



**READ AND SAVE THESE INSTRUCTIONS**

## ADDENDUM MANUAL

Desiccant dryer  
**Condair DA 500-4000 Freezer**

# Thank you for choosing Condair

Installation date (MM/DD/YYYY):

Commissioning date (MM/DD/YYYY):

Site:

Model:

Serial number:

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# 1 Introduction

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## 1.1 To the very beginning

We thank you for having purchased a **Condair DA 500 - 4000 Freezer desiccant dryer** (for short: Condair DA).

The Condair DA desiccant dryers incorporate the latest technical advances and meets all recognized safety standards. Nevertheless, improper use of the Condair DA desiccant dryer may result in danger to the user or third parties and/or damage to property.

To ensure a safe, proper, and economical operation of the Condair DA desiccant dryer, please observe and comply with all information and safety instructions contained in this addendum manual.

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

## 1.2 Notes on the addendum manual

### Limitation

**The subject of this addendum manual are the Condair DA 500 - 4000 desiccant dryers in their different versions.** The various options and accessories are only described insofar as this is necessary for proper operation of the equipment. Further information on options and accessories can be obtained in the respective manuals.

This installation and operation manual is restricted to the **installation, operation and maintenance** of the Condair DA desiccant dryer and is meant for **well-trained personnel being sufficiently qualified for their respective work.**

## Symbols used in this manual



The catchword "NOTE" used in conjunction with the hand symbol designates important notes in this manual that require special attention.



The catchword "CAUTION" used in conjunction with the caution symbol in the circle designates notes in this operation manual that, if neglected, may cause **damage and/or malfunction of the unit or other material assets**.



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



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

## Safekeeping

Please safeguard this addendum manual together with the Condair DA installation and operation manual in a safe place, where it can be immediately accessed. If the desiccant dryer changes hands, the addendum manual and the installation and operation manual must be passed on to the new operator.

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

## Language versions

This addendum manual is available in other languages. Please contact your Condair representative for information.

## 2 For your safety

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Note: It is mandatory that you observe and follow all the safety information in section 2 of the installation and operation manual for the Condair DA 500-4000 desiccant dryer.

### 3 Important notes

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Note: It is imperative that you observe and follow the important information on delivery, transport and storage in section 3 of the installation and operation manual for the Condair DA 500-4000 desiccant dryer.



## 4 Product overview

### 4.1 Product designation

The product designation and the most important unit data are found on the specification label fixed on the right side below the operation panel (see example below):

