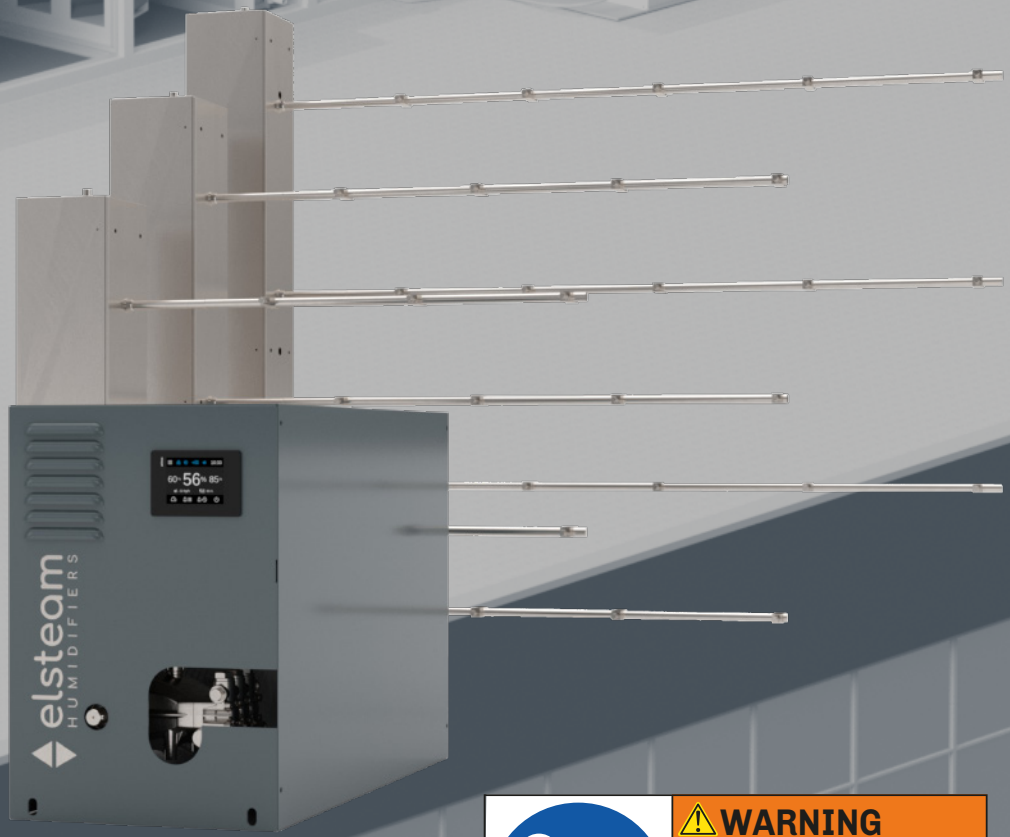
elsteam
HUMIDIFIERS

EHPN Series

High-pressure air humidifiers



⚠ WARNING

Make sure you read and fully understand the manual before using this device.

Non-observance of these instructions may result in death or serious injury.

Operating and maintenance manual

924EHPNE4.01 - 02/2024

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IMPORTANT INFORMATION

Liability and residual risks

ELSTEAM assumes no liability for any damage caused by the following (by way of example; this is not an exhaustive list):

- Installation/use for purposes other than those specified and, in particular, not adhering to the safety provisions set out by current regulations in the country in which the product is installed and/or contained in this manual;
- Use in appliances that do not guarantee sufficient protection against electric shocks, water and dust within the installation conditions created;
- Use in appliances that allow access to hazardous parts without the use of a keyed or tooled locking mechanism when accessing the instrument;
- Tampering and/or modifying the product;
- Installation/use in appliances which do not comply with current regulations in the country in which the product is installed.

The customer/manufacturer is responsible for ensuring their machine complies with these regulations.
ELSTEAM's responsibility is limited to the correct and professional use of the product in accordance with regulations and the instructions contained in this manual and other product support documents.

To comply with EMC standards, observe all the electrical connection instructions. As it depends on the wiring configuration as well as the load and the installation type, compliance must be verified for the final machine as specified by the relevant product standard.

Disclaimer

This document is the exclusive property of ELSTEAM. It contains a general description and/or a description of the technical specifications for the services offered by the products listed herein. This document should not be used to determine the suitability or reliability of these products in relation to specific user applications. Each user or integration specialist should conduct their own complete and appropriate risk analysis, in addition to carrying out a product evaluation and test in relation to its specific application or use. Users can send us comments and suggestions on how to improve or correct this publication.

Neither ELSTEAM nor any of its associates or subsidiaries shall be held responsible or liable for improper use of the information contained herein.

ELSTEAM has a policy of continuous development; therefore, ELSTEAM reserves the right to make changes and improvements to any product described in this document without prior notice.

The images in this document and other documentation supplied with the product are provided for illustrative purposes only and may differ from the product itself.

The technical data in this manual is subject to change without prior notice.

Terms and Conditions of use

Permitted use

Only use the device for adiabatic humidification and high-pressure adiabatic cooling.

The device must be installed and used in accordance with the instructions provided and, in particular, hazardous live parts or highly pressurised water must not be accessible under normal conditions.

The device must be suitably protected from water and dust with regard to its application and must also only be accessible with the aid of a tool.

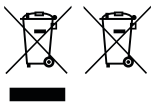
Only qualified personnel may install the product or perform technical support procedures on it.

The customer must only use the product as described in the documentation relating to that product.

Prohibited use

Any use other than those described in the "**Permitted use**" section and in the product support documentation is prohibited.

Disposal



The device must be disposed of in accordance with local regulations regarding the collection of electrical and electronic appliances.

Consider the environment

The company works towards protecting the environment, while taking account of customer requirements, technological innovations in materials and the expectations of the community to which we belong. ELSTEAM places great importance on respecting the environment, encouraging all associates to become involved with company values and guaranteeing safe, healthy and functional working conditions and workplaces.

Please consider the environment before printing this document.

IMPORTANT SAFETY INFORMATION

Please read this document carefully before installation; study all the warnings before using the device. Only use the device in accordance with the methods described in this document. The following safety messages may be repeated several times in the document, to provide information regarding potential hazards or to attract attention to information which may be useful in explaining or clarifying a procedure.

SYMBOLS

This symbol is used to indicate a risk of electric shock.
It is a safety indication and as such, should be observed to avoid potential accidents or fatalities.

This symbol is used to indicate a risk of serious personal injury.
It is a safety indication and as such, should be observed to avoid potential accidents or fatalities.

This symbol is used to indicate a serious risk of exposure to biological agents.
It is a safety indication and as such, should be observed to avoid potential accidents or fatalities.

SAFETY MESSAGES

DANGER

DANGER indicates a situation of imminent danger which, if not avoided, **will lead to death or serious injury**.

WARNING

WARNING indicates a situation of imminent danger which, if not avoided, **may lead to death or serious injury**.

CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, **could cause minor or moderate injury.**

NOTICE

NOTICE indicates a situation not related to physical injuries but which, if not avoided, could damage the equipment**.**

NOTE: The maintenance, repair, installation and use of the equipment must only be entrusted to qualified personnel.

QUALIFIED PERSONNEL

Only suitably trained and experienced personnel capable of understanding the content of this manual and all documentation regarding the product are authorised to work on and with this equipment. Furthermore, the personnel must have completed courses in safety and must be able to recognise and prevent the implied dangers. The personnel must have suitable training, knowledge and experience at a technical level, and be capable of anticipating and detecting potential risks caused by using the product, as well as changing the settings and modifying the mechanical, electric and electronic equipment for the entire system in which the product is used. All personnel working on and with the product must be entirely familiar with the relevant standards and directives, as well as safety regulations.

UNAUTHORIZED PERSONNEL

The humidifier must **not** be used by persons (including children) with reduced physical, sensory or mental capabilities or persons with no experience or knowledge.

SAFETY INFORMATION RELATING TO THE PRODUCT

EHPN series humidifiers are defined as "**NOT ACCESSIBLE TO THE PUBLIC**".

Before carrying out any work on the equipment, read these instructions carefully, making sure you understand everything.

⚠ DANGER

RISK OF ELECTRIC SHOCK, EXPLOSION OR ELECTRIC ARC

- Only use electrically insulated measuring devices and equipment.
- Do not install the equipment while the power supply is connected.
- Cut off the power supply to all equipment, including any connected devices, before removing any covers or hatches, or before installing/uninstalling accessories, hardware, cables or wires.
- Provide safety interlocks (isolators) of a suitable size between the power supply and the humidifier, with a contact opening distance of at least 3 mm for each pole.
- Always use a properly calibrated Voltmeter to make sure the system is powered off.
- The maintenance, repair, installation and use of the equipment must only be entrusted to qualified personnel.
- Do not touch the unshielded components or the terminals while they are live.
- Do not disassemble, repair or modify the product.
- Do not expose the equipment to liquids or chemicals.
- Make sure there is an effective earth connection.
- Before applying voltage to the equipment:
  - Make sure all protective elements, such as covers, hatches and grilles, are fitted and/or closed using a tool (e.g. a spanner).
  - Check all wiring connections.

⚠ DANGER

RISK OF ELECTRIC SHOCK AND FIRE

- Do not use the device with loads greater than those indicated in the technical data section.
- Do not exceed the temperature and humidity ranges indicated in the technical data section.
- Only use cables with a suitable cross-section as indicated in the section “Wiring best practices”.

⚠ WARNING

MALFUNCTIONING OF THE EQUIPMENT

- Perform the wiring carefully, in compliance with electromagnetic compatibility and safety requirements.
- Carry out a full start-up test.
- Make sure the wiring is correct for the end application.
- Minimise the length of the connections as much as possible, to avoid winding the cables around electrically connected parts.
- Before applying the power supply, check all the wiring connections.
- Do not connect wires to unused terminals and/or terminals marked with the text “No connection” (“N.C.”).

The humidifier produces humidity (mist) at a pressure of 80 bar (8 MPa).

⚠ WARNING

HIGH-PRESSURE WATER SYSTEM

Do not approach or touch the equipment while it is running.

⚠ WARNING

REGULATORY INCOMPATIBILITY

Make sure all the equipment used and systems designed conform to current local, regional and national standards.

SAFETY INFORMATION RELATED TO HEALTH AND HYGIENE

The **EHPN** humidifier features:

- Automatic draining for inactivity;
- Periodic automatic cleaning;
- Manual disinfection of the network and AHU;

Humidification systems with low maintenance levels can harm health. If maintenance is insufficient, pathogenic germs may build up in the air duct and affect the air quality.

Inadequate use and/or poor maintenance of the humidifier can damage your health.

⚠ WARNING

BIOLOGICAL RISK

- In the event of improper use and installation, microorganisms (including the bacteria that cause Legionellosis) may proliferate and be transferred into the air treatment system after the humidifier has been shut down for a long time.
- In the event of poor maintenance/cleaning after the humidifier has been shut-down for a long time, microorganisms (including the bacteria that cause Legionellosis) may proliferate and be transferred into the air treatment system.
- The humidifier must be used properly and be maintained and cleaned properly at prescribed intervals, as described in the ***MAINTENANCE*** chapter.

1. INTRODUCTION

Chapter content

This chapter contains the following information:

1.1 Description

The **EHPN** series is the ELSTEAM solution for high-pressure adiabatic air humidification systems.

The **EHPN** series consists of 2 elements:

- Pump unit;
- Distribution network (one or more racks, single-branch, room).

The **EHPN** high-pressure adiabatic humidifier produces mist by conveying high-pressure water (80 bar) in a distribution network composed of nozzles. Microscopic holes in the nozzles atomise the water into a fine mist, which is absorbed by the air in the duct or in the surrounding environment when distributed in the room.

The **EHPN** series adiabatic humidification system regulates its operation according to the humidity request from the control systems (see ***"6.6 CONFIGURATIONS" ON PAGE 49***).

The droplet separator (optional only installed in the AHU) is used to stop and water droplets that were not atomised before entering the duct.

NOTE: **EHPN** series humidifiers are defined as "**NOT ACCESSIBLE TO THE PUBLIC**".

1.2 Product overview

1.2.1 Pump unit

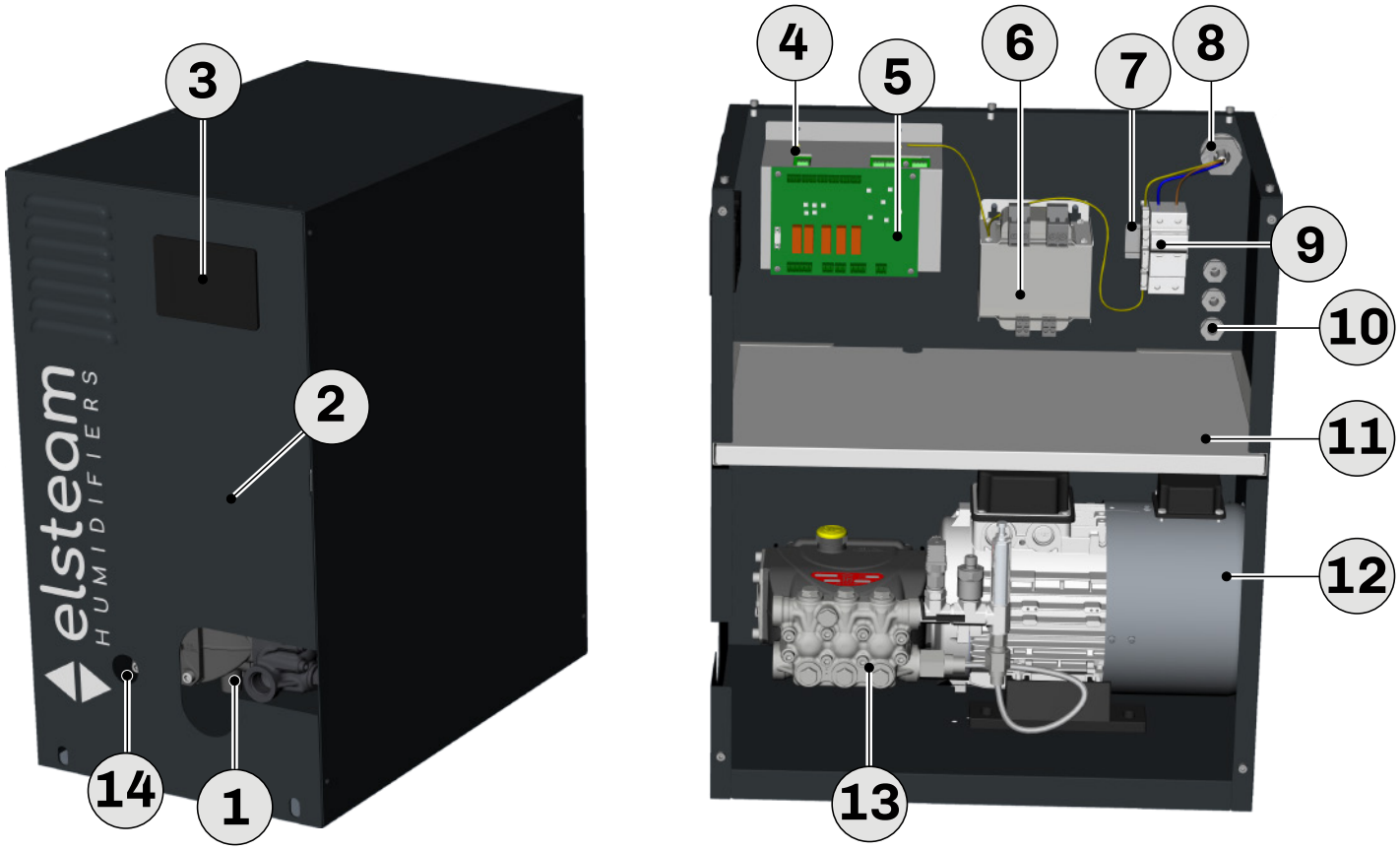


Fig. 1. *Pump unit overview*

Reference	Description	Reference	Description
①	Water pipe inlet/outlet hole	⑧	Cable gland for power wiring
②	Pump unit body	⑨	Fuse holder base
③	User interface, 3.5" TFT graphic display	⑩	3 cable glands for signal wiring
④	EVCO Compact series inverter	⑪	Removable shelf to separate the electrical/ hydraulic parts
⑤	Pump unit control board	⑫	Servo-ventilated motor
⑥	230/24 Vac transformer	⑬	Stainless steel pump
⑦	Earth terminal	⑭	Oil level check hole

1.2.2 Distribution rack

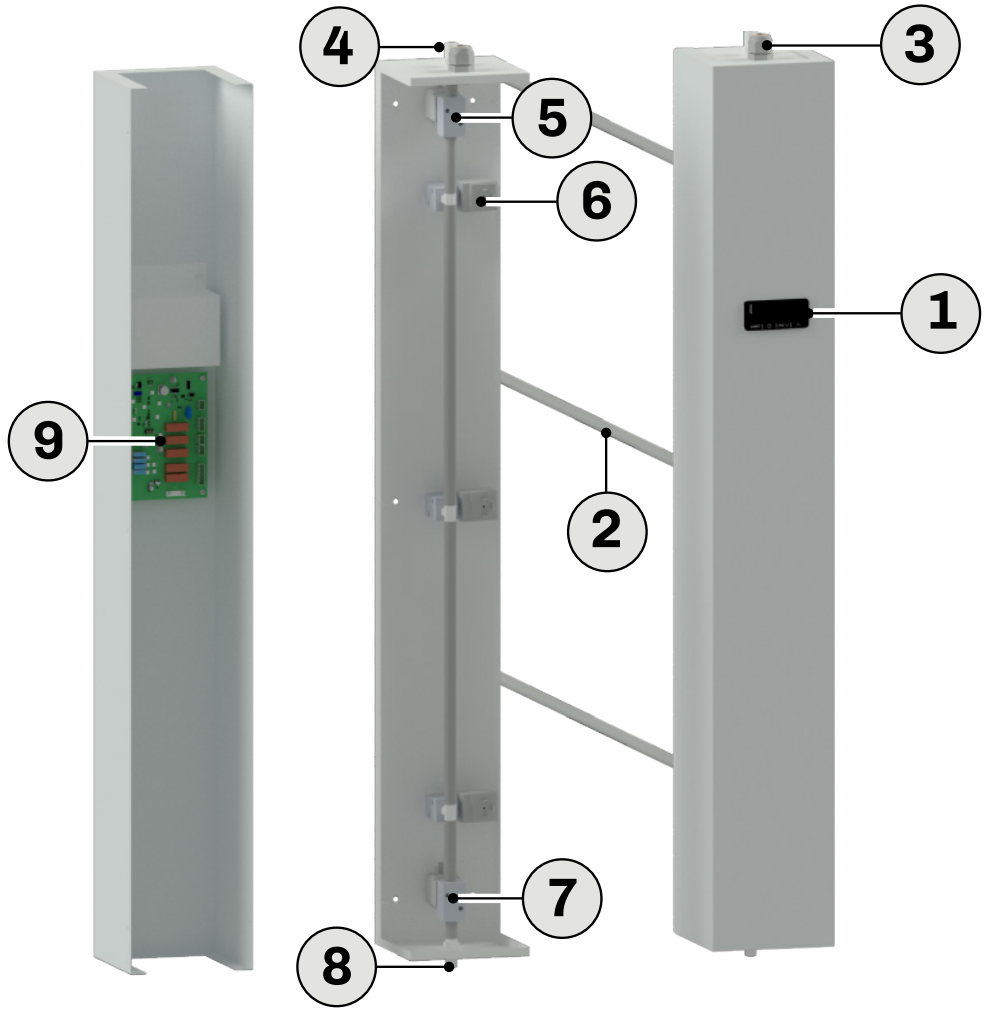


Fig. 2. *Distribution rack overview*

Reference	Description	Reference	Description
①	LED user interface	⑥	High-pressure solenoid valve, throttling
②	Distribution branches	⑦	High-pressure solenoid valve, rack outlet
③	Cable gland for power/signal wiring entry	⑧	1/8" threaded pipe for connection to the outlet
④	Rack water filling inlet	⑨	Distribution rack control board
⑤	High-pressure solenoid valve, rack inlet		

1.3 Main features

- Adiabatic humidifier with low energy consumption;
- Rack provided with number of nozzles to suit required capacity;
- Operation with demineralised water;
- Humidity production range (60...840 l/h);
- VDI6022-1 certification (downloadable here or from the website www.elsteam.it/download);
- An EVCO inverter provides variable speed control;
- Distribution system in the AHU or room;
- Choice of nozzles to suit the required capacity and size of the AHU (4 l/h or 8 l/h);
- Constant pressure of 80 bar regardless of the number of nozzles;
- Minute particle production (15 µm);
- **Stainless steel pumping system;**
- EVCO control with **EPcolor** interface on the pump unit and EVCO control with **EV3** interface on the distribution rack;
- Pump control with real-time display of operating parameters.

1.3.1 Electronic control features

- Proportional microprocessor control of humidity production:
  - High efficiency;
  - Rapid response to changes in requirements;
  - Precise production control.
- Operating status indication via 3.5" glass TFT graphic display:
  - Continuous monitoring of the operating status;
  - Automatic malfunction analysis;
  - Clear, advanced diagnostics;
  - Can be connected to supervision systems via Modbus.

1.4 Applications

The **EHPN** series can be used in various applications including:

- Air treatment plants;
  - Hospital environments where sterile steam is not required;
  - Industries;
- Direct room humidification;
  - Storage cells;
  - Post sorting centres;
  - Meat, fish and food processing environments that require controlled humidity;
- Retail settings;
- Industrial processes, such as paper processing, engineering yarns, bricks, plant fibre products, medical 3D printing processes, etc.;
- Electronic production, coating systems, etc.;
- Applications that require low electrostatic charges;
- Applications that require low dust levels.

1.5 Available models

1.5.1 Pump unit

P/n	Name	Description
EHPN060M2DW	EHPN 060	High-pressure humidifier, 60 l/h, 230 Vac single-phase, demineralised water.
EHPN120M2DW	EHPN 120	High-pressure humidifier, 120 l/h, 230 Vac single-phase, demineralised water.
EHPN180M2DW	EHPN 180	High-pressure humidifier, 180 l/h, 230 Vac single-phase, demineralised water.
EHPN240M2DW	EHPN 240	High-pressure humidifier, 240 l/h, 230 Vac single-phase, demineralised water.
EHPN300M2DW	EHPN 300	High-pressure humidifier, 300 l/h, 230 Vac single-phase, demineralised water.
EHPN420M2DW	EHPN 420	High-pressure humidifier, 420 l/h, 230 Vac single-phase, demineralised water.
EHPN540M2DW	EHPN 540	High-pressure humidifier, 540 l/h, 230 Vac single-phase, demineralised water.
EHPN660M2DW	EHPN 660	High-pressure humidifier, 660 l/h, 230 Vac single-phase, demineralised water.
EHPN840M2DW	EHPN 840	High-pressure humidifier, 840 l/h, 230 Vac single-phase, demineralised water.

1.5.2 Distribution rack

P/n	Name	Description
EHPDxxxyRK0800w	EHPD 800	Customisable distribution rack (see key), H = 800 mm.
EHPDxxxyRK1000w	EHPD 1000	Customisable distribution rack (see key), H = 1000 mm.
EHPDxxxyRK1200w	EHPD 1200	Customisable distribution rack (see key), H = 1200 mm.
EHPD CUSTOM	EHPD XXXX	Customisable distribution rack, H = Customisable.

P/n key
xxx = Number of nozzles (210 nozzles maximum for 840 l/h model with 4 l/h nozzles)
y = Nozzle capacity (4 l/h or 8 l/h)
w = Number of branches or steps

Example p/n: EHPD**0184**RACK**12003**

018 = Number of nozzles (18 nozzles)
4 = Nozzle capacity (4 l/h)
1200 = Rack height (1200 mm)
3 = Number of branches or steps (3 branches)

1.6 Accessories

The following accessories for use with **EHPN** series immersed electrode humidifiers are available:

P/n	Description
EHDE01	Droplet separator, 760x760x70 mm
EHDE02	Droplet separator, 608x608x70 mm
EHDE03	Droplet separator, 456x456x70 mm
EHDE04O	Droplet separator, 760x608x70 mm
EHDE05O	Droplet separator, 760x456x70 mm
EHDE06O	Droplet separator, 608x456x70 mm
EHDE04V	Droplet separator, 608x760x70 mm
EHDE05V	Droplet separator, 456x760x70 mm
EHDE06V	Droplet separator, 456x608x70 mm
EHPNFILT	Water inlet filter, 5-1 µm
EHPNK03	Technopolymer unit/rack water inlet pipe, L = 2 m
EHPNK04	Technopolymer unit/rack water inlet pipe, L = 3 m
EHPNK05	Technopolymer unit/rack water inlet pipe, L = 5 m
EHPNK06	Technopolymer unit/rack water inlet pipe, L = 10 m
EHPNK07	Technopolymer unit/rack water inlet pipe, L = 15 m
EHPNK13	Stainless steel unit/rack water inlet pipe, L = 2 m

P/n	Description
EHPNK14	Stainless steel unit/rack water inlet pipe, L = 3 m
EHPNK15	Stainless steel unit/rack water inlet pipe, L = 5 m
EHPNK16	Stainless steel unit/rack water inlet pipe, L = 10 m
EHPNK17	Stainless steel unit/rack water inlet pipe, L = 15 m
EHPNK18	3/8G T connection kit for multirack water filling
EHRO200	Reverse osmosys system 200 L/H
EHRO300	Reverse osmosys system 300 L/H
EHRO400	Reverse osmosys system 400 L/H
EHAC100	Vertical expansion tank for autoclave 100 L
EHAC200	Vertical expansion tank for autoclave 200 L
EHKDA25	Antiscalant dosing system and additive kit (25 kg)
EHUV300	Uv disinfection system UV 300 L/H
EHUV600	Uv disinfection system UV 600 L/H
0016020016	Telescopic support for **EHPN** rack distribution branches
EVIF25TW4X0001	EVlink TTL/Wi-Fi + RTC 12-30Vdc

Illustrations of some accessories are shown below.

1.6.1 Droplet separator

The customer is responsible for installing a droplet separator. An optional ELSTEAM droplet separator is available for the **EHPN** humidifier.

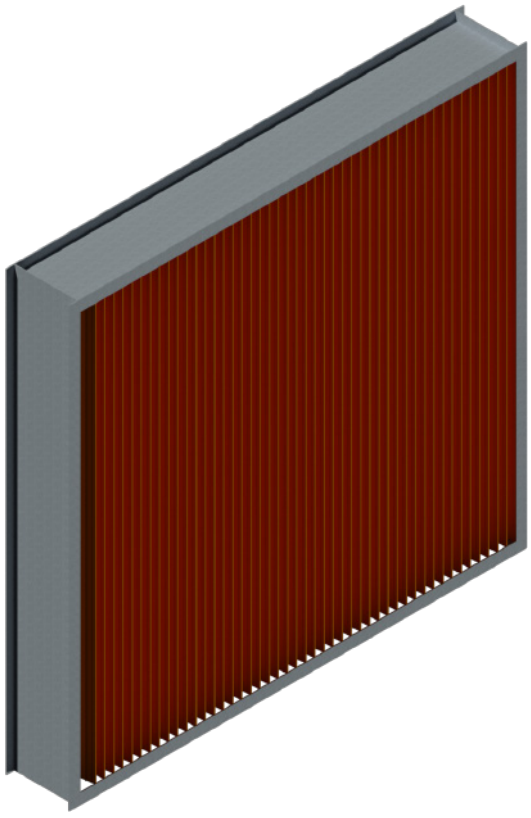


Fig. 3. *Droplet separator*

NOTE: The droplet eliminator of the humidifying system **EHPN** was not intended to be cleaned. After exceeding its lifetime, the droplet separator must have been replaced.

1.6.2 Reverse osmosis system (example)

The image is provided for illustrative purposes only and may differ from the product itself.

