

EN7548388-04

09 - 2023

# HUMIDIFIER EVAPORATIVE

Installation  
Operation  
System start-up  
Maintenance



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# 1 - TECHNICAL RECOMMENDATIONS/WARRANTY

For all technical recommendations relating to the humidifier, please see paragraphs 1-GENERAL, 2-SAFETY GUIDELINES, 3-REGULATIONS of Instruction Manual FR 7486825 for the Unit, supplied with the product.

Regarding the warranty, please see paragraph 1-GENERAL of Instruction Manual FR 7486825 for the Unit, supplied with the product.

**!** All specific recommendations relating to the humidifier are described below in paragraphs 3-DESCRIPTION, 4-TECHNICAL CHARACTERISTICS and 5-INSTALLATION/START-UP//MAINTENANCE.

## **!** RESPONSIBILITIES

All personnel operating a humidifier are responsible for:

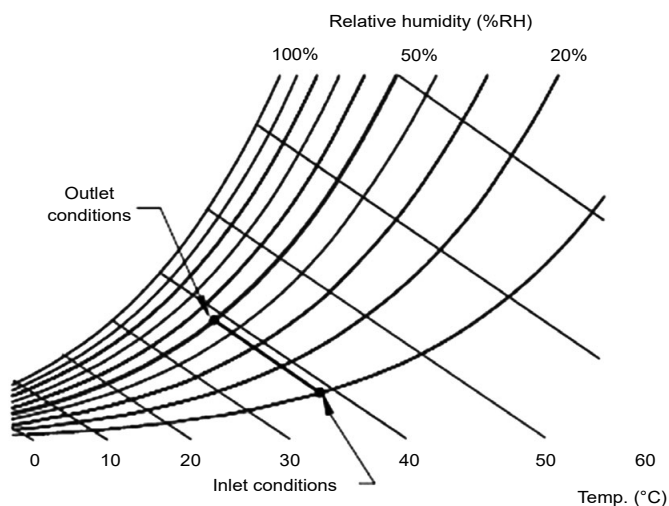
- Their personal safety, the safety of other people and the prevention of damage to the humidifier
- The correct operation of the humidifier
- Electrical wiring must be installed in accordance with national standards, by qualified personnel.

These instructions explain how the humidifier must be used.

These instructions are recommendations only, and do not replace the responsibilities set out above.

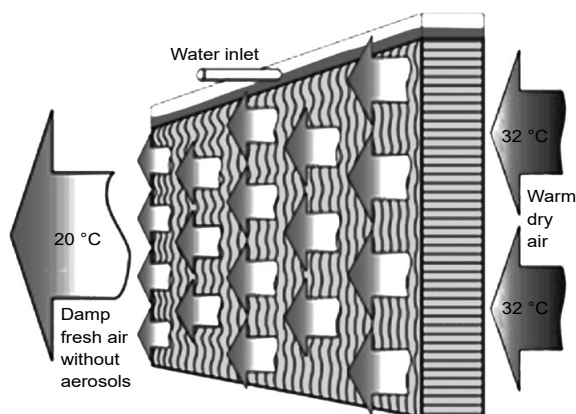
# 2 - OPERATING PRINCIPLE

Increasing the relative humidity by passing air through a matrix moistened with water is a simple, safe method of humidification, with the benefit of the adiabatic cooling generated and low operating costs.



The dry air passes through an absorbent cellulose fibre or fibreglass matrix and collects the water vapour located on the moist surface.

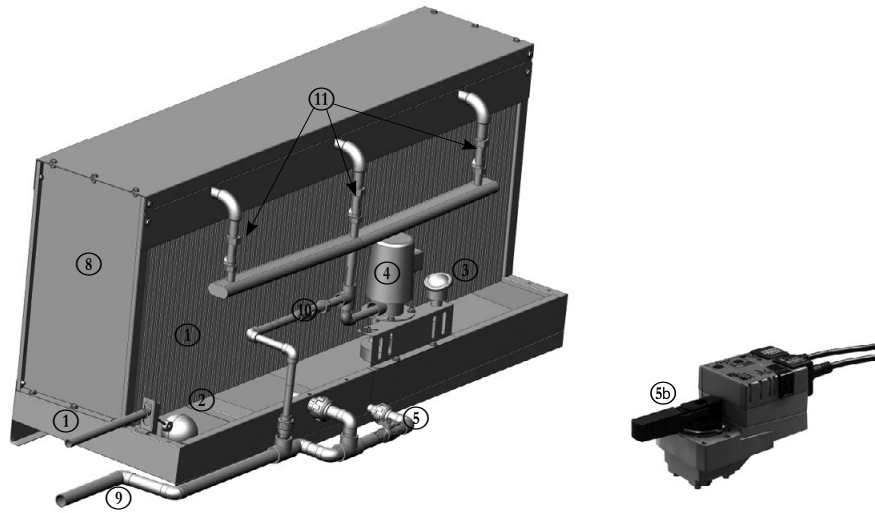
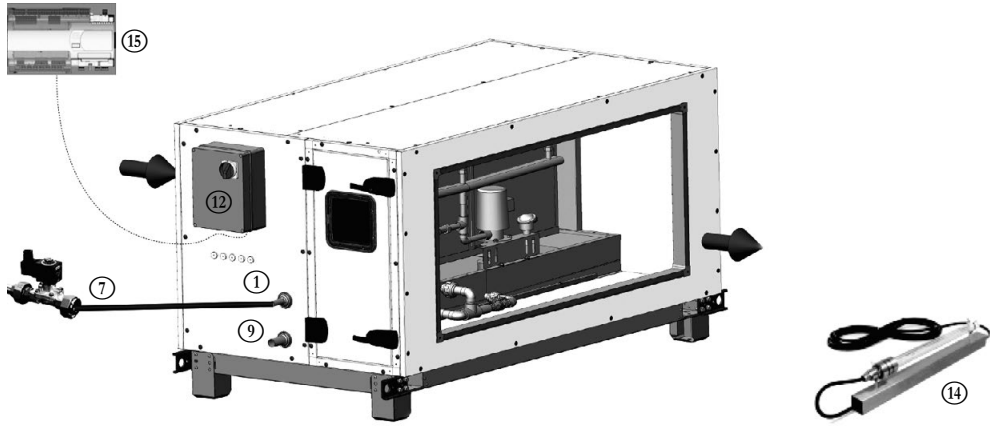
The water is distributed from the top of the matrix by a solid stainless steel nozzle bar and distribution cassettes located at the top of each vertical row of matrices ensure even humidification.



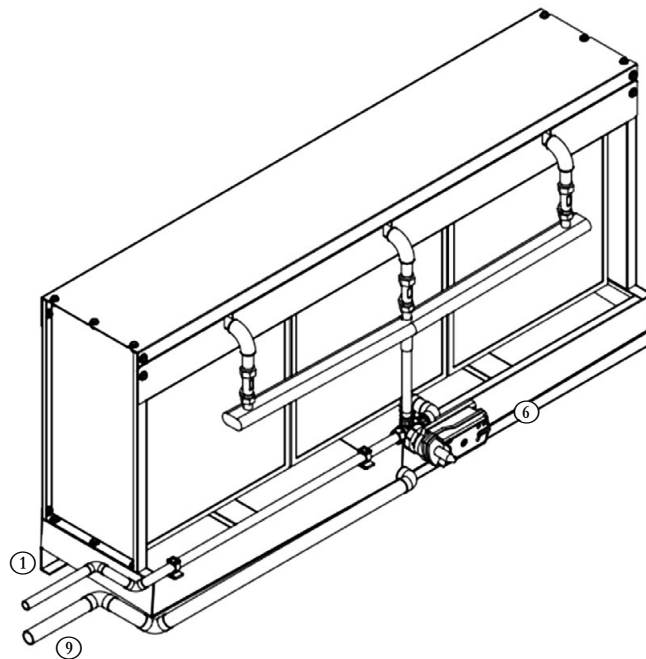
### 3 - DESCRIPTION

#### 3.1 - General description of the humidifier

Recirculated water model - RW



Direct water model - DW



### 3 - DESCRIPTION

Component	DW humidifier (without pump)	RW humidifier (with pump)
1. Water supply connection	Std	Std
2. Float fill valve	Std	Std
3. High and low water level sensor	NA	Std
4. Recirculation pump	NA	Std
5. Two-way valve		
a. Manual	NA	Std
b. 24 VAC motorised	NA	Option
6. Motorised 3-way valve	Option	NA
7. Supply solenoid valve	NA	Option
8. Medium cassette		
a. 100 mm cellulose fibre - 65% efficient	Option	Option
b. 200 mm cellulose fibre - 85% efficient	Option	Option
c. 75 mm cellulose fibre - 65% efficient	Option	Option
d. 150 mm cellulose fibre - 85% efficient	Option	Option
9. Ø32 PVC pipe drain connector	Std	Std
10. Mineral salt deconcentration by		
a. Deconcentration manifold	NA	Std
b. Conductivity sensor	NA	Option (component 12 mandatory)
11. Flow balancing valve	Std	Std
12. Humidifier control only with CCB box	NA	Option (including components 5b and 7)
13. Droplet separator	Std if: - V>3 m/s cellulose - V>3,5 m/s fibreglass	Std if: - V>3 m/s cellulose - V>3,5 m/s fibreglass
14. Submersible UV lamp	Option	Option
15. AHU control	NA	Option (including components 5b, 7 and 12)



**The humidifier is pre-wired when option 15 (AHU control) has been selected. Otherwise, the installer is responsible for wiring.**

#### 3.2 - General recommendations

##### Recommendations for optimised operation

The air passing through the module must be filtered at least to filtration standards F7 and ePM1 50% in order to prevent fouling of the humidifier cassettes. Finer filtration may also be necessary in hospitals, food processing and electronics settings. We recommend that a water filter be installed on the supply.

If the supply water for the humidifier has a calcium content above the recommended level (see "drinking water network analytical parameters" after component 9), we recommend that the water be demineralised.

When the humidifier is the last component of the Unit, we recommend that an expansion valve be positioned 1,000 mm downstream of the humidifier.

##### Recommendations for use in accordance with hygiene standard VDI6022

This adiabatic evaporative humidifier option is certified in accordance with VDI6022 subject to certain restrictions and operating conditions:

- The standard relates to RW and DW humidifiers equipped with an inorganic fibreglass medium
- DW humidifiers must be equipped with 3-way valves
- RW humidifiers must be equipped with CCB control boxes (the option includes the supply and drainage solenoid valves)
- These humidifiers and their control boxes are designed so that they ensure complete drainage of the water from the tank and the supply and drainage pipes during one-off or permanent shutdowns of the humidification system for more than 48 hrs.
- Whenever the humidifier is shut down, the Unit controller must ensure that the humidifier media are dried completely.
- The water supply pipes must be equipped with a device preventing any water from returning to the drinking water column.

## 4 - TECHNICAL CHARACTERISTICS

### 4.1 - General characteristics of the humidifier

Permissible air flow in m<sup>3</sup>/hr. for DW and RW humidifiers:

Size of the Air Handling Units	10	15	20	25	35	45	60	70
Without separator - cellulose fibre	2927	4007	6167	8143	10336	12539	19559	21298
Without separator - fibreglass	3415	4675	7195	9500	12058	14629	22819	24847
With separator - cellulose fibre + fibreglass	4878	6678	10278	13572	17226	20898	32598	35496

Indicative water consumption (depending on air conditions)

Calculation of the evaporated water flow rate for all adiabatic humidifiers (DW/RW) according to the air conditions:

We = absolute humidity at inlet kg/kgas

Ws = absolute humidity at outlet kg/kgas

M<sub>air</sub> = air mass flow kgas/s

rho = water volume mass at 20 °C = 1000 kg/m<sup>3</sup>

Q<sub>water</sub> = evaporated water flow l/h

$Q_{water} = [(Ws-We)*M_{air}/rho] \times 1000 \times 3600$

• Recirculated water (RW) humidifier:

Evaporated water flow rate in l/hr with pump (pH neutral, medium TH), T°=30°C and 10% RH

Type of humidifier medium	Flow rate in l/hour for 1,000 m <sup>3</sup> /hr of air
Fibreglass or cellulose fibre - 65% efficient	5,6 l/hr
Fibreglass or cellulose fibre - 85% efficient	7,1 l/hr

Example: AHU025- humidifier 85% -8,000 m<sup>3</sup> /hr =8 x 7.1 = 56.8 l/hr

Deconcentration flow rate (to limit mineral salt concentration in the tank):

Deconcentration flow rate = see the "technical recommendations" paragraph in "mineral salt deconcentration by a. Deconcentration manifold"

Water consumption = evaporation flow rate + deconcentration flow rate

• Direct water (DW) humidifier:

The total supply flow rate = 3\* evaporation flow rate.

Refer to the technical selection or to the calculation above.

This total water supply flow rate for the humidifier assembly must be distributed evenly across each medium in proportion to the width of the cassette, using the balancing valves (see §4.2 - item 11)

Module casing	304 stainless steel
Max. inlet water pressure	6 bar
Max. inlet water temperature	15°C
Drain dimension	32 mm PVC piping
Min./max. air temperature on the humidifier	5°C/40°C

## 4 - TECHNICAL CHARACTERISTICS

### 4.2 - Characteristics of the components

1. Water supply connection	
Technical characteristics	PP-R 1/2" BSP-M pipe
Technical recommendations	Connect the mains water to the 1/2" BSP male connector float valve with a shut-off valve. Apply sealant before connecting.
2. Float fill valve	
Technical characteristics	304 stainless steel
Technical recommendations	The float valve can be adjusted by 25 mm vertically using a 20 mm spanner, to adjust the tank water levels (image 1). When the tank is full, the water level must be 3 cm below the overflow. During operation, the level must never drop below the foot of the pump, as this can damage the pump irrevocably (image 2). The water level in the tank can also be adjusted by altering the rotation (max. 110°) of the float, using a 10 mm spanner (image 3).
Images	<p>1). </p> <p>2). </p> <p>3). </p>

# 4 - TECHNICAL CHARACTERISTICS

## 3. High and low water level sensor

Technical characteristics

304 stainless steel

Technical recommendations



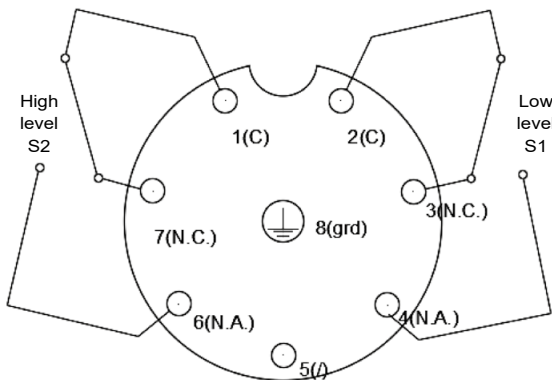
**Warning: Remove the protective net from the float before system start-up.**

**S1 low level:** This connection is mandatory to protect the operation of the recirculation pump, as it activates and deactivates the pump when it detects a minimum water level in the tank (If the humidifier control option has been selected → Connector J17 on the Control Box - NO contact).

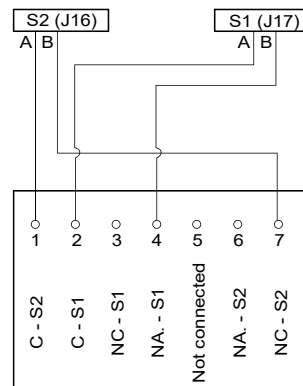
**S2 high level:** The maximum level is used as a safety system if the water supply float valve fails. It must not be used to control the water supply. If the equipment has a supply solenoid valve, connect it here so that it is shut off by the safety system (If the humidifier control option has been selected → Connector J16 on the control box - NC contact).

