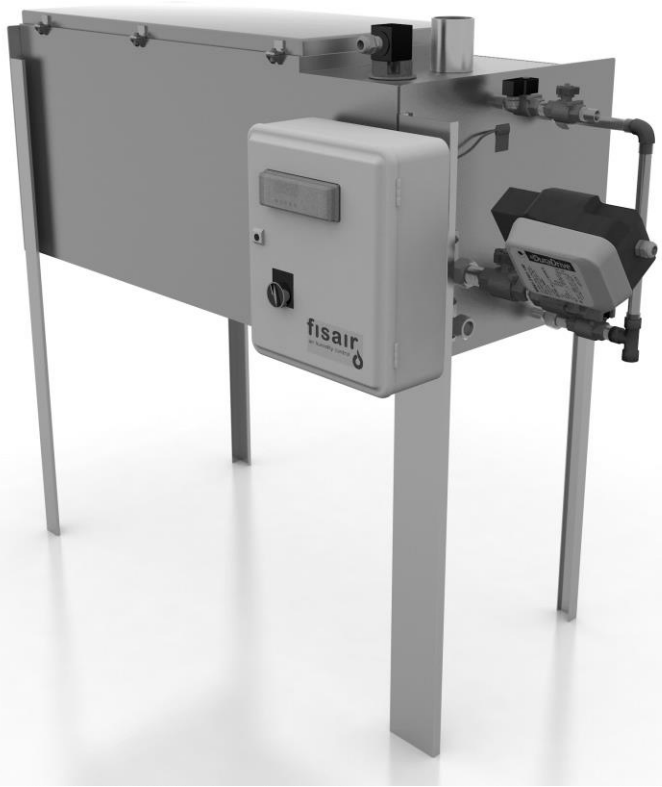
fisair
air humidity control



INSTALLATION AND MAINTENANCE MANUAL
DIPHUSAIR-VxV BOILER STEAM EXCHANGE HUMIDIFICATION SYSTEM

MVxV-EN-17-1

In compliance with the Rules and Standards of the European Union on Machine Safety, it is essential to read this protocol carefully before installing any equipment.

AENOR
Registered Company
ISO 9001
RC-0529/2015

CERTIFIED IQNet MANAGEMENT SYSTEM

Contents

1 Introduction

Dear Customer,

The DIPHUSAIR VxV humidifier is our answer to current technical requirements. These are met through their operating safety, functional convenience and financial efficiency.

To ensure the correct operation of your FISAIR humidifier, please read this Manual carefully and retain it for future consultation. If there is any part of this document that you do not understand, or if you have any questions about your dehumidifier - please contact your local distributor.

1.1 Operation instructions

The correct use of the humidifier includes following our instructions for installation, set-up, operation and maintenance, as well as following the steps indicated in the instructions in the correct sequence as described.

This humidifier may only be used by persons who are fully qualified and authorized to do so.

Any person who transports and/or used the unit or who works with it must read and understand the relevant section of this manual, in particular the section entitled "Safety Instructions".

You are advised to keep a copy of the user manual in the place where the humidifier is going to operate (or nearby).

Ignoring these instructions may invalidate all applicable guarantees and warranties.

2 Safety Instructions

Please read these safety notes carefully and examine the equipment to become familiar with it before installing, commissioning or servicing.

The following symbols or messages may appear in this document or on the equipment. They warn of potential hazards or provide information that may help you clarify or simplify a procedure.

See instructions

Read this manual before installation, which must be by properly qualified personnel. Incorrect installation can cause personal and equipment damage. You must consult the manual before maintenance or start-up.

Attention

This is a safety alert symbol. It warns of the potential of bodily injury.

Observe all safety information with this symbol to avoid any situation that could lead to injuries and/or damage to the unit.

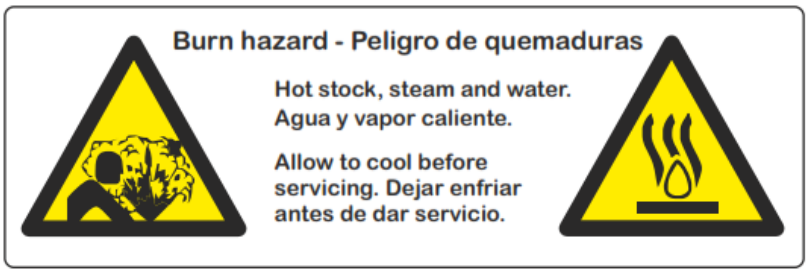
Attention, Live Current

The presence of this symbol on a hazard or warning label indicates that there is a risk of electrocution, which can lead to personal injury or life-threatening conditions if the instructions are not followed.

Turn off before opening

Turn off the power before opening the equipment to make new connections or perform maintenance in any part of it. Electric shock or fire may result if not turned off. Follow the equipment shutdown and control instructions to ensure the safety of the equipment and personnel.

Hot surface and danger of burns



This steam humidifier has extremely hot surfaces. Water in the tank, pipes and distribution assemblies can reach 100°C. Contact with the equipment surfaces and boiler water inlets and outlets is very dangerous and can cause severe burns. Let the equipment cool down before maintenance or inspection of any part of the system.

Caution: hot water and excessive pressure

- Drainage water can reach temperatures higher than 90°C and can therefore damage the drainage ducts and drain. Ensure the pipes and the sump can withstand this temperature.
- Excessive water supply pressure (greater than 2 bar) can cause the humidifier to overflow. Be sure to regulate the water inlet through the needle valve.

General points

- If you notice that something is not working properly, switch off the unit immediately and take steps to ensure that it does not switch on again. All faults must be corrected immediately.
- Use duly qualified personnel to carry out repair work. This will ensure that the unit operates safely.
- Use only original FISAIR replacement parts.
- Refer to local regulations that restrict or regulate the use of this humidifier.

How the unit works

- Do not jeopardise the safety of the unit.
- Periodically check the device's protection and alert devices.
- The unit's safety fittings must not be removed or disabled.

Installing, Disassembling, Maintaining and Repairing the unit

- Switch off the unit's power supply when conducting maintenance work or making repairs to the unit.
- Never add components to the unit without prior written approval from FISAIR.

About the electrical components

- Any work that affects the electrical components must be carried out by qualified electricians.
- Switch off the power supply and ensure that it does not re-connect while any electrical component is being handled.
- Switch off the unit immediately if any fault is detected in the electrical power supply.
- Use only original, correctly calibrated fuses.

- Carry out periodic checks of the electrical unit.
- All defects, such as loose connections or burnt cables, must be repaired immediately.

3 Transport and storage

When in transit, the unit must be protected from impacts of any kind, and all possible measures must be taken to prevent malfunctions due to improper loading or unloading of the unit.

When lifting the equipment, always use a pallet truck or forklift.

Upon receipt of the unit, make sure that the type and serial number of the plate correspond to the order and delivery information. Check that the unit is complete and in perfect conditions. If there are components missing or damaged during transport, immediately inform your supplier in writing.

Keep the unit dry and protected from the elements while in storage. If it has to be stored for a long period before installation, choose a place where the equipment will not be damaged mechanically or be contaminated by dust or construction materials. If stored outdoors, protect it against the weather and atmospheric elements.

Attention

Avoid direct exposure to the sun and places that can exceed 50°C.

Note: Storage area temperature and humidity conditions:

- ❖ Temperature: [-20…+50ºC]
- ❖ Relative humidity: [5…95 %RH] no condensation.

4 Rating plate

The rating plate provide essential information about the technical features of the machine.

The EC Machinery Safety Regulation requires all machinery operated within the European Economic Community to have a rating plate indicating its main features, the machine serial number and the manufacturer's name inscribed in a durable manner.

The DIPHUSAIR-VxV series has two types of plates:

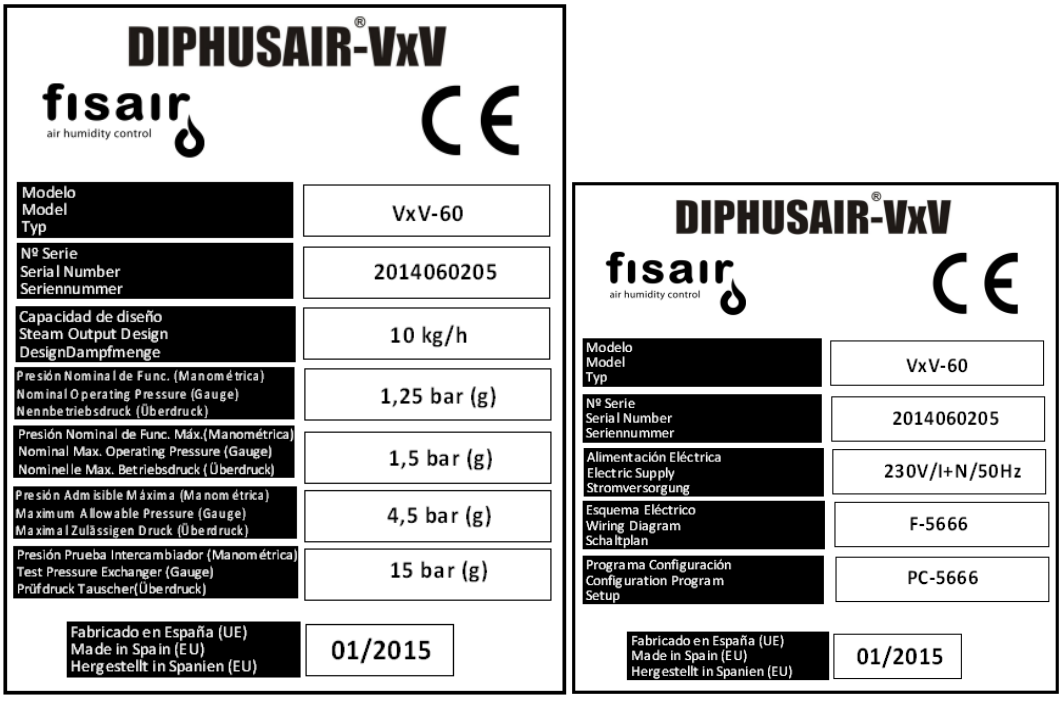
- The larger main plate is located on the outside of the electrical panel. It states:

  - Equipment model
  - Serial number
  - Design capacity

- Nominal operating pressure (gauge)
- Nominal maximum operating pressure (gauge)
- Maximum admissible pressure (gauge)
- Exchanger test pressure (gauge)
- Place and date of manufacture

- The smaller plate is inside the electrical panel. It shows:

  - Equipment model
  - Serial number
  - Electrical power connection
  - Nominal power for the equipment
  - Nominal current for the equipment.
  - Electrical wiring number
  - Programmable Logic Relay (PLR) configuration program
  - Place and date of manufacture



5 General description

5.1 Introduction

The control of environmental humidity is increasingly important in today's society for the comfort of people, the quality of production and maintenance processes and the conservation of materials or products made.

If the natural or controlled environment humidity is lower than that desired, a system may be needed to increase it to the required level. The DIPHUSAIR-VxV humidifier selected for each specific application provides the desired degree of humidity easily, reliably and permanently and at moderate operating costs.

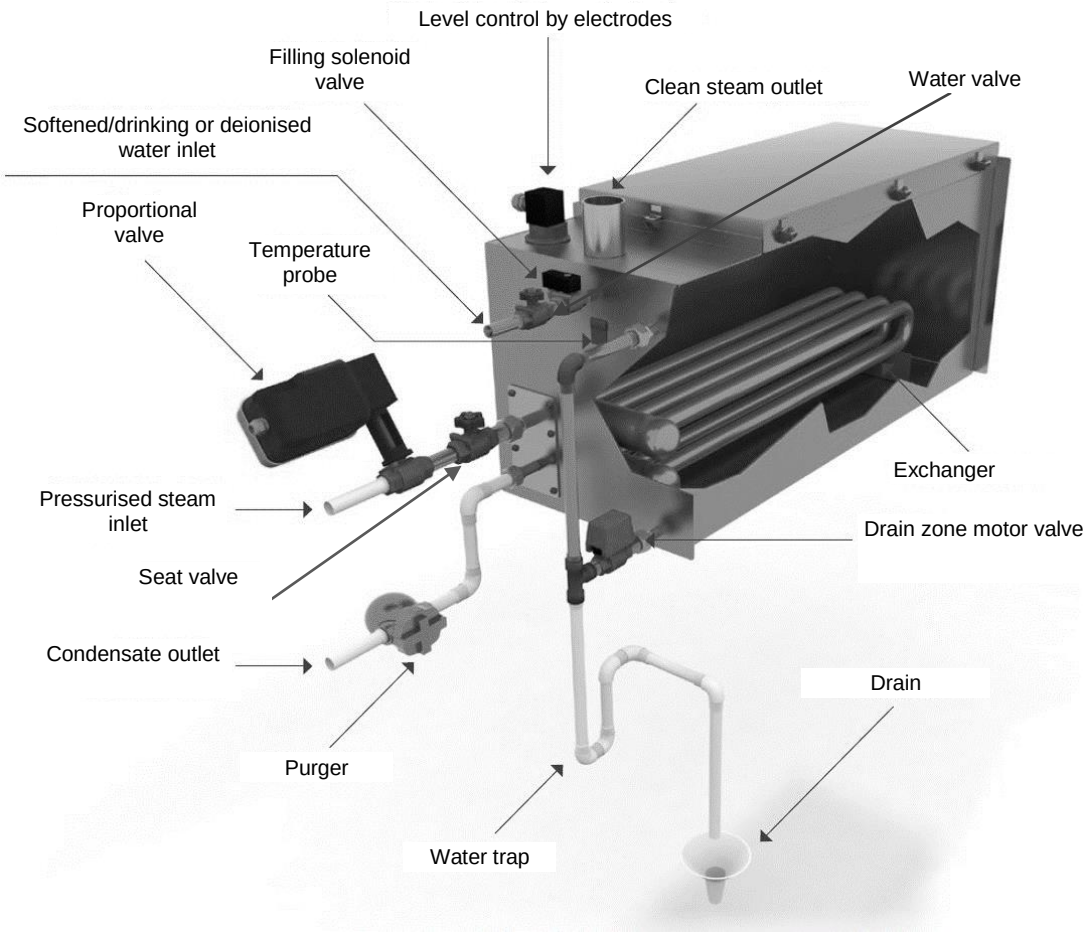
5.2 Operating principle

The DIPHUSAIR VxV series air humidifiers operate on the basis of a copper tubing heat exchanger through which steam from the boiler circulates, providing the necessary heat to produce clean steam from drinking/softened or deionised water. The process of heat transmission is produced by conduction and convection in the nucleate boiling phase.

The special machining of the coil, from copper tube according to the EN1057:2007 standard, makes this type of exchanger the most efficient; while also avoiding contamination and the contact of drinking water with boiler steam. The external nickel-plating treatment of the exchanger further increases the already high corrosion resistance of the copper.

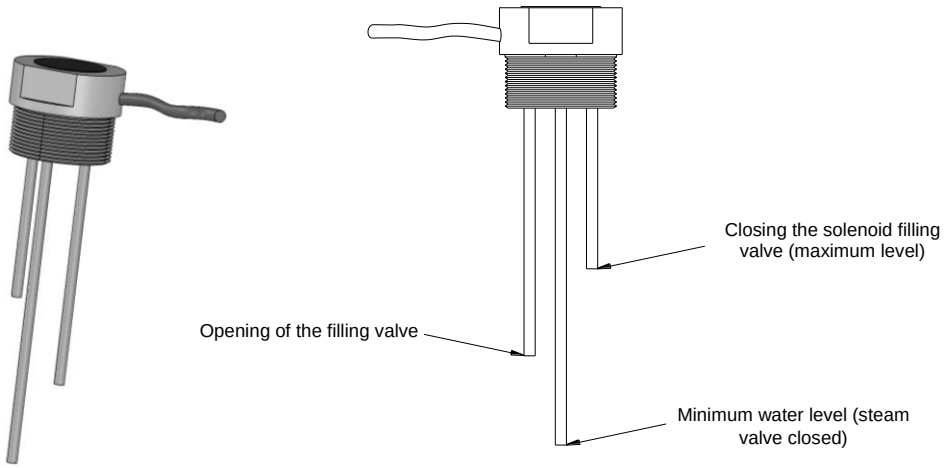
VxV for drinking/softened water

Fill and drain solenoid valves are installed for drinking/softened water for periodic purges. The filling valve is a float valve for deionised water and the drain valve is manual.

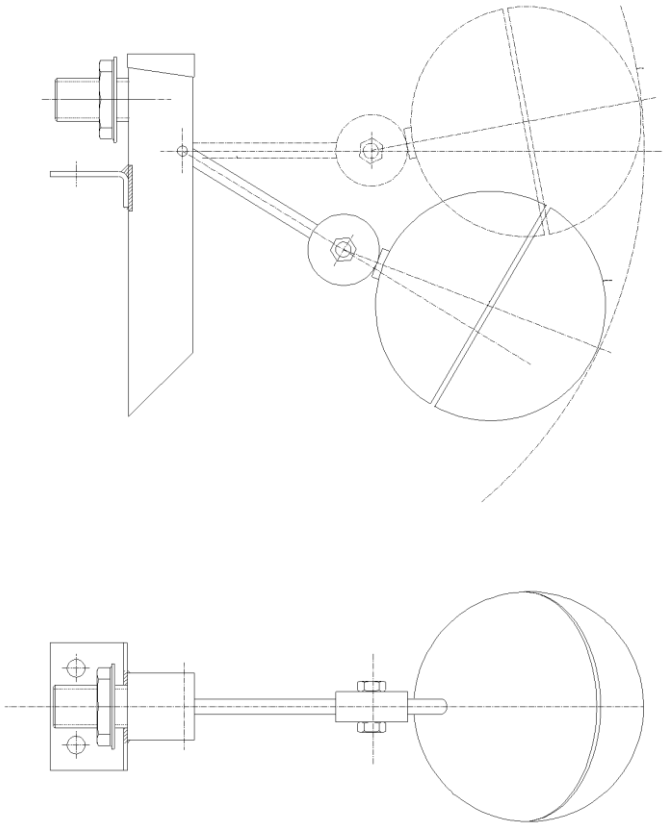


5.3 Level control by electrodes

This system is used in equipment with drinking/softened water. The water conductivity must be at least 100µS/cm for the electrode probe to work properly. It will not work if the water is deionised. The different water levels reaching the probe determine the electronic valve opening or closing control according to the following figure:



5.4 Level control by float valve



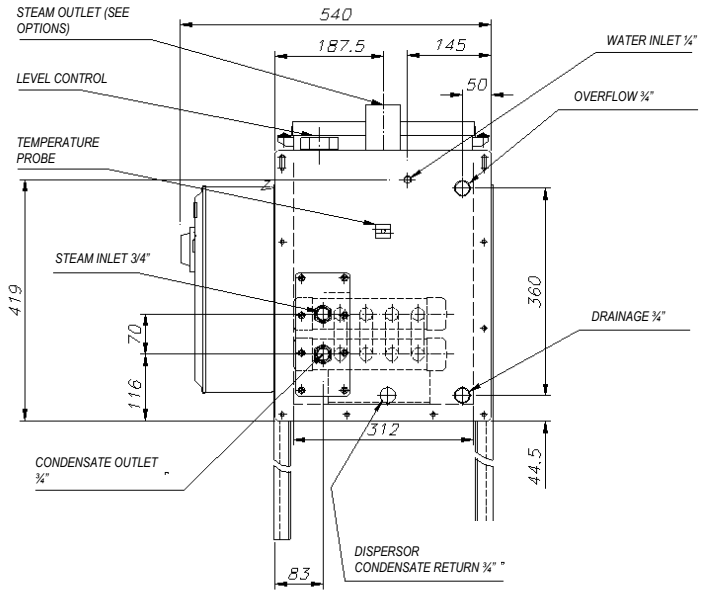
This system is used in equipment with deionised water. This type of control requires no maintenance.

