: properly insulated? Correct installation material used? Minimum internal diameter maintained?
  - ☐ Steam hose(s) securely attached with clamps?
  - ☐ Heat expansion during operation and shortening of the hose with ageing taken into consideration?

– Condensate hose
  - ☐ Downslope of at least 20 %?
  - ☐ Siphon (min. ø200 mm) existing and filled with water?
  - ☐ Condensate hose correctly fixed and not kinked?

## 5.5 Water installation

### 5.5.1 Overview water installation



## 5.5.2 Notes on water installation

### Water supply

The water supply is to be carried out according to the figure found in chapter 5.5.1 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 5 µm water filter can be used) should be made as close as possible to the steam humidifier.
- Admissible mains pressure **1.0 to 10.0 bar (hammer-free system)**
  For mains pressures >10 bar, the connection must be made via a pressure reducing valve (adjusted to 1.0 bar). For mains pressures <1.0 bar please contact your Condair supplier.
- **Notes on water quality**:
  - For the water supply of the Condair EC, use exclusively **untreated drinking water**.
  - The use of **additives** such as corrosion inhibitors, disinfectants, etc. is **not allowed**, since these additives may endanger health and affect proper operation.
  - If the Condair EC shall be operated with softened or partly softened water, please contact your Condair supplier.
- The connection material must be **pressure-proof** and **certified for use in drinking water systems**.
- **Important!** Before connecting the water line**, the line should 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 figure found in chapter 5.5.1 and the applicable local regulations for water installations. The indicated connection specifications must be observed.

- Make sure that the drain pipe is correctly fixed and easily accessible for inspections and cleaning purposes.
- The draining temperature is: **80…90 °C**. Use temperature-resistant installation materials only!

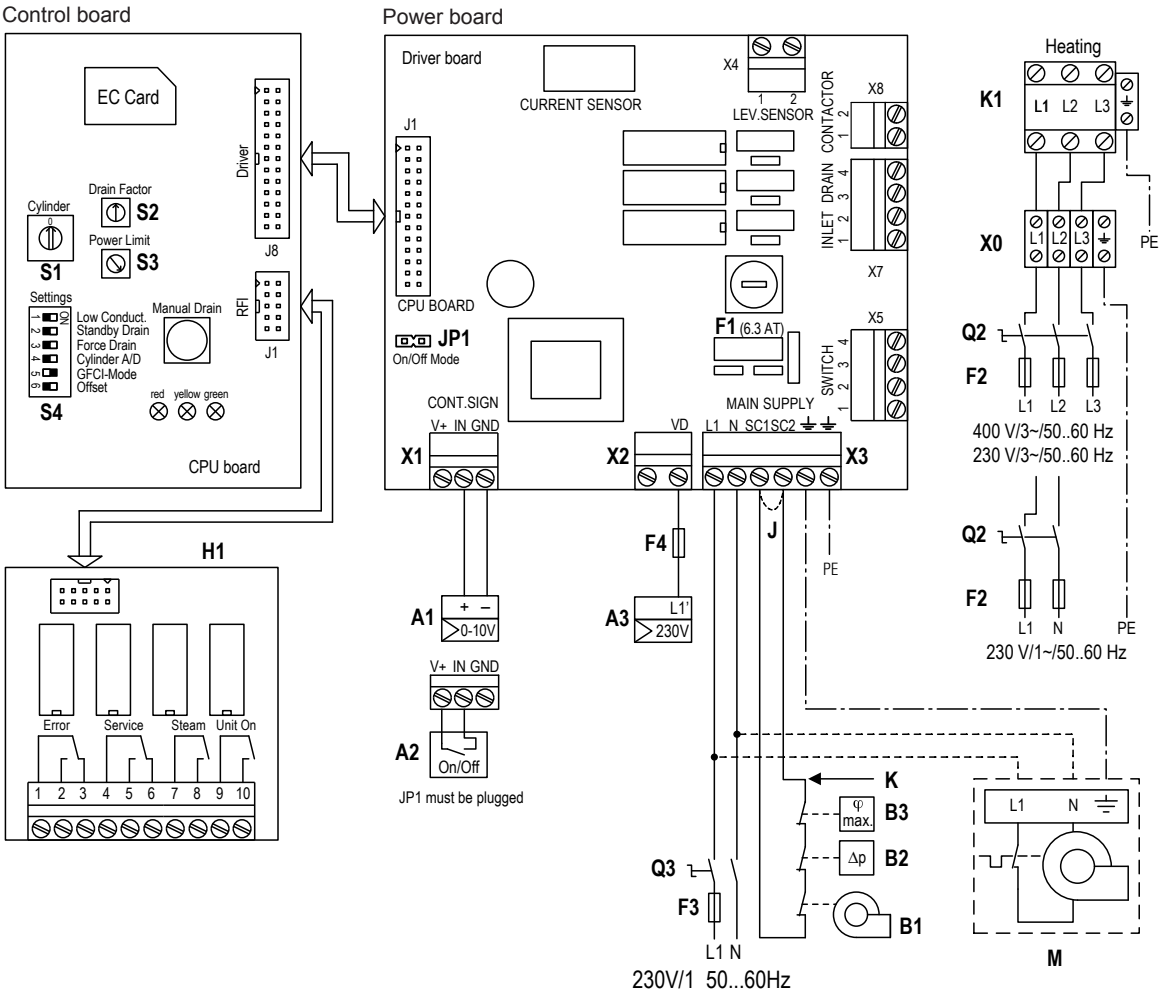
### 5.5.3 Inspecting the water installation

Check the following topics:

– Water supply
  - ☐ Has filter valve (accessory “Z261”) or shut-off valve and 5 µm water filter respectively been installed in supply line?
  - ☐ Have admissible water pressure (1 – 10 bar) and admissible temperature (1 – 40 °C) been observed?
  - ☐ Does the supply capacity match the humidifier and is the minimum inside diameter 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 40 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?
  - ☐ Is the drain hose properly secured (hose clamps at unit connection tightened)?
  - ☐ Does the water drain installation meet the requirements of the local regulations for water installations?

## 5.6 Electric installation

### 5.6.1 Wiring diagram Condair EC




A1 Continuous controller (active 0-10V)
A2 On/Off controller (passive 24VDC), set jumper on JP1
A3 On/Off control (active 230VAC)
B1 Ventilation interlock
B2 Airflow monitor
B3 Safety humidistat
F1 Internal fuse power board (6.3 A, slow acting)
F2 External fuse heating voltage supply
F3 External fuse control voltage supply
F4 External fuse 230V On/Off control
H1 Remote operating and fault indication (option “RFI”)
J Short circuited, if no external monitoring devices are connected
JP1 Jumper On/Off mode
K External safety chain (230V/5A)
K1 Main contactor (for connecting the heating voltage supply to the unit)
M Fan unit FAN3 EC
Q2 External service switch heating voltage supply
Q3 External service switch control voltage supply
S1 Rotary switch "Cylinder type”
S2 Potentiometer “Drain factor”
S3 Potentiometer “Power limitation”
S4 DIP switch “General unit settings”
X0 Connection terminal heating voltage (option THV)
X1 Connection terminal control signal
X2 Connection terminal On/Off control active
X3 Connection terminal control voltage

## 5.6.2 Notes on electric installation

**Important notes**

- The electric installation must be carried out according to the wiring diagram in chapter 5.6.1, the notes on electric installation as well as the applicable local regulations. All information given in the wiring diagram must be followed and observed.
- All cables must be lead into the unit via the cable openings equipped with cable glands (e.g. option “CG-cable gland”). The cable for the heating voltage supply must be lead into the unit from the bottom via the cable opening equipped with the clamp strap. Fix the cable with the clamp strap.
- Make sure the cables do not scrub on any components.
- Maximum cable length and required cross section per wire must be observed.
- The supply voltages must match the respective voltages (heating and control voltage) stated in the wiring diagram.

**Heating voltage supply Up**

**CAUTION!**

Before connecting, ensure that the mains voltage corresponds with the **heating voltage for the unit** (see type plate).

The Condair EC is to be connected to the mains supply in accordance with the wiring diagram, via a **service switch “Q2”** (disconnecting device with a minimum contact opening of 3 mm is an essential requirement) and an **fuse group “F2”** (essential requirement, fuses are to be as detailed in the following table). The supply wiring is to be fed into the unit via a tension-relieving device (cable gland) and connected to the **terminals of the main contactor “K1”**.

| Heating voltage | Max. steam capacity [kg/h] | Condair EC .. | Nominal power [kW] | Nominal current [A] | Main fuses F2 [A] |
|---|---|---|---|---|---|
| **400V3** (400V/3~/50...60Hz) | 5 | **5** | 3.8 | 5.4 | 3x 10 |
| | 8 | **8** | 6.0 | 8.7 | 3x 10 |
| | 15 | **15** | 11.2 | 16.2 | 3x 20 |
| | 23 | **23** | 17.3 | 24.9 | 3x 35 |
| | 32 | **32** | 24.0 | 34.6 | 3x 50 |
| | 45 | **45** | 33.7 | 48.7 | 3x 63 |
| **230V3** (230V/3~/50...60Hz) | 5 | **5** | 3.8 | 9.4 | 3x 20 |
| | 8 | **8** | 6.0 | 15.1 | 3x 20 |
| | 15 | **15** | 11.2 | 28.2 | 3x 40 |
| | 23 | **23** | 17.3 | 43.3 | 3x 63 |
| | 32 | **32** | 22.5 | 56.5 | 3x 63 |
| **230V1** (230V/1~/50...60Hz) | 5 | **5** | 3.8 | 16.3 | 20 |
| | 8 | **8** | 6.0 | 26.1 | 35 |

The cross-section of the mains cable must comply with the applicable local regulations.