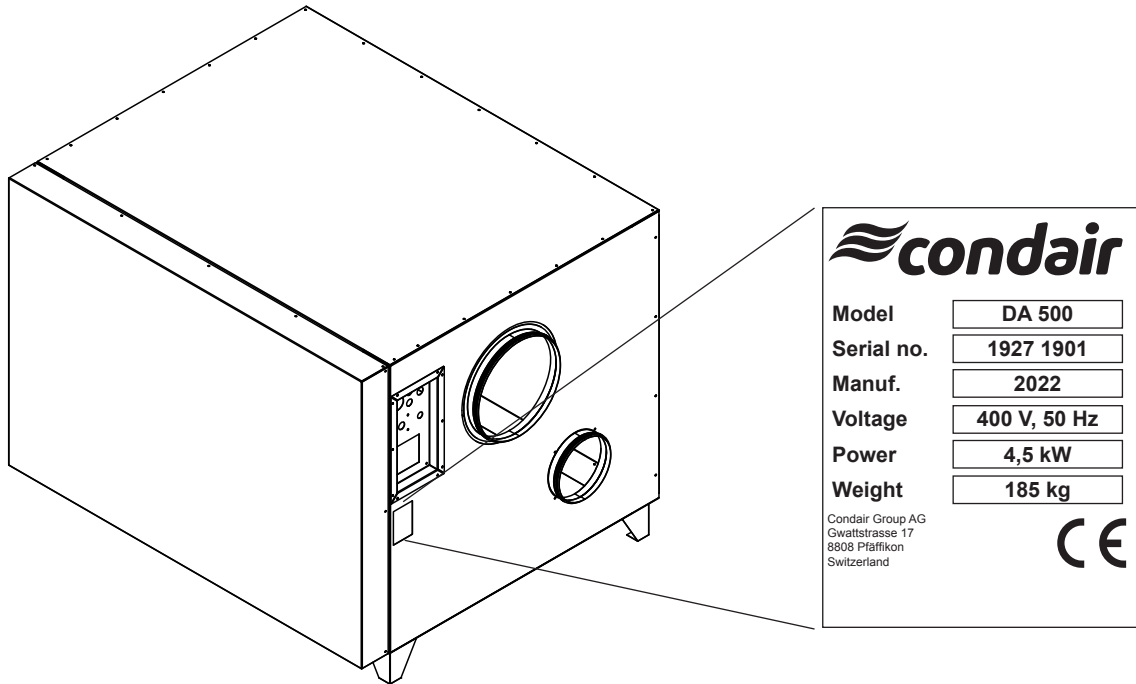


Fig. 1: Specification label

## 4.2 Applications

The Condair desiccant dryers are based on the sorption principle (see description of the operating principle in the installation and operation manual), which removes unwanted humidity from the air at normal atmospheric pressure. With the Freezer version, Condair offers a special design for the device sizes DA 500-4000, specially designed for use in the deep-freeze area. Compared to the standard DA 500-4000 dryer series, this device series has, among other features a 100 mm thick insulated AISI 304 stainless steel housing.

The desiccant dryer is designed for continuous operation and can be used at air temperatures from -25 °C to +20 °C and humidity values of up to 100% RH.

Note: For operating conditions outside the above temperature range, please contact your Condair partner.

The Condair DA freezer units have been developed over many years and constantly been optimized with regard to the aforementioned freezing temperatures. By completely eliminating critical thermal bridges on the housing and by precisely matching key components such as the fans, the rotor and the heating elements for example, high efficiency and safety in system operation are optimized. The special design allows the unit to be placed outside of the actual freezer area, where the installation of the dryer often conflicts with the storage area. By installing the dryer outside of the deep-freeze area, valuable storage and useable space remain free. The application-optimized design of the Condair DA Freezer desiccant dryer also eliminates the requirement for a complex and expensive installation of a pre-heater. The Condair DA Freezer desiccant dryers are therefore the optimal solution for use in cold stores, test rooms and applications with similar requirements, also in terms of cost-effectiveness, both in procurement and operation.

## 4.3 Operation principle

The operation principle of the DA Freezer desiccant dryer is identical to that of the Condair DA 500-4000 standard devices. Please note the information in section 4.3 of the installation and operation manual for the Condair DA 500-4000 desiccant dryer.

## 4.4 Product description

The Condair DA 500-4000 Freezer desiccant dryers with applied ducting meet the requirements of IEC protective class IP23. The electrical panel meets the requirements of IEC protective class IP44.

### 4.4.1 Casing

The sandwich-panel housing is made of AISI 304 stainless steel and is filled with 100 mm of insulation material. The internal structure is made of Aluzinc®. The heavily insulated construction, with a sealing profile on the housing, is optimized against thermal bridges and achieves a high degree of tightness. The service-friendly design allows easy access to internal components via a removable front panel.

### 4.4.2 Rotor

The desiccant dryer has a drying rotor made of 82% desiccant silica gel, 16% fibreglass and 2% adhesive sealant. The rotor has a matrix of corrugated and flat heat resistant sheets, which houses the Silica Gel desiccant agent. This matrix creates a large number of axial flutes through the rotor, which together builds up an immense surface area for moisture adsorption in a small volume. The rotor is manufactured and processed to be able to withstand moisture-saturated air without being damaged. Furthermore, the rotor will not be damaged even if the fan or the heater for reactivation should fail during operation. The desiccant rotor is tested according to ASTM E84-18b, and the results are Flame Spread Index (FSI) 0 and Smoke Developed Index (SDI) 0.

