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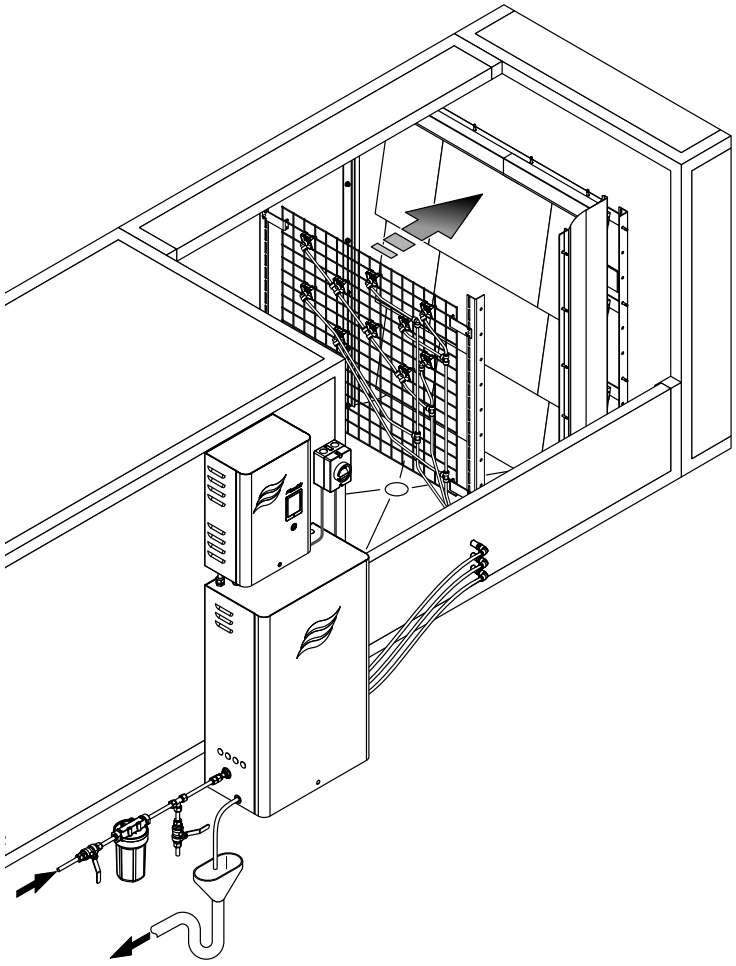
DL SERIES



OPERATION MANUAL

Adiabatic humidification system
Condair **DL**

Humidification and Evaporative Cooling

condair

Thank you for choosing Condair

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

Manufacturer

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1 Introduction

1.1 To the very beginning

We thank you for having purchased the **adiabatic air humidification system Condair DL**.

The adiabatic air humidification system Condair DL incorporates the latest technical advances and meets all recognized safety standards. Nevertheless, improper use of the adiabatic air humidification system Condair DL 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 adiabatic air humidification system Condair DL, please observe and comply with all information and safety instructions contained in the present documentation as well as in the separate documentations of the components installed in the humidification system.

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

1.2 Notes on the operation manual

Limitation

The subject of this operation manual is the adiabatic air humidification system Condair DL. 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 instructions.

This operation manual is restricted to the **commissioning**, **operation**, **maintenance** and **troubleshooting** of the adiabatic humidification system Condair DL and is meant for **well trained personnel being sufficiently qualified for their respective work**.

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

Symbols used in this manual

CAUTION!

The catchword “CAUTION” used in conjunction with the caution symbol in the circle designates notes in this operation manual 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 operation manual 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 operation manual that, if neglected, may lead to **severe injury or even death of persons**.

Safekeeping

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

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

Language versions

This operation manual is available in various languages. Please contact your Condair representative for information.

2 For your safety

General

Every person working with the adiabatic air humidification system Condair DL must have read and understood the installation manual and the operation manual of the Condair DL before carrying out any work. Knowing and understanding the contents of the installation manual and the operation manual 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 components of the adiabatic humidification system Condair DL must be observed and kept in readable state.

Qualification of personnel

All work described in this operation manual **may only be carried out by specialist who are well trained and adequately qualified and are authorized by the customer**.
For safety and warranty reasons any action beyond the scope of this manual must be carried out only by qualified personnel authorised by the manufacturer.

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

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

Intended use

The adiabatic humidification system Condair DL is intended exclusively for **air humidification in AHU's or air ducts** within the specified operating conditions (see chapter *9.1 – Technical data*). Any other type of application, without the written consent of the manufacturer, is considered as not conforming with the intended purpose and may lead to the adiabatic humidification system Condair DL becoming dangerous. Operation of the equipment in the intended manner requires **that all the information contained in this operation manual are observed (in particular the safety instructions)**.

Danger that may arise from the adiabatic humidification system Condair DL

DANGER!
Risk of electric shock!

The control unit of the adiabatic humidification system Condair DL contains live mains voltage. One may get in touch with live parts when the control unit is open. Touching live parts may cause severe injury or danger to life.

Prevention: Before carrying out any work on the adiabatic air humidification system Condair DL switch off the control unit, disconnect it from the mains via the electrical isolator and secure electrical isolator in Off position against inadvertent power-up.

DANGER!
Health risk because of inadequate hygiene!

Inadequately operated and/or poorly maintained adiabatic humidification systems may endanger the health. When inadequately operated and/or poorly maintained micro-organisms (including the bacterium which causes Legionnaire's disease) may grow in the water system and in the area of the humidification unit and may affect the air in the AHU/air duct.

Prevention: the adiabatic humidification system Condair DL must strictly be operated and maintained in accordance with this manual.

Behaviour in case of danger

If it is suspected that **safe operation is no longer possible**, then the adiabatic air humidification system Condair DL should immediately **be shut down and secured against accidental power-up according to chapter** *4.5 – Decommissioning the system*. This can be the case under the following circumstances:

– if components of the adiabatic air humidification system Condair DL are not correctly positioned, locked or sealed
– if the adiabatic air humidification system Condair DL is damaged
– if the adiabatic air humidification system Condair DL is no longer operating correctly
– if connections and/or piping are not sealed
– if the electrical installations are damaged

All persons working with the adiabatic air humidification system Condair DL must report any alterations to the system that may affect safety to the owner without delay.

Prohibited modifications to the unit

No modifications must be undertaken on the adiabatic air humidification system Condair DL 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 representative.

3 Product Overview

3.1 Models overview

The adiabatic air humidification system Condair DL is available in two base models (Type A: with booster pump, Type B: without booster pump) for different duct/AHU sizes.

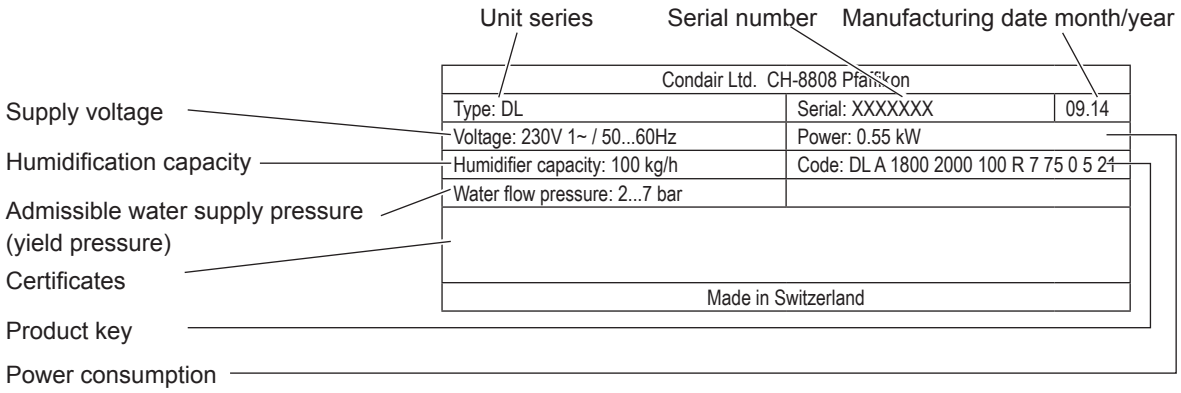
		Condair DL .	
		Type A (**with** booster pump)	**Type B** (**without** booster pump)
Duct inside width “W”	[mm]	450 ... 4200 **	
Duct inside height “H”	[mm]	450 ...4000 **	
Humidification capacity	[l/h]	2 ...1000 **	2 ...1000 **

** Larger systems on request

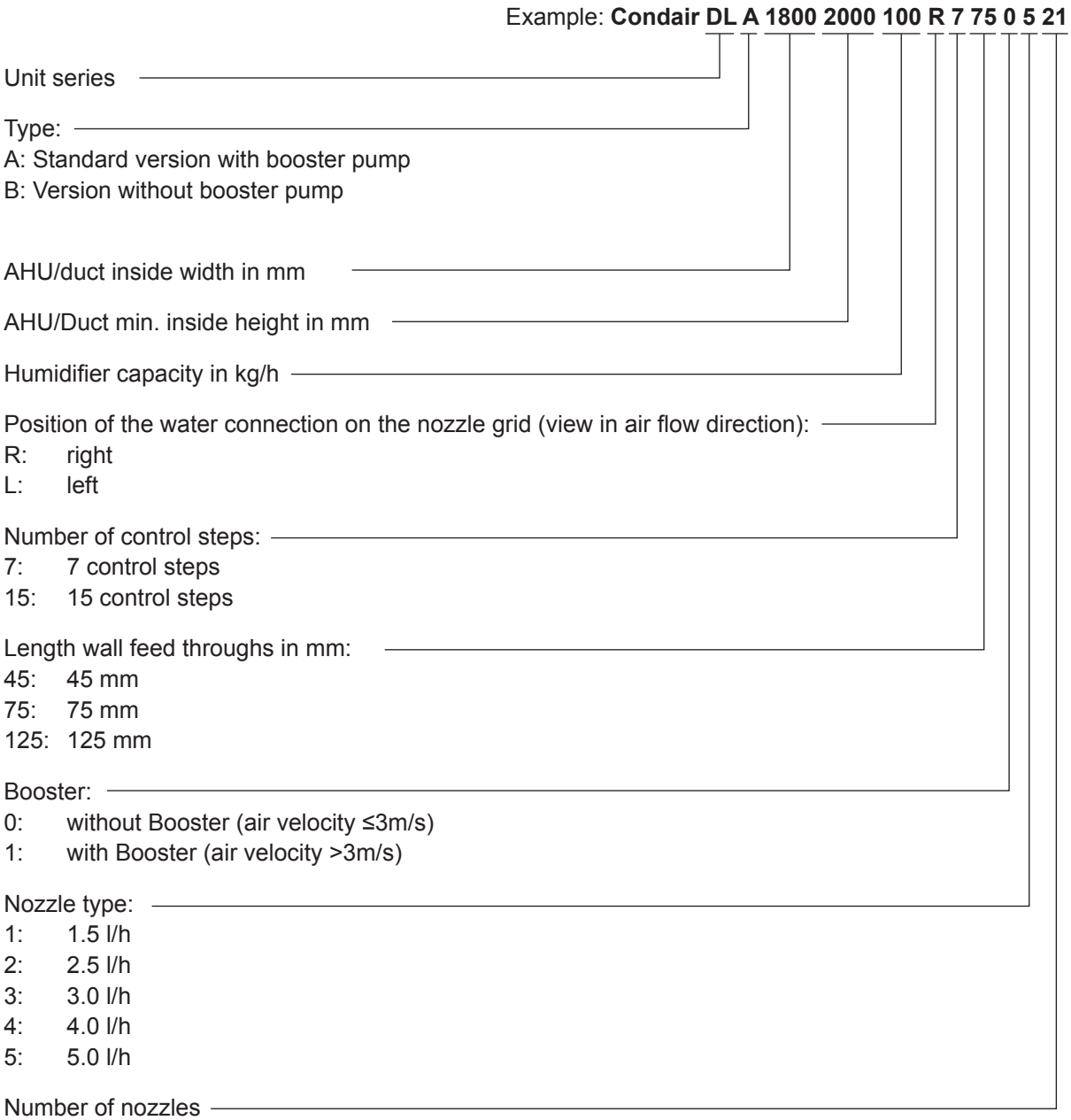
Both base models can be extended with different options in their functionality. Furthermore, there are different accessories available.

3.2 Product designation / Which model do you have

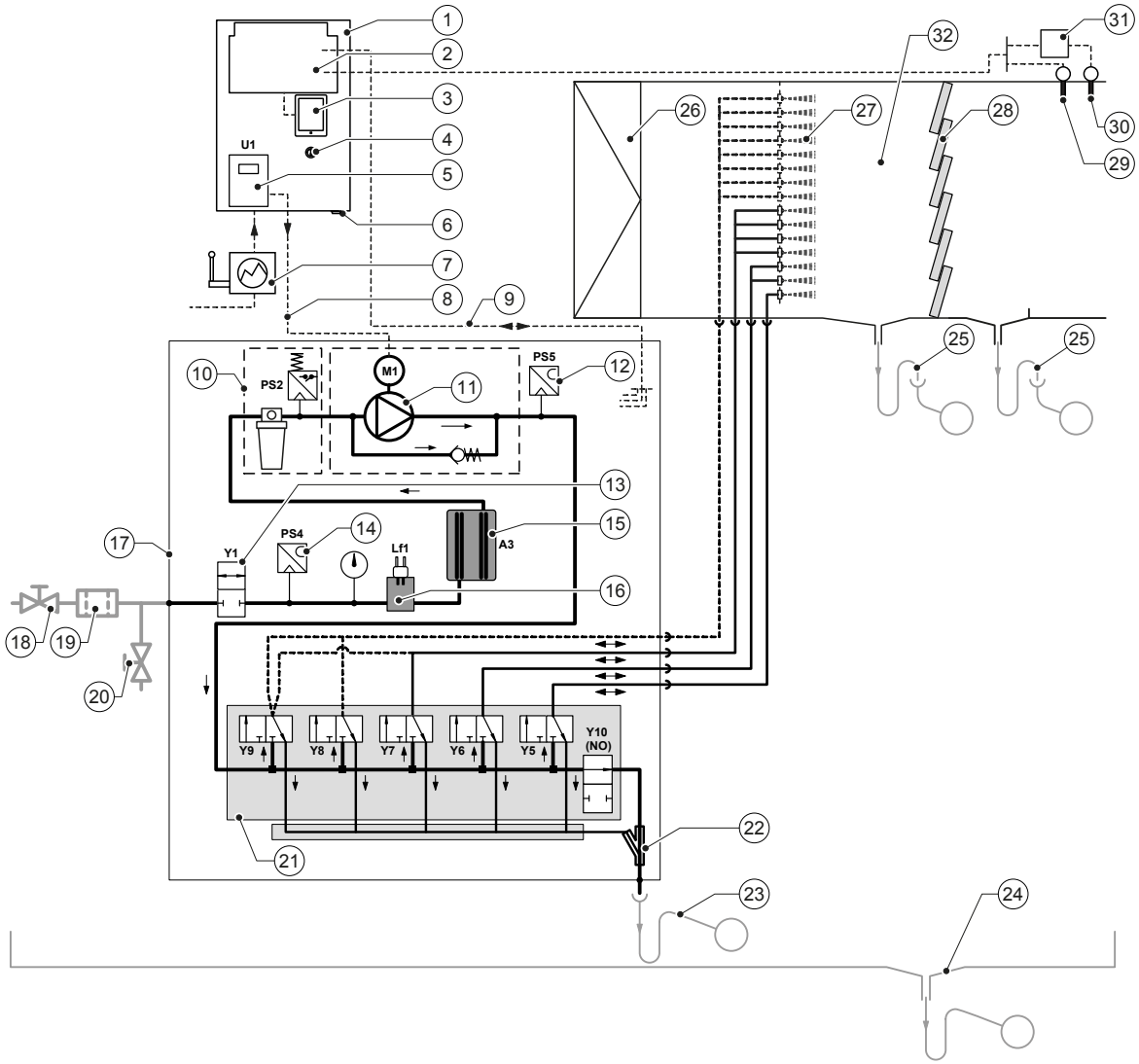
The product designation and the most important unit data are found on the rating plate fixed on the right side of the control unit (see example below):



Product key


Example: **Condair DL A 1800 2000 100 R 7 75 0 5 21**
Unit series
Type:
A: Standard version with booster pump
B: Version without booster pump
AHU/duct inside width in mm
AHU/Duct min. inside height in mm
Humidifier capacity in kg/h
Position of the water connection on the nozzle grid (view in air flow direction):
R: right
L: left
Number of control steps:
7: 7 control steps
15: 15 control steps
Length wall feed throughs in mm:
45: 45 mm
75: 75 mm
125: 125 mm
Booster:
0: without Booster (air velocity ≤3m/s)
1: with Booster (air velocity >3m/s)
Nozzle type:
1: 1.5 l/h
2: 2.5 l/h
3: 3.0 l/h
4: 4.0 l/h
5: 5.0 l/h
Number of nozzles

3.3 Basic design the adiabatic air humidification system Condair DL



1 Control unit
2 Driver board
3 Control board with touch screen
4 Switch **<Humidification On/Off>**
5 Frequency converter for booster pump (Type A)
6 Switch **<Control unit On/Off>**
7 Mains supply via electrical isolator
8 Voltage supply booster pump motor
9 Cable harnesses sensors and valves
10 Sterile filter with pressure switch PS2 (Type A) or without pressure switch PS2 (Type B)
11 Booster pump (Type A)
12 Pressure sensor nozzle pressure PS5
13 Inlet valve Y1
14 Pressure sensor inlet pressure PS4
15 Silver ionisation A3
16 Conductivity sensor Lf1
17 Central unit
18 Shut-off valve RO water supply (by client)
19 Water filter (by client, mesh size 0.005 mm)
20 Test valve, flame treatable (by client)
21 Valve manifold with spray nozzles Y5-Y9 and drain valve Y10
22 Water jet pump (spray circuits drain)
23 Drain with siphon (by client)
24 Water tub or floor drain with siphon (by client)
25 Duct/AHU drains with siphon (by client)
26 Air filter min. F7 or EU7 (by client)
27 Spray nozzles
28 Post-evaporation elements (porous ceramics)
29 Humidity sensor (by client)
30 Temperature- and humidity sensor (by client)
31 External continuous controller (by client, e.g. Enthalpy controller)
32 Air duct/AHU

Abb. 1: Basic design the adiabatic air humidification system Condair DL

3.4 Functional description

From the reverse-osmosis system (RO system) the fully demineralised water (also called RO water or permeate) is fed via a shut-off valve (18, by client) and a water filter (19, by client) to the central unit (17).