### Control voltage supply Uc

**CAUTION!**

- Before connecting, ensure that the mains voltage corresponds with the **control voltage of the unit (230 V/1 50…60 Hz).**
- The humidifier must only be connected to a **mains supply with a protective conductor**.

The connection to the control voltage Uc is made in accordance with the wiring diagram, to the **terminal "X3"** on the power board. The customer is to install a **service switch Q3** in the supply line (all pole disconnecting device with a minimum contact opening of 3 mm) and an **F3 fuse (max. 10 A slow acting) (these** are both essential requirements).

The cross-section of the mains cable must comply with the applicable local regulations (minimum of 1.5 $mm^2$).

### External safety circuit

To guarantee the safety of the humidification system, monitoring the operation by means of a safety circuit is an absolute requirement.

To accomplish this, the **potential-free contacts (max. contact loading 250V/5A)** of external monitoring devices (e.g. safety high limit humidistat, airflow monitor, ventilation interlock, etc.) are **connected in series to the contacts "SC1" and "SC2" of the terminal block "X3"** in accordance with the wiring diagram.

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

The mains voltage is connected to terminal block "X3" (up to 240 V). The steam humidifier must therefore be isolated from the mains supply (heating and control voltage), before starting the connection work.

If, for whatever reason, no external monitoring devices are connected, a connecting bridge "J" must be installed on the contacts "SC1" and "SC2" of the terminal block "X3".

Do not apply any **extraneous voltage** to the terminals.

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

### Remote operating and fault indication H1 (Option "RFI")

The optional remote operating and fault indication PCB is to be connected to the control board via the terminal "J1". The optional remote operating and fault indication PCB contains four potential-free relay contacts for the connection of the following operating and fault indications:

- "Error": This relay is activated if an error is present.
- "Service": This relay is activated when the set service interval has expired.
- "Steam": This relay closes as soon as the unit produces steam.
- "Unit On": This relay closes as soon as the unit is switched on via the main switch.

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

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

Note: The minimum cross section of the supply cable must comply with the local regulations.

**Control signal**

– **External continuous humidity controller 0-10V (A1)**
  An external humidity continuous controller is to be connected to the contacts “IN” (+) and “GND” (–) of the terminal block “X1”.
– **24 VDC On/Off humidistat (passive)**
  An 24 VDC On/Off humidistat is to be connected to the contacts “V+” and “IN” of the terminal block “X1”.
  Note: for the 24 VDC On/Off control a jumper must be set on “JP1”.
– **230V On/Off control (active)**
  The signal line of a 230V On/Off control is to be connected to the contact “VD” of the terminal block “X2” via external fuse “F4” (max. 10 A, slow-acting).

**Connecting the fan unit FAN3 EC**

Refer to the separate documentation of the fan unit.

## 5.6.3 Unit configuration

All setting components for the unit configration are located on the control board:

– Rotary switch “Cylinder”: cylinder type
– Potentiometer “Drain Factor”: drain factor
– Potentiometer “Power Limit”: power limitation
– DIP switch “Settings”: general settings

**Setting the steam cylinder type (“Cylinder”)**

Use the rotary switch “Cylinder” to select the type of steam cylinder used.

| Position | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cylinder type | 342 | 343 | 344 | 363 | 444 | 464 | 544 | 564 | 654 | 674 | 644 | 664 |

**Setting the drain factor**

Use the potentiometer “Drain Factor” to set the drain factor (setting range: 0.5...2.0, factory setting: 1.0).

**Setting the power limitation**

Use the potentiometer “Power Limit” to set the power limitation in % of the maximum capacity (setting range: 30...100%, factory setting: 100%).

**General settings (“Settings”)**

With the DIP switches “Settings” you can set different unit parameters. The unit parameters are preset in the factory and may only be modified by the client after consulting the Condair representative.

| Switch | Factory setting | Description |
|---|---|---|
| 1 | OFF | ON: low water conductivity <125 µS/cm<br>OFF: normal water conductivity ≥125 µS/cm |
| 2 | OFF | ON: standby draining (72 hours) activated<br>OFF: standby draining (72 hours) deactivated |
| 3 | OFF | ON: forced draining (72 hours) activated<br>OFF: forced draining (72 hours) deactivated |
| 4 | OFF | ON: cleanable steam cylinder<br>OFF: replaceable steam cylinder |
| 5 | ON | ON: the heating voltage is interrupted during draining of the steam cylinder<br>OFF: the heating voltage is interrupted during draining and refilling of the steam cylinder |
| 6 | OFF | ON: Offset control signal activated (2-10V)<br>OFF: Offset control signal deactivated (0-10V) |

### 5.6.4 Inserting the EC Card

All important operating parameters such as the maximum steam capacity and the heating voltage are permanently stored on the EC Card.
Before you start the electrical installation, **check whether the EC Card is installed**. If it is not, **check whether the type designation on the EC Card supplied corresponds with the type designation on the data plate inside the unit**. If the designations match, place the EC Card in the card holder on control print . Then cover the data plate above the type plate inside the unit with the data plate supplied (self-adhesive).
If the type designation on the EC Card and the data plate do not match, the EC Card must not be installed. If this is the case, contact your Condair supplier.

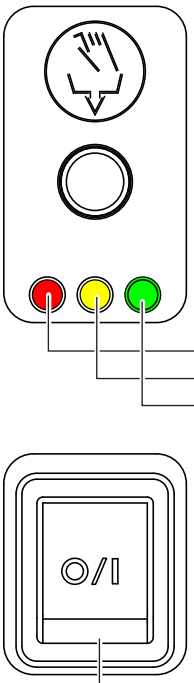
### 5.6.5 Inspecting the electrical installation

Check the following points:

- ☐ Do the supply voltages for heating and control comply with the relevant voltages given in the wiring diagram?
- ☐ Is the correct EC Card inserted?
- ☐ Are the voltage supplies (heating and control voltage) correctly fused?
- ☐ Is the service switch “Q..” installed in the supply line for to the heating and control voltage?
- ☐ 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 front panel mounted and correctly fixed with the two screws?

# 6 Operation

## 6.1 Function of the display and operating elements




**Drain/Info key**

– press key **shortly**: Opens and closes the drain valve (manual draining).
Note: the drain valve is automatically closed after 10 minutes.
– press key for a **extended period of time (>3 sec.)**: activating the info mode

**red LED “Error”**

– in normal operating mode
  – The LED lights in case of a malfunction of the unit. Further **operation is no longer possible**, the heating voltage is interrupted.
  – The LED flashes alternately with the green LED if the external safety chain (ventilation interlock, safety humidistat, etc.) is open.
– in info mode
LED flashes in intervals if a malfunction is present. The number of “flashes” per interval indicates the left digit of the error code.

**yellow LED “Warning and info indication”**

– in normal operating mode
The LED lights if the cylinder maintenance is due (see chapter 7) or the maintenance indication is not reset after the maintenance (see chapter 7.6).
– in info mode
LED flashes in intervals if a malfunction is present. The number of “flashes” per interval indicates the right digit of the error code.

**green LED “Steam”**

– in normal operating mode
  – The LED lights if the unit produces steam.
  – The LED flashes alternately with the red LED if the external safety chain (ventilation interlock, safety humidistat, etc.) is open.
– in info mode
LED flashes in intervals. The number of “flashes” per interval multiplied by 10 indicates the current steam output in %.

**Unit switch**

Switches the unit on and off. The switch is illuminated when the unit is switched on.

## 6.2 Commissioning

Proceed as follows when putting the unit into operation:

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

**DANGER!**

Damaged devices or devices with damaged installation may present danger to human life or cause severe damage to material assets.
**Damaged units and/or units with damaged or faulty installation must not be operated.**

2. Check whether the front panel is mounted and fixed with the two screws.
3. Open the shut-off valve in the water supply line.
4. Verify the set humidity value at the humidity controller or at the humidistat, and readjust as required.
5. **Switch on the service switches** for mains supplies (heating and control voltage).
6. **Actuate the unit switch** of the steam humidifier.

The steam humidifier carries out a **system test**, during which all the LEDs light up.

If, after the system test:
– **the yellow LED lights permanently**, the steam cylinder maintenance is due (see chapter 7) or the maintenance indication has not been reset (see chapter 7.6).
– **the red LED lights permanently**, a fatal malfunction has occurred (see chapter 8).

After the system test the unit is in normal operation mode.

As soon as the humidity controller or the humidistat requires humidity, power is switched on for heating. The inlet valve opens (slight delay) and the steam cylinder fills with water. As soon as the submerged electrodes heat the water up the green LED lights up and after a few minutes (approx. 5–10 minutes, depending on the conductivity of the water) steam is produced.
Note: If the Condair EC is operated with water of low conductivity it may happen that the maximum steam capacity is not reached in the first few hours of operation. This is normal. As soon as the conductivity has reached a sufficient level (due to the vaporisation process) the humidifier will reach the maximum steam capacity.

## 6.3 Notes on operation

### 6.3.1 Function of the LED's in info mode

The info mode is activated by pressing the drain/info key for an extended period of time (> 3 seconds). After activating the info mode:

– first, the green LED flashes. The number of flashes indicates the current steam output in % of the maximum steam capacity.

| | Green LED flashing ... | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1x | 2x | 3x | 4x | 5x | 6x | 7x | 8x | 9x | 10x |
| Steam output in % | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

Note: if no steam production is in progress when the info mode is activated the green LED lights for 3 seconds, then it turns off again.