Images

View from beneath



8-position M12 connector for pin assignment, viewed from female side



Example of connection to CCB2.0 or CCE2.0

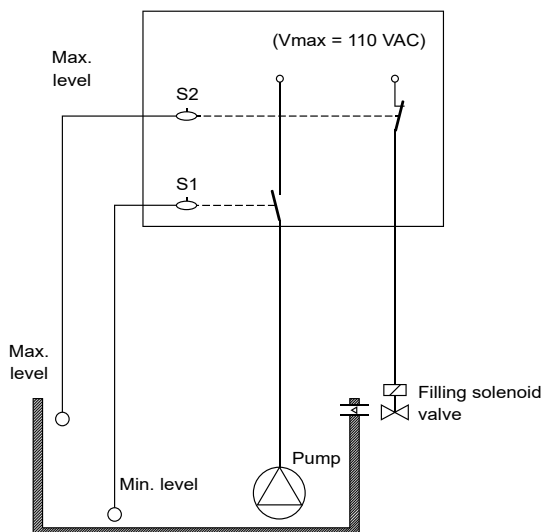
N.C.= Normally closed

N.O.= Normally open

C = Common

S1 (J17) low level

S2 (J16) high level





# 4 - TECHNICAL CHARACTERISTICS

## 4. Recirculation pump

**Technical characteristics**

Pump main body: Polypropylene  
 Pipe hydraulic body: AISI-304 stainless steel  
 Pump shaft: AISI-420 stainless steel  
 Fastenings: AISI-316 stainless steel  
 Impeller: acetal resin (POM)  
 Motor casing: Polypropylene (60 W) or aluminium (125 W)  
 Rated power 60 W (0,13 A) or 125 W (0,36 A) depending on size, medium and efficiency.  
 400 V/3~+PE/50 Hz connection  
 Connection box: PG9 packing box, max. cable Ø = 8 mm. IP 54

**Technical recommendations**

Connect the power supply line to the terminal connection box on the water irrigation pump.  
 Unless the control option has been selected (humidifier only or AHU), the protection and power supply of the pump must be determined by the system project designer. When option 12 - humidifier control - has not been selected, we recommend a thermal-magnetic circuit breaker with a rated current of:  
 0,1...0,16 A for the 60 W pump or 0,25...0,4 A for the 125 W pump.

**Always respect the phase order. If the phases are reversed, the pump will turn in the wrong direction, the water flow rate will be reduced and the efficiency will be compromised.**  
**To avoid this, use a phase order detector when connecting the supply and check the water flow rate passing through the flow balancing valves on the Cassette irrigation pipes. For information, an arrow on the motor casing shows the motor's rotation direction.**



**Images**


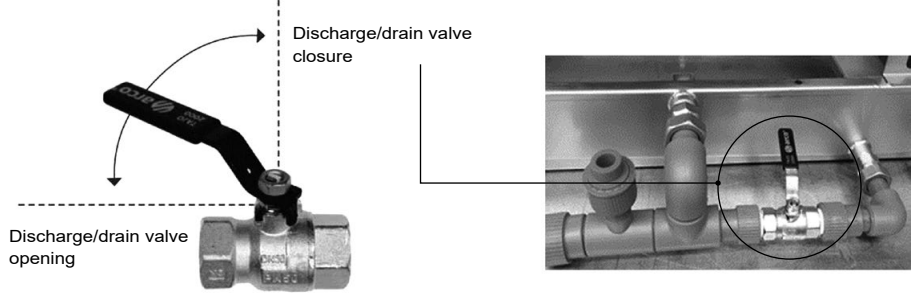

**STAR CONNECTION  
(400 V/III/50 Hz)**

**THREE-PHASE PUMP WIRING DIAGRAM**

Name	Description												
L1	Disconnecting switch for electrical isolation												
<table border="1" style="margin: auto;"> <thead> <tr> <th>SEL</th> <th>1-2</th> <th>3-4</th> <th>5-6</th> </tr> </thead> <tbody> <tr> <td>1</td> <td style="text-align: center;"> </td> <td style="text-align: center;"> </td> <td style="text-align: center;"> </td> </tr> <tr> <td>0</td> <td style="text-align: center;"> </td> <td style="text-align: center;"> </td> <td style="text-align: center;"> </td> </tr> </tbody> </table>		SEL	1-2	3-4	5-6	1				0			
SEL	1-2	3-4	5-6										
1													
0													
X0	External housing												
X1	Pump connection box (IP55)												

## 4 - TECHNICAL CHARACTERISTICS

### 5. 2-way valve

<b>Technical characteristics</b>	Valve connection: 1/2" G Servomotor (motorised valve): Power consumption 5 VA/3,5 W. Supply voltage 24 VAC - 2 control points. Cable cross-section 0,75 mm <sup>2</sup> , length 0,9 m Rated torque: 7 Nm. IP54.																																																																												
<b>Technical recommendations</b>	 <b>In the event of a power failure, the motorised valve remains in the closed position. To drain the humidifier, the valve must be forced open on the servomotor (see image below). See below</b>																																																																												
<b>Images</b>	<p><b>Manual valve:</b></p>  <p><b>Servomotor (motorised valve):</b></p> 																																																																												
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<b>Weight</b>	Weight	0,51 kg																																																																											

# 4 - TECHNICAL CHARACTERISTICS

## 5. 2-way valve

**Images**

**Auxiliary relays**

**Coloured wire:**  
 1 = Black  
 2 = Red  
 3 = White  
 S1 = Purple  
 S2 = Red  
 S3 = White

A - Ab = 0%

## 6. Motorised 3-way valve - (DW humidifier only)

**Technical characteristics** Servomotor: as for the 2-way valve

**Technical recommendations** The 3-way valve is used to supply water to the media and to completely drain the pipes (thus preventing water from stagnating in the system).

**Images**

**ASSEMBLIES IN DIRECTION OF WATER FLOW**

**DIRECTION OF WATER SUPPLY FLOW**

**FLOW FOR MANIFOLD/IRRIGATION SYSTEM DRAINAGE**

$\Delta P_{max}$  3,5 bar. The three-way valve shown functions against the atmospheric pressure, which is why, when this valve is used, a maximum water intake pressure of 3,5 bar is authorised.

**24 VAC**

**LRF24 (-0)**

**LRF24-S (-0)**

## 4 - TECHNICAL CHARACTERISTICS

### 6. Motorised 3-way valve - (DW humidifier only)

6. Motorised 3-way valve - (DW humidifier only)			
Images	<b>Electrical values</b>	Nominal voltage	24 V AC/DC
		Nominal frequency	50/60 Hz
		Nominal voltage range	AC 19,2...28.8 V/DC 21,6...28.8 V
		Power input during operation	5 W
		Power input at shut-down	2,5 W
		Power input for sizing the cables	7 VA
		Auxiliary contacts	2 x SPDT, 1 x 10°/1 x 85°
		Switching power for the auxiliary contact	1 mA...3 A (0,5 A inductive), DC 5 V...AC 250 V
		Supply / control connection	1 m cable, 2 x 0,75 mm <sup>2</sup>
		Auxiliary contact connection	1 m cable, 6 x 0,75 mm <sup>2</sup>
	Parallel operation	Yes (take the performance data into consideration)	
	<b>Functional data</b>	Motor torque	4 Nm
		Electrical safety function torque	4 Nm
		Direction of movement of the electrical safety function	NC without supply, valve closed (A – AB = 0%)
		Manual control	With activation key, which can be set to any position
		Stroke time	75 s/90°
		Safety function stroke time	<20 s @ -20...50 °C/<60 s @ -30 °C
		Noise level, motor	50 dB(A)
		Position indication	Mechanical
	Service life	Min. 60,000 safety positions	
	<b>Safety data</b>	IEC/EN protection class	III, Safety Extra Low Voltage (SELV)
		IEC/EN auxiliary contact protection class	II, Reinforced insulation
		IEC/EN Index of Protection	IP54
		EMC	CE according to 2014/30/EU
		Low voltage directive	CE according to 2014/35/EU
		IEC/EN certification	IEC/EN 60730-1 and IEC/EN 60730-2-14
		Type of action	Type 1
		Rated supply/control pulse voltage	0,8 kV
		Aux. contact rated surge voltage	2,5 kV
		Pollution degree	3
		Ambient humidity	Max. 95% RH, without condensation
		Ambient temperature	-30...50 °C [-22...122 °F]
		Storage temperature	-40...80 °C [-40...176 °F]
		Maintenance	Maintenance-free
	<b>Weight</b>	Weight	1,6 kg

## 4 - TECHNICAL CHARACTERISTICS

7. Supply solenoid valve	
<b>Technical characteristics</b>	<p>Rated power 8 W            Voltage: 24 VAC/50/60 Hz - NC contact            Valve connection: 1/2" G            IP65</p>
<b>Technical recommendations</b>	<p>This valve is supplied unmounted. It should be located upstream of the float valve, on the outside of the unit. The high level on the level sensor must control this solenoid valve. It acts as a safety system in the event that the float valve fails. It must not be used to control the water supply. Control is managed by the float valve.</p>
<b>Images</b>	<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>Water filling/supply NC solenoid valve, 1/2" G, brass</p> </div> <div style="text-align: center;"> <p>24 V connector (L1+N+E)</p> </div> <div style="text-align: center;"> <p>24 V coil (50/60 Hz)</p> </div> </div>
8. Medium cassette	
<b>Technical characteristics</b>	<p><u>Cellulose fibre:</u>            Organic material.            - 65% efficient → 100 mm            or            - 85% efficient → 200 mm  <u>Fibreglass:</u> IARC Group 3 (not classifiable as to its carcinogenicity to humans).            Inorganic material coated with a biocide (silver-zeolite). M0-A1 fire rating. Contains silver ions that increase the action against the development of microorganisms. Media compatible with hygiene standard VDI6022.            - 65% efficient → 75 mm            or            - 85% efficient → 150 mm</p>
<b>Technical recommendations</b>	<p>The water quality and deconcentration system settings make it possible to improve the service life of the medium. Fibreglass can be cleaned with weak acetic acid (15-20%) or wine vinegar.</p>
9. Ø32 PVC pipe drain connector	
<b>Technical characteristics</b>	<p>PP-R 1" BSP-M pipe coupling</p>
<b>Technical recommendations</b>	<p>Provide a drain trap, not supplied. For the sizing of the drain trap, see § 7.1. Condensate drain trap.</p> <div style="display: flex; align-items: center; margin-top: 10px;"> <p><b>The drain pipe must be Ø32 or more for satisfactory draining of the water.</b></p> </div>

## 4 - TECHNICAL CHARACTERISTICS

### Deconcentration system:

The water in the medium evaporates as the water vapour pressure in the medium is greater than the pressure of the air passing through it. Given that only the water evaporates, the concentration of the dissolved mineral salts increases, despite the fact that water is added to compensate for the evaporation.

To delay the formation of mineral deposits on the surfaces of the evaporation panel (which will result in a gradual increase in the air pressure loss and a reduction in operational efficiency), it is essential that some of the recirculation water is discharged to the drainage network so that "clean" water can be supplied regularly.

Drinking water network analytical parameters (recommended).

1. Conductivity: between 60 and 350  $\mu$  S/cm
2. Total hardness ( $\text{CaCO}_3$ ): between 20 and 100 mg/L
3. Ionic silica ( $\text{SiO}_2$ ) < 30 mg/L
4. Iron (Fe) < 0.2 mg/L
5. Oils and fats < 2 mg/L
6. Total dissolved solids < 450 mg/L
7. PH: between 6 and 8
8. Water quality standards described in the second table below

The table below contains the chloride values required for each water type.

Chlorides		
Drinking water	Softened water	De-ionised water
< 100 mg/l	< 70 mg/l	< 30 mg/litre

No.	Name	Standard value
1	Common bacteria	Colonisation number per 100 or less than 1 mL
2	Escherichia Coli	Not detected
3	Cadmium and compounds	$\leq 0,003$ mg/l (volume of Cadmium)
4	Mercury and compounds	$\leq 0,0005$ mg/l (volume of Mercury)
5	Selenium and compounds	$\leq 0,01$ mg/l (volume of Selenium)
6	Lead and compounds	$\leq 0,01$ mg/l (volume of Lead)
7	Arsenic and compounds	$\leq 0,01$ mg/l (volume of Arsenic)
8	Chromium [VI] and compounds	$\leq 0,05$ mg/l (volume of Chromium [VI])
9	Cyanide and Cyanogen chloride	$\leq 0,01$ mg/l (volume of Cyanogen)
10	Nitrate and nitrite	$\leq 10$ mg/l
11	Fluoride and compounds	$\leq 0,8$ mg/l (volume of Fluoride)
12	Boron and compounds	$\leq 1,0$ mg/l (volume of Boron)
13	Carbon tetrachloride	$\leq 0,002$ mg/l
14	1,4-Dioxane	$\leq 0,05$ mg/l
15	Cis-1,2-Dichloroethylene and trans-1,2-Dichloroethylene	$\leq 0,04$ mg/l
16	Dichloroethylene	$\leq 0,02$ mg/l
17	Tetrachlorethylene	$\leq 0,01$ mg/l
18	Trichloroethylene	$\leq 0,01$ mg/l (the standard value was tightened in 2011 from 0,03 mg/l)
19	Benzene	$\leq 0,01$ mg/l
20	Chlorate	$\leq 0,6$ mg/l
21	Chloroacetic acid	$\leq 0,02$ mg/l
22	Chloroform	$\leq 0,06$ mg/l
23	Dichloroacetic acid	$\leq 0,04$ mg/l
24	Dibromochloromethane	$\leq 0,1$ mg/l
25	Bromate	$\leq 0,01$ mg/l
26	Total trihalomethane (chloroform dibromochloromethane, bromodichloromethane and bromoform)	$\leq 0,1$ mg/l
27	Trichloroacetic acid	$\leq 0,2$ mg/l
28	Bromodichloromethane	$\leq 0,03$ mg/l

## 4 - TECHNICAL CHARACTERISTICS

No.	Name	Standard value
29	Bromoform	≤ 0,09 mg/l
30	Formaldehyde	≤ 0,08 mg/l
31	Zinc and compounds	≤ 1,0 mg/l (volume of Zinc)
32	Aluminium and compounds	≤ 0,2 mg/l (volume of Aluminium)
33	Copper and compounds	≤ 1,0 mg/l (volume of Copper)
34	Sodium and compounds	≤ 200 mg/l (volume of Sodium)
35	Manganese and compounds	≤ 0,05 mg/l (volume of Manganese)
36	Chloride	200 mg/l or less
37	Calcium, Magnesium	300 mg/l or less
38	Anionic surfactant	0,2 mg/l or less
39	(4S, 4aS, 8aR) -4,8a-dimethyloctahydronaphthalen-4a (2e) -ol (or Geosmin)	0,00001 mg/l or less
40	1,2,7,7-Tetramethylbicyclo[2,2,1]-Heptane-2-ol (or 2-Methylisoborneol)	0,00001 mg/l or less
41	Nonionic surfactant	0,02 mg/l or less
42	Phenols	≤ 0,005 mg/l (converted to volume of Phenols)
43	Organic substances (totalling organic carbon)	3 mg/l or less
44	Taste	Not abnormal
45	Odour	Not abnormal
46	Colour	≤ 5 degrees
47	Turbidity	≤ 2 degrees