In the central unit the RO water is fed via the inlet valve Y1 (13), the conductivity measurement Lf1 (16), and the silver ionisation (15) which degerminates the water and the sterile filter (10) to the valve manifold (21) with the spray valves Y5-Y7 (7 control steps), Y5-Y7+Y9 (7 control steps with double stage), Y5-Y8 (15 control steps) or Y5-Y8+Y9 (15 control steps with double stage) and the drain valve Y10.

On systems type A the central unit is equipped with a booster pump (11) (controlled via the frequency converter) which increases the water pressure to the required operating pressure of approximately 7 bars (yield load) starting from a certain humidity demand.

When a humidity demand is present the spray valves open depending on the demand:
– one, two or all three spray valves (with 3 spray circuits: Y5-Y7),
– one, two or all four spray valves (with 3 spray circuits with double stage: Y5-Y7+Y9) or
– one, two, three or all four spray valves (with 4 spray circuits: Y5-Y8) or
– one, two, three or all five spray valves (with 4 spray circuits with double stage: Y5-Y8+Y9).

The fully demineralised water is now fed to the respective spray nozzles (27) producing fine drops. The air passing by the nozzles absorbs the drop thus getting humidified. Drops not absorbed by the air is retained in the post-evaporation elements (28) thus humidifying the air passing through the post-evaporation elements. Excess water is flowing down to the bottom of the post-evaporation unit and is led via the siphon trap (25) and open tundish to the waster water line of the building.

Control

The system is controlled by an external controller (e.g. enthalpy controller) or by the P/PI controller built into the control unit.

On systems with 3 spray circuits a 7-step control is provided corresponding to 1/7, 2/7, 3/7, 4/7, 5/7, 6/7 and 7/7 of maximum output. On systems with 4 spray circuits a 15-step control is provided with corresponding with corresponding performance gradation.

On systems type A the booster pump is switched on at a demand of approx. 60-70 % (switching point is dependent on the inlet pressure), and then the capacity is controlled continuously up to 100% via the pump speed.

Monitoring

The inlet pressure and the nozzle pressure are monitored with the analogue pressure sensors “PS4” and “PS5”.

The pressure after the sterile filter is monitored with the pressure switch “PS2” on systems type A (with booster), and on systems type B (without booster pump) with the pressure sensor “PS5” since the pressure after the sterile filter is equal to the nozzle pressure.

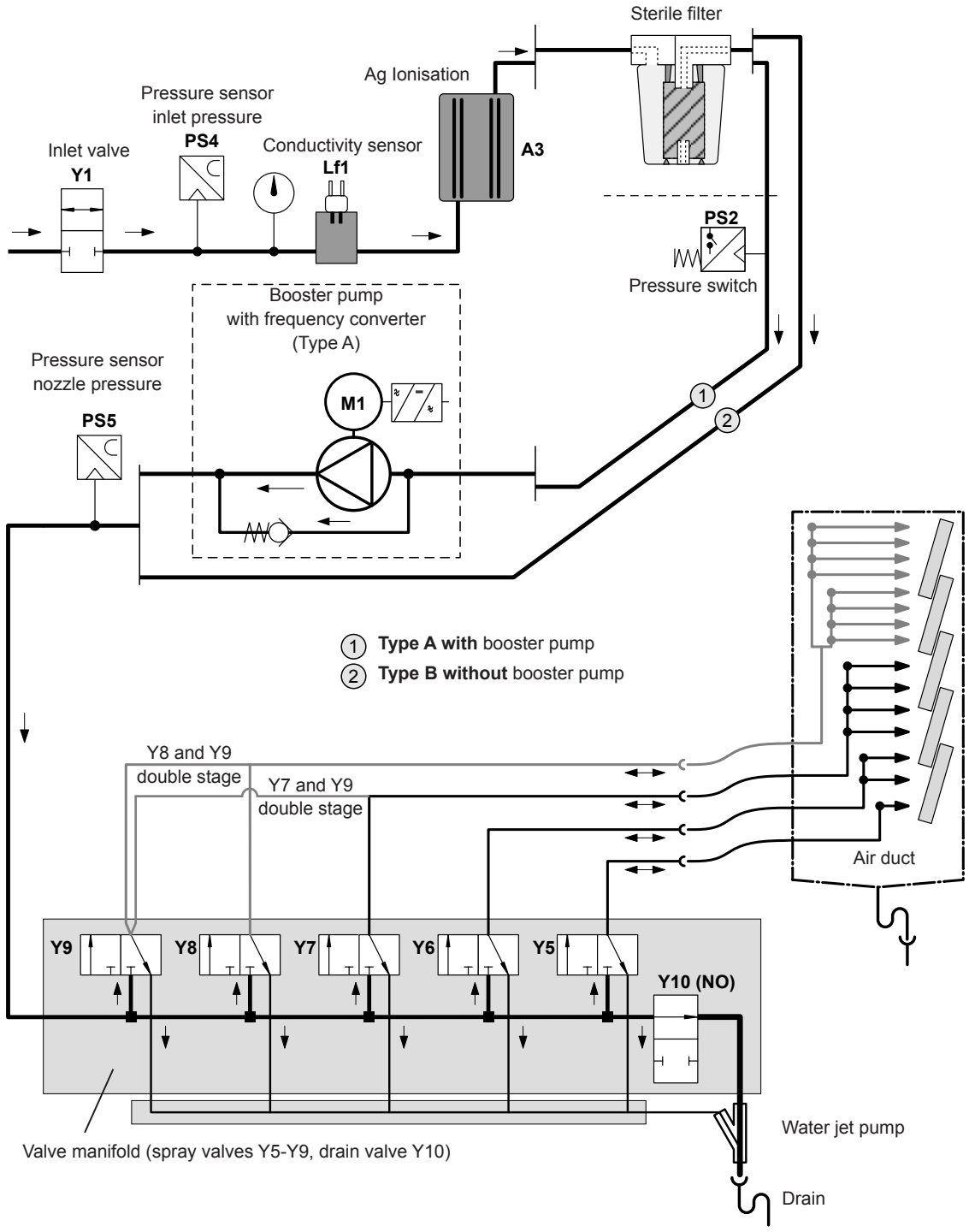
The conductivity of the fully demineralised water is continuously monitored. If the conductivity of the fully demineralised water exceeds the admissible range (max. 15 µS/cm), the drain valve Y10 on the valve manifold (14) opens and the water system is flushed until the conductivity meets the preset value. A fault message is displayed or the system is stopped if the conductivity value does not reach the admissible range within a certain period (conductivity >100 µS/cm).

Hygiene function/Flushing

In order to prevent standing water, each spray circuit which is not active is emptied via the corresponding spray valve (the spray valves are connected to the drain in currentless status).

If the conductivity in the water supply line exceeds a preset value or if the humidification system has been without demand for more than 23 hours, the drain valve Y10 opens and the water supply line and the water lines in the central unit are flushed for a certain time with fresh RO water. During the flushing additionally residual water in the spray circuits are sucked out via the built in water jet pump (22) .

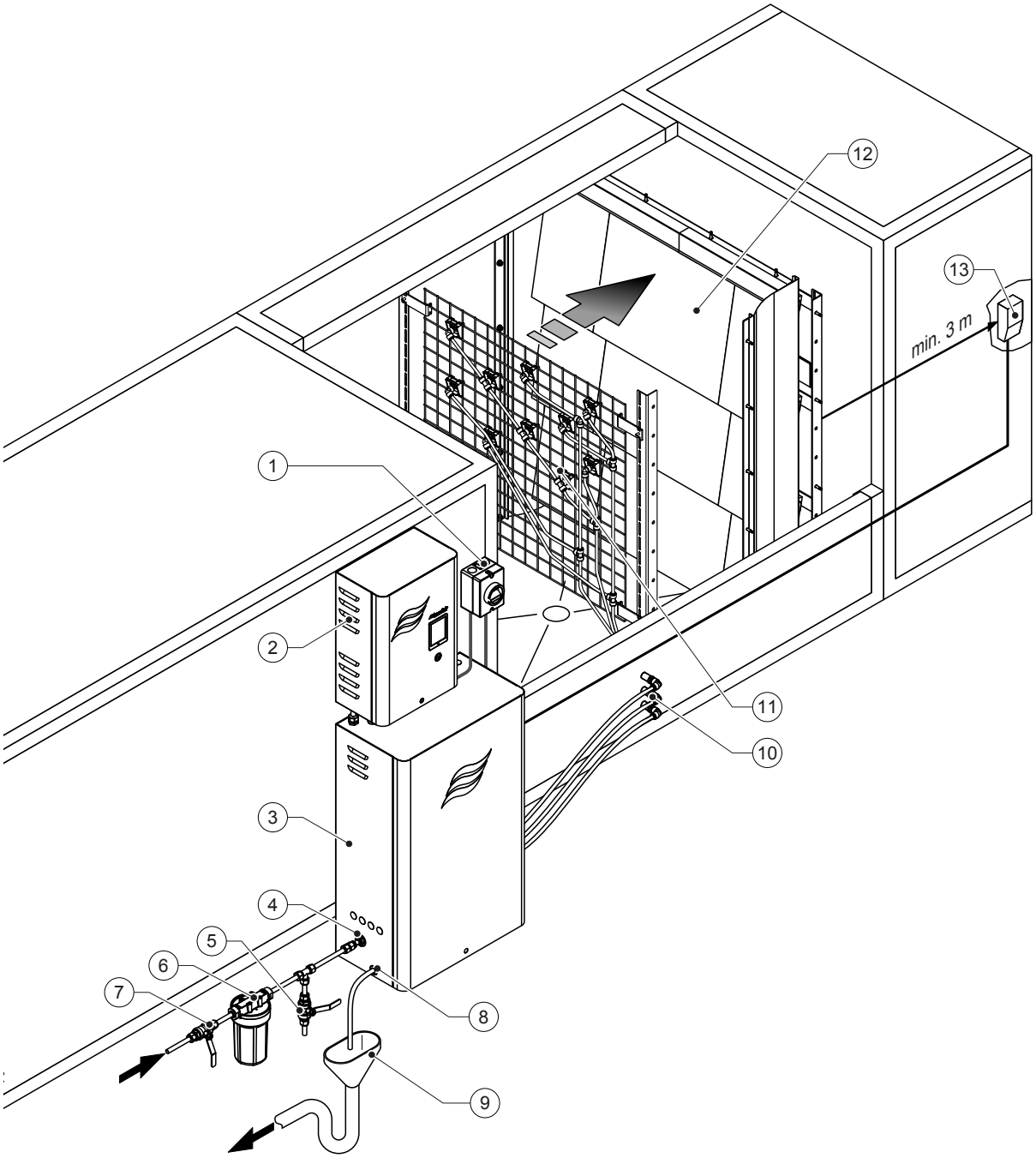
3.5 Hydraulic diagram



3 spray circuits: Y5, Y6 and Y7 (7-steps)
3 spray circuits double stage: Y5, Y6, Y7 and Y9 (7-steps)
4 spray circuits: Y5, Y6, Y7 and Y8 (15-steps)
4 spray circuits with double stage: Y5, Y6, Y7, Y8 and Y9 (15-steps, from 500 kg/h)

Abb. 2: Hydraulic diagram humidification system Condair DL

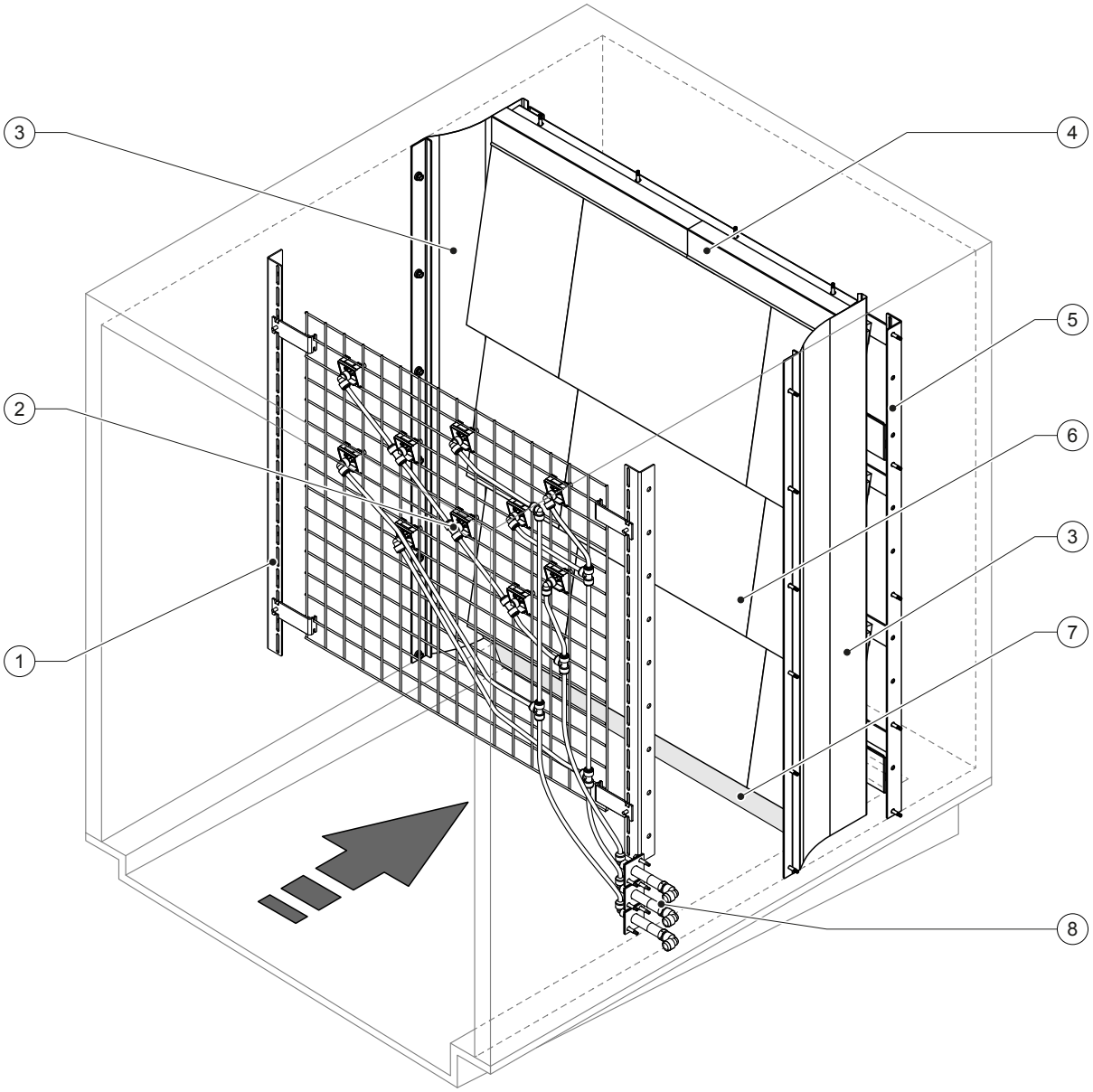
3.6 System overview Condair DL



1 Electrical isolator mains supply
2 Control unit
3 Central unit
4 Water supply connector - plug-in coupling ø12 mm or G 1/2" male thread adapter (supplied)
5 Test valve, flame treatable (recommended, by client)
6 Water filter (recommended, by client)
7 Shut-off valve water supply (mandatory, by client)
8 Water drain hose (rubber hose ø10/12 mm)
9 Open tundish with siphon (by client)
10 Wall feed throughs spray circuits (ø8/10 mm)
11 Grid with nozzles
12 Post-evaporation unit
13 Humidity controller (e.g. enthalpy controller) or humidity sensor