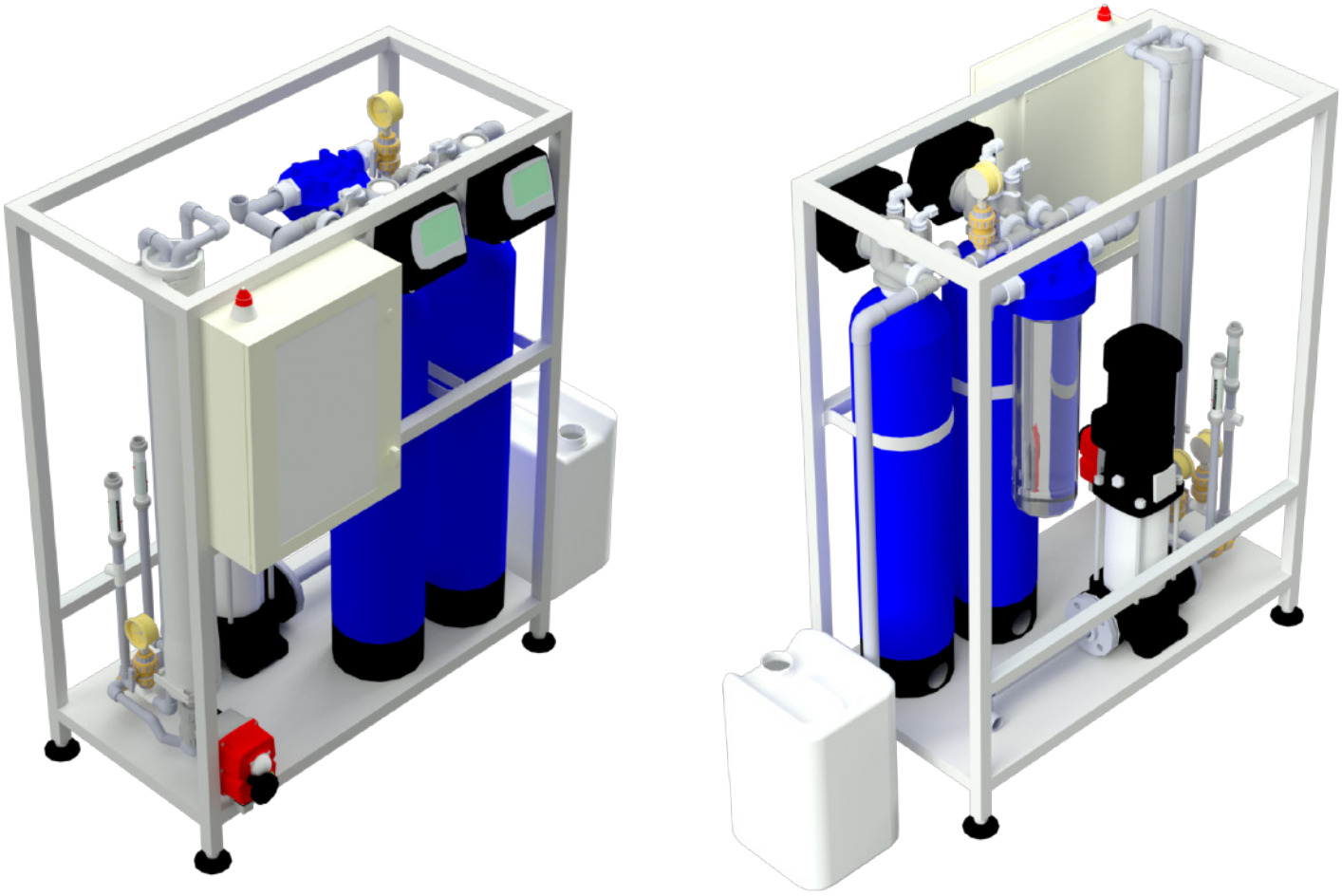


Fig. 4. *Reverse osmosis system (example)*

In order to ensure correct sizing to meet your requirements, you can contact ELSTEAM, which will work together with a partner to propose an appropriate water treatment system.

1.6.3 Antiscalant dosing kit

Fig. 5. *Antiscalant dosing kit*

1.6.4 UV lamp

Fig. 6. *UV lamp*

1.6.5 Telescopic support for EHPN rack distribution branches

Fig. 7. *Telescopic support for EHPN rack distribution branches*

2. TECHNICAL DATA

Chapter content

This chapter contains the following information:

2.1 Technical specifications

Description	M.U.	EHPN 060	EHPN 120	EHPN 180	EHPN 240	EHPN 300	EHPN 420	EHPN 540	EHPN 660	EHPN 840
Steam production										
Production capacity:	l/h	60	120	180	240	300	420	540	660	840
Electrical properties										
Power absorbed:	kW	1.5	1.5	1.5	1.5	1.5	1.5	2.2	2.2	2.2
Power supply:	V, Hz	230 Vac 50/60Hz								
Single phase/three phase:	Ph	Single-phase								
Water properties										
Supply water quality:	---	See section ***"WATER SPECIFICATIONS" ON PAGE 33***								
Supply water conductivity:	µS*cm	0...100								
Supply water hardness:	°f	0...5								
Minimum inlet flow rate:	l/min	***2x*** production capacity								
Supply water temperature	°C (°F)	4...50 (39.2..122)								
Supply water pressure:	MPa (bar)	0.05...0.4 (0.5...4)								
Water outlet pressure:	MPa (bar)	8 (80)								
Supply water connection:	---	M3/4 G								
General specifications										
Dimensions:	mm (in.)	See section ***"4.1 DIMENSIONS" ON PAGE 22***								
Weight (pump unit):	kg	44								
IP protection level of the pump unit:	---	IP20								
IP protection level of the distribution rack:	---	IP40								
Maximum installation altitude:	m (ft.)	2000 (6561.6)								
Ambient conditions of the pump unit										
Ambient operating conditions:	°C (°F), %	1...40 (33.8...104), 10...80% non-condensing								
Transportation and storage conditions:	°C (°F), %	-10...70 (14...185), 5...95% non-condensing								
Ambient conditions of the distribution rack										
Ambient operating conditions:	°C (°F), %	-10...40 (14...104), 10...80% non-condensing								
Transportation and storage conditions:	°C (°F), %	-20...70 (-4...185), 5...95% non-condensing								
Regulation										
Control type/command signal:	---	ON/OFF Proportional Probe								
Supervision/Configuration:	---	RS-485 MODBUS Supervision Wi-Fi								
Compliance										
EC:	---	Yes, with self-certification								
VDI6022-1:	---	See certificate								

NOTE: Contact the ELSTEAM sales office for further information.

3. RECEIVING THE PRODUCT

Chapter content

This chapter contains the following information:

3.1 Before you start

⚠ CAUTION

IMPROPER HANDLING

- Use all necessary personal protective equipment (PPE), such as safety gloves and shoes, while handling packaging and unpacking.
- Follow the handling instruction given in this manual and any other documentation associated with the product.
- Handle and store the product in its original packaging.
- Do not handle or store the product if the packaging is or seems to be damaged.
- Take all necessary measures to avoid damaging the product and prevent other hazards while handling or opening the packaging.

NOTICE

UNEXPECTED EQUIPMENT OPERATION

- Droppages and shocks can damage the humidifier beyond repair.
- Tampering with or removing the identification stickers invalidates the warranty.

3.2 Checking the packaging

- Make sure the packaging is intact (one package for each distribution rack and one dedicated to the pump unit);
- Make sure the humidifier is intact (both the distribution rack and the pump unit) upon delivery and inform the courier immediately, in writing, of any problems caused by careless or improper transportation (accept the package conditionally).

3.2.1 Opening the packaging

- Take the packages to the humidifier installation site;
- Open the cardboard packaging and remove any impact protection;
- Take the distribution rack and pump unit out of their packaging.

NOTE: The racks are packaged with the branches disassembled.

3.2.2 Checking the packaging contents

The product package contains:

- **EHPN** series humidifier, consisting of
  - Pump unit;
  - Distribution rack;
- Instruction sheet;
- Inverter user manual;
- Pump user manual;
- Yellow oil cap on the pump (vented) to be used for operation; replace with the red one for transport only.
- Hexagonal key to open the pump unit.

4. DIMENSIONS AND MECHANICAL ASSEMBLY

Chapter content

This chapter contains the following information:

4.1 Dimensions

4.1.1 Pump unit

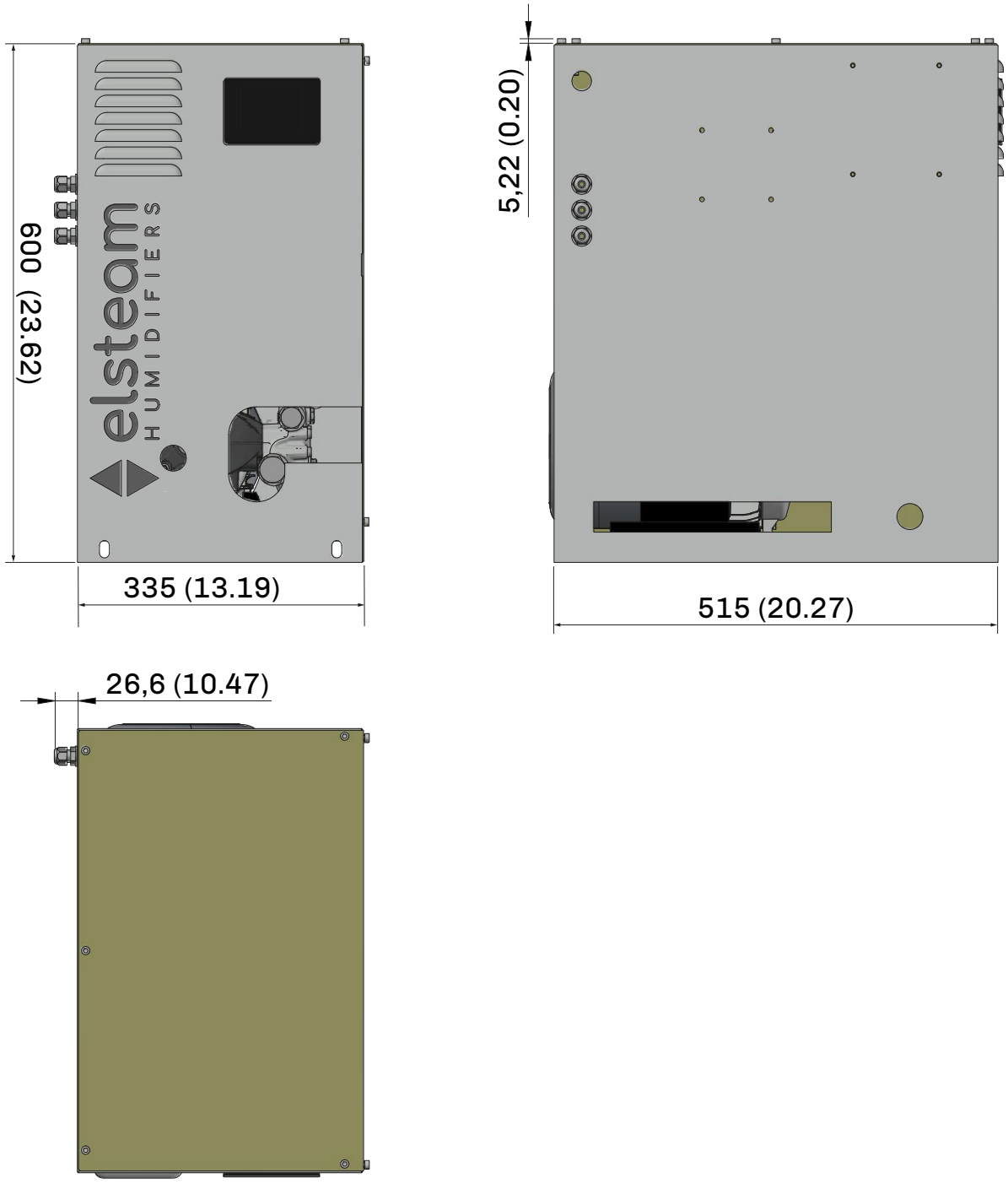


Fig. 8. *Pump unit dimensions*

4.1.2 Distribution rack

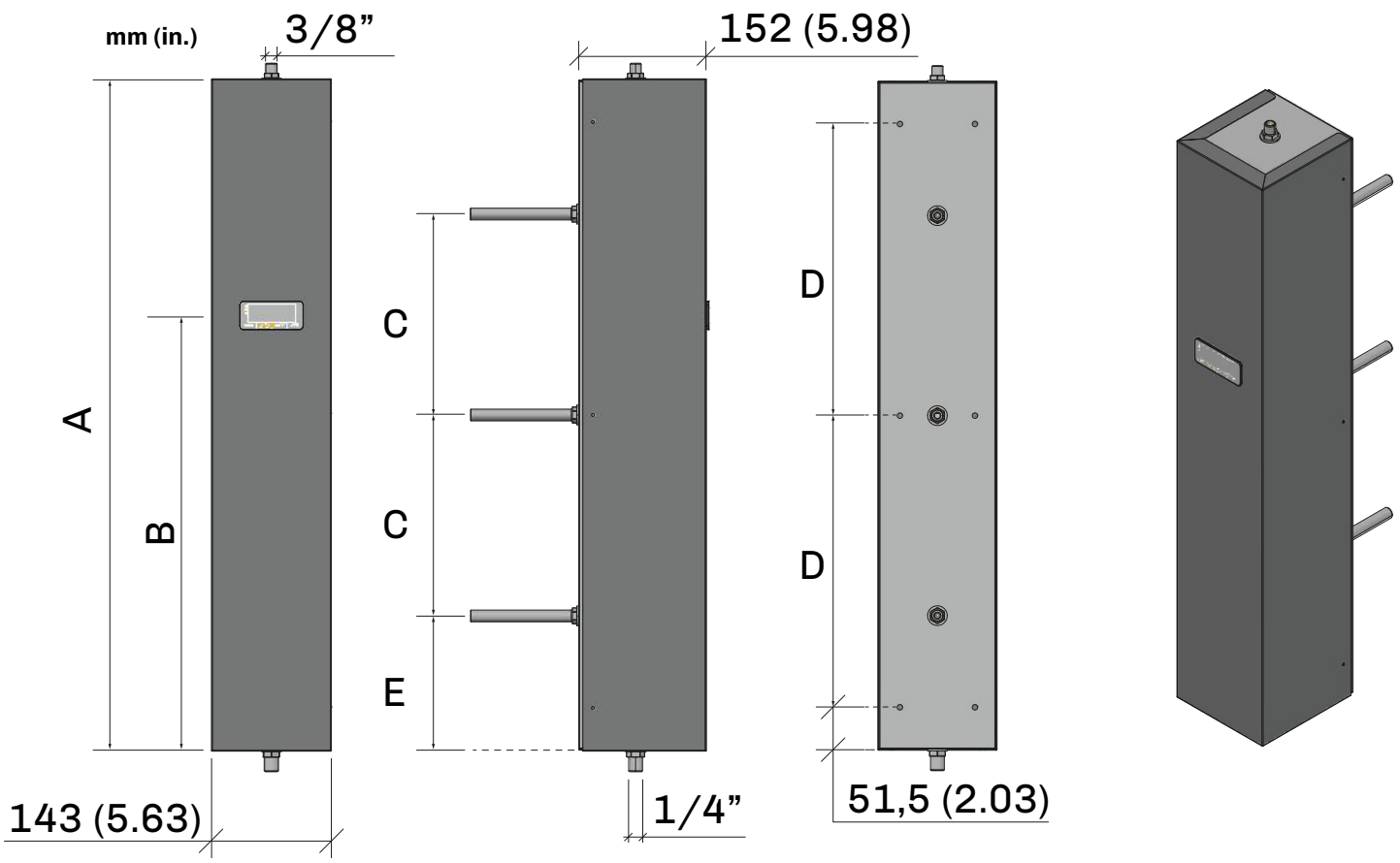


Fig. 9. *Distribution rack dimensions*

Dimensions [mm (ft.)]

Models	A	B	C	D	E
Rack 0800	803 (2.63)	520.5 (1.70)	240 (0.79)	350 (1.15)	161.5 (0.53)
Rack 1000	1003 (3.29)	720.5 (2.36)	340 (1.11)	450 (1.47)	161.5 (0.52)
Rack 1200	1203 (3.95)	920.5 (3.02)	460 (1.51)	550 (1.80)	141.5 (0.46)

NOTE: Other configurations are available on request, depending on the number of branches to be managed (up to a maximum of 7). Contact the Elsteam sales office.

4.2 Installing the pump unit

4.2.1 Installation instructions

When outside, always install the pump unit in a covered box.

⚠ DANGER

RISK OF ELECTRIC SHOCK, EXPLOSION OR ELECTRIC ARC

- Protect the humidifier properly from water and dust.
- Install the humidifier in a covered box, observing the minimum installation distances.
- Make sure the humidifier is protected properly from water and dust.

Installation example

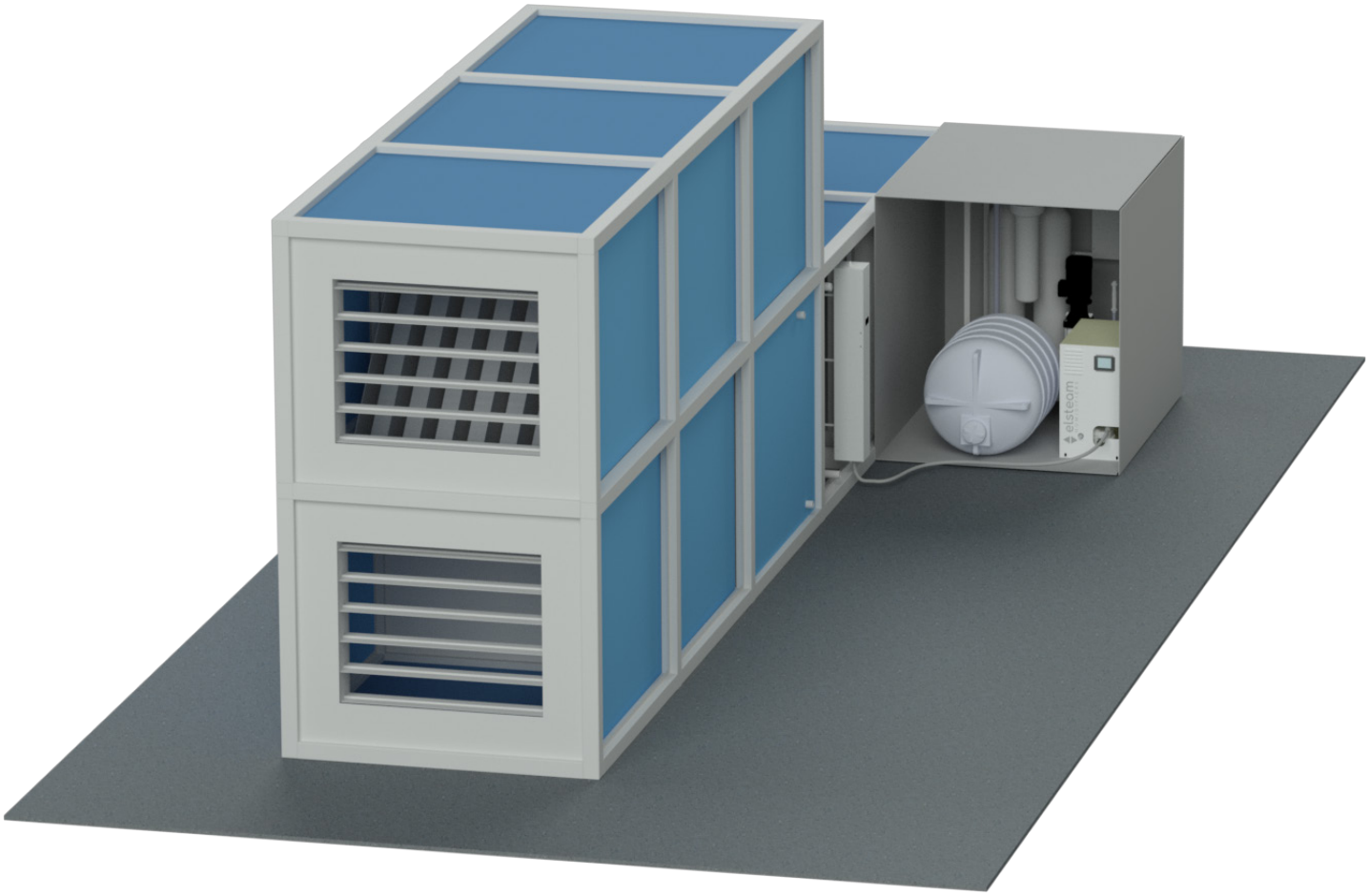


Fig. 10. *Installing the pump unit*

4.2.2 Minimum installation distances

mm (in.)

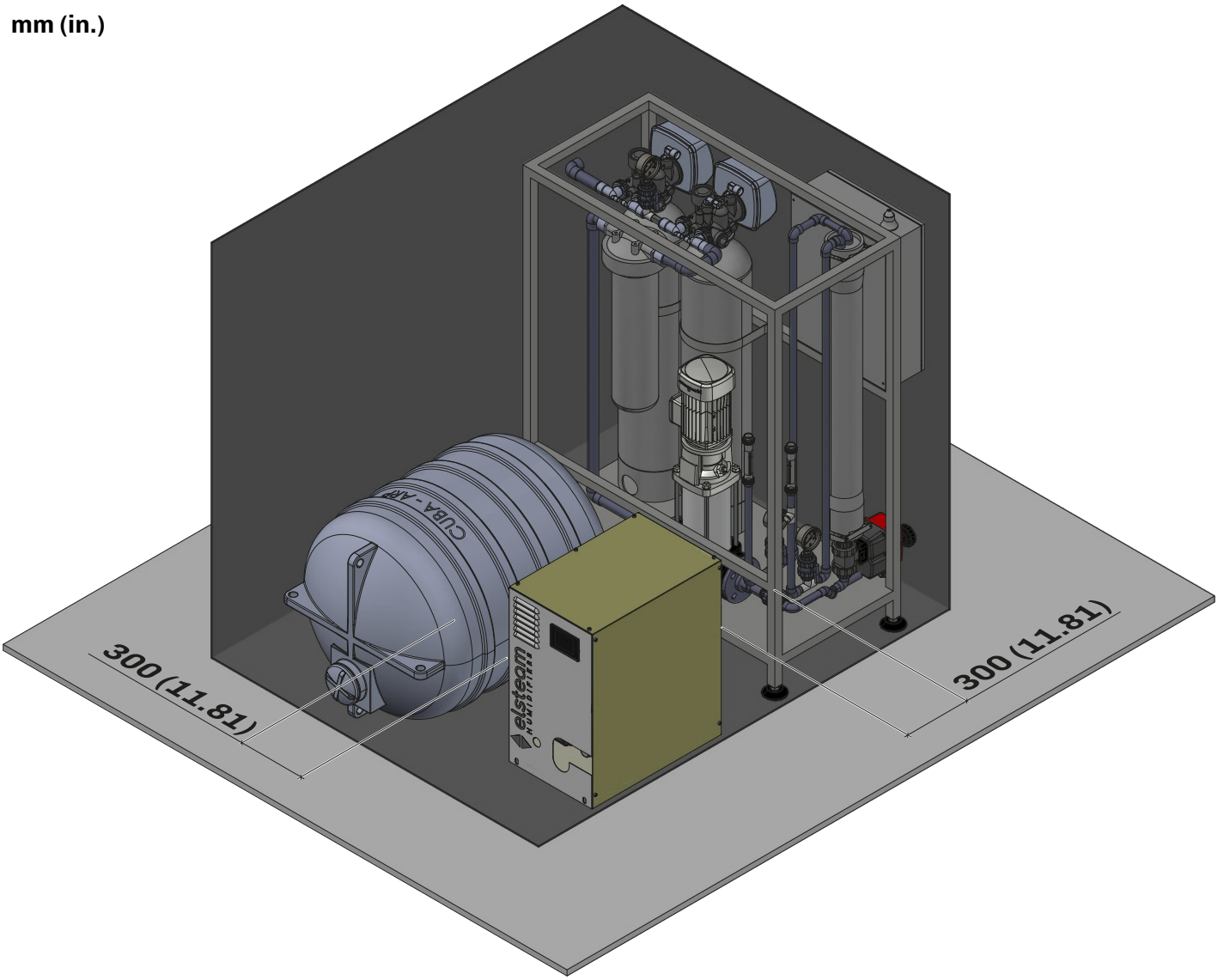


Fig. 11. *Minimum installation distances*

4.3 Installing the distribution rack

⚠⚠ DANGER

RISK OF ELECTRIC SHOCK, EXPLOSION OR ELECTRIC ARC

Make sure there is an effective earth connection.

4.3.1 Installation instructions

- Undo the screws on the top and bottom faces to open the distribution rack;
- Drill holes in the wall, depending on the number of branches (3 or 7 maximum);
- Insert the retaining inserts for the distribution rack branches in the wall of the AHU;
- Secure the distribution rack to the wall with 6 self-tapping screws;
- Tighten the screws on the top and bottom faces to close the distribution rack.

NOTICE

FAULTY INSTALLATION

- Install the rack to the highest standards.
- Make sure the distribution rack is secured properly to the wall on which it is installed.
- Install the distribution rack in such a way that it is protected properly from water and the weather (IP40).

Fig. 12. *Installing the distribution rack*

When using branches that are so long they bend, you can use the following accessory:

P/n	Description
0016020016	Telescopic support for **EHPN** rack distribution branches

to prevent unexpected operation and/or mechanical faults and to give the branches a slope of 0.2...1° so that they drain fully.

4.3.2 Installation position

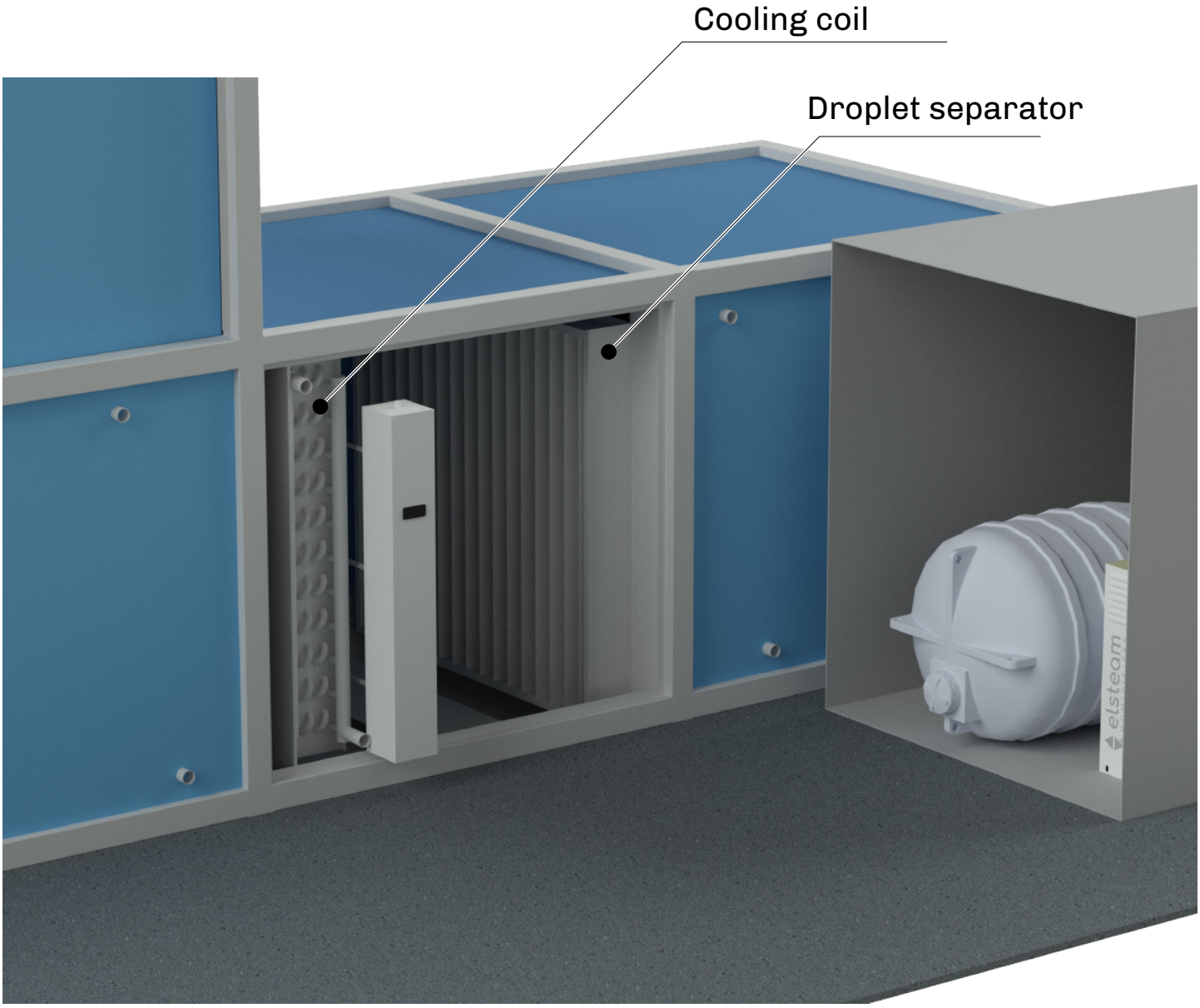


Fig. 13. *Installation position*

4.3.3 Minimum installation dimensions

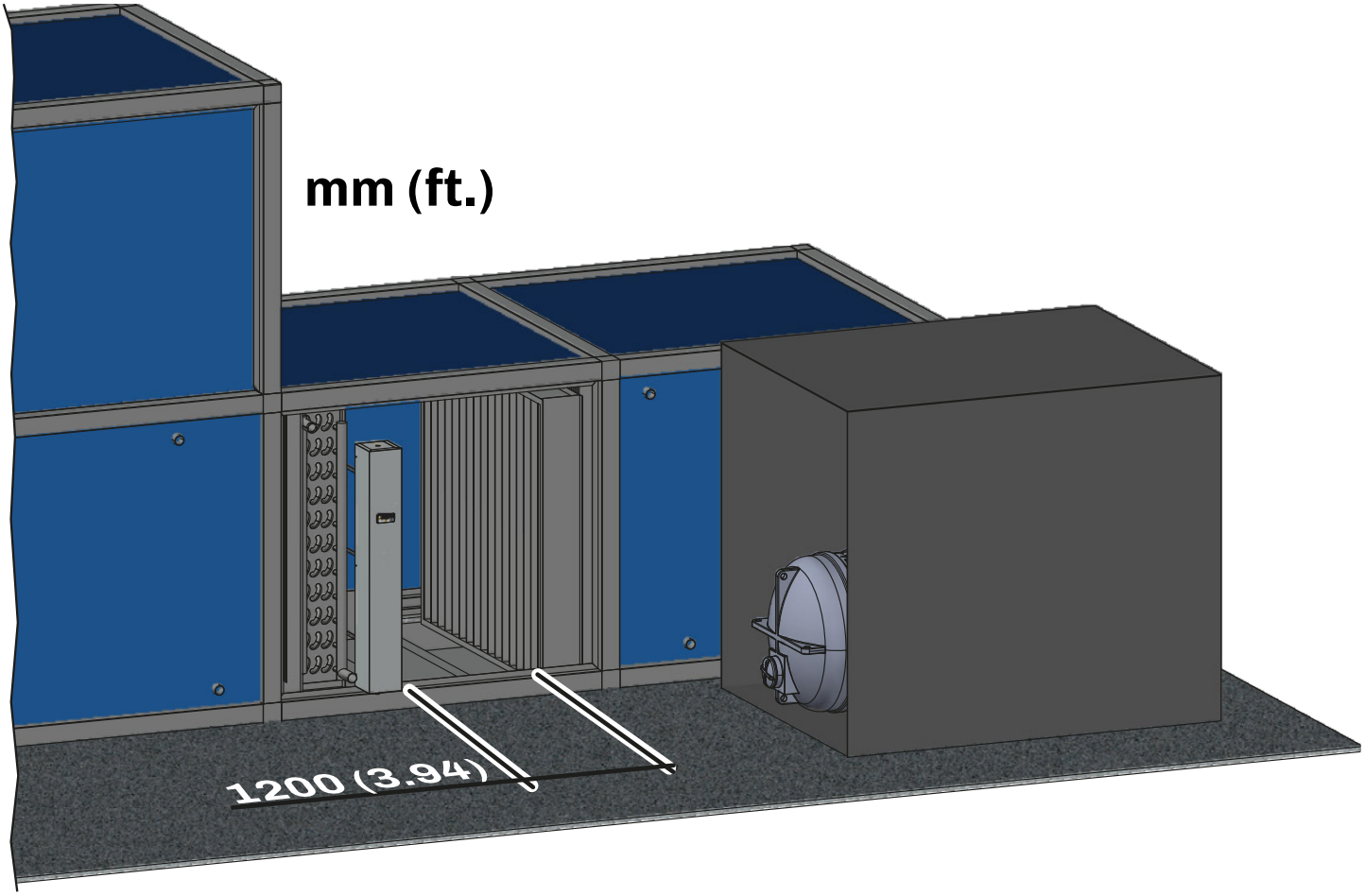


Fig. 14. *Minimum installation distances*

With distances below those specified, the moisture absorption efficiency of the air is lower, resulting in increased condensation and drainage from the droplet separator.