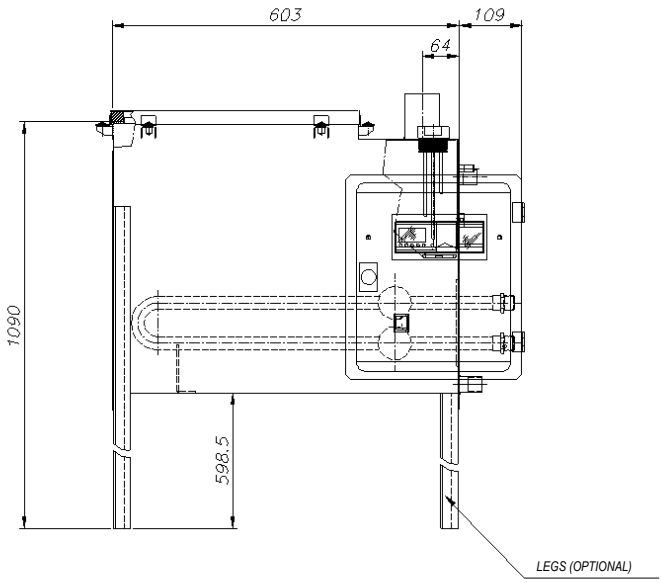
5.5 VxV-60 external dimensions

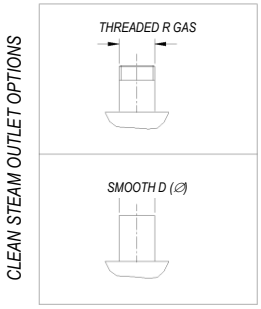
MODEL	CAPACITY (kg/h)	WEIGHT (kg) OPERATING / LOADING	STEAM OUTLET (**)	
			THREADED	SMOOTH
VxV-060	60 (*)	80/45	DN40 (1-1/2" GAS)	D25, D40, D50, D76
			DN50 (2" GAS)	

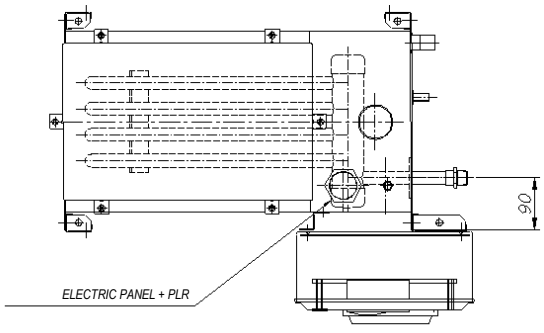
(*) Capacity with steam at 150 kPa. See performance table for other steam pressures.

(**) Establish option







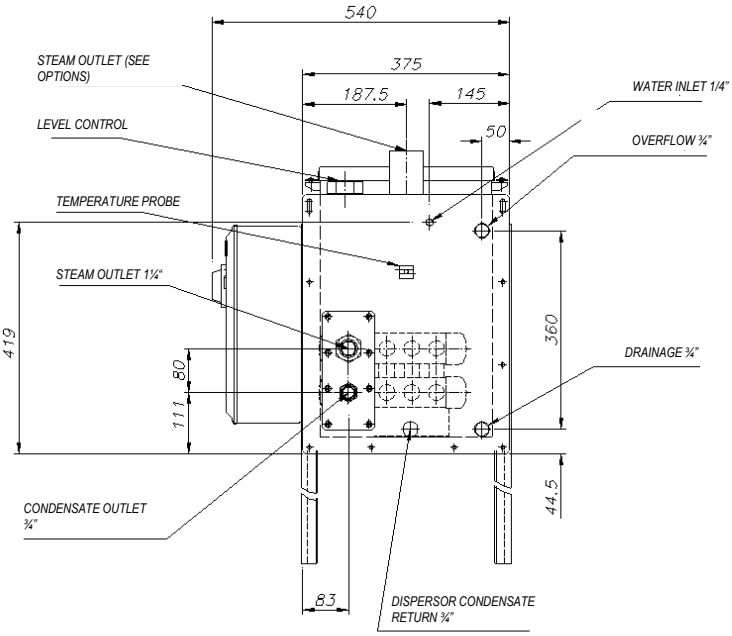


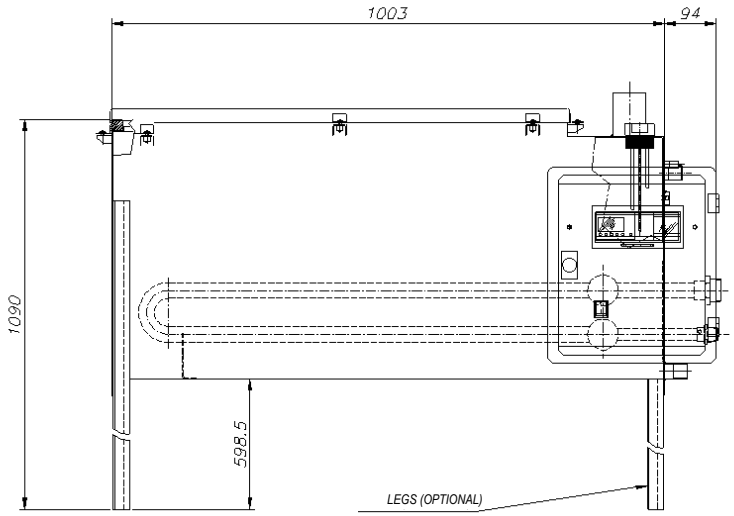
5.6 VxV-120 external dimensions

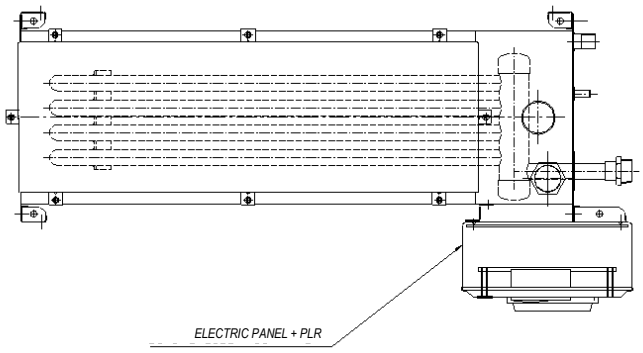
MODEL	CAPACITY (kg/h)	WEIGHTS(kg) OPERATING / LOADING	STEAM OUTLET (**)		
			THREADED	SMOOTH	FLANGE
VxV-120	120 (*)	155/57	2" GAS	D40, D50, D76	DIN 2642 DN50
			2-1/2" GAS		DIN 2642 DN65

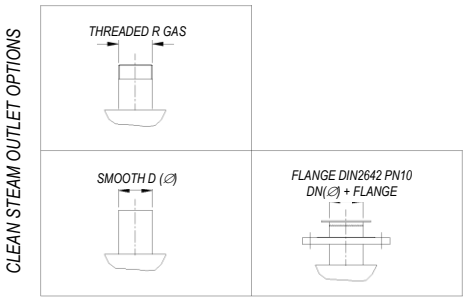
(*) Capacity with steam at 150 kPa. See performance table for other steam pressures.

(**) Establish option.





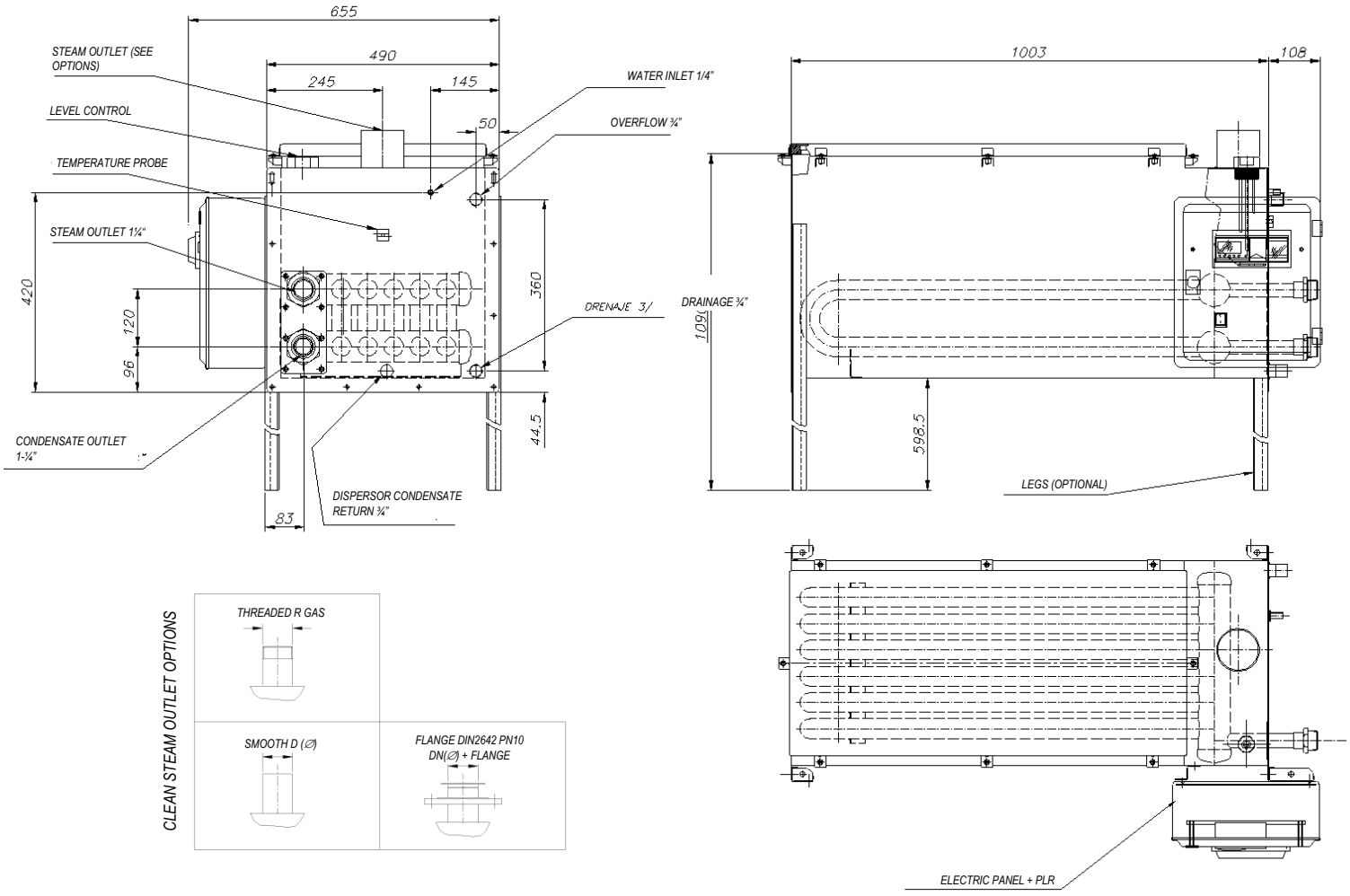




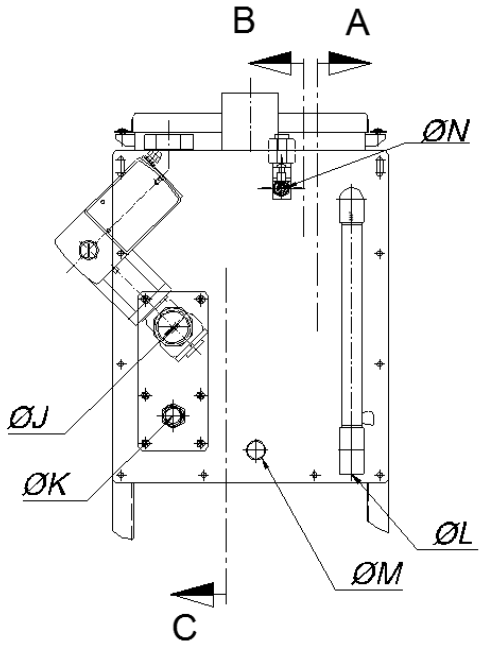
5.7 VxV-240 external dimensions

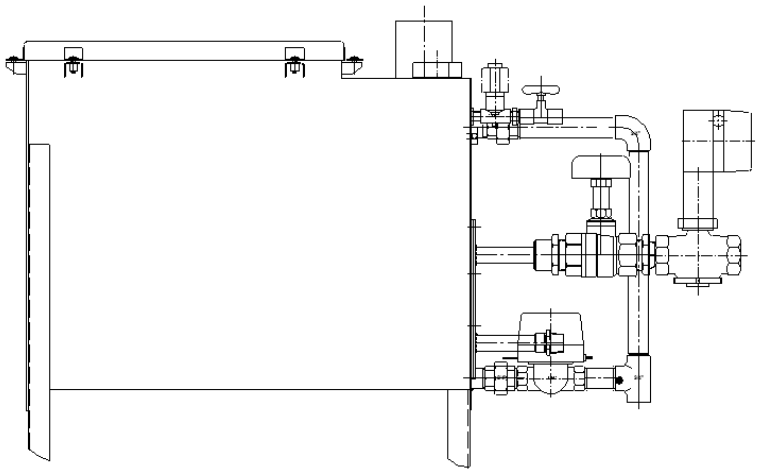
MODEL	CAPACITY (kg/h)	WEIGHTS(kg) OPERATING / LOADING	STEAM OUTLET (**)		
			THREADED	SMOOTH	FLANGE
VxV-240	240*	160/65	5" GAS	*D40, D50, D76*	D/N2642 DN80
			4" GAS		DIN2642 DN 100

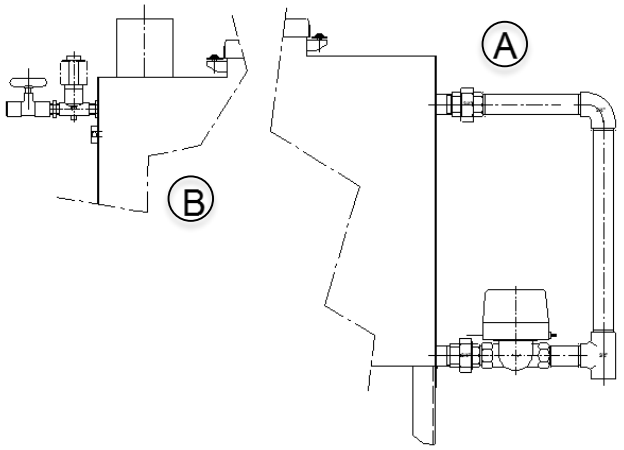
(*) Capacity with steam at 150 kPa. See performance table for other steam pressures.
**Establish option.

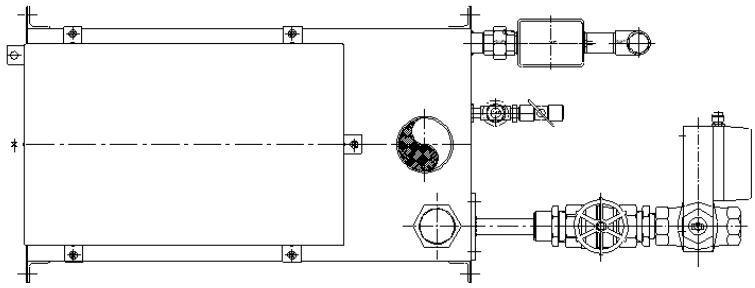


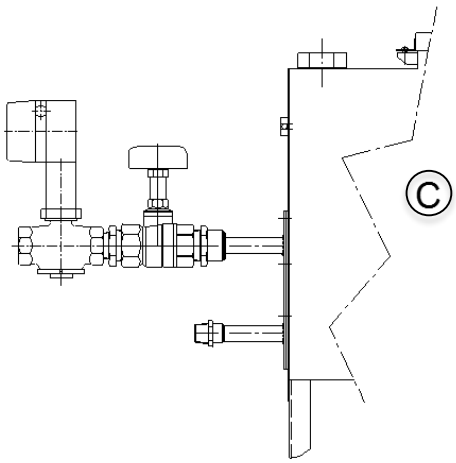
5.8 Valves and connections







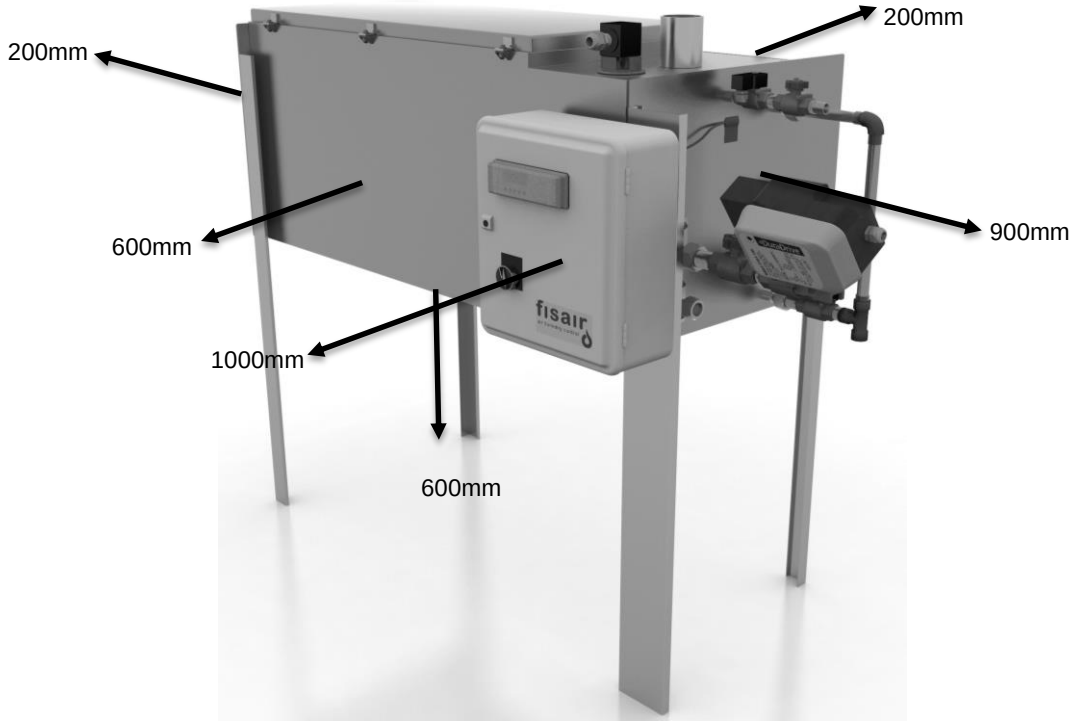




NAME	STEAM		L	M	N
	ØJ INLET	ØK OUTLET	OVERFLOW/DRAIN OUTLET	RETURN CONDENSATE DISPERSER	MAINS WATER INLET
VxV-060	3/4" BSP	3/4" BSP	3/4" BSP	3/4" BSP	1/4" BSP
VxV-120	1-1/4" BSP	3/4" BSP			
VxV-240	1-1/4" BSP	1-1/4" BSP			

6 Installation

6.1 Operating environment service and conditions areas



When choosing the installation location, provide the necessary spaces for periodic inspection and maintenance. In this regard, pay attention to the pipe routes. Avoid placing on critical equipment or processes to prevent damage if there are leaks. Also avoid locations near electromagnetic sources. Consult the dimension information sheet for each model, and remember the following has to be done periodically:

- Clean/replace the steam and water filters.
- Check and re-tighten screws in areas with sealing gaskets.
- Check for possible dirt inside the equipment when the exchanger is not operating.
- Verify the operation of the PLR and the connection of the different components.
- Verify the proper functioning of the different valves.
- Secure to the ground via the M10 drill holes found at the end of each leg.