Abb. 3: System overview Condair DL

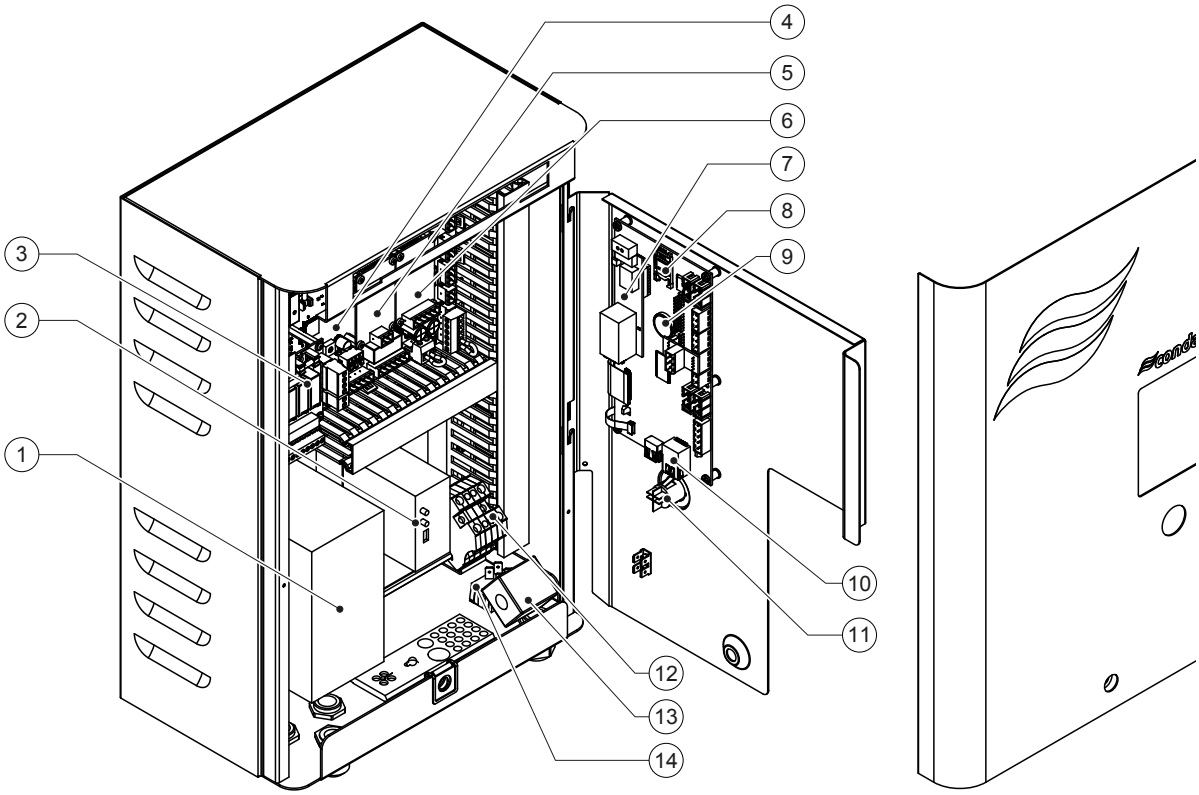
3.7 Overview humidification unit Condair DL



1 Support frame Nozzle unit
2 Spray nozzles
3 Lateral sealing plates
4 Upper sealing plates
5 Support frame post-evaporation unit
6 Ceramic plates
7 Rubber sealing duct floor
8 Wall feed throughs spray circuits (ø8/10 mm)

Abb. 4: Overview Humidification unit Condair DL

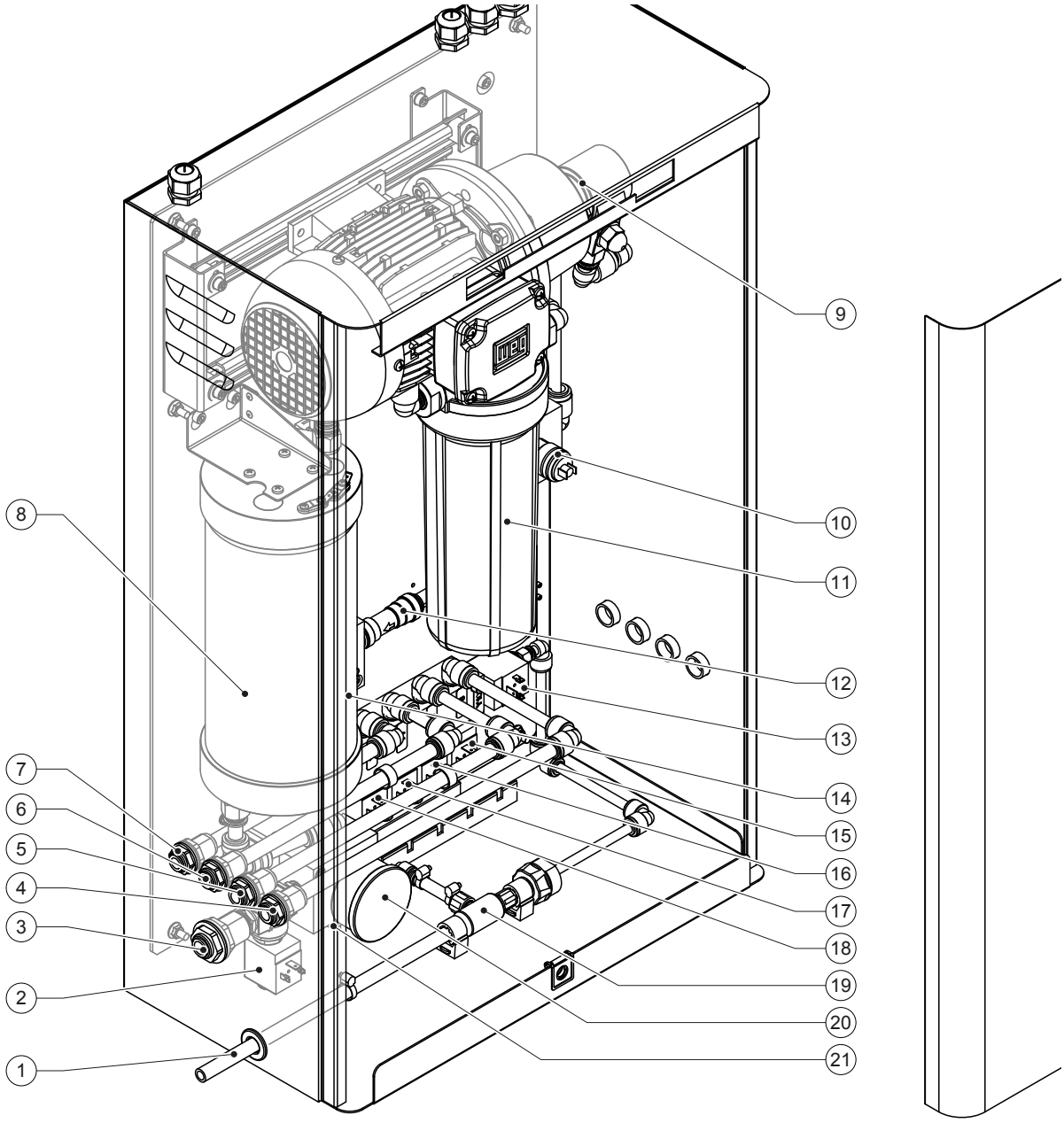
3.8 Overview control unit Condair DL



1 Frequency converter
2 Leakage monitoring (option)
3 Remote operating and fault indication board
4 Driver board
5 Ag-Ionisation board
6 Conductivity monitoring board
7 BMS interface board (option LonWorks or BACnet)
8 Memory card
9 Back-up battery (CR 2032, 3V)
10 RJ45 connector (ethernet interface)
11 Switch **<Humidification On/Off>**
12 Terminals mains voltage supply
13 Snap ferrite mains voltage supply
14 Switch **<Control unit On/Off>**

Abb. 5: Overview control unit Condair DL (without internal cabling)

3.9 Overview central unit Condair DL



1 Water drain hose
2 Inlet valve
3 Water supply connector - plug-in coupling ø12 mm or G 1/2" male thread adapter (supplied)
4 Connector spray circuit 1 (Y5)
5 Connector spray circuit 2 (Y6)
6 Connector spray circuit 3 (Y7+Y9)
7 Connector spray circuit 4 (Y8+Y9)
8 Silver ionisation cartridge
9 Booster pump (Type A only)
10 Pressure switch PS2 (Type A with Sterile filter only)
11 Sterile filter
12 Check valve (Type A only)
13 Drain valve Y10
14 Pressure sensor PS5
15 Spray valve Y5
16 Spray valve Y6
17 Spray valve Y7
18 Spray valve Y8
19 Water jet pump
20 Manometer inlet pressure
21 Pressure sensor PS4

Abb. 6: Overview central unit Condair DL

4 Operation

The adiabatic air humidification system Condair DL may be commissioned and operated only by persons familiar with the adiabatic air humidification system Condair DL and adequately qualified. It is the owner's responsibility to verify proper qualification of the personnel.

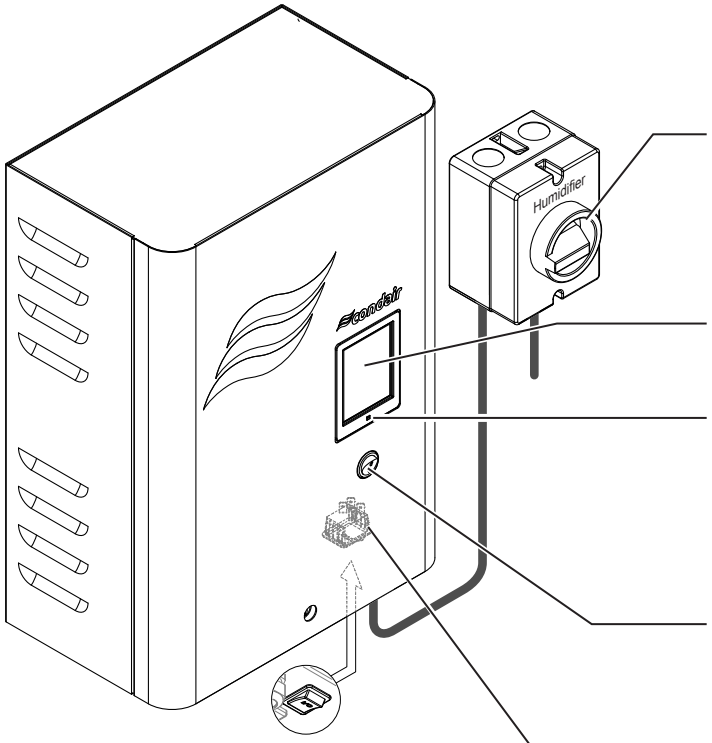
4.1 First-time commissioning

The first-time commissioning must always be done by a service technician of your Condair representative or a well trained and authorised person of the customer. Therefore the current manual does not provide detailed information on this procedure.

The following steps are carried out by the service technician upon first-time commissioning in the specified order:

- Inspecting the humidification unit, the control unit and the central unit for correct installation.
- Inspecting the electrical installation
- Inspecting the water installation
- Flushing the water supply line and testing the water quality.
- Checking direction of rotation of the booster pump and adjusting the relief valve of the booster pump.
- Checking whether the spray circuits are connected to the corresponding nozzles and that all nozzles are spraying correctly.
- Configuring the control unit or the humidification system Condair DL, respectively.
- Carrying out test runs.
- Fill in the commissioning protocol
  Note: a master of the commissioning protocol is included in the delivery or can be ordered from your Condair representative.

4.2 Display and operating elements



1 Electrical isolator
Note: the electrical isolator is included in the delivery and must mandatory be installed in the mains supply line within 1 m to the control unit!

2 Touch screen

3 Status LED
- green: Condair DL is humidifying
- green pulsing: No demand or humidification is switched off
- orange: Warning present or maintenance due
- red: Fault present

4 Switch **<Humidification On/Off>**
Note: with this switch the humidification function can be activated and deactivated. The hygiene functions (regular flushing of the water system) remain still active even with deactivated humidification function.

5 Switch **<Control unit On/Off>** (located on the bottom of the control unit)
Note: with this switch you can switch on and off the control unit. If the control unit is switched off all functions (including hygiene functions) of the adiabatic air humidification system Condair DL are deactivated.

Abb. 7: Display and operating elements Condair DL

DANGER!
Risk of electric shock!

Since mains supply to the control unit is not interrupted by switching off the **<Humidification On/Off>** switch and there is still mains voltage inside the control unit even when you switch off the **<Control unit On/Off>** switch too, the **electrical isolator must be switched off before open the control unit**.

4.3 Recommissioning after interruption of operation

The following description outlines the recommissioning procedure after an interruption of the operation (e.g. after servicing the system). It is assumed that first-time commissioning has been carried out properly by the service technician of your Condair representative. Proceed as follows to prepare the adiabatic air humidification system Condair DL for operation:

1. Examine the system components and installations for possible damage.

   DANGER!

   Damaged systems or systems with damaged components or installations may present danger to human life or cause severe damage to material assets.
   Damaged systems and/or systems with damaged or faulty installations must not be operated.

2. Make sure the ceramic plates are correctly located and properly sealed.

   WARNING!

   An unsealed post-evaporation unit may lead to severe damage of material assets.
   Put the system into operation only if the ceramic plates are correctly positioned and the post-evaporation unit correctly sealed.

3. **Switch on the electrical isolator in the mains supply line** (mains supply to control unit).
4. If closed, open shut-off valve in the water supply line.
5. Switch **<Control unit On/Off>** and **<Humidification On/Off>** switch on the control unit to "**On**", and activate control unit via the external enable switch if necessary.
6. If the adiabatic air humidification system Condair DL has been disconnected from the mains for more than 48 hours the message "Commissioning" appears. If this is the case proceed as follows:
   - Switch off control unit via the **<Control unit On/Off>** switch.
   - Close shut-off valve in the water supply line.
   - Disconnect the water supply line from the connector on the central unit.
   - Lead the open end of the water supply line into open tundish of the waster line of the building.
   - Open the shut-off valve in the water supply line and flush the supply line for at least 5 minutes. Close shut-off valve in the water supply line again. Reconnect the water supply line to the connector on the central unit, and open the shut-off valve.
   - Switch on control unit via the **<Control unit On/Off>** switch.

   Note: After switching on the control unit the "Commissioning" message appears again. Reset the message with the "Commissioning Reset" function in the service submenu (see chapter *5.5.2 – Performing maintenance functions – "Service" submenu*). Whether or not you reset the message the Condair DL is automatically switched to normal operating mode after 5 minutes.
7. If the sterile filter has been replaced, deaerate the sterile filter as described in *chapter 6.6*.

The adiabatic air humidification system Condair DL is now in **normal operating mode** and the **standard operating display** is shown in the display.
Note: Further information on the operation of the Condair DL control software can be found in chapter *5 – Operating the Condair DL control software*.

4.4 Notes on operation

4.4.1 Important notes on operation

– For hygiene reasons the drain valve opens **every 23 hours for aprrox. 300 seconds** in standby mode in order to flush water supply line.

– Humidification is not activated if the humidification request is below 11% (with 3 spray circuits) or below 5.8% (with 4 spray circuits), respectively.

4.4.2 Remote operating and fault indication

Via the relays on the operating and fault indication board the following operating status are indicated:

Activated remote indication relay	**When?**
“Error”	An error is present, operation is stopped or further operation is possible for a limited period of time only.
“Service”	One of the maintenance counter has elapsed. The corresponding maintenance must be performed.
“Humidification”	Demand present/humidification
“Unit on”	The humidification system is switched on and under voltage

4.4.3 Inspections during operation

During operation the adiabatic air humidification system Condair DL has to be inspected periodically. On this occasion check the following:

- the water systems for any leakage.
- the components of the humidification system for correct fixing and any damage.
- the electric installation for any damage.
- the display for whether or not a warning or error message is present.

If the inspection reveals any irregularities (e.g. leakage, error indication) or any damaged components take the adiabatic air humidification system Condair DL out of operation as described in chapter *4.5 – Decommissioning the system*. Then, have the malfunction be eliminated or the damaged component be replaced by a well trained specialist or a service technician from your Condair representative.

4.4.4 Manual flushing of the water system

Note: if an error message is active manual flushing is not possible.

To perform a manual flushing of the water system proceed as follows:

1. Press on the **<Drain>** button in the standard operating display. The “Manual” submenu appears.
2. Press on the **<Drain>** button. The drain confirmation display appears.
3. Press on the **<Yes>** button to start the flushing of the water system. A possible running humidification process is interrupted. If your system is equipped with the optional external water supply flushing valve Y4, first the water supply line is flushed. Then, the inlet valve Y1 opens and the internal water system of the central unit is flushed via the drain valve Y10 (normally open valve). If your system is equipped with the optional compressed-air flushing valve Y3, the spray circuits are blown out one after the other, assumed there is no humidity demand present and the safety chain and the external enable contact (if applicable) are closed.

   The progress bar in the display shows the current status of the flushing cycle. After flushing cycle has finished the unit returns to the “Manual” submenu.

   In order to stop the flushing cycle press the **<Cancel>** button in the flushing progress window. The flushing cycle is stopped and the unit returns to the “Manual” submenu.

4.4.5 Perform a pressure release of the water system

Note: a pressure release can be performed even if a error message is active.

To release the pressure in the water system of the central unit proceed as follows:

1. Close the shut-off valve in the water supply line.
2. Press on the **<Pressure Release>** button in the standard operating display. The “Manual” submenu appears.
3. Press on the **<Pressure Release>** button in the “Manual” submenu. The drain confirmation display appears.
4. Press on the **<Yes>** button to start the pressure release of the water system. The inlet valve Y1 and the drain valve Y10 open for approx. 10 minutes. Then, the unit returns to the “Manual” submenu.
   Note: in order to stop the pressure release cycle press the **<Cancel>** button in the progress window. The pressure release cycle is stopped and the unit returns to the “Manual” submenu.

4.5 Decommissioning the system

In order to take the adiabatic air humidification system Condair DL out of operation (e.g. to perform maintenance works) perform the following steps:

1. Close the Shut-off valve in the water supply line.
   Note: if you want to perform work on the water system release the pressure in the water system (see chapter *4.4.5 – Perform a pressure release of the water system*). As soon as the error message “E22 Water Missing” appears stop the pressure release cycle.
2. Switch off **<Humidification On/Off>** and **<Control unit On/Off>** switch on the control unit, and if necessary deactivate control unit via the external enable switch.
3. **Disconnect control unit from the mains supply**: switch off electrical isolator in the mains supply line and secure switch in the “Off” position against accidentally switching on.
4. **Mind hygiene! Let the fan of the ventilation system run** until the humidification unit is **dry**.
5. If work has to be carried out on the humidification unit switch off the AHU and secure the system against accidentally being switched on.