4.3.4 Branch slope

To drain the water fully, the distribution rack branches must have a slope of 0.2...1° (3 mm per metre).

⚠ WARNING

BIOLOGICAL RISK

- In the event of improper use and installation, microorganisms (including the bacteria that cause Legionellosis) may proliferate and be transferred into the air treatment system after the humidifier has been shut down for a long time.
- The humidifier must be used properly and be maintained and cleaned properly at prescribed intervals, as described in the ***MAINTENANCE*** chapter.

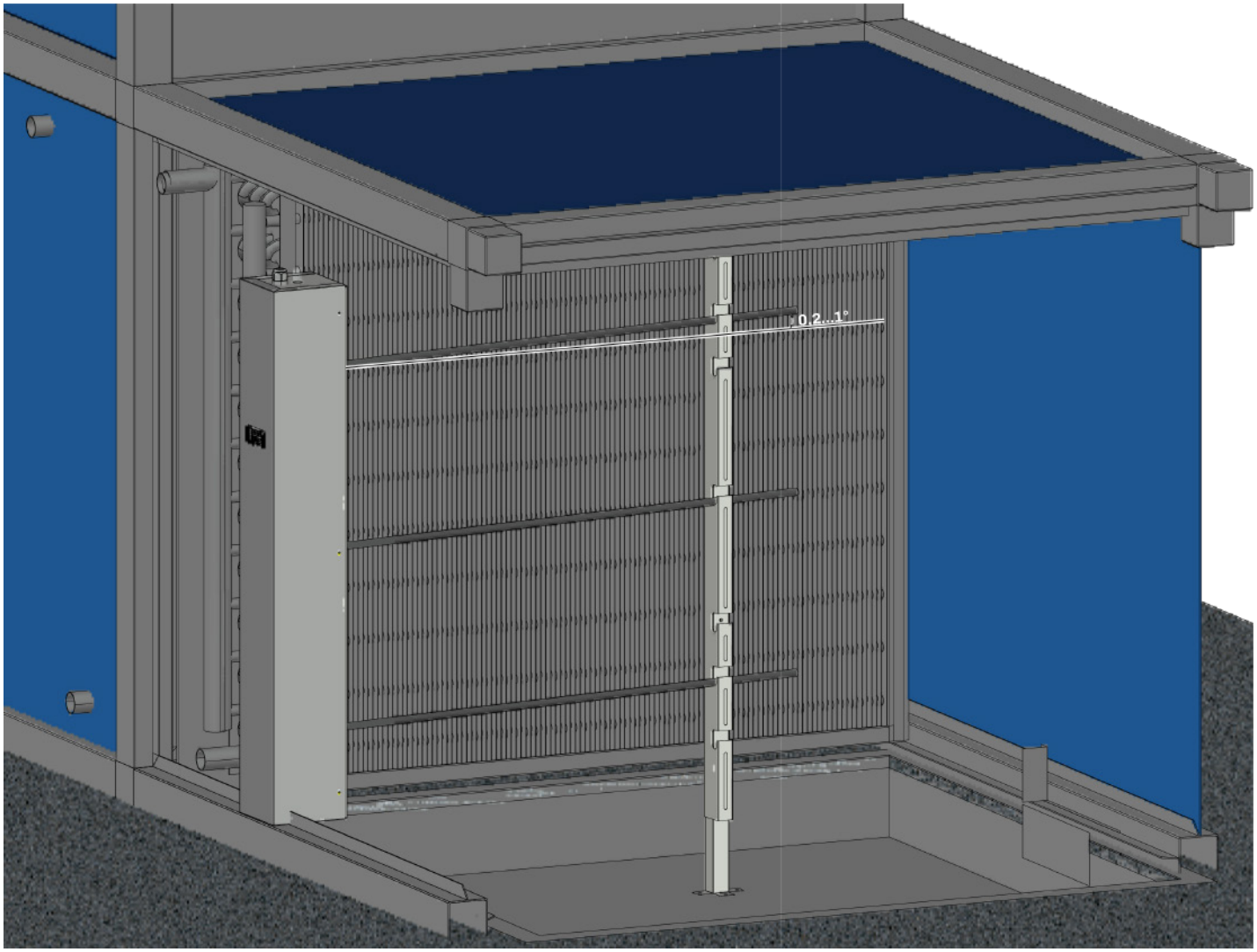


Fig. 15. *Distribution rack branch slope*

5. INSTALLING THE PLUMBING

Chapter content

This chapter contains the following information:

5.1 Plumbing composition of the pump unit

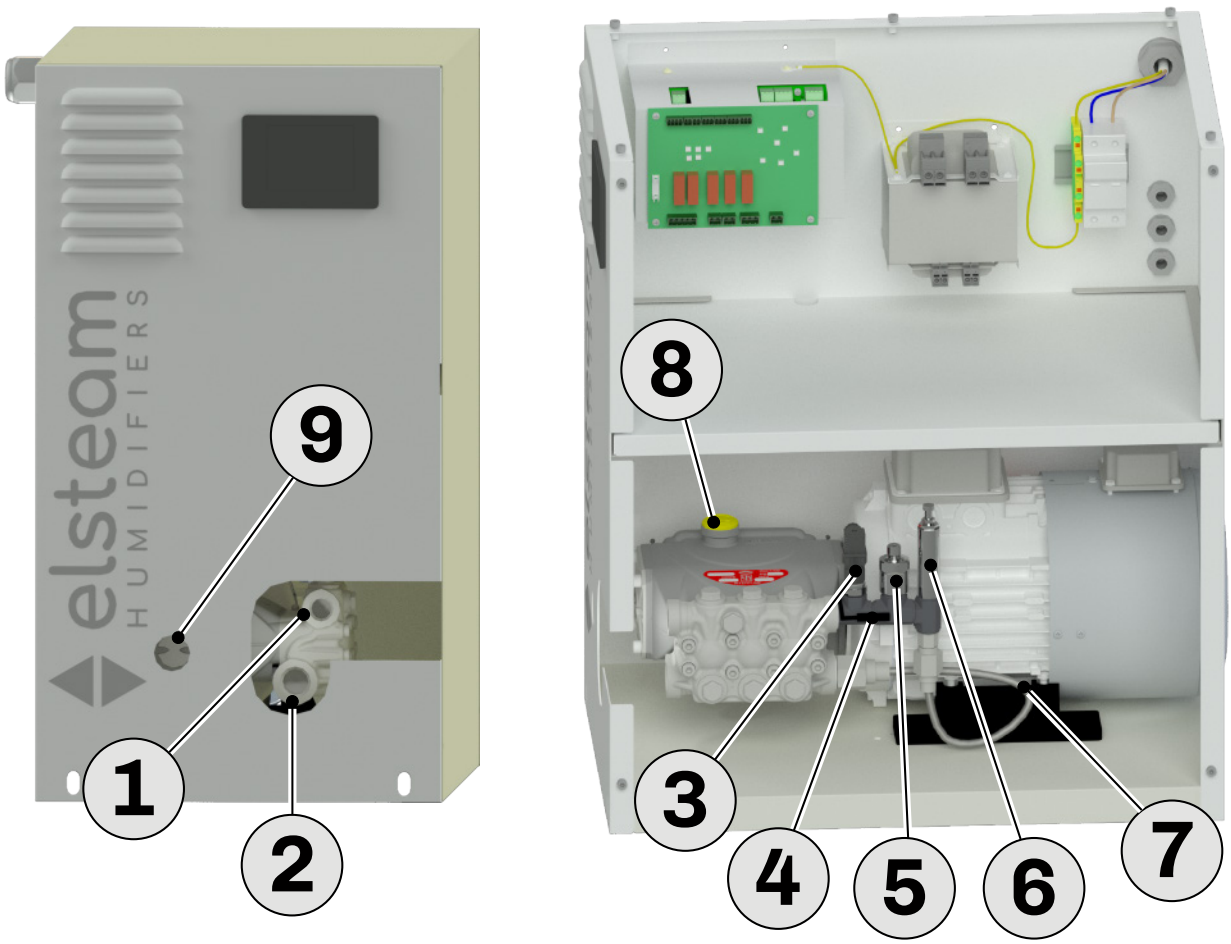


Fig. 16. *Plumbing overview*

Reference	Description
①	3/8" G water outlet to the distribution rack
②	3/4" G water inlet
③	Pressure transducer
④	NTC pump temperature probe
⑤	Maximum pressure switch

Reference	Description
⑥	Safety valve
⑦	Bypass valve hose
⑧	Yellow oil cap with dipstick
⑨	Inspection hole for visual oil level check

5.2 Plumbing composition of the distribution rack

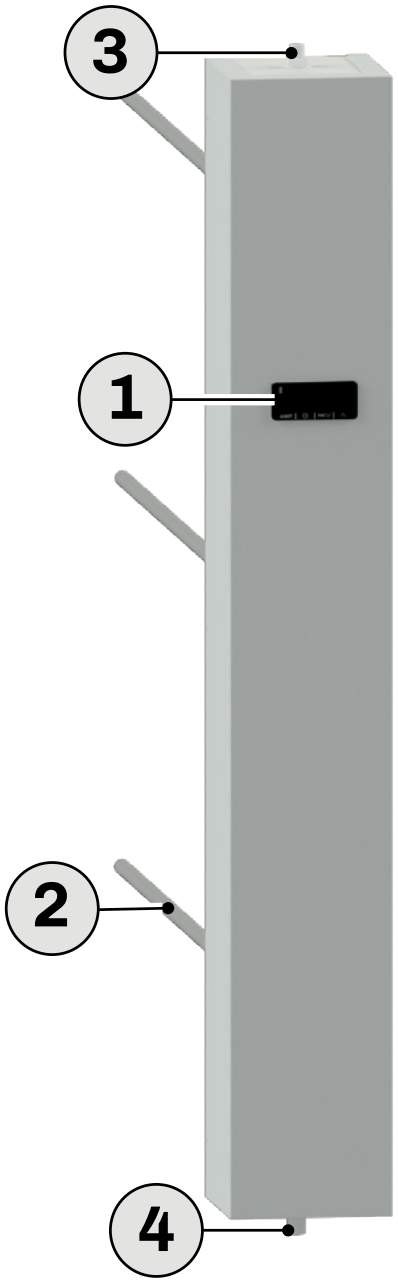


Fig. 17. *Plumbing overview*

Reference	Description	Reference	Description
①	LED user interface	③	3/8" G water inlet from the pump unit
②	Distribution branches	④	1/8" G water drain outlet

5.3 Installing the plumbing

To install the plumbing correctly, provide the following outside the AHU, in the immediate vicinity of the pump unit:

- A shut-off tap;
- A filter supplementing the one already present inside the solenoid valve;
- A pressure reducer if the mains pressure exceeds 0.4 MPa (4 bar).

If using metal pipes, make sure they are properly earthed.
Do not use pre-existing system pipework or used materials. Only use the materials supplied with the product.

NOTE: When using a pressure reducer, make sure it is effective and does not significantly reduce the flow rate. The minimum flow rate must be at least twice the maximum consumption of the humidification systems.

The pressure must be no less than 0.05 MPa (0.5 bar).

Example:
***EHPN060** humidifier with maximum humidity of 60 l/h (i.e. **1 l/min**)*
*Minimum inlet flow rate = maximum humidification 1 l/min x 2 = **2 l/m**.*

Heating cables are used on both the supply pipe upstream of the pump unit, the connection pipe from the pump unit to the rack, and the distribution rack outlet pipe.

NOTICE

MALFUNCTIONING OF THE EQUIPMENT

- The water supply must have a minimum pressure of 0.02 MPa (0.2 bar).
- Connect the pump inlet to the mains using the hose supplied in order to reduce water hammer in the water supply to the humidifier.
- If the AHU is exposed to atmospheric agents, fit heating cables to the water supply and discharge pipes.

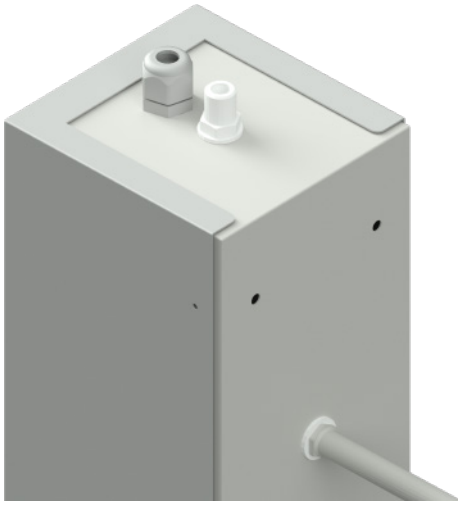


***Fig. 18.** Water inlet connection*

Water specifications

General specifications

Description	Features
Water pressure	0.05...0.4 MPa (0.5...4) bar)
Water temperature	4...50 °C (39.2..122 °F)
Electrical conductivity	0...100 µS/cm (at a temperature of 20 °C (68 °F))
Total hardness	0...5 °f
Minimum supply flow rate	***2x*** production capacity (l/min)

Optimal properties

Description	Features
Water pressure	0.1...0.3 MPa
Water temperature	5...20 °C (41..68 °F)
Electrical conductivity	0...25 µS/cm (at a temperature of 20 °C (68 °F))
Total hardness	0...2 °f
Minimum supply flow rate	***2x*** production capacity (l/min)

The maintenance diagnostics are defined according to the properties specified in the paragraph ***"WATER SPECIFICATIONS" ON PAGE 33***; ELSTEAM shall not be held liable and shall not honour the *WARRANTY* if other kinds of water supply are used.

Using a water supply with different properties does not preclude proper pump operation, however, carry out maintenance at the frequencies specified in the pump operation and maintenance manual and not as specified in this manual and indicated by default on the terminal display.

Neither ELSTEAM nor any of its associates or subsidiaries shall be held responsible or liable for improper use of the information contained herein.

Supply water that is harder than specified in the paragraph ***"WATER SPECIFICATIONS" ON PAGE 33*** causes scaling and blocks the nozzles, and therefore requires more frequent maintenance and leads to an increase in malfunctions and blocking alarms.

What to do

- Let the water flow through the drain for a few hours before making the final connection.
- Check the retention status of the hydraulic circuit regularly to prevent faults and consequent water leakage into the room.
- Make sure that the distribution branches are always installed within a condensate collection tank with a drain.

NOTICE

MALFUNCTIONING OF THE EQUIPMENT

- Once the humidifier has been installed, let the remaining water in the pipes flow out to prevent the filter from becoming clogged.
- Make sure the humidifier parts are perfectly intact.
- If any of the humidifier parts are not intact, do not proceed with installation.

5.4 Water drainage system

NOTICE

MALFUNCTIONING OF THE EQUIPMENT

Size the drain pipe correctly in order to prevent blockages and clogging during automatic cleaning.

Fig. 19. *Water outlet connection*

5.5 Distribution in the AHU

⚠ WARNING

HIGH-PRESSURE WATER SYSTEM

- Always install the distribution rack so that it cannot be accessed by unqualified persons.
- Only qualified personnel may access the inside of the air handling unit (to access the distribution branches) using a tool (e.g. a spanner).

⚠ WARNING

MALFUNCTIONING OF THE EQUIPMENT

- Install the equipment in a position which ensures the minimum distances from all adjacent structures and equipment as indicated in this document.
- Install all equipment in compliance with the technical specifications indicated in the relevant documentation.

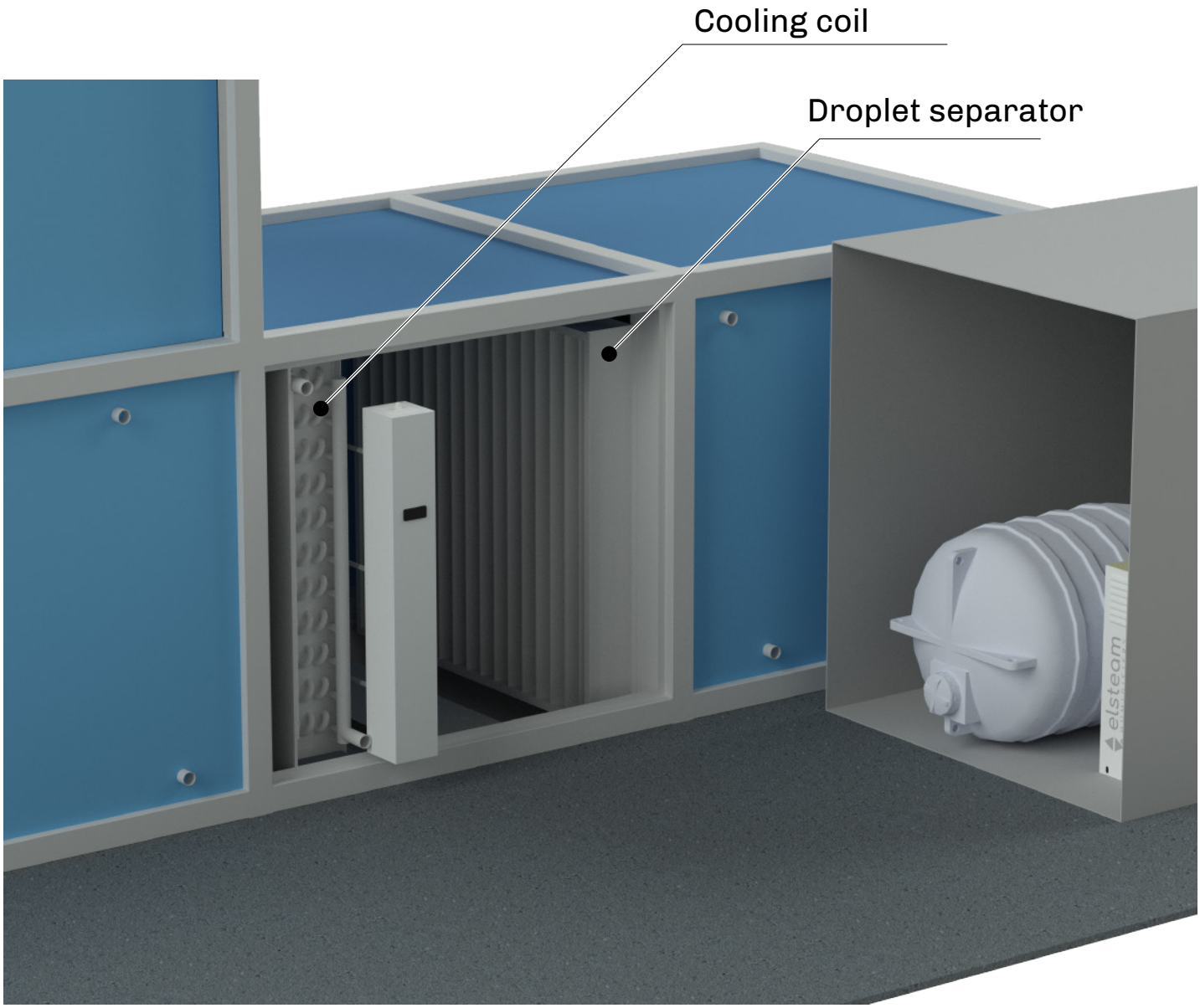


Fig. 20. *AHU installation position*

NOTE: in ambient temperature conditions which may lead to the formation of ice, it is wise to take all necessary precautions to prevent the supply water and the drain water from freezing and causing the humidifier to malfunction.

5.6 Distribution in the room

⚠ WARNING

HIGH-PRESSURE WATER SYSTEM

- Always install the distribution rack so that it cannot be accessed by unqualified persons.
- Only qualified personnel may access the inside of the air handling unit (to access the distribution branches) using a tool (e.g. a spanner).

⚠ WARNING

MALFUNCTIONING OF THE EQUIPMENT

- Install the equipment in a position which ensures the minimum distances from all adjacent structures and equipment as indicated in this document.
- Install all equipment in compliance with the technical specifications indicated in the relevant documentation.

5.6.1 Composition

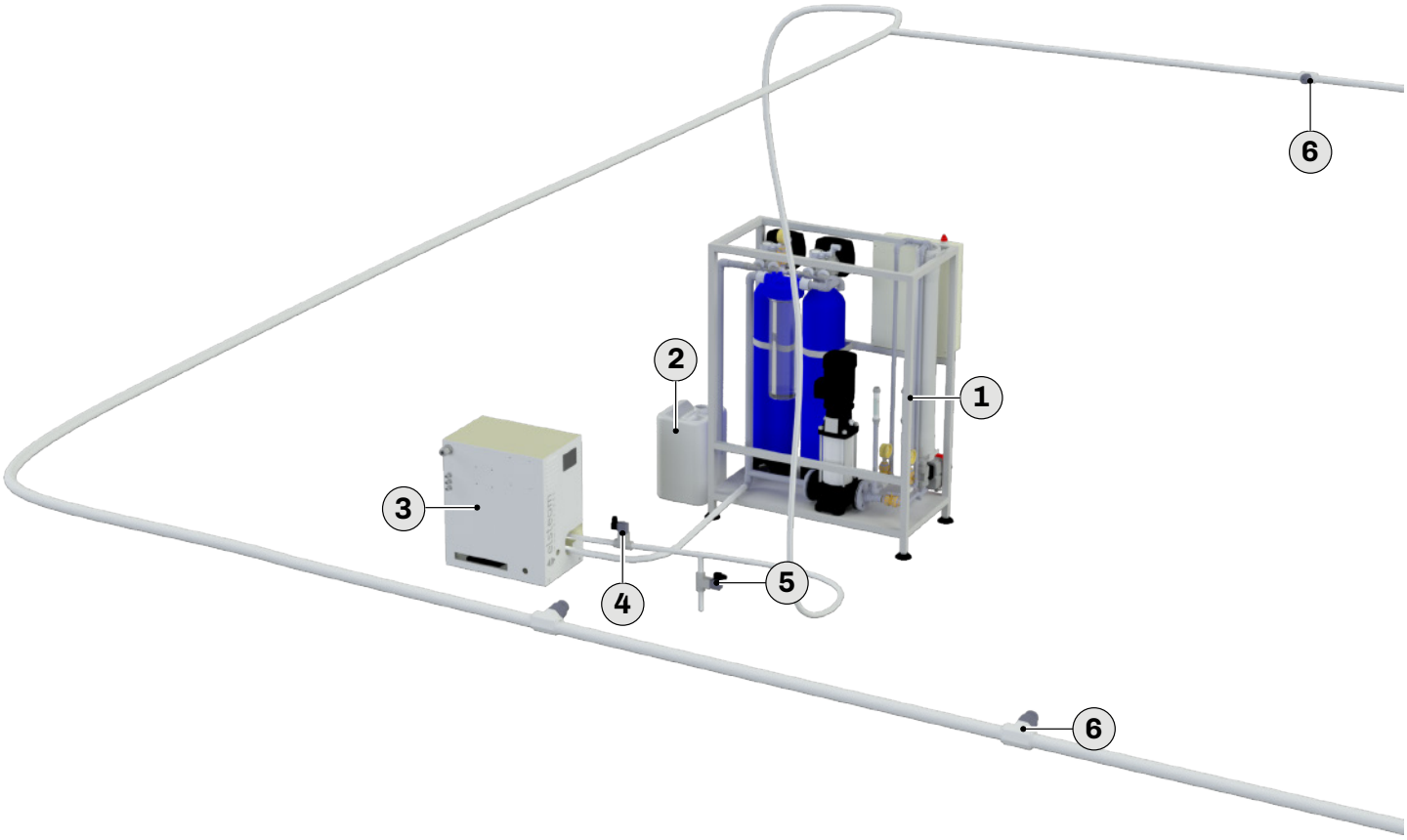


Fig. 21. *Mist distribution in the room*

Reference	Description	Reference	Description
①	Reverse osmosis water treatment system	④	Throttling solenoid valve (NC)
②	Antiscalant	⑤	Outlet solenoid valve (NO)
③	Pump unit	⑥	Distribution system

Always position the outlet solenoid valve (NO) after the throttling solenoid valve (NC), at the lowest point in the distribution line in order to prevent water stagnation. When the system stops running, the outlet solenoid valve (NO) must always ensure that the distribution line is drained fully.

5.6.2 Example

Fig. 22. *Mist distribution in the room*

6. ELECTRICAL CONNECTIONS

Chapter content

This chapter contains the following information:

6.1 Before you start

Read this manual carefully before installing the equipment.

In particular, the safety instructions, electrical requirements and current regulations for the machine or the process in which this device is involved must be observed.

The use and application of the information contained herein requires experience in the design and installation of humidification systems. Only the user, integrator or manufacturer of the machine can be familiar with all the conditions and factors which arise during installation and configuration, operation and maintenance of the machine or the process, and as such can identify the relevant automation equipment and the corresponding interlocks and safety systems which can be used effectively and appropriately. When selecting automation and control equipment and other connected equipment and software, for a particular application, you must consider all applicable local, regional and national standards and/or regulations.

⚠ ⚠ DANGER

RISK OF ELECTRIC SHOCK, EXPLOSION OR ELECTRIC ARC

- Only use electrically insulated measuring devices and equipment.
- Do not install the equipment while the power supply is connected.
- Cut off the power supply to all equipment, including any connected devices, before removing any covers or hatches, or before installing/uninstalling accessories, hardware, cables or wires.
- Provide safety interlocks (isolators) of a suitable size between the power supply and the humidifier, with a contact opening distance of at least 3 mm for each pole.
- Always use a properly calibrated Voltmeter to make sure the system is powered off.
- The maintenance, repair, installation and use of the equipment must only be entrusted to qualified personnel.
- Do not touch the unshielded components or the terminals while they are live.
- Do not disassemble, repair or modify the product.
- Do not expose the equipment to liquids or chemicals.
- Make sure there is an effective earth connection.
- Before applying voltage to the equipment:
  - Make sure all protective elements, such as covers, hatches and grilles, are fitted and/or closed using a tool (e.g. a spanner).
  - Check all wiring connections.

⚠ WARNING

MALFUNCTIONING OF THE EQUIPMENT

- Perform the wiring carefully, in compliance with electromagnetic compatibility and safety requirements.
- Carry out a full start-up test.
- Make sure the wiring is correct for the end application.
- Minimise the length of the connections as much as possible, to avoid winding the cables around electrically connected parts.
- Before applying the power supply, check all the wiring connections.
- Do not connect cables to unused terminals and/or terminals marked with the text “No connection” (N.C.).

⚠ WARNING

REGULATORY INCOMPATIBILITY

Make sure all the equipment used and systems designed conform to current local, regional and national standards.