#### Rotor sealings

The rotor has two peripheral seals (PTFE/Silicone) on the rotor casing and four radial seals (PTFE)

#### Rotor drive system

An electrical gear motor and a belt drive achieve the slow rotation of the rotor. The belt sits on the outer rim of the rotor and is driven by a pulley on the drive motor. A belt tension device keeps the belt in place and maintains tension to prevent belt slip. Correct operation of the drive system, and direction of rotation can be checked by opening the front panel.

The centre hub of the rotor is equipped with ball bearings. The rotor shaft is made from stainless steel.

### 4.4.3 Air filters

Two separate air filters class ISO coarse  $\geq 65\%$  are installed on the inlet of each air flow. These filters protect primarily the internal components from dust.

### 4.4.4 Fans for process- and reactivation air

The device is equipped with two directly driven centrifugal fans, IP54 and ISO F, installed in the device. The exact type can be found in the respective wiring diagram.

#### **4.4.5 Heater for reactivation air**

For the units with electrical reactivation air heating, the reactivation heater is of the PTC-type (Positive Temperature Coefficient). These special PTC heating elements are additionally protected against wetness and moisture and offer the usual protection against overheating.

#### **4.4.6 Electrical cabinet**

The electrical cabinet is located in a separate compartment on the service side of the desiccant dryer. The main switch and PLC display are located on the front on the right-hand side.

#### **4.4.7 Operation Options**

The operation of the desiccant dryer with a description of the built-in PLC can be found in the separate PLC controller manual.

# 5 Installation

## 5.1 Installation and service access

As standard the Condair desiccant dryer is designed for indoor installation, and must be installed in horizontal position on its feet, preferably bolted to the floor.

The ambient conditions at the place of installation should be within the range:

- Ambient temperature: 0 °C to +30 °C (with reduced reactivation heat output up to +35 °C)
- Ambient humidity: 10-60 %rh (Ambient humidities of  $\geq 60\%$  RH require installation in a condensate tray)

A weatherproof version is available on request.

For maintenance work, there should be a minimum distance (clearance) of 1,000 mm on the service side of the desiccant dryer.

## 5.2 Duct connections

The DA Freezer desiccant dryer must be installed outside the room to be dehumidified.

All air duct connections are prepared for the connection of standard spiral ducts.

### 5.2.1 Wet air duct

If possible, the wet air from the desiccant dryer should be exhausted to the outside.

Depending on the installation situation, the wet air duct must be insulated and either installed with a gradient of  $>2^\circ$  starting from the desiccant dryer, or provided with a condensate drain at the lowest point. There is a risk of condensate accumulation in the wet air duct and consequently in the device. To avoid this, e.g. a  $\varnothing 4-6$  mm hole at the lowest point of the wet air duct after the desiccant dryer must be provided.

The wet air duct should have a maximum pressure drop of 50 Pa. A higher pressure drop in the wet air duct can lead to undesired device-internal infiltration and must be compensated for by a damper in the dry air duct if necessary.

In order to protect the desiccant dryer from incoming moisture when it is not in operation, an on-site motorized damper is required in the wet air duct, which closes synchronously with the damper in the reactivation air duct. When the desiccant dryer is switched off, the reactivation air fan continues to run for a few seconds to prevent heat build-up in the reactivation section. The duration of the cooling cycle must be taken into account when controlling the on-site motorized dampers.

Since there is a risk that the wet air temperature could exceed  $+80^\circ\text{C}$ , it is recommended to insulate the wet air duct system and to equip the wet air duct with an appropriate warning sign.

The wet air outlet to the outside should be protected with a coarse wire net.

## 5.2.2 Reactivation air into the desiccant dryer

The reactivation air duct to the desiccant dryer should be as short as possible. The intake opening of the duct should have a coarse wire net, to stop foreign objects from entering the desiccant dryer.

Alternatively, the room air can also be used for reactivation.

Depending on the prevailing temperatures at the installation site, there is also a risk of condensation forming in the regeneration air duct. For this purpose, an on-site condensate drain must be installed to avoid condensate accumulation.