Important information on extended periods of non-use

Important! For reasons of hygiene, we basically recommend that the control unit and the supplying RO system should be left switched on and only to switch off the humidification function via the **<Humidification On/Off>** switch on the control unit. With the system switched on, the water circuit is flushed at regular intervals and hence the build-up of germs is opposed.

If the adiabatic air humidification system Condair DL is not be used for a longer period of time observe the following points:

– **Mind hygiene! Drain all water conduits**.
  Note: Regarding the emptying of the water supply line from the RO system please refer to the specifications of the manufacturer of the RO system.
– Remove the sterile filter, drain the water in the filter housing, dry filter housing and install a new filter cartridge.
– Drain the Ag ionisation cartridge.
– For safety reasons the **post-evaporation elements should remain in their working position**, even if the humidifier is not used for an extended period. This prevents the water from being sprayed directly into the duct in case the humidifier is powered up inadvertently.

5 Operating the Condair DL control software

5.1 Standard operating display

After switching on the control unit and the automatic system test the control unit is in **normal operating** mode and the **standard operating display** is shown.
Note: the appearance of the standard operating display depends on the current operating status and the configuration of the humidity regulation of the system and can deviate from the display shown below.

The standard operating display s structured as follows:

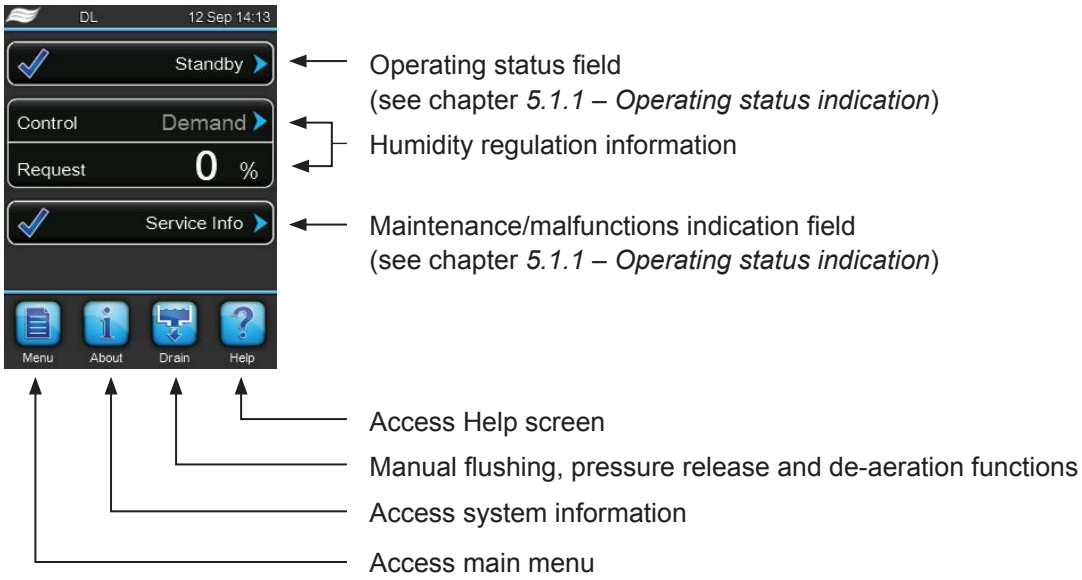


Abb. 8: Standard operating display

5.1.1 Operating status indication

The following operation status indications may appear during operation:

Operating status indication	Description
	The control is initalising.
	The humidification system is flushed and ready to humidify immediately if a demand is present.
	No humidity demand for more than 60 minutes the humidification system is in standby mode. The water system is flushed automatically for 300 seconds before the next humidification takes place.
	The water is being flushed.
	The humidification system is humidifying.
	The humidification system is filling and deaerating after water shortage has occured.
	The conductivity of the supply water is beyond of the admissible range, the water system is flushed automatically for a certain period of time.
	The humidification system was stopped via the external enable switch.
	The humidification function is deactivated via the **<Humidification On/Off>** switch on the front side of the control unit. The hygiene functions (regular flushing of the water system) remain still active.
	The humidification system is stopped due to a malfunction which obviates further operation. Additionally “Warning” or “Fault” is displayed in the maintenance and malfunction field.

5.1.2 Maintenance and malfunction indications

The following maintenance and malfunction indications may appear during operation:

Operating status indication	Description
	No malfunction present. By pressing on the indication field the service menu can be accessed.
	This message appears after switching on, if the control unit has been isolated from the mains supply for more than 48 hours. The humidification system is blocked for 5 minutes. Before operation the RO water supply line to the central unit must be flushed. The commissioning warning is reset automatically after 5 minutes or you can reset the warning in the “Service” submenu (see chapter *5.5.2 – Performing maintenance functions – “Service” submenu*).
	The system service is due. If the system service is not performed within 7 days a fault message is triggered. The system remains operable.
	The silver ionisation cartridge is exhausted and must be replaced. If the silver ionisation cartridge is not replaced within 7 days a corresponding Fault is triggered and the system is stopped.
	A malfunction with status “Warning” is active. Additionally the yellow LED lights. Depending on the malfunction the humidification system is either be stopped or stays operable for a certain period of time.
	A malfunction with status “Fault” is active. Additionally the red LED lights. Depending on the malfunction the humidification system is either be stopped or stays operable for a certain period of time.

5.2 Navigating/Operating the Condair DL control software

Navigation element	Action
	Accessing main menu
	Accessing system information
	Performing manual drain/pressure release
	Accessing help screen
	If you press on a field with a blue arrow symbol a new screen with additional information or settings appears.
	This symbol on the left side of the operating status field and of the maintenance/malfunctions indication field indicates, that the system is working ok.
	This symbol on the left side of the the maintenance/malfunctions indication field indicates, that a Warning is present. Press on the field to get further information.
	This symbol on the left side of the operating status field and of the maintenance/malfunctions indication field indicates, that a Fault is present (additionally the LED lights red). Press on the field to get further information.
	Jumps back to previous screen (Cancel and back)
	Scroll up/down in the present window
	Increase/decrease value
	Delete shown value
	Confirm set value or selected option

5.3 Information functions

5.3.1 Accessing support information

In the standard operating display press the **<Help>** button.
The screen with the support information appears.

5.3.2 Accessing system information

In the standard operating display press the **<About>** button.

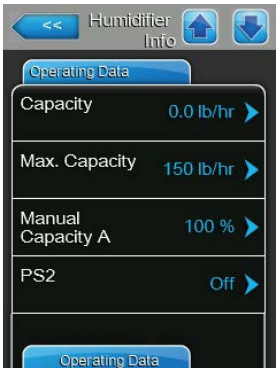
The system information screen appears. Use the arrow buttons to scroll up and down within the system information screen to access the different operating data.

Maintenance

- **Hours of Operating**: Operating hours since initial commissioning of the system.
- **Next Service**: Remaining time until next maintenance of the system must be performed.
- **Remaining Aglon Capacity**: Remaining capacity of the silver ionisation cartridge in Ah.

Operating data

- **Conductivity**: Actual conductivity of the supply water in µS/cm.
- **Lower Limit**: Set limit value for the water conductivity in µS/cm.
- **Aglon Current**: Actual current of the Ag ionisation in mA.
- **Target Aglon Current**: Set nominal current for Ag ionisation in mA.



- **Capacity**: Actual capacity of the humidification system in kg/h.
- **Max. Capacity**: Maximum capacity of the humidification system in kg/h.
- **Manual Capacity A**: Set capacity limitation in % of the maximum capacity.
- **PS2**: Actual status of the optional pressure switch PS2 when operating the humidification system Condair DL type A with sterile filter (“On”= pressure present, “Off”= no pressure present).

- **PS4**: Actual water inlet pressure in bar.
- **PS5**: Actual atomization pressure of the water in bar (Type A with booster pump only).
- **Pump current**: Actual current of the booster pump in A.
- **Y1**: Actual operating status of the inlet valve “Y1”.

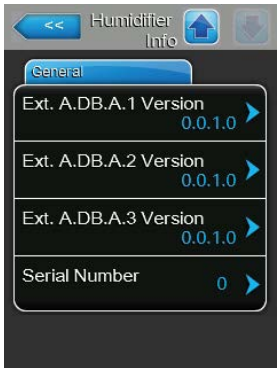
- **Y2**: no function.
- **Y3**: Actual operating status of the optional compressed-air flushing valve “Y3” .
- **Y4**: Actual operating status of the optional external water supply flushing valve “Y4”.
- **Y5**: Actual operating status spray valve “Y5”.

- **Y6**: Actual operating status spray valve “Y6”.
- **Y7**: Actual operating status Spray valve “Y7”.
- **Y8**: Actual operating status Spray valve “Y8”.
- **Y9**: Actual operating status Spray valve “Y9 (double stage with “Y7” or “Y8”).

- **Y10**: Actual operating status drain valve (open when de-energised).
- **Y11**: no function

General

- **Humidifier Model**: Designation of the humidifier model.
- **Device Type**: Device type (“Hum”= Humidifier without booster pump, “Hum+FC”= Humidifier with booster pump)
- **Software Version**: Actual Version of the control software.
- **Driver A.DB.A Version**: Actual software version of the driver board.



- **Ext. A.DB.A 1 Version**: Actual software version of the conductivity monitoring board (conductivity supply water).
- **Ext. A.DB.A 2 Version**: Actual software version of the Ag ionisation board.
- **Ext. A.DB.A 3 Version**: No function
- **Serial Number**: Serial number of the humidification system.

5.4 Configuration

5.4.1 Accessing the “Configuration” submenu

Password: **8808**

5.4.2 Activating/deactivating and configuration of unit functions – “Features” submenu

In the “Features” submenu you can activate/deactivate and configure unit functions.

Drain Timer

- **Function**: with this setting you can activate (“On”) or deactivate (“Off”) the timer controlled flushing of the water system.
  Note: during the timer controlled flushing of the water system, first the water supply line is flushed, assumed your system is equipped with the optional external water supply flushing valve Y4. Then, the inlet valve Y1 opens and the internal water system of the central unit is flushed via the drain valve Y10 (normally open valve). Finally, the spray circuits are blown out with pressured air one after the other, assumed your system is equipped with the optional compressed-air flushing valve Y3.
- **Start Time**: with this setting you determine the time of day, at which the timer controlled flushing of the water system is to be carried out.
  Note: if at the point in time, on which the timer controlled flushing is to be carried out, a humidity demand is present, the flushing is omitted.

5.4.3 Humidity control Settings – “Control Settings” submenu

In the “Control Settings” submenu you determine the control settings for the adiabatic air humidification system Condair DL. The control settings available depend on the selected signal source and the control mode.

Basic

– **Source**: with this setting you determine whether the control signal comes from an analogue source (signal of a humidity sensor or demand signal from an external humidity controller) or via Modbus.

  Factory setting: **Analog**

  Options: **Analog** or **Modbus**

– **Control Mode**: with this setting you determine the type of controller used with the adiabatic air humidification system Condair DL.

  Factory setting: **Demand**

  Options: **On/Off** (external On/Off humidistat)
  Demand (external continuous controller)
  RH P (internal P controller)
  RH PI (internal PI controller)

– **Manual Capacity A**: with this setting you determine the capacity limitation in relation to maximum capacity in %.

  Factory setting: **100 %**

  Options: **20 ... 100 %**

– **Signal Type Channel 1**: with this setting you determine the control signal with which the humidification system is controlled.
  Note: this setting appears only if signal source is set to “Analog” and control mode is set to “Demand”, “RH P” or “RH PI”.

  Factory setting: **0-10 V**

  Options: **0-5V, 1-5V**, **0-10V**, **2-10V**, **0-20V**, **0-16V**, **3.2-16V**, **0-20mA**, **4-20mA**

PI Control Parameter

– **Setpoint**: with this setting you set the humidity setpoint for the internal P/PI controller in %rh.
Note: this setting appears only if the Control Mode is set to “RH P” or “RH PI”.
Factory setting: **40 %rh**
Options: **0 ... 95 %rh**

– **P-Band Channel 1** : with this setting you set the proportional range for the internal P/PI controller in %rh.
Note: this setting appears only if the Control Mode is set to “RH P” or “RH PI”.
Factory setting: **15 %rh**
Options: **6 ... 65 %rh**

– **Integral Time Channel 1**: with this setting you set the integral time for the internal P/PI controller.
Note: this setting appears only if the Control Mode is set to “RH PI”.
Factory setting: **5 minutes**
Options: **1 ... 60 minutes**

5.4.4 Basic settings – “General” submenu

In the “General” submenu you determine the basic settings for operating the Condair DL control unit.

Basic

– **Date**: With this setting you determine the current date in the set format (”MM/DD/YYYY” or “DD/MM/YYYY”).
Factory setting: **00/00/0000**

– **Time**: With this setting you set the current hour of the day in the set time format (”12H” or “24H”).
Factory setting: **12:00**

– **Language**: With this setting you determine the dialogue language.
Factory setting: **depending on the country**
Options: **different dialogue languages**

– **Units**: With this setting you determine the desired unit system.
Factory setting: **depending on the country**
Options: **Metric or Imperial**

– **Contrast**: With this setting you determine the desired value for the display contrast.
  Factory setting: **8**
  Options: **1 (weak contrast) ... 31 (strong contrast)**
– **Brightness**: With this setting you determine the desired value for the display brightness.
  Factory setting: **52**
  Options: **1 (dark) ... 100 (white)**

Time/Date

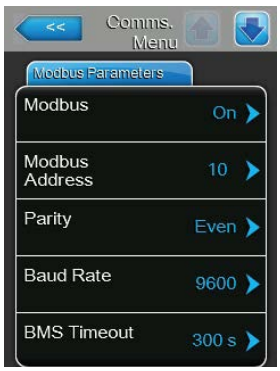
– **Date Format**: With this setting you determine the desired date format.
  Factory setting: **DD/MM/YYYY**
  Options: **DD/MM/YYYY** or **MM/DD/YYYY**
– **Clock Format**: With this setting you determine the desired time format.
  Factory setting: **12H**
  Options: **24H** (24 hours, display 13:35) or
  12H (12 hours, display: 01:35 PM)

5.4.5 Communication settings – “Communication” submenu

In the “Communication” submenu you determine the parameters for the communication.

Modbus Parameters

Note: modifications of the Modbus settings are activated only after a restart of the control unit.



– **Modbus**: With this setting you can activate (“On”) or deactivate (“Off”) communication via a Modbus network.
  Factory setting: **Off**
  Options: **Off** or **On**

  The following parameters appear only if the Modbus function is activated.
  – **Modbus Address**: With this setting you determine the Modbus address for the adiabatic air humidification system Condair DL for the communication via a Modbus network.
    Factory setting: **10**
    Setting range: **1 ... 247**
  – **Parity**: With this setting you set the parity bit for the data transfer.
    Factory setting: **Even**
    Options: **None, Even or Odd**

– **Baudrate**: With this setting you set the Baudrate for the data transfer.
  Factory setting: **9600**
  Options: **9600, 19200, 39400, 115200**
– **BMS Timeout**: With this setting you set the timeout time for the data transfer.
  Factory setting: **300 Seconds**
  Setting range: **0 ... 300 Seconds**

Remote Fault Board

– **Indication**: With this setting you determine whether maintenance messages ("Service") only or all Warning messages ("Warning") are outputted via the service relay of the remote operating and fault indication board.
  Factory setting: **Service**
  Options: **Service** or **Warning**
– **Safety Loop**: With this setting you determine whether an Fault ("On") or a Warning ("Off") is triggered when the external safety chain is open.
  Factory setting: **Off**
  Options: **Off** or **On**

5.5 Maintenance functions

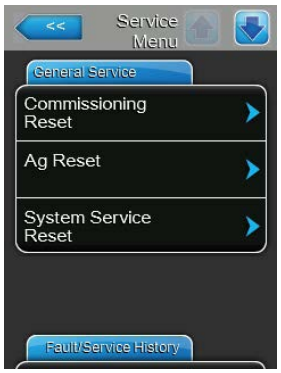
5.5.1 Accessing the “Service” submenu

Password: **8808**

5.5.2 Performing maintenance functions – “Service” submenu

In the “Service” submenu you can enter the activation code, accessing and resetting the fault and maintenance history and performing different input and output diagnostic functions.

General Service



- **Commissioning Reset**: with the “Commissioning Reset“ function you can reset the “Commissioning” message, which appears if the control unit has been disconnected from the mains for more than 48 hours. After pressing on the “Commissioning Reset” button a confirmation window appears where the resetting must be confirmed.
  Note: after resetting the control unit must be connected to the mains for at least 15 minutes, otherwise the “Commissioning” message appears on the next startup again.
- **Ag Reset**: with the“Ag Reset“ function you can reset the Ag maintenance message or the Ag maintenance counter, respectively. After pressing on the “Ag Reset” button a confirmation window appears where the resetting must be confirmed.
- **System Service Reset**: with the“System Service Reset“ function you can reset the system service message or the system service counter, respectively. After pressing on the “System Service Reset” button a confirmation window appears where the resetting must be confirmed.

Fault/Service History

Note: the fault and maintenance events stored can be correctly analysed only if the data and the time of day are correctly set.