6.2 Electrical composition of the pump unit

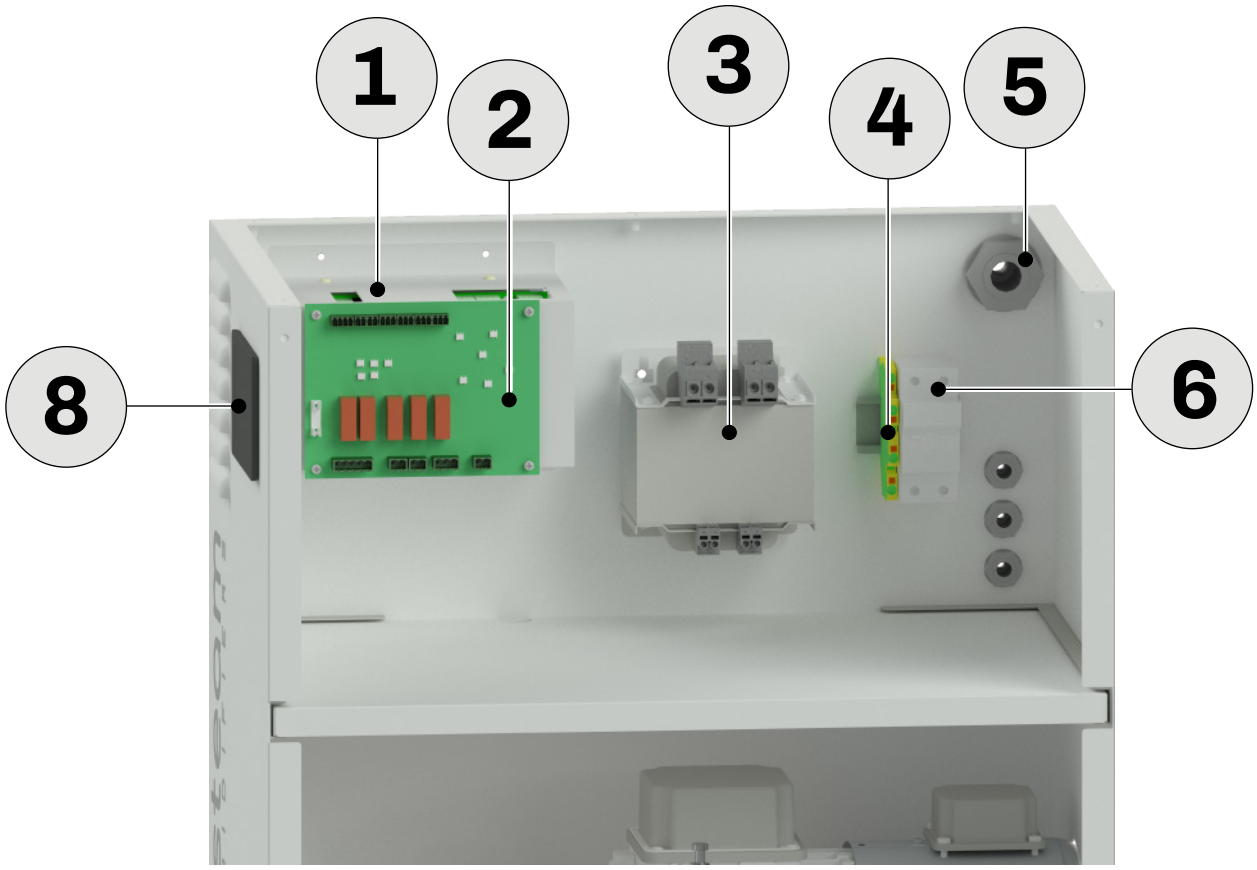


Fig. 23. *Pump unit electrical overview*

Reference	Description	Reference	Description
①	EVCO Compact series inverter	⑤	Cable gland for power wiring
②	Pump unit control board	⑥	Fuse holder base
③	230/24 Vac transformer	⑦	3 cable glands for signal wiring
④	Earth terminal	⑧	User interface, 3.5" TFT graphic display

6.3 Electrical composition of the distribution rack

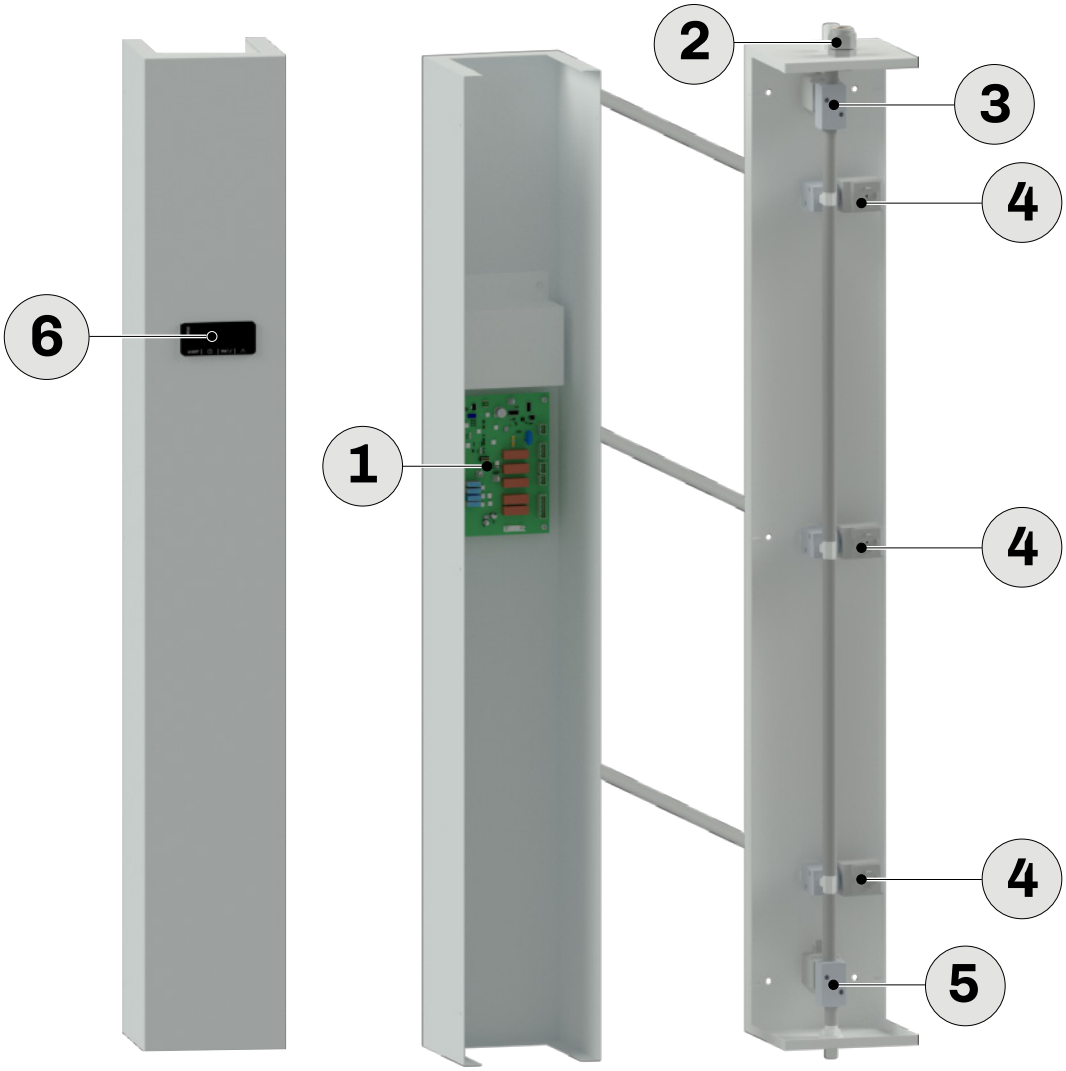


Fig. 24. *Distribution rack electrical overview*

Reference	Description	Reference	Description
①	Distribution rack control board	④	Throttling solenoid valve (NC) (branch)
②	Cable gland for power/signal wiring	⑤	Rack outlet solenoid valve (NO)
③	Rack inlet solenoid valve (NC)	⑥	LED user interface

6.4 Connection best practice

6.4.1 Wiring best practices

⚠ DANGER

RISK OF ELECTRIC SHOCK AND FIRE

- Do not install the equipment while the power supply is connected.
- Cut off the power supply to all equipment, including any connected devices, before installing/uninstalling cables or wires.
- Do not use the device with loads greater than those indicated in the technical data section.
- Do not exceed the temperature and humidity ranges indicated in the technical data section.
- Provide safety interlocks (isolators) of a suitable size between the power supply and the humidifier, with a contact opening distance of at least 3 mm for each pole.
- Only use cables with a suitable cross-section as indicated in the section “Wiring best practices”.

When wiring the humidifiers, observe the following instructions:

- Make sure the operating environment and conditions fall within the specified values.
- Use cables with the correct diameter, suited to the voltage and current requirements.
- Use double-insulated cables suitable for outdoor use (minimum requirement: H05RN-F) which also include an earth wire.

⚠ DANGER

LOOSE WIRING CAUSES ELECTRIC SHOCKS AND OVERHEATING

Tighten the connections in compliance with the technical specifications relating to tightening torques.

⚠ WARNING

MALFUNCTIONING OF THE EQUIPMENT

- Perform the wiring carefully, in compliance with electromagnetic compatibility and safety requirements.
- Carry out a full start-up test.
- Make sure the wiring is correct for the end application.
- Minimise the length of the connections as much as possible, to avoid winding the cables around electrically connected parts.
- Before applying the power supply, check all the wiring connections.
- Do not connect cables to unused terminals and/or terminals marked with the text “No connection” (N.C.).

⚠ WARNING

REGULATORY INCOMPATIBILITY

Make sure all the equipment used and systems designed conform to current local, regional and national standards.

Suitable wiring for power supply (at the fuse holder)

Step 17.8 mm (0.70 in.)

mm / in. 7 / 0.28			
mm²	4	4	4
AWG	10	10	10
no. of conductors	2		

Ø 3.5 mm (0.14 in.)		N•m	2,5
		lb-in	22.12

Fig. 25. *Suitable wiring for power supply (at the fuse holder)*

Suitable wiring for the power cables

Step 5.08 mm (0.199 in.)

mm / in. 7 / 0.28								
mm²	0.2…2.5	0.2…2.5	0.25…2.5	0.25…2.5	2 x 0.2…1	2 x 0.2…1.5	2 x 0.25…1	2 x 0.5…1.5
AWG	24…14	24…14	22…14	22…14	2 x 24…18	2 x 24…16	2 x 22…18	2 x 20…16

Ø 3.5 mm (0.14 in.)		N•m	0.5…0.6
		lb-in	4.42…5.31

Fig. 26. *Suitable wiring for the power cables*

Suitable wiring for I/O SELV

Step 3.5 mm (0.137 in.)

mm / in. 7 / 0.28								
mm²	0.14…1.5	0.14…1.5	0.25…1.5	0.25…0.5	2 x 0.08…0.5	2 x 0.08…0.5	2 x 0.25…0.34	2 x 0.5…0.5
AWG	25…15	25…15	22…15	22…20	2 x 28…20	2 x 28…20	2 x 23…21	2 x 20…20

Ø 3.5 mm (0.14 in.)		N•m	0.5…0.6
		lb-in	4.42…5.31

Fig. 27. *Suitable wiring for I/O SELV*

6.4.2 Cable glands and cable routing

6.4.3 Pump unit cable glands

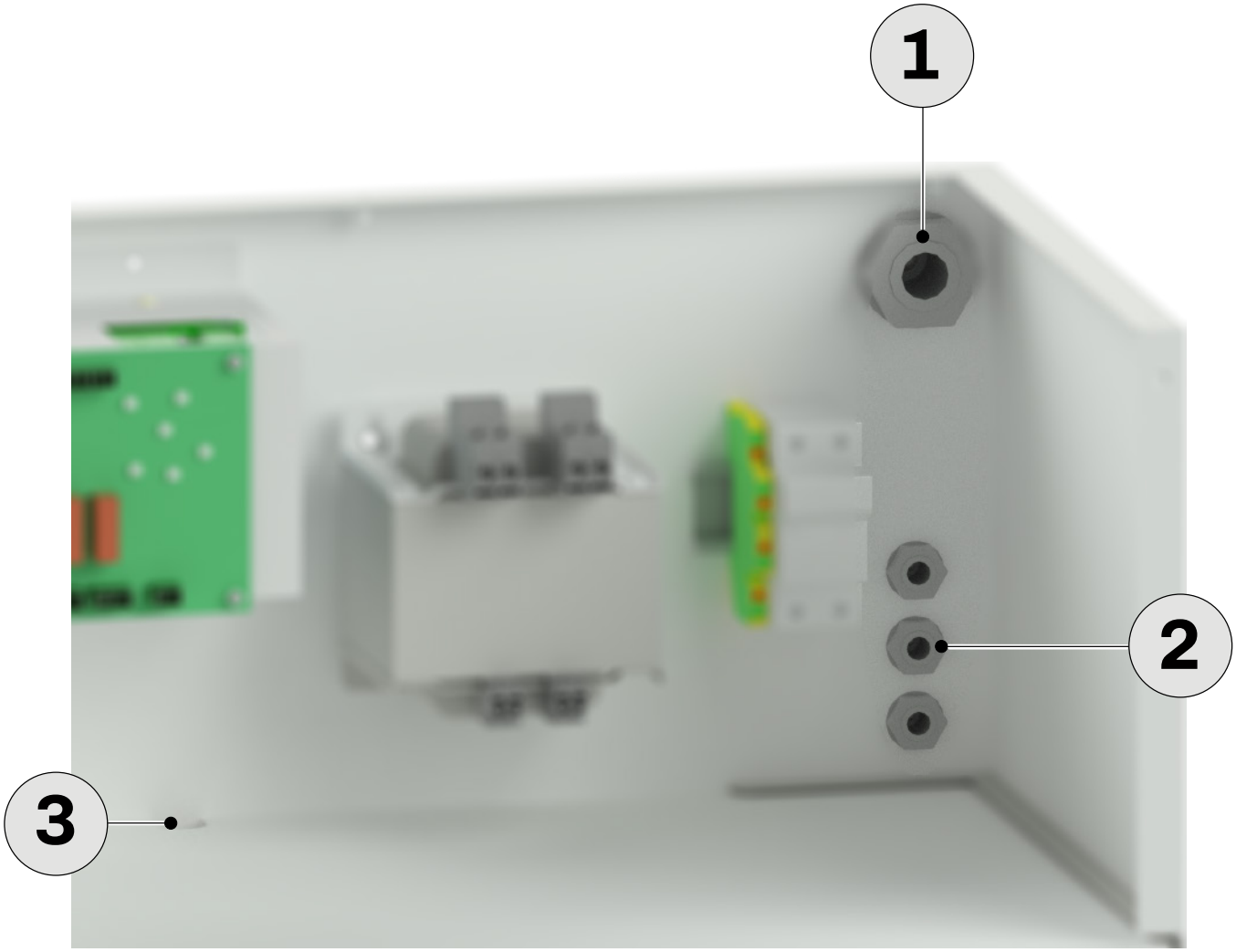


Fig. 28. *Cable glands and cable routing*

Ref.	Description
①	Power cable entry on cable gland (**PGx** depending on model)
②	Signal wiring entry on cable gland PG9
③	Cable routing in the water section (for motor and stainless steel pump)

6.4.4 Distribution rack cable glands

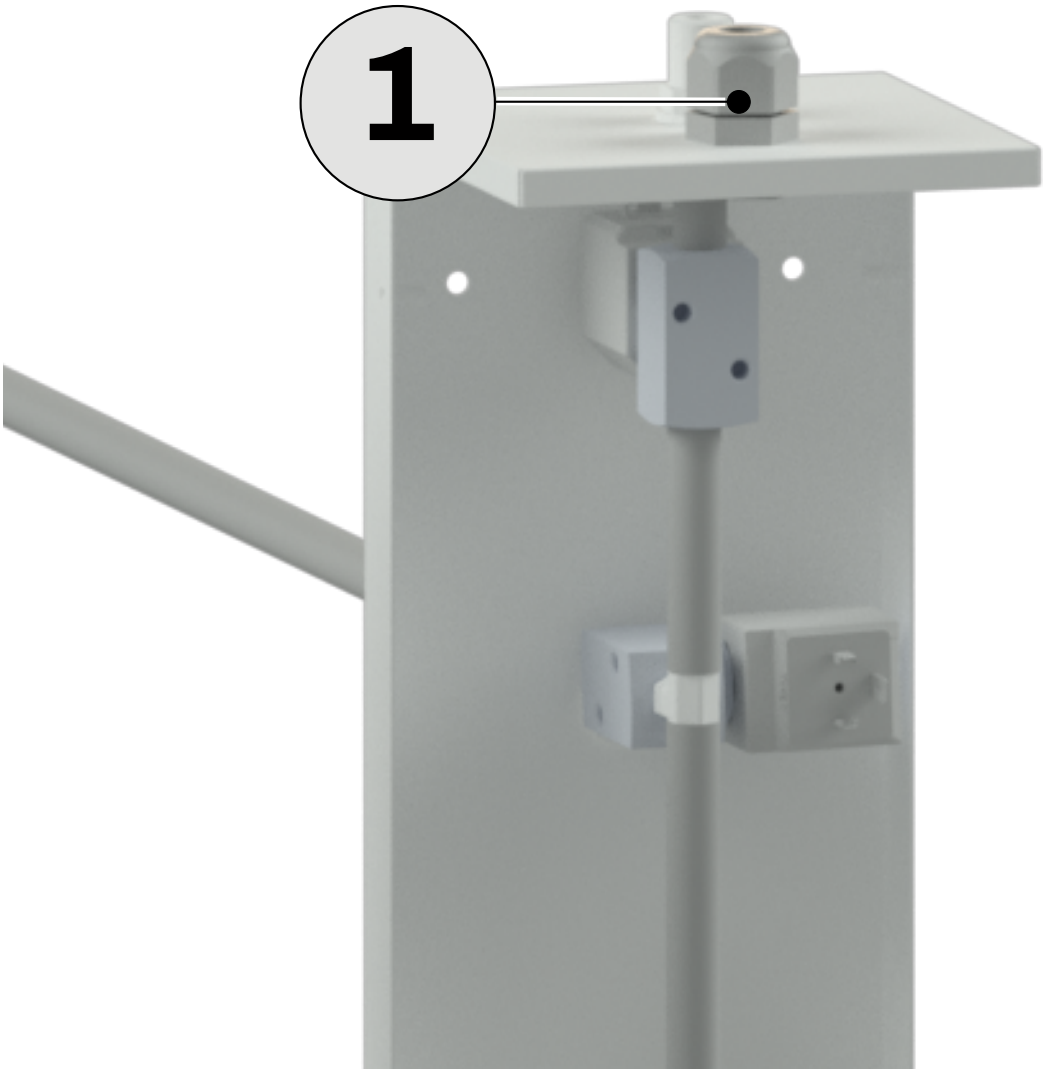


Fig. 29. *Cable glands and cable routing*

Ref.	Description
①	Signal wiring entry on cable gland PG9

6.4.5 Replacing fuses - Fuse box

Suitable personal protective equipment for the power supply

⚠ DANGER

RISK OF ELECTRIC SHOCK

- Cut off the power supply to all equipment, including any connected devices, before removing any covers or hatches, or before installing/uninstalling accessories, hardware, fuses, cables or wires.
- Always use a properly calibrated Voltmeter to make sure the system is powered off.

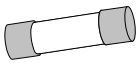
	EHPN 060	EHPN 120	EHPN 180	EHPN 240	EHPN 300	EHPN 420	EHPN 540	EHPN 660	EHPN 840
Current (A)	10	10	10	10	10	10	10	16	16
Type	Rapid	Rapid	Rapid	Rapid	Rapid	Rapid	Rapid	Rapid	Rapid
Size	10x38	10x38	10x38	10x38	10x38	10x38	10x38	10x38	10x38

Fig. 30. *Overload protection devices according to model*

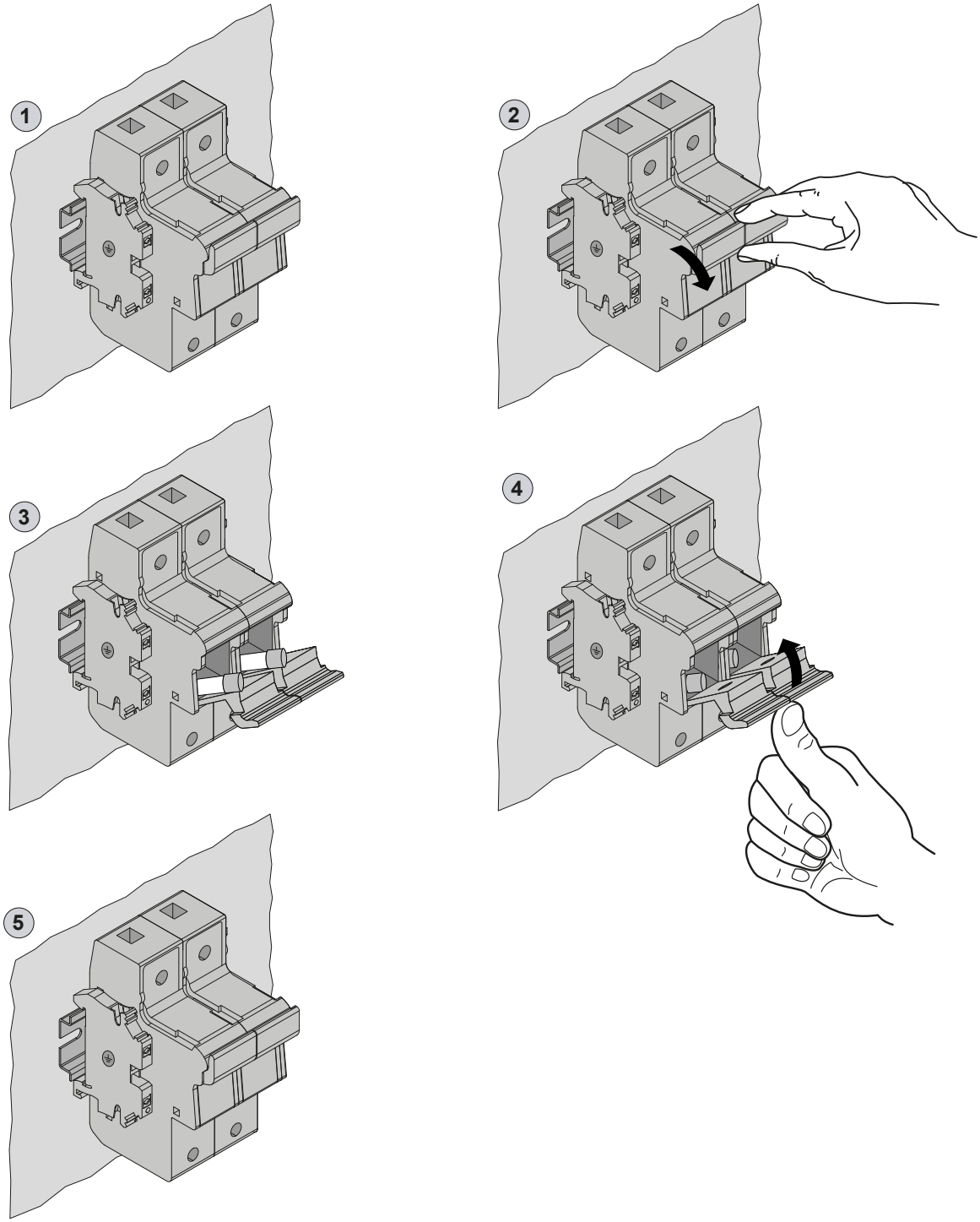


Fig. 31. *Overload protection device*

6.5 Electrical connections

6.5.1 Pump unit control board

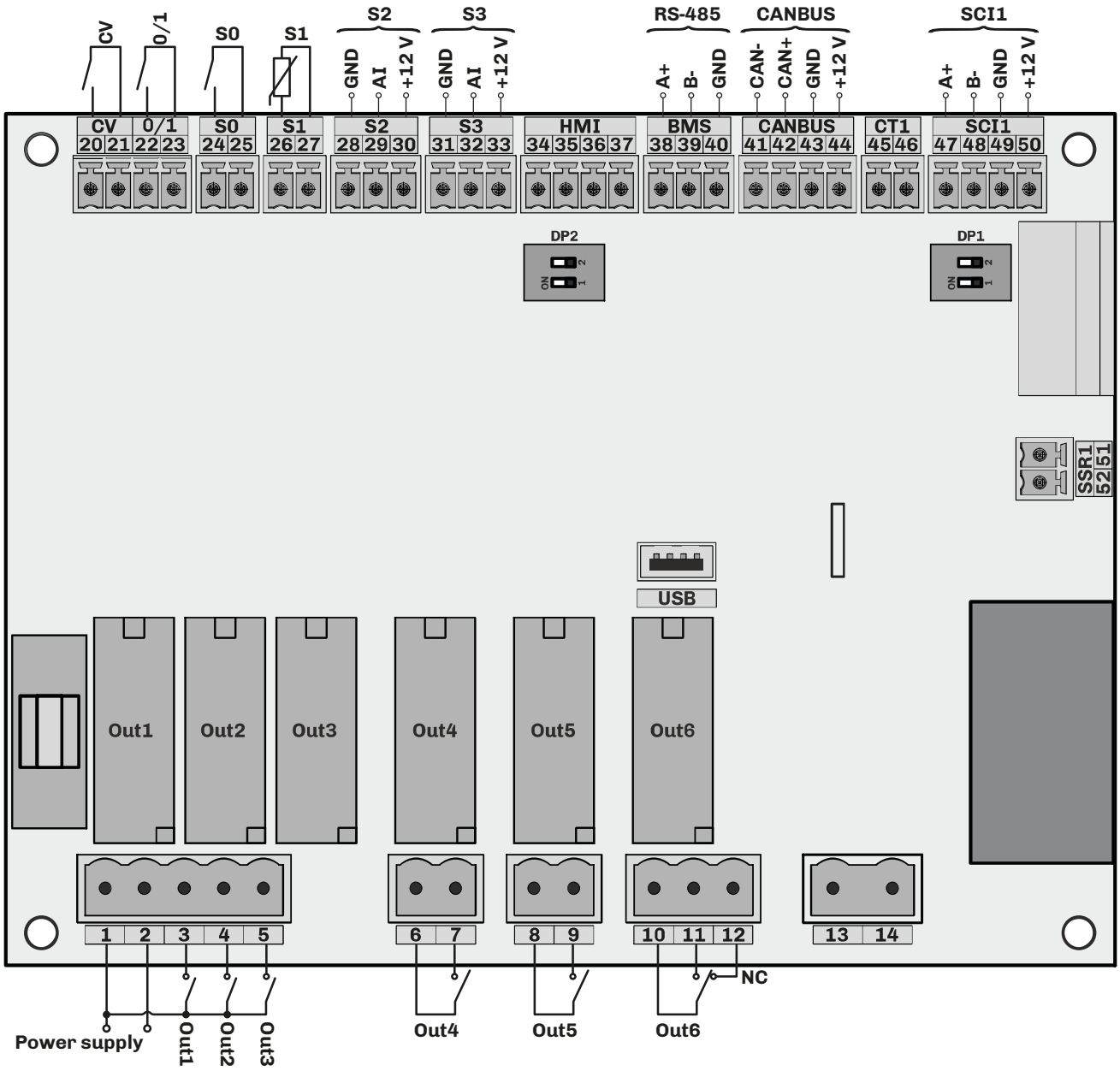


Fig. 32. *Electrical connections for the pump unit control board*

TERMINALS			
1-2	24 Vac power supply	**26-27**	Analogue input **S1**: pump temperature (NTC)
1-3	Output **Out1**: inlet solenoid valve for single-branch or room versions	**28...30**	Analogue input **S2**: pressure transducer (4...20 mA)
1-4	Output **Out2**: outlet solenoid valve for single-branch or room versions	**31...33**	Input **S3**: humidity sensor for single-branch or room versions (**CFGp** = HUM)
1-5	Output **Out3**: disinfection solenoid valve (single-branch) or room ventilation enable	**34...37**	Reserved.
6-7	Output **Out4**: dehumidification enable	**38...40**	RS-485 serial line connection for BMS Modbus
8-9	Output **Out5**: indicator	**41...44**	CANBUS serial line connection to the distribution rack and user interface
10...12	Digital output **Out6**: alarm		
13-14	No connection **N.C.**	**45-46**	No connection **N.C.**
20-21	Digital input: enable (**CV**)	**47...50**	Connection to the inverter
22-23	Digital input: remote ON/OFF (**0/1**)	**DP1**	Activate termination resistor on **SCI1 RS-485** serial line. **1** = **SCI1** RS-485 serial termination; **2** = Reserved
24-25	Digital input **S0**: humidistat for single-branch or room versions (**CFGp** = 0-1)	**DP2**	Termination resistor on **BMS / CANBUS** RS-485. **1** = **BMS** RS-485 serial termination **2** = **CANBUS** serial termination