– then, if a malfunction is present (warning or error) the red and the yellow LED flash successively. The number of flashes of the red LED indicates the left digit of the error code while the number of flashes of the yellow LED indicates the right digit of the error code.
Note: If the red LED lights when the info mode is activated the malfunction indicated is an error (E..) otherwise a warning (W..).

This indication procedure is repeated until the info mode is exited automatically after 5 minutes or the info mode is exited by pressing the drain/Info key again.

Examples:

| | | | | | |
|---|---|---|---|---|---|
| Indication in normal operating mode | green LED lights | no | yes | yes | no |
| | red LED lights | no | no | no | yes |
| Indication in info mode | green LED flashes .. | — | 5x | 5x | — |
| | red LED flashes .. | — | — | 3x | 2x |
| | yellow LED flashes .. | — | — | 6x | 1x |
| **Steam output** | | **0 %** | **50 %** | **50%** | **0 %** |
| **Error code** | | **—** | **—** | **W36** | **E21** |

### 6.3.2 Remote operating and fault indication

If your unit is equipped with the optional operating and fault indication “RFI” the following operating status are shown remotely:

| **Activated remote indication relay** | **When?** | **Display on unit** |
|---|---|---|
| **“Error”** | A malfunction is present, further operation is not possible, the heating voltage is interrupted | Red LED lights |
| **“Service”** | Steam cylinder maintenance is due. The unit remains operational for a certain time | Yellow LED lights |
| **“Steam demand”** | Steam demand/Steam production | Green LED lights |
| **“Unit on”** | Unit switched on | Unit switch lights |

### 6.3.3 Inspections during operation

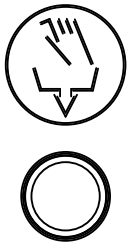
During operation the Condair EC and the humidification system have to be inspected weekly. On this occasion check the following:

- the water and steam installation for any leakage.
- the steam humidifier and the other system components for correct fixing and any damage.
- the electric installation for any damage.

If the inspection reveals any irregularities (e.g. leakage, error indication) or any damaged components take the Condair EC out of operation as described in chapter 6.5. Then, contact your Condair representative.

## 6.4 Carrying out manual draining

Proceed as follows to drain the unit manually:



1. **Briefly press the drain/info key**. The heating voltage is interrupted and the drain valve opens. The **yellow LED flashes**.
   Note: the drain valve closes after 10 minutes automatically
2. To stop the drain cycle b**riefly press the drain/info key again**.

## 6.5 Taking the unit out of operation

In order to take the steam humidifier out of operation, perform the following steps:

1. If the unit has to be switched off because of a malfunction, please note the error code (number of flashes of the red and yellow LED) of the actual error message shown in the display.
2. Close the shut-off valve in the water supply line.
3. Start manual draining (see chapter 6.4) and wait until the steam cylinder is empty.
4. **Actuate the unit switch.**
5. **Disconnect steam humidifier from the mains**: Switch off all service switches to mains supplies (heating and control voltage) and secure switches in “off” position against accidentally being switched on, or clearly mark the switches.
6. If **ambient temperatures ≤ 0°C** must be expected when the unit is out of operation (operation of the Condair **EC** in a protective housing outside the building): drain the water supply pipe and the water filter (filter valve).

**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 cylinder cool down to prevent danger of burning.

# 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 electrical shock!**

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 EC out of operation as described in chapter 6.5 (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).

## 7.2 Maintenance list

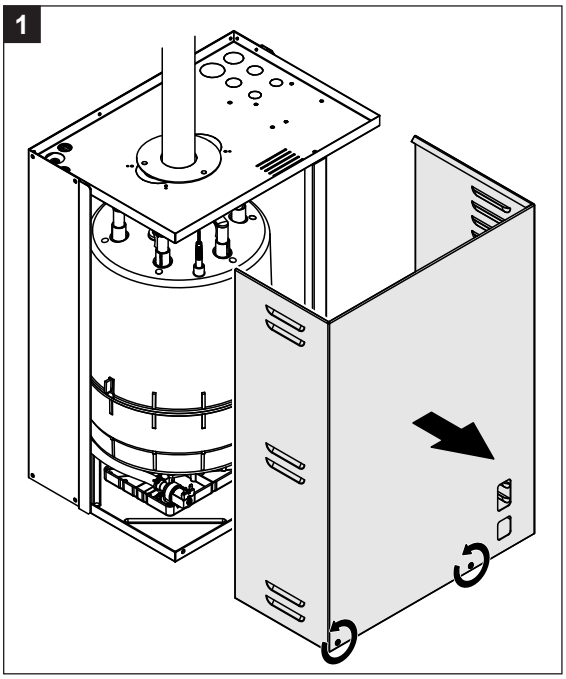
To maintain operational safety the Condair EC steam humidifier must be maintained at regular intervals. This is differentiated between the f**irst maintenance after approx. 500 operating hours (I)**, **steam cylinder maintenance after the yellow LED lights (II)** and **annual maintenance (III)**.

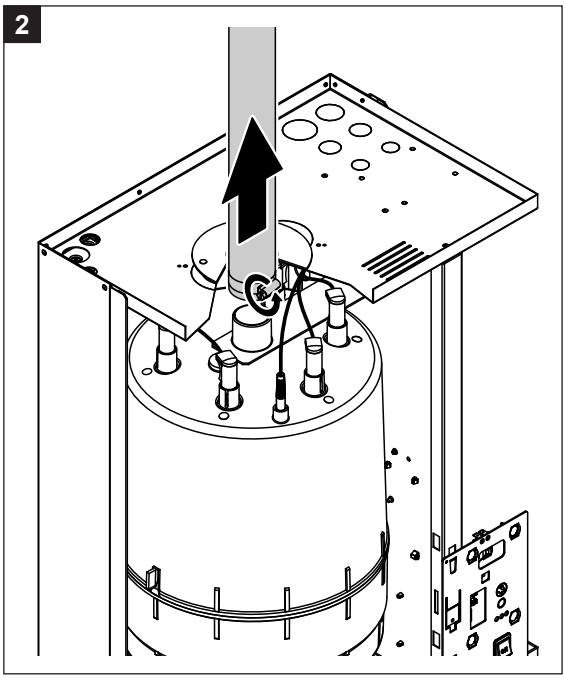
Below you will find a summary of the work to be carried out for each of the three maintenance stages.

| **Components** | **Interval** | | | **Work to be done** |
|---|---|---|---|---|
| | **I** | **II** | **III** | |
| Cleanable steam cylinder Type D.. | X | X | X | Clean steam cylinder and electrodes and check for damage, replace if necessary. Note: The steam cylinder must be replaced after a maximum operating time of 5,000 h. |
| Electrode plug | X | X | X | Check to see firmly positioned (remove cover and tighten fixing screw with hexagonal head socket wrench).<br>Warning! This work should only be carried out by an electrician. |
| Replacement steam cyl. type A.. | | X | | Remove and replace. |
| Drain valve | | | X | Remove, disassemble and clean, replace if necessary. |
| Steam cylinder receptacle | | | X | Inspect, clean if necessary. |
| Inlet valve | | | X | Remove and clean filter insert, replace if necessary. |
| Drain cup | | | X | Remove and clean if necessary. |
| Drain pipe and siphon | | | X | Inspect, clean if necessary (decalcify and rinse out). |
| Steam installation | X | | X | Inspect steam and condensate hoses for cracks and to see that they are correctly attached, replace faulty hoses. |
| Water installation | X | | X | Inspect water hoses in the unit for cracks and to see that they are correctly attached, replace faulty hoses<br>Check supply pipe is tight, make tight if necessary.<br>Clean water filter, if available. |
| Electrical installation | X | | X | Check all cables in the unit are firmly positioned and examine status of insulation. |

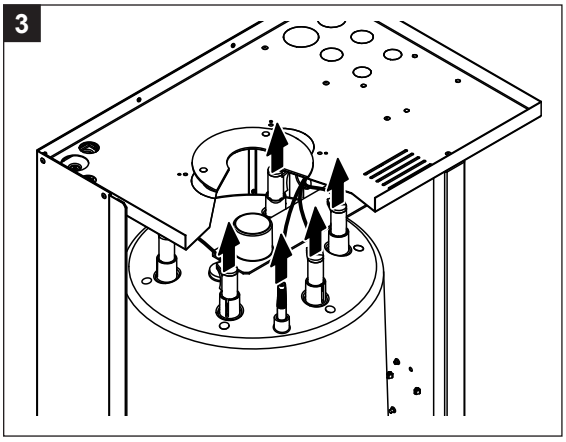
## 7.3 Removing and installing parts for maintenance

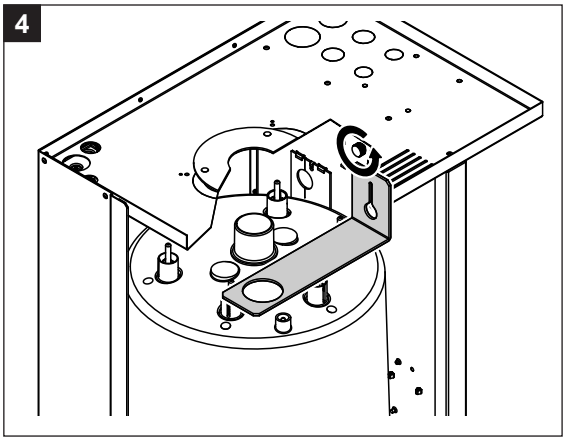
### 7.3.1 Removal and installation of the steam cylinder



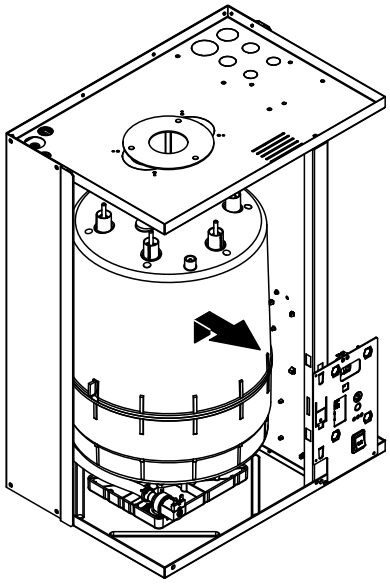

1. Use a screwdriver to undo the two screws fixing the front panel to the unit, then remove the front panel.
2. Release the hose clamp on the steam hose using a screwdriver, then detach the steam hose from the steam outlet connection of the steam cylinder.