– **Fault History**: with this function you can access the fault history list where the last 40 fault events are stored. After pressing on the “Fault History” button the fault history list appears.
– **Service History**: with this function you can access the service history list where the last 40 service events are stored. After pressing on the “Service History” button the service history list appears.
– **Reset Fault History**: with this function you can reset the fault history list. After pressing on the “Reset Fault History” button a confirmation window appears where the resetting of the fault history list must be confirmed.
– **Reset Service History**: with this function you can reset the service history list. After pressing on the “Reset Service History” button a confirmation window appears where the resetting of the service history list must be confirmed.

Diagnostics

– **Input Diagnostics**: with the “Input Diagnostics” function you can access the “Input Diagnostics” submenu where you can view different current input values the control system is using. Detailed information on the individual input diagnostic functions can be found in chapter *5.5.2.1 – Input diagnostic functions – “Input Diagnostics” submenu*.
– **Output Diagnostics**: with the “Output Diagnostics” function you can access the “Output Diagnostics” submenu where you can activate or deactivate different system functions for diagnostic reason.

CAUTION!

The operation of the “Output Diagnostics” submenu requires wide knowledge of the control software and must be operated only by authorised and trained personnel, since false operation may lead to damage of system components.

– **Relay Diagnostics**: with the “Relay Diagnostics” function you can access the “Relay Diagnostics” submenu where you can activate or deactivate the relays of the optional remote operating and fault indication board. Detailed information on the individual relay diagnostic functions can be found in chapter *5.5.2.3 – Relay diagnostic functions – “Relay Diagnostics” submenu*.

  Note: By accessing the “Relay Diagnostics” submenu the humidification system is automatically switched to standby operation.

5.5.2.1 Input diagnostic functions – “Input Diagnostics” submenu

The following input values can be viewed after accessing the “Input Diagnostics” submenu.
Note: the input values can be accessed and viewed too, via the “Service Info” selection field in the standard operating display.

Signal

- **Humidity control**: Actual demand signal in %
- **Safety Loop**: Actual status of the external safety chain (“Off”= safety chain open, “On”= safety chain closed).
- **Control Enable**: Actual status of the external enable switch, if present (“Off”= switch open, “On”= switch closed).

Hydraulic

- **FC Error**: Actual status of the error relay of the frequency converter (“Off”= frequency converter switched off or error present, “On”= Frequency converter switched on and no error present)
- **CS1**: Actual status of the external switch (K2 on wiring diagram) of the optional pressured air flushing (“Off”= external switch open, “On”= external switch closed).
- **PS2**: Actual pressure status after sterile filter (“Off”= no pressure present, “On”= pressure present).
- **PS4**: Actual water inlet pressure in bar.

- **PS5**: Actual nozzle pressure in bar.
- **Pump Current**: Actual current of the booster pump motor.

Conductivity

– **Conductivity**: Actual conductivity of the supply water in µS.

Aglon Current

– **Aglon Current**: Actual current of the Ag ionisation in mA.

Hygiene&Safety

– **24V External Supply**: Actual voltage of the external 24 V supply.
– **10V External Supply**: Actual voltage of the external 10 V supply.
– **5V Peripheral Supply**: Actual voltage of the external 5 V supply.

5.5.2.2 Output diagnostic functions – “Output Diagnostics” submenu

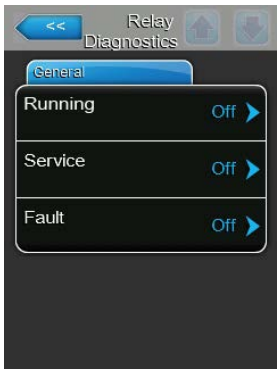
CAUTION!

The operation of the “Output Diagnostics” submenu requires wide knowledge of the control software and must be operated only by authorised and trained personnel, since false operation may lead to damage of system components.

5.5.2.3 Relay diagnostic functions – “Relay Diagnostics” submenu

The following relay diagnostic functions are available after accessing the “Relay Diagnostics” submenu.

General



- **Running**: with this function you can activate (“On”) and deactivate (“Off”) the relay “Running” on the remote operating and fault indication board.
- **Service**: with this function you can activate (“On”) and deactivate (“Off”) the relay “Service” on the remote operating and fault indication board.
- **Fault**: with this function you can activate (“On”) and deactivate (“Off”) the relay “Fault” on the remote operating and fault indication board.

5.6 Administration settings

5.6.1 Accessing “Administrator” submenu

Password: **8808**

5.6.2 Switching on/off password protection

In the “Administrator” submenu you can activate and deactivate the password protection for the main menu and the setpoint.

Password settings

- **Setpoint Password**: with the function “Setpoint Password” you can protect the setpoint input screen with the user password “**8808**” against unauthorised access (“Yes”) or not (“no”).
- **Main Menu Password**: with the function “Main Menu Password” you can protect the access to the main menu with the user password “**8808**” against unauthorised access (“Yes”) or not (“no”).

6 Maintenance and Replacement of components

6.1 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 notes

The instructions and details for maintenance work must be followed and upheld. Only carry out the maintenance work described in this documentation.

The adiabatic air humidification system Condair DL must be maintained in the prescribed intervals, the cleaning work must be carried out correctly.

Only use original spare parts from your Condair representative to replace defective parts or parts which have elapsed their lifetime.

Safety

DANGER!
Risk of electric shock!

Before carrying out any maintenance work take the adiabatic air humidification system Condair DL out of operation (switch of control unit and disconnect it from the mains and close water supply to the central unit) **as described in chapter** *4.5 – Decommissioning the system* **and secure the system against inadvertent power-up.** In addition take AHU out of operation as described in the operations instructions of the AHU and secure the AHU against inadvertent power-up.

CAUTION!

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

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

DANGER!
Health risk by inadequate maintenance!

Inadequately operated and/or poorly maintained adiabatic humidification systems may endanger the health. When inadequately operated and/or poorly maintained micro-organisms (including the bacterium which causes Legionnaire's disease) may grow in the water system and in the area of the humidification unit and may affect the air in the AHU/air duct.

Prevention: the adiabatic humidification system Condair DL must correctly be operated as described in chapter *4 – Operation*, and must be correctly maintained and cleaned in the prescribed intervals as described in chapter *6 – Maintenance and Replacement of components*.

6.2 Hygiene and Maintenance according to VDI 6022 Page 1

The adiabatic air humidification system Condair DL incorporates the very latest technology, and has been designed to guarantee **hygienically trouble-free operation** when **operating conditions are observed**. The hygiene during operation was tested, proven and confirmed by the award of the **SGS-Fresenius Hygiene Certificate** following long-term tests at the Fresenius Institute.

To ensure operational safety and to guarantee hygiene in long-term operation, the **maintenance concept for the Condair DL** has been structured in **two stages**. This differentiates between **periodical checking** and the implementation of a **total system service** of the Condair DL. In order to operate the system according to the regulations “optimised air humidification DGUV” the maintenance must be carried out in accordance with the information given in chapter *6 – Maintenance and Replacement of components*, additionally an maintenance record must be provided.

Hygiene Service

For carrying out a total system service your Condair representative offers maintenance contracts. The trained Condair service technicians have the necessary equipment and carry out the hygiene service upon the newest state of the art. The valid technical guidelines are thereby considered. **For this purpose please contact your Condair representative.**

6.2.1 Periodical checking

Periodical checking should be carried out **monthly** and include the following work:

Item	Work to be carried out
Nozzle system	– **Manually switch on the individual spray circuits via the diagnostic function** (see chapter *5.5.2.2 – Output diagnostic functions – "Output Diagnostics" submenu*) **and check the spray pattern of the atomizing nozzles** (spray cone: 60° acceptable). Remove atomizing nozzles with uneven spray pattern and clean them (see total system service). – **Check hoses and connections for sealing**, if necessary, replace defective components.
Post-evaporation unit	– **Check ceramic plates for breakage**. Damaged plates should be replaced (see full servicing guide). **Note: A grey discolouration of the ceramic plates is normal. This is due to deposits from the silver ionisation.**
Central unit	– **Silver ionisation**: see detailed information in chapter *6.5 – Replacement of the silver ionisation cartridge "Hygieneplus"*. – **Check hoses, connections, pressure sensors (PS4 and PS5) valves**, etc.in the central unit. Replace defective components where necessary.
Humidifier housing/ Water tub	– **Check the water container and humidifier housing for soiling** (Rust, slime, dust), clean if necessary (see total system service). – **Check the water tub behind the post evaporation unit for collection of residual water**. If residual water is present, check the water drain and the post evaporation unit.
Maintenance record	– Read off the **operating parameters**, including "**Fault history**", in the info level and enter the values as well as the last four error messages on the **maintenance record sheet**. Note: a master of the maintenance record sheet is included in the delivery or can be ordered from your Condair representative.

6.2.2 Total system service

The frequency of the implementation of a total system service depends on the operating conditions. The state of the humidifier‘s hygiene and its components mostly depends on the quality of the humidifier water, the performance (and the frequency of replacement) of the filter installed before the unit, the air velocity, the air temperature, and the microbiological and chemical composition of the inlet air.

The basic rule is: when the “Sys Service” message appears, or at least once a year, the implementation of a total system service is obligatory.

Resetting the “Sys Service” message

Upon completion of the total system service the **maintenance due message** can be reset via the Service menu (see chapter *6.7 Resetting the maintenance counter*).

Item	Work to be carried out
Nozzle system	– **Manually switch on the individual spray circuits via the diagnostic function** (see chapter *5.5.2.2 – Output diagnostic functions – “Output Diagnostics” submenu*) **and check the spray pattern of the atomizing nozzles** (spray cone: 60° acceptable). Remove spray nozzles with a poor spray pattern and clean them in an ultrasonic bath or with a household decalcifier. – **Check hoses and connections for sealing**, if necessary, replace defective components. – **Check spray nozzles for secure seating**. Slightly tighten loose nozzles by hand. – **Clean supporting structure, nozzle grid(s) and tubing with a combined detergent and disinfectant** (application in accordance with manufacturer data), finally rinse all components with hygienically pure water (RO water).
Post-evaporation unit	– If the the post-evaporation unit is not accessible for cleaning from the air outlet side, the ceramic plates must be removed. – **Check ceramic plates for breakage**. Damaged plates must be replaced. – **Check ceramic plates for soiling**. Dust deposits are to be rinsed off with water. Ceramic plates, which cannot be cleaned any more, have to be replaced. **Note: A grey discolouration of the ceramic plates is normal. This is due to deposits from the silver ionisation**. If the ceramic plates show severe deposits of dust, the ventilation system air filter should be checked for cracks, cleanliness and filter quality (min. F7 or EU7). Clean soiled plates. – **Clean supporting structure and sealing plates with a combined detergent and disinfectant** (application in accordance with manufacturer data), finally rinse all components with hygienically pure water (RO water). – **Check the supporting structure, the ceramic plates, the sealing plates for correct assembly and tight seating of screw connections**. If necessary, install faulty components correctly and tighten loose screw connections.
Central unit	– **Silver ionisation**: observe notes in chapter *6.5 – Replacement of the silver ionisation cartridge “Hygieneplus”* . – Clean filter housing of the sterile filter and replace filter cartridge. – **Check hoses, connections, pressure sensors (PS4 and PS5) valves**, etc.in the central unit. Replace defective components where necessary.

Item	Work to be carried out
Humidifier housing/ Water tub	– **Check the water tub behind the post evaporation unit for collection of residual water**. In the event of a substantial amount of residual water, check the water drain and post evaporation unit. Please note: drops of water and small pools of water in the water tray behind the post-evaporation unit are as a rule caused by the system. – **Clean the water tub and humidifier housing (also clean behind the post evaporation unit) with a combined detergent and disinfectant**. Finally rinse all components with hygienically pure water (RO water) and rub dry.
Components installed upstream in the water supply line	– To ensure hygiene the components installed upstream in the water supply line (e.g. water filter, reverse-osmosis system, etc.) must be cleaned and maintained in accordance with the information of the manufacturer.
Electrical installation	– **Inspect connections and cables**. Arrange for a qualified specialist to rectify defective installations.
Humidifier water	– **Determine the bacterial count at the water connection to the central unit**. In the event of **bacterial count** concentrations above the limit of 100 cfu/ml, the water supply/water pipes must be subject to a microbiological inspection and appropriate action must be taken immediately (please contact your Condair representative). **Bacterial count** concentrations in the upper area of the permitted range may be an indication of the onset of bacterial problems in the water supply. The water supply and water pipes should also be subject to a microbiological inspection.
System air	– **Determine the bacterial count in the supply air before the humidifier inlet.** In the event of **bacterial count** concentrations above the limit of 1000 cfu/m^3, the ventilation system must be subject to a microbiological inspection and appropriate action must be taken immediately to rectify the situation (please contact your Condair representative). **Bacterial count** concentrations in the upper area of the permitted range may be an indication of the onset of bacterial problems in the ventilation system. The ventilation system should also be subject to a microbiological inspection. – **Determine the bacterial count in the air at the humidifier outlet to confirm the hygienic function of the humidifier**.
Maintenance record	– After the full servicing, read off the **operating parameters**, including "**Fault history**", in the info level and enter the values as well as the last four error messages on the **maintenance record sheet**. Finally, reset the maintenance due message or the maintenance counter, respectively. Note: a master of the maintenance record sheet is included in the delivery or can be ordered from your Condair representative.

6.3 Notes on cleaning and cleaning agents

For the cleaning of the individual system components of the Condair DL and the cleaning agents which should be used a separate cleaning instruction is available. Condair recommends to use “Condair Clean” as cleaning agent. Please contact your Condair representative for this purpose.

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

CAUTION!

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

DANGER!

Do not use no cleaning agents, which leave poisonous residues. These can get in contact with the ambient air during operation and endanger the health of persons. In any case the components have to be thoroughly rinsed with RO water after cleaning.

6.4 Removal and installation of components

6.4.1 Removal and installation of the ceramic plates

Removal of the ceramic plates

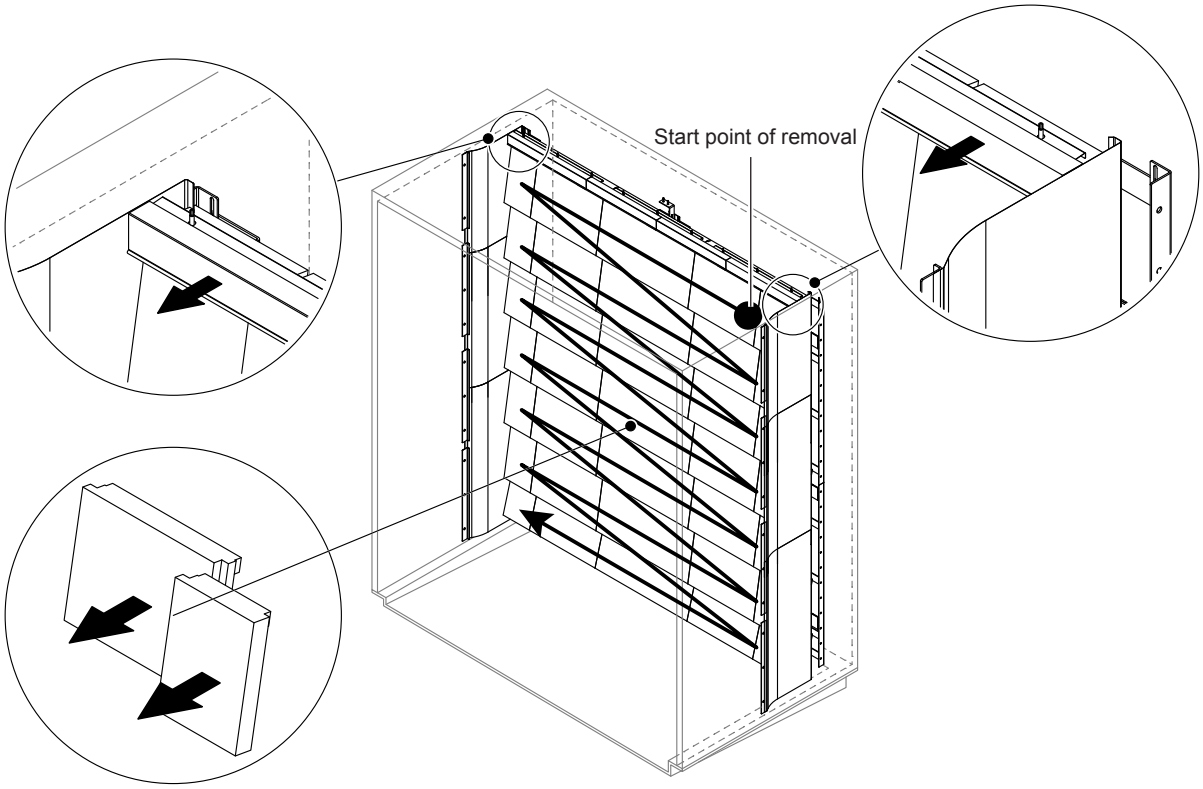


Abb. 9: Removal of the ceramic plates

Proceed as follows to remove the ceramic plates:

1. Remove upper sealing plates.
2. Start on top right and remove the ceramic plates from right to left.
   Important: mark position of the ceramic plates for correct re-assembly.
3. Repeat step 2 for all ceramic plate rows.