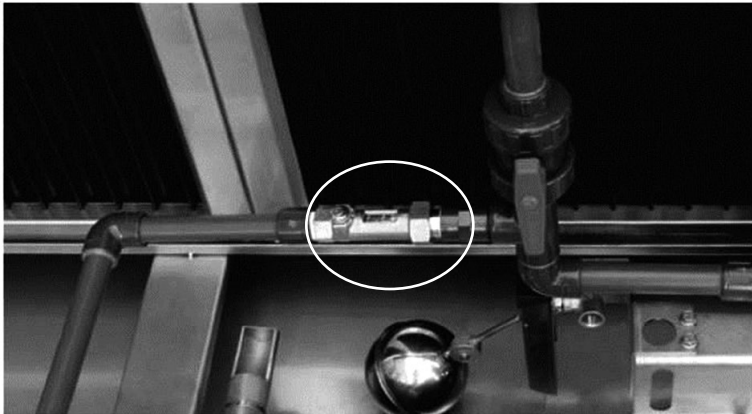

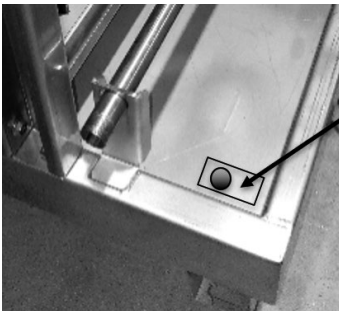
Information on water hardness:

ppm or mg/L	µS/cm	°F (French degrees)	Hardness
0-70	0-140	0-7	Very soft
70-150	140-300	7-15	Soft
150-250	300-500	15-25	Slightly hard
250-320	500-640	25-32	Moderately hard
320-420	640-840	32-42 hard	Hard
Above 420	Above 840	Above 42	Very hard

Deconcentration and therefore the replacement of the recirculation water can be done in two ways:


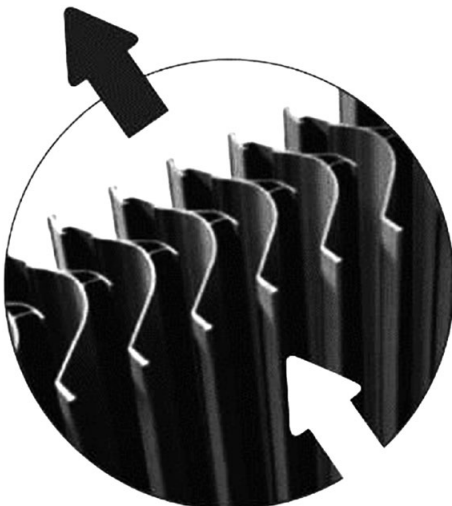
- a. By deconcentration manifold (continuously)
- b. By conductivity sensor

## 4 - TECHNICAL CHARACTERISTICS

10. Mineral salt deconcentration by a. Deconcentration manifold	
<b>Technical characteristics</b>	PVC manifold + balancing valve assembled on the humidifier, located between the media water distribution column and the drain (see image below).
<b>Technical recommendations</b>	<p><b>Extent of deconcentration or continuous draining based on conductivity.</b></p> <p><u>Draining flow rate calculation via the flow control valve (see §11 below)</u></p> <p>Draining based on the concentration cycle COC.            Draining flow rate = Evaporation/(COC-1)            Concentration cycle COC based on conductivity (100-1000 µS/cm)            Note: Always with the recommended drinking water network parameters.</p> <ul style="list-style-type: none"> <li>• 100 µS/cm = 9 COC</li> <li>• 550 µS/cm = 6 COC</li> <li>• 1,000 µS/cm = 2 COC</li> </ul> <p><u>Water evaporation calculation:</u></p> <p>Evap[l/min] = Qair x 60 x pair x Woutlet - Winlet x 0,001            Qair: air flow [m³/hr]            Pair: air density [kg/m³] (≈ 1,2)            Woutlet= absolute humidity of air at outlet [g/kg]            Winlet= absolute humidity of air at inlet [g/kg]</p> <p>Sample calculation:</p> <ul style="list-style-type: none"> <li>• On the basis of the drinking water network parameters</li> <li>• Water evaporation = 3,23 l/min</li> <li>• Water conductivity = 550 µS/cm</li> <li>• COC= 6</li> <li>• Draining = 3,23/ (6-1) = 0,65 l/min</li> </ul> <p>Otherwise, the system can be set to approximately 10% of the total irrigation flow rate (see §11 below). By periodically observing the state of the panels; after 1 or 2 weeks of operation, if there are no white mineral deposits on the surface, the draining flow rate can be reduced, or, conversely, increased if scale is observed.</p> <p> <b>Warning: The continuous draining/deconcentration flow rate must not be less than 0.31 l/min</b></p>
<b>Images</b>	
10. Mineral salt deconcentration by b. Conductivity sensor	
<b>Technical characteristics</b>	Conductivity sensor + control box expansion board   <b>Note: humidifier control option required.</b>
<b>Technical recommendations</b>	Screw the conductivity sensor onto the humidifier tank. Connect the conductivity sensor to board SEF-026 in the control box (component 12). Calibrate the sensor with the calibration solutions supplied as accessories. Perform several media washing cycles (see §5) and then configure the conductivity threshold on clean water, in accordance with the recommendations for the humidifier control option (see explanations in §7.7 of the manual supplied with the unit).
<b>Images</b>	 <p>Conductivity sensor in position A with 2m cable.</p>



## 4 - TECHNICAL CHARACTERISTICS

11. Flow balancing valve	
<b>Technical characteristics</b>	Control valve + 1/2" brass flow meter.
<b>Technical recommendations</b>	<p>Adjust the irrigation vales for the evaporation cassettes to guarantee the recommended water flow rate for complete humidification of the media. The flow rate is read at the float's low level. The value of 1 litre/second per square metre of irrigation surface is sufficient to compensate for the water evaporation. The irrigation surface area is the width of the cassette x its thickness.</p> <p>Information for calculating the water flow rate:            Cellulose media 65 % efficiency, thickness = 100 mm            Cellulose media 85 % efficiency, thickness = 200 mm            Fibreglass media 65 % efficiency, thickness = 75 mm            Fibreglass media 85 % efficiency, thickness = 150 mm            Excess irrigation water is important to ensure continuous surface washing of the panels.</p> <p>Sample irrigation per cassette:            Cassette width (500 mm) and Panel thickness (150 mm)            Irrigation flow rate per cassette = 0,5 m x 0,15 m x 60= 4,5 l/min</p>
<b>Images</b>	<div style="display: flex; align-items: center; justify-content: center;"> <div style="text-align: center; margin-right: 20px;"> <p>Control is carried out using a flat-headed screwdriver in the location indicated</p> <p>Control valve + 1/2" brass flow meter to adjust the irrigation of each cassette.</p> </div>  </div>
12. Humidifier control only	
<b>Technical characteristics</b>	The Basic Control Box (CCB) is supplied separately, in an insulated housing made up of a base and a cover with a steel hinge with an epoxy polyester powder surface finish in grey RAL 7035, weather resistant (in accordance with IEC 62208) with degree of protection IP66 in accordance with IEC 60529 and impact protection IK10 in accordance with IEC 62262. CCB control box operating range: -10°C/40°C.
<b>Technical recommendations</b>	(see MCCB manual §7) + wiring diagram in related documents (§6)
13. Droplet separator	
<b>Technical characteristics</b>	Polypropylene
<b>Technical recommendations</b>	For high air speeds ( $V > 3$ m/s for cellulose media and 3,5 m/s for fibreglass media), the humidifiers have a second PP cassette that collects the droplets running off the media.
<b>Images</b>	

## 4 - TECHNICAL CHARACTERISTICS

14. Submersible UV lamp	
Technical characteristics	Lamp submerged in the tank. Supply voltage: 230 V/50 Hz. Power: 18 or 36 W depending on model IP68, CE UV lamp -C more details §8.2.1
Technical recommendations	<p><b>!</b> These UV rays carry a strong risk of burning if they fall directly on the skin or eyes! Disconnect the power before carrying out any work on the lamp !</p> <p>On this option, a door safety contact is mandatory and connected if the AHU control option has been selected (otherwise the installer is responsible for the door contact wiring). This contact cuts the supply to the UV lamp each time the door is opened. However, as a safety measure, deactivate the UV lamp then reactivate it after the operation (see §7.6.a). See MCCB manual §7 + submersible UV lamp manual §8.</p>
Images	
15. AHU control	
Technical characteristics	See controls manual - FR 7486826
Technical recommendations	<p>See controls manual - FR 7486826</p> <p><b>!</b> The unit controls govern the CCB control box. For this, "auto" mode must be enabled on the box.</p>

**!** When installing an air handling unit containing a humidifier with a recycling pump, it is **IMPERATIVE** that appropriate systems for combating microorganisms and bacteria are put in place (this must only be done by personnel with the required expertise).  
It is **IMPERATIVE** that a risk assessment be carried out regarding the growth of microorganisms and bacteria, particularly Legionella.

## 5 - INSTALLATION/START-UP/MAINTENANCE

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**Fibreglass media may contain fibreglass dust residue. On start-up, maintenance or replacement of the media, remember to wear a FFP2 or FFP3 mask to protect against the potential risk of inhaling this dust.**



**Humidifiers have a high voltage power supply. The wiring, connections and electrical connections must be performed in accordance with national standards and by qualified personnel.  
The power supply must be disconnected during installation and maintenance operations.**

### 5.1 - Installation

1. Water connection (see components 1 and 9)



**In the specific case where the dew point temperature of the air exiting the humidifier is substantially higher than the water supply temperature, areas of condensation may appear in the following locations:**

- **On the water supply pipe**
- **On the walls of the tank (specifically for direct water (DW) humidifiers).**

**In this specific case, to avoid this problem, insulate the tank walls and pipes.**

2. If the humidifier is not wired (AHU control option not selected), make the electrical connections for the pump, water level and, depending on the options selected, the motorised 2-way valve, motorised 3-way valve (for RW humidifiers), supply solenoid valve, conductivity sensor and submersible UV lamp (see components 4, 3, 5.b, 6, 7, 10.b, 14).
3. If the humidifier control and/or AHU control option has been selected, secure the humidifier CCB control box (component 12) to the front panel, run the cables through the packing boxes and connect the cables to the connectors on the SEF-028 card in the CCB control box (see MCCB manual §7). To connect the humidifier unit to the main unit, see the wiring diagram for the AHU and the general IOM.



**These electrical connections must be made by qualified personnel. Select the correct cross-section for the leads: see the technical characteristics of each component above. If the AHU control or humidifier control option has not been selected, protect the power supply with a suitable thermal circuit breaker.**

4. Check that all the pipe connections are tight.
5. Check the direction of rotation of the pump.
6. After start-up, check that the input current does not exceed the stated current.

### 5.2 - System start-up




**The humidifier control box (CCB) can be in manual mode for the start-up settings, but if the AHU control option has been selected, it is imperative that it be returned to "auto" mode before standard operation, so that it is controlled by the AHU PLC (component 15). See MCCB manual §7.**



**If the AHU control option (option 15 in §3.1) is selected, to start up the humidifier with the AHU deactivated, bridge the AHU fault return (J20 - IN3), then switch to manual "on" mode. Caution: remove the bridge when system start-up is complete**



**If the UV lamp option is selected, although there is a door contact to cut the supply to the UV lamp, the UV lamp should be deactivated before any work is carried out on the humidifier (see §7.6.a). Reactivate the UV lamp after the operation**

1. Clean the tank and perform a cleanliness check before start-up, remove the protective net from the float on the water level detector.
2. Adjust the balancing valves on each cassette (component 11)
3. Fill the tank with water, then adjust the water level with the float valve (component 2)
4. Adjust the deconcentration valve if the conductivity sensor option has not been selected (component 10.a)
5. Install the control box, see MCCB manual §7 (component 12)
6.  **Before the AHU is started up (fan motor assemblies not operating), perform several tank drainage cycles after at least 6 hours of operation of the humidifier only, to wash the cells and remove the scum and odour that may have been caused by the inorganic material dust remaining after the manufacturing process.**



**For fibreglass media, avoid getting washing water (which will contain fibreglass dust) in contact with skin.**

7. Filling the drain trap



**Remember to isolate the supply and drain pipes and the drain trap and provide a frost protection device for the water in the drain trap to prevent freezing on installations in environments where temperatures can drop below zero.**

8. If the AHU control option has been selected, remember to switch back to "auto" mode on the humidifier control box.

## 5 - INSTALLATION/SYSTEM START-UP/MAINTENANCE

### 5.3 - Maintenance



**If the UV lamp option is selected, although there is a door contact to cut the supply to the UV lamp, the UV lamp should be deactivated before any work is carried out on the humidifier (see §7.6.a). Reactivate the UV lamp after the operation**

The main components that require maintenance are as follows:

- Once a month, the irrigation pump: The most important thing is to check that dirt does not clog the suction and discharge circuit and that electricity consumption is below the rated consumption stated on the plate.
- Once a year, the float valve: Its mechanical opening and closing function must be inspected periodically.
- Once a year, the drain valves: Their mechanical control function must be inspected periodically.
- Once a year, the solenoid valves (if any): Their mechanical opening and closing function must be inspected.
- Once every three months, the evaporation panels: check for wear and fouling due to lime scale deposits.



**If there is visible deterioration of the fibreglass medium, dispose of the medium (see § Disposal below).**

**Their service life, with a drinking water or industrial water supply, depends mainly on the correct operation of the continuous draining or mineral salt deconcentration system, which prevents the formation of lime scale deposits on the surface. If this is not well controlled, the panels will have to be replaced very quickly, as the air will be prevented from passing through them by the deposits. Fibreglass can be cleaned with weak acetic acid (15-20%) or wine vinegar.**

- Once a year, the irrigation: Follow the steps described on the "Cleaning the individual irrigation system" page.



**We recommend frequent observations in the days following start-up, which will indicate the actual behaviour of the installation. Similarly, during long periods of inactivity, it is essential that the equipment be drained completely.**



**Before carrying out any work, remember to deenergise all of the components (pump, UV lamp, servomotors, etc.)**

### 5.4 - Disposal of the product and effluent generated

Comply with the regulations in force.

Please see paragraph 12-FINAL SHUTDOWN of Instruction Manual FR 7486825 for the Unit, supplied with the product.

### 5.5 - Cleaning and disinfection

The water tank, irrigation system and other components of the humidifier are specially designed to drain completely by gravity, without help from mechanical components.

Evaporative humidifiers must be cleaned regularly to prevent them from becoming contaminated; all of the surfaces of their components (panels, pipes and particularly the water tank) must be disinfected with an appropriate solution.

If the inorganic medium (fibreglass) is not damaged, it can be cleaned after removal using a weak acetic acid solution or an oxygen-based household bleaching agent dissolved in water. In this case, the complete cassette (with water distribution cover) should be submerged in a container of solution for approximately one hour. Rinse the medium with water when it is removed from the solution. If the foam has not completely disappeared, submerge the cassette again in a container of water then rinse with a water jet. The cleaning process can be repeated as often as necessary.

Allow the medium to dry completely before refitting the cassette in its frame.



**Cleaning process only compatible with fibreglass media (inorganic material).**

The use of chemical disinfectants for day-to-day maintenance of the panels is not recommended, as it could reduce the efficiency and service life of the panel. If it is necessary to use chemicals, either due to a long period of inactivity or for any other reason, an effective method is to submerge the panels in a disinfectant containing chlorine, such as sodium hypochlorite (bleach) or sodium percarbonate. When using disinfectants containing chlorine, it is imperative that you take into account the fact that toxic chlorine gas forms if they are combined with an acidic solution.

The composition of the inorganic fibreglass panel includes agents that inhibit the growth of bacteria and fungi, such as silver and zinc pyrethrin. These agents are bacteriostats, not disinfectants.

We recommend that treatment be added to the water used to supply the humidifier.

HEF2E humidifiers have obtained a "hygiene compliance test" certificate. They meet the requirements of the following standards:

VDI 6022, sheet 1 (01/2018)

DIN 1946, part 4 (09/2018)

VDI 3803, sheet 1 (05/2020)

SWKI VA104-01 (01/2019)

## 5 - INSTALLATION/SYSTEM START-UP/MAINTENANCE

All of the materials included in the humidifier have obtained negative results regarding the proliferation of pathogenic microorganisms. To ensure satisfactory operation in accordance with hygiene standard VDI6022, maintenance must be performed regularly in accordance with the instructions given in table 6, §6.6 of VDI 6022; a maintenance log must also be kept.