3. Remove all plugs from the electrodes and from the level sensor.
4. Loosen the screw of the steam cylinder fixing device by a few turns, then push the fixing device upwards until it comes loose and remove it.

**5**



5. Carefully lift steam cylinder away from the cylinder receptacle, then remove it to the front.

**CAUTION!**

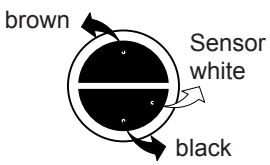
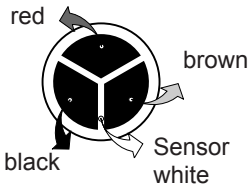
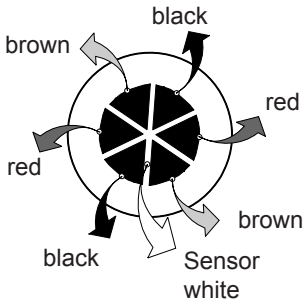
Put steam cylinder down carefully to avoid damage to the lower connection piece!

**Installation** of the steam cylinder follows the reverse sequence. **Observe the following**:

– Before installing the steam cylinder in the unit, check the O-ring of the cylinder receptacle for damage and replace if necessary.

– Moisten the O-ring of the cylinder receptacle with water (do not use grease or oil), then insert steam cylinder into the receptacle and push it down to the stop.

– Attach the electrode plugs and the level sensor plug to the respective electrode and sensor connections according to the following table.

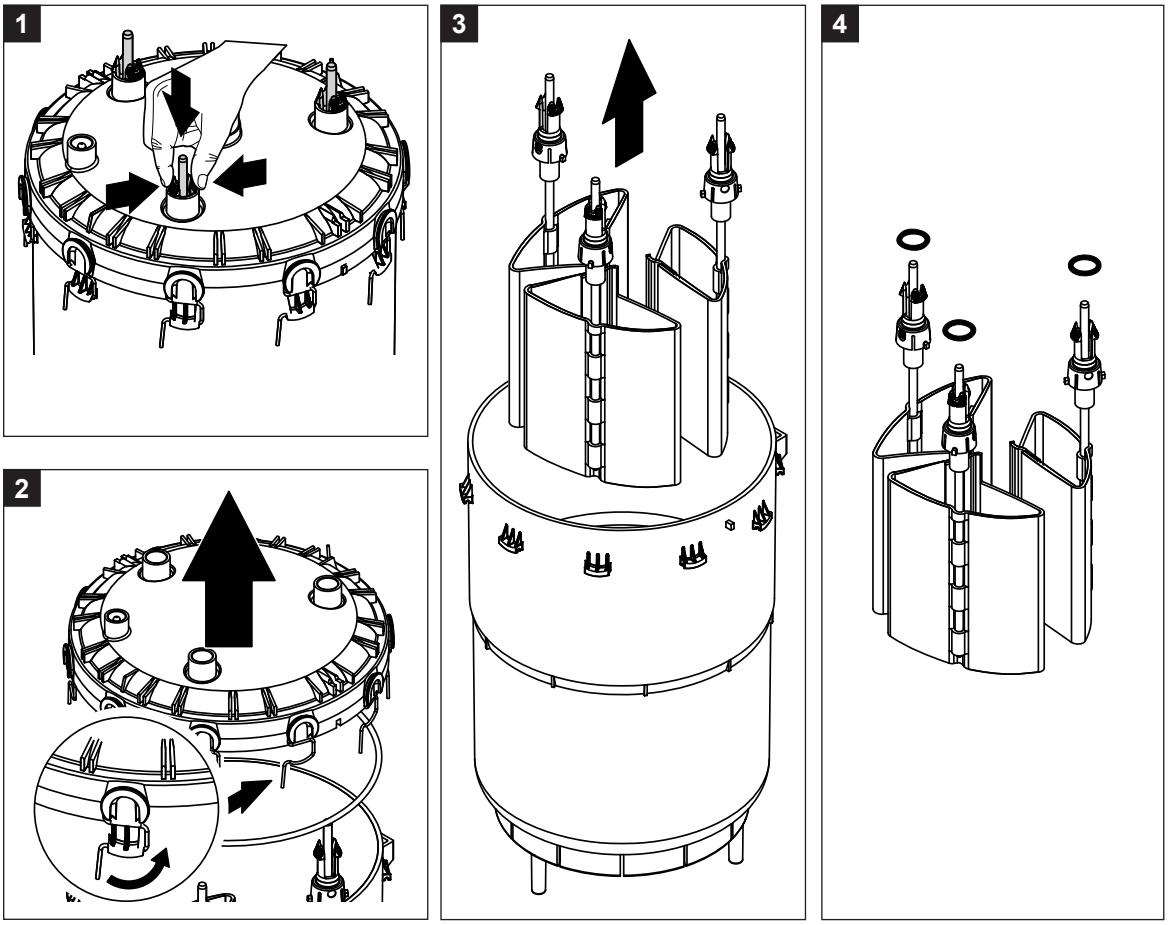
| Steam cylinder type | | |
|---|---|---|
| **A342 / D342** | **A343 / D343**<br>**A363 / D363**<br>**A444 / D444**<br>**A464 / D464** | **A654 / D654**<br>**A644 / D644**<br>**A664 / D664**<br>**A674 / D674** |
|  |  |  |

– Fasten steam hose on the connector of the steam cylinder with hose clamps.

**CAUTION!**

– A leaky steam hose can cause damage due to moisture inside the unit.
– The outlet connector of the steam cylinder is made of plastic. **Do not overtighten** the hose clamp on the steam connector of the steam cylinder.

### 7.3.2 Disassembly and assembly of the cleanable steam cylinder type D...




1. Fasten electrode snap fastenings and push electrodes approx. 2 cm downwards into the steam cylinder.
2. Release clamp clips of the cylinder cover and raise cover.
3. Remove carefully electrodes by lifting upwards.
4. Remove O-rings from the electrodes.
   Note: Intact O-rings can be reused.

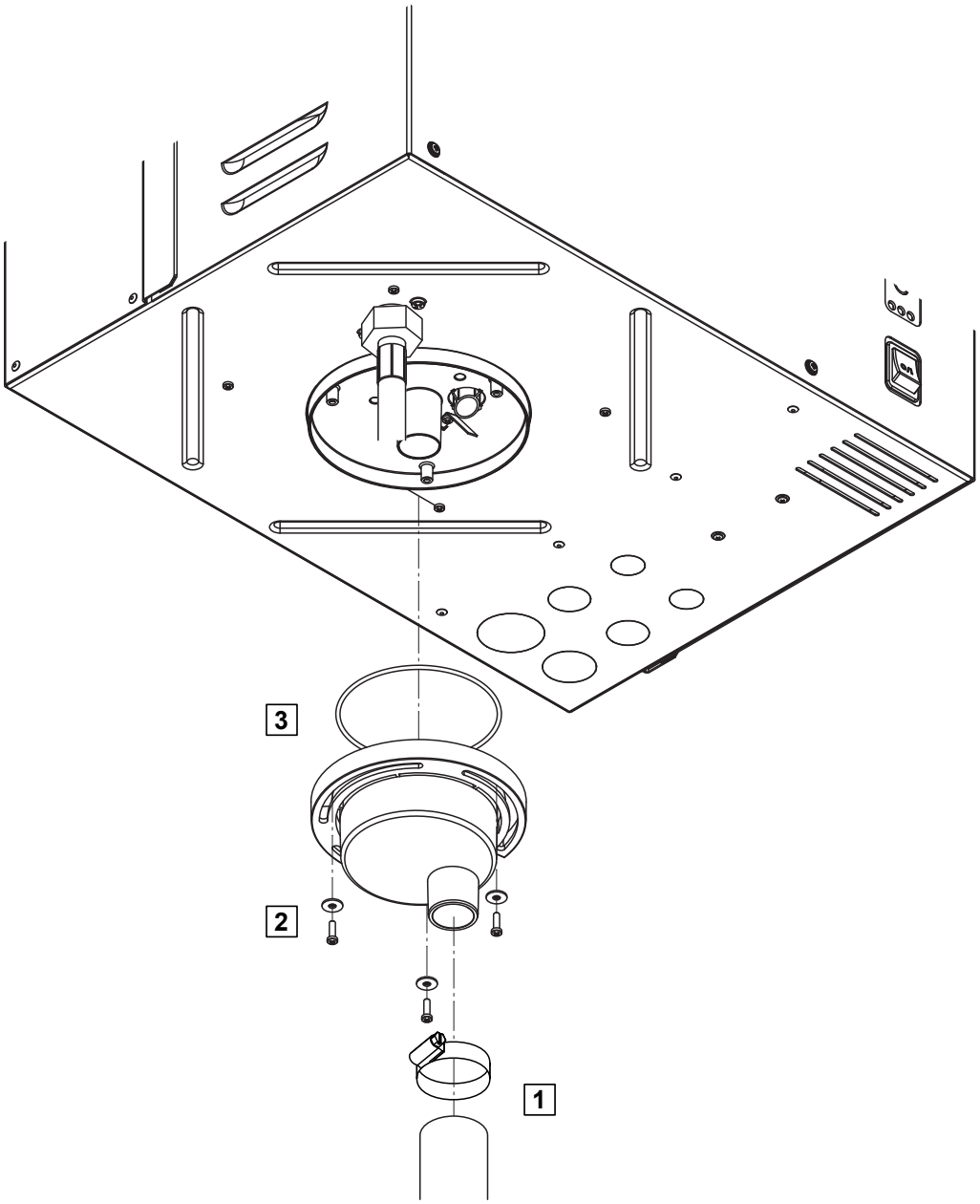
The **assembly** of the cleanable steam cylinder follows the reverse sequence. **Observe the following**:

– Before assembling the steam cylinder, check the O-ring in the steam cylinder cover and the O-rings on the electrodes for damage, and replace if necessary. Make sure to relocate O-rings correctly.

– Insert electrodes into steam cylinder cover and push them upwards until the snap fasteners engage.

– Place the cylinder cover (with mounted O-ring) in the correct position (align the two cams on the steam cylinder body with the corresponding grooves in the cylinder cover) on the cylinder body and secure cover with the fastening clips.

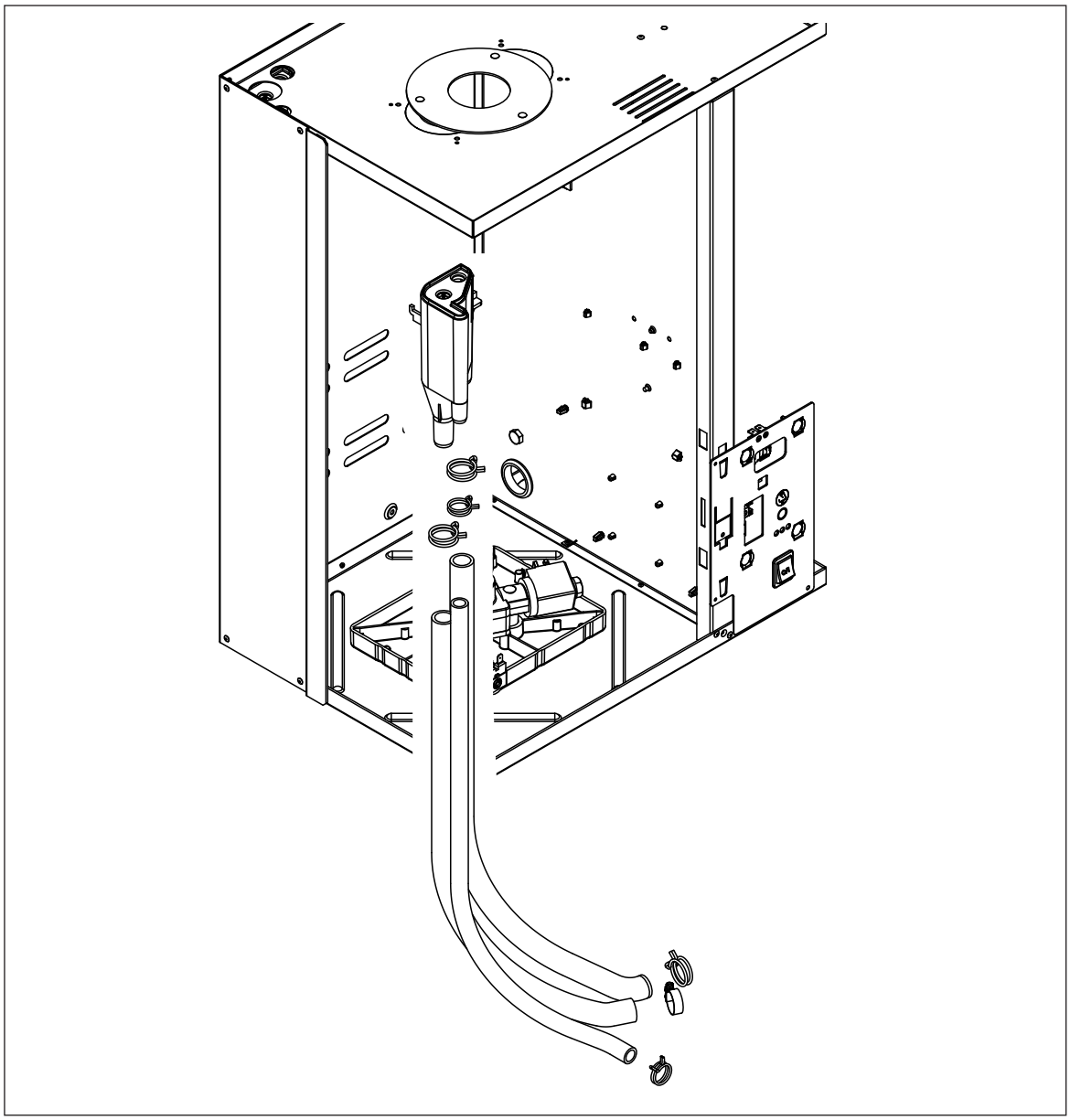
### 7.3.3 Removal and installation of the drain cup




1. Release the hose clamp, then remove water drain hose from the connector on the water cup.
2. Undo the three screws fixing the drain cup to the unit using a screwdriver, then remove the drain cup downwards.
3. Remove O-ring from the annular groove of the drain cup.

**Installation** of the drain cup follows the reverse sequence. Before assembling check O-ring of the drain cup for damage and replace if necessary.

### 7.3.4 Removal and installation of the water cup and the water hoses

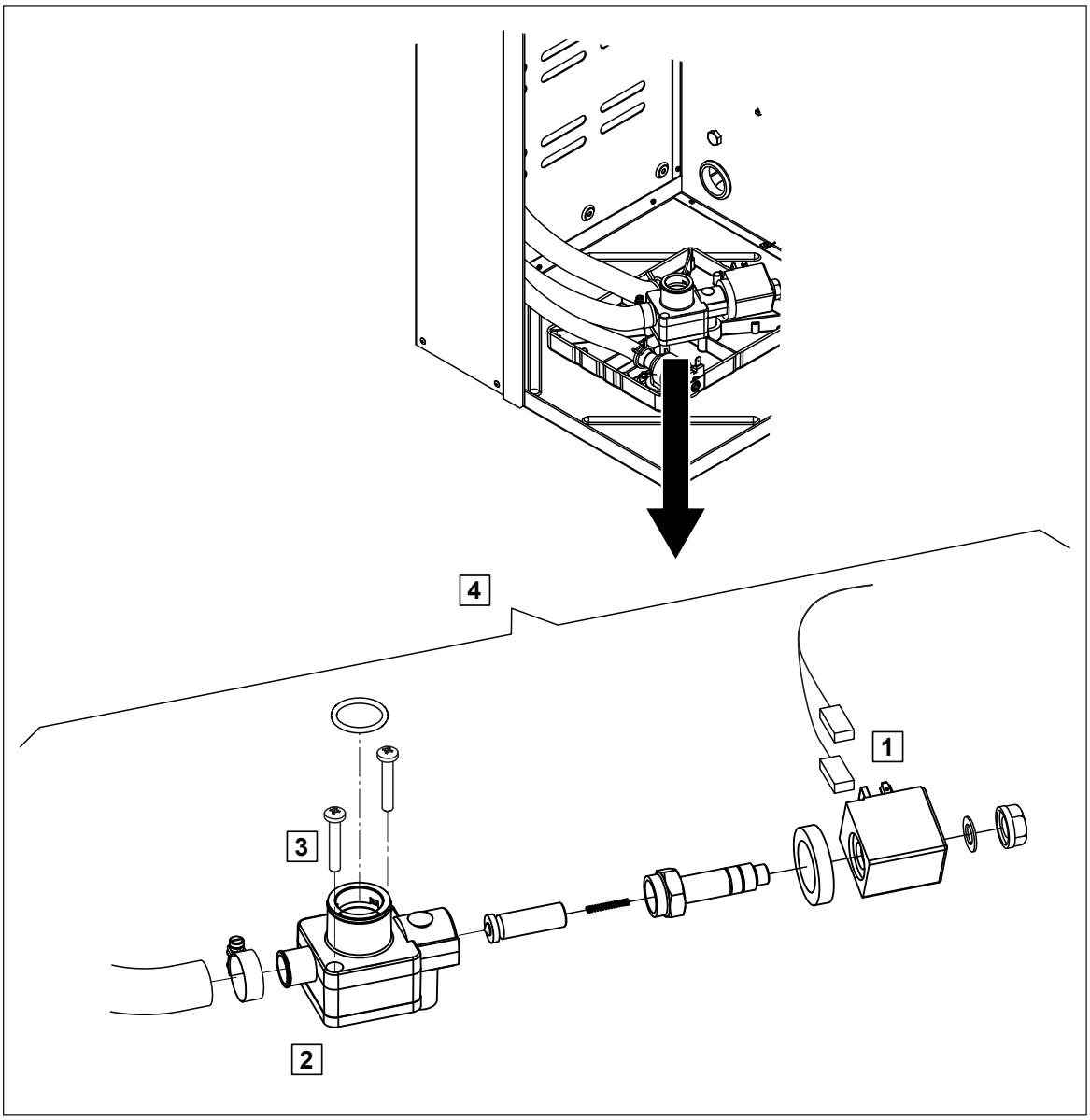


For removing the water cup and the water hoses the steam cylinder must be removed first (see chapter 7.3.1).