Installation of the ceramic plates

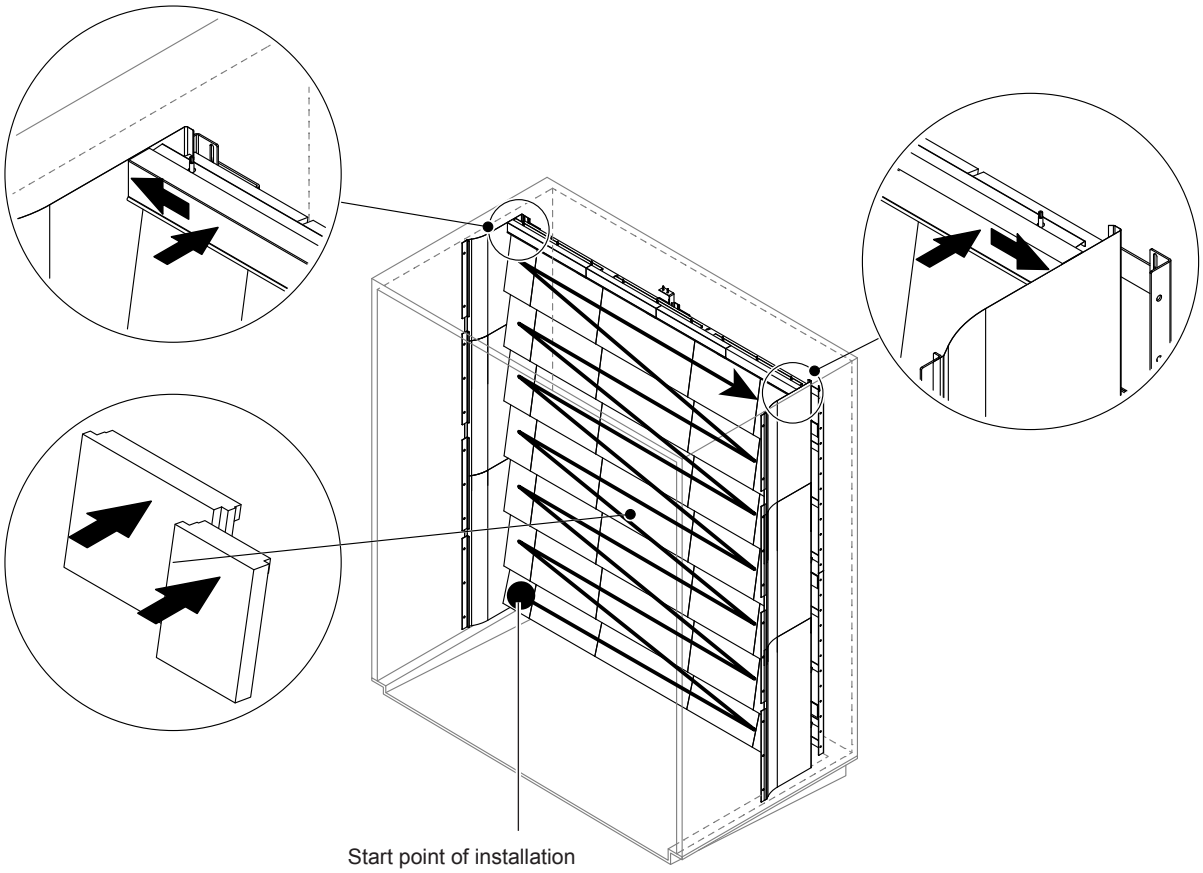


Abb. 10: Installation of the ceramic plates

Before installation, check all ceramic plates for possible damage. Damaged ceramic plates and ceramic angles **must not be reinstalled**.

For installation of the ceramic plates proceed in the reverse order of removal (also see section “Install ceramic plates” in the installation manual).
Important! Make sure to reinstall the ceramic plates in the appropriate locations and that the upper sealing plates on left and the right side are flush with the corresponding the lateral sealing plate.

6.4.2 Removal and installation of the spray nozzles

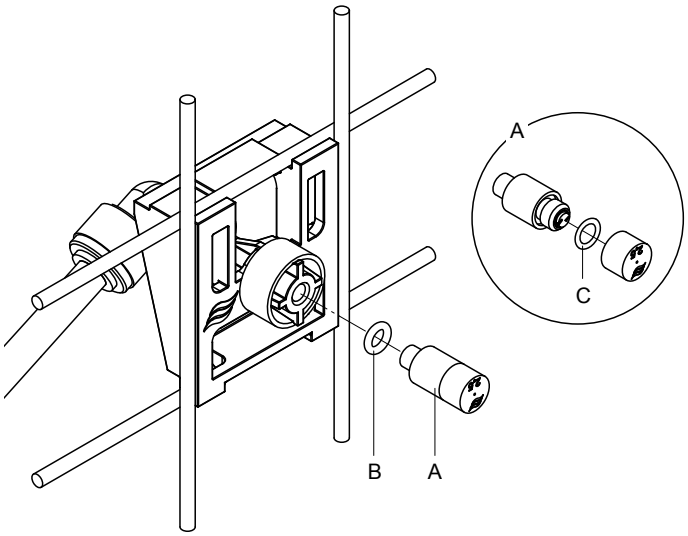


Abb. 11: Removal and installation of the spray nozzles

Removal of the spray nozzles

1. Loosen nozzle “A” by hand and remove it together with the O-ring“B”.
   Note: prior to the removal note the position and the colour identification of the nozzle.
2. If necessary, disassemble the nozzle according to the illustration above.

Installation of the spray nozzles

1. Before installation, check nozzle “A” and o-rings “B” and “C” for any damage. **Damaged nozzles or damaged o-rings must be replaced.**
2. If necessary, assemble the nozzle according to the illustration above.
3. Before installation of the nozzle flush the corresponding spray circuit by activating the appropriate spray valve via the “Output Diagnostics” submenu.
4. Screw in cleaned or new nozzle with O-ring into the nozzle holder and tighten it by hand until it comes to a stop (do not use tools).
   Note: make sure the nozzle is installed in the nozzle grid on the right place and with the correct orientation.

6.4.3 Removal and installation of the nozzle holder

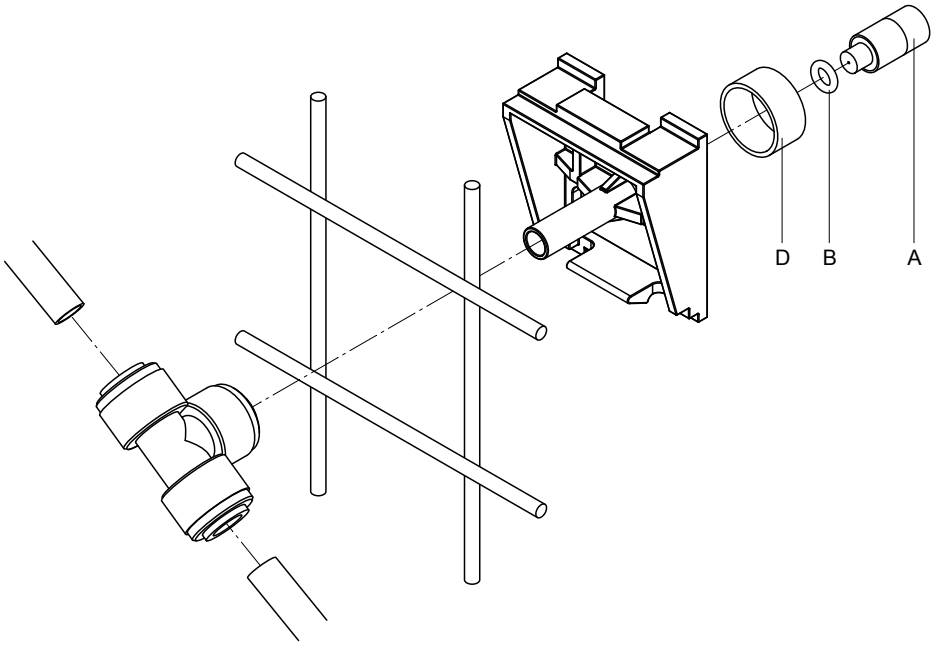


Abb. 12: Removal and installation of the nozzle holder

Removal of the nozzle holder

1. Remove nozzle“A” together with the O-ring “B” as described in *chapter 6.4.2*.
2. Remove coloured ring “D” from the nozzle holder.
3. Remove the hose(s) from the nozzle holder (press the locking ring towards screw, then pull hose off).
4. Remove connection nipple (press the locking ring towards screw, then pull off nipple).
5. Squeeze the catch locks of the nozzle holder and remove the holder.
   Note: prior to the removal note the orientation of the nozzle holder (straight, to the left, etc.).

Installation of the nozzle holder

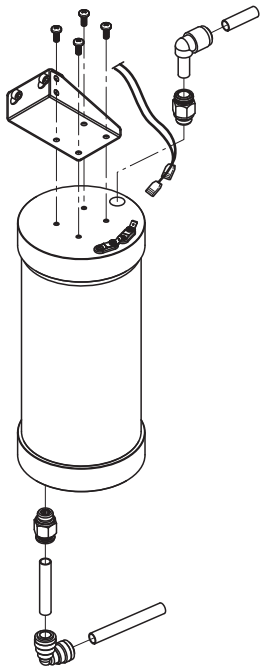
1. Before installation, check all parts (including O-rings) for any damage. **Damaged parts must be replaced**.
   Important! Before installation, flush water conduits with RO water.
2. The installation follows the reverse order of the removal.
   – Make sure the nozzle holder is installed in the nozzle grid on the right place and with the correct orientation.
   – Following installation verify correct fastening of all hose connectors. Correctly mounted hoses can not be removed without pressing the locking ring.

6.5 Replacement of the silver ionisation cartridge “Hygieneplus”

If the silver ionisation cartridge needs to be replaced a maintenance warning appears in the standard operating display in the maintenance and fault indication field. Via the “Service” relay on the remote operation and fault indication board, additionally maintenance request is issued.

If the silver ionisation cartridge is not replaced and the Ag maintenance counter is **not reset within 7 days** an error message is triggered and **the humidification is stopped**. Via the “Error” relay on the remote operation and fault indication board, additionally a fault is issued.

Replacing the silver ionisation cartridge



1. Set the adiabatic air humidification system Condair DL **out of operation** as described in chapter *4.5 – Decommissioning the system*, and **release the pressure in the water system**.
2. Remove the two electrical connectors from the connections on the silver ionisation cartridge.
3. Loosen the hose connectors at the entry and the exit, then remove both screw-in nipples.

CAUTION!

The silver ionisation cartridge is filled with water. Place a bucket under the cartridge before loosening the connections

4. Undo the four screws fastening the silver ionisation cartridge to the holder, then remove the cartridge.

CAUTION!

The silver ionisation cartridge weighs approx. 3 kg (6.5 lb)

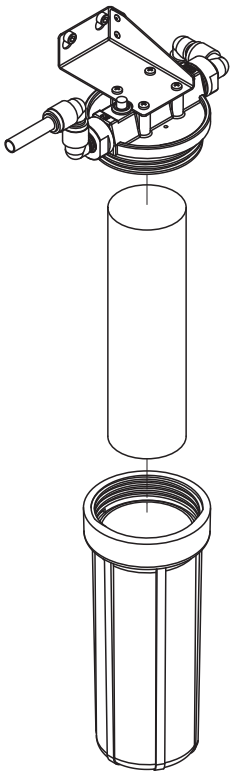
5. Install the new silver ionisation cartridge in the reverse order.

Important: Exhausted silver ionisation cartridges **must be sent to the local Condair representative for correct disposal**.

6.6 Replacement of the sterile filter and de-aeration of the filter housing

Replacing the sterile filter

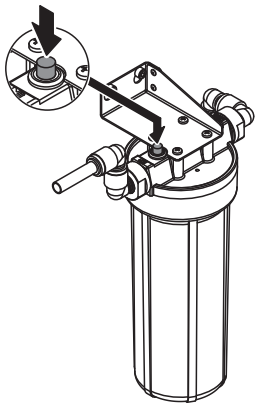
If error “E66” is shown or before any commissioning for a new humidification season the sterile filter must be replaced.



1. Set the adiabatic air humidification system Condair DL **out of operation** as described in chapter *4.5 – Decommissioning the system*, and **release the pressure in the water system**.
2. Loosen and remove the filter housing. Then, remove filter cartridge.
3. Clean filter housing and upper part of filter.
4. Insert new filter cartridge into the filter housing.
   Important! Use original filter cartridge from your Condair representative only.
5. Screw in filter housing with new filter cartridge and tighten it by hand.

De-aeration of the filter housing

After replacement of the sterile filter or when the filter housing has been opened the filter housing must be de-aerated. Proceed as follows:

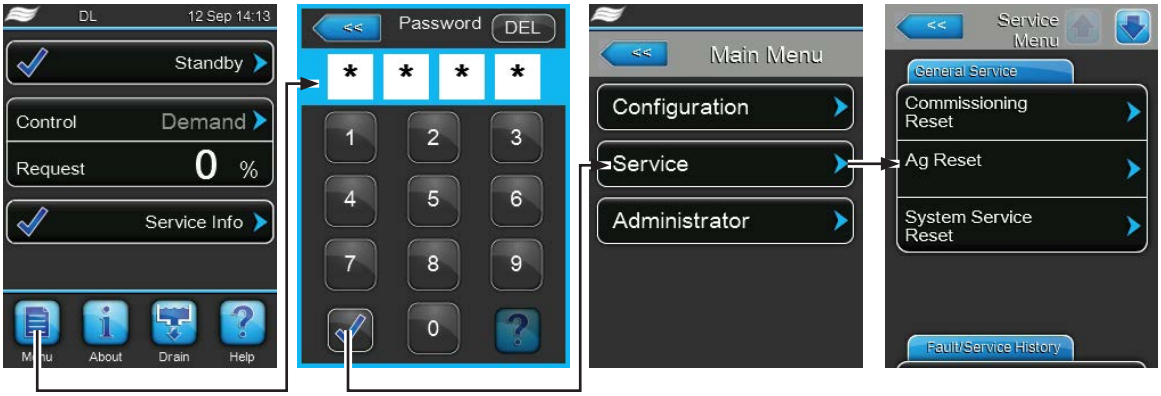


1. Set the adiabatic air humidification system Condair DL into operation as described in chapter *4.3 – Recommissioning after interruption of operation*.
   Important: a minimum flow pressure of 3.0 bar must present in the water supply line.
2. Perform a manual flushing cycle (see chapter *4.4.4 – Manual flushing of the water system*). As soon as an acoustic noise is audible from the water flow press the red knob on top of the filter housing cover (see illustration) until water (without air) is pouring out.
   Note: If an fault message is active the malfunction must be eliminated before a the flushing can be performed.
4. If necessary, stop manual flushing cycle.

6.7 Resetting the maintenance counter

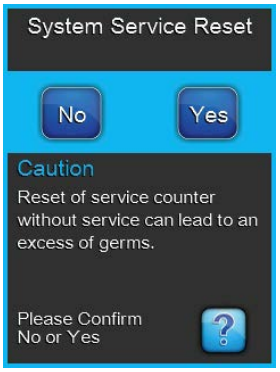
After completing the total system maintenance or after replacement of the Ag ionisation cartridge, the corresponding maintenance indication or maintenance counter, respectively must be reset. Proceed as follows to reset the maintenance counter:

1. Select in the “Service” submenu the corresponding reset function (“System Service Reset” or “Ag Reset”).



Password: **8808**

2. The reset dialogue appears:



- Press the **<Yes>** button to reset the corresponding maintenance counter (“System Service Reset” or “Ag Reset”) . The maintenance counter and the maintenance indication are reset and the control unit is restarted.
- Press the **<No>** button if the maintenance work has not been completed and you want abort the reset procedure. The control unit returns to the “Service” submenu.

7 Fault elimination

7.1 Fault indication

Malfunctions during operation detected by the control software are indicated by a corresponding **Warning** message (operation still possible) or **Fault** message (operation not longer possible) in the maintenance and fault indication field in the standard display of the control unit.

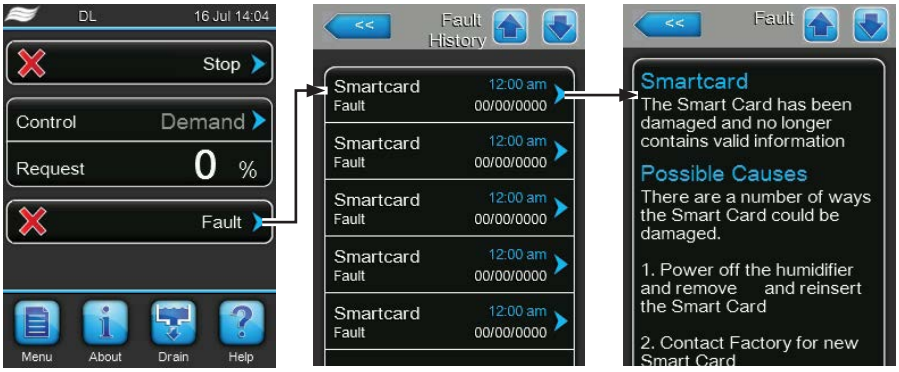
Warning

Temporary problems (e.g. water supply interrupted for a short time) or malfunctions which cannot cause damage to the system are indicated with a warning message. **If the cause of the malfunction disappears of its own accord within a certain period of time, the alarm message will automatically switch off otherwise an fault message is triggered.**
Note: warnings can be indicated also via the service relay of the remote operating and fault indication. Therefore the warning indication via the service relay must be activated in the communication menu of the control software (see chapter *5.4.5 – Communication settings – "Communication" submenu*).

Fault

Malfunctions where further operation is not possible any longer or malfunctions which can damage the system are indicated with a fault message, additionally the red LED below the touch panel light up. If such a malfunction occurs the operation of the system is limited only or the system will be switched off automatically.