Note: Operating area temperature and humidity conditions:

- Temperature: [-20…+40ºC]
- Relative humidity: [5…95% RH] no condensation.

6.2 Connection to the mains power supply

Attention

This equipment operates at elevated temperatures, so it must be connected to the electrical supply by qualified personnel following the applicable Electrical Regulations.

Attention, Live Current

The equipment is intended for indoor installation with IP44 degree of protection for electrical equipment. The unit must be connected to the mains power supply of the installation using a power line protected against short-circuits and grounded to earth, with the cross-section and sensitivity required for each model's power rating.

The earth terminal must be made of solid metal-to-metal connections and a good radio frequency interference (RFI) conductor to earth (multi-conductor conductors).

The earth wire must have the same AWG size (mm^2) as the power wiring or size according to the IEC 60364 standard requirements.

The power source is 230V/I+N/50Hz.

The equipment incorporates a terminal strip in its electrical panel to make the connection according to current regulations.

6.3 Mains or treated water supply

A table of required values for each type of water is attached. Damage caused by chlorine corrosion is not covered by the FISAIR guarantee policy.

Chlorides			**Total hardness**	**pH**		**Silica**
Drinking water	Softened water	Deionised water	Drinking water	Drinking water	Softened or deionised water	< 15 ppm
< 50 ppm	< 25 ppm	< 5 ppm	< 500 ppm	6.5-8.5	7-8	

6.4 Supply of thermal fluids and insulation

Models that use steam must be connected to the thermal fluid supply according to the regulations applicable in each case and according to good practice. The fluid transport pipes will carry de-aerators, traps, filters, cut-off valves and measuring instruments requesting the type of exchanger supplied.

Special care must be taken when levelling equipment, since a small imbalance could cause it to not work properly.

According to the additional technical instructions standard, ITE 02.15.2 Hot Surfaces:
"Except for the surfaces of the heat-emitting components, any equipment surface that can be touched accidentally must have a temperature lower than 60°C or be protected, where necessary ...", and appendix 03.1 of the same ITE, Minimum *thermal* insulation thickness*: "Equipment components (e.g. devices, appliances, pipes and accessories) must have a thermal insulation with the minimum thickness outlined below when they contain fluids at temperature: Lower than the environment, above 40°C and located in unheated rooms, including conduits, galleries, machine rooms and similar ..."* This type of equipment should be thermally insulated.

In this manual, the recommended tubing assembly diagram (6.7) is attached.

6.5 PLR microprocessor

The PLR that this type of equipment assembles is a programmable device for real time operational management and supervision of the different equipment components connected to it, working from the on-board display or a remote location.

Integration in the management and operational supervision with the PLR makes it possible to achieve a faster, simpler, more precise and reliable operation of the humidifier, as well as reducing the wiring needed for the electrical board.

The different components that can be assembled in the VxV equipment series means the series has a high range of combinations; therefore, the electrical diagram and PLR management protocol are attached according to the components assembled on the equipment.

The PLR management protocol and the electrical diagram can be found in the appendices of this manual.

Note: The automatic program has been designed, so that both its execution, and the actions and/or reactions that are produced in the machine and its surroundings, do not affect the degree of safety or functionality for which said machine has been designed, while also respecting the directive on electromagnetic compatibility.

Attention

Deleting and/or modifying the said program contained in the PLR, run from the onboard display or from an online PC, will modify the terms and conditions of the guarantee, as well as affecting compliance with the explicit directives and standards that cover its manufacture. The installer, handler or user shall therefore bear full responsibility for any repercussions arising from the unit's modified functionality.

Attention

The device programmed is not covered by the safety measures against personal injuries. For this purpose, a series of passive safety fittings are installed.

6.6 Installation and connection of control equipment

The location and assembly instructions of the control components are normally specified by their supplier.

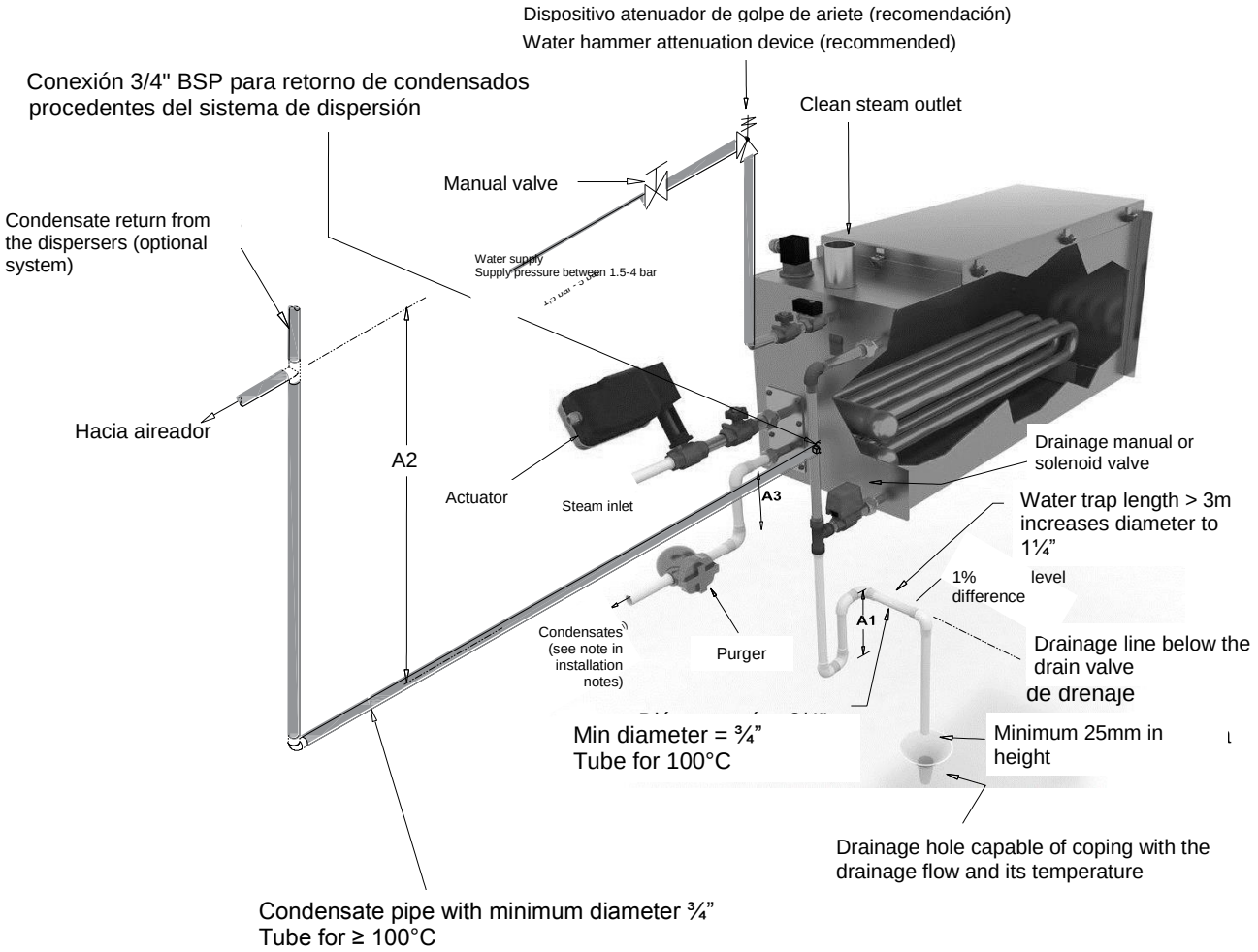
The operation of the proportional actuator of the valve that modulates the variable step of steam will be done by an external analogue signal [0...10] Vdc from the regulator/controller system that will command it or it can be operated manually, setting the desired valve opening value 0...100% in the PLR.

There are also two monitoring connections, without voltage to check the proper operation or a defect in the remote equipment.

There is also a connection (H1) to connect an all/nothing digital signal from a possible hygrostat or controller/regulator to stop or start the equipment.

Note: The electrical diagram is required to connect the power supply, the logic signal [0...10] Vdc and the remote monitoring connections.

6.7 Connecting drinking or treated water and pressurised steam from boiler



The drain valve must be manual for deionised water and the water supply pipe must be able to withstand 100°C.

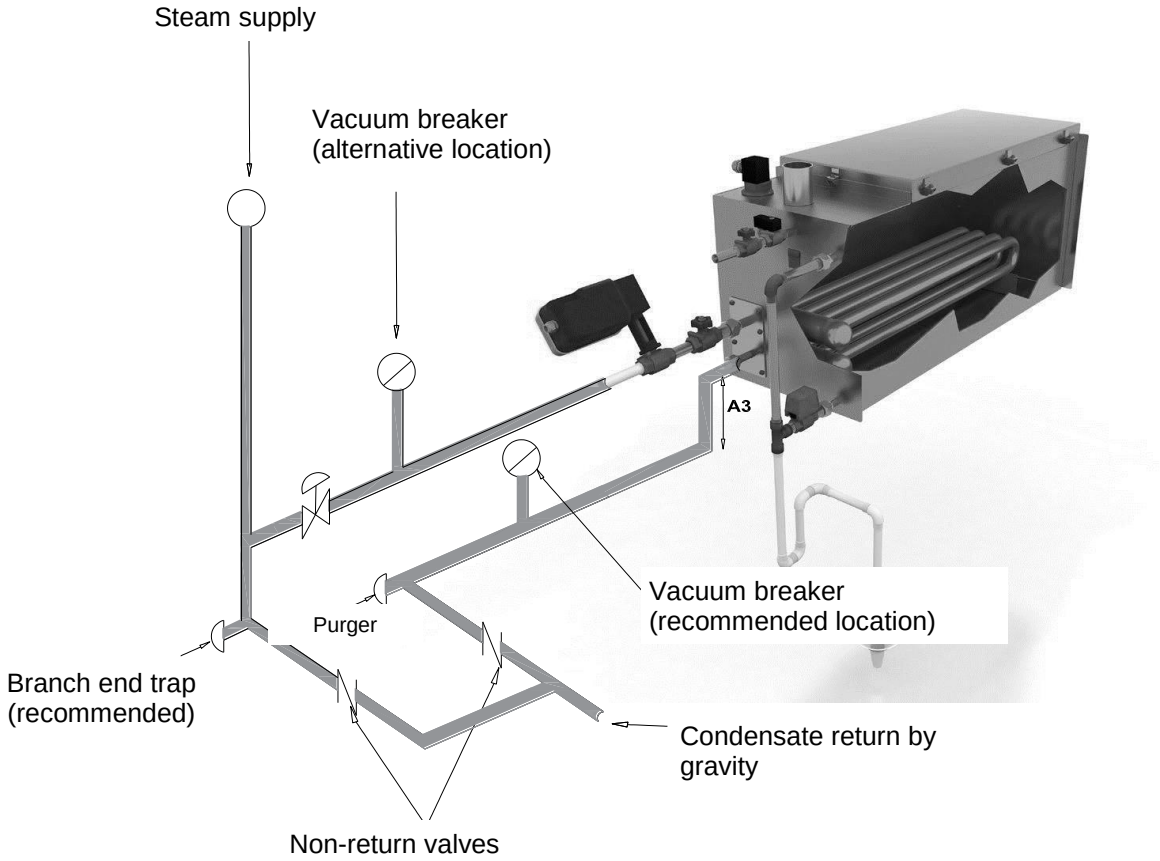
	HEIGHTS A1, A2 and A3		
Capacity (kg/h)	**Water trap height (A1 in**	**Aerator height (A2 in mm)**	**Trap height (A3 in mm)**
< 50	300	700	325
50-80	400	800	325
> 80	475	850	325

Installation notes

1. Condensates: The return of condensates from the trap installed after the exchanger must be done to a non-pressurised system (by gravity only).
2. The water supply is 25mm above the overflow line, thus eliminating a possible counter current.
3. If the water supply pipe is not metallic, a 50mm water trap is recommended to isolate the steam during maintenance.
4. Move the equipment away from the floor drain (it should never be placed on top), due to the possible formation of steam in the drain or overflow of hot water. This steam could affect the DIPHUSAIR VxV electrical components.
5. Damage caused by chlorine corrosion is not covered by the FISAIR guarantee policy.
6. A vacuum breaker should be installed in the condensate return to ensure drainage with the steam valve closed.

It is also advisable to install Y filters at the steam inlet and water supply. These will be from the section of the pipe used.

Boiler steam connection



The heat exchanger is designed for a maximum operating steam pressure of 1.5bar.

Failure to install the steam trap at the end of the supply line can cause a water hammer, which could damage the exchanger.

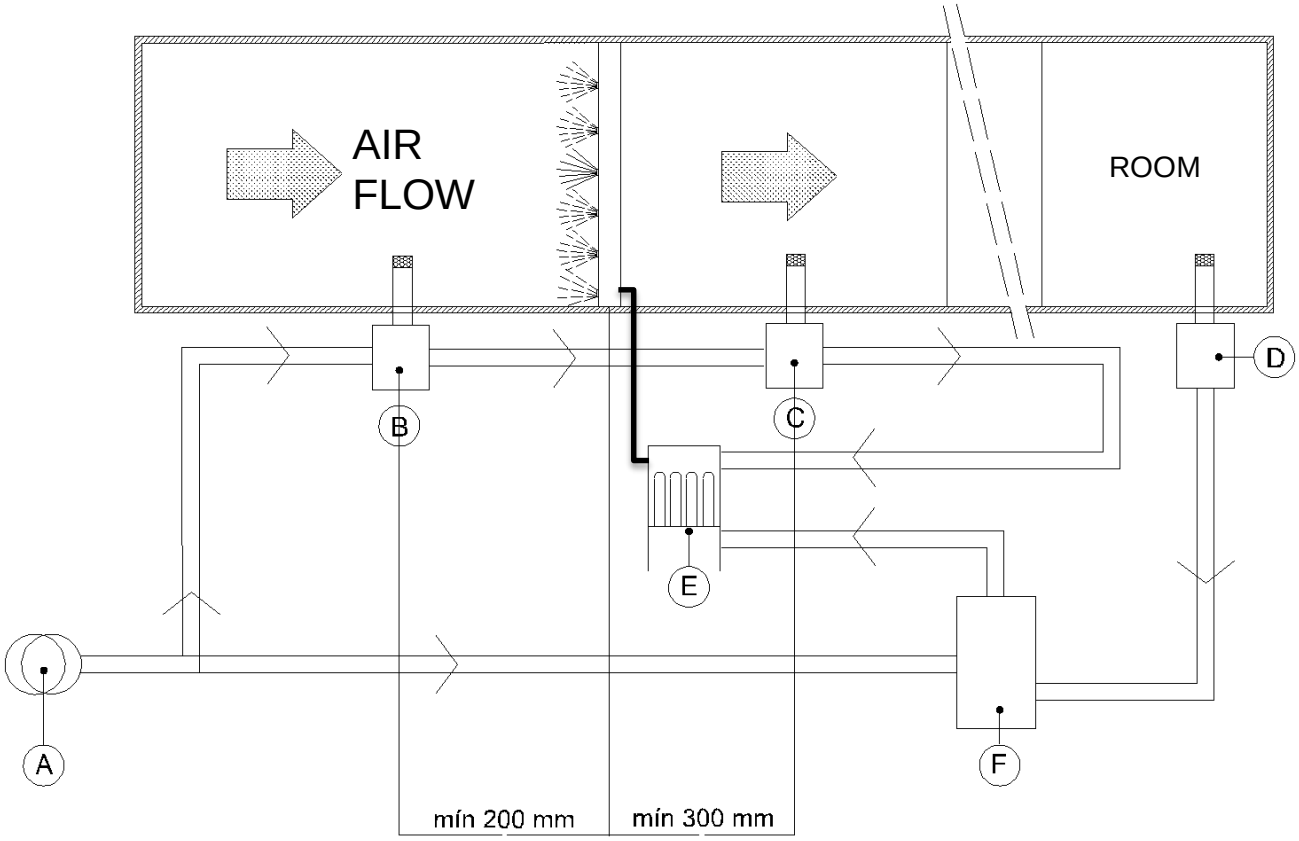
It is not recommended to raise the condensate with pressurised steam. The heat exchanger can break if acting in this way. A steam condensate pump is recommended when the condensate is raised in a pressurised system.

6.8 Control and location of sensors

The location of the sensors has a significant impact on the operation of the humidifier. It is recommended not to exchange the duct sensors with the room sensors, since each is calibrated for a certain air velocity.

The proposed assemblies appear below. Some components must be supplied by the installer.