1. Release hose clamps, then disconnect all hoses from the corresponding connectors and remove the hoses.
   Note: The hoses connected to the water cup may also be removed together with the water cup (see illustration) and then disconnected from the connectors of the water cup outside the unit.
2. **Carefully** pull fixing clip of the water cup to the front, then push water cup down from the holding device and remove it to the front.

The **installation** of the water cup and the water hoses follows the reverse sequence. Before fixing the water hoses to the connector using the hose clamps, align the hoses in a way that they are not twisted.

### 7.3.5 Removal and installation of the drain valve

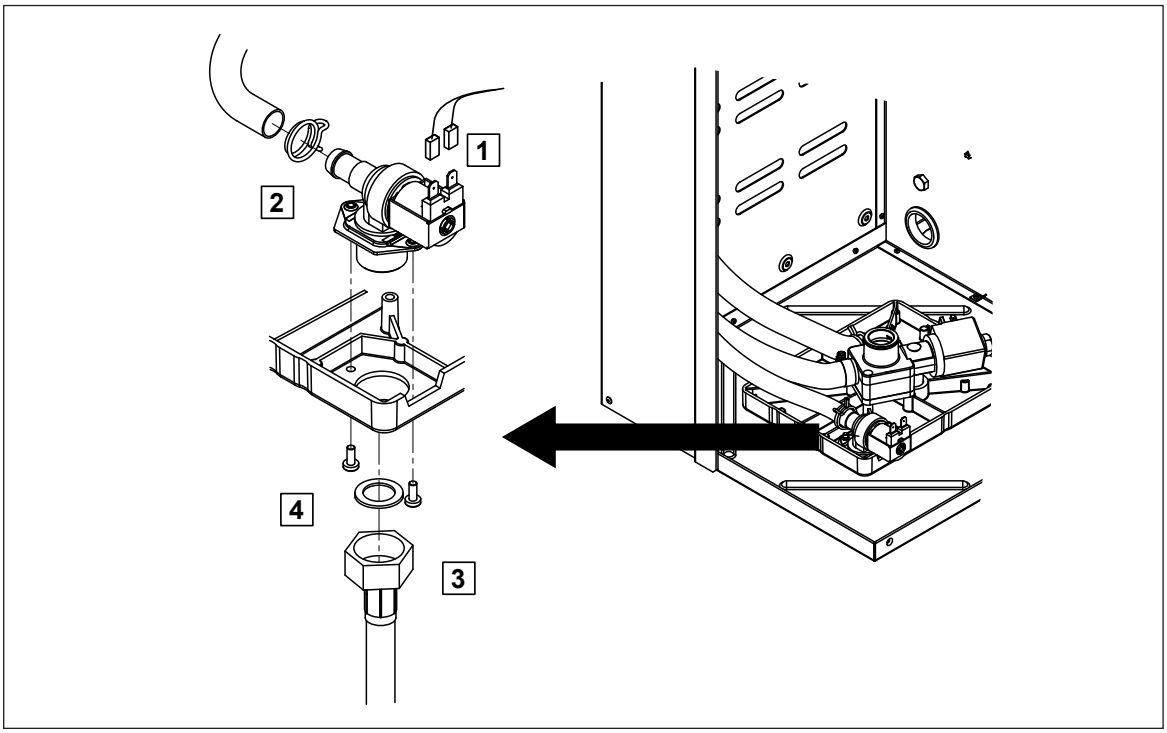



For removing the drain valve the steam cylinder must be removed first (see chapter 7.3.1).

1. Detach electric cables (polarity of the cables must not be observed).
2. Release hose clamp and remove the hose from the connector.
3. Loosen the two screws with Phillips screwdriver, then remove the drain valve.
4. Disassemble the drain valve.

The **assembly** and the **installation** of the drain valve follows the reverse sequence. Before assembling the valve, check O-ring for damage and replace if necessary.

### 7.3.6 Removal and installation of the inlet valve

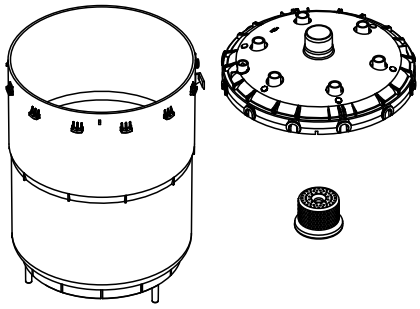
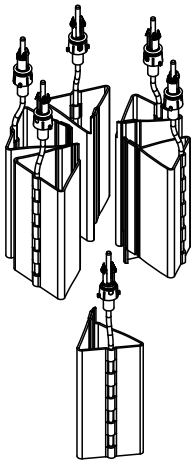
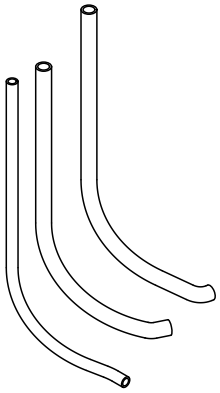
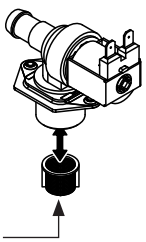


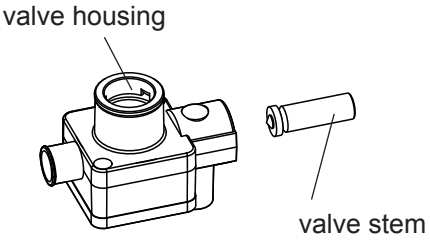
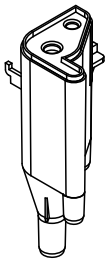
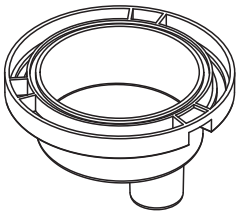

For removing the inlet valve the steam cylinder must be removed first (see chapter 7.3.1).

1. Detach electric cables (polarity of the cables must not be observed).
2. Release hose clamp and remove the hose from the connector.
3. Unlock union nut of the water pipe and remove water pipe.
4. Loosen the two screws with Phillips screwdriver, then remove inlet valve.

The **installation** of the inlet valve follows the reverse sequence. The union nut of the water pipe must be tightened by hand only.

## 7.4 Notes on cleaning the unit components

| Unit component | What to clean and how to clean |
|---|---|
| **Steam cylinder cover**<br>**Steam cylinder body**<br>**Cylinder strainer**<br>  | • Knock off or brush away any limescale as much as possible (do not use a wire brush).<br>If the parts are heavily calcified, place them in an 8% formic acid solution (**observe safety notes in chapter 7.5**), until the limescale comes off.<br>• Finally wash parts in a lukewarm soap solution and rinse well with tap water. |
| **Heating electrodes**<br>  | • Immerse the heating electrodes (up to 2 cm below the snap fastening) in a container with 8-percent formic acid (**observe safety notes in chapter 7.5**). Allow the acid to take effect until the limescale has dissolved.<br>Note: The heating elements do not have to be entirely free from scale.<br>• Finally rinse the heating electrodes well with tap water and let them dry.<br><br>**CAUTION**: On no account remove limescale from the heating electrodes using tools (screwdriver, scraper, etc.) or by striking. This could damage the heating elements! |
| **Water hoses**<br>  | • Remove any limescale by slightly knocking on the tubes using a rubber hammer. Then, rinse the tubes well with hot tap water. |
| **Inlet valve**<br>  <br>strainer insert | • Remove strainer insert with pointed pliers. Use a brush (do not use a wire brush) to remove any limescale.<br>• Wash strainer insert with a lukewarm soap solution, then rinse well with tap water.<br>**Let the inlet valve dry before reinstallation!** |

| Unit component | What to clean and how to clean |
|---|---|
| **Drain valve**<br>  | • Use a brush to remove any limscale from the valve housing, the bores and the valve seat on the valve stem (do not use a wire brush).<br>• Wash the valve housing and the valve stem with a lukewarm soap solution, rinse the parts well with tap water and let them dry. |
| **Water cup**<br>  | • Remove any limscale from the water cup and its connectors using a brush (do not use a wire brush).<br>• Wash the water cup with a lukewarm soap solution and rinse well with tap water. |
| **Drain cup**<br>  | • Use a brush to remove any limscale from the drain cup and the receptacle on the bottom side of the unit (do not use a wire brush).<br>If the drain cup is heavily calcified, place it in an 8% formic acid solution (**observe safety notes in chapter 7.5**), until the limescale comes off.<br>• Wash the drain cup and the receptacle on the bottom side of the unit with a lukewarm soap solution, rinse the parts well with tap water. |
| **Interior of the unit (water side only)** | Wipe the interior of the unit with a damp cloth without using any cleaning agent.<br>**CAUTION**: Take care that the electrical connections and the electronic components remain dry! |

## 7.5 Notes on cleaning agents

**Only use cleaning agents stated in the table above**. 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 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 Resetting the maintenance indication

After completing maintenance work, the **maintenance indication** (yellow LED lights) must be reset as follows:

- Press drain key **with the unit switched off** and hold down.
- Switch on steam humidifier via the unit switch.
- Hold drain key down until the system test is completed (approx. 10 seconds).