By pressing on the maintenance and malfunction indication field in the standard operating display the error list shown with all active warning and fault messages. By pressing on the corresponding Warning or Fault entry additional information regarding the malfunction are displayed (see display on the far-right).



7.2 Malfunction list

Most operational malfunctions are not caused by faulty equipment but rather by improper installation or disregarding of planning guidelines. Therefore, a complete fault diagnosis always involves a thorough examination of the entire system (e.g. hose connections, humidity control system, etc.).

Code		Message	Information	
Warning	Fault		Possible causes	Remedy
W02	——	BMS Timeout	BMS (Modbus, BACnet, LonWorks) has stopped sending humidity/demand updates.	
			Signal cable from BMS not connected correctly or defective.	Correctly connect or replace signal cable.
			Interfering signal present.	Eliminate source of interfering signal.
			Address conflict with other units in the chain.	Correctly set unit adresses.
W20	E20	Safety Loop	External safety chain is open, humidification is stopped! Note: as soon as the safety chain is closed again the humidification system Condair DL continues to work normally.	
			Ventilation interlock open.	Check/switch on fan of the AHU.
			Air proving switch has triggered.	Check fan/filter of the AHU.
			High limit humidistat has triggered.	Wait, check/replace high limit humidistat.
			Fuse “F2” on the driver board defective.	Replace fuse “F2” on the driver board.
——	E22	Water Missing!	Water inlet pressure too low or not present! Note: as soon as the water pressure rises again above the set minimum value the humidification system Condair DL to work normally.	
			Shut-off valve in the water supply line closed.	Open shut-off valve.
			Reverse osmosis system is regenerating or switched off.	Wait or switch on reverse osmosis system.
			Inlet valve Y1 defective or clogged.	Check/replace inlet valve Y1.
			Pressure sensor PS4 defective.	Replace pressure sensor PS4.
——	E24	Pump Current	Current of booster pump not within valid range, humidification is stopped!	
			Nozzles clogged or defective.	Clean/replace nozzles.
			Wrong nozzle type installed.	Install correct nozzle type.
			Spray valves blocked in closed position.	Check/replace spray valves.
			Frequency converter wrong configured.	Contact your Condair representative.
			Pressure relief valve on booster pump set too high.	Contact your Condair representative.
W28	E28	Sys Service	The maintenance interval of the system service has elapsed. If the system service is not performed and the maintenance message is not reset within one week after the maintenance message has been triggered a fault message is triggered!	
			System service due.	Perform system service and reset maintenance counter.
——	E32	Demand Snsr	Demand signal invalid, humidification is stopped!	
			Humidity sensor or external controller not or not correctly connected.	Check/correctly connect humidity sensor/external controller.
			Sensor/controller wrong configured.	Correctly configure sensor/controller via the configuration menu.
			Sensor/controller defective.	Replace sensor/controller.

Code		Message	Information	
Warning	Fault		Possible causes	Remedy
—	E50	Commissioning	This message appears on commissioning if the system or the control unit, respectively was disconnected from the mains for more than 48 hours. The system remains blocked for 5 minutes, and then starts automatically with a flushing cycle.	
			The control unit was disconnected from the mains for more than 48 hours.	We recommend to disconnect the water supply line from the reverse osmosis system on the connection of the central unit and to flush the supply line for 5 minutes into a separate drain. Then, reset the commissioning warning as described in *chapter 5.5.2* or wait until the message is reset automatically after 5 minutes. Note: after resetting, the control unit must be connected to the mains for at least 15 minutes otherwise the message reappears on the next commissioning.
—	E51	Level Disinf.Pump	Level of the disinfectant in the tank is too low. Humidification is further possible for limited period of time!	
			Disinfectant in the tank is used up.	Refill disinfectant.
			Level sensor is not or not correctly connected.	Check/correctly connect level sensor.
			Level sensor defective.	Replace level sensor.
—	E54	Leak Sensor	Leakage monitoring has triggered, humidification is stopped!	
			Water supply line and/or spray circuit lines to the duct and/or water drain line leaky.	Check/seal water supply line, spray circuit lines and water drain line.
			Components (tubes, valves, Ag cartridge, etc.) in the central unit leaky.	Check/seal/replace components in the central unit.
			Fuse “F2” on the driver board defective.	Replace fuse “F2” on the driver board.
—	E55	Ag-Ion Service	Ag cartridge is exhausted and must be replaced, humidification is further possible for limited period of time!	
			Ag cartridge not replaced or Ag maintenance counter not reset after Ag cartridge has been replaced.	Replace Ag cartridge and reset Ag-maintenance counter.
—	E57	Activation	Activation code has not been entered yet.	
			Activation code has not been entered yet.	Enter activation code (code available from your Condair representative).
—	E58	Pr.Sens.Inlet	Invalid signal from inlet water pressure sensor PS4!	
			Pressure sensor PS4 not or not correctly connected.	Check/correctly connect pressure sensor PS4.
			Pressure sensor PS4 wrong configured.	Correctly configure pressure sensor PS4.
			Pressure sensor PS4 defective.	Replace pressure sensor PS4.
—	E59	Sensor NozzPress	Invalid signal from nozzle pressure sensor PS4!	
			Pressure sensor PS5 not or not correctly connected.	Check/correctly connect pressure sensor PS5.
			Pressure sensor PS5 wrong configured.	Correctly configure pressure sensor PS5.
			Pressure sensor PS5 defective.	Replace pressure sensor PS5.

Code		Message	Information	
Warning	Fault		Possible causes	Remedy
—	E62	Nozzle Pressure	Nozzle pressure too high!	
			Wrong type of nozzle installed.	Install correct type of nozzle.
			Nozzles clogged.	Clean/Replace nozzles.
			Max. nozzle pressure set too high.	Contact your Condair representative.
			Wrong order of spray circuits or spray valves.	Correctly connect spray circuits.
			Pressure relief valve on booster pump set too high.	Contact your Condair representative.
—	E63	Aglon Broken	No sufficient current can be built up in the Ag cartridge!	
			Ag cartridge exhausted or defective.	Replace Ag cartridge.
			Electrical supply to Ag cartridge interrupted.	Correctly connect Ag cartridge.
			Installed Ag cartridge too small.	Install correct Ag cartridge.
			Ag board defective.	Replace Ag board.
—	E64	Aglon Shortcut	Short circuit on Ag cartridge!	
			Ag cartridge has internal short circuit due to material defect or due to exhaustion.	Replace Ag cartridge.
—	E65	Aglon Test	Daily Ag Ion test failed.	
			The Ag cartridge can not build up the required maximum current because the end of life-span of the cartridge is reached or a wrong cartridge type is installed.	Replace Ag cartridge.
—	E66	Sterile filter	Pressure after sterile filter too low.	
			Filter clogged.	Disinfect RO water supply line and replace sterile filter.
			Pressure switch PS2 after sterile filter defective.	Check/replace pressure switch PS2.
			Pressure sensor PS5 defective.	Check/replace pressure sensor PS5.
—	E67	No pressure	Air pressure of the compressed-air flushing option too low or no pressure present.	
			Pressure regulator wrongly adjusted.	Correctly adjust pressure regulator (4...5 bar).
			Shut-off valve in the compressed-air supply line closed.	Open shut-off valve in the compressed-air supply line.
			Compressed-air flushing valve Y3 clogged or defective.	Check/replace compressed-air flushing valve Y3.
—	E70	Conduct. Sensor	Invalid signal from Conductivity sensor!	
			Conductivity sensor disconnected or connecting cable interrupted.	Correctly connect conductivity sensor.
			Conductivity monitoring wrong configured.	Correctly configure conductivity monitoring.
			Conductivity board defective	Replace conductivity board.
—	E71	Limite Permeate	Conductivity of the supply water from the reverse osmosis system has exceeded the lower limit value! Humidification still possible at the moment.	
			Reverse osmosis system defective or wrong configured or service due.	Check/repair reverse osmosis system.
			Conductivity sensor not correctly set.	Contact your Condair representative.

Code		Message	Information	
Warning	Fault		Possible causes	Remedy
—	E72	Condu Permeate	Conductivity of the supply water from the reverse osmosis system has exceeded the upper limit value! Humidification is stopped!	
			Reverse osmosis system wrong configured.	Correctly setup reverse osmosis system.
			Permeate membrane of the reverse osmosis system defective or service due.	Check/repair reverse osmosis system.
			Conductivity board wrong configured or defective.	Contact your Condair representative.
			Conductivity sensor soiled or defective (short circuit).	Replace conductivity sensor.
—	E74	Keep Alive	Communication between control board and driver board interrupted.	
			Driver board not connected.	Correctly connect driver board.
			Wrong driver board installed.	Install and connect correct driver board.
			Driver board defective.	Replace driver board.
	E80	USB Logger	USB data logger fault.	
			USB data logger not connected or defective.	Check/replace USB data logger.
—	E82	Driver Missing	Communication with driver board interrupted.	
			RS485 Bus to driver board interrupted.	Contact your Condair representative.
—	E84	Driver defective	Unknown fault on driver board	
			Driver board defective.	Replace driver board.
—	E85	Driver ID wrong	Driver board ID wrong.	
			Wrong driver board connected or SAB address wrong.	Contact your Condair representative.
—	E86	Driver Incompatible	Wrong version of driver board.	
			Wrong version of driver board.	Contact your Condair representative.
—	E87	Local 24VSupply	Local 24V voltage on driver board out of valid range!	
			Short circuit on supply module or supply module defective.	Contact your Condair representative.
—	E88	Local 5V Supply	Local 5V voltage on driver board out of valid range!	
			Short circuit on supply module or supply module defective.	Contact your Condair representative.
—	E89	Local Ref Supply	Local reference voltage out of valid range!	
			DC supply faulty or supply line interrupted.	Contact your Condair representative.
—	E91	Pressure Instable	Water inlet pressure instable!	
			Shut-off valve in the water supply line not fully open.	Check/completely open shut-off valve.
			Pressure of the reverse osmosis system too low.	Check reverse osmosis system.
			Cross section of the supply line too small.	Install water supply line with lager cross section (min. ø10/12 mm).
			Sterile filter clogged.	Clean sterile filter housing and replace filter cartridge.

Code		Message	Information	
Warning	Fault		Possible causes	Remedy
—	E93	FC Error	Monitoring of the frequency converter has triggered.	
			Frequency converter overloaded, too hot or over current monitoring has triggered. Error code can be checked on frequency converter.	Contact your Condair representative.
			Fuse “F1” on the driver board defective.	Replace fuse “F1” on the driver board.
			Pressure relief valve on booster pump set too high.	Contact your Condair representative.
—	E94	FC Current	Current of the frequency converter is too high!	
			Booster pump or pump motor blocked.	Replace booster pump or pump motor.
			Frequency converter or control wrong configured.	Check settings and correctly configure if necessary.
			Spray circuit valves clogged or defective.	Spray circuit valves check/replace.
			Nozzles or spray circuit lines clogged.	Check/clean/replace Nozzles or spray circuit lines.
			Pressure relief valve on booster pump set too high.	Contact your Condair representative.
—	E96	Per. 5V Supply	Peripheral 5V supply out of valid range.	
			5V supply interrupted.	Check wiring.
			Fuse “F2” on the driver board defective.	Replace fuse “F2” on the driver board.
			Overload on external connection.	Disconnect load on terminal X16.
			Overload due to defective pressure sensor.	Replace pressure sensor.
—	E97	Ext. 24V Supply	External 24 V supply faulty. Voltage too high or too low.	
			Fuse “F2” on the driver board defective.	Replace fuse “F2” on the driver board.
			Short circuit on external connection.	Remedy short circuit.
			Overload on external connection.	Disconnect load on terminal X16.
—	E98	Ext. 10V Supply	External 10 V supply faulty. Voltage too high or too low.	
			Fuse “F2” on the driver board defective.	Replace fuse “F2” on the driver board.
			Short circuit on external connection.	Remedy short circuit.
			Overload on external connection.	Disconnect load on terminal X16.
—	E100 to E107	DO Yx (e.g. DO Y5)	Fault on corresponding spray valve (Y5 to Y9).	
			Spray valve not connected or coil defective.	Correctly connect spray valve or replace coil.
—	E110	DO Y10	Fault on drain valve Y10.	
			Drain valve not connected or coil defective	Correctly connect drain valve or replace coil.
—	E111	Y4	Fault on external optional water supply flushing valve Y4.	
			Water supply flushing valve not connected or coil defective	Correctly connect water supply flushing valve or replace coil.
—	E113	Y3	Fault on optional air flushing valve Y3.	
			Compressed-air flushing valve not connected or coil defective	Correctly connect compressed-air flushing flushing valve or replace coil.

7.3 Malfunctions without indication

The following table presents failures that do not trigger an fault message, together with indications on their cause and notes on how to eliminate the sources of trouble

Failure	Cause	Remedy
Residual water in the section of the duct outside the water tub.	Sealing elements improperly installed or defective	Mount sealing elements correctly or replace, as required
	Ceramic plates improperly installed or ceramic plates broken.	Correctly install or replace ceramic plates.
	Air velocity in the duct is too high (systems without booster >3.0 m/s, systems with booster >4 m/s).	Reduce air velocity in the duct, if possible, or install booster (consult your Condair representative beforehand).
Condair DL humidifies permanently.	Nominal value of humidity is set too high.	Set nominal value correctly.
	Ambient humidity very low.	Wait.
	The internal controller is activated although an external controller is connected.	Deactivate the internal controller.
Spray valves open and close continually.	Unstable control signal.	Check controller settings and adjust controller, as required.
Maximum humidification capacity is not reached	Capacity limitation active.	Deactivate capacity limitation (set to: 100%).
	System incorrectly dimensioned (insufficient capacity).	Contact your Condair representative.
	Booster pump defective (insufficient permeate pressure)	Replace booster pump.
	Pressure relief valve of booster pump not adjusted correctly.	Contact your Condair representative.
Booster pump starts too late or not at all	Capacity limitation activated.	Deactivate capacity limitation (set to: 100%).
	Booster pump not activated.	Contact your Condair representative.
	Soft start function in progress.	Wait until set time has elapsed and the soft start function is terminated.
Spray valve Y5 (stage 1) and/or spray valve Y6 (stage 2) and/or spray valve Y7 (stage 3) do not open	Spray valve Y5 and/or spray valve Y6 and/or spray valve Y7 defective.	Replace spray valves.
	Capacity limitation active.	Deactivate capacity limitation (set to: 100%).
Spray valve Y8 and/or Y9 (stage 2) do not open even with 100% humidity demand.	Spray valve Y8 and/or spray valve Y9 defective or not activated in the control system.	Contact your Condair representative.
	Wrong stage control (7-steps instead of 15-steps)	Contact your Condair representative.
The humidifier is automatically powered down after about one week of operation.	Ag ionisation defective or exhausted. Capacity counter run-out.	Replace silver ionisation cartridge and reset the capacity counter.

7.4 Notes on fault elimination

– For the elimination of faults set the adiabatic air humidification system Condair DL out of operation as described in chapter (see chapter *4.5 – Decommissioning the system*) and disconnect it from the mains.

DANGER!

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

– 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 the backup battery, replacement of fuses) must be repaired by authorized personnel.

CAUTION!

Electronic components are very sensitive to electrostatic discharge. When carrying out repairs to the control unit, appropriate measures (ESD-protection) must be taken to prevent damage to electronic components.

– Repair work on the booster pump must be carried only by your Condair representative.

7.5 Replacing the fuses and backup battery in the control unit

The fuses of the control unit must be replaced by **authorized personnel only** (e.g. electrician).

Replace fuses of the control unit only with fuses matching the specifications below with the appropriate nominal current capacity .

Never use refurbished fuses. Do not bridge the fuse holder.