6.5.2 Distribution rack control board

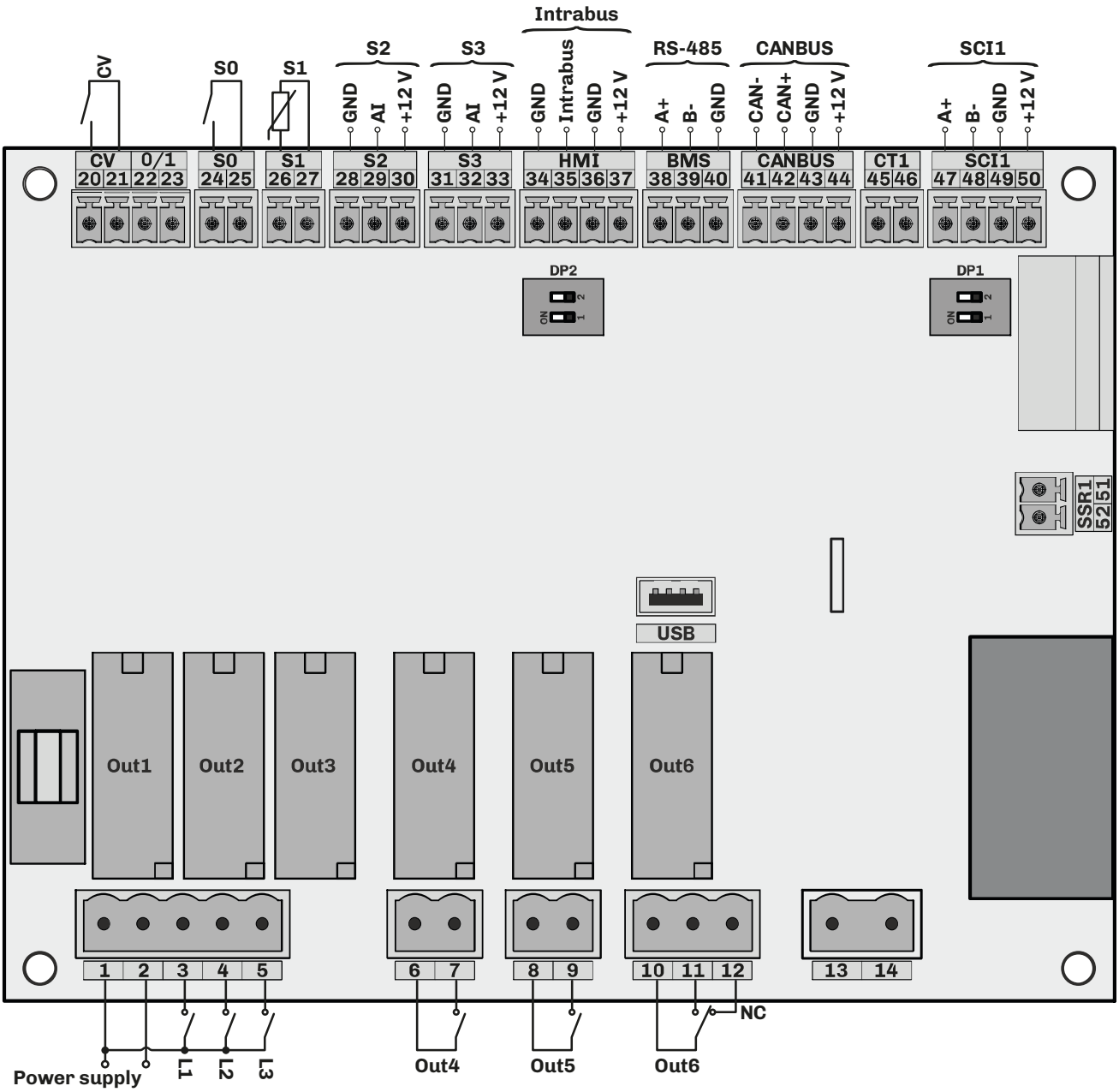


Fig. 33. *Electrical connections for the distribution rack control board*

TERMINALS			
1-2	24 Vac power supply	**26-27**	No connection **N.C.**
1-3	Output **L1**: throttling solenoid valve	**28...30**	Input **S2**: main humidity sensor
1-4	Output **L2**: throttling solenoid valve	**31...33**	Input **S3**: humidity limit sensor
1-5	Output **L3**: throttling solenoid valve	**34...37**	Connection to the **EV3K** interface
6-7	Output **Out4**: rack inlet solenoid valve	**38...40**	RS-485 serial line connection for BMS Modbus
8-9	Output **Out5**: rack outlet solenoid valve	**41...44**	CANBUS serial line connection to the pump unit control board
10...12	Digital output: alarm		
13-14	No connection **N.C.**	**45-46**	No connection **N.C.**
20-21	Digital input: enable (**CV**)	**47...50**	Connection to the 7-branch expansion board
22-23	No connection **N.C.**	**DP1**	Activate termination resistor on **SCI1 RS-485** serial line. **1** = **SCI1** RS-485 serial termination; **2** = Reserved
24-25	Digital input: humidistat (**CFG** = 0-1) (**S0**)	**DP2**	Termination resistor on **BMS / CANBUS** RS-485. **1** = **BMS** RS-485 serial termination **2** = **CANBUS** serial termination

6.5.3 Distribution rack 7-branch expansion board

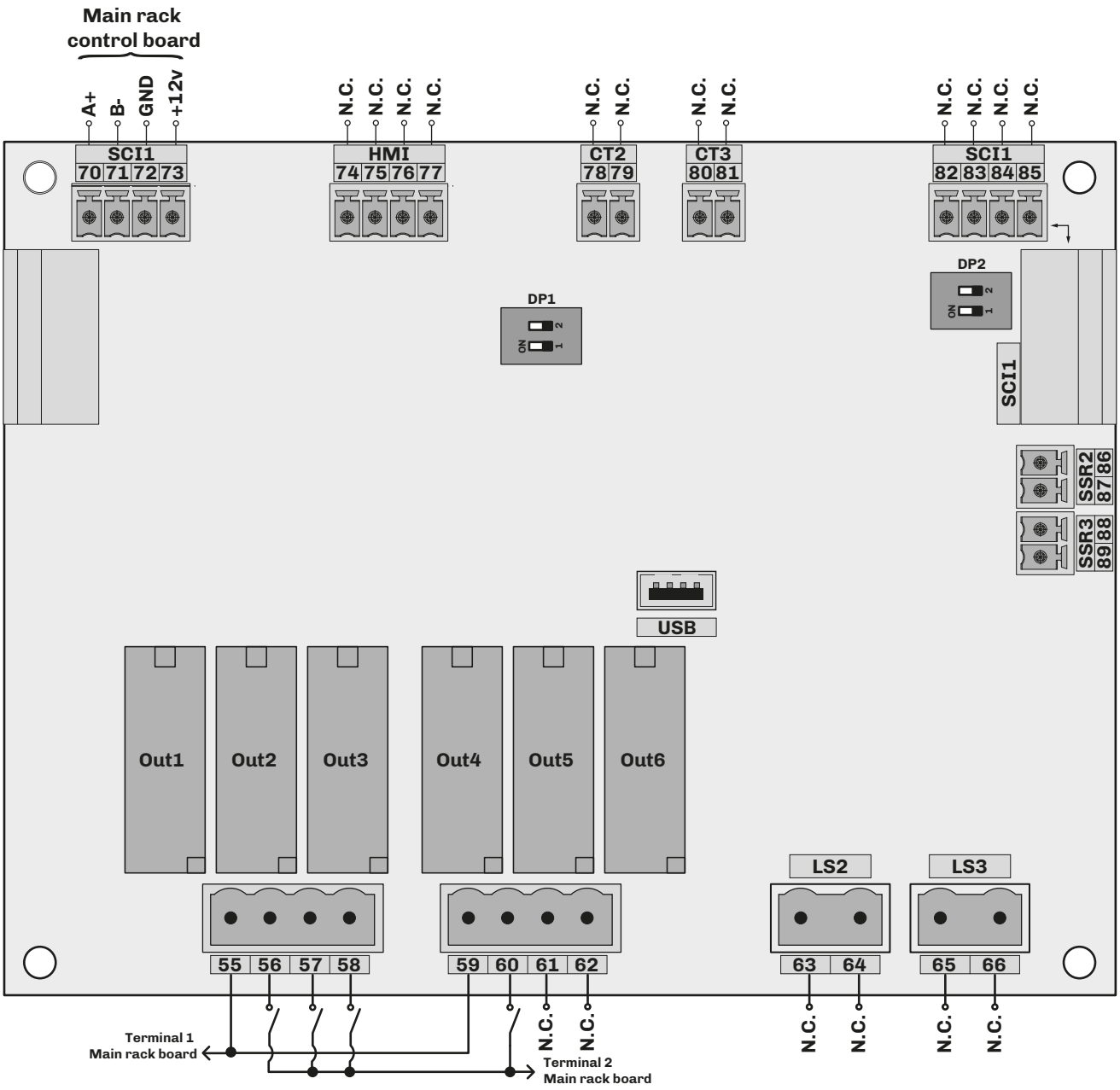


Fig. 34. *Electrical connections for the 7-branch distribution rack*

TERMINALS					
55-59	Power supply connection to main rack board (terminal 1)	**80-81**	No connection **N.C.**		
		82...85	No connection **N.C.**		
		86-87	No connection **N.C.**		
56-2	Connection to expansion branches **L4**	**88-89**	No connection **N.C.**		
57-2	Connection to expansion branches **L5**	**DP1**	Modbus communication address of 7-branch expansion board		
58-2	Connection to expansion branches **L6**		**1**	**2**	Address offset relative to **LA1**
60-2	Connection to expansion branches **L7**		OFF	OFF	**LA1 + 0**
63-64	No connection **N.C.**		OFF	ON	**LA1 + 1**
65-66	No connection **N.C.**		ON	OFF	**LA1 + 2**
70...73	Connection to main rack control board **SCI1**		ON	ON	**LA1 + 3**
74...77	No connection **N.C.**	**DP2**	Activate termination resistor on **SCI1 RS-485** serial line. **1** = SCI1 RS-485 serial termination; **2** = Reserved		
78-79	No connection **N.C.**				

6.6 Configurations

To start up humidity production, contacts **CV** and **0/1** must be closed in all the configurations below.

NOTE: For VDI6022-1 compliance, connection to ventilation consent is mandatory. In case of lack of ventilation in the AHU, the humidifier must be in the STOP state.

6.6.1 Single-branch or room mode

In this operating mode, the regulator is on the pump unit.

ON/OFF connection with humidistat or external contact (CFGp = 0-1)

Configuration
P25 = 0
CFGp = 0-1
CV

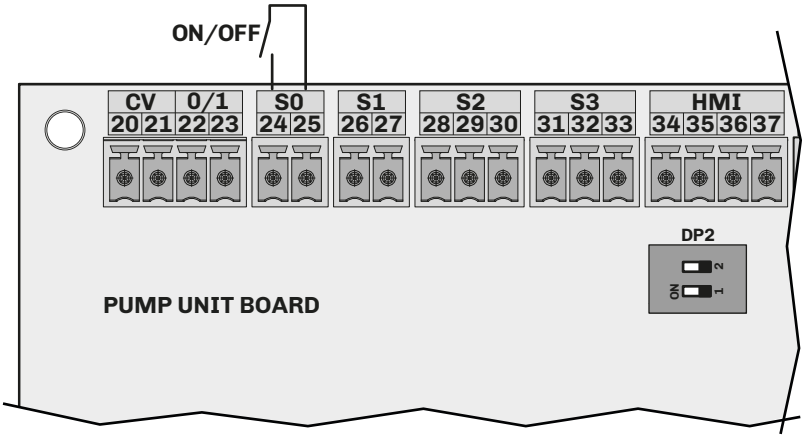


*Fig. 35. ON/OFF connection with humidistat or external contact (**CFGp** = 0-1)*

Humidity sensor connection (CFGp = HUM)

Parameter configuration
P25 = 0
CFGp = HUM
P7 = 0-10 **P7** = 0-5 **P7** = 0.20 **P7** = 4.20 **P7** = 520

S3 input
29 = Sensor signal input
30 = Sensor power supply

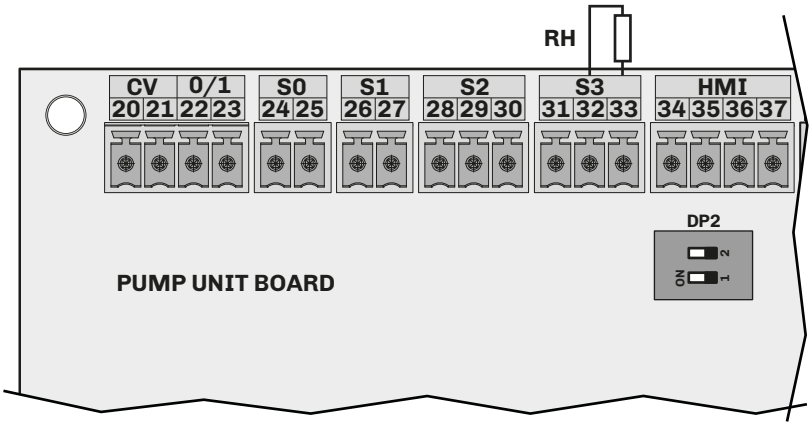


*Fig. 36. Humidity sensor connection (**CFGp** = HUM)*

EVHTP520 humidity sensor connection (CFGp = HUM)

Parameter configuration
P25 = 0
CFGp = HUM
P7 = E520

28 = GND
29 = V+

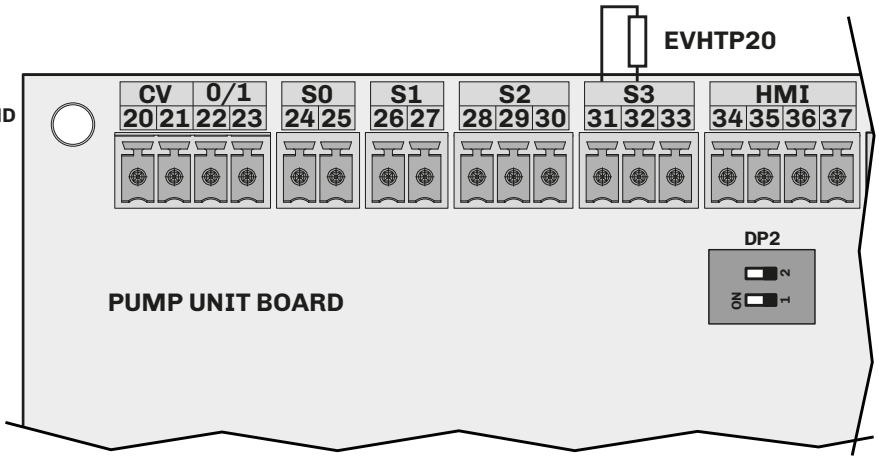


*Fig. 37. EVHTP520 humidity sensor connection (**CFGp** = HUM)*

0...5 V / 0...10 V humidity sensor connection (CFGp = HUM)

Parameter configuration
P25 = 0
CFGp = HUM
P7 = 0-5 **P7** = 0-10

S3 input
31 = GND
32 = V+
33 = Sensor power supply

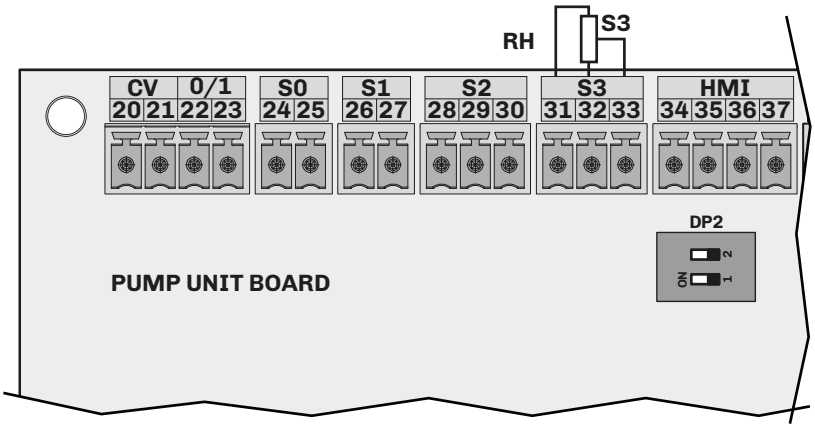


Fig. 38. *0...5 V / 0...10 V humidity sensor connection (**CFGp** = HUM)*

6.6.2 Duct distribution mode (single-rack or multi-rack)

In this operating mode, the regulator is on the distribution rack.

To start humidity production, the **0/1** contact on the pump unit must be closed.

ON/OFF connection with humidistat or external contact (CFG = 0-1)

Parameter configuration
P25 ≠ 0
CFG = 0-1

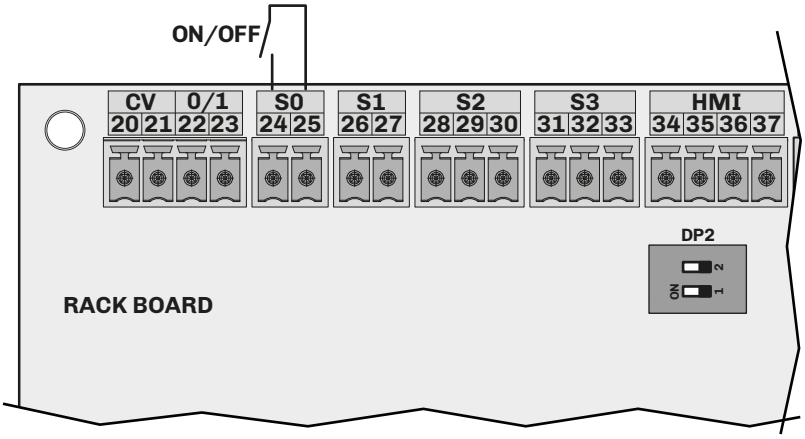


Fig. 39. *ON/OFF connection with humidistat or external contact (**CFG** = 0-1)*

External proportional humidistat connection (CFG = PROP)

Parameter configuration
P25 ≠ 0
CFG = PROP
P2 = 0-10 **P2** = 0-5 **P2** = 0.20 **P2** = 4.20

28 = GND
29 = V+

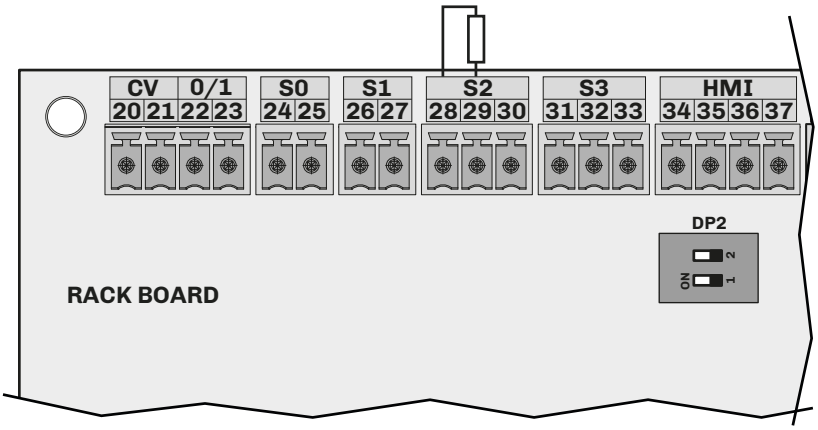


Fig. 40. *External proportional humidistat connection (**CFG** = PROP)*

Humidity sensor connection (CFG = HUM)

Parameter configuration
P25 ≠ 0
CFG = HUM
P2 = 0-10 **P2** = 0-5 **P2** = 0.20 **P2** = 4.20 **P2** = 520

S2 input
29 = Sensor signal input
30 = Sensor power supply

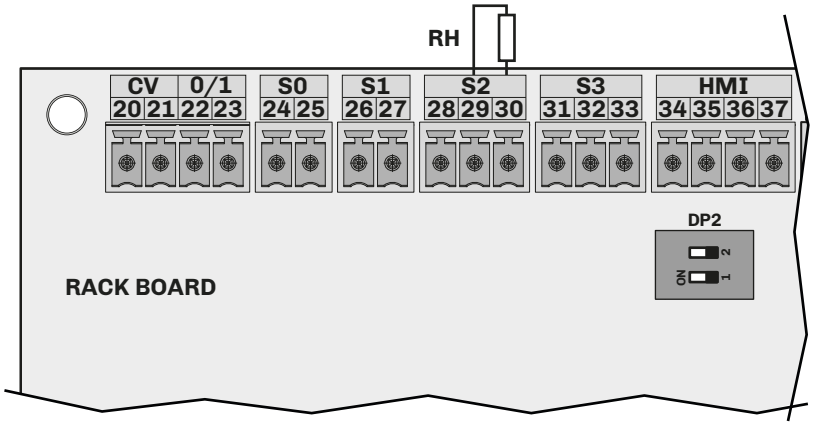


Fig. 41. *Humidity sensor connection (**CFG** = HUM)*

Humidity sensor connection EVHTP520 (CFG = HUM)

Parameter configuration
P25 ≠ 0
CFG = HUM
P2 = E520

28 = GND
29 = V+

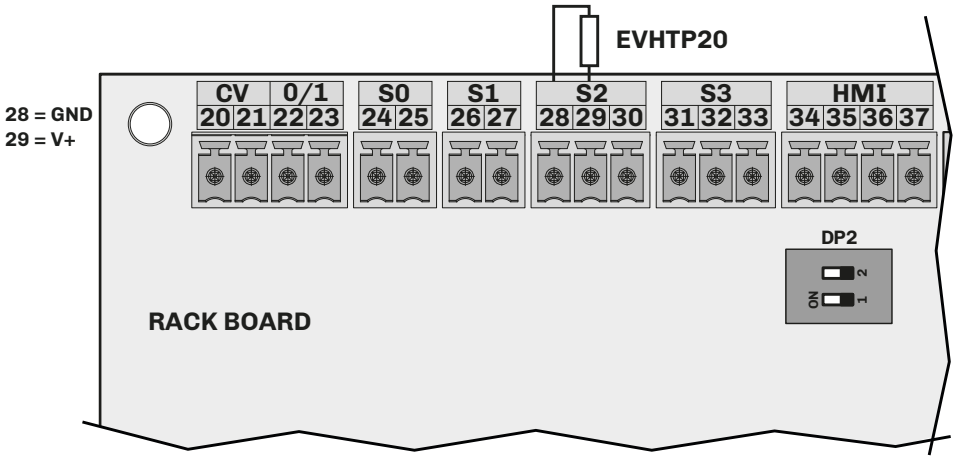


Fig. 42. *Humidity sensor connection EVHTP520 (**CFG** = HUM)*

Connection for humidity sensor and limit sensor (CFG = HUML)

Parameter configuration
P25 ≠ 0
CFG = HUML
P2 = 0-10 **P2** = 0-5 **P2** = 0.20 **P2** = 4.20 **P2** = 520
P7 = 0-10 **P7** = 0-5 **P7** = 0.20 **P7** = 4.20 **P7** = 520

S2 input
29 = Sensor signal input
30 = Sensor power supply

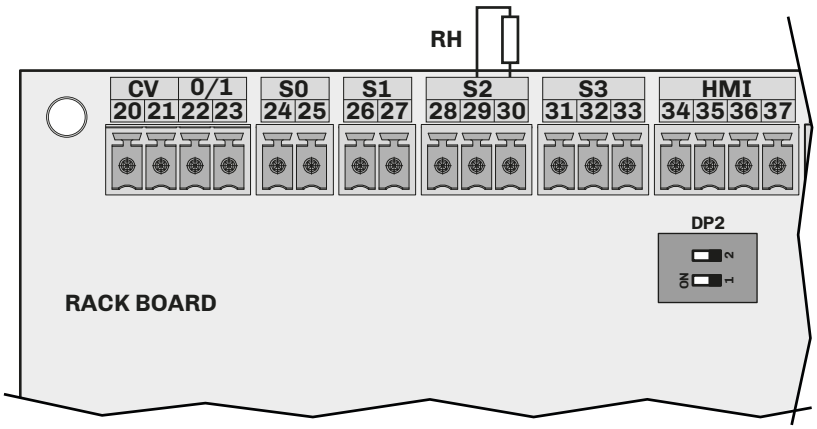


Fig. 43. *Connection for humidity sensor and limit sensor (**CFG** = HUML)*

Humidity sensor connection 0...5 V / 0...10 V

Parameter configuration
P25 ≠ 0
CFG = HUM **CFG** = HUML
P2 = 0-5 **P2** = 0-10
P7 = 0-5 **P7** = 0-10

S2 input
31 = GND
32 = V+
33 = Sensor power supply

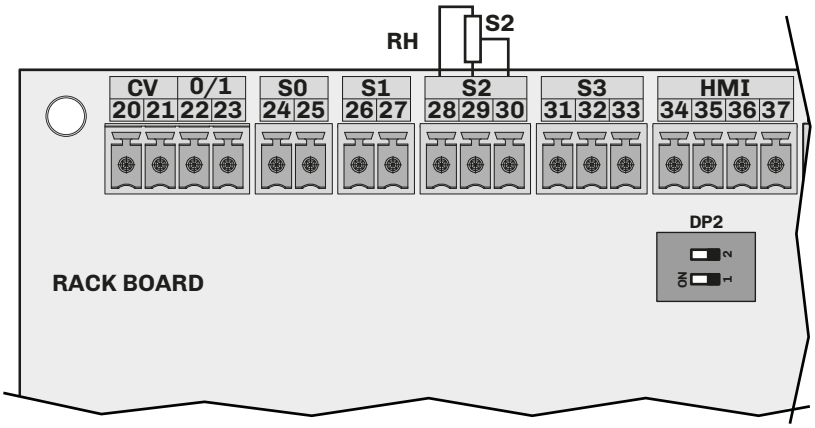


Fig. 44. *Humidity sensor connection 0...5 V*

6.7 Power supply and earth wiring connection

Fig. 45. *Power supply connections*

7. PUMP UNIT USER INTERFACE

Chapter content

This chapter contains the following information:

Make sure the humidifier and all the installed components are properly connected before start-up, in accordance with regulations, criteria and all applicable local, regional and national standards.

7.1 Interface

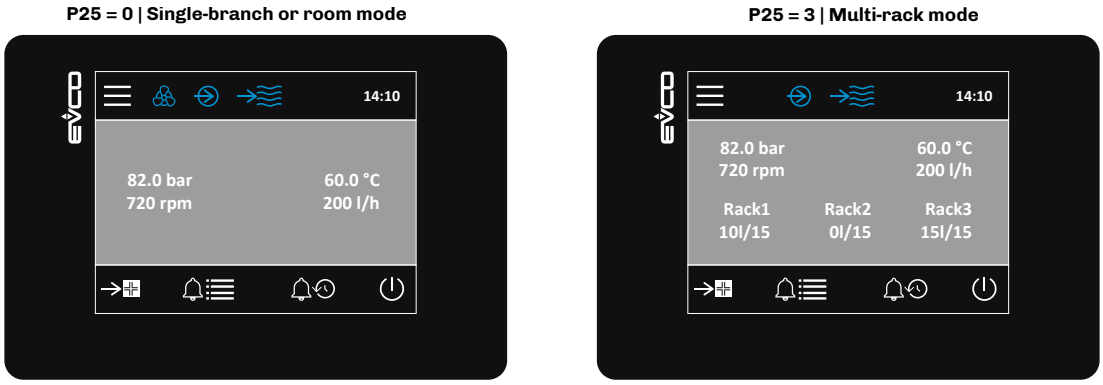


Fig. 46. *User interface*

7.1.1 Icons

Icon	Lit steadily	OFF
	Distribution in the room ON	In all other cases
	Generic pump activation request	In all other cases
	Inlet solenoid valve ON Water filling in progress	Inlet solenoid valve OFF Water filling finished
	Disinfection ON	In all other cases
	Single-branch or room only Outlet solenoid valve ON Water draining in progress	**Single-branch or room only** Outlet solenoid valve OFF Water draining finished

7.1.2 Keys

Key...	Tap and release to...
	Access the menu
	Access the manual water draining start page
	Access the alarm menu

Key...	Tap and release to...
	Access the alarm log
	(When available) return by one level

7.1.3 First start-up

Make sure the humidifier and all the installed components are properly connected before start-up, in accordance with regulations, criteria and all applicable local, regional and national standards.

At the first start-up, the machine is disabled until the red cap on the oil pump has been replaced with the yellow cap, and the inlet water conductivity has been entered, after which the humidifier OFF screen will open automatically.

NOTE: If you do not have the electrical conductivity value of the water, it can be obtained from the website of the drinking water supplier.

NOTE: Entering an electrical conductivity greater than 100 µS/cm will invalidate the warranty.