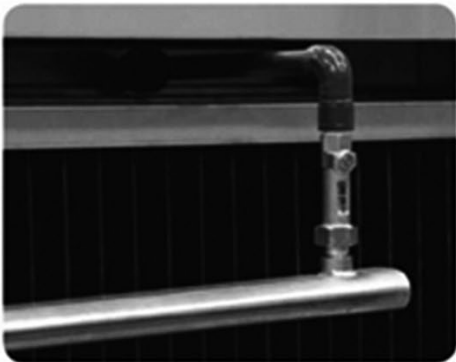
### 5.6 - Removing the media

①

Remove the manifold + evaporative cassette irrigation flow control valve assembly.



a



Unscrew the connections on each irrigator

b



Unscrew the connections

c



Manifold + irrigation flow control valve assembly

## 5 - INSTALLATION/SYSTEM START-UP/MAINTENANCE

2

Detach the PP-R D25 pipe for assembly to the manifold

a



Unscrew the PP-R DN20 ball check valve connection

b



PP-R D25 pipe

3

Remove the front cover



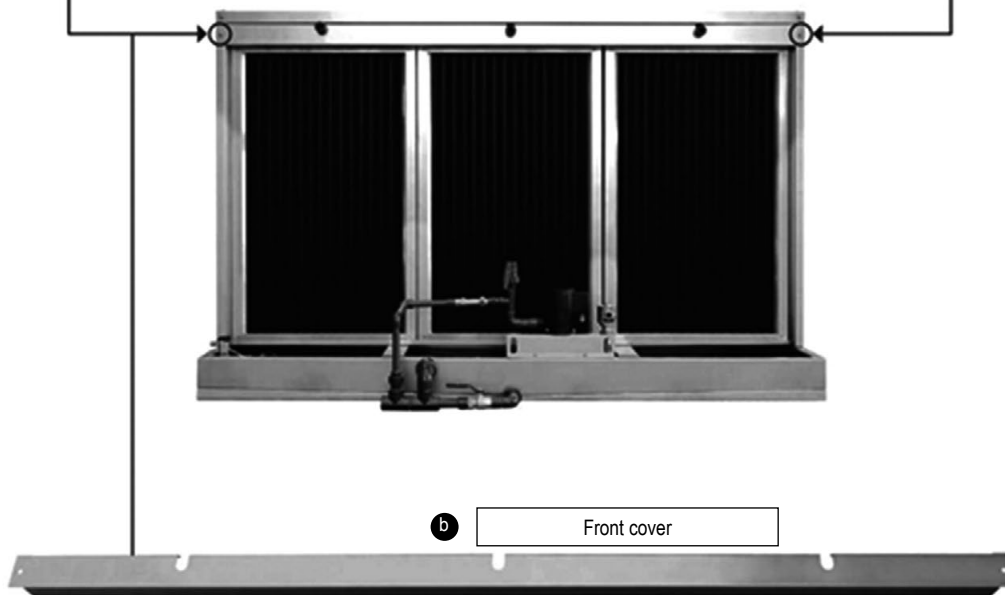
a

Unscrew the two screws holding the part in place



b

Front cover



## 5 - INSTALLATION/SYSTEM START-UP/MAINTENANCE

④

Removing the drain



a

Unscrew the brass connector on the control valve + drain flow meter



a

Unscrew the PP-R 1/2" link



a

Drain

⑤

Removing the bracket + pump + level sensor assembly (as an option, the float valve might be mounted on this bracket)



a

Unscrew the bracket

b

If the float valve is mounted on the bracket, disconnect the water supply

⑥

Removing the droplet separator

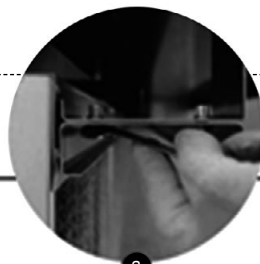


## 5 - INSTALLATION/SYSTEM START-UP/MAINTENANCE

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7

Step 6 of LATERAL removal



a

8

Removing part "b"

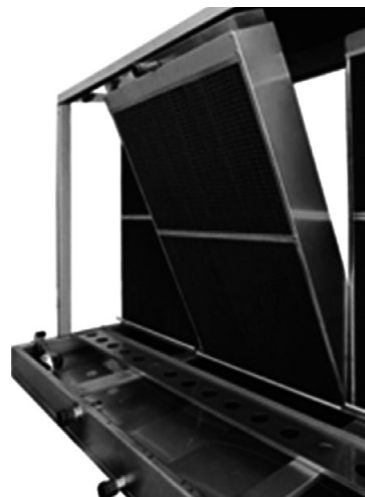
Unscrew the four screws (two on each side)



b

9

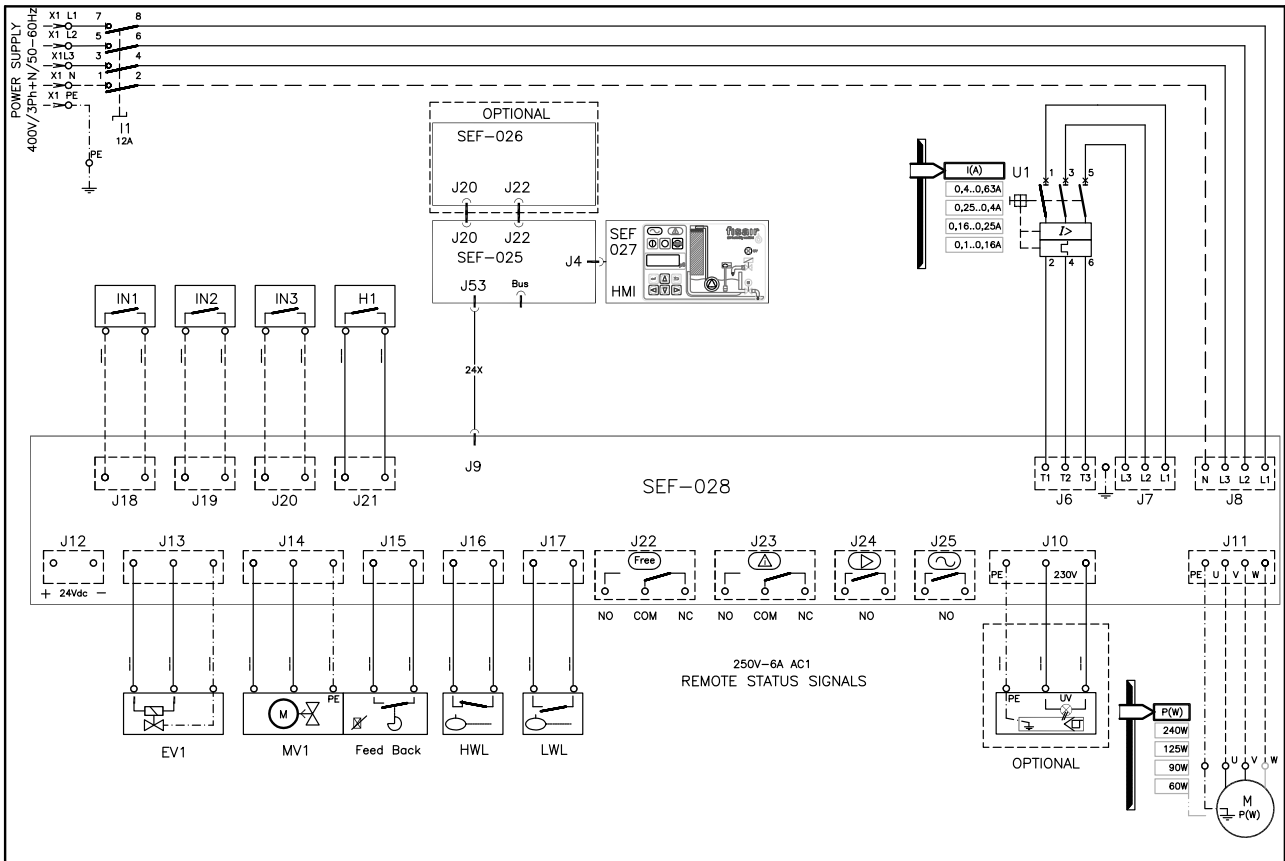
Removing the evaporative cassettes





# 6 - RELATED DOCUMENTS

## 6.1 - CCB control box wiring diagram (option 12)



## 7 - MCCB MANUAL - HUMIDIFIER CONTROL BOX



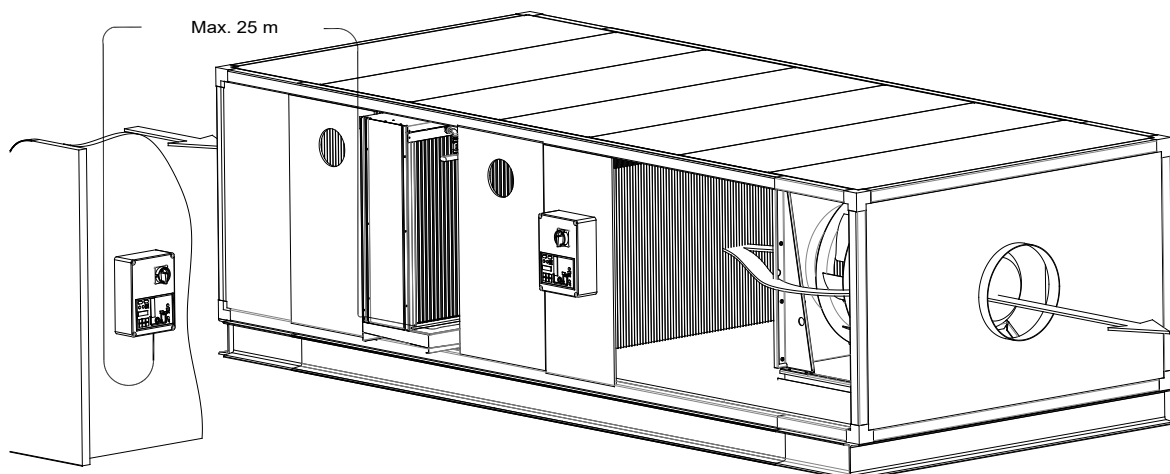
### 7.1 - General description

The Basic Control Panel has been specifically designed for interconnection and supervision of the accessories supplied with the FISAIR Evaporative Humidifiers. The addition of the CCB or CCB+C makes it possible to obtain more precise, simple and reliable integration into air treatment units.

The control panel manages all the accessories of the FISAIR Evaporative Humidifiers:

- Water recirculation pump
- Minimum and maximum water level sensor in the tank
- Water supply solenoid valve for the tank
- Motorised valve for drainage/discharge of the tank
- The water treatment system by means of a UV lamp (optional)
- Water conductivity control (optional, only for CCB+C)

**Figure 1: Examples of installation of the CCB on a vertical wall and a CCB integrated into the AHU**



## 7 - MCCB MANUAL - HUMIDIFIER CONTROL BOX

### 7.2 - Installation

The Basic Control Box (CCB) is supplied in an insulated housing made up of a base and a cover with a steel hinge with an epoxy polyester powder surface finish in grey RAL 7035, the coating of which is weather resistant (in accordance with IEC 62208) with degree of protection IP66 in accordance with IEC-60529 and impact protection rating IK10 in accordance with IEC 62262.

Heat and humidity measurement conditions in the installation area:

- Relative Humidity [ 5% ... 95% RH], without condensation.
- Temperature [ -10 °C ... +40°C ]

During installation the recommended spaces for connections, inspection and maintenance must be complied with. If the box is drilled in the places indicated for fixing, it must be ensured that the necessary degree of protection  $\geq$  IP66 is maintained. The Basic Control Panel weighs 6 kg, and should be installed vertically on a wall (see Figure 1) to maintain the IP66 degree of protection. Figures 2.1 and 2.2 show the minimum service spaces that must be complied with and the heights of the holes which must be drilled for fixing.

Figure 2.1: Right-hand view, door open

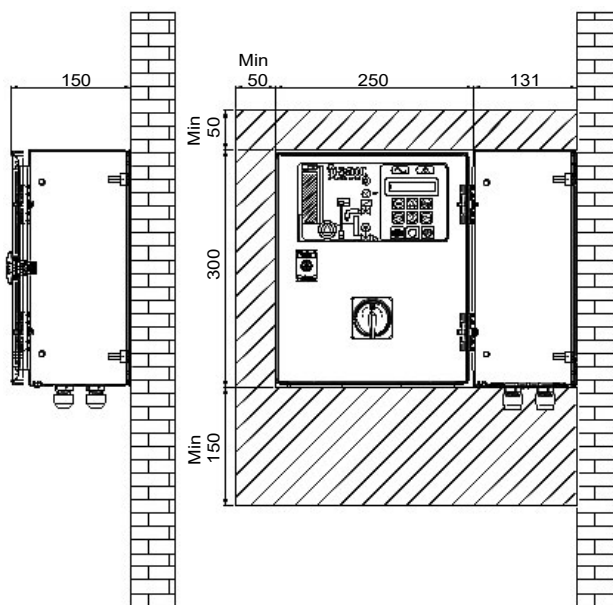
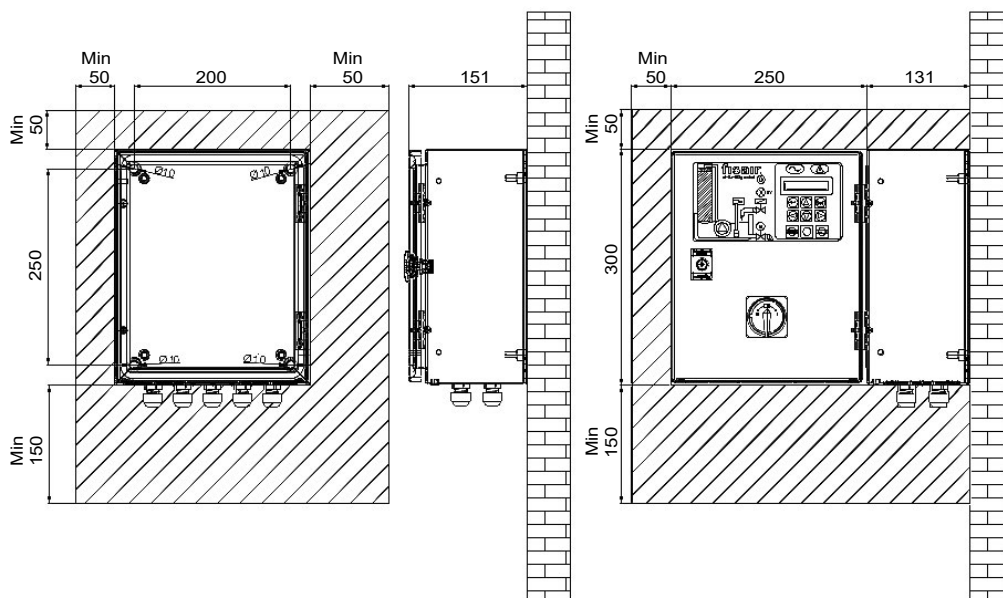


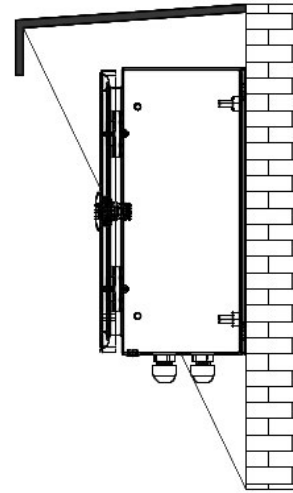
Figure 2.2: Front view, door open



## 7 - MCCB MANUAL - HUMIDIFIER CONTROL BOX



If the control panel is installed outdoors, it must be housed under a protective cover to protect it from the direct effects of sun and rain (taking into consideration the requirement that the installation field does not exceed 40 °C)