Typical installation of control and location of sensors



A: Transformer

B: Flow switch

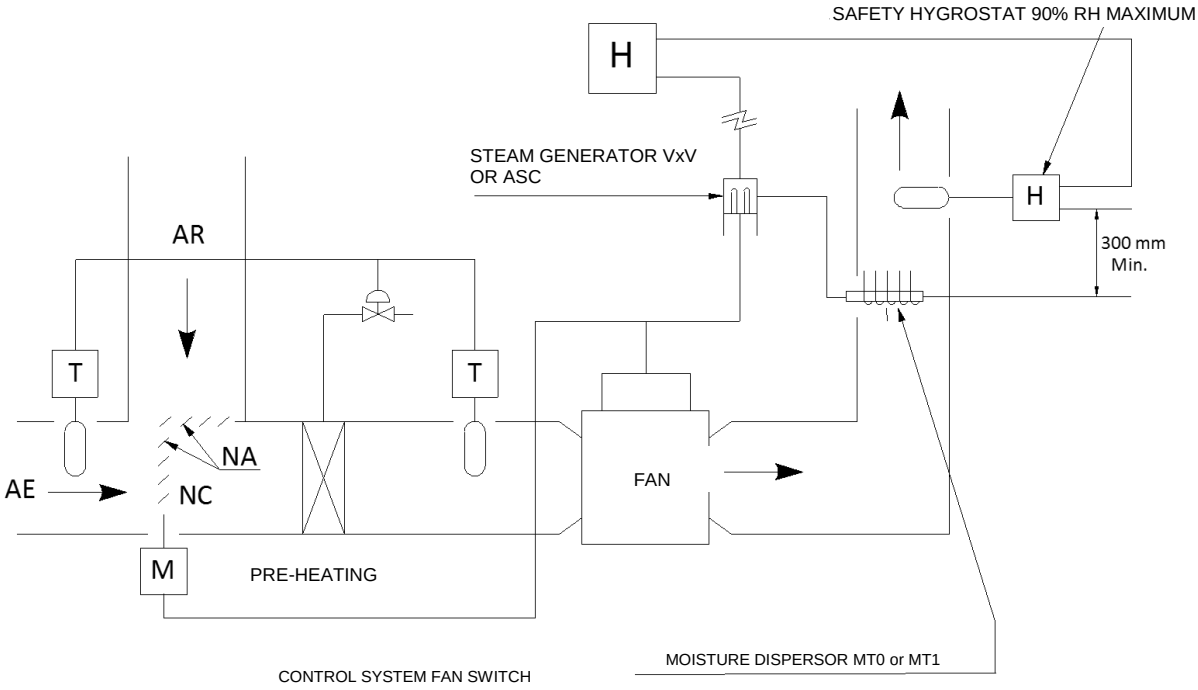
C: Safety hygrostat maximum 90% RH

D: Humidity probe

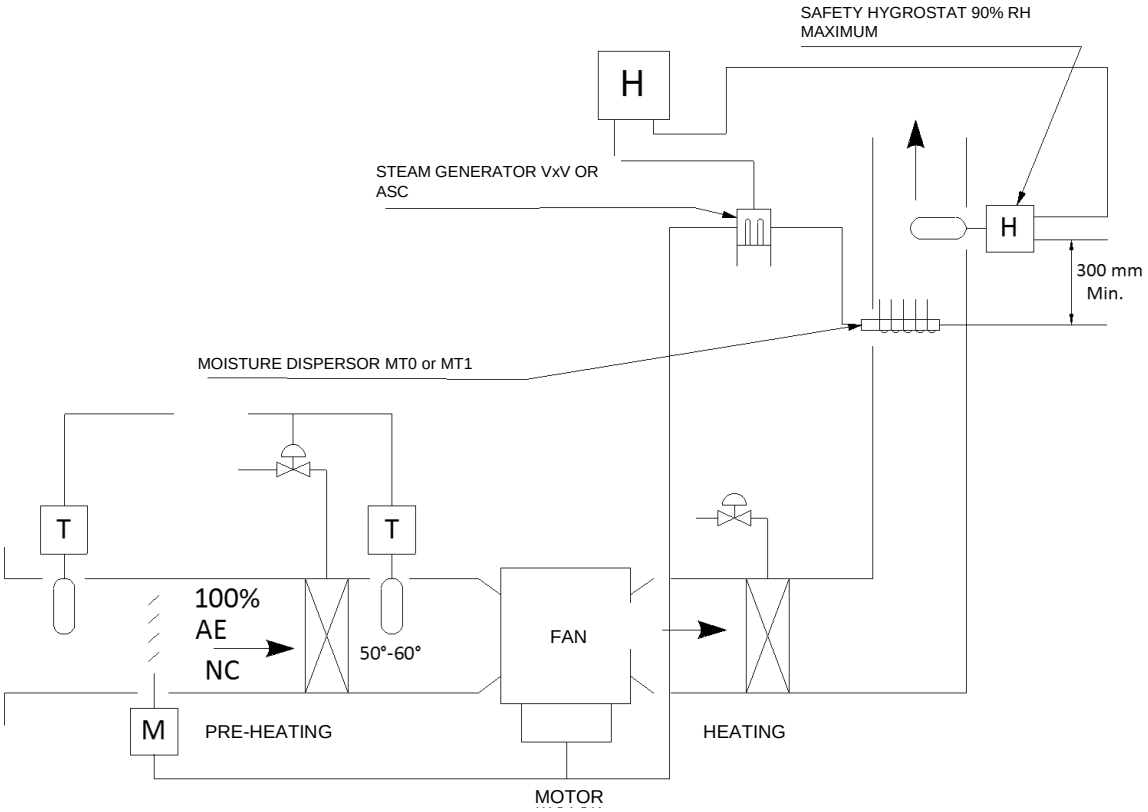
E: VxV humidifier

F: Humidity controller

DUCT INSTALLATION WITH RETURN AND EXTERIOR AIR WITH PRE-HEATING

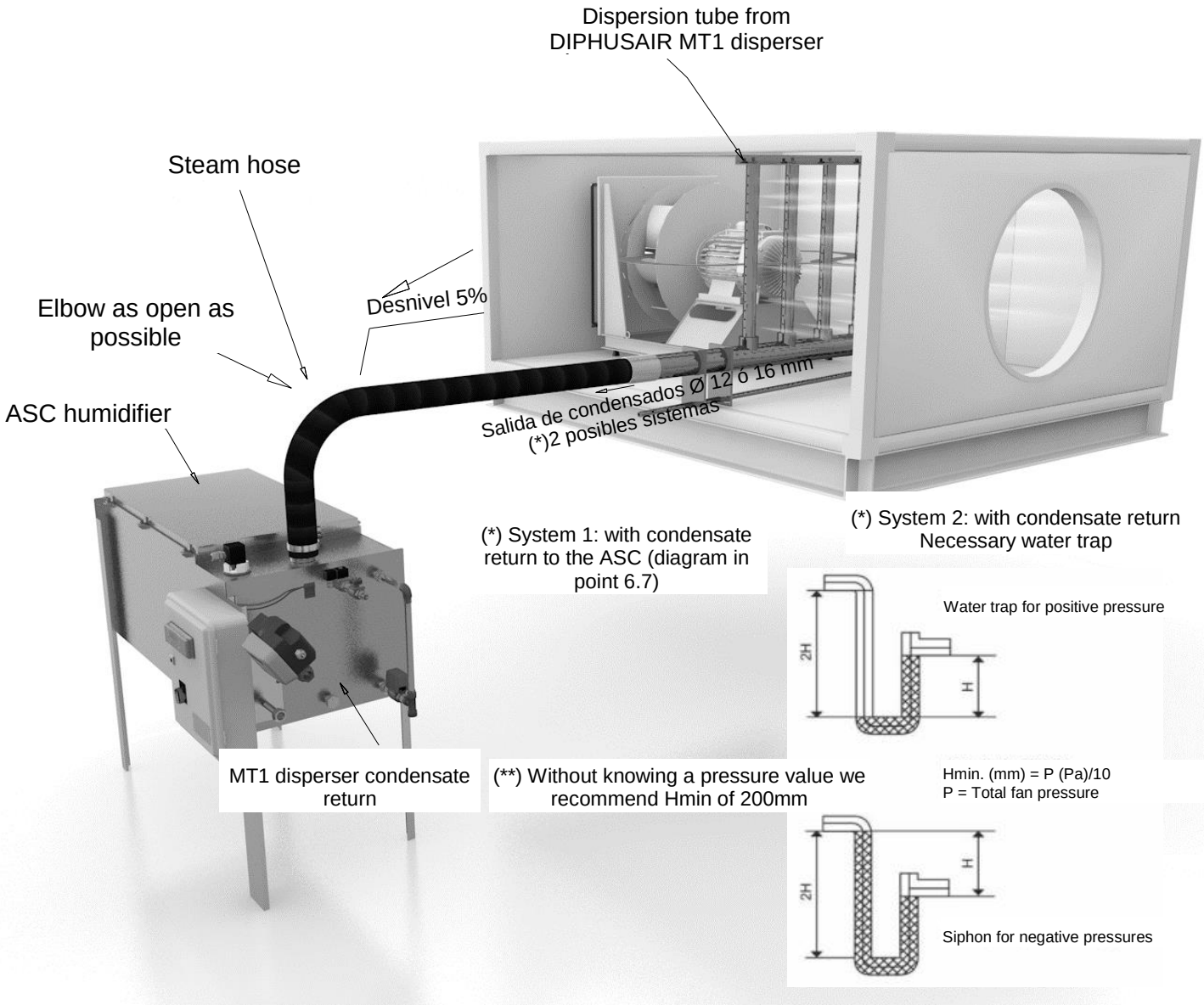


DUCT INSTALLATION WITH 100% EXTERIOR AIR AND 2 HEATING STATIONS



7 Connection to the DIPHUSAIR MT1 or MT0 steam dispersion system

7.1 Above the VxV humidifier



This installation example is also valid for MT0.

The dispersion system should be placed where there is no possibility of condensation in the duct; neither upstream nor downstream. In general, the best position is after the heating coil or in the area where the temperature is higher, as the absorption distance is lower with high temperatures.

It should not be placed close to a filter, where the flow may impinge in front of a metal surface or where it may affect the fire detection system or smoke detection.

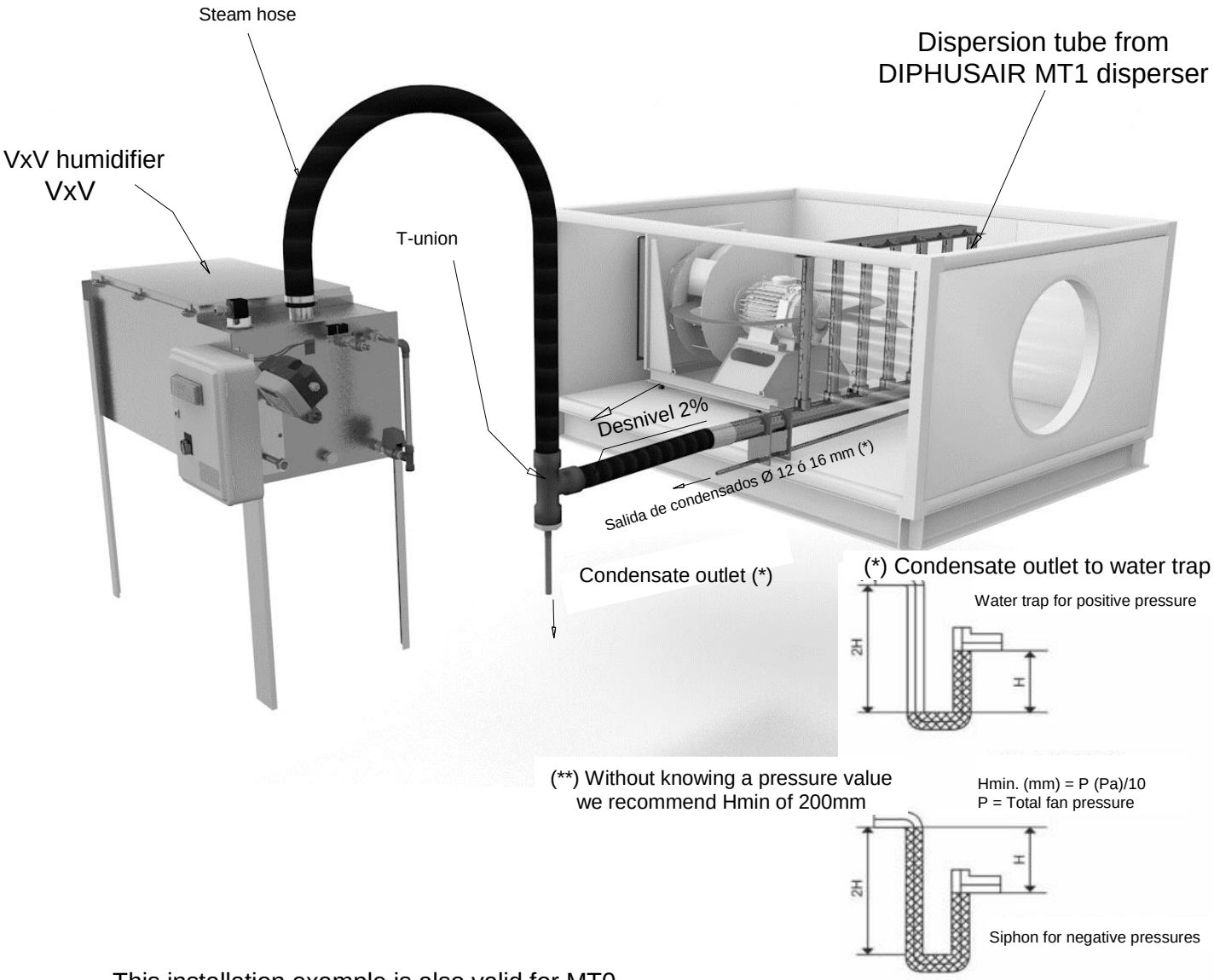
In system 2, the water outlet connection to the drain must have a water trap of sufficient height (2H) to overcome the pressure of the system and ensure the condensate is completely drained.

There must be a minimum height of 25mm between the end of the water trap and drain.

The water trap and drain must be able to withstand temperatures higher than 90°C.

Note: For pre-filter installation, contact FISAIR as absorption distances vary.

7.2 Below the VxV humidifier



This installation example is also valid for MT0.

There must be a minimum height of 25mm between the end of the water trap and drain.

The water trap and drain must be able to withstand temperatures higher than 90°C.

7.3 Tube to be used for the connection between the VxV humidifier and MT1 or MT0 dispersion system.

A special flexible hose for the steam should be used. No more than 3m of flexible hose should be used between the VxV exchanger and the DIPHUSAIR MT1 dispersion system.

Flexible steam hose			**Rigid copper or stainless steel tube**		
Size ∅ [mm]	**Maximum capacity [Kg/h]**	**Maximum recommended length [m]**	**Size ∅ [mm]**	**Maximum capacity [Kg/h]**	**Maximum recommended length [m]**
25	25	Recom 3, max 5	25	23	5
40	65	Recom 3, max 5	40	60	7
50	123	Recom 3, max 5	50	120	8
76	200	Recom 3, max 5	76	204	22
104	340	Recom 3, max 5	104	320	28

1. Use FISAIR flexible tubing for the best results. Other tubing may last less time or may cause foaming in the evaporation chamber, resulting in condensate discharge into the dispersion system. Do not use flexible tubing for outdoor applications.
2. The maximum recommended length is 3m, as longer lengths can cause the tube to twist or create lower points.

Description	**Size∅ [mm]**	**Steam losses [kg/h/m]**		**Insulation thickness [mm]**
		No insulation	**Insulation**	
Flexible tubing	25	0.20	-	-
	40	0.25	-	-
	50	0.32	-	-
	76	0.41	-	-
	104	0.53	-	-
Rigid tubing	25	0.18	0.028	50
	40	0.20	0.033	50
	50	0.27	0.040	65
	76	0.36	0.049	65
	104	0.49	0,061	75

Note: Data taken at room temperature of 25°C

8 Recommendations for start-up

9 Launching

Once the equipment has been connected to the air ducts, mains power supply and control components, where appropriate, the equipment commissioning process should be done as follows:

Attention

Before acting on the equipment electrical panel controls, check that its mechanical components can act freely, without being impeded by installation component assembly items.

Check the following points:

1. The humidifier is properly levelled before being filled and after filling (this point is critical).

2. Check the correct installation according to point 6 “Installation”:

2.1 Service and operating environment condition spaces are as according to point 6.1.

2.2 Connection to the mains network according to specifications, according to Electrical diagram F-5666 and in compliance with local regulations (point 6.2).

2.3 Connection to the thermal fluid supply, treated or mains water drainage and condensate collection according to points 6.3, 6.4 and 6.5.

2.4 Installation and connection of the control equipment according to point 6.6 and PLR management protocol (annex to this manual).

3. Press the equipment main switch. Check that the green **ON** light is lit. Check the proper functioning of the PLR and follow its management protocol in the annex to this document. After turning on the equipment, check that:

- The earth connection is properly made.
- The input signals are consistent with the expected values.

- ❖ After opening the water supply, the drain valve is closed.
- ❖ Check that the tank is full and reaches the minimum level (input C of the PLR active according to point 5.2, PLR connection status) and open the steam valve.
- ❖ The maximum level is reached (input E of the PLR active, according to PLR protocol point 5.2, PLR connection status) and close the solenoid filling valve after defoaming.

4. Perform the defoaming control according to point 8.2.

Note: It is advisable to check the electrical consumption of the main electrical components are in accordance with the nominal values.

After the equipment has reached its operating regime (at least 30 minutes), make the relevant temperature and humidity measurements.

10 Defoaming

The duration of defoaming determines the amount of water cleaned with each filling cycle. This means that since the maximum level is reached a waiting time is programmed until the filling solenoid valve EV1 is cut off.

Defoaming reduces the need for frequent cleaning of the humidifier. Each time the tank fills, it fills to the overflow level. A part of the fill water flows through the overflow towards the drainage, removing minerals left by the evaporation cycle and preventing surface residues.

The hot water flowing through the drain are operating costs. FISAIR recommends the user observes and controls the water supply ¼" needle valve to adjust the defoaming time and achieve a balance between reducing mineral build-up and conserving hot water.

11 Equipment shutdown

The equipment can be put out of service by closing the steam valve, either manually or automatically.

Manual:

Press the equipment main switch I1.

Automatic:

- The hygrostat or controller can turn the equipment off by the digital H1 all/nothing connection signal.

- The controller that emits the analogue signal [0...10] Vdc commanding the steam valve proportional actuator demands 0 kg/h of steam from a 0Vdc signal.