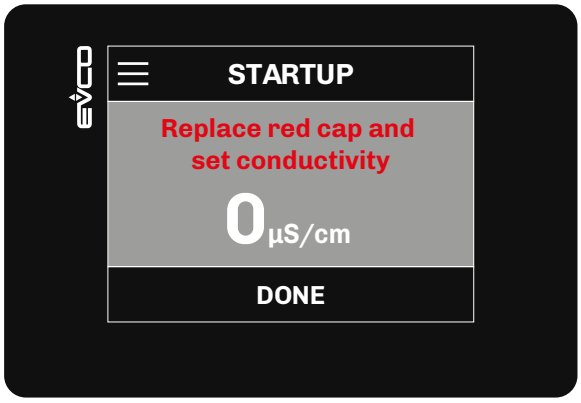


Fig. 47. *First start-up - Setting the electrical conductivity*

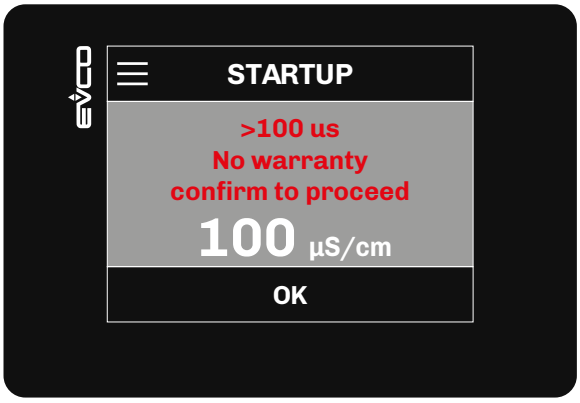
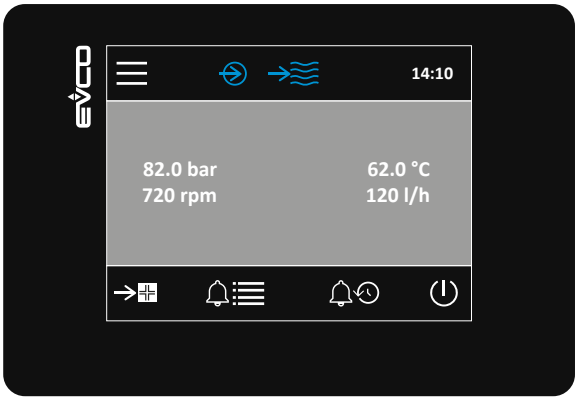


Fig. 48. *Setting the electrical conductivity > 100 µS*

7.2 Menu

7.2.1 Home screen

Single-branch or room mode



Multi-rack mode

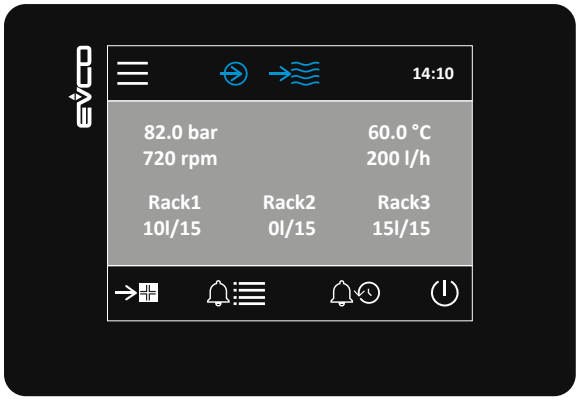


Fig. 49. *HOME screen with ON/OFF regulation from digital input*

HOME screen with proportional regulation using humidity sensor (CFGp = HUM)

Single-branch or room mode

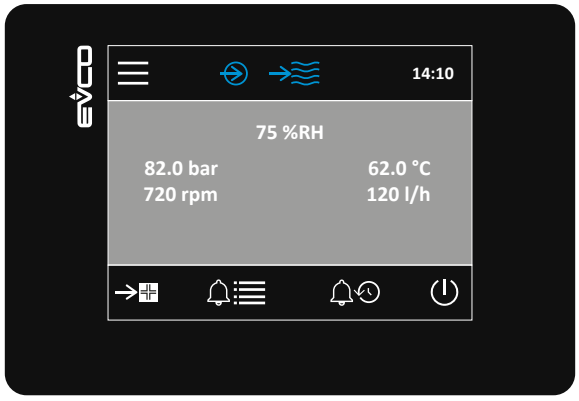
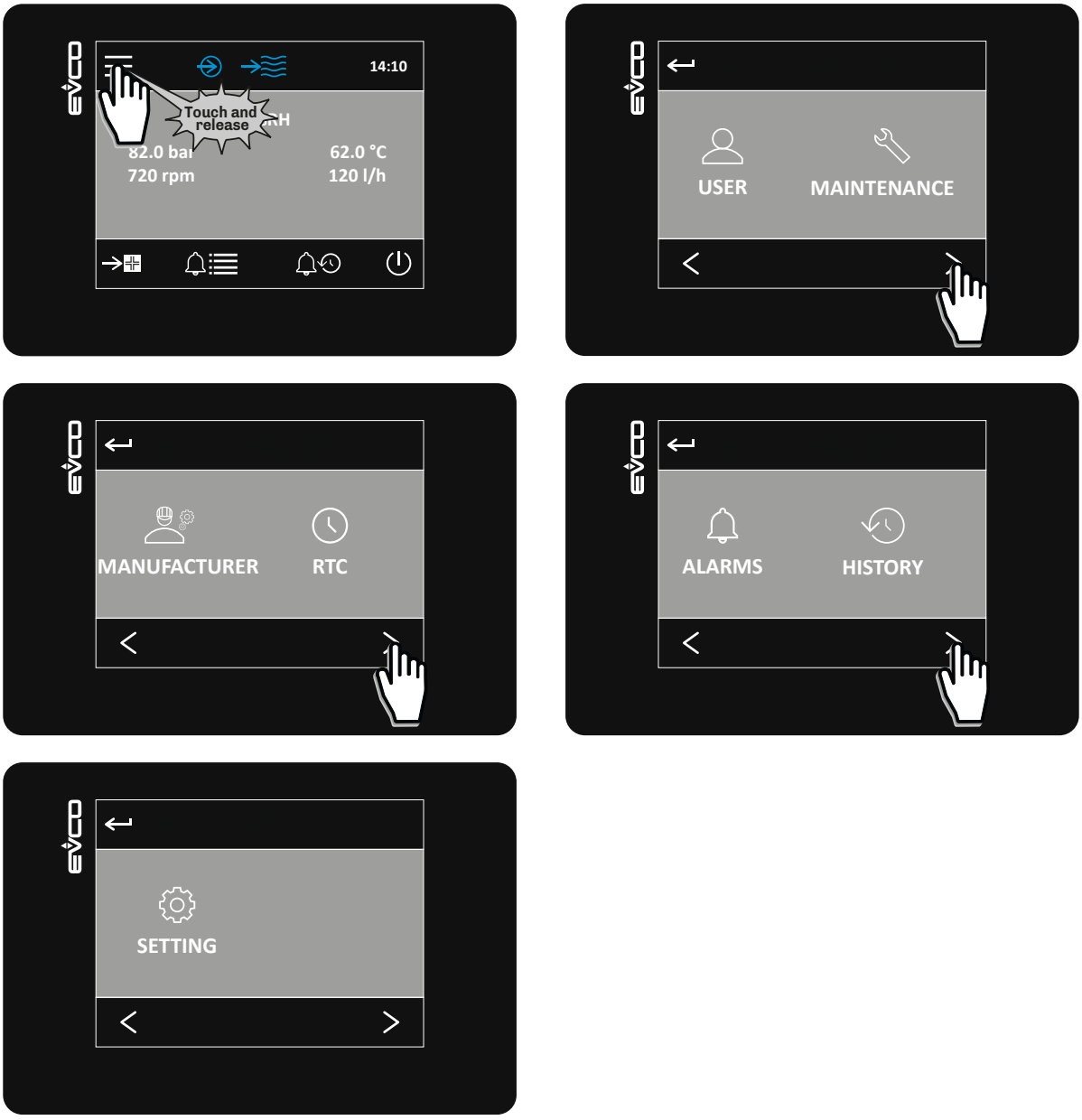


Fig. 50. *Home screen with humidity sensor alone*

Top line: Humidity measured by the room humidity sensor.

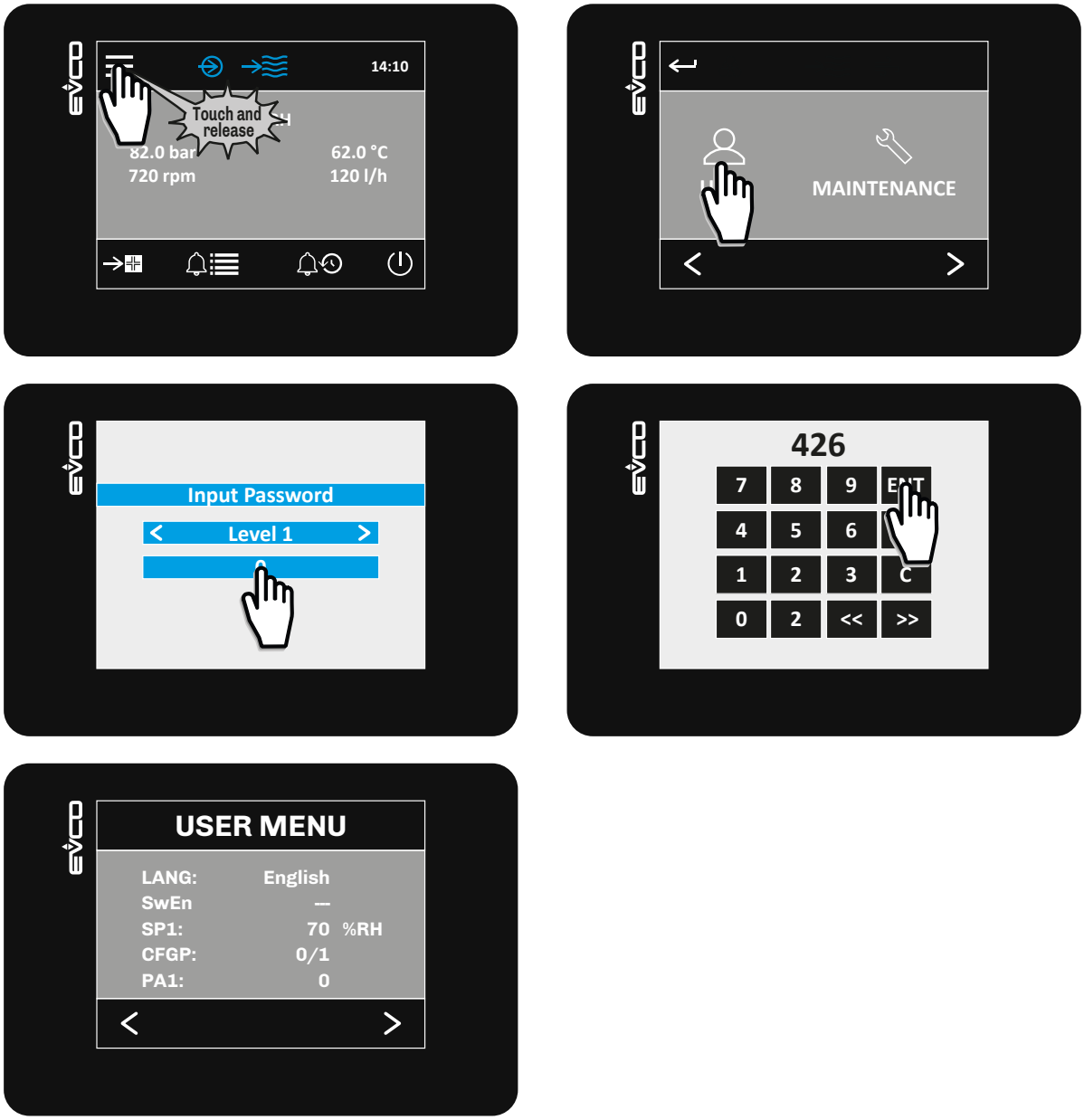
7.2.2 Menu



Menu	Description
USER	Access the user menu
MAINTENANCE	Access the maintenance technician menu
MANUFACTURER	**RESERVED. NOT ACCESSIBLE TO THE PUBLIC.**
RTC	Access to change the date/time
ALARMS	Currently accessing alarm control
HISTORY	Access the alarm log
SETTING	Reset parameters to factory settings

7.2.3 User Menu

The user menu can be used to display and change user parameters.
To access the user menu:



Menu option	Description
LANG	Sets the display language. **English**; **Italian**.
CFGP, etc.	See *"11.1 REGULATION PARAMETER TABLE FOR THE PUMP UNIT" ON PAGE 87*

7.2.4 Changing the humidity setpoint (main humidity sensor)

Only with **CFGp** = HUM

To change the humidity setpoint: access the user menu as described in the sub-paragraph *"8.2.1 USER MENU" ON PAGE 68*, and change the value of **SP1**.

7.2.5 Maintenance menu

To access the maintenance menu:

Fig. 51. *Maintenance menu*

The following is a table with the labels shown on the display and their description:

Menu option	Description
CFGp	Sets the operating mode. See ***"11.1 REGULATION PARAMETER TABLE FOR THE PUMP UNIT" ON PAGE 87***
Other parameters	See ***"11.1 REGULATION PARAMETER TABLE FOR THE PUMP UNIT" ON PAGE 87***
S1	Displays the value read by the sensor (pump temperature).
S2	Displays the value read by the sensor (pressure transducer).
S3	Displays the value read by sensor S3 if it is connected.
DICV	Displays the status of the **CV** digital input (fan enable) if it is connected. **OFF** = **CV** input closed; **On** = **CV** input open.
DIOF	Displays the status of the **0/1** digital input (remote ON/OFF) if it is connected. **OFF** = **0/1** input closed; **ON** = **0/1** input open.

Menu option	Description
DISO	Displays the status of the **S0** digital input (remote humidistat enable) if it is connected. **OFF** = **S0** input closed; **ON** = **S0** input open.
DOEV1	Displays the status of the inlet solenoid valve output. **OFF** = Inlet solenoid valve output OFF; **ON** = Inlet solenoid valve output ON.
DOEVo	Displays the status of the outlet solenoid valve output. **OFF** = Outlet solenoid valve output OFF; **ON** = Outlet solenoid valve output ON.
DOEVd	Displays the status of the disinfection solenoid valve output. **OFF** = Disinfection solenoid valve output OFF; **ON** = Disinfection solenoid valve output ON.
DOdeh	Displays the status of the dehumidification enable output. **OFF** = Dehumidification enable output OFF; **ON** = Dehumidification enable output ON.
DOa	Displays the status of the general alarm output. **OFF** = General alarm output OFF; **ON** = General alarm output ON.

7.2.6 Displaying/resetting the operating hours

The operating hours can be displayed and reset from the maintenance menu.

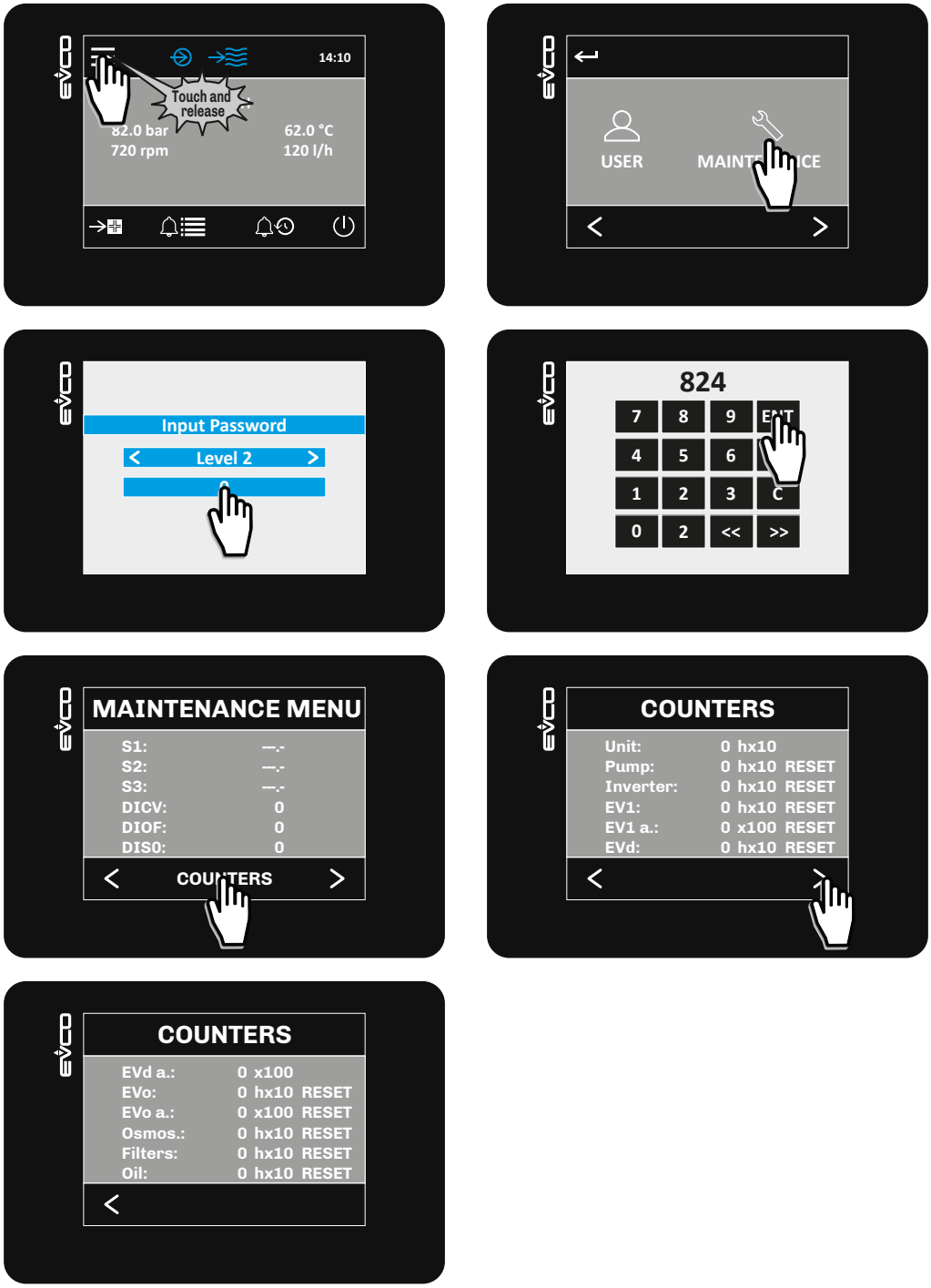


Fig. 52. *Displaying the operating hours*

The following is a table with the labels shown on the display and their description:

Menu option	Displays...
Unit	The hours of humidifier operation.
Pump	The hours of pump operation.
Inverter	The hours of inverter operation.
EV1	The hours of branch 1 solenoid valve operation.
EV1 a.	The number of branch 1 solenoid valve activations.
EVd	The hours of inlet solenoid valve operation.

Menu option	Displays...
EVd a.	The number of inlet solenoid valve activations.
EVo	The hours of outlet solenoid valve operation.
EVo a.	The number of outlet solenoid valve activations.
Osmos.	The hours of reverse osmosis system operation.
Filters	The hours of filter operation.
Oil	The hours of pump oil operation.

Resetting the operating hours

To reset the operating hours, tap the **RESET** key beside the corresponding value.

7.2.7 Output functional test

The output functional test page can be accessed from the maintenance menu. Here the outputs can be forced on or off:

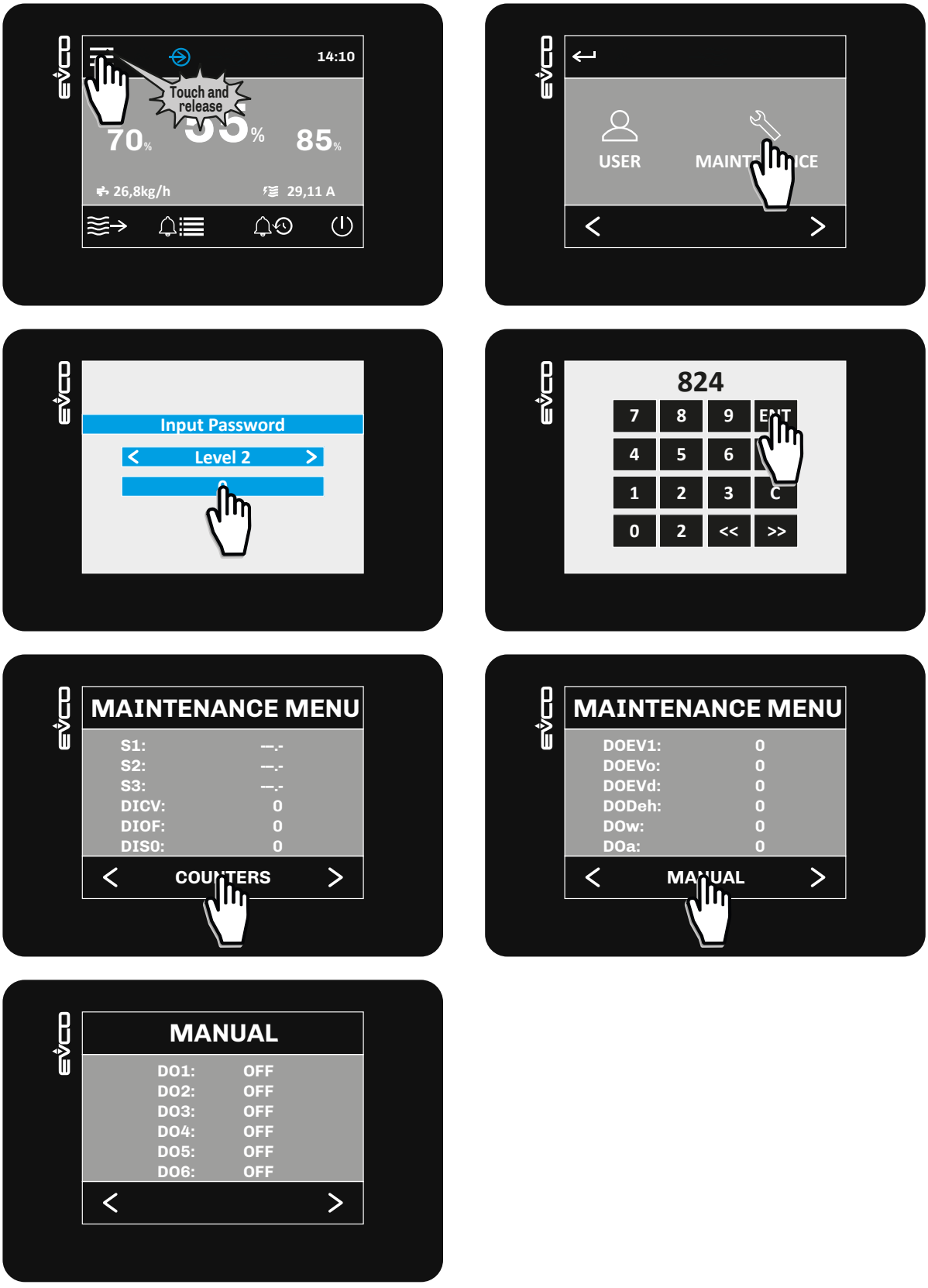


Fig. 53. *Displaying the operating hours*

The following is a table with the labels shown on the display and their description:

Menu option	Description
DO1	Forces the inlet solenoid valve output on/off for single-branch or room versions. **OFF** = Inlet solenoid valve output forced OFF; **ON** = Inlet solenoid valve output forced ON.
DO2	Forces the outlet solenoid valve output on/off for single-branch or room versions. **OFF** = Outlet solenoid valve output forced OFF; **ON** = Outlet solenoid valve output forced ON.
DO3	Forces the disinfection solenoid valve output on/off for single-branch or room versions. **OFF** = Disinfection solenoid valve output forced OFF; **ON** = Disinfection solenoid valve output forced ON.
DO4	Forces the dehumidifier enable output on/off. **OFF** = Dehumidification enable output forced OFF; **ON** = Dehumidification enable output forced ON.
DO5	Forces the indicator output on/off. **OFF** = Indicator output forced OFF; **ON** = Indicator output forced ON.
DO6	Forces the general alarm output on/off. **OFF** = General alarm output forced OFF; **ON** = General alarm output forced ON.

8. DISTRIBUTION RACK USER INTERFACE

Chapter content

This chapter contains the following information:

Make sure the humidifier and all the installed components are properly connected before start-up, in accordance with regulations, criteria and all applicable local, regional and national standards.

8.1 Interface

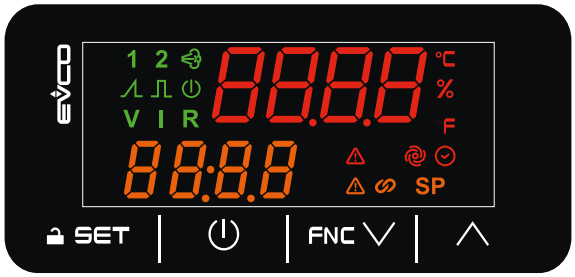


Fig. 54. *Distribution rack interface*

8.1.1 Icons

Icon	Lit steadily	OFF
1	Humidity sensor fitted	In all other cases
2	Limit sensor fitted	In all other cases
	Production active	In all other cases
	Proportional operating mode	In all other cases
	ON/OFF operating mode	In all other cases
	Humidifier OFF	Humidifier ON
V	Voltage sensor operating mode	In all other cases
I	Current sensor operating mode	In all other cases
R	Resistive sensor operating mode	In all other cases
	Warning in progress	No warning in progress
	CV input closed (enable signal given)	**CV** input open (enable signal not given)
SP	Displaying and changing the current humidity setpoint	In all other cases
	Alarm in progress	No alarm in progress
	Draining in progress	In all other cases
	Displayed value is operating hours	In all other cases
F	Display shows temperature in °F	In all other cases
%	Display shows humidity in %	In all other cases
°C	Display shows temperature in °C	In all other cases

8.1.2 Keys

Key...	Tap and release to...	Tap and hold for at least 3 seconds to...
	Go back a level	Humidifier ON/OFF
FNC	• Scroll down through the values • Navigate within the menu	Go to the maintenance and reset operating hours menu
	• Scroll up through the values • Navigate within the menu	Activate manual draining
SET	• Confirm the values on the display • Set/change the humidity setpoint	Enter the main menu

8.1.3 First start-up

Make sure the humidifier and all the installed components are properly connected before start-up, in accordance with regulations, criteria and all applicable local, regional and national standards.

Fig. 55. *Distribution rack OFF*

8.1.4 Home screen

HOME screen with ON/OFF regulation from digital input (CFG = 0-1)

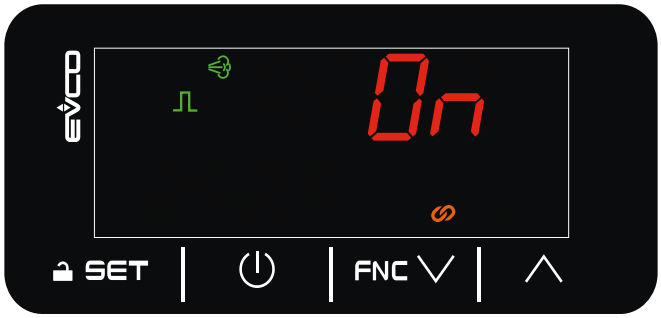


Fig. 56. *Home screen with ON/OFF regulation from digital input (**CFG** = 0-1)*

Top line: Shows the state of the digital control input (**S0**).
NOTE: The **CV** and **0/1** contacts must be closed to produce humidity.

HOME screen with proportional regulation (CFG = PROP)

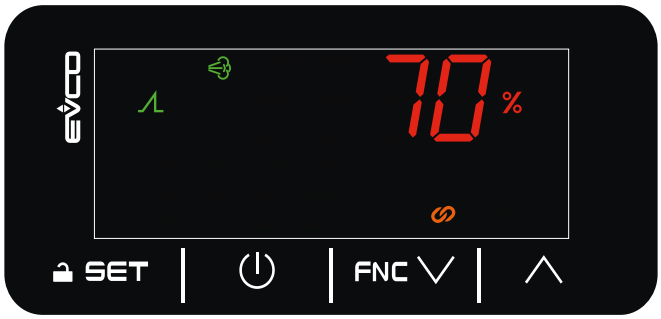


Fig. 57. *Home screen with proportional regulation (**CFG** = PROP)*

Top line: Actual humidity request in %.
NOTE: The **CV** and **0/1** contacts must be closed to produce humidity.

HOME screen with regulation via humidity sensor (CFG = HUM) or humidity sensor and limit sensor (CFG = HUML)

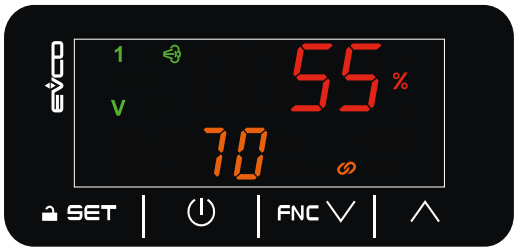


Fig. 58. Home screen with humidity sensor alone

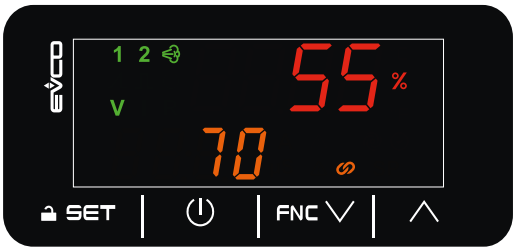


Fig. 59. Home screen with humidity sensor and limit sensor

Top line: Humidity measured by the room humidity sensor.
Bottom line: Humidity setpoint.
NOTE: The **CV** and **0/1** contacts must be closed to produce humidity.

8.1.5 Changing the main sensor humidity setpoint

With **CFG** = HUM or **CFG** = HUML only.