### 7.3 - Description of hardware

Figure 3.1: Front view of the CCB cover

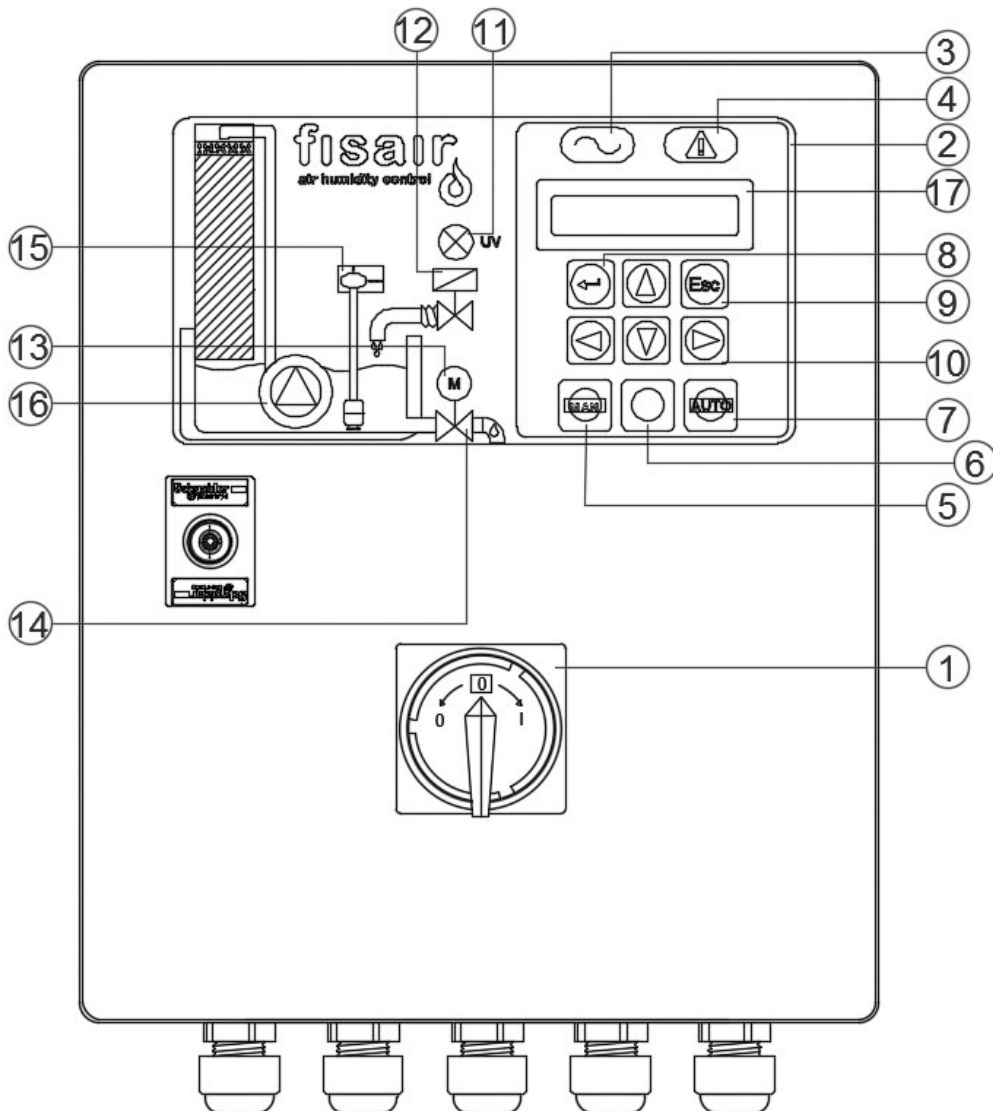


Figure 3.2: Bottom view of the CCB

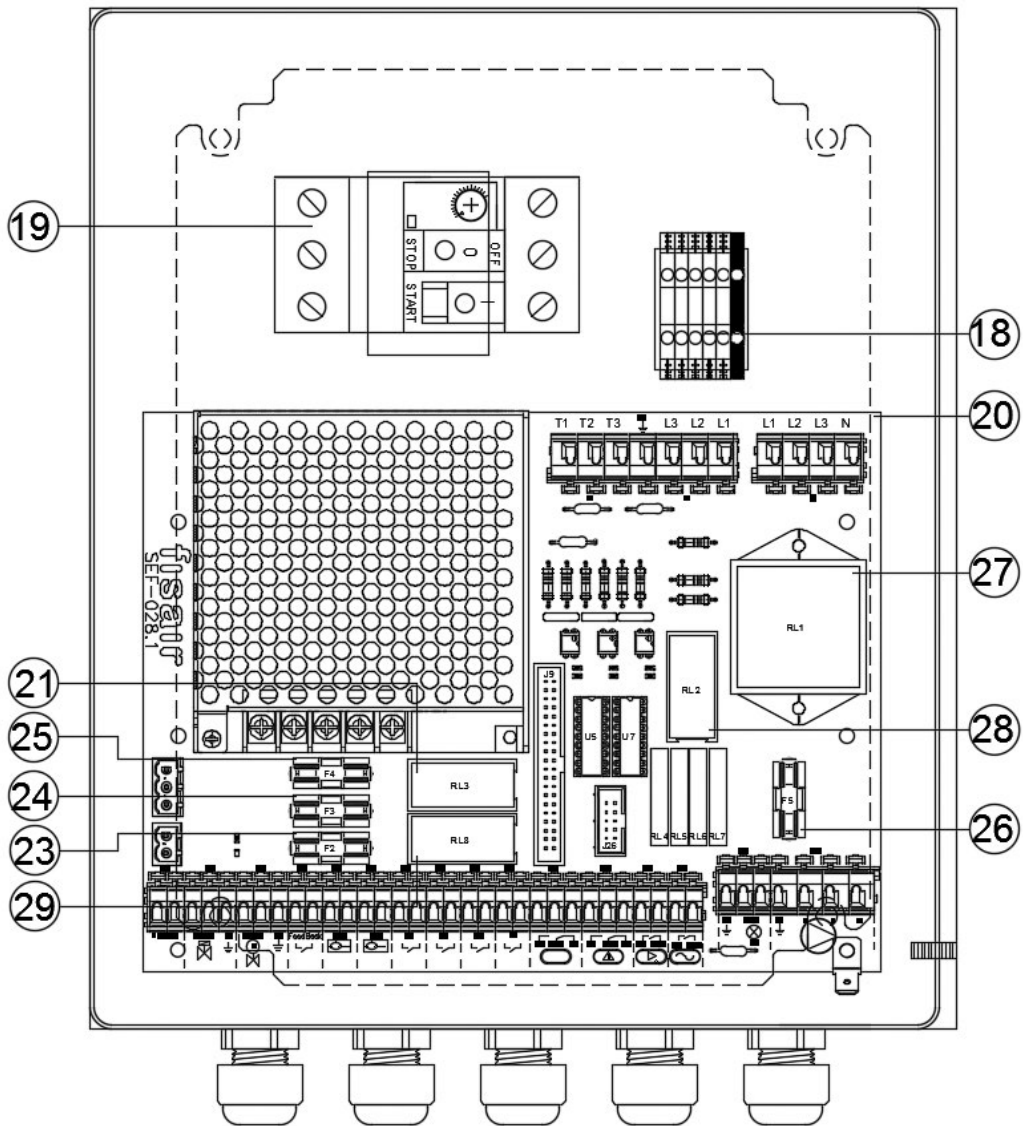
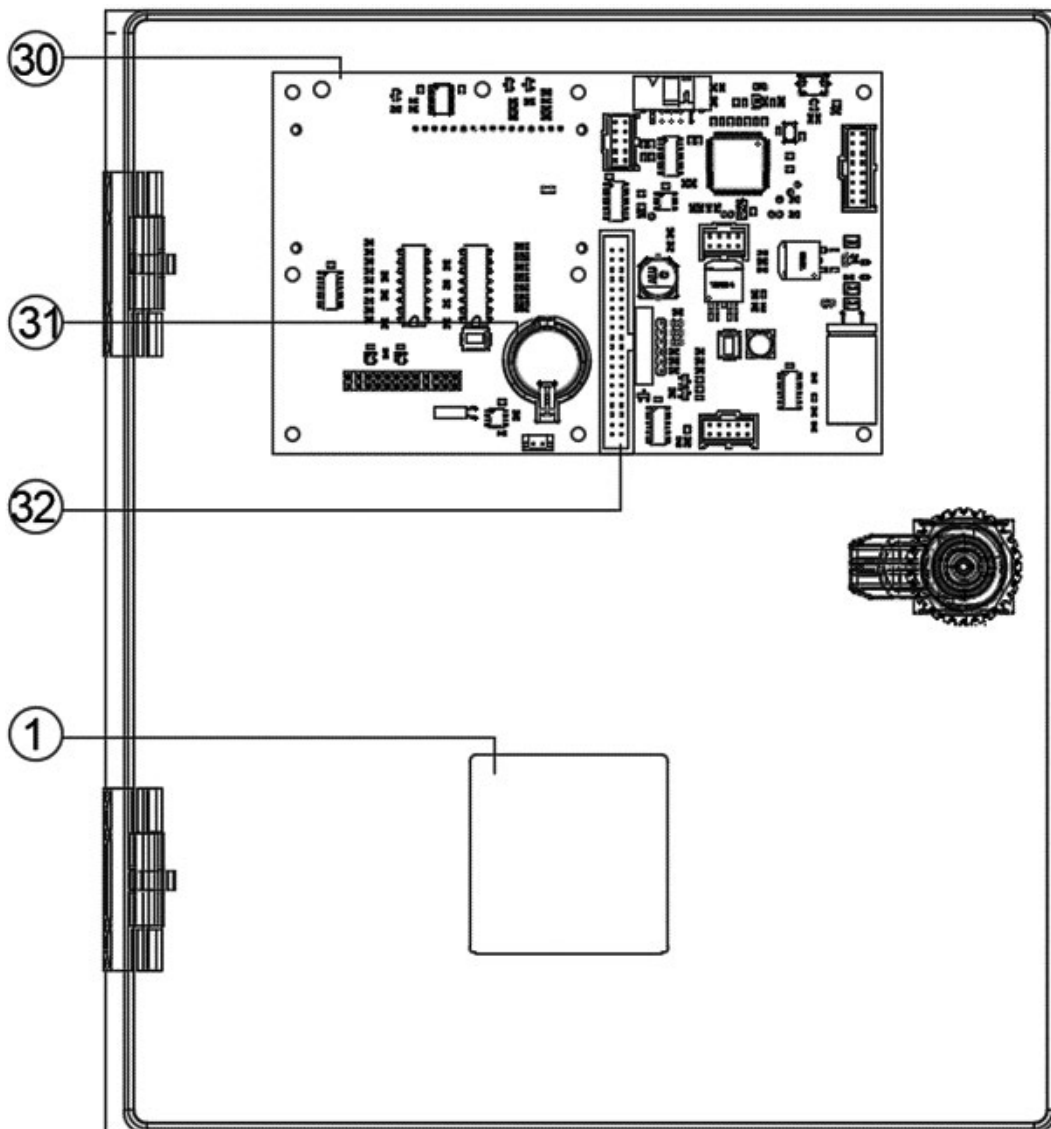
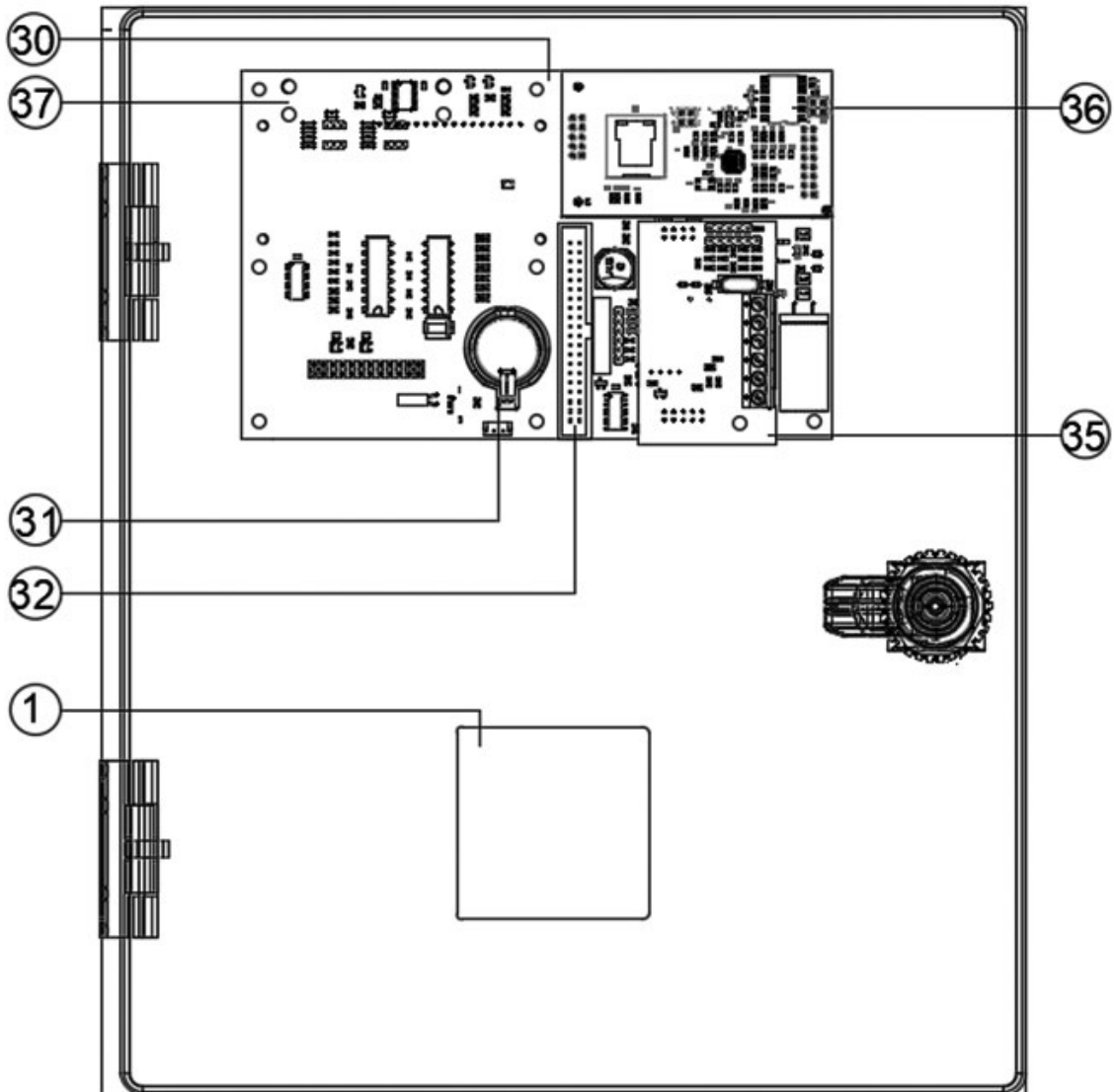


Figure 3.3: Interior of the CCB cover



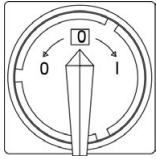
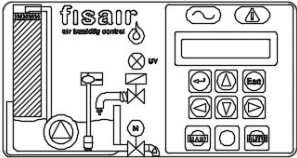







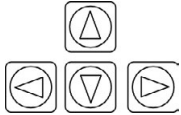






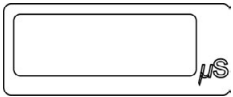
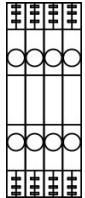
## 7 - MCCB MANUAL - HUMIDIFIER CONTROL BOX