In order to protect the desiccant dryer from incoming moisture when it is not in operation, an on-site motorized damper is required in the reactivation air duct, which closes synchronously with the damper in the wet air duct. When the desiccant dryer is switched off, the reactivation air fan continues to run for a few seconds to prevent heat build-up in the reactivation section. The duration of the cooling cycle must be taken into account when controlling the on-site motorized damper.

The reactivation air flow is controlled by a damper in the inlet duct of the reactivation air.

The air flow must be measured during commissioning and the damper adjusted accordingly. For a solution with a speed-controlled fan, please contact your Condair representative (see also installation schematics in [chapter 5.2.4](#)).

## 5.2.3 Process- and dry air ducts

The ducting of the exhaust and supply air of the room to be dehumidified must be as airtight as possible and adequately insulated for the temperatures to be expected.

The dried supply air should preferably be routed directly to the evaporator. The air is warmed up by the dehumidification process and the drying process prevents icing on the cooling fins.

Alternatively, it also makes sense that the dried air is introduced above the opening, of the cold room door, as this is where the moisture load is at its highest and, depending on the implementation, has an infiltration-inhibiting effect.

The process air flow is trimmed by installing a damper on site in the process air inlet duct. For a solution with a speed-controlled fan, please contact your Condair representative.

## 5.2.4 Installation schematics

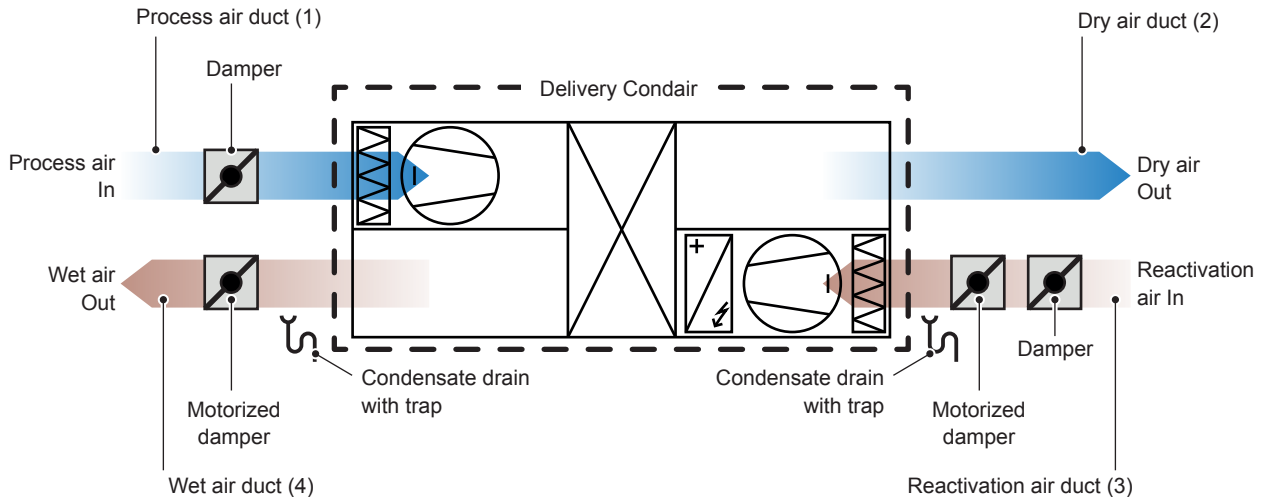


Fig. 2: Installation schematics

### 1 Process air duct

To adjust the airflow to the required value during commissioning, the air flow needs to be adjusted manually with a damper, which is installed at the process air inlet. The process inlet air damper is not required if the system is fitted with fan speed control option.

### 2) Dry air duct:

The dry air duct should have the lowest possible pressure drop (check available static pressure), also to prevent unnecessary positive pressure building up in the dry air chamber inside the unit.

### 3) Reactivation air duct:

In order to adjust the correct air flow during commissioning, the air flow must be trimmed manually using an on-site damper element in the reactivation air inlet duct. Depending on the ambient temperatures at the installation site, there is a risk of condensate forming in the reactivation air duct. In order to avoid any accumulation of condensate, the reactivation air duct should have a condensate drain at the lowest point.