To change the humidity setpoint:

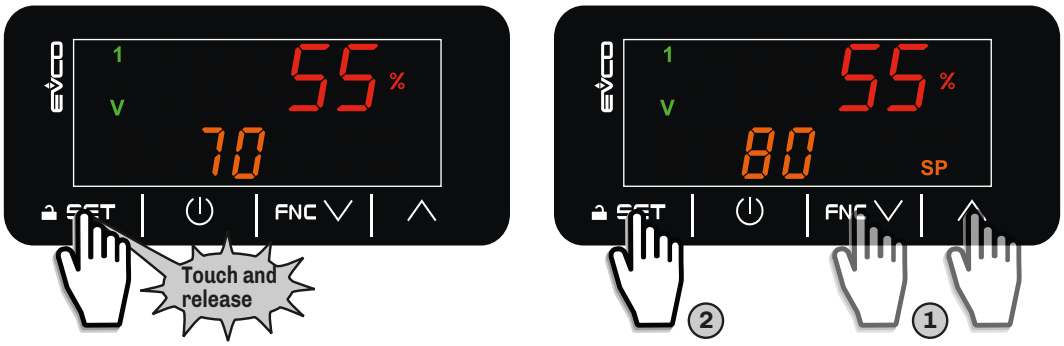


Fig. 60. Changing the humidity setpoint

8.2 Menu

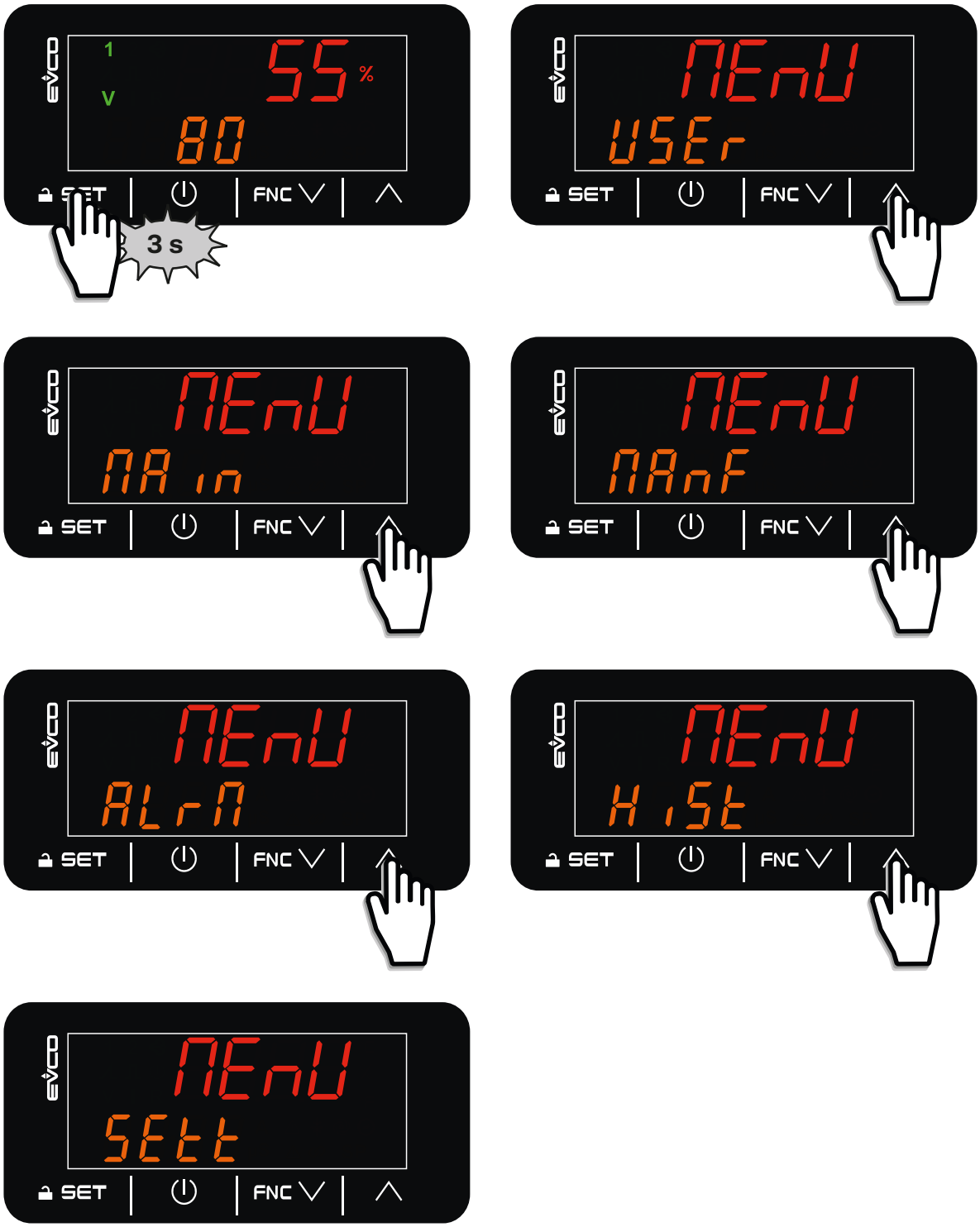


Fig. 61. *Distribution rack interface menu*

Menu	Description
USEr	Access the user menu
MAIn	Access the maintenance technician menu
MAnF	**RESERVED. NOT ACCESSIBLE TO THE PUBLIC.**
ALrM	Currently accessing alarm control
HISt	Access the alarm log
SEtt	Reset parameters to factory settings

8.2.1 User Menu

The user menu can be used to display and change user parameters.

To access the user menu:

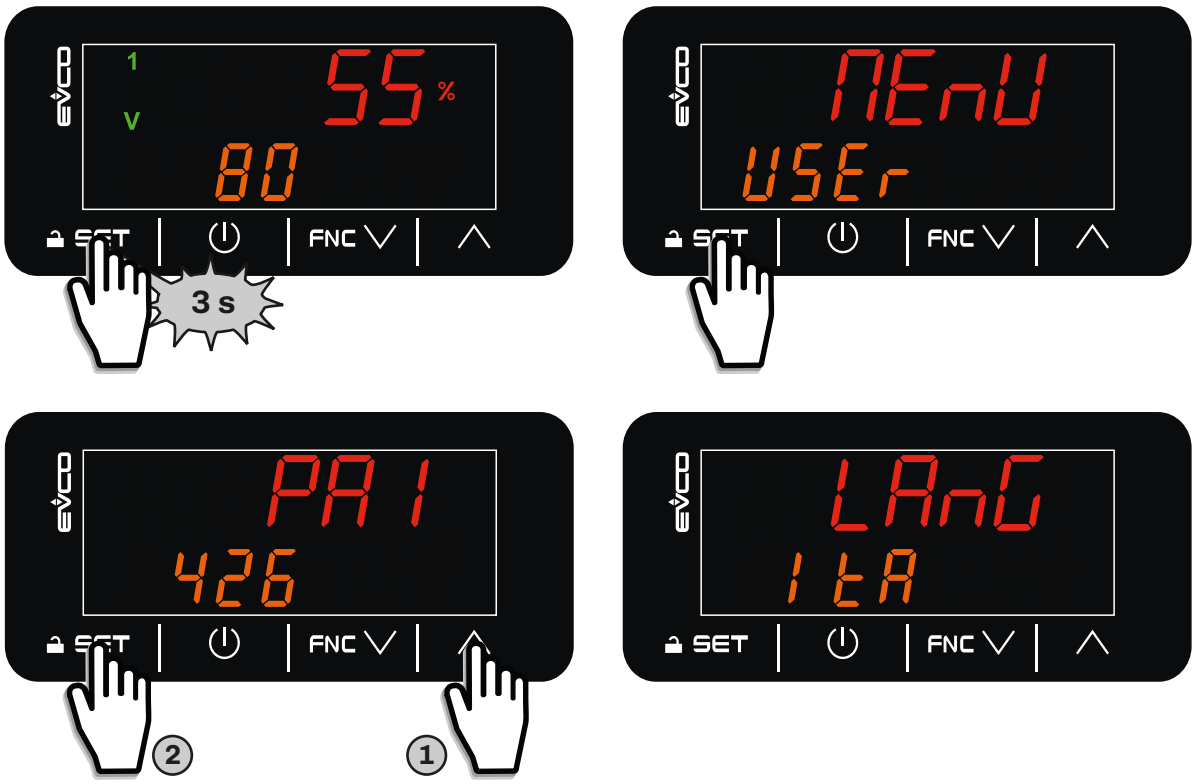


Fig. 62. *User menu*

Top line	Bottom line	Description
LAnG	Set language	Sets the display language. **EnG** = English; **Ita** = Italian.
SP1	Humidity setpoint	Sets the humidity setpoint. See ***"11.2 REGULATION PARAMETER TABLE FOR THE DISTRIBUTION RACK" ON PAGE 89***
SP2	Humidity limit setpoint	Sets the humidity limit setpoint `. See ***"11.2 REGULATION PARAMETER TABLE FOR THE DISTRIBUTION RACK" ON PAGE 89***
Other parameters	See ***"11.2 REGULATION PARAMETER TABLE FOR THE DISTRIBUTION RACK" ON PAGE 89***	

8.2.2 Maintenance menu

To access the maintenance menu:

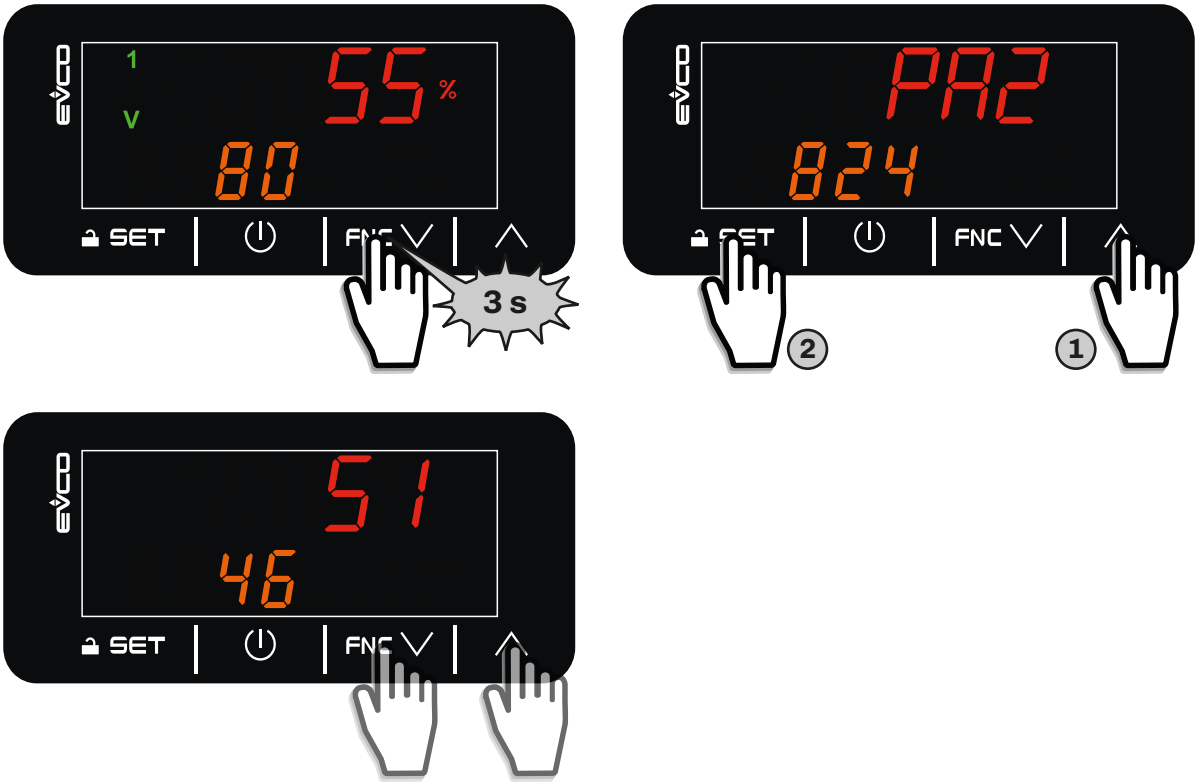


Fig. 63. *Maintenance menu*

The following is a table with the labels shown on the display and their description:

Top line	Bottom line	Description
S2	Sensor S2 value	Displays the value read by sensor S2 if it is connected.
S3	Sensor S3 value	Displays the value read by sensor S3 if it is connected.
CU	**CV** input status.	Displays the status of the **CV** digital input (fan enable) if it is connected. **OFF** = **CV** input closed; **On** = **CV** input open.
OI	**0/1** input status	Displays the status of the **0/1** digital input (remote ON/OFF) if it is connected. **OFF** = **0/1** input closed; **On** = **0/1** input open.
SO	**S0** input status	Displays the status of the **S0** digital input (remote humidistat enable) if it is connected. **OFF** = **S0** input closed; **On** = **S0** input open.
oEU1	Branch 1 solenoid valve output status	Displays the status of the branch 1 solenoid valve output. **OFF** = Branch 1 solenoid valve output OFF; **ON** = Branch 1 solenoid valve output ON.
oEU2	Branch 2 solenoid valve output status	Displays the status of the branch 2 solenoid valve output. **OFF** = Branch 2 solenoid valve output OFF; **ON** = Branch 2 solenoid valve output ON.
oEU3	Branch 3 solenoid valve output status	Displays the status of the branch 3 solenoid valve output. **OFF** = Branch 3 solenoid valve output OFF; **ON** = Branch 3 solenoid valve output ON.
oEUi	Branch 3 solenoid valve output status	Displays the status of the inlet solenoid valve output. **OFF** = Inlet solenoid valve output OFF; **ON** = Inlet solenoid valve output ON.
oEUo	Branch 3 solenoid valve output status	Displays the status of the outlet solenoid valve output. **OFF** = Outlet solenoid valve output OFF; **ON** = Outlet solenoid valve output ON.
oAL	General alarm output status	Displays the status of the general alarm output. **OFF** = General alarm output OFF; **ON** = General alarm output ON.

Top line	Bottom line	Description
oEU4	Branch 4 solenoid valve output status	Displays the status of the branch 4 solenoid valve output. **OFF** = Branch 4 solenoid valve output OFF; **ON** = Branch 4 solenoid valve output ON.
oEU5	Branch 5 solenoid valve output status	Displays the status of the branch 5 solenoid valve output. **OFF** = Branch 5 solenoid valve output OFF; **ON** = Branch 5 solenoid valve output ON.
oEU6	Branch 6 solenoid valve output status	Displays the status of the branch 6 solenoid valve output. **OFF** = Branch 6 solenoid valve output OFF; **ON** = Branch 6 solenoid valve output ON.
oEU7	Branch 7 solenoid valve output status	Displays the status of the branch 7 solenoid valve output. **OFF** = Branch 7 solenoid valve output OFF; **ON** = Branch 7 solenoid valve output ON.
HrS	Operating hours management page	Enters the page that displays the operating hours of the humidifier and its parts. To access the page: Double tap the SET key, enter password **PA2** using the FNC ∨ or ∧ keys, and tap SET to confirm.
MAnu	Output forcing page	Enters the output forcing page. To access the page: Double tap the SET key, enter password **PA2** using the FNC ∨ or ∧ keys, and tap SET to confirm.

8.2.3 Displaying/resetting the operating hours

The operating hours can be displayed and reset from the maintenance menu.

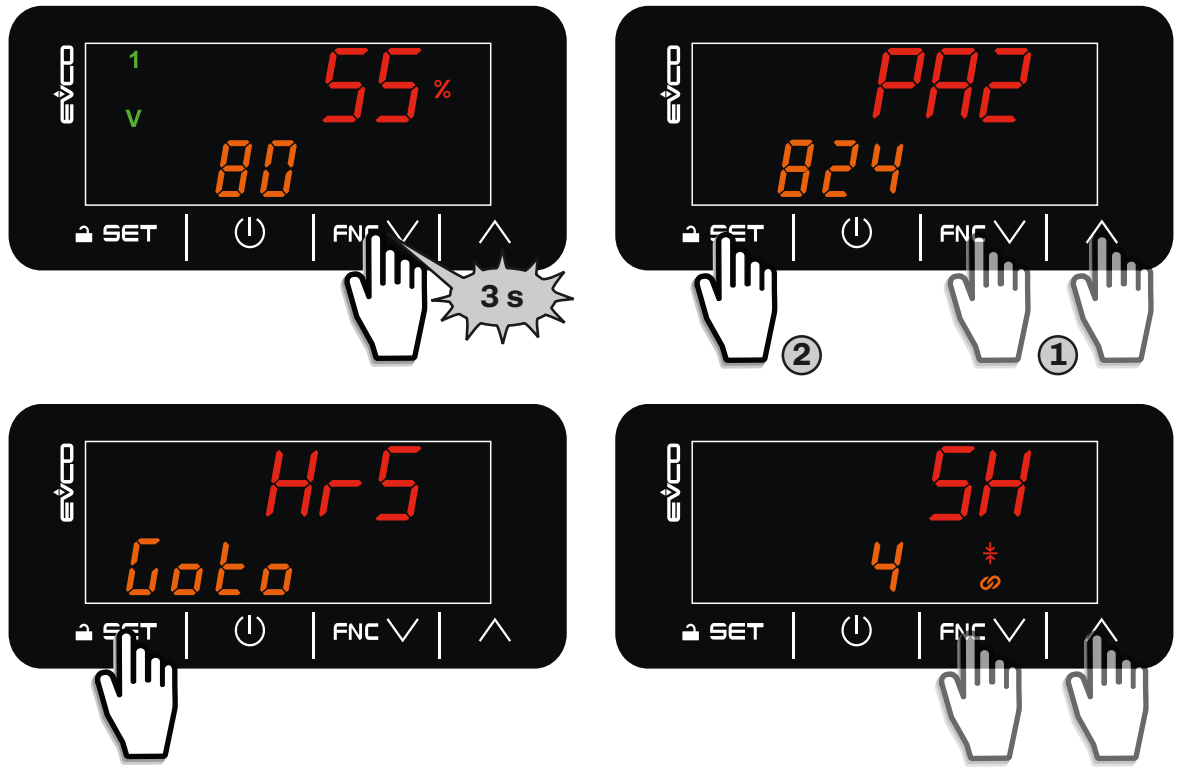


Fig. 64. *Displaying the operating hours*

The following is a table with the labels shown on the display and their description:

Top line	Bottom line	Description
SH	Humidifier hours	Displays the hours of humidifier operation.
EU1H	Branch 1 SV. hours	Displays the hours of branch 1 solenoid valve operation.
EU1A	No. branch 1 SV. activations	Displays the number of branch 1 solenoid valve activations.
EU2H	Branch 2 SV. hours	Displays the hours of branch 2 solenoid valve operation.
EU2A	No. branch 2 SV. activations	Displays the number of branch 2 solenoid valve activations.
EU3H	Branch 3 SV. hours	Displays the hours of branch 3 solenoid valve operation.
EU3A	No. branch 3 SV. activations	Displays the number of branch 3 solenoid valve activations.

Top line	Bottom line	Description
EUiH	Inlet SV hours	Displays the hours of outlet solenoid valve operation.
EUiA	No. inlet SV. activations	Displays the number of inlet solenoid valve activations.
EUoH	Inlet SV. hours	Displays the hours of outlet solenoid valve operation.
EUoA	No. outlet SV. activations	Displays the number of outlet solenoid valve activations.
EU4H	Branch 4 SV. hours	Displays the hours of branch 4 solenoid valve operation.
EU4A	No. branch 4 SV. activations	Displays the number of branch 4 solenoid valve activations.
EU5H	Branch 5 SV. hours	Displays the hours of branch 5 solenoid valve operation.
EU5A	No. branch 5 SV. activations	Displays the number of branch 5 solenoid valve activations.
EU6H	Branch 6 SV. hours	Displays the hours of branch 6 solenoid valve operation.
EU6A	No. branch 6 SV. activations	Displays the number of branch 6 solenoid valve activations.
EU7H	Branch 7 SV. hours	Displays the hours of branch 7 solenoid valve operation.
EU7A	No. branch 7 SV. activations	Displays the number of branch 7 solenoid valve activations.

Resetting the operating hours
The operating hours can be reset by setting the parameters to 0.

8.2.4 Output functional test

The output functional test page can be accessed from the maintenance menu. Here the outputs can be forced on or off:

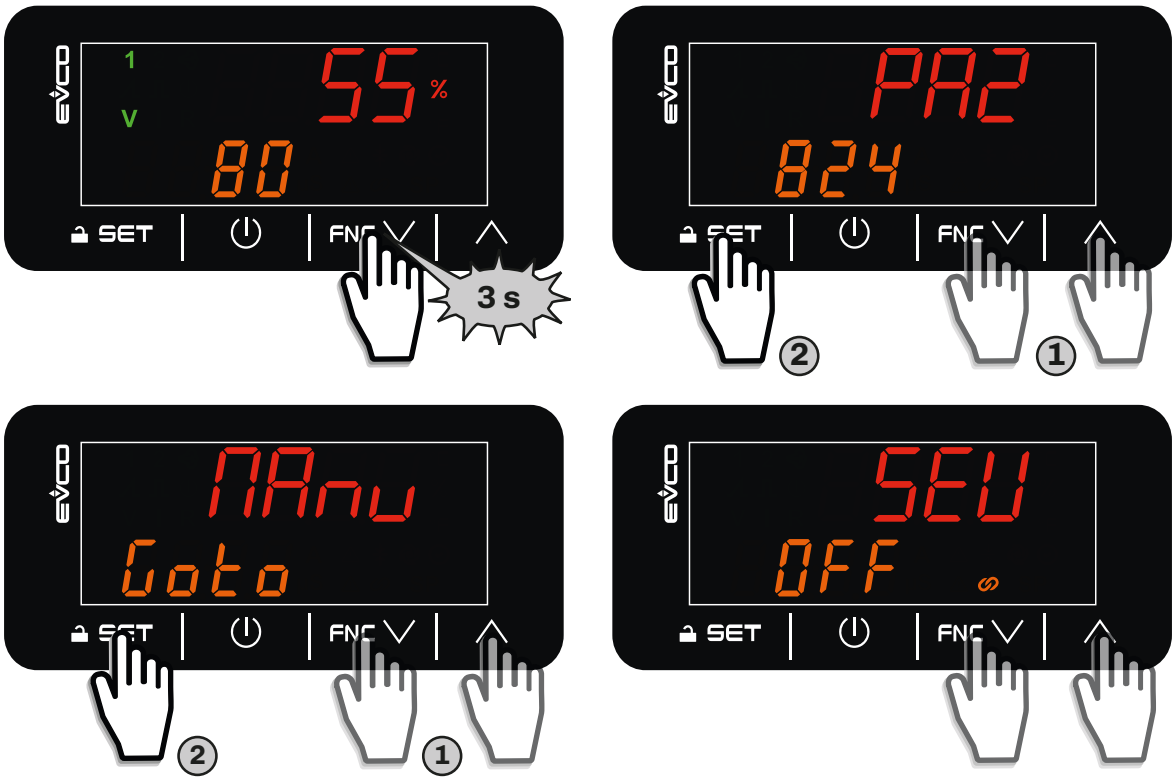


Fig. 65. *Output functional test*

The table below contains the labels shown on the display and their descriptions:

Top line	Bottom line	Description
SEU1	Branch 1 SV output status	Forces the branch 1 solenoid valve output on/off. **OFF** = Branch 1 solenoid valve output forced OFF; **ON** = Branch 1 solenoid valve output forced ON.
SEU2	Branch 2 SV output status	Forces the branch 2 solenoid valve output on/off. **OFF** = Branch 2 solenoid valve output forced OFF; **ON** = Branch 2 solenoid valve output forced ON.

Top line	Bottom line	Description
SEU3	Branch 3 SV output status	Forces the branch 3 solenoid valve output on/off. **OFF** = Branch 3 solenoid valve output forced OFF; **ON** = Branch 3 solenoid valve output forced ON.
SEUi	Inlet SV output status	Forces the inlet solenoid valve output on/off. **OFF** = Inlet solenoid valve output forced OFF; **ON** = Inlet solenoid valve output forced ON.
SEUo	Outlet SV output status	Forces the outlet solenoid valve output on/off. **OFF** = Outlet solenoid valve output forced OFF; **ON** = Outlet solenoid valve output forced ON.
SAL	General alarm output status	Forces the general alarm output on/off. **OFF** = General alarm output forced OFF; **ON** = General alarm output forced ON.
SEU4	Branch 4 SV output status	Forces the branch 4 solenoid valve output on/off. **OFF** = Branch 4 solenoid valve output forced OFF; **ON** = Branch 4 solenoid valve output forced ON.
SEU5	Branch 5 SV output status	Forces the branch 5 solenoid valve output on/off. **OFF** = Branch 5 solenoid valve output forced OFF; **ON** = Branch 5 solenoid valve output forced ON.
SEU6	Branch 6 SV output status	Forces the branch 6 solenoid valve output on/off. **OFF** = Branch 6 solenoid valve output forced OFF; **ON** = Branch 6 solenoid valve output forced ON.
SEU7	Branch 7 SV output status	Forces the branch 7 solenoid valve output on/off. **OFF** = Branch 7 solenoid valve output forced OFF; **ON** = Branch 7 solenoid valve output forced ON.
Sd	Dehumidification enable output status	Forces the dehumidifier enable output on/off. **OFF** = Dehumidification enable output forced OFF; **ON** = Dehumidification enable output forced ON.

9. POWER-UP AND START-UP

Chapter content

This chapter contains the following information:

9.1 Before you start

Startup is an investment for the customer.

The personnel responsible for operating and servicing the system must actively participate in the startup process.

The startup procedures are used to:

- Test the system;
- Train personnel in proper operational maintenance of the system.

The training is intended to:

- Ensure that the personnel who operate and carry out routine maintenance on the system are offered the best possible operating and safety conditions;
- Achieve maximum system efficiency;
- Prevent costly maintenance and machine downtime caused by negligence and/or inadequate knowledge/training in terms of its operating principles.

The control unit has a protection degree of IP20, therefore it is not suitable for installation in areas exposed to atmospheric conditions.

⚠ WARNING

RISK OF ELECTRIC SHOCK, EXPLOSION OR FIRE

Install the equipment in sheltered areas which are not exposed to atmospheric conditions.

The distribution rack has a protection level of IP40, therefore it is not suitable for installation in areas exposed to the weather.

⚠ WARNING

RISK OF ELECTRIC SHOCK, EXPLOSION OR FIRE

Install the equipment in sheltered areas which are not exposed to atmospheric conditions.

To drain the water fully, the distribution rack branches must have a slope of 0.2...1° (3 mm per metre).

9.2 First start-up instructions

9.2.1 Safety instructions

⚠ ⚠ DANGER

RISK OF ELECTRIC SHOCK, EXPLOSION OR ELECTRIC ARC

- Do not install the equipment while the power supply is connected.
- Cut off the power supply to all equipment, including any connected devices, and remove the power fuses before removing any covers or hatches, or before installing/uninstalling accessories, hardware, cables or wires.
- Always use a properly calibrated Voltmeter to make sure the system is powered off.
- Do not touch the unshielded components or the terminals while they are live.
- Make sure there is an effective earth connection; if there is not, earth the equipment.
- Before applying voltage to the equipment:
  - Make sure all protective elements, such as covers, hatches and grilles, are fitted and/or closed.
  - Check all wiring connections.

NOTICE

MALFUNCTIONING OF THE EQUIPMENT

- Make sure the water mains is correctly connected.
- Make sure the water connections are tightened properly and eliminate any drips.
- Make sure that the NO solenoid valve can completely drain the distribution network or rack, otherwise the user shall be responsible for any bacterial proliferation resulting in a health risk, and the manufacturer shall not be held liable.
- Make sure that the water quality and flow meets the technical requirements specified in the chapter ***"5.3 INSTALLING THE PLUMBING" ON PAGE 33***.

Make sure the humidifier and all the installed components are properly connected before start-up, in accordance with regulations, criteria and all applicable local, regional and national standards.

At the first start-up, the machine is disabled until the red cap has been replaced with the yellow cap, and the inlet water conductivity has been entered, after which the humidifier OFF screen will open automatically.

9.2.2 Operating instructions

To start the humidifier (with humidistat or sensor connected):

- ☐ • Check the pump unit power supply
- ☐ • Check the electrical connection between the control unit and distribution rack
- ☐ • Check that the tightening torques of the electrical connections comply with the local regulations
- ☐ • Check the filling and drain network (see sections: ***"5.3 INSTALLING THE PLUMBING" ON PAGE 33***, ***"5.4 WATER DRAINAGE SYSTEM" ON PAGE 34*** and ***"5.5 DISTRIBUTION IN THE AHU" ON PAGE 35***);
- ☐ • Check the production capacity of the reverse osmosis system
- ☐ • Make sure the osmosis water production system is working
- ☐ • Make sure the water supply pipes before the pump unit have been suitably purged and cleaned of any remnants/ evidence of work on the system
- ☐ • Check the water connections between the osmosis water production system and the control unit
- ☐ • Check the water connection with a pipe suitable for high pressure (at least 150 bar) between the control unit and the distribution rack
- ☐ • Connect the humidistat or sensor as required ***(SEE "6.6 CONFIGURATIONS" ON PAGE 49);***
- ☐ • Make sure there is a control signal on the rack control unit[1]
- ☐ • Fit the power fuses;
- ☐ • Check that the **CV** [2] contact is closed, see ***"6.5 ELECTRICAL CONNECTIONS" ON PAGE 46;***
- ☐ • Replace the red cap with the yellow cap. The cap must be replaced before the humidifier can be used. When starting up the machine, the display will prompt you to confirm that the cap has been replaced;
- ☐ • Close the pump unit and distribution rack;
- ☐ • Activate the isolator installed outside the humidifier and open the water supply source;
- ☐ • Press the ON/OFF button on the user interface to start the humidifier;
- ☐ • Set the electrical conductivity of the incoming water (if you do not have the electrical conductivity value of the water, it can be obtained from the website of the drinking water supplier);
- ☐ • Make sure the entire system is working properly in accordance with the instructions in the operating and maintenance manual, and that the external regulation is working correctly
- ☐ • Set the humidity setpoint **SP** to 100%;

[1] **NOTE**: With the exception of situations where the system needs to be installed by the Support Centre, which will carry out the startup procedure.