Figure 3.4: Interior of the CCB cover - optional conductivity map



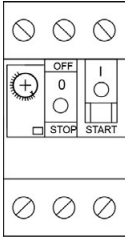
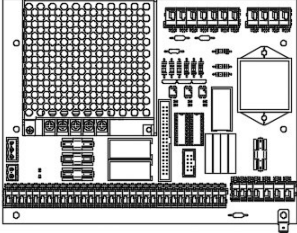








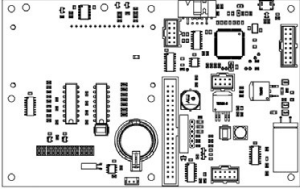



## 7 - MCCB MANUAL - HUMIDIFIER CONTROL BOX




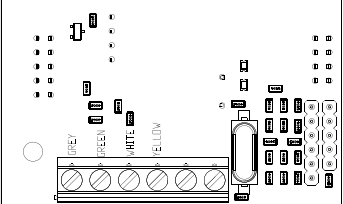
LED / Key	No.	Description, Function and Item Code
	1	Switch (I1) for switching off and isolating the supply voltage with the possibility of locking by padlock (not supplied) Item code: 64300129
	2	HMI. Control and display interface SEF-027.1 Ref: 52300012
	3	LED. Yellow. Indicates equipment undervoltage
	4	LED. Red. Indicates a general fault
	5	Operation in manual mode key
	6	Change of operating state key
	7	Operation in automatic mode key.
	8	Confirmation key (ENTER)
	9	Return key (ESC)
	10	Navigation keys
	11	LED. Blue. Indicates that the UV lamp is operating
	12	LED. Yellow. Indicates that the water supply solenoid valve is powered on
	13	LED. Green. Indicates that the motorised drain valve is powered on
	14	LED. Green. Indicates that the motorised drain valve is open (requires a feedback connection)
	15	Float switch status LED: Yellow: Indicates level below minimum Green: Indicates operating level Red: Indicates maximum water level Flashing red: Indicates a fault
	16	Water pump status LED: Green: Water pump in operation Red: Malfunction
	17	Display screen: Errors Automatic mode Manual mode Off state Value in µS of the conductivity of the water (only applicable with conductivity sensor installed)
	18	Supply terminals (X1)



## 7 - MCCB MANUAL - HUMIDIFIER CONTROL BOX

LED / Key	No.	Description, Function and Item Code
	19	Thermal-magnetic circuit breaker (U1 in the wiring diagram) for protection of the water pump Item code: 64350005 (Pump 55 W single-phase) Item code: 64350002 (Pump 60 W three-phase) Item code: 64350010 (Pump 90 W single-phase) Item code: 64350004 (Pump 125 W three-phase) Item code: 64350005 (Pump 240 W three-phase) Item code: 64350020 (Pump 370 W single-phase)
	20	Electronic power card SEF-028.1 Item code: 52300013
	29	Relay 8, for servomotor discharge/drain Item code: 64130018
	23	Fuse F2 for protection of the auxiliary power supply Item code: 64600012
	24	Fuse F3 for protection of the water supply solenoid valve Item code: 64600012
	25	Fuse F4 for protection of the motorised discharge/drain valve Item code: 64600012
	26	Fuse F5 for protection of the UV Lamp Item code: 64600013
	27	Relay RL1 for the water recirculation pump Item code: 64130019
	28	Relay RL2 for the UV Lamp Item code: 64130018
	21	Relay RL3 for the water supply solenoid valve Item code: 64130018
	30	Central processing card SEF-025.1 Item code: 52300010
	31	3 V Battery CR2032 Item code: 69101000

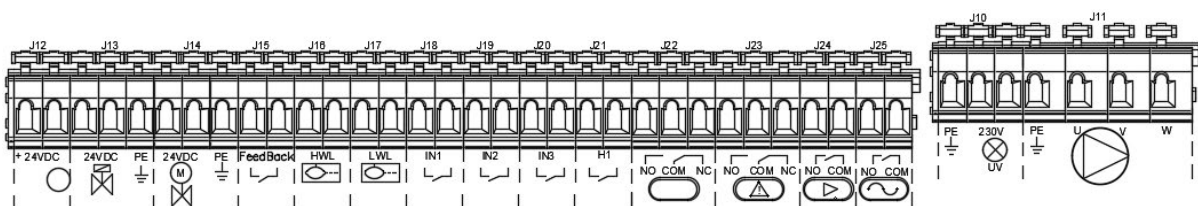
# 7 - MCCB MANUAL - HUMIDIFIER CONTROL BOX

LED / Key	No.	Description, Function and Item Code
	32	40-pin flat cable connector. Between SEF 28.1 and SEF-025.1
	33	CCB information plate
	34	Conductivity sensor with 2 m cable for the CCB+C Item code: 64220250
	35	Conductivity sensor card SEF-026 for the CCB+C Item code: 52300011
















## 7.4 - Connections

1) Connect the standard or optional accessories to the SEF-028 card as shown in figure 4.1.

Figure 4.1: SEF-028 card



## 7 - MCCB MANUAL - HUMIDIFIER CONTROL BOX

Type of connection	Symbol	Connection	Description	Max. Power Max. Voltage
Optional	+24VDC	J12 <sup>(1)</sup>	Motorised water drainage valve supply	5 W 24 VDC
Mandatory		J13	Water supply solenoid valve	14 W 24 VDC
Mandatory		J14 <sup>(1)</sup>	Motorised water drainage valve	40 W 24 VDC
Mandatory		J15 <sup>(1)</sup>	Motorised drain valve position feedback (opening limit)	Dry contact
Mandatory		J16	Maximum water level sensor (NC contact)	Dry contact
Mandatory		J17	Minimum water level sensor (NO contact)	Dry contact
Optional		J18 <sup>(2)</sup>	UV lamp operating sensor (optional)	Dry contact
Optional		J19 <sup>(2)</sup>	Forced drain signal: the other signals are ignored until the end of the drain, then, the operation returns to its original state	Dry contact
Optional		J20 <sup>(2)</sup>	Triggering of external fault	Dry contact
Optional		J21 <sup>(2)</sup>	Remote ON/OFF activation in automatic mode.	Dry contact
-		J22	Not used	500 VA 250 V
Optional		J23	Remote fault signal.	500 VA 250 V
Optional		J24	Remote operating signal.	500 VA 250 V
Optional		J25	Remote voltage signal.	500 VA 250 V
Optional		J10	UV lamp power supply	40 W 230 V
Mandatory		J11	Water recirculation pump	240 W to 400 V 370 W to 230 V

(1) Motorised drain valve actuator connection:

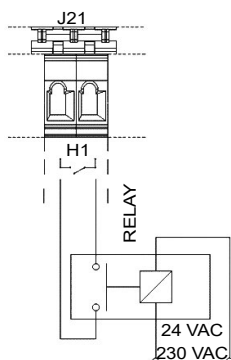
Terminal SEF-028.1	Actuator	
	Actuator cable no.	Actuator cable colour
J12 + (red)	2	Red
J12 - (black)	1	Black
J14 + (red)	3	White
J14 - (black)	-	-
J14 ground (yellow)	-	-
J15 a (grey)	S1	Purple
J15 b (grey)	S3	White
Direction of rotation	-	

(2) The following recommendations must be followed:

If the cable is longer than 5 m. A twisted, shielded cable must be used.

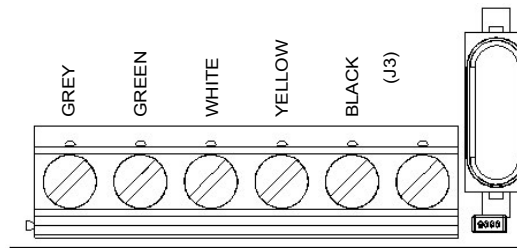
If the cable is longer than 15 m. It is possible that the cable's resistivity or excessive noise on the line will cause the signal to drop: in this case, a high sensitivity relay must be installed close to the CCB2.0 cabinet which is installed outdoors.

Example: Connection to J21 (H1):



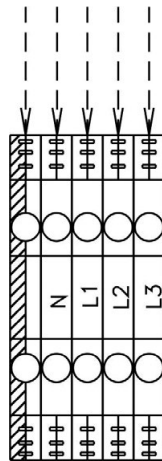
## 7 - MCCB MANUAL - HUMIDIFIER CONTROL BOX

- 2) (Optional, only for CCB+C) Connect the conductivity sensor to the SEF-026 card, connecting the wires according to the indicated colours (ground to J3, any of the two interlocks):

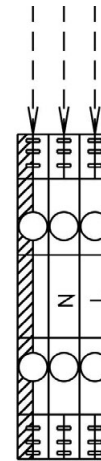


- 3) With the switch in position 0, connect the main power supply, as applicable, to the X1 terminals

**Connection of three-phase line**



**Connection of single-phase line**



### The appropriate cabling prevents electrical noise:

Electrical noise can cause undesirable effects in the electronic control circuits which has an impact on the control capacity. The electrical noise is generated by electrical equipment, such as inductive loads, electric motors, solenoid coils, welding machines, or fluorescent light circuits. Electrical noise or interference generated by these sources (and the effect on the controllers) is difficult to define, but the most common symptoms are incorrect control or intermittent operational issues.



#### **IMPORTANT:**

**For maximum EMC effectiveness, connect all the humidity controls, the upper limit and the air flow using a multilayer, multicoloured shielded cable with a drainage cable for the monitor. Connect the earth cable for the monitor with a cable at least 50 mm long.**

**Do not connect the shielded cable at the end of the device to the earth.**

# 7 - MCCB MANUAL - HUMIDIFIER CONTROL BOX

## 7.5 - Supervision

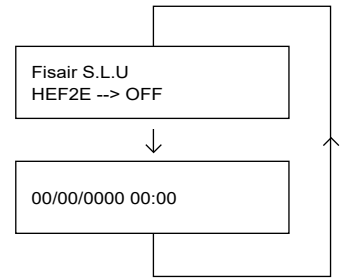
**START:** Main screen displayed when the equipment is switched on via the disconnect switch (I1) and displays the following information on 2 screens that permanently appear in succession:

Screen 1:

- Company name: FISAIR, S.L.U
- Status indication: HEF2E → OFF

Screen 2:

- Date: 01/01/2019
- Time: 21:00



To start the device, select one of the two configuration modes available, manual (MAN) or automatic (AUTO):

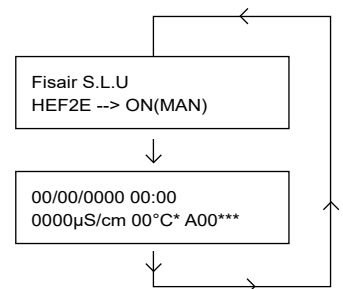
**MAN:** Select manual mode (MAN) on the control and display interface to enter this mode. The following information is displayed on 2 screens that permanently appear in succession.

Screen 1:

- Company name: FISAIR, S.L.U.
- Status indication: HEF2E → ON (MAN)

Screen 2:

- Date: 01/01/2019
- Time: 21:00
- Water temperature and conductivity value (µS/cm). \* Depending on conductivity control.



\*\*\* In the event of a fault, an **alarm code is displayed** on the second line of the screen; see Section 10 "Alarms" for more information.

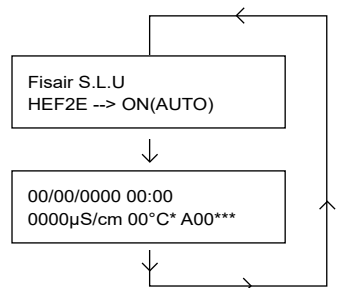
**AUTO:** Select automatic mode (AUTO) on the control and display interface to enter this mode. The following information is displayed on 2 screens that permanently appear in succession.

Screen 1:

- Company name: FISAIR, S.L.U.
- Status indication: HEF2E → ON (AUTO)

Screen 2:

- Date: 01/01/2019
- Time: 21:00
- Water temperature and conductivity value (µS/cm). \* Depending on conductivity control.



\*\*\* In the event of a fault, an **alarm code is displayed** on the second line of the screen; see Section 10 "Alarms" for more information

## 7.6 - Configuration

Configure the basic control box according to the air handling requirements during the process of integrating the humidifier with Fisair evaporation. Pay special attention to the quality of the water supply, hygiene requirements of the application and the required working cycles.

For this, select the different configuration options using the control and display interface buttons.

The different configuration modes are displayed on the screen (integrated in the control and display interface).

To access the configuration menu, press and hold the ◀▶ keys for a few seconds. You can switch from one screen to the other using the vertical arrows. The right arrow takes you to the next level on a screen and the left arrow takes you back a level.

The two possible configurations are shown below:

## 7 - MCCB MANUAL - HUMIDIFIER CONTROL BOX

### 7.6.1 - Drainage

Draining of the tank is configured by the following control options:

#### 7.6.1.1 - Drainage by controlling the conductivity:

Partial drainage via the conductivity sensor is controlled by the following timers\*:

- Conductivity Set-Point (0-1999  $\mu\text{S}/\text{cm}$ )

The conductivity required inside the tank is defined in the SET-POINT timer.

If the conductivity sensor exceeds this value, the tank is partially drained.

- Timer T02 (Min. 1 min / Max. 15 min)

The time interval between two partial drainages is defined by the conductivity control according to the time value defined in T02.

- Timer T07 (Min. 5 s / Max. 360 s)

The partial drainage time is configured with the conductivity control after the setpoint is exceeded.

#### 7.6.1.2 - Standard drainage:

Full drainage of the tank depends on the following timers\*:

- Timer T05 (Min. NEVER / Max. 24 h)

When the equipment is operating, periodically it is fully drained according to the time value defined in T05.

- Timer T06 (min. 0 h / Max. 24 h)

Once the equipment has been switched off, the delay for complete drainage is configured based on the time value defined as T06.

#### 7.6.1.3 - No drainage (Never):

The tank is never drained

\*Configuration of these timers is outlined in Section 7 "Settings".

### 7.6.2 - Pre-start-up configuration

A pre-start-up process can be activated and the number of cycles to be repeated can be specified.

This process involves repeating the cycling according to a set number of times: Water recirculation pump on for 10 minutes, then tank drainage for 10 minutes.

This process removes dust produced during the manufacturing process from the panel.

During the pre-start-up cycle, the fans for the air ducts to be treated must be shut down.

The UV lamp must not be turned on during this process.

Once the function is active, the equipment must be started in Manual mode (MAN) to launch the start-up cycles.

The regulation options available are as follows:

- Enable:

Activates the start-up process

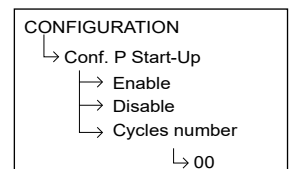
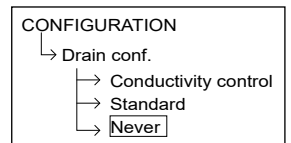
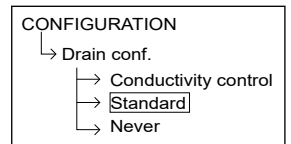
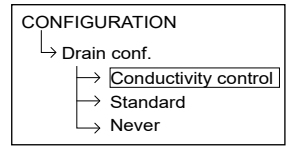
- Disable(\*):

Deactivates the start-up process

- Cycles number (min. 0 cycles /Max. 10 cycles)

Defines the number of cycles during the start-up process.

The factory-set value is 6 cycles



(\*) Once the function is active, the equipment must be started in Manual mode (MAN) to launch the commissioning cycles.

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### 7.6.3 - Stage configuration.

Not available on the Basic Control Box 2.0 (CCB2.0).