# 8 Fault elimination

**Important!** 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.

## 8.1 Fault indication

In case of malfunction during operation, the unit control checks whether there is a temporary problem or whether it can resolve the problem by taking necessary measures. Such malfunctions are not indicated in the normal operation mode. However an appropriate **error code with the status "Warning"** is generated.
Note: If the cause of the malfunction disappears of its own accord or if the controls can repair the malfunction, the alarm will automatically reset.

If the control, after several attempts, fails to solve the problem (number of attempts depends on the type of malfunction) or if the problem obstructs further operation, the heating voltage is interrupted via the main contactor. The **red LED lights in normal operation mode** and an appropriate **error code with the status "Error"** is generated.

**The error code can be queried in the info mode**. **Press drain/info key at least 3 seconds** to enter the info mode. In the info mode the number of flashes of the red LED indicates the decade of the error code while the number of flashes of the yellow LED indicates the digit of the error code (refer to chapter 6.3.1 for further information regarding the info mode).

Examples:

| | | | | | |
|---|---|---|---|---|---|
| Normal operation mode | red LED lights | yes | no | yes | yes |
| Info mode | red LED flashes .. | — | 2x | 2x | 3x |
| | yellow LED flashes .. | 2x | 1x | 1x | 7x |
| **Error code** | | **E2** | **W21** | **E21** | **E37** |

## 8.2 Malfunction lists

### 8.2.1 System faults

| Warning | | Error | | Cause | Remedy |
|---|---|---|---|---|---|
| Code | Malfunction | Code | Malfunction | | |
| | | **E1** | **EC Card missing** | No EC Card installed on the control board. | Install EC Card or start test run. |
| — | — | **E2** | **EC Card is empty** | No data stored on the EC Card. | Install new EC Card. |
| — | — | **E2** | **EC Card is defective** | Invalid data stored on the EC Card. | Install new EC Card. |
| — | — | **E2** | **EC Card is incompatible** | The installed EC Card is not compatible with the hardware of the unit or with the basic settings of the control electronics. | Install correct EC Card. Let your Condair service technician adjust the basic settings. |
| — | — | **E10** | **Hardware fault** | Control board defective. | Replace control board. |

### 8.2.2 Unit faults

| Warning | | Error | | Cause | Remedy |
|---|---|---|---|---|---|
| Code | Malfunction | Code | Malfunction | | |
| **W20** | **External safety chain is open** | — | — | Ventilation interlock open. | If applicable, check/turn on ventilation system. |
| | | | | Air flow monitor triggered. | Check ventilator/filter of the ventilation system. |
| | | | | Safety humidistat triggered. | Wait. If applicable, check safety humidistat |
| **W21** | **Max. filling level of steam cylinder reached** | **E21** | **Max. filling level of steam cylinder reached but no heating current** | Water conductivity too low (after initial operation). | Wait until the mineral content of the cylinder has increased |
| | | | | Water conductivity too low for type of steam cylinder. | Select correct steam cylinder type. |
| | | | | Phase failure heating voltage. | Check service switch in the mains supply line and switch on if applicable. Check mains fuse(s) and replace if applicable. |
| **W22** | **Permissible filling time exceeded (20 minutes)** | **E22** | **Permissible filling time exceeded (more than 4 hours)** | Water supply obstructed/shut-off valve closed/water pressure too low. | Inspect water supply (filter, water piping, etc.), check/open shut-off valve, check water pressure. |
| | | | | Inlet valve blocked or defective. | Inspect strainer insert in the inlet valve, if applicable clean strainer insert or replace inlet valve. |
| | | | | Excessive back pressure in the steam line (duct pressure too high, steam line too long or kinked), causing water loss via filling cup. | Check duct pressure, inspect steam installation. If applicable install pressure compensation kit (see options). |
| | | | | Leakage in the water system. | Inspect water system and seal if necessary. |

| Warning | | Error | | Cause | Remedy |
|---|---|---|---|---|---|
| Code | Malfunction | Code | Malfunction | | |
| **W23** | **No electrode current for more than 20 minutes** | **E23** | **No electrode current for more than 4 hours** | Phase failure heating voltage. | Inspect/turn on service switch of the mains supply line. Inspect the fuses of the mains supply, replace if necessary. |
| | | | | Water supply obstructed/shut-off valve closed/water pressure too low. | Inspect water supply (filter, water piping, etc.), check/open shut-off valve, check water pressure. |
| | | | | Inlet valve blocked or defective. | Inspect strainer insert of the inlet valve, if applicable clean strainer insert or replace inlet valve. |
| | | | | Excessive back pressure in the steam line (duct pressure too high, steam line too long or kinked), causing water loss via filling cup. | Check duct pressure, inspect steam installation. If applicable install pressure compensation kit (see options). |
| | | | | Leakage in the water system. | Inspect water system and seal if necessary. |
| **W24** | **Electrode current in relation to the steam demand too high** | **E24** | **Electrode current in relation to the steam demand too high** | Humidity demand has decreased too fast. | Automatic adaptation of the operating point. |
| | | | | Drain valve defective. | Inspect drain valve, replace if necessary. |
| | | | | Drain in steam cylinder blocked. | Clean/replace steam cylinder. |
| | | | | Water conductivity too high for this type of steam cylinder. | Select correct steam cylinder type. |
| **W25** | **Max. admissible electrode current exceeded** | **E25** | **Max. admissible electrode current exceeded** | Drain valve defective. | Inspect drain valve, replace if necessary. |
| | | | | Drain in steam cylinder blocked. | Clean/replace steam cylinder. |
| | | | | Water conductivity too high for this type of steam cylinder. | Select correct steam cylinder type. |
| — | — | **E26** | **Main contactor jammed** | Main contactor jammed in activated position. | Inspect main contactor, replace if necessary. |
| **W27** | **Foam detection** | **E27** | **Foam detection (4 automatic drainings within 24 hours)** | Foaming in steam cylinder. | Drain steam cylinder via drain key (several times, if necessary). Check quality of the supply water. |
| **W28** | **Steam cylinder needs service** | **E28** | **Service interval for steam cylinder exceeded** | Mineral deposits and/or electrodes spent. | Steam cylinder Type A: replace<br>Steam cylinder Type D: clean<br><br>Important: After replacement or cleaning of the steam cylinder, reset the maintenance counter (see chapter 7.6). |
| **W29** | **Steam cylinder needs service** | **E29** | **Max. operating hours of the steam cylinder reached** | Maximum operating hours of the steam cylinder reached. | Steam cylinder Type A: replace<br>Steam cylinder Type D: clean<br><br>Important: After replacement or cleaning of the steam cylinder, reset the maintenance counter (see chapter 7.6). |
| **W36** | **Standby draining of steam cylinder active** | — | — | Automatic standby draining of steam cylinder active. | No measures must be taken. |
| **W37** | **Forced draining of steam cylinder active** | — | — | Forced draining of steam cylinder active. | No measures must be taken. |

## 8.3 Notes on fault elimination

**DANGER!**
**Danger of electrical shock!**

For the elimination of faults **set the steam humidifier out of operation** as described in chapter 6.5, **separate the unit from the mains** and **secure it against inadvertent power-up**.

The elimination of faults must be carried out by qualified and well trained professionals only. Malfunctions relating to the electrical installation (e.g. replacement of fuses) must be repaired by authorized personnel or by your Condair representative's service technician only.

Repair work and the replacement of faulty components must be carried out by your Condair representative's service technician only!

## 8.4 Resetting the error indication (red LED lights)

To reset the error indication:

**Disconnect the steam air humidifier from the mains. Wait approx. 5 seconds, then reconnect the unit to the mains.**

Note: If the fault has not been eliminated, the error indication reappears after a short while.

# 9 Taking out of service/Disposal

## 9.1 Taking out of service

If the Condair EC must be replaced or if the humidification system is not needed any more, proceed as follows:

1. Take the unit out of operation as described in chapter 6.5.
2. Have the unit (and all other system components, if necessary) unmounted by a qualified service technician.

## 9.2 Disposal/Recycling

Dismantled components must be disposed of and/or recycled according to the local regulations. In case of doubt please contact your Condair supplier.