- Any error arises that activates the fault alarm completely closes the steam valve.

12 Safety and control components

In addition to the usual electrical component protective devices, the humidifier electrical panel incorporates the following safety and control components:

Note: All the components act on the PLR if there is a failure. Go to the PLR management protocol.

- Float switch (feed water <100 µS/cm and reverse osmosis or treated); its 2 positions are: operating level reached and insufficient operating level.

- Pt100 sensor on the external housing: In conjunction with the PLR, it acts as a thermometer and thermostat.

- Electrode switch (feed water > 100 µS/cm, from the mains or softened); its 3 positions are as shown in point 5.3.

13 Maintenance

Attention

Before performing maintenance, the equipment must have been turned off long enough for the equipment to cool down and the water in the tank to be completely drained. All supply valves must be closed.

Preventive maintenance

The maintenance requirements vary according to the water quality, as the potable/softened water carries a variety of minerals according to the geographical area. Hard water (with a high mineral content) requires more frequent cleaning and more drainage/rinsing cycles. Softened water reduces mineral build-up inside the humidifier.

The following table is indicative:

ACTION	PERIODICITY
Cleaning the filters	Every 3 months
Inspect the proportional valve actuator.	Every 3 months
Inspect interior and valves in general (e.g. surfaces, operation, level switch and presence of foreign matter).	Every 2 months
Switchgear and wiring connections.	Every 2 months
Drinking/softened water: inspection and cleaning of electrode probe.	Every 3 months
Drinking/softened water: inspection and cleaning of drainage pipe; check foam drainage and clean possible mineral accumulations	Every 3 months
Deionised water: check the float valve closure	Every 3 months
General cleaning	Annual

Corrective maintenance

The FISAIR steam exchanger humidifier is a very simple device whose components will fail very few times.

The valves and level switch are standard and may require repair as with any other mechanical or electrical failure, and are not described in this manual. The exchanger may need repairing or long-term replacement, as with any other conventional heat exchange element.

Similarly, minor components such as the seals and electrical panel components may need to be replaced in the long term. Each user can decide for himself whether to keep a store of replacement parts depending on the lead time to procure them from local distributors of this conventional material.

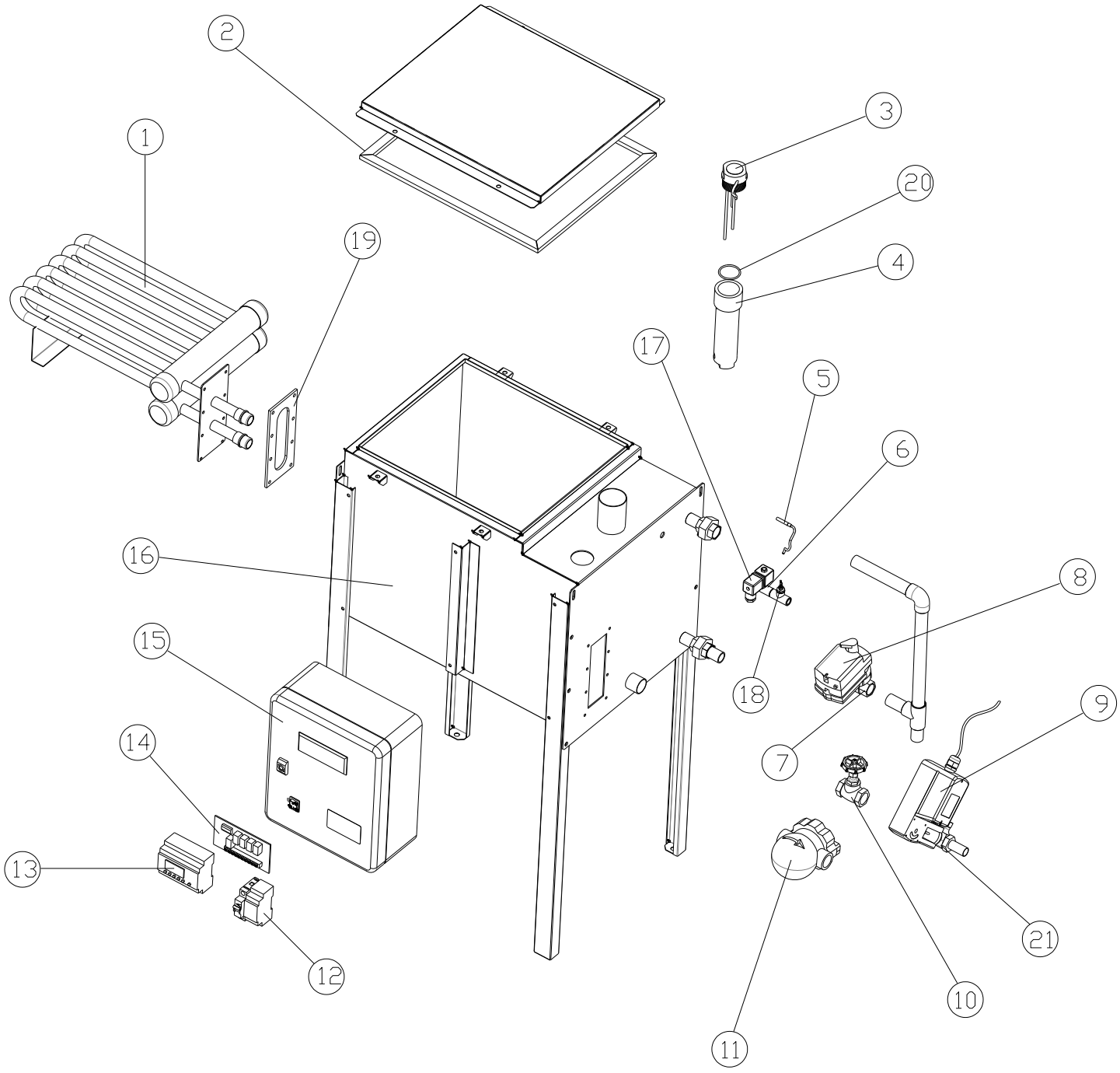
14 Troubleshooting

When a fault occurs, it will be indicated in point 6 of the PLR management protocol (Cause and effect of possible operating failures). If a fault occurs, turn off the humidifier immediately via the main switch. Faults must be resolved exclusively by qualified personnel in accordance with the safety instructions.

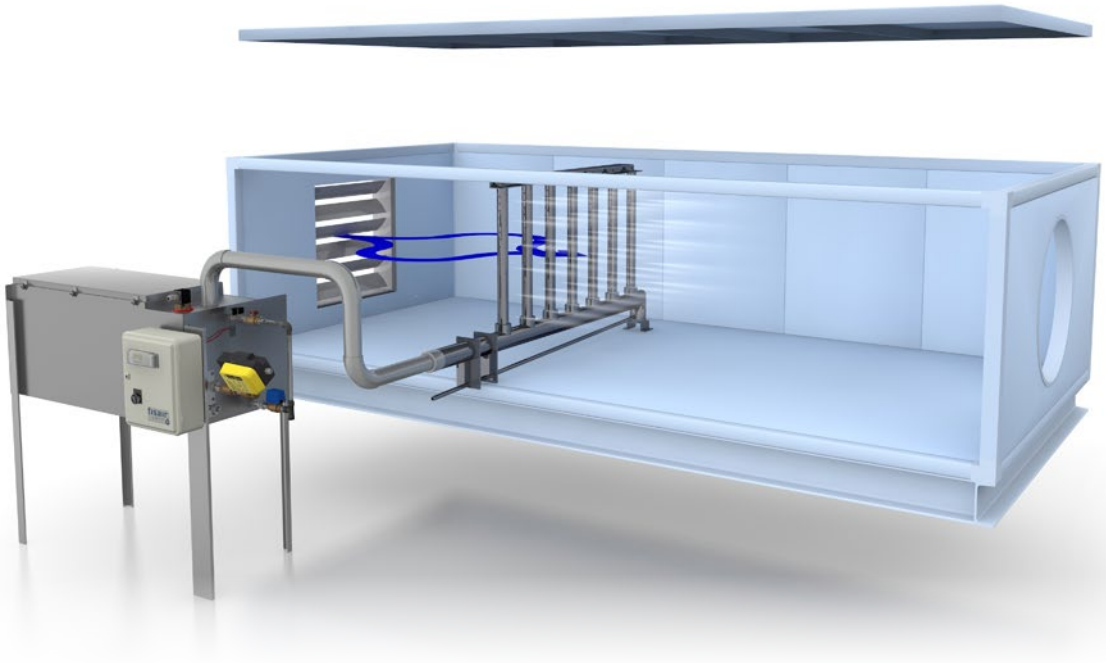
15 Saturated steam properties

PRESSURE kPa g	TEMPERATURE °C	SPECIFIC VOLUME	INTERNAL ENERGY	ENTHALPY	ENTROPY
		Steam m³/kg	Steam kJ/kg	Steam kJ/kg	Steam kJ/kg°C
50	**81.32**	**3.24**	**2483.2**	**2645.2**	**7593**
60	**85.93**	**2.73**	**2488.9**	**2652.9**	**7531**
70	**89.93**	**2.36**	**2493.9**	**2659.4**	**7479**
80	**93.49**	**2.09**	**2498.2**	**2665.2**	**7434**
90	**96.69**	**1.87**	**2502.1**	**2670.3**	**7394**
100	**99.61**	**1.69**	**2505.6**	**2674.9**	**7359**
110	**102.29**	**1.55**	**2508.7**	**2679.2**	**7327**
120	**104.78**	**1.43**	**2511.7**	**2683.1**	**7298**
130	**107.11**	**1.33**	**2514.4**	**2686.6**	**7271**
140	**109.29**	**1.24**	**2516.9**	**2689.9**	**7246**
150	**111.35**	**1.16**	**2519.2**	**2693.1**	**7223**
160	**113.29**	**1.09**	**2521.4**	**2696**	**7201**
170	**115.15**	**1.03**	**2523.5**	**2698.6**	**7181**
180	**116.91**	**1.02**	**2525.5**	**2701.4**	**7162**
190	**118.59**	**0.93**	**2527.3**	**2703.9**	**7144**
200	**120.21**	**0.89**	**2529.1**	**2706.2**	**7127**

16 List of spare parts



Item	Code	Component
1	51310000	Exchanger VxV-60
	51310001	Exchanger VxV-120
	51310002	Exchanger VxV-240
2	62410081	Silicone gasket maintenance cap VxV-60
	62410082	Silicone gasket maintenance cap VxV-120
	62410083	Silicone gasket maintenance cap VxV-240
3	64220322	3-electrode level sensor
4	44050009	Level sensor teflon cover
5	64220021	Temperature probe PT100
6	63310003	Filling solenoid valve
7	63310050	Drain motor-valve body
8	63390026	Drain motor-valve actuator
9	65620005	Steam control valve actuator
10	62010005	Manual seat valve ½”
	62010010	Manual seat valve ¾”
	62010011	Manual seat valve 1 ½”
11	65650025	Condensate trap
12	20650010	Power supply
13	64140005	PLR with screen
14	52000002	PCB SEF-011
15	52100025	Control panel
16	VxV serial number required	Tank
17	64510111	Solenoid valve coil
18	62010004	Filling needle valve
19	42090001	Silicon gasket exchanger
20	62410020	Level sensor O-ring
21	VxV serial number required	Steam control valve



Diphusair VxV connection with Diphusair MT1 steam disperser in the AHU

Diphusair VxV steam humidifier technical data

Model		VxV-60	VxV-120	VxV-240
Clean steam pressure	[kPa]	<4		
Total electrical power	[W]	75		
Electricity connection		230V / I+N / 50Hz		
Maximum steam pressure (gauge)	kPa (G)	150		
Maximum boiler water temperature	[ºC]	127,4		
Maximum chassis temperature	[ºC]	98		

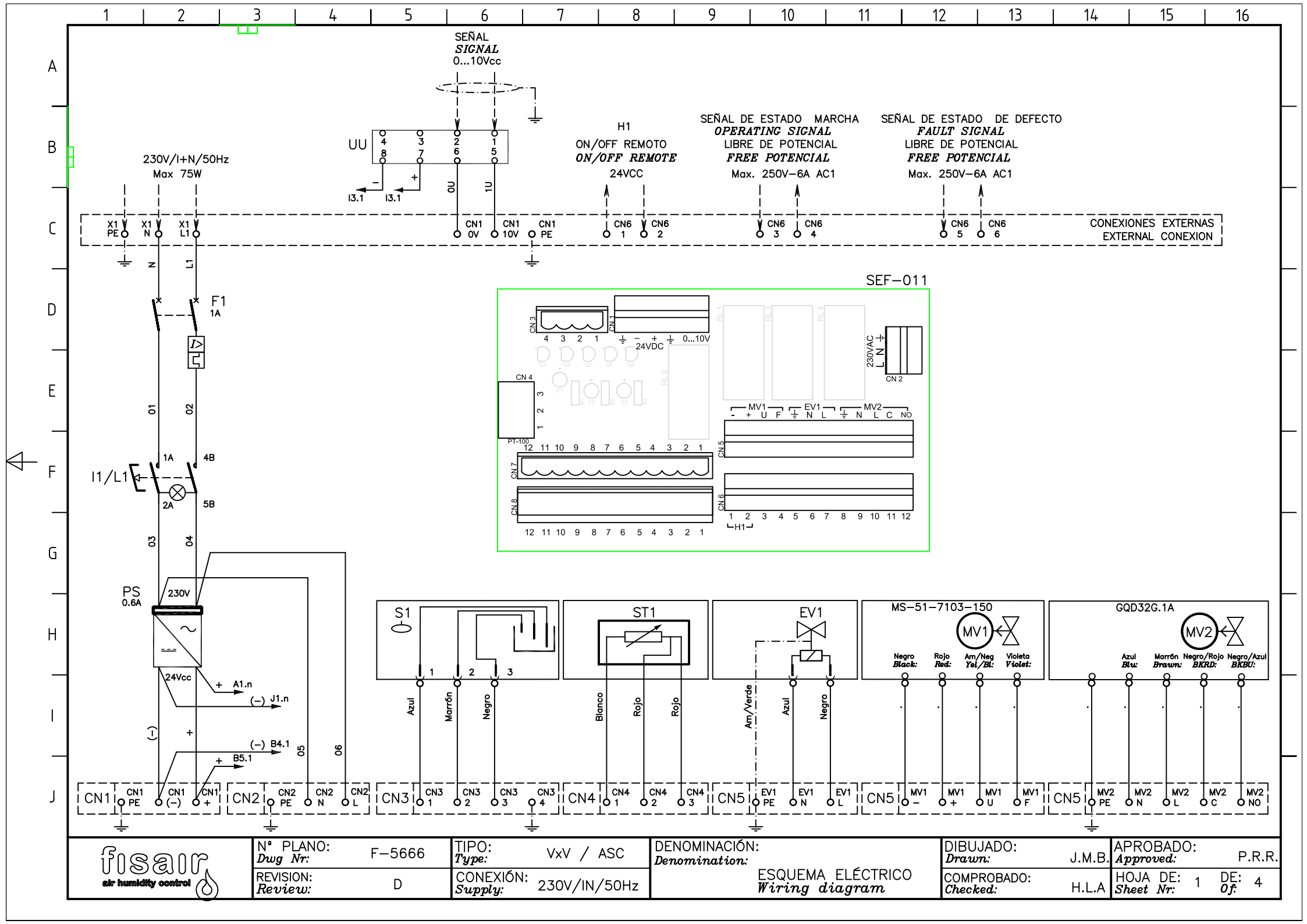
(*) For other operating conditions, request the corresponding capacity.

The manufacturer reserves the right to change specifications without prior notification.

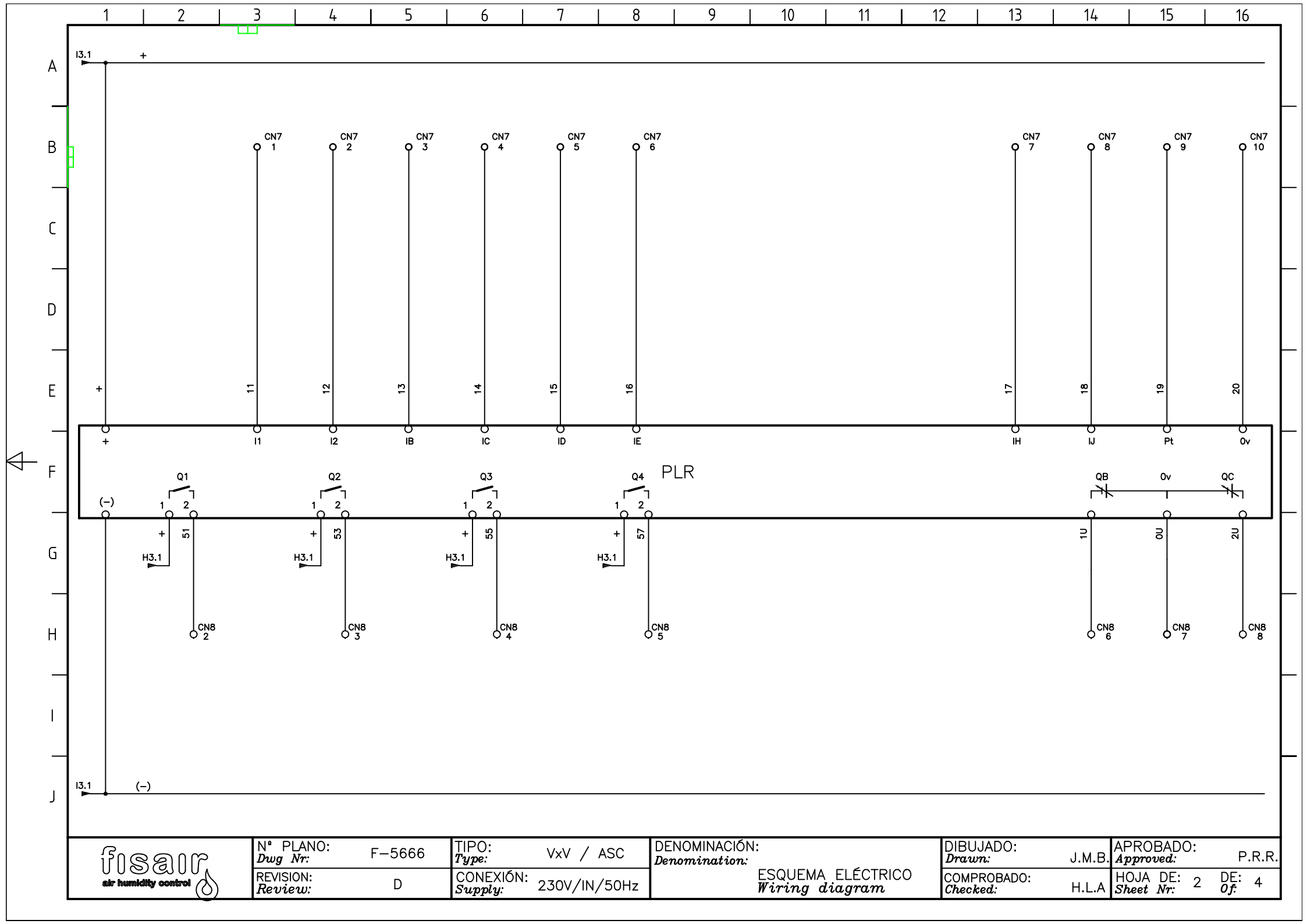
Capacities of Diphusair VxV steam humidifiers