### 7.6.4 - Configuration 0...10 V or 4...20 mA:

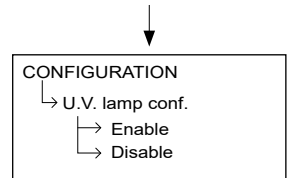
Not available on the Basic Control Box 2.0 (CCB2.0).

Staged regulation is only available in the multi-stage control panel 2.0 (CCE2.0).

### 7.6.5 - Configuring the UV lamp

Activates or deactivates the water treatment system via UV:

- Enabled (activated, 1)
- Disabled (deactivated, 0)



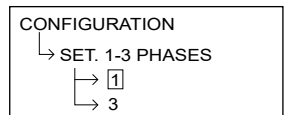
**Note 1:** If a submersible UV lamp is installed in the tank, a bridge must be placed on jumper J18 (IN1)

**Note 2:** Every time the UV lamp is turned on, an internal runtime counter of 12,000 hours is activated, but only when the equipment is running. After 12,000 hours of operation, error E51 is triggered to request the lamp be replaced.

**Note 3:** When the lamp is replaced following error E51, reset the 12,000 hour counter by turning off the lamp (0) and turning it back on (1) in this configuration menu.

### 7.6.6 - Configuration of the main 1-3-PHASE supply

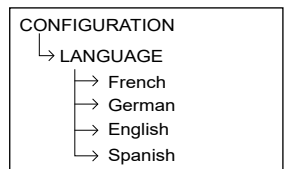
Selection the supply type for your system, single-phase (1) or three-phase (3).



### 7.6.7 - Language

Selected the required language on the screen:

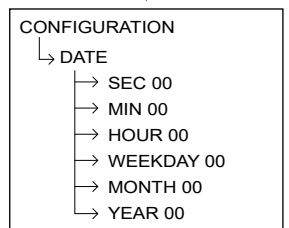
- Spanish
- English
- German
- French



### 7.6.8 - Date

Set the exact date and time by entering the information displayed on the following screens:

- Seconds
- Minutes
- Hour:
- Weekday
- Month
- Year



## 7.7 - Settings

The values required for the different parameters to be adjusted are configured in this section. The conductivity setpoint and the different timers are configured. Each parameter can be adjusted within its own value range.

The different parameters to be adjusted are displayed on the screen (integrated in the control and display interface).

You can switch from one screen to the other using the vertical arrows. The right arrow takes you to the next level on a screen and the left arrow takes you back a level.

# 7 - MCCB MANUAL - HUMIDIFIER CONTROL BOX

## 7.7.1 - SET-POINT $\mu\text{S}/\text{cm}$ (if applicable)

Enter the conductivity setpoint. If this conductivity value is exceeded, the motorised drain valve is activated and water is restored to the required conductivity (lower than the setpoint).

Keep in mind that TIMER T07 controls the time between when the setpoint value is exceeded and the opening of the drain valve, whereas TIMER T02 defines the time interval between two partial drainages.

The range extends from 0 to 1999  $\mu\text{S}/\text{cm}$ .

## 7.7.2 - TIMER T01 (e.g. SW1 AB)

Enter the delay time for the recirculation pump after detection of a minimum water level. This should not be too short to cause unstable oscillations nor too long so that the water level causes the pump to shut down.

The timer range extends from 30 s to 1000 s.

The factory-set value is 90 s.

## 7.7.3 - TIMER T02 (e.g. SW1 CD)

Enter the time interval between partial tank drainages with the conductivity control.

The timer range extends from 1 min to 15 min.

The factory-set value is 5 min.

## 7.7.4 - TIMER T03 (e.g. SW2 AB)

Enter the confirmation time for a full drainage. This is the maximum time the level sensor requires to confirm the minimum water level or an obstruction in the drain after the drainage control.

The timer range extends from 1 min to 60 min.

The factory-set value is 10 min.

## 7.7.5 - TIMER T04 (e.g. SW2 CD)

Enter the additional full drainage time during which the motorised drain valve will be open.

The timer range extends from 30 min to 400 min.

The factory-set value is 60 min.

## 7.7.6 - TIMER T05 (e.g. SW3 AB)

Enter the frequency of full drainages during operation.

The timer range extends from 0 min to 24 h.

The factory-set value is 0 min.

0 min = never

## 7.7.7 - TIMER T06 (e.g. SW3 CD)

Enter the time interval between shut down of the equipment and the full drainage.

The timer range extends from 0 h to 24 h.

The factory-set value is 1 h.

0 h = The drainage is carried out as soon as the equipment is shut down.

## 7.7.8 - TIMER T07 (e.g. SW4 CD)

Enter the setpoint for the time interval between partial drainages due to the opening of the motorised drain valve when the conductivity is continually exceeded.

The timer range extends from 5 s to 360 s.

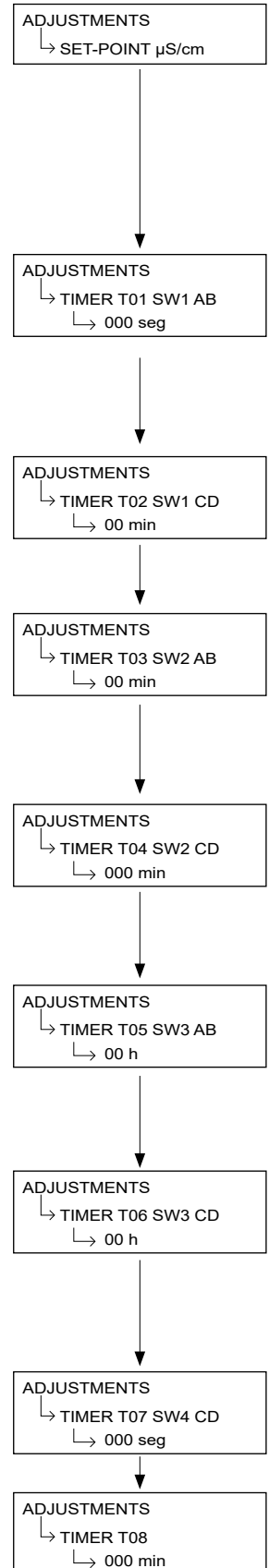
The factory-set value is 30 s.

## 7.7.9 - TIMER T08

Enter the maximum duration of fillings, i.e. the time after which the minimum level is reached when the tank is being filled.

The timer range extends from 5 min to 60 min.

The factory-set value is 15 min.





## 7 - MCCB MANUAL - HUMIDIFIER CONTROL BOX

### 7.8 - Calibration

Calibration is recommended every 12 months.

To do this, proceed as follows:

- I. Soak the sensor head in HI 7061 Cleaning Solution (Item code 69510002) for at least one hour. If you require thorough cleaning, rub the metal tips with very fine sandpaper or a non-abrasive brush.
- II. Fill a clean container with high conductivity liquid. This can be done with 1,413  $\mu\text{S}/\text{cm}$  HI 7031 solution (Item code 69510001).
- III. Insert the sensor into the container to measure the conductivity.
- IV. Read the temperature of the liquid (22 °C) displayed in the supervision menu. Wait 5 minutes until the temperature reading is stable.
- V. Check the conductivity of the solution at this temperature in the table found on the bottle label (e.g. 1332  $\mu\text{S}$ ).
- VI. This value is entered in the menu CALIBRATION → HIGH. To do this, access the menu containing the measuring sensor conductivity value (e.g. 1380  $\mu\text{S}$ ). Correct it according to the conductivity value at this temperature. (Example 1332  $\mu\text{S}$ ). Fully exit the supervision menu so that the value is saved.
- VII. For the menu CALIBRATION → LOW, repeat steps I - VI, **with the low conductivity fluid**. You can use the HI 7033 solution of 84  $\mu\text{S}/\text{cm}$  (Item code 69510003 and 69510004).

CALIBRATION
↳ HIGH 1413 $\mu\text{S}/\text{cm}$
↳ 000

CALIBRATION
↳ LOW 84 $\mu\text{S}/\text{cm}$
↳ 000

### 7.9 - Launch

After the steps prior to installation and when all the connections have been made according to the corresponding wiring diagram (see number of wiring diagram on the information plate inside the CCB2.0)

1. Verify that the mains voltage corresponds to the supply voltage of the CCB2.0 indicated on its wiring diagram.
2. Change the state of the disconnect switch I1 from position 0 to position 1.  
The LEDs on the control and display interface turn on and the "low voltage" remote signalling contact is activated (Connection J25).



Fisair S.L.U. 00/00/0000 00:00
HEF2E --> ON (AUTO);

3. Initial adjustments (configuration and settings) are carried out according to the operating mode.
  - a) UV lamp (if applicable)  
Turn the UV lamp on or off using the navigation keys.  
See Section 6.3
  - b) Conductivity sensor: (if applicable)  
Adjusting the setpoint: The conductivity setpoint is adjusted as shown in Section 7.1.

#### - Recommendation:

The setpoint must be 20% higher than the first reading carried out, when the clean water tank is filled for the first time.


TIMER **T01** must be coded so that this reading can be carried out (see Section 7.2) at 1000 s, and therefore without the pump starting up and therefore contaminating the water in the tank. When this measurement has been taken, reset **TIMER T01** to the factory setting or according to contractual requirements.

Partial drainage operation (depending on conductivity control):

- When the setpoint and the value of **TIMER T07** are exceeded (the latter defines the duration during which the setpoint must be exceeded without interruption), the motorised drain valve opens and the water in the tank is restored, as the filling solenoid valve remains open (it is adjusted and only closes when the maximum level is detected).
- A minimum partial drainage of 100 s is therefore carried out, the motorised valve closes and the tank fills up until the float valve closes. The filling solenoid valve remains open (the closing of the solenoid valve is only controlled by the maximum level sensor).
- No measurement by the sensor (it is not in contact with the water) indicates that the water level has dropped below the sensor electrodes. The motorised valve closes and a new partial drainage cycle starts **TIMER T02** detects the minimum duration between partial drainages and **TIMER T07** the setpoint time during which the conductivity threshold must be continually exceeded.
- The complete cycle of this operation is performed without shutting down the pump.

## 7 - MCCB MANUAL - HUMIDIFIER CONTROL BOX

4. Select the operating mode that best suits your needs, automatic or manual:

The required operating mode is selected using the MAN  or AUTO  keys (Remember to move the disconnect switch I1 to position 1)

On the equipment status display (MAN, AUTO or START), see Section 5 "Supervision".








MAN → START OPERATION

Fisair S.L.U. 00/00/0000 00:00  
HEF2E --> ON (MAIN);

AUTO → START OPERATION

Fisair S.L.U. 00/00/0000 00:00  
HEF2E --> ON (AUTO);

5. Operation:

- I. If the UV lamp has turned on, the LED  flashes blue until confirmation is received from the lighting sensor. It then stops flashing and remains lit up in blue. If the lamp is submersed, a bridge must be placed on jumper J18 (IN1), as this works for several hours.
- II. When the operating mode is chosen (MAN or AUTO), the LED for the water supply solenoid valve  lights up, indicating the tank is being filled, until the mechanical float valve is closed. In the event of a fault in the mechanical float valve, the tank continues to be filled until the level sensor detects the maximum water level (the LED  turns red)
- III. III. When the minimum water level is reached, (LED  green), the water recirculation pump starts up (LED  green) at the end of the time set in **TIMER T01**
- IV. During operation or after shut-down, the LEDs  turn on according to the  filling settings.
- V. During operation - in both MAN and AUTO mode - an alarm code is displayed on the screen in the event of a fault. (see Section 5 "supervision")
- VI. If the equipment has the optional conductivity meter:

The conductivity measurement is displayed in  $\mu\text{S/cm}$ . (see Section 5 "supervision")

### 7.10 - List of alarms


Alarm indication	Item	Description of the alarm	Recommended action
40*	CPU	Internal fault on the SEF-025.1 card	Contact Technical Services
41*	RAM	RAM	Replace the battery and/or contact Technical Services to reload the program into the RAM
42*	Conductivity sensor	Connection error or damaged component	Check the connection and/or contact Technical Services
43	Level switch	Connection error or damaged component	Contact Technical Services
44*	Thermal-magnetic circuit breaker	Connection error, on current or lack of phases	Check the connection, ensure that the supply network is correct. Once the fault is rectified, reset the circuit breaker
45*	UV Lamp	Contact IN1 has not been closed by the lamp sensor	Check the signal from the UV lamp sensor
46	Motorised discharge/drain valve	The minimum level has not been detected during drainage, after the "drainage confirmation delay" has elapsed	Check that the motorised drain valve is operating correctly
47	Water supply	The minimum water level has not been detected during filling, after a set delay.	Check that the water supply solenoid valve is operating correctly
48	Motorised discharge/drain valve	The feedback from the motorised valve contradicts the set-point	Check that the motorised valve and feedback connection are operating correctly
49	Conductivity	The conductivity of the water cannot be reduced	Check that the conductivity sensor is operating correctly. Check the conductivity order
50*	External fault	IN3 open, if an external component is installed.	-
51*	Submersible UV lamp in the tank	The lamp has exceeded 12,000 hours of operation	Replace the UV lamp with a new one. Reset the 12,000 hour timer in accordance with the instructions in §7.6.5, [note 3]

\* These alarms prevent the operation of the equipment. Once the fault has been rectified, the equipment must be deenergised and restarted to return it to its initial state.




## 8 - AL-UW SUBMERSIBLE UVC LAMP

### 8.1 - Safety

#### 8.1.1 - System hazards


	<p>In the event of operating error or misuse, there is a risk of: Bodily harm to the user; Damage to the unit, the system, and other property of the user; Impairment of the performance and effectiveness of the unit. All persons involved in the assembly, start-up, operation, and service and maintenance of this device, must: Be qualified to perform their task; Follow this instruction manual to the letter.</p>
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#### 8.1.2 - Safety guidelines


	<b>DANGER</b>
	<b>ELECTRICAL INSTALLATION</b>
	<b>HARMFUL RADIATION</b>

#### 8.1.3 - Appropriate use


For satisfactory operation of the UV unit, it is absolutely essential to follow the assembly instructions and comply with the conditions of use set out by the manufacturer (Evaporative humidifier - Annex).

	<p>The unit is intended exclusively for disinfecting water in closed filtration, humidification and process chambers, and must be considered a component part within a system.</p>
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Operating personnel must follow the instructions in the instruction manual, which can be downloaded free of charge from the online support section if necessary. Alternatively, it may be ordered free of charge from the manufacturer upon submission of proof of purchase.

	<p>Unauthorised modification of the unit is forbidden. Only original spare parts may be used for maintenance work. Non-compliance with this warning will invalidate any warranty.</p>
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#### 8.1.4 - Emissions

	<p>Radiation: Infrared and light in higher ranges, as well as UV radiation in strong concentrations. Primary emission at 254 nm</p> <p>Ozone: Traces</p>
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## 8 - AL-UW SUBMERSIBLE UVC LAMP

### 8.1.5 - Hazards



Electrical power supply with sealed ballast in the base.  
Maintenance work may only be carried out by an authorised electrician.

Improper handling of a UV system or component parts of the UV installation, as well as non-compliance with individual passages of this document, or the document in its entirety, constitute a potential hazard. Read this document carefully.



Before carrying out service work, always switch off the unit at the mains and unplug. Make sure that there is no mains electricity supply to the system.



#### Caution – UVC radiation

UVC radiation will damage the retina even after the shortest exposure times!

It is imperative that eyes and skin be protected against UVC radiation. Never look directly at a UV light source when it is on without protection.



Caution – danger of glass breakage. Broken UV lamps or cladding tubes present a hazard of glass splinters. A UV source contains mercury. It is essential that you comply with section 8.7, “Disposal”, in this regard.

### 8.1.6 - Authorised operators



The unit may only be operated by persons who have read and understood this instruction manual.

The minimum age for operating the unit is 18 years.