In order to protect the reactivation section of the dryer from condensate and ice formation when not in operation, a motorized damper must be installed on site in the reactivation air duct, which closes automatically when there is no demand for dehumidification. This damper must be switched synchronously with the motorized damper in the wet air duct.

### 4) Wet air duct:

The wet air duct should be isolated and as short as possible, with a maximum pressure drop of 50 Pa. In the wet air duct, there is a risk of condensation. To prevent a collection of condensate, this duct should slope down in angle of at least  $>2^\circ$  or has a condensate drain on its lowest point.

In order to protect the reactivation section of the dryer from condensate and ice formation when not in operation, a motorized damper must be installed on site in the wet air duct, which closes automatically when there is no demand for dehumidification. This damper must be switched synchronously with the motorized damper in the reactivation air duct.

## 5.3 Electrical installation

See [Appendix 1 – electrical wiring diagram](#).

## 6 Commissioning

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Note: Observe and follow the information on commissioning in section 6 of the installation and operation manual for the Condair DA 400-5000 desiccant dryer.



# 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 covers. Please note the following:



**DANGER!**  
Danger of electric hazard!

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

**Prevention:** Before carrying out any work set the Condair DA desiccant dryer out of operation (switch off the unit, disconnect it from the mains) and secure the unit against inadvertent power-up.



**WARNING!**  
Risk of injury!

**Inside the Condair DA desiccant dryer there are moving parts present, which can cause serious injury to hands and fingers.**

**Prevention:** Before carrying out any work set the Condair DA desiccant dryer out of operation (switch off the unit, disconnect it from the mains) and secure the unit against inadvertent power-up.

Keep hands or other body parts away from moving parts.



**WARNING!**  
Risk of burns!

**Inside the Condair DA desiccant dryer are heating element present, which can cause burns if touched.**

**Prevention:** Before carrying out any work set the Condair DA desiccant dryer out of operation (switch off the unit, disconnect it from the mains), secure the unit against inadvertent power-up, **and wait at least 15 minutes prior to opening any service panel, allowing the heater to cool down.**

The maintenance intervals for the desiccant dryer depend on the surrounding environment and installation site. Recommended maintenance intervals could therefore differ from one installation to another. Incorrect maintenance and service may result in reduced dehumidification capacity.

## 7.2 Filters

The desiccant dryer is equipped with two air filters, one for the process air and the other for the reactivation air. The filters are positioned at the respective inlets of the desiccant dryer. If required, the desiccant dryer can be factory-equipped with air differential pressure switches for filter monitoring.

The filters should be checked at least once a month, especially in the early stages of operation, to detect heavy air pollution or icing problems. It is recommended to equip at least the reactivation air filter with a filter guard ex works, as there is a risk of icing depending on the operating conditions on site. In addition, long-term high relative humidity >90% in the process air or incorrect operation of the desiccant dryer can lead to icing on the process air filter.

There is a service alarm in the PLC, which is activated after a specified time to ensure that the filters are checked regularly. The interval should be adjusted according to local requirements.



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Never operate the desiccant dryer without the filters, as the rotor can be damaged by dust.

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## 7.3 Rotor

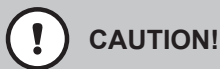
The rotor is maintenance free. However should it be necessary to clean the rotor the first choice should be careful use of compressed air. With severe contamination, the rotor can be washed with water.

Cleaning with water is no routine matter; please contact your Condair representative.

Check the rotor bearing and the rotor surface once a year.

Note: Due to the effects of heat during the reactivation process, the white color of the desiccant rotor changes to beige or brownish over time. This is normal and does not affect rotor performance.

DA desiccant dryers with built-in PLC have inductive rotor guard as standard. This feature is not available for units without PLC.



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Airborne chemical compounds, e.g. oily vapors or solvents can also be adsorbed by the rotor and permanently reduces its capacity.

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## 7.4 Rotor seals

As with the air filters, the rotor seals should also be checked monthly, especially in the initial operating phase, and then every quarter, since unfavorable or incorrect operation of the DA desiccant dryer, e.g. operation with a constant process air flow, icing and increased wear on the rotor seals can occur. There is service alarm in the PLC for this purpose, which can be adjusted as required.