Generation of steam (kg/h)		VxV-60	VxV-120	VxV-240
Boiler steam pressure (kPa) [gauge] (*)	50 kPa (G)	15	32	64
	75 kPa (G)	26	53	107
	100 kPa (G)	38	78	158
	125 kPa (G)	51	103	209
	150 kPa (G)	60	120	240

(*) The use of steam pressures >150 kPa(G) is not recommended because this would destabilize the behaviour of the exchanger.



fisair air humidity control	Nº PLANO: *Dwg Nr:* F–5666	TIPO: *Type:* VxV / ASC	DENOMINACIÓN: *Denomination:*	DIBUJADO: *Drawn:* J.M.B.	APROBADO: *Approved:* P.R.R.
	REVISION: *Review:* D	CONEXIÓN: *Supply:* 230V/IN/50Hz	ESQUEMA ELÉCTRICO *Wiring diagram*	COMPROBADO: *Checked:* H.L.A	HOJA DE: *Sheet Nr:* 1 DE: *Of:* 4



fisair air humidity control	Nº PLANO: *Dwg Nr:* F-5666	TIPO: *Type:* VxV / ASC	DENOMINACIÓN: *Denomination:* ESQUEMA ELÉCTRICO *Wiring diagram*	DIBUJADO: *Drawn:* J.M.B.	APROBADO: *Approved:* P.R.R.
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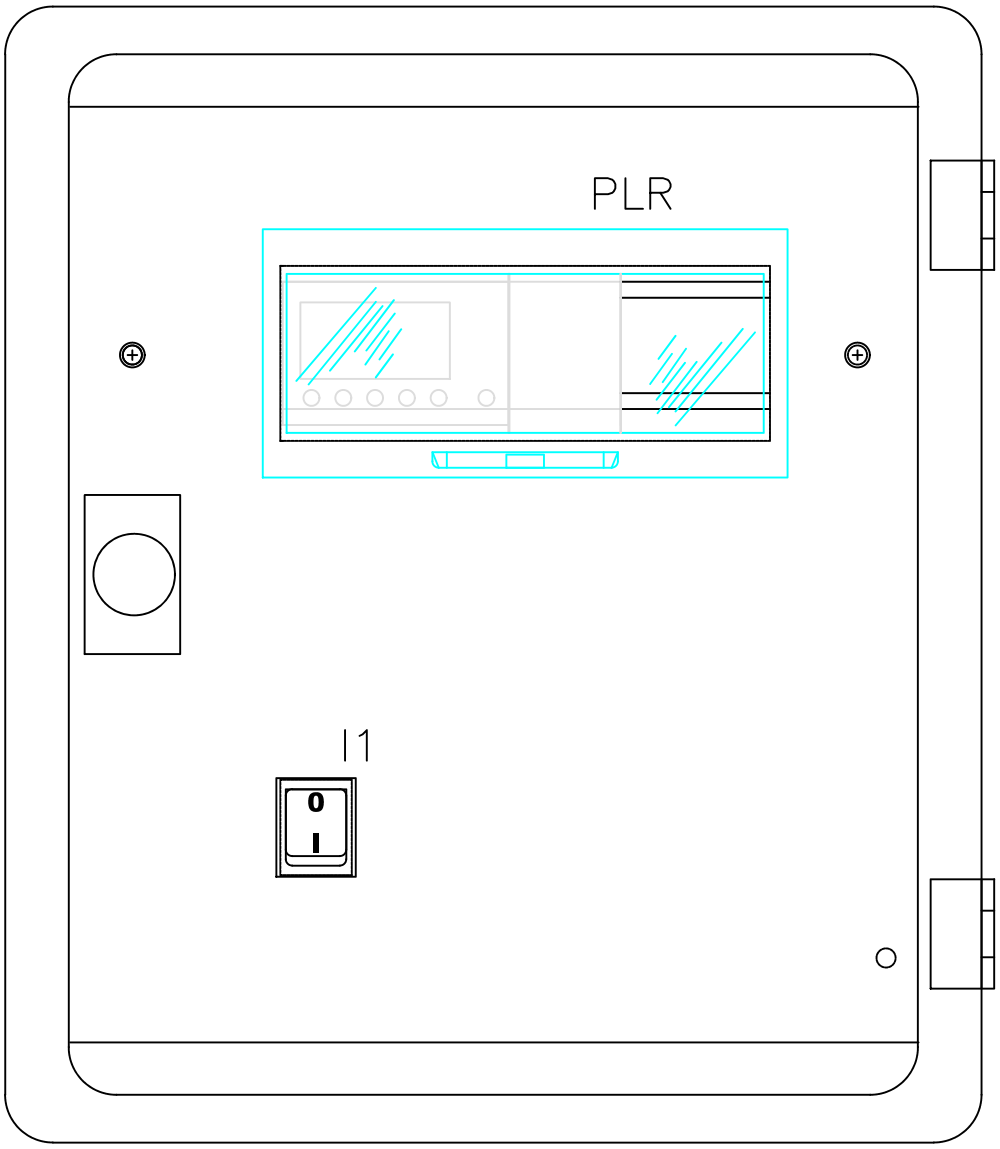
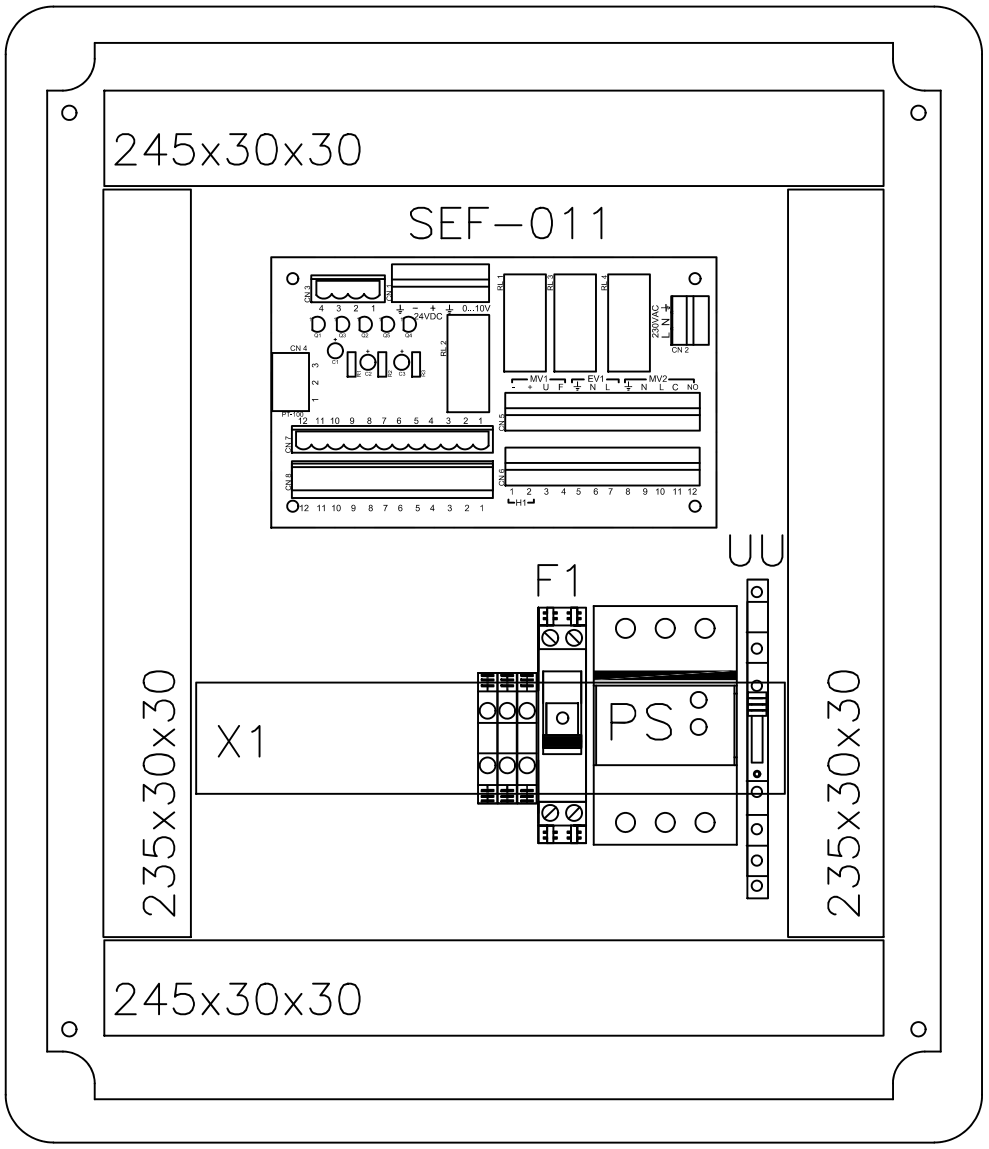
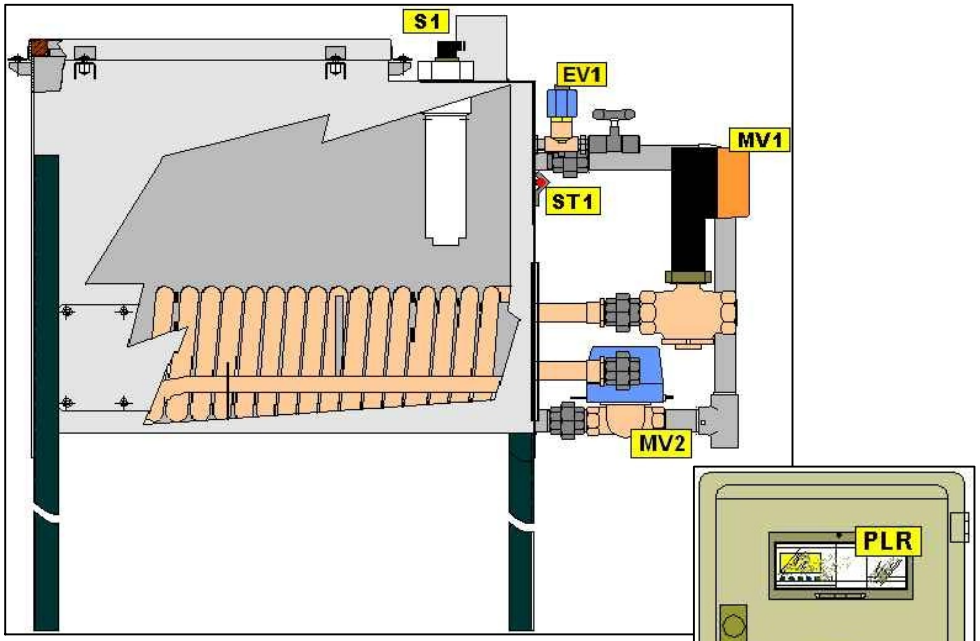
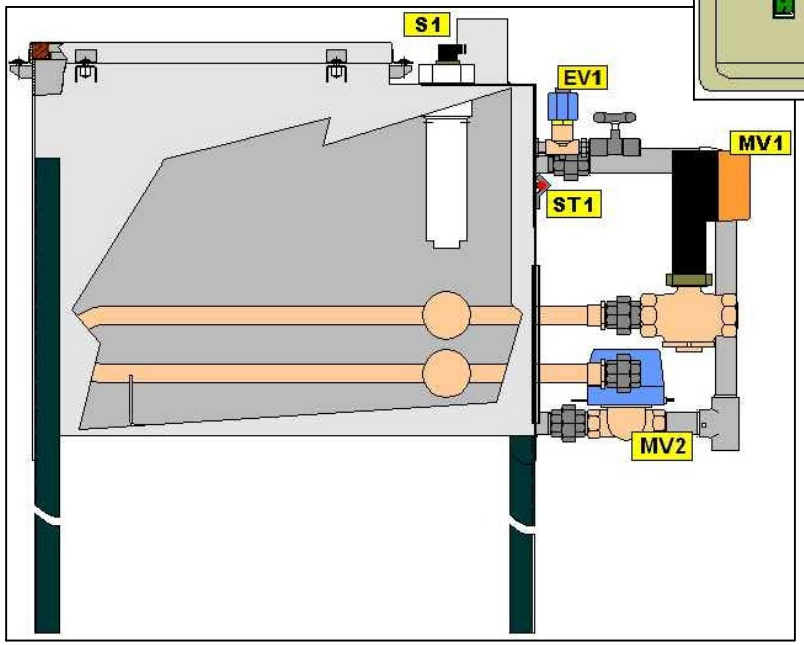




fisair air humidity control	Nº PLANO: *Dwg Nr:* F-5666	TIPO: *Type:* VxV / ASC	DENOMINACIÓN: *Denomination:*	DIBUJADO: *Drawn:* J.M.B.	APROBADO: *Approved:* P.R.R.
	REVISION: *Review:* D	CONEXIÓN: *Supply:* 230V/IN/50Hz	ESQUEMA ELÉCTRICO *Wiring diagram*	COMPROBADO: *Checked:* H.L.A	HOJA DE: *Sheet Nr:* 3 DE: *Of:* 4





Nombre *Name*	Descripción *Description*	Posición *Position*
F1	Protección magnetotérmica de Línea. *Magneto thermal circuit breaker*	F2.1
I1	Interruptor puesta en marcha de equipo *on/off switch*	E2.1
L1	Lampara de indicación de conexión *lamp state on-off*	E2.1
PS	Fuente de alimentación *Power suply*	G2.1
SEF-011	Circuito interfaz electrónico. *Electronic interfaz*	G11.1
S1	Cabezal sensor de nivel *Level sensor*	G5.1
ST1	Sensor de temperatura de superficie. *Temperature sensor,reactivation air*	G8.1
Ev1	Válvula solenoide *Solenoid electric valve*	G10.1
Mv1	Actuador eléctrico para válvula de vapor *Electric actuating modulator for steam valve*	G12.1
Mv2	Motor para accionamiento de válvula de drenaje. *Electric motor for drain valve*	G15.1
H1	Conexión remota para puesta en marcha *Remote conection for turn-on the machine*	B8.2
PLR	Relé programable *Programing logic relay*	F*.2
UU	Amplificador de separación *Isolating amplifier*	B5.1

Dispositivo opcional
Optional device

fisair air humidity control	Nº PLANO: *Dwg Nr:* F-5666	TIPO: *Type:* VxV / ASC	DENOMINACIÓN: *Denomination:* ESQUEMA ELÉCTRICO *Wiring diagram*	DIBUJADO: *Drawn:* J.M.B.	APROBADO: *Approved:* P.R.R.
	REVISION: *Review:* D	CONEXIÓN: *Supply:* 230V/IN/50Hz		COMPROBADO: *Checked:* H.L.A	HOJA DE: *Sheet Nr:* 4 DE: *Of:* 4

ZELIO 2 SR3 PLR MANAGEMENT PROTOCOL (DIPHUSAIR VxV)

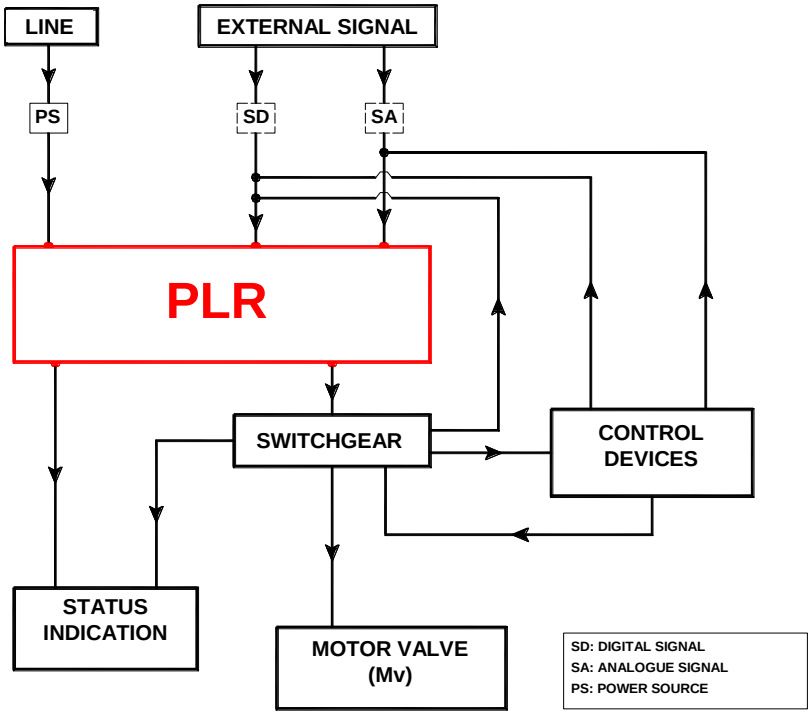
Table of Contents

1 Introduction.

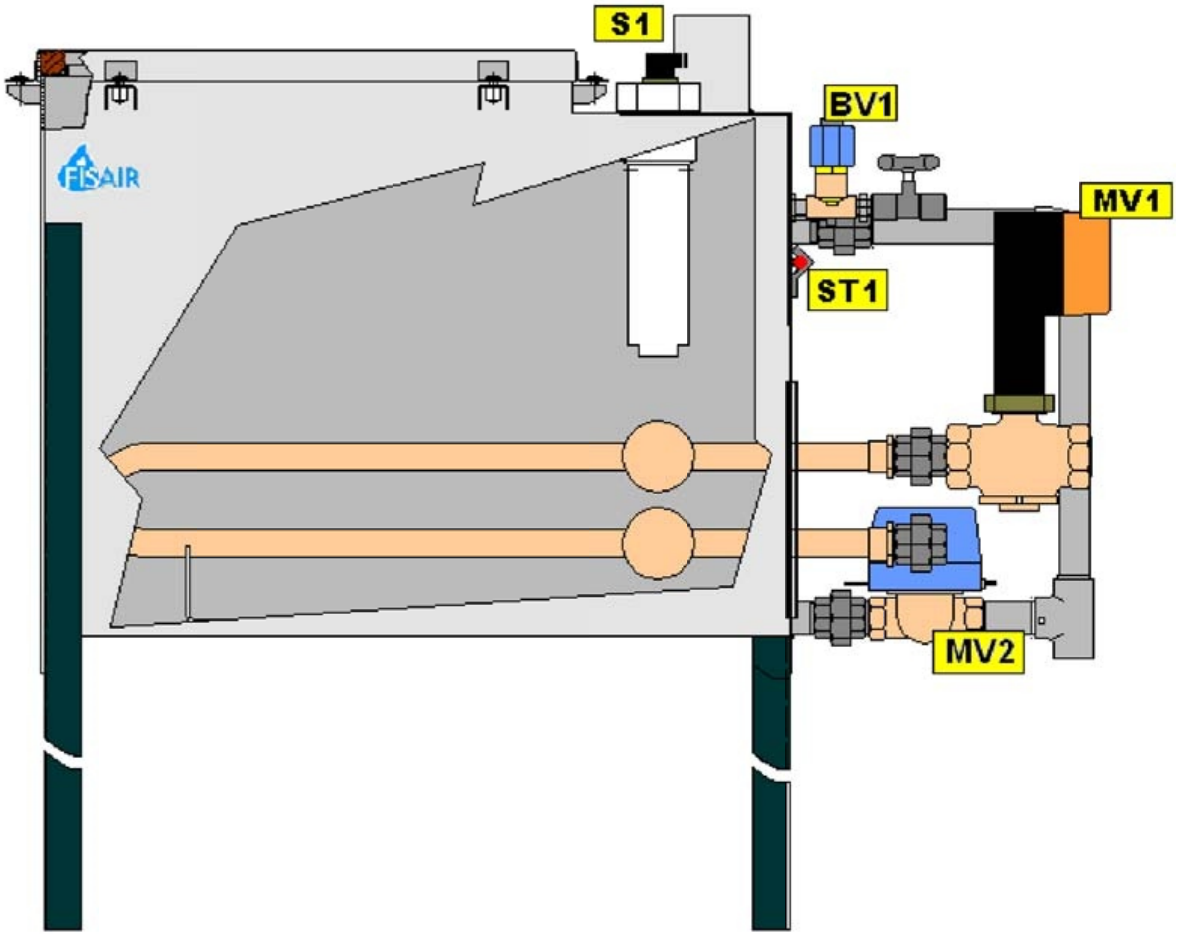
Integration in the management and operational supervision with the PLR ZELIO 2 SR3 makes it possible to achieve a faster, simpler, more precise and reliable operation of the humidifier, as well as reducing the wiring needed for the electrical board.