The operator is responsible for any third parties in the operating area, and must prevent misuse of the unit. The operator is responsible for any damage arising from misuse.

### 8.1.7 - Safety measures on the installation site

The system must be sufficiently firmly anchored to the container designated for the use of the UV system if it is possible that it might be dislodged from its installation point by buoyancy or vibration.



During operation of the UV unit, the disinfection area must be shielded by suitable covers, doors or flaps rendering it UV-tight with respect to the environment.

During work on the open chamber, the UV unit must always be switched off and disconnected from the mains.

Normal or acrylic glass is impervious to UVC radiation, and thus already constitutes sufficient visual protection during normal operation.



The electricity cable must be routed so that kinking, cutting, rubbing or any other mechanical stress which could lead to the destruction of the cable may be ruled out.



Reference must be made to the danger of UV radiation in a clearly visible location on the housing or on the access opening to the disinfection area by suitable warning messages (for example, “Danger, UV radiation – protect eyes and skin!”).

## 8 - AL-UW SUBMERSIBLE UVC LAMP

### 8.1.8 - Protection devices

The unit complies with international health and safety standards and requirements, and conforms in terms of construction and regulations to Protection Classification IP 68 (in accordance with DIN 40 050 Sheet 1), making it suitable for immersion use.

The UV lamp itself is printed with a warning message. The operator must check that the appropriate warning signs on the system refer to the dangers of the UV radiation source.

### 8.1.9 - Personal protective equipment (PPE)

Should it be necessary, in a specific situation, to observe the UVC device in operation, Personal Protective Equipment must be worn.

For brief exposure to UVC radiation there are no special requirements regarding clothing choice.

All parts of the body should be completely covered. Wear gloves and a face mask, or at least protective goggles.

For prolonged exposure, all types of plastic fibre cloth will be damaged and coloured fabrics will fade.



If you need to observe a UVC system in operation, wear appropriate protective equipment.

### 8.1.10 - What to do in an emergency

Direct UVC radiation leads to painful corneal inflammations (keratitis) and sunburn-like reddening of the skin. In certain cases the effects may take some time to manifest themselves. In case of emergency please consult a medical specialist.

## 8.2 - Operating data and description of the device

### 8.2.1 - Overview

Model	40 W	75 W	40 W Amalgam	80 W Amalgam
Reference	3100860	3100862	3100864	3100866
Lamp T5	40 watts	75 watts	40 watts	80 watts
Service life of the lamp	8000 hours	8000 hours	16,000 hours	16,000 hours
Supply voltage	230 VAC 50/60 Hz	230 VAC 50/60 Hz	230 VAC 50/60 Hz	230 VAC 50/60 Hz
Length frame + quartz crystal	85 cm	85 cm	55 cm	85 cm

Subject to technical modifications

### 8.2.2 - General information

The submersible lamps comply with the strictest quality requirements and are manufactured throughout from high-grade components and materials. All metal parts of an AL-UW submersible lamp are made of corrosion-resistant stainless steel (AISI 316).

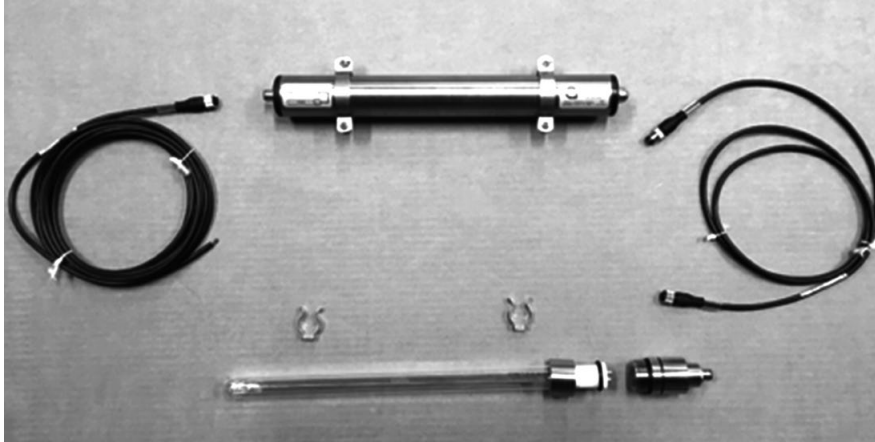
### 8.2.3 - Description

AL-UW submersible lamps consist essentially of a supply unit provided with holding clips for accommodating the high-performance tube. The electronic components in the supply unit are completely sealed with moulded resin and protected against moisture penetration. Connection to the mains is via the non-detachable connection cable (standard length 10 m).

The IP68-tested unit has a special three-part stainless-steel screw joint enabling the submersible lamp to be used in liquids up to an external pressure of 10 kPa/cm<sup>2</sup> (test pressure 20 kPa/cm<sup>2</sup>). The screw joint consists of two union nuts (on both the tube and socket sides) and a centre section with an anticlockwise double thread.

## 8 - AL-UW SUBMERSIBLE UVC LAMP

Together with the socket holder, a non-detachable union nut is connected to the supply unit, and can therefore not go astray. When the union nuts are screwed anticlockwise onto the centre section, the sealing rings are very noticeably compressed into the appropriate guides in the centre section. In this way, they seal the electrical contacts of the UVC tube from moisture penetration. As an additional safeguard, there are additional sealing rings on the inside of the centre section and on the socket holder, respectively. AL-UW model submersible lamps are constructed so that they can be disassembled and reassembled without the use of tools.



### 8.2.4 - Power supply

To guarantee users maximum safety in the event of a failure and maximum power development of the UV system, AL-UW submersible lamps have a high-frequency electronic ballast, built into the foot of the device and suited to the characteristics of the tube. This ensures the best possible electrical efficiency and UV radiation. The electronic components are interference-suppressed to a high level, and can therefore also be used in critical areas. They have an automatic circuit breaker in case of component or lamp faults. The high voltage stability of the ballast (~190 – 250V) provides for steady ignition behaviour, even in the event of unfavourable mains-power fluctuations. The high efficiency of all related components ensures low sensible heat (< 35°C).

Although the electronics guarantee the reliable ignition of the UVC tube over a very wide temperature range, continuous operation at temperatures above +50°C or below – 20°C should be avoided. Short-term temperature loads of up to 70°C are possible, but reduce the service life of the system. This also applies for frequent switching on and off.

### 8.3 - Assembly and connection of the unit

#### 8.3.1 - General advice for assembly



Make sure you take the time to check the unit thoroughly – it's in your best interests.

The submersible lamp is delivered ready for connection and equipped with all the necessary components. Before first use, it is imperative that you check all components to ensure that they are clean and undamaged. The protective quartz tube of the UV tube must be free of grease, oil, traces of adhesive or fingerprints. An ordinary lint-free household cloth and a little denatured alcohol or methylated spirit can be used for cleaning.



Check the submersible lamp to make sure that it is undamaged and in good condition (sealing surfaces).

Look out for possible damage in the form of cuts in the cable sheath, a hairline crack in the protective quartz tube, dirty sealing surfaces, or damage to the sealing rings. The condition and proper fit of the seals is absolutely critical for the impermeability of the device.

If the seals are dirty, old, brittle or otherwise damaged, or if the sealing surface is contaminated (this includes dust and chalk), water will gradually creep through the socket and cable into the sealed electronics. This will inevitably lead to a short-circuit, and hence to complete failure of the system.



Before plugging in the device, it is imperative that you check that the mains lead is in good condition, especially in damp areas.

## 8 - AL-UW SUBMERSIBLE UVC LAMP

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### 8.3.2 - Electrical connections

The connection cables of the submersible lamp (standard length 5 m) are pulled by their free ends out of the process chamber through cable bushings and connected at the clamps provided to the electricity supply/monitoring unit.

According to the relevant provisions (EN 60598-1), the electrical connection of the submersible lamp must be performed by authorised technical personnel.

(The connection to the main power supply with a 230 VCA  $\pm$  10 % socket must be protected by a 30 mA differential residual-current circuit breaker.



Connection may only be carried out by a specialist. The device must be protected by a 30 mA residual-current circuit breaker.

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### 8.4 - Unit operation

After connection by an expert, the unit is ready for operation and can be used immediately. The system electronics are completely maintenance-free and cannot be modified; in the event of failure, they must be replaced in full. For more on this subject, see also the advice given in section 6, "Faults and troubleshooting".

The following two points must simply be borne in mind during operation of the unit:

The UVC radiation source/protective quartz tube must remain clean and free from coatings during operation.

The UVC radiation source is subject to continuous ageing, and must therefore be changed/ replaced at regular intervals dependent on the user profile.

The frequency of the cleaning cycles depends on the residue formation on the UV tubes/the protective tube. The higher the mineral concentration in the water (especially iron, calcium and manganese), or the higher the input of adhesive foreign substances in the process fluid, the more frequently cleaning is required.



UV lamps must be cleaned at regular intervals in order to remain in proper working order.

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The rate of ageing of the radiation source is also dependent upon use. **Aire Limpio®** UV tubes are normally designed for an uninterrupted 12,000 hours of use. Should you be unable or unwilling to keep the system in continuous operation, let yourself be guided by the way normal fluorescent lamps should be dealt with: above all, avoid switching the unit on and off too frequently, as this leads to unnecessary stress, and hence the ageing of the disinfection lamp.



Avoid frequent switching on and off. All switching reduces the service life of the UV lamp.

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Further information on this subject is available in section 6, "Maintenance and spare parts".


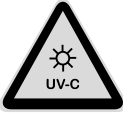
## 8 - AL-UW SUBMERSIBLE UVC LAMP

### 8.5 - Faults and troubleshooting

FAULT	CAUSE AND REMEDY
The residual-current circuit breaker is triggered as soon as the UV device is switched on.	Water has entered one or more of the submersible lamps in the system. This fault can only occur if water gets into the ballast unit of the submersible lamp owing for example to cable damage, and causes a short to earth. The damaged cable or systems must be replaced.
There is condensation water in the UV tube.	Check the protective quartz sheath of the UV tube for damage (hairline crack). Check whether water has got into the screw joint, and dry this area carefully. <u>Replace the sealing rings</u> and check the system over the following hours/days
Although all of the emitters are functioning properly, no germ-reducing effect is achieved.	Check the operating time and cleanliness of the UV tubes (the tube replacement interval must not exceed 12,000 hours). Were the project planning details consistent with the installation? Please contact a qualified <b>Aire Limpio®</b> system consultant.
The UV tube fails to ignite, although the system is switched on.	Check the mains supply connections. Check the contact pins of the UV tube (are they freely rotatable, loose, or broken?) and the area where the gold-plated contact pins connect inside the socket. Check the tube for visible damage. Is the internal tube broken (hairline crack) in the area of the socket?
The new UV tube flickers pale blue-violet, or flashes only briefly after it is switched on.	The UV emitter must be replaced. This fault occurs – if at all – after only a few operating hours, and can be put down to a manufacturing defect. The tube is defective. Oxygen has got into the quartz glass bulb of the UV tube. You will of course receive a free replacement.
The UV tube goes out after only a few operating hours, and has an opaque, silvery-black coating in the area of the coil (cathodes).	The UV emitter is defective, and must be replaced. The tube has been ignited too often. Each ignition of the tube is lossy, and particles flake off from the coil coating/ignition aid. With time, frequent ignition of the radiation source leads to complete loss of the coil coating (blackening of the tube wall), and the tube ceases to function.
How often must the emitters be cleaned?	The cleaning intervals are decisively determined by the quality of the water (degree of contamination), and above all its hardness. Regular inspection and cleaning are essential. A UV emitter with a grimy surface is markedly less efficient (comparable to a dirty car headlight).


### 8.6 - Maintenance and spare parts

#### 8.6.1 - Warning

	Always disconnect the unit from the main power supply when carrying out maintenance work.
	Never look directly at a lit UVC tube without eye protection! Never touch a lit tube.

#### 8.6.2 - Tube replacement/modification


UVC tubes have a limited service life. They are subject to a continuous ageing process that is markedly accelerated by frequent on/off cycles (> 3 on/off cycles/day).

	Avoid frequent switching on and off. All switching reduces the service life of the UV lamp.
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The actual burn time of the high-performance UVC tube (> 20,000 hrs) tells us nothing about the actual UVC power available for disinfection purposes.

Under normal operating conditions, the service life of the submersible lamp tubes is approximately 12,000 hrs (25 % ± 5 % decrease in power at rated UV output of the UV source in question).

Bear in mind that you cannot see ultraviolet radiation. The actual radiation lies far beyond the visible spectrum and the UVC output continuously decreases even though the visible blue light of the tube does not dwindle perceptibly. If you don't have access to a monitoring device (see **Aire Limpio®** product information), it is therefore essential that you make a note of the operating conditions and the replacement date in a maintenance schedule (see Section 10.2, "Service Plan").

	It is absolutely essential that the tube be replaced after 12,000 operating hours in order to maintain the performance and efficiency of the device.
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## 8 - AL-UW SUBMERSIBLE UVC LAMP

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Pay special attention to the sealing rings each time you service the unit. The sealing rings in immediate contact with the UV tubes are particularly subject to stress. The high UV load causes the sealing material to deteriorate quickly, with the result that the sealing rings immediately become cracked and lose their sealing function in the event of mechanical stress (dismantling of the unit/lever effect by lifting the submersible lamp from one side, etc.). For safety reasons, the sealing rings must therefore be replaced each time the system is serviced.



Always replace the sealing rings when replacing the lamps or carrying out a service.

### 8.6.3 - Cleaning the system

Regular cleaning of the quartz glass of the UVC tube(s) is essential. For cleaning, use a soft cloth. Chalk build-up and other fouling must be carefully removed with commercially available descaling agents and cleaners. Bear in mind that UVC tubes are made of quartz glass, and are therefore highly impact-sensitive and fragile.

In order to prevent greasy deposits, you should never touch the UVC tubes with your bare hands. Fingerprints form a nearly impenetrable barrier to ultraviolet radiation.



We strongly recommend that you clean the tube surface with an alcohol-based solution before starting up the system and after carrying out a service.

### 8.6.4 - Spare parts



Never replace defective components with other manufacturers' components.

Safe operation and a high level of reliability can only be ensured when all safety advice concerning the handling of electronic components is followed, and the components in question are replaced with original accessories and spare parts should the need arise.



Improper handling or the use of other manufacturers' components can lead to injury and material damage.

## 8.7 - Disposal

### 8.7.1 - UVC tubes

Like fluorescent lamps, UV tubes contain mercury. They therefore most definitely do not belong in normal household waste! Please be environmentally responsible by ensuring that defective or spent tubes are disposed of correctly as hazardous waste, or recycled.



UVC tubes constitute hazardous waste. Please do not dispose of them with normal household waste.

You can return your old UV tubes to us for expert disposal. Please use the original box for this, and the packaging material from your spare parts delivery. Make sure the tubes are packed carefully so that they can withstand transport and handling, and don't forget to affix sufficient postage.

We regret to inform you that we must refuse acceptance of broken goods as well as those sent with insufficient postage.

### 8.7.2 - Holder and ballast

The stainless-steel holder with the sealed ballast may be treated like normal electronic waste for disposal purposes.





The quality management system of this product's assembly site has been certified in accordance with the requirements of the ISO 9001 standard (latest current version) after an assessment conducted by an authorized independent third party.

The environmental management system of this product's assembly site has been certified in accordance with the requirements of the ISO 14001 standard (latest current version) after an assessment conducted by an authorized independent third party.

The occupational health and safety management system of this product's assembly site has been certified in accordance with the requirements of the ISO 45001 standard (latest current version) after an assessment conducted by an authorized independent third party.

Please contact your sales representative for more information.

Carrier S.C.S, Rte de Thil - 01120 Montluel, France.

The manufacturer reserves the right to change the product specifications without notice.

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