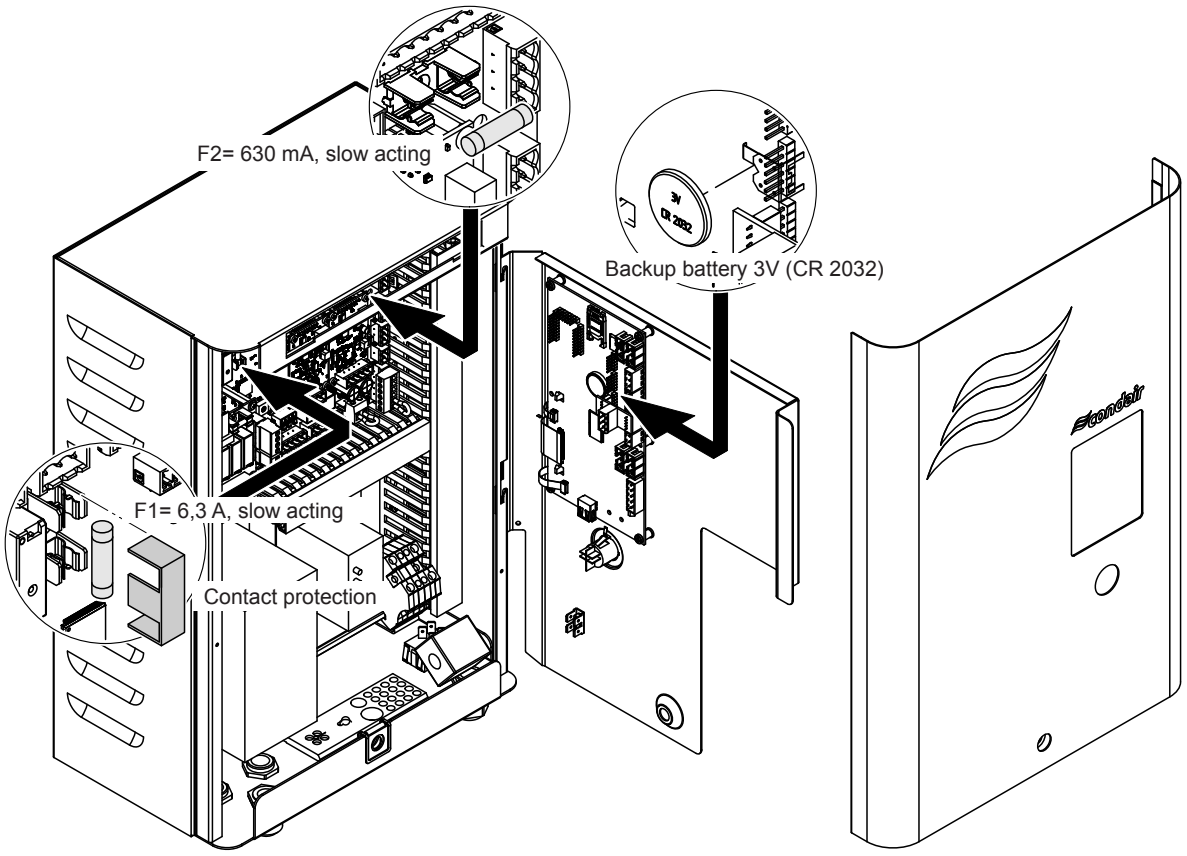
To replace the fuses or the backup battery proceed as follows:

1. Disconnect control unit from the mains by switching off the electrical isolator and secure electrical isolator in “Off” position against inadvertent switching on.
2. Undo the screw of the front cover of the control unit, then remove the front cover.
3. Carefully lift-off the control board assembly from the housing frame, swivel it 90° to the right, then fix it to the housing frame again.
4. Replace desired fuse or the backup battery.

DANGER!

The contact protection of fuse “F1” must mandatory be relocated after the fuse has been replaced.

5. Relocate front cover on control unit and lock it with the retaining screw.
6. Reconnect control to the mains by switching on the electrical isolator.



7.6 Resetting the fault indication

To reset the error indication (red LED light, operating status indication shows “Stop”):

1. Disconnect the control unit from the mains via the **<Control unit On/Off>** switch (located on the bottom side of the control unit).
2. Wait approx. 5 seconds, then reconnect the control unit to the mains by switching the **<Control unit On/Off>** switch again.

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

8 Taking out of service/Disposal

8.1 Taking out of service

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

1. Take the adiabatic air humidification system Condair DL out of operation as described in chapter *4.5 – Decommissioning the system*.
2. Have the system components unmounted by a qualified service technician.

8.2 Disposal/Recycling

Components not used any more must not be disposed of in the domestic waste. Please dispose of the individual components in accordance with local regulations at the authorised collecting point.

If you have any questions, please contact the responsible authority or your local Condair representative.

Thank you for your contribution to environmental protection.

9 Product specification

9.1 Technical data

	Condair DL	
	Type A (**with** booster pump)	Type B (**with**out booster pump)
Dimensions/Weight		
Installation length in AHU/duct (Min-Max)	600 - 900 mm [1]	
Width AHU/duct (Min-Max)	450 - 4200 mm [2]	
Height AHU/duct (Min-Max)	450 - 4000 mm [2]	
Dimensions central unit HxWxD	800 x 500 x 250 mm	
Weight central unit	approx. 50 kg	
Dimensions control unit HxWxD	450 x 315 x 190 mm	
Weight control unit	approx. 20 kg	
Wet weight post-evaporation unit	approx. 55 kg/m^2 humidifier area	
Dry weight post-evaporation unit	approx. 40 kg/m^2 humidifier area	
Hydraulic		
Humidification capacity	10 ... 1000 l/h [3]	10 ... 1000 l/h [3]
Nozzle pressure	3 ... 7 bar	
Nozzle sizes	5 (1.5, 2.5, 3, 4, 5 l/h at 4 bar)	
Spray circuit valves	3/2 way NO (normally open)	
Electric		
Supply voltage/current control unit	200 ... 240 VAC / 50..60 Hz, max. 6 A	
Control booster pump motor	with frequency converter	——
Motor rating booster pump	approx. 10 VA per 10 kg/h spray capacity	——
Voltage solenoid valves (Y5-Y10)	24 V DC	
Frequency converter	Yes	No
Control signals	0-20VDC, 0-10VDC, 0-8.25VDC, 1-5VDC, 0-5VDC, 0-1VDC, 0-20mA, 4-20mA	
Control accuracy [4]	7-steps: ±3 %rh and 15-steps: ±2 %rh	7-steps: ±4 %rh and 15-steps: ±3 %rh
Number of steps (humidity control)	7-steps (3 spray circuits) and 15-steps starting from 30 kg/h (4 spray circuits)	
Sound level		
Sound level	approx. 51 dB(A)	approx. 41 dB(A)
Hygiene		
Silver ionisation cartridge “Hygieneplus”	Yes	
Sterile filter	Yes	
Communication		
Remote operating and fault indication board	Yes	
Modbus	Yes	
BACnet	Yes	

Interfaces		
Ethernet	Yes	
RS 485	Yes	
Air		
Pressure drop (2 m/s)	approx. 40 Pa	
Max. air velocity	3 m/s (without booster), 4 m/s (with booster)	
Air filter quality before humidification unit	F7 (EU7) or better	
Max. recommended air temperature	60°C (before humidification unit) [5]	
Water		
Connector water supply	ø12 mm plug-in coupling or G 1/2" male thread adapter (supplied)	
Connector water drain	ø10 mm hose connection (on water jet pump inside central unit)	
Admissible water supply pressure	working pressure 3 ... 7 bar	working pressure 3 ... 7 bar
Admissible water temperature	max. 45 °C	
Water quality requirements	fully demineralised water from reverse osmosis system with 0.5...15 µS/cm (**without any additives**), max. 100 cfu/ml	
Operating monitoring RO water	min. pressure, max. pressure, pressure after sterile filter, conductivity	
Protection class		
Control unit	IP22	
Central unit	IP22	
Certificates		
Certificates	CE, DGUV, EAC	

[1] Larger installation length on demand
[2] Larger dimensions on demand
[3] Smaller and larger capacities on demand
[4] The nominal control accuracy may not always be available, because various factors (temperature control, water recycling, flap valve systems, etc.) may affect the accuracy.
[5] Higher temperature on demand

9.2 Options

	Condair DL	
	Type A (**with** booster pump)	Type B (**with**out booster pump)
Options		
Leak monitoring	x	
Connection set compressed-air flushing	x	
BMS interface board (LonWorks or BACnet)	x	
Mounting frame for central unit and control unit	x	
Connection set for disinfection system	x	

10 Appendix

10.1 CE declaration of conformity

condair

EC

Konformitätserklärung	Declaration of conformity	Déclaration de conformité
Condair erklärt in alleiniger Verantwortung, dass das Produkt	Condair declares under sole responsibility, that the product	Condair Déclare sous sa seule responsabilité, que le produit
	(Model / Type) **Condair DL A** **Condair DL B**	
auf das sich diese Erklärung bezieht, mit den folgenden Normen oder normativen Dokumenten übereinstimmt	to which this declaration relates is in conformity with the following standards or other normative standards	auquel se réfère cette déclaration est conforme aux normes ou autres documents normatifs
	EN 61000-6-2 / 2005 **EN 61000-6-3 / 2007** **EN 60335-1 / 2003** **EN 60335-2-88 / 2003**	
und den Bestimmungen der folgenden Richtlinien entspricht	and is corresponding to the following provisions of directives	et est conforme aux dispositions des directives suivantes
	2006 / 42 / EC, 2004 / 108 / EC **VDI 3803 10/2002** **VDI 6022-1 / 2006** **VDI 6022-2 / 2006**	

Pfäffikon, 31.10.2014
Condair Technology & Innovation Ltd.

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Pfäffikon, 30.10.2014
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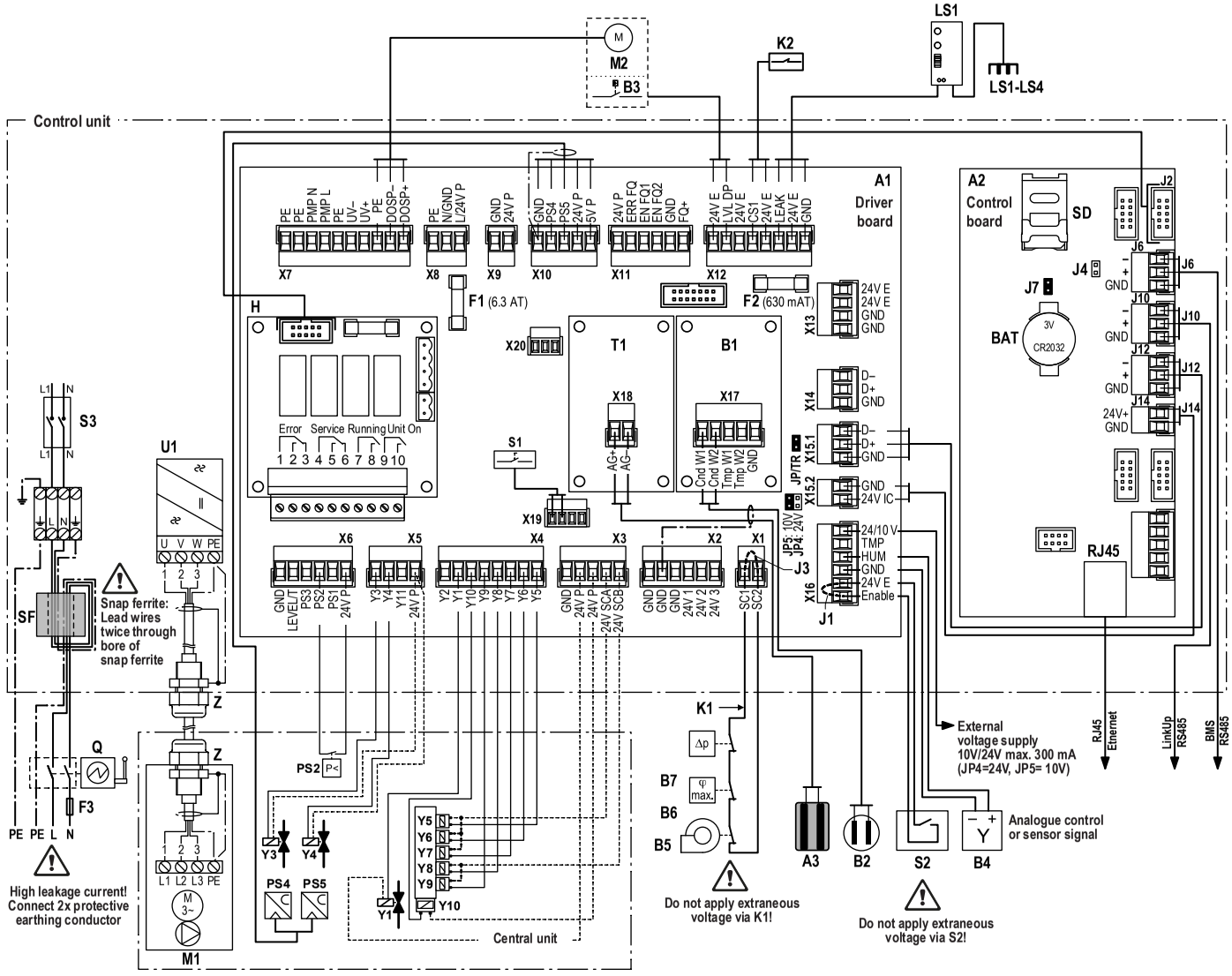
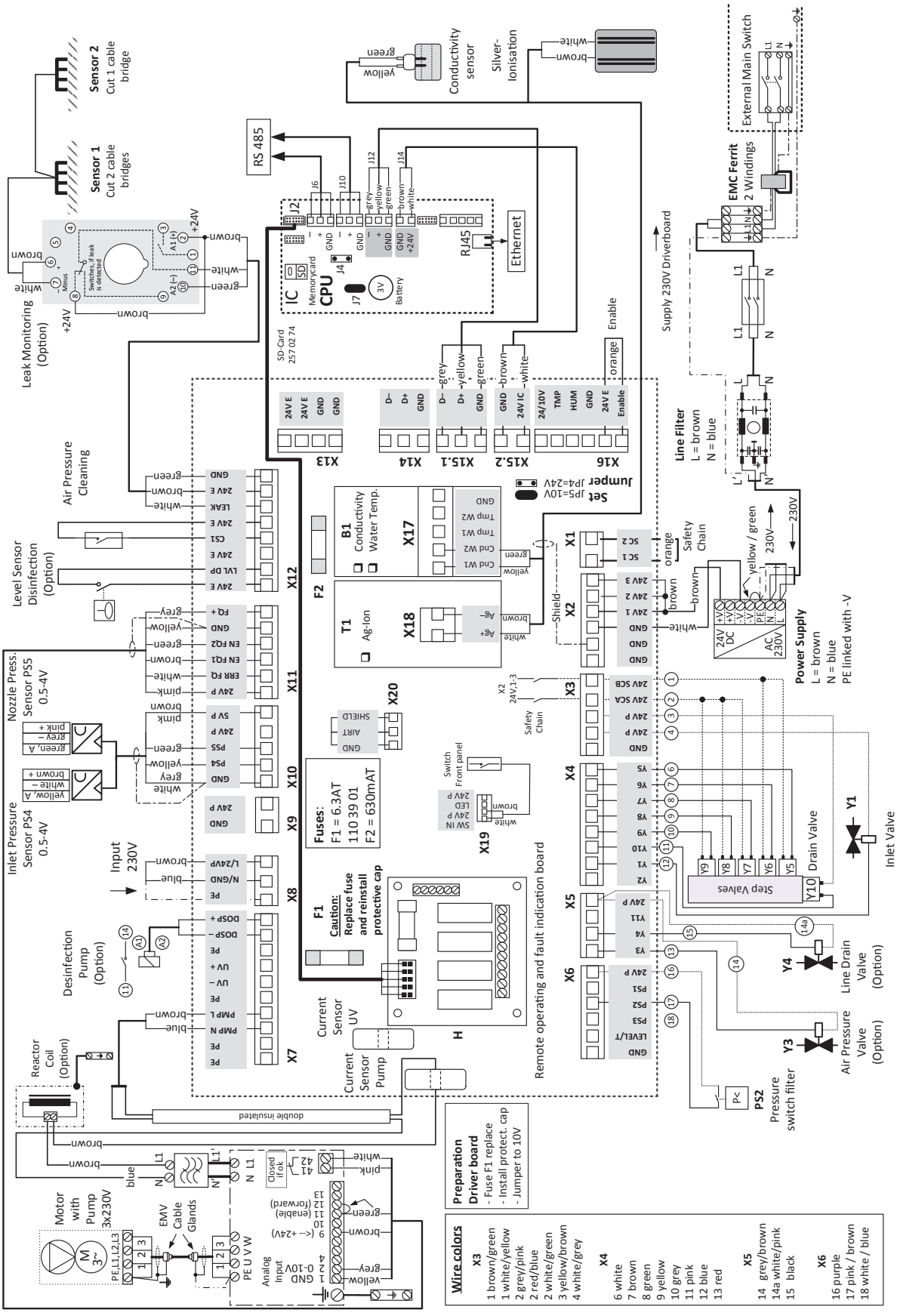
10.2 Wiring diagram Condair DL



Legend

A1	Driver board
A2	Control board (CPU) with display
A3	Ag ionisation
B1	Conductivity measuring board
B2	Conductivity sensor
B3	Level sensor disinfection pump (option)
B4	Demand or humidity signal
B5	Ventilaton interlock
B6	High limit humidistat
B7	Air proving switch
F1	Fuse 230V supply
F2	Fuse 10V / 24V supply
F3	Fuse mains supply 10AT
H	Remote operating and fault indication board
J1	Cable bridge, if no external enable contact is connected
J3	Cable bridge, if no monitoring devices are connected to SC1 and SC2
J4	Jumper for activating the terminating resistor for Modbus network (Jumper must be connected, if Condair DL is the last unit in the Modbus network)
J7	Jumper connected: Modbus communication via RS 485 interface (J6)
JP4	Jumper connected = 24V on X16, JP5 no jumper!
JP5	Jumper connected = 10V on X16, JP4 no jumper!
JP/TR	Jumper connected to last driver board
K1	External safety chain Do not apply extraneous voltage with K1
K2	External flushing contact or start compressed-air flushing (option)
LS1	Control leakage monitoring
LS2-4	Floor sensors for leakage monitoring, max. 3
M1	Booster pump (Type A only)
M2	Disinfection pump (option)
PS2	Pressure switch (sterile filter)
PS4	Pressure sensor inlet pressure
PS5	Pressure sensor nozzle pressure
Q	Electrical isolator (supplied)
S1	<Humidification On/Off> switch (located on the front cover of the control unit)
S2	External enable contact humidification
S3	<Control unit On/Off> switch (located on the bottom plate of the control unit)
SF	Snap ferrite for mains supply, lead wires twice through bore of snap ferrrite
T1	Control board Ag ionisation
U1	Frequency converter (Type A only)
Y1	Safety valve inlet
Y3	Compressed-air flushing valve for compressed-air flushing (option)
Y4	External water supply flushing valve (option)
Y5-9	Spray valves
Y10	Drain valve
Z	ESD cable glands, Expose cable shield here

10.3 Wiring plan Condair DL



Notes

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