The ZELIO 2 SR3 PLR fitted to this type of equipment is a programmable device for the real time operation and supervision of the various equipment components connected to it.

When using this protocol, the electrical diagrams must always be at hand.



2 Components managed by the PLR

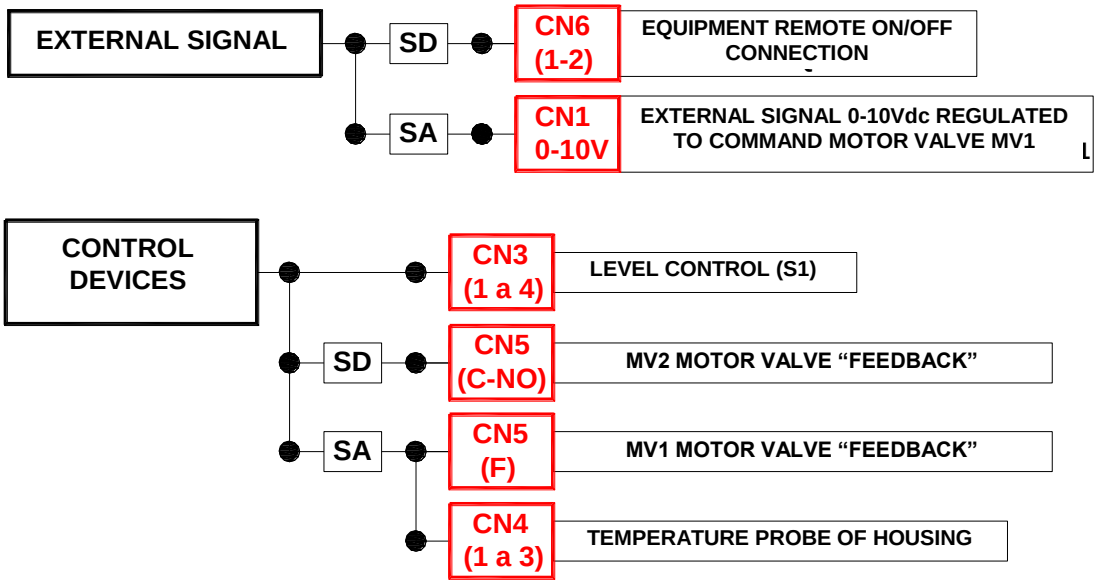


Component	Name	Description
MV1	Motor valve 1	Proportional electric actuator for the ASC boiler valve
MV2	Motor valve 2	Motor for operating the drain valve
ST1	Temperature sensor	Housing surface temperature sensor
S1	Level sensor	Electrode level sensor for water level control
EV1	Solenoid valve	Solenoid valve for controlling drinking/softened water

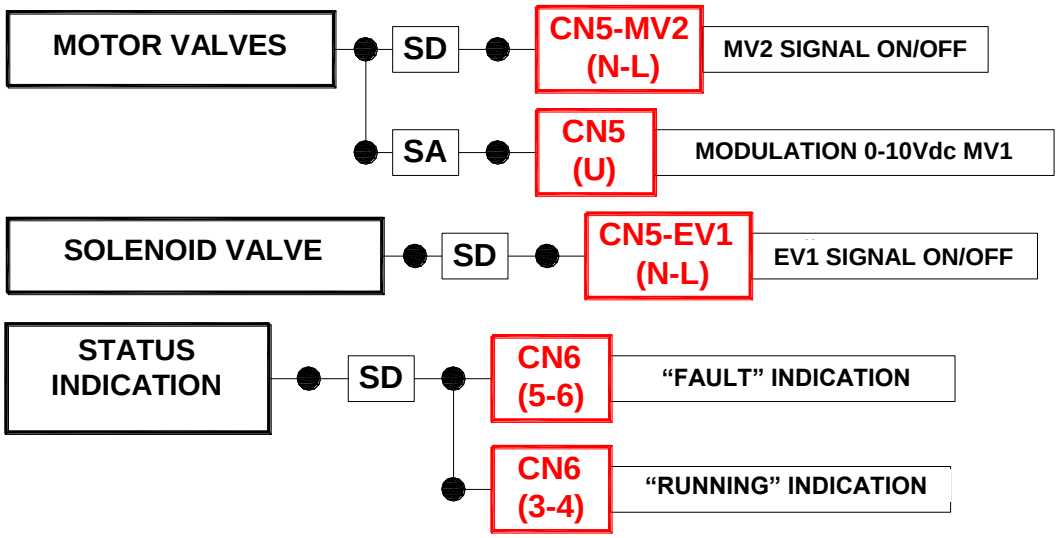
3 Switchgear, control devices and external signals connected to the PLR.

The electric controller has a 50 x 25 mm black and white screen and can connect 6 digital + 3 analogue inputs and 4 digital + 2 analogue outputs.

3.1 PLR INPUT CONNECTIONS



3.2 PLR output connections



4 Functions provided by the ZELIO-2-SR3 PLR

4.1 Controls

- Motor-valve MV1 remote on-off operation control
- Proportional modulation to open motor-valve MV1 by a regulated external signal, 0-10Vdc for 0-100% opening, from a humidity controller/regulator.
- All-or-nothing activation of MV2 motor-valve
- All-or-nothing activation of EV1 solenoid valve
- Manual adjustment mode, opening MV1 motor-valve

4.2 Safety and alarms

- Equipment alarm and shutdown due to excessively high temperature (≥ 105°C) of VxV housing, measured by the ST1 probe.
- Equipment alarm and shutdown due to low water level, measured by the electrode level controller S1.
- Equipment alarm and shutdown due to disparity between the value, 0-100% opening of MV1 (with the "external 0-10Vdc" or "manual" demand) and the 0-10Vdc value of MV1 actual positioning feedback valve. A deviation of ± 5% between the two values is allowed.
- Equipment alarm and shutdown due to disparity between the MV2 motor valve all/nothing open value and the MV2 actual positioning feedback.

- Blocked drain alarm, measured by the electrode level controller S1.
- "Running" and "fault/alarm" indication. Both connections must be free of voltage.

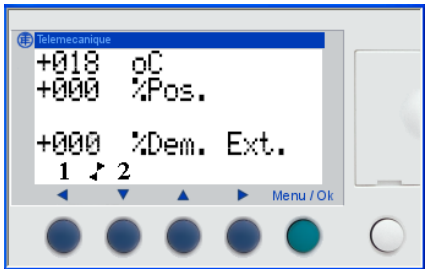
5 Management protocol

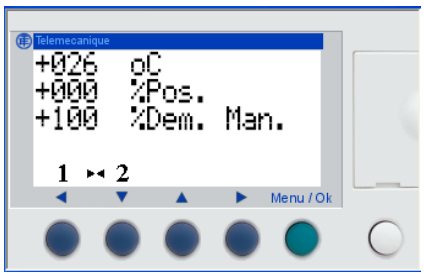
After meeting the installation prerequisites and checking the mains values coincide with those required by the machine, the following operations can be supervised, configured and adjusted to obtain the described actions. The operational sequences will be described using icons.

5.1 Supervision status

Follow the steps described in the equipment electrical installation instruction manual. Once connected to the electric supply, the magnetothermic switch (F1) is armed. Turn on the switch I1. It will light green, which means the equipment is "live".

One of the following displays will appear on the PLR. The factory setting is "automatic" mode.





SUPERVISION STATUS "AUTOMATIC" SUPERVISION STATUS "MANUAL"

The following can be seen in both states:

- **VxV housing temperature (ºC):** Temperature measured by the ST1 probe attached to the front of the VxV housing (e.g. 18ºC and 26ºC).

- **FEEDBACK actual opening position of valve (% Pos.):** MV1 motor valve actual opening percentage (e.g. 0%)

The following is seen in the "automatic" supervision status:

- **External signal opening demanded 0-10Vdc (% Dem. Ext.):** Opening percentage demanded by the external signal (0-10Vdc,-0-100% opening) from a humidity controller/regulator (e.g. 0%)

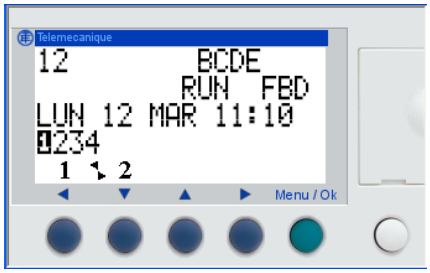
The following is seen in the “manual” supervision status:

- **Manual signal opening demanded (% Dem. Man.):** Opening percentage demanded by the manual signal to be adjusted in the PLR; factory setting 20% programmed opening (e.g. 100%).

5.2 Connection status.

1º) By continuously pressing the white key (located far right), the display appears with the abbreviation “Param” (parameters).

2º) Pressing the white key and green key (Menu/OK) brings up the connection display.



This shows:

1. **PLR DIGITAL INPUTS:** They are the alphanumeric values of the upper part indicated as 1-2-B-C-D-E.

   - **1:** H1 ON/OFF Remote connection.
   - **2:** “Feedback” of MV2 drain valve limit switch position reached (fully open).
   - **B:** “Feedback” of ASC MV1 valve open position, 0-10Vdc/0-100%.
   - **C:** Minimum level reached by the level detector S1.
   - **D:** Average level reached by the level detector S1.
   - **E:** Maximum level reached by the level detector S1.

2. **PLR DIGITAL OUTPUTS:** They are the numerical values of the lower part indicated as 1-2-3-4.

   - **1:** ASC MV1 valve opening signal .
   - **2:** Alarm signal.
   - **3:** EV1 fill solenoid valve opening signal.
   - **4:** MV2 empty/drain motor valve opening signal.

3. Date and time.
4. “RUN” (run status of program installed on the PLR).

To return to the supervision screen, press the green key (Menu/OK) 3 times.

6 Launching.

6.1 Operation manual

In this mode, the equipment operates by opening the motor valve MV1 by the percentage programmed on the PLR.

- Steps to follow for manual start-up:

1º) Check that the magnetothermic switch F1 is armed and the PLR is on in monitoring status. The “automatic” supervision status appears by default.

2º) Connections to be made. A connection must be made:

- Remote equipment start-up connection: **ON/OFF REMOTE (CN6 1-2)**.

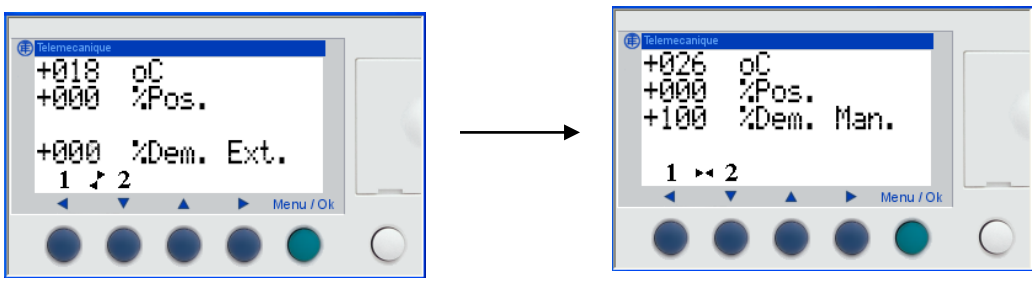
Optionally, the following “status indication” connections can be made:

- **RUNNING SIGNAL (CN6 3-4):** “Run” signal, free of max. voltage. 250V-6A AC1.
- **FAULT SIGNAL (CN6 5-6):** “Fault” signal, free of max. voltage. 250V-6A AC1.

3º) Configuration to work manually:

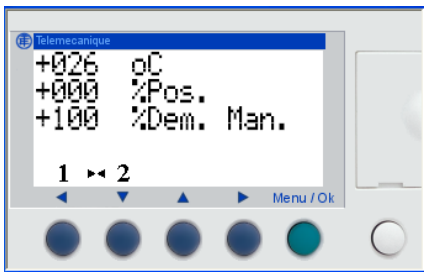
Press the ▼ key (**2** in the display) and the following display will appear with the % manual demand (% Dem. Man.); by default, this programmes a 100% valve opening.

The display will change from % external demand (% Dem. Ext.) to % manual demand (% Dem. Man.)

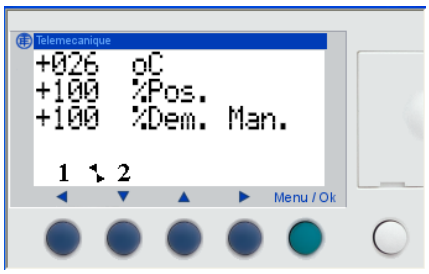


AUTOMATIC MODE **MANUAL MODE**

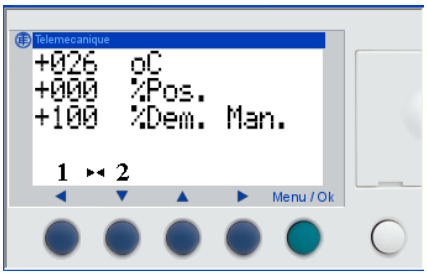
- Initial display before the MV1 opening response:

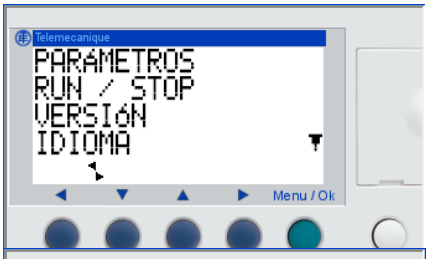


- Display after the MV1 motor valve opening response. The MV1 opening is adjusted to 100% demand.

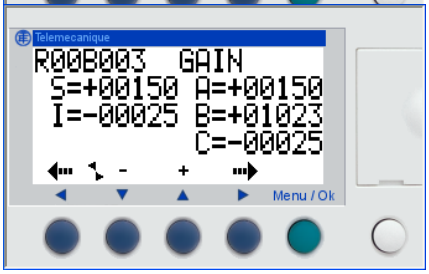


4º) Manual demand adjustment (MV1 desired opening percentage):

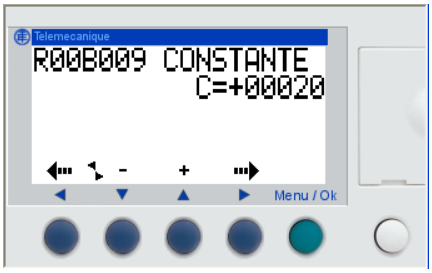




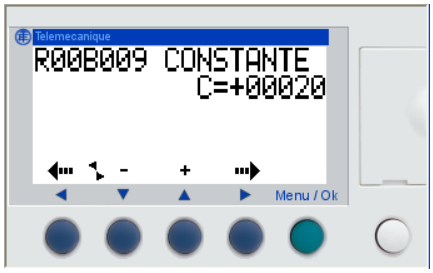
a) Press the green “menu/OK” button once on the “manual” monitoring screen; the following display will appear with the word “PARAMETERS” flashing.



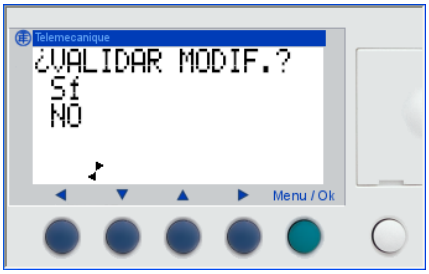
b) Enter “PARAMETERS” by pressing the green key again. The following parameter screen from module R00B:003 will appear. The MV1 opening percentage setting is done in the module R00B:009.



c) Use keys ▲(+) and ▼(-) until the module R00B:009 is reached. It will be seen that it is programmed at 20%.



d) To change this value, press ► once until the value C = XXXX flashes. Use keys ▲(+) and ▼(-) until the desired value is reached. In this case, 75% opening. Press the green (Menu/OK) key to accept the change. (Enter a value between 0-100).



e) After pressing the Menu/OK key, "Yes" will appear flashing in this display. Press the Menu/OK key again to accept the change.

5º) It will work properly whenever:

- The safety thermostat ST1 value is not above 105°C.
- The water is at the minimum level required by the electrode level S1.
- The magnetothermic switch is armed and there is no problem in the lines and connections.

6.2 Automatic operation.

In this mode, the equipment will work by modulating the motor-valve MV1 opening in proportion to the external signal 0-10Vdc demanded.