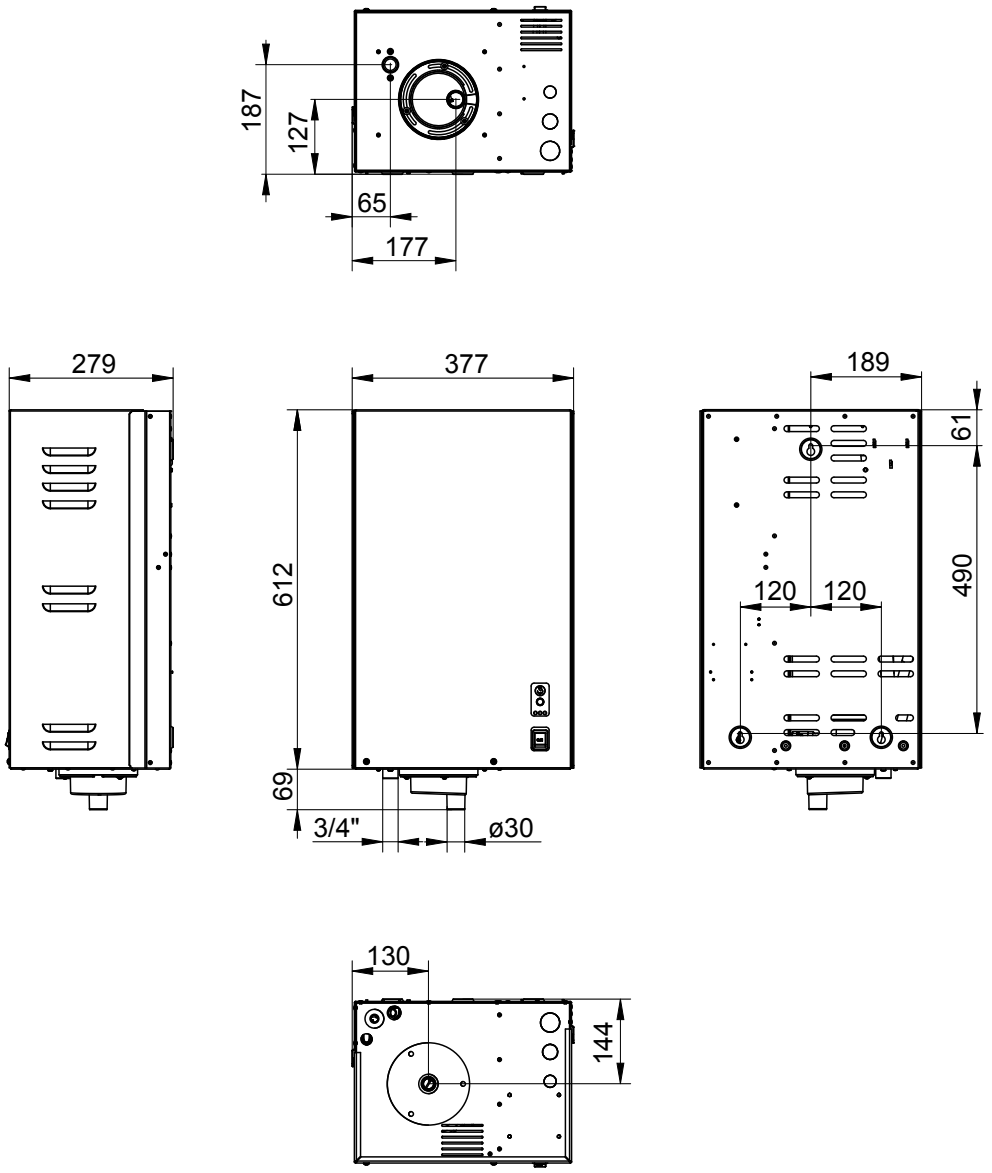
# 10 Product specifications

## 10.1 Technical data

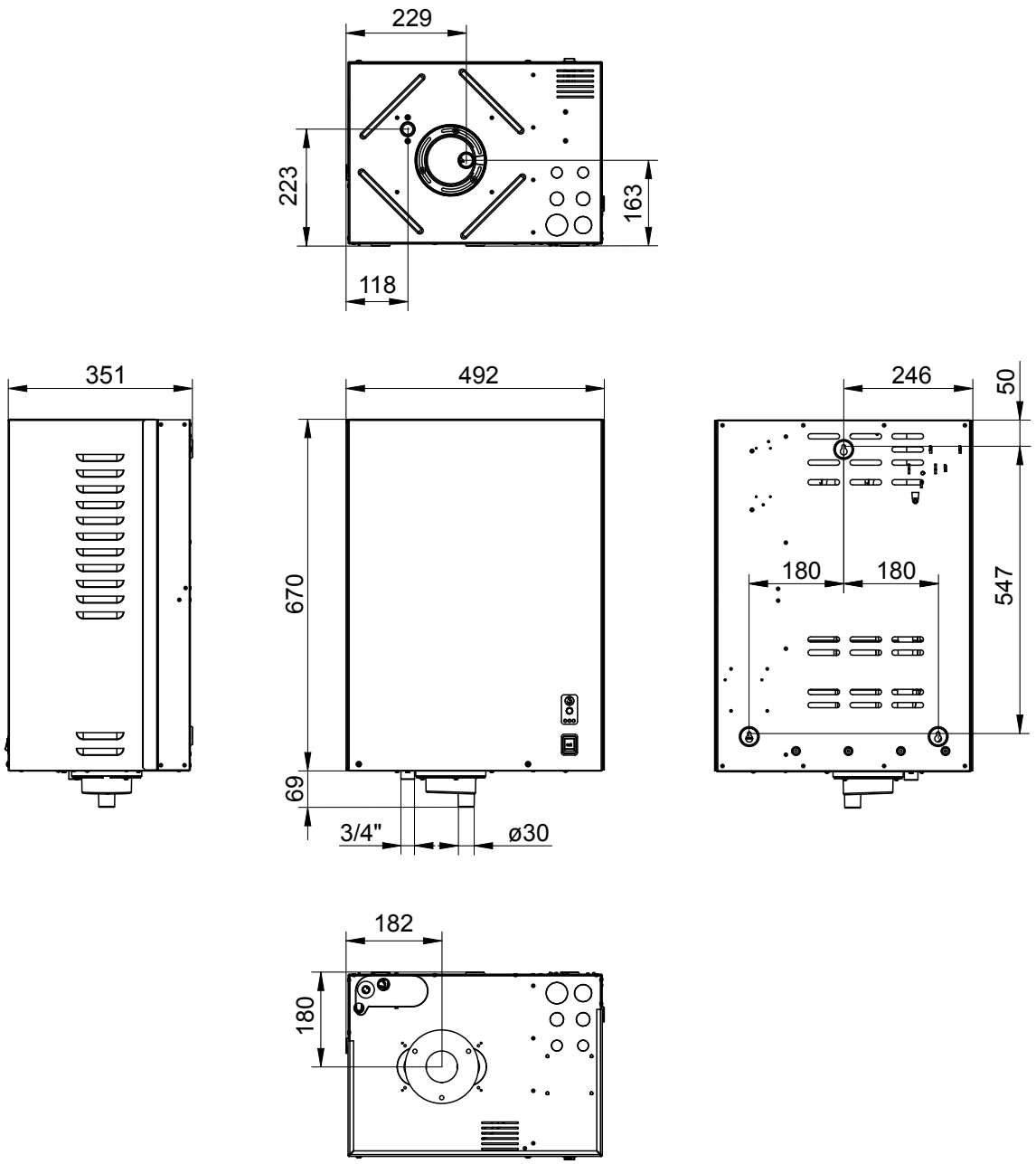
| | | | | |
|---|---|---|---|---|
| **Heating voltage 230V/1~/50..60Hz** | | | | |
| Unit model | | **5/8** | | |
| Steam capacity in kg/h | | 5/8 | | |
| Max. power consumption in kW | | 3.8/6.0 | | |
| **Heating voltage 230V/3~/50..60Hz** | | | | |
| Unit model | | **5/8** | **15** | **23/32** |
| Steam capacity in kg/h | | 5/8 | 15 | 23/32 |
| Max. power consumption in kW | | 3.8/6.0 | 11.2 | 17.3/22.5 |
| **Heating voltage 400V/3~/50..60Hz** | | | | |
| Unit model | | **5/8** | **15** | **23/32/45** |
| Steam capacity in kg/h | | 5/8 | 15 | 23/32/45 |
| Max. power consumption in kW | | 3.8/6.0 | 11.2 | 17.3/24.0/33.7 |
| **Control voltage** | | 1 x 230V / 50-60 Hz | | |
| **Operating conditions** | | | | |
| Admissible water pressure | | 1...10 bar | | |
| Water quality | | Untreated drinking water with a conductivity of 125...1250 µS/cm | | |
| Admissible water temperature | | 1...40 °C | | |
| Admissible ambient temperature | | 1...40 °C | | |
| Admissible ambient humidity | | max. 75% rh (non-condensing) | | |
| Admissible duct air pressure | | -0.8 kPa...1.5 kPa; overpressure kit (option) up to 10.0 kPa | | |
| Type of protection | | IP 20 | | |
| Conformity | | CE | | |
| **Dimensions/Weights** | | | | |
| Housing (WxHxD) in mm | 377x612x279 | 1 | 1 | |
| | 492x351x670 | | | 1 |
| Net weight in kg | | 19 | 19 | 28 |
| Operating weight in kg | | 24 | 30 | 65 |
| **Equipment/options** | | | | |
| Steam cylinder type (Type A.. standard equipment) | A3.../D3... | 1 | | |
| | A4.../D4... | | 1 | |
| | A6.../D6... | | | 1 |
| Cable gland | CG | 1 | 1 | 1 |
| Overpressure set | OPS | 1 | 1 | 1 |
| Remote operating and fault indication | RFI | 1 | 1 | 1 |
| Terminals heating voltage | M-THV | 1 | 1 | |
| | L-THV | | | 1 |
| **Accessories** | | | | |
| Steam distribution pipe | 41-... | 1 | | |
| | 61-... | | 1 | |
| | 81-... | | | 1 |
| Steam distribution system OptiSorp | System 1 | 1 | 1 | 1 |
| Fan unit | FAN3S M | 1 | 1 | |
| | FAN3S L | | | 1 |
| Steam hose / meter | DS22 | 1 | | |
| | DS60 | | 1 | |
| | DS80 | | | 1 |
| Condensate hose / meter | KS10 | 1 | 1 | 1 |

## 10.2 Unit dimensions

**Condair EC 5/8/15** (dimensions in mm)



**Condair EC 23/32/32/45** (Dimensions in mm)



Notes

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