## 7.5 Electrical motors

All electric motors are maintenance-free and do not require servicing or lubrication. Check the motors for abnormal sound once a year.

## 7.6 Heater

The electric reactivation heater does not need maintenance, but should be checked twice a year for any mechanical damage to the heating elements.

## 7.7 Rotor drive belt

Check the belt tensioning at regular intervals. The tension is maintained constantly by the belt tensioner, and should not need to be adjusted during normal operation. Please note that the belt tension should not be too tight as this can damage the drive motor.

## 7.8 General summary of maintenance intervals

	Filter	Rotor bearing	Motors	Rotor drive	Heater	Seals
As required	x *					
Every 3th month						x *
Every 6th month				x	x	
Every 12th month		x	x			

\* Check monthly in the initial phase

## 8 Troubleshooting

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Note: For troubleshooting, observe the information in section 8 of the installation and operation manual for the Condair DA 500-4000 desiccant dryer.

# 9 Product specification

## 9.1 Technical Data

		DA 500-4000 Freezer
Nominal process air flow	m <sup>3</sup> /h	500 - 4000
Nominal reactivation air flow	m <sup>3</sup> /h	150 - 550
Operation range - temperature	°C	-25 to +20
Operation range - humidity	%rH	0 to 100
Voltage supply <sup>1)</sup>	V/Ph/Hz	400/3/50
Connection diameter process air	mm	400
Connection diameter dry air	mm	315
Connection diameter reactivation air	mm	200
Connection diameter wet air	mm	200
Filter class process air <sup>2)</sup>		ISO Coarse 65%
Filter class reactivation air <sup>2)</sup>		ISO Coarse 70%
Dimensions (H x B x T)	mm	1067 x 1339 x 1128
Weight	kg	205 - 225

<sup>1)</sup> 60 Hz are available upon request

<sup>2)</sup> Classification according to ISO 16890

 **NOTE!**

Some performance data can only be shown as ranges due to individual customer requirements.