- <u>Steps to follow for automatic start-up:</u>

1º) Check that the magnetothermic switch F1 is armed and the PLR is on in monitoring status.

2º) Connections to be made. The following connections have to be made:

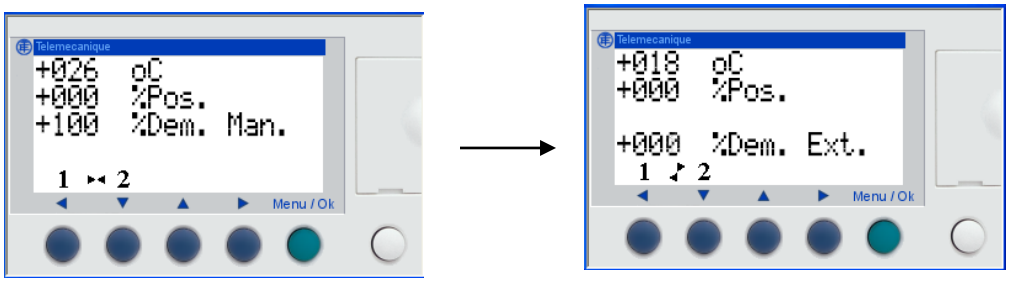
- Remote equipment start-up connection: **ON/OFF REMOTE (CN6 1-2)**.
- Connection of 0-10VDC SIGNAL (CN1, 0-10Vdc) from a humidity regulator/controller.

Optionally, the following "status indication" connections can be made:

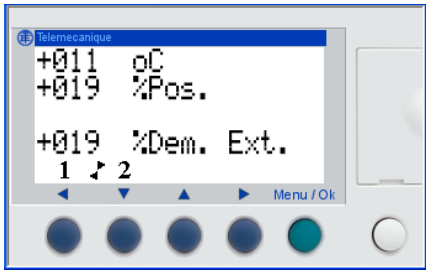
- **RUNNING SIGNAL (CN6 3-4):** "Run" signal, free of max. voltage. 250V-6A AC1.
- **FAULT SIGNAL (CN6 5-6):** "Fault" signal, free of max. voltage. 250V-6A AC1.

3º) Configuration to work "automatically":

No configuration is required for this operation. If the equipment is in manual mode, the ▼ key (**2** on the display) has to be pressed to change from manual to automatic mode. The display will change from % manual demand (% Dem. Man.) to % external demand (% Dem. Ext.).



MANUAL MODE AUTOMATIC MODE



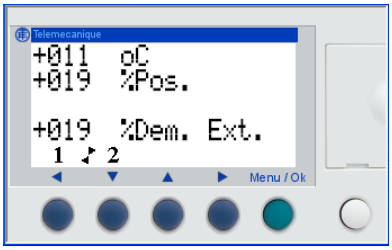
- Display after the MV1 motor valve opening response. The MV1 opening is adjusted to 19% demand. (%Pos. = Feedback signal of actual MV1 position).

7 Drainage function / partial and total emptying

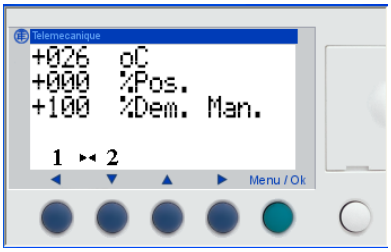
7.1 Drainage / partial emptying in operation

The DIPHUSAIR VxV is emptied or partially drained by opening the MV2 motor-valve during operation. This partial emptying is factory set at every 150 filling cycles and lasts for 2 minutes.

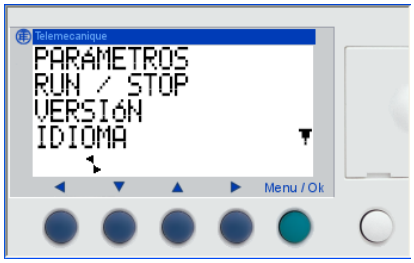
Adjustment of drainage/partial emptying cycles and time



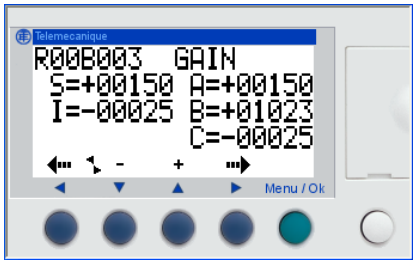
MANUAL MODE



AUTOMATIC MODE



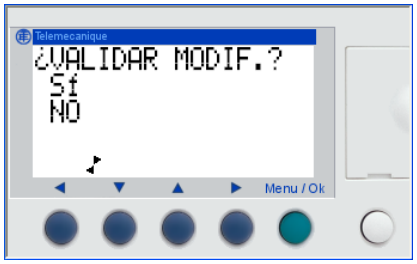
a) Press the green “menu/OK” button once on the “manual” or “automatic” monitoring screen; the following display will appear with the word “PARAMETERS” flashing.



b) Enter “PARAMETERS” by pressing the green key again. The following parameter screen from module F00B:003 will appear. The adjustment is made in module F00B:202.

c) Use keys ▲(+) and ▼(-) until the module F00B:202 is reached. It will be seen that 150 cycles and 1200 dS (2min) are programmed.

d) To change this value, press ► once until the value SETTING = 00150 flashes. Use keys ▲(+) and ▼(-) until the desired value is reached. Press the green (Menu/OK) key to accept the change. Follow the same procedure to change the drain time (PRESS).



e) After pressing the Menu/OK key, “Yes” will appear flashing in this display. Press the Menu/OK key again to accept the change.

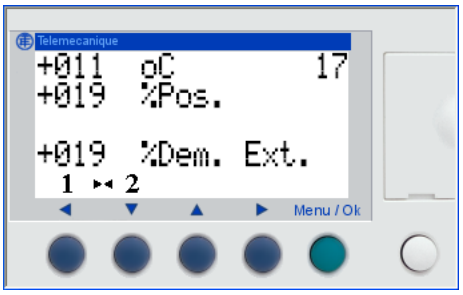
7.2 Complete drainage/emptying upon shutdown.

The DIPHUSAIR VxV will completely drain if the motor-valve MV2 is opened when in shutdown by cutting the remote control ON/OFF signal. This emptying will be done 72h after shutdown.

8 Troubleshooting.

8.1 Fault 17 (automatic reset).

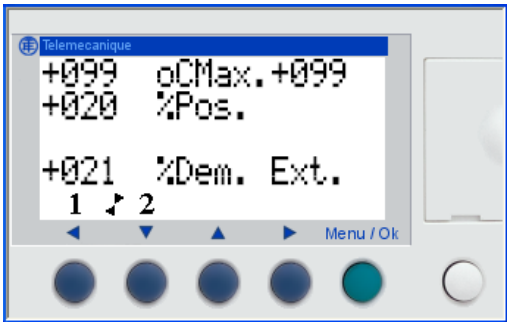
DISPLAY EFFECT	CAUSE
17	➢ Filling is not effective. The minimum water level is not reached for the MV1 motor-valve to open.



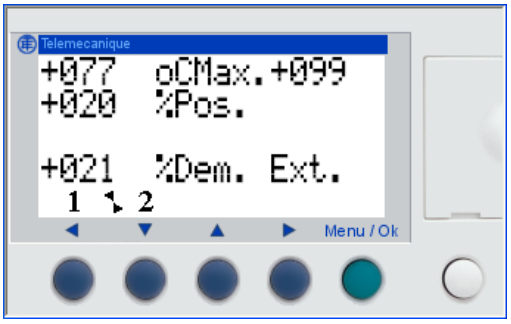
This safety feature is *"automatically reset"* as soon as the minimum water level is reached. The steam MV1 motor valve will reopen to the position demanded by the "External demand" or "Manual demand".

8.2 Fault $^{o}C_{Max.}$ (manual reset).

DISPLAY EFFECT	CAUSE
$^{o}C_{Max.}$	➢ The maximum housing temperature of 98°C has been exceeded.



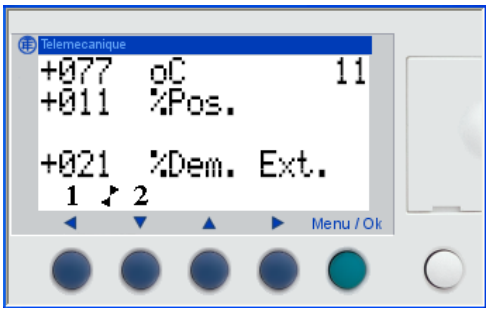
If the housing temperature exceeds the programmed 105°C, the steam motor valve MV1 will close immediately, and °CMax will appear on the screen and the maximum temperature reached by the housing will be seen on the upper display.



This safety feature is *"manually reset"*. Even if the temperature falls below the 105°C cut-off point, the MV1 motor steam valve will not re-open until the safety reset key ◄ (**1**) is pressed. As soon as the safety is reset, the "$^{o}C_{Max.}$" and the maximum temperature reached by the casing will disappear, and the steam valve will re-open to the position demanded by the "External demand" or "Manual demand".

8.3 Fault 11 (automatic reset).

DISPLAY EFFECT	CAUSE
11	➢ The feedback analogue signal 0-10Vdc (CN5 F) of the steam motor-valve MV1 opening exceeds the ± 5% margin, with the external demand signal from the humidity regulator/controller or the manual demand.



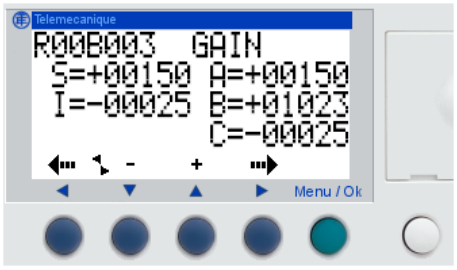
If the programmed ± 5% margin is exceeded in a period < 400s (*), the steam motorcycle valve MV1 will close immediately, and '11' will appear on the upper part of the screen.
If the tank water temperature does not reach 85°C (**) within the time of 400s, the fault 11 will also appear on the screen.

This safety feature is *"automatically reset"* when the feedback analogue signal 0-10Vdc of the motor valve MV1 opening is within the ± 5% margin of difference with the external demand signal from the humidity regulator/controller or the manual demand signal; MV1 will re-open to the position demanded by the "External Demand" or "Manual Demand".

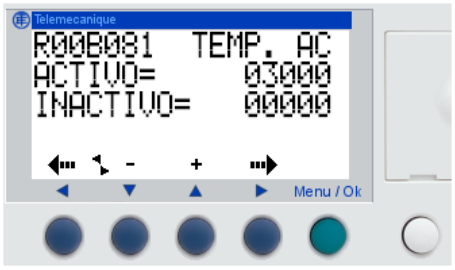
(*)(**) The time of 400s and temperature of 85°C can be adjusted on the screen according to the equipment needs.
To modify these values, follow the steps below:

1. Access the main menu from the main screen with the green Menu/OK button.

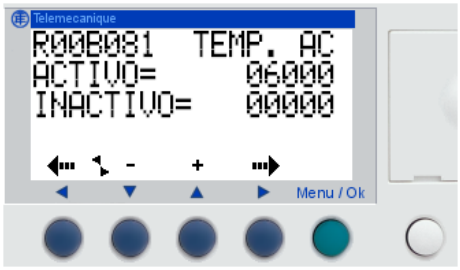
2. Enter PARAMETERS with the green Menu/OK button.



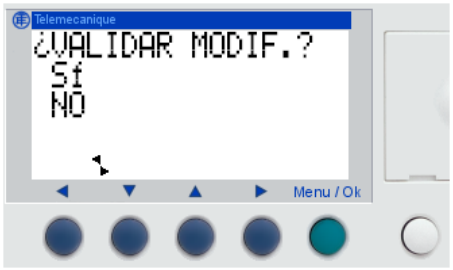
3. Using the up and down buttons, look for the parameter R00B081.



4. Change the ACTIVE value, to 06000 (600s), for example.



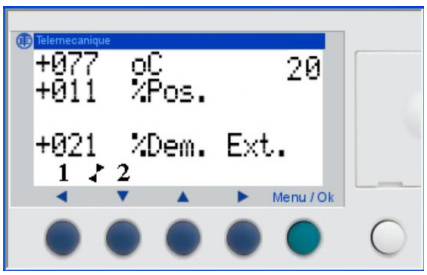
5. Confirm the change with YES and return to the main menu.



6. Repeat the previous steps to locate and modify the value of block R00B0189. (Default value 85°C)
   If this parameter value is too low it will increase the response time at the start of steam production. Recommended value: within 85-92°C

8.4 Fault 20 (automatic reset)

DISPLAY EFFECT	CAUSE
20	➢ The drainage/emptying is not effective.



This safety feature is *"automatically reset*".

DECLARACIÓN CE DE CONFORMIDAD
EC CONFORMITY DECLARATION
EG KONFORMITÄTSERKLÄRUNG
DECLARATION CE DE CONFORMITÉ

Departamento de Dirección de Calidad
Quality Management Department

Qualitätsmanagement-Abteilung
Département de gestion de la qualité

fisair
air humidity control

DECLARAMOS Bajo nuestra única responsabilidad que el humidificador de aire:
WE DECLARE, under our own responsability that the air humidifier:
Unter unserer ausschließlicher Verantwortung ERKLÄREN WIR, daß der Luftbefeuchter:
NOUS DECLARONS, sous notre unique responsabilité que l'humidificateur d'air:

MARCA/BRAND/MARKE/MARQUE:

FISAIR

SERIE/SERIES/REIHE/SÉRIE:

DIPHUSAIR VxV

Se adapta a las normas:
Meets the regulations:
Den Normen entspricht:
S'adapte aux normes:

- **EN ISO 12100**: 2010
- **EN 60204-1**: 2006
- **EN 61000-6-1**: 2007
- **EN 61000-6-3**: 2007
- **EN 13445-1/5**: 2015

Es conforme a los requisitos esenciales de las Directivas:
Conforms to the essential requirements of the Directives:
Und den von den Richtlinien aufgestellten Grundvoraussetzungen Rechnung trägt:
Et est conforme aux conditions essentielles des Directives:

- **2006/42/CE**
- **2014/30/UE**
- **2014/35/UE**
- **2014/68/UE**

Con exclusión de responsabilidades sobre las partes o componentes adicionados o montados por el cliente.
With no liability for the parts or components added or assembled by the customer.
Unter Ausschluß der Verantwortung über die vom Kunden bereitgestellten und/oder angebauten Teile.
Avec exclusion des responsabilités concernant les parties ou les composants ajoutés ou assemblés par le client.

Departamento de Dirección de Calidad/Quality Management Department/
Qualitätsmanagement-Abteilung/Département de gestion de la qualité:

Hugo J. López Álvarez
San Martin de la Vega, julio 2016

FISAIR S.L.U. WARRANTY POLICY

Quality Department
Departamento de Calidad

Two-year Limited Warranty

FISAIR warrants to the original purchaser that its products will be free from defects in materials and parts for a period of two (2) years after installation or twenty-seven (27) months from the date FISAIR ships such product, whichever date is the earlier.

If any FISAIR product is found to be defective in material or assembly during the applicable warranty period, FISAIR's entire liability, and the purchaser's sole and exclusive remedy, shall be the repair or replacement of the defective product or part.

Warranty disclaimer

FISAIR shall not be liable for any costs or expenses, whether direct or indirect, associated with the installation, removal or reinstallation of any defective product.

The Limited Warranty does not include any consumer part such as joints, pulleys, filters or media.

FISAIR's Limited Warranty shall not be effective or actionable if:

a) All related product invoices have been payed in time and terms.
b) Unless there is compliance with all installation and operating instructions furnished by FISAIR, or if the products have been modified or altered without the written consent of FISAIR, or if such products have been subject to accident, misuse, mishandling, tampering, negligence or improper maintenance. Such situations could be an incorrect power supply connection, crashed with inappropriate objects, security protection devices unblocked and so.
c) Components and/or manufactures are affected or damaged by the effects of corrosion (gradual wear of the metal bodies by the action of external actors not controlled by FISAIR).

Any warranty claim must be submitted to FISAIR in writing within the stated warranty period.

Parts Warranty

Defective parts may be required to be returned to FISAIR. In case any part is claimed as a faulty one, FISAIR will ask the customer to send the part back to the factory in order to analyze if the part is failing due to any of above referred actions (see warranty disclaimer) or due to effective part failing.

If the part must be replaced immediately, FISAIR will ship the part to the customer immediately and invoice the part with a 30 days delay payment for the faulty part to be returned. If the part is returned in this period, the part fail analysis would be made to emit a technical report for the warranty coverage based in this Warranty Statement document.

In case that the part is failing due to a lack of quality, FISAIR will credit this invoice in order to stop the payment. In case FISAIR does not receive the part in this period, or if the failure is due to the reasons covered in the Warranty disclaimer paragraph, the invoice will be effective.

In case any part from the product / shipment is missing, the customer should notify FISAIR before 3 days from the shipment date of arrival.

Quality Department
Departamento de Calidad

Service Covered by Warranty

In case that there is any FISAIR product that should be serviced in order to recover its proper used designed, FISAIR will select the person (s) in charge of this operation. These qualified technicians should have the enough knowledge to service FISAIR units.

No company should practice a warranty service without the writing FISAIR notice giving the authorization to do it and if any cost should be cover by FISAIR should be advised in advance to the service job. In case that FISAIR should send FISAIR staff to solve the solution, trip expenses are not covered by the warranty.

FISAIR's Limited Warranty is made in lieu of, and FISAIR disclaims all other warranties, whether express or implied, including but not limited to any implied warranty of merchantability, any implied warranty of fitness for a particular purpose, any implied warranty arising out of a course of dealing or of performance, custom or usage of trade.

FISAIR shall not, under any circumstances be liable for any direct, indirect, incidental, special or consequential damages (including, but not limited to, loss of profits, revenue or business) or damage or injury to persons or property in any way related to the manufacture or the use of its products. The exclusion applies regardless of whether such damages are sought based on breach of warranty, breach of contract, negligence, strict liability in tort, or any other legal theory, even if FISAIR has notice of the possibility of such damages.

By purchasing FISAIR's products, the purchaser agrees to the terms and conditions of this Limited Warranty.

Extended Warranty

The original user may extend the term of the FISAIR Limited Warranty for a limited number of months past the initial applicable warranty period and term provided in the first paragraph of this Limited Warranty. All the terms and conditions of the Limited Warranty during the initial applicable warranty period and term shall apply during any extended term.

Each case should be valued in terms of type of product, equipment application, use and location of the product operation site.

Any extension of the Limited Warranty under this program must be in writing, signed by FISAIR, and paid for in full by the purchaser.

Quality Manager:

Hugo J. López Álvarez
San Martín de la Vega, February 2016