## 9.2 Dimensions DA 500-4000 Freezer

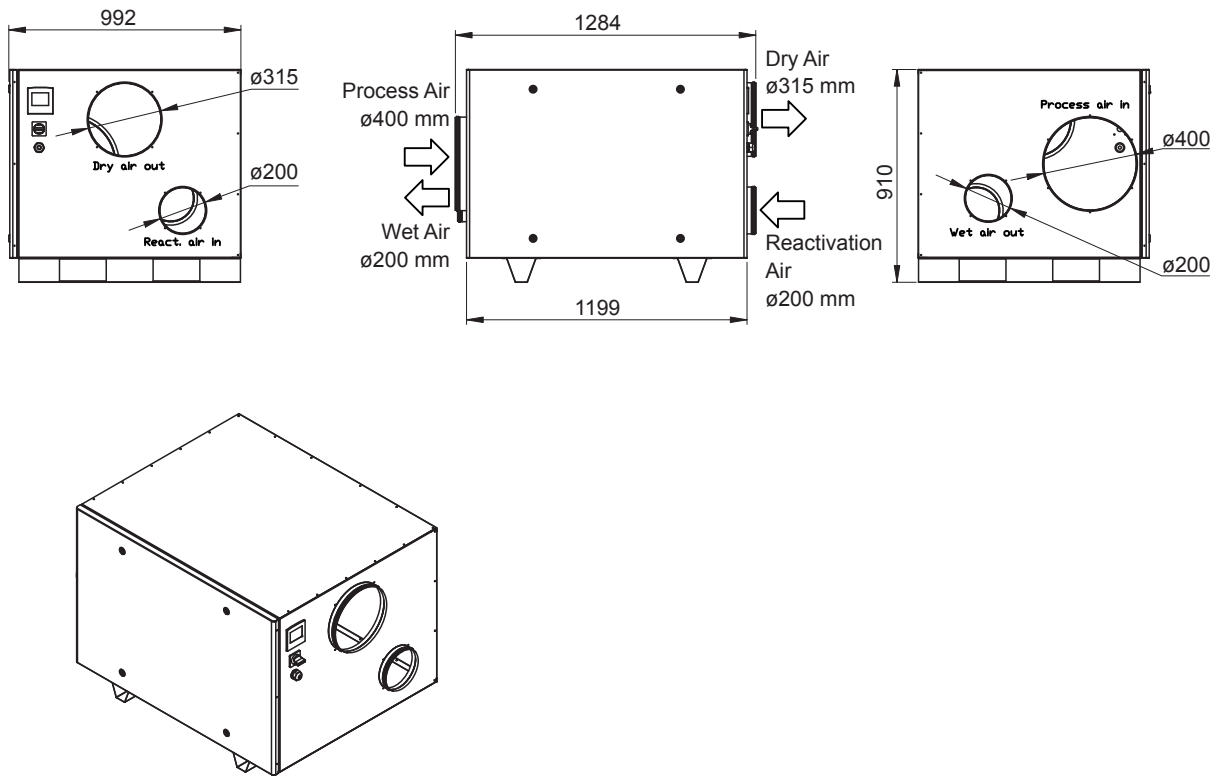


Fig. 3: Dimensions DA 500-4000 Freezer

## 10 Spare parts

### 10.1 Spare parts Condair DA 500

Part	Part No.	Technical specification	Numbers installed	Numbers of recommended spare parts
Condenser rotor motor	2597817	0,5 $\mu$ F 700 V	1	
Belt tensioner	2596156	Rosta SE11 + R11	1	
Process air filter	2597865	Panel filter 715 x 494 x 45 mm	1	2
Reactivation air filter	2597866	Panel filter 310 x 450 x 25 mm	1	2
Rotation guard sensor with magnet	2597875		1	
Standard Basic PLC 3,5" incl. software	2597879	Unitronics Samba 3.5™	1	

Due to the precise matching of the device-internal components such as the fans, the rotor, the rotor drive and the heating elements, there is no general spare parts list available for the DA Freezer desiccant dryer. For offers of spare parts, please contact your local Condair partner and have the serial number of the desiccant dryer at hand.

# 11 Built-in components

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Due to the precise matching of the device-internal components such as the fans, the rotor, the rotor drive and the heating elements, there is no generally applicable list of the installed components for the DA Freezer desiccant dryer. For information on the installed components, please contact your local Condair partner and have the serial number of the desiccant dryer at hand.



# 12 EU declaration of conformity

## EU declaration of conformity

Condair Group AG  
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Switzerland

declare under own responsibility that the product:

**Condair Dehumidifier DA 500, DA 700, DA 800, DA 1000, DA 1100, DA 1400, DA 2400, DA 3400, DA 4000, DA 4400, DA 6000, DA 6400, DA 7400, DA 8000, DA 9400, DA 13000, DA 19000 and DA 27000 from unit no 128 1512**

which is detailed in this declaration complies to the following harmonized European standards and technical specifications:

<b>EN ISO 12100:2010</b>	Safety of machinery - General principles for design - Risk assessment and risk reduction (ISO 12100:2010)
<b>EN 60204-1:2018</b>	Safety of machinery - Electrical equipment of machines - Part 1: General requirements
<b>EN 61000-6-3:2007/A1:2011/AC:2012</b>	Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments
<b>EN 61000-6-2:2005/C1:2005</b>	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments

according to conditions in directive:

<b>2006/42/EC</b>	Machinery Directive
<b>2009/125/EC</b>	Ecodesign requirements for fans driven by motors with an electric input power between 125 W and 500 kW
<b>2014/30/EU</b>	Electromagnetic Compatibility (EMC) Directive

Pfäffikon 2018-12-12

The manufacturer:



Condair Group AG  
Robert Merki



## 13 Appendix 1 – electrical wiring diagram

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The electrical wiring diagram for the desiccant dryer will be completed about 2 weeks before completion of the unit and is delivered together with the unit.

As every dehumidifier is uniquely manufactured to client specification the wiring diagram is unique to the particular unit consequently the specific electrical wiring diagram.



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CH94/0002.00

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