[2] **NOTE**: For VDI6022-1 compliance, connection to ventilation consent is mandatory. In case of lack of ventilation in the AHU, the humidifier must be in the STOP state.

NOTICE
RISK OF ELECTRIC SHOCK, EXPLOSION OR FIRE The first oil change should take place between 50...150 hours of operation. For subsequent changes, please refer to the operating manual.

9.3 Instructions for seasonal or long-term shut-down

If you need to switch off the humidifier for long periods of time, always make sure that all water has been drained from the system.

⚠ ⚠ WARNING

BIOLOGICAL RISK

- In the event of improper use and installation, microorganisms (including the bacteria that cause Legionellosis) may proliferate and be transferred into the air treatment system after the humidifier has been shut down for a long time.
- In the event of poor maintenance/cleaning after the humidifier has been shut-down for a long time, microorganisms (including the bacteria that cause Legionellosis) may proliferate and be transferred into the air treatment system.
- The humidifier must be used properly and be maintained and cleaned properly at prescribed intervals, as described in the ***MAINTENANCE*** chapter.

- Set the humidity request setpoint **SP1** to 0% on each distribution rack installed or on the pump unit if in single-branch or room mode;
- Make sure that all water has been drained from the system;
- Switch off the humidifier.

NOTE: The humidifier is turned off gradually (not instantaneously) so as to allow the AHU to dry completely. The drain valve is of the normally open (NO) type, this allows drying as even with the AHU turned off, the distribution and drain circuit remain open in the absence of water supply.

9.4 Starting up after a seasonal or long-term shut-down

- Check the supply and drain network (see paragraphs: ***"5.3 INSTALLING THE PLUMBING" ON PAGE 33, "5.4 WATER DRAINAGE SYSTEM" ON PAGE 34*** and ***"5.5 DISTRIBUTION IN THE AHU" ON PAGE 35***);
- Check the power fuses;
- Check the humidistat or sensor connections, depending on the required operation ***(SEE "6.5 ELECTRICAL CONNECTIONS" ON PAGE 46);***
- Check that the contacts **CV** and **S0** are closed (see ***"6.5 ELECTRICAL CONNECTIONS" ON PAGE 46);***
- Close the pump unit;
- Activate the isolator installed outside the humidifier and open the water supply source;
- Press the ON/OFF button on the user interface to start the humidifier;
- Run the rack and AHU disinfection cycles;
- Set the humidity setpoint **SP** to the value required for the application;
- The humidifier runs a distribution rack washing cycle in order to keep the humidifier in a good operating condition.
- The humidifier starts to producing humidity on request.

10. OPERATION

Chapter content

This chapter contains the following information:

10.1 Operating principle

The **EHPN** series is the ELSTEAM solution for high-pressure adiabatic air humidification systems.

The **EHPN** series consists of 2 elements:

- Pump unit;
- Distribution rack with nozzles.

The **EHPN** high-pressure adiabatic humidifier produces mist by conveying high-pressure water (80 bar) in a distribution rack composed of nozzles. Microscopic holes in the nozzles atomise the water into a fine mist, which is absorbed by the air in the duct.

The **EHPN** series adiabatic humidification system regulates its operation according to the humidity request from the distribution rack(s). When there is a humidity request from the sensor or external signal (depending on the configuration), each rack opens one or more solenoid valves so that the nozzles installed on the distribution branches produce mist.

The droplet separator (optional) is used to stop and water droplets that were not atomised before entering the duct.

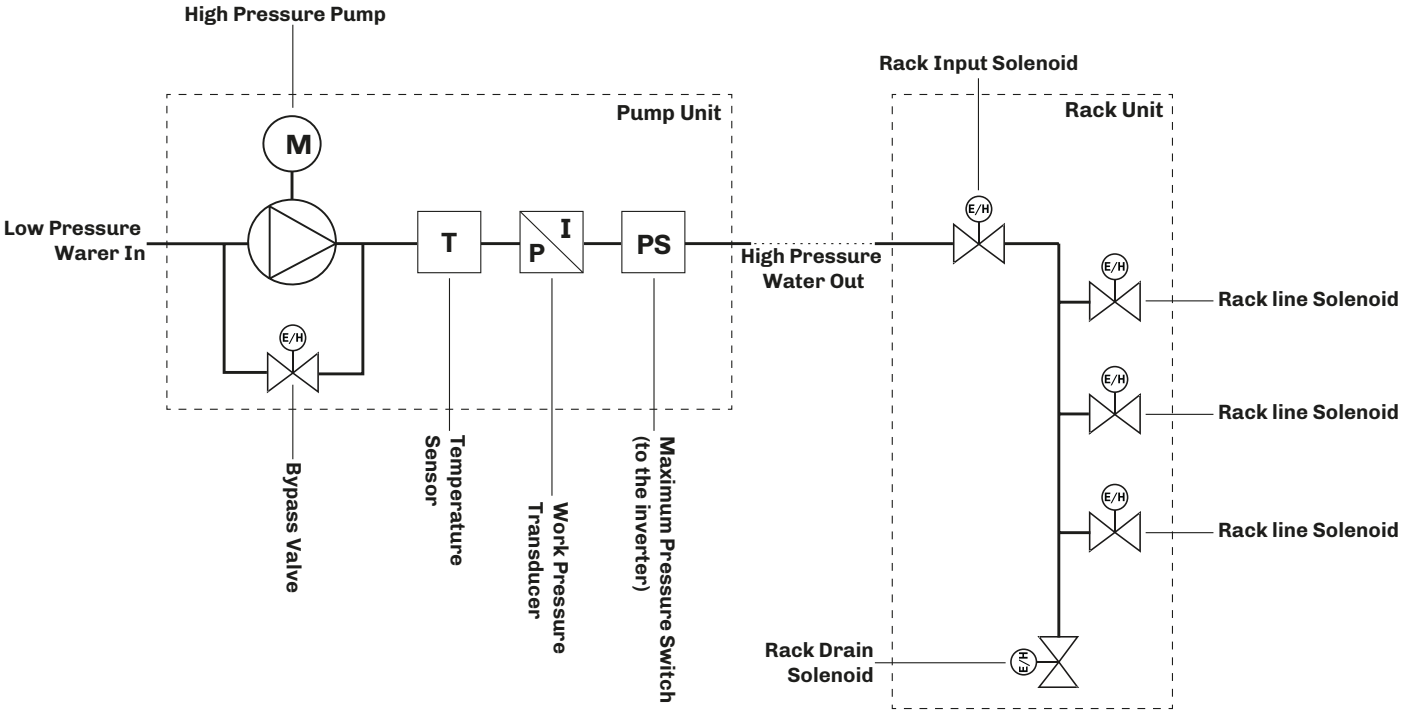


Fig. 66. *Operating principle diagram*

10.2 Humidity regulation

The humidity can be regulated in two ways:

- Operation with distribution in the room (or single-branch) | Parameter **P25 = 0**;
- Operation with distribution in the duct | Parameter **P25 ≠ 0**;

10.2.1 Operation with distribution in the room (or single-branch) | P25 = 0

With distribution in the room, the humidity can be regulated in two ways, depending on how the **CFGp** parameter is set in the pump unit user interface:

- ON-OFF regulation in the room (**CFGp** = 0-1);
- Regulation with the humidity sensor (**CFGp** = HUM).

Operation with distribution in the room (or single-branch) does not involve using the distribution rack, but a pipe (with nozzles) is simply connected to the outlet for the distribution racks.

ON-OFF regulation in the room

To use the **EHPN** with ON-OFF regulation, the following conditions must be met:

- **CFGp** = 0-1;
- **P25** = 0;
- Enable digital input closed (**CV**);
- Remote ON/OFF digital input closed (**0/1**).

When digital input **S0** is closed, the **EHPN** produces humidity at the maximum value set in parameter **r6**.

Regulation with the humidity sensor in the room

To use the **HPN** with regulation using a humidity sensor, the following conditions must be met:

- **CFGp** = HUM;
- **P25** = 0;
- Set parameter **P7** according to the sensor type to be used;
- Enable digital input closed (**CV**);
- Remote ON/OFF digital input closed (**0/1**).

Atomised water is produced when the humidity read by sensor **S3** drops below setpoint **SP1** and is no longer produced when the humidity > **SP1**+**r4**.

10.2.2 Operation with distribution in the duct | P25 ≠ 0

With distribution in the duct, the humidity can be regulated in four ways, depending on how the **CFG** parameter is set in the distribution rack user interface:

- ON-OFF regulation in the duct (**CFG** = 0-1);
- Proportional regulation in the duct (**CFG** = PROP);
- Regulation with the humidity sensor in the duct (**CFG** = HUM);
- Regulation with the humidity sensor and limit sensor in the duct (**CFG** = HUML)

ON-OFF regulation in the duct

To use the **EHPN** with ON-OFF regulation, the following conditions must be met:

- **CFG** = 0-1;
- **P25** ≠ 0;
- Enable digital input closed (**CV**);
- Remote ON/OFF digital input closed (**0/1**).

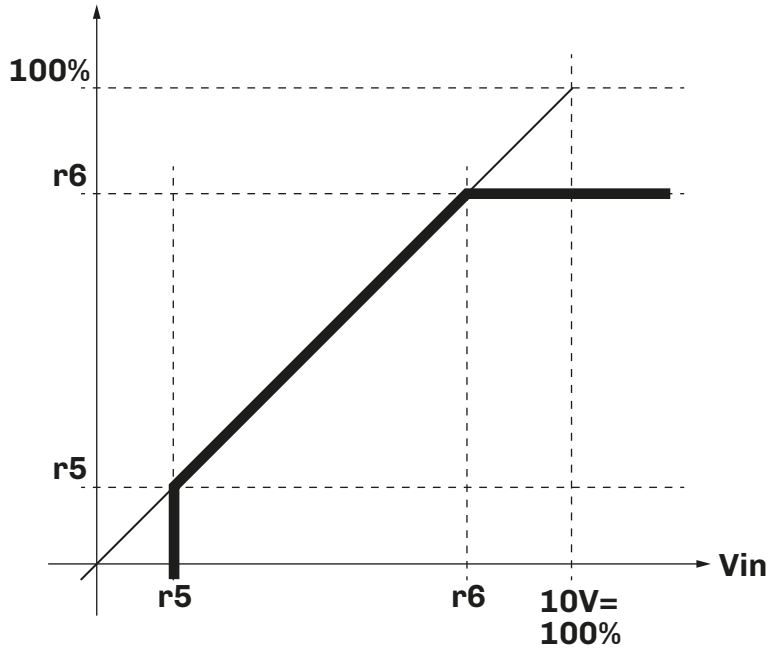
When digital input **S0** is closed, the **EHPN** produces humidity at the maximum value set in parameter **r6**.

Proportional regulation in the duct

To use the **EHPN** with proportional regulation, the following conditions must be met:

- **CFG** = PROP;
- **P25** ≠ 0;
- Enable digital input closed (**CV**);
- Remote ON/OFF digital input closed (**0/1**).

The humidity production varies with the value read at analogue input **S2**, with the logic expressed in the graph below, without exceeding parameter **r6**:



KEY	
Line	**Description**
——	V_{in}
▬	Production

Fig. 67. *How proportional regulation works | **CFG** = PROP*

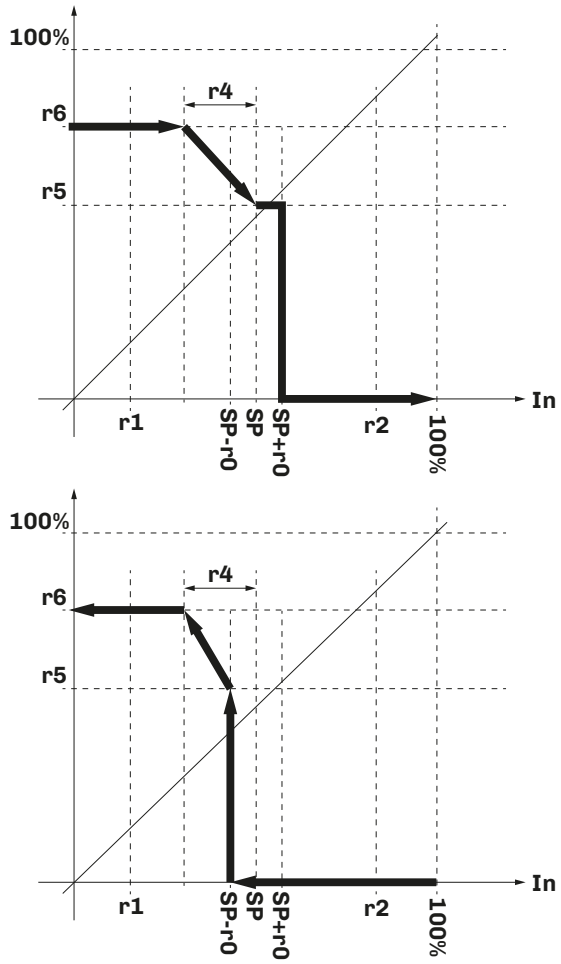
Regulation with the humidity sensor in the duct

To use the **HPN** with regulation using a humidity sensor, the following conditions must be met:

- **CFG** = HUM;
- **P25** ≠ 0;
- Set parameter **P7** according to the sensor type to be used;
- Enable digital input closed (**CV**);
- Remote ON/OFF digital input closed (**0/1**).

Atomised water is produced when the humidity drops below setpoint **SP1** and is no longer produced when the humidity > **SP1**+**r4**.

The humidity production varies with the value read at analogue input **S2**, with the logic expressed in the graph below, without exceeding parameter **r6**.



KEY	
Line	**Description**
——	V_{in}
▬	Production

Fig. 68. *How regulation with the humidity sensor works | **CFG** = HUM*

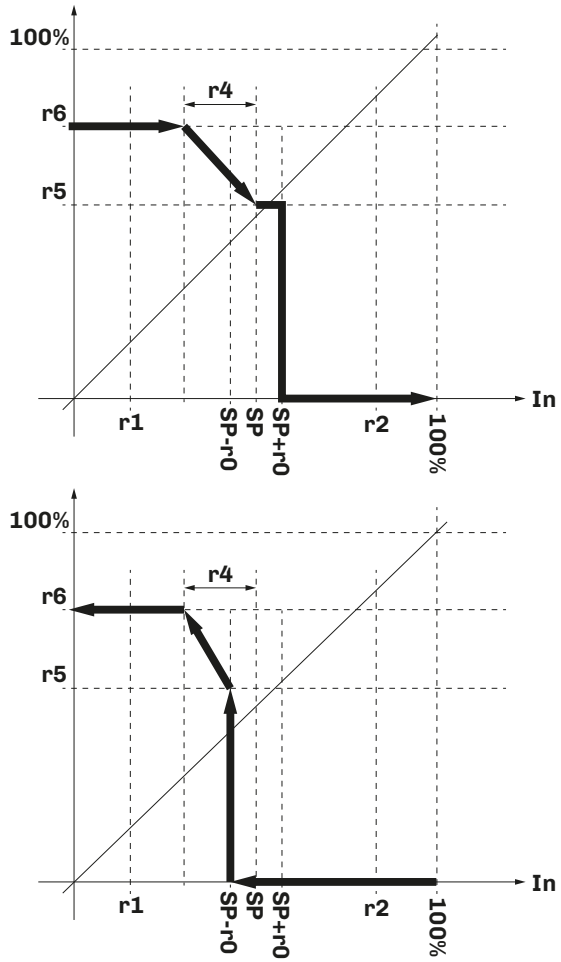
Regulation with the humidity sensor + limit sensor in the duct

To use the **EHPN** with regulation with a humidity sensor and limit sensor, the following conditions must be met:

- **CFG** = HUML;
- **P25** ≠ 0;
- Set parameter **P2** according to the sensor type to be used (for the main sensor);
- Set parameter **P7** according to the sensor type to be used (for the limit sensor);
- Enable digital input closed (**CV**);
- Remote ON/OFF digital input (**0/1**).

Atomised water is produced when the humidity drops below setpoint **SP1** and is no longer produced when the humidity > **SP1**+**r4**.

The humidity production varies with the value read at analogue input **S2**, with the logic expressed in the graph below, without exceeding parameter **r6**



KEY	
Line	**Description**
——	V_{in}
▬	Production

Fig. 69. *Regulation with the humidity sensor + limit sensor | **CFG** = HUML*

Humidity production behaves in the same way as for regulation with the humidity sensor (**CFG** = HUM), but the second sensor connected to analogue input **S3** stops steam generation, depending on the humidity delivery.

The humidity limit activates when the humidity measured by sensor **S3** exceeds **SP2**.

10.3 Rack management with initial VDI washing

When the zone requests humidity, the distribution rack requests the pump unit to activate the pump, and simultaneously all solenoid valves in both the racks and the pump unit open to allow a washing cycle for time **M8**.

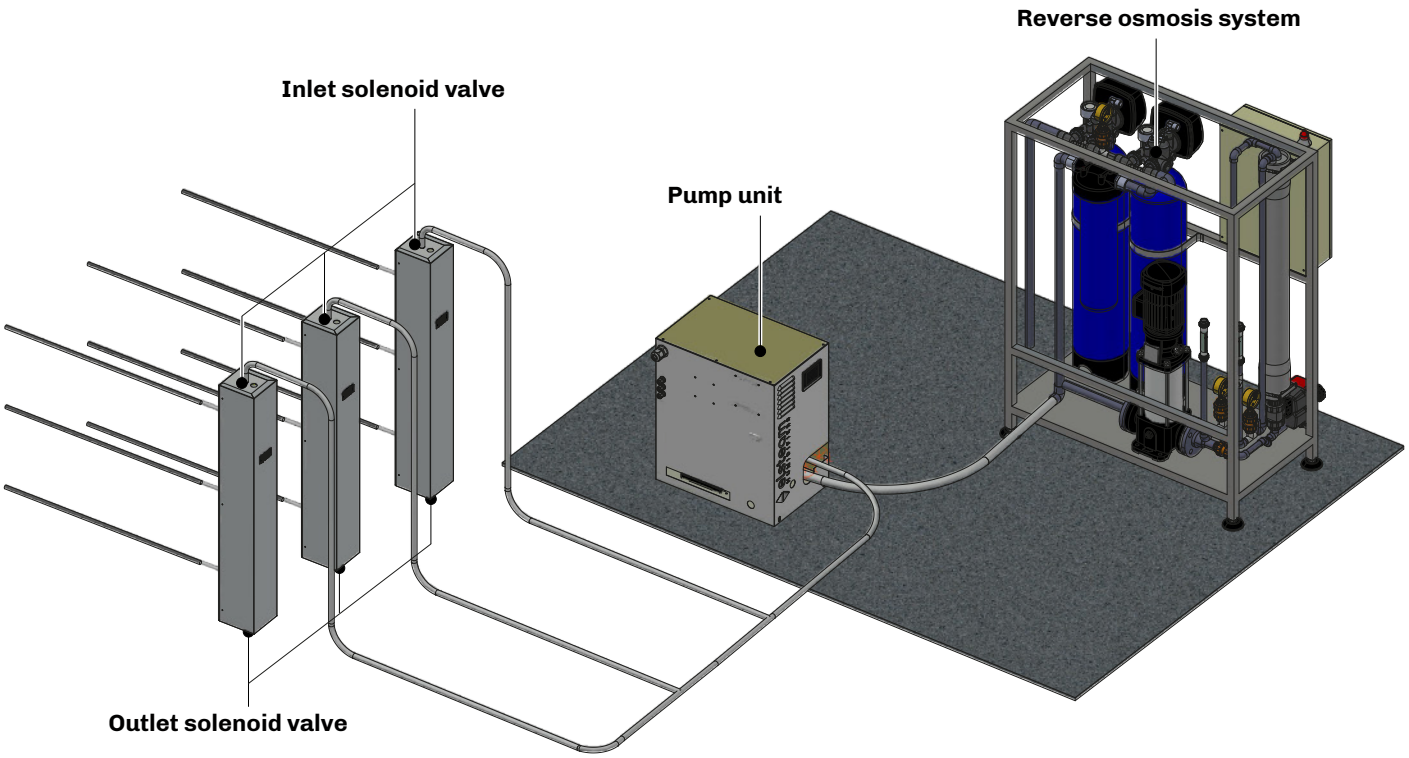


Fig. 70. *Rack management diagram*

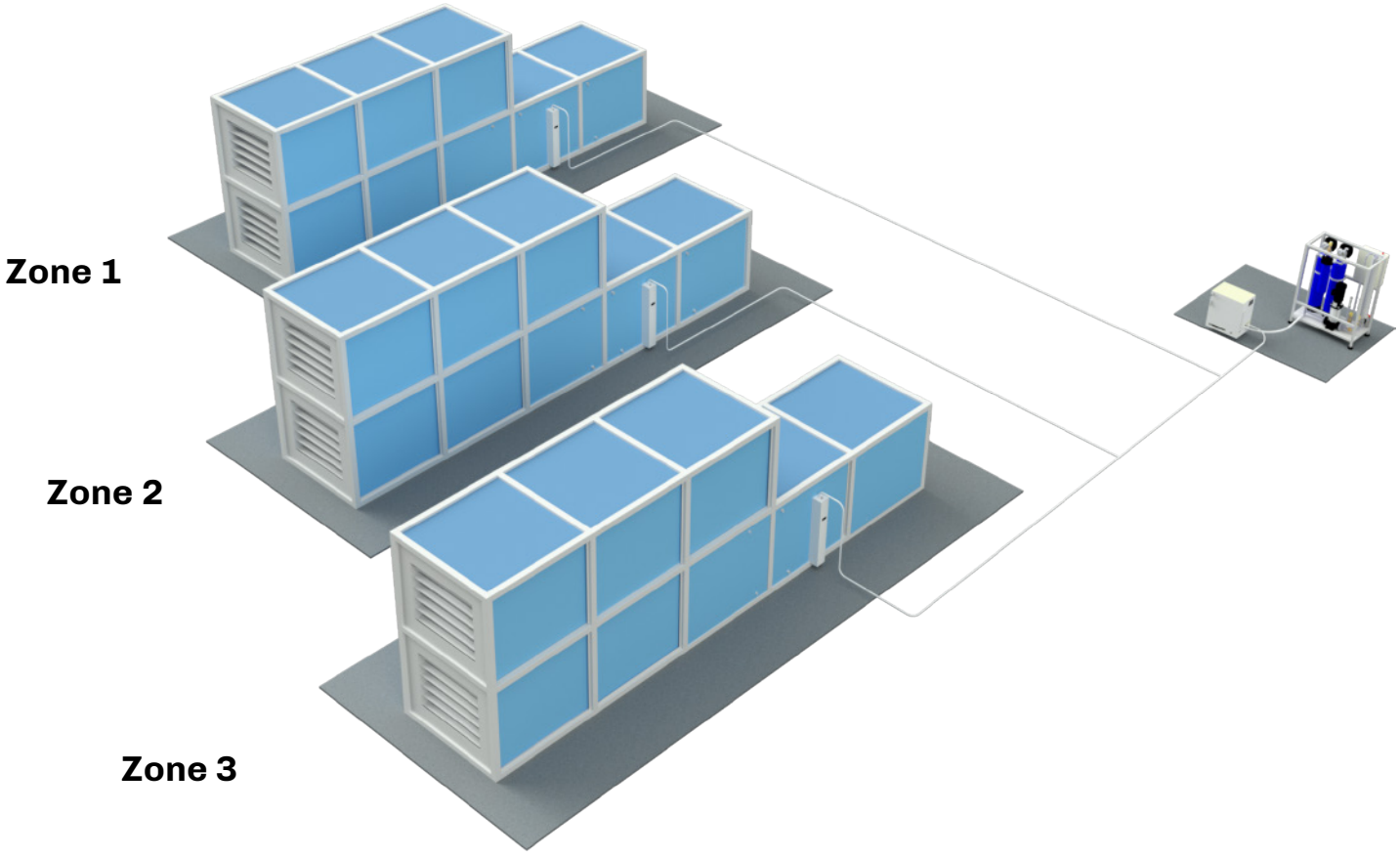


Fig. 71. *Rack management example*

After washing, the **EHPN** resumes working according the zone humidity requests.

The activation of the inlet solenoid valve is proportional to the request, always within the production range **r5** and **r6**, and the number of branches.

Par.	Description	MU	Range
P11	Number of branches installed.	num	1...7
r5	Minimum production.	%	20...**r6**
r6	Maximum production.	%	**r5**...100

The activation logic is as follows:

Humidity request < 20% (r5 minimum request)

- Branch 1, 2 and 3 solenoid valves closed
- Outlet solenoid valve open
- Control unit activation signal disabled

Humidity request 20...40%

- Solenoid valve 2 open (central branch)
- Outlet solenoid valve closed
- Control unit activation signal enabled

Humidity request 40...60%

- Solenoid valves 1 and 2 open
- Outlet solenoid valve closed
- Control unit activation signal enabled

Control signal 60...80% (r6 maximum request)

- Solenoid valves 1, 2 and 3 open
- Outlet solenoid valve closed
- Control unit activation signal enabled

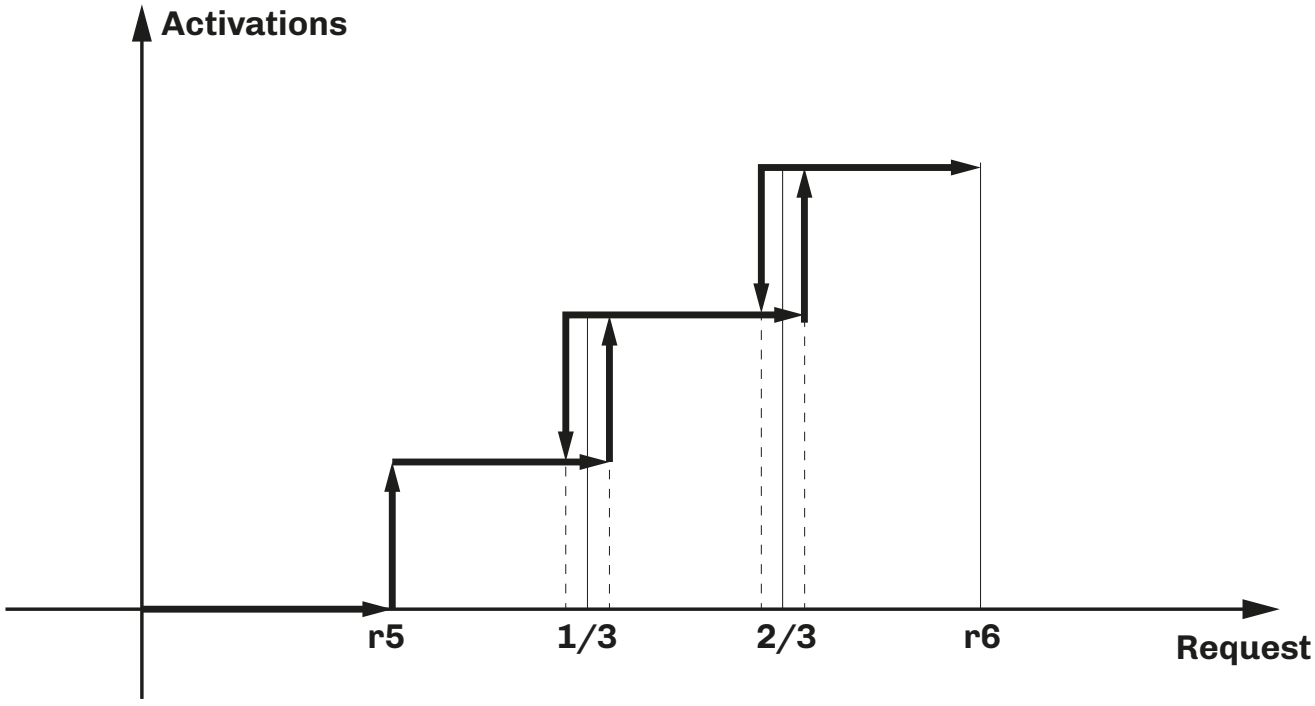


Fig. 72. *Rack management diagram*

If two branches are configured, the first branch is always activated with a request above the minimum production **r5**, while the second branch is activated when the request exceeds (**r5**+((**r5**+**r6**)/2).

If there is only one branch, this is always active with a humidity request above the minimum **r5**.

10.4 Pump management (in the pump unit)

On a humidity request from the racks, the motor/pump unit provides the ON signal and ramps the drive inverter up to the nominal pressure.

Once the nominal pressure is reached, the pump temperature is also monitored; it is stopped with alarm **AL02** if the temperature is below **M0** or with alarm **AL03** if the temperature is above **M1**.

If instead the nominal temperature is not reached within the time **c4**, the pumps is stopped with alarm **AL01**.

10.5 Changing oil

There are times for the first oil change and the subsequent ones. Moreover, there are two time thresholds:

- A threshold above which only the maintenance warning (non-blocking) is displayed;
- A threshold above which the machine will be blocked with the corresponding alarm.

The **EHPN** calculates the maintenance thresholds automatically, based on the electrical conductivity of the water. In any case they can still be changed via parameters.

The parameters that define the oil change maintenance are as follows:

Par.	Description	MU	Range
c0	First oil change interval.	h	50...100
c1	First oil change tolerance.	h	20...**70**
c2	Subsequent oil change interval.	h	500...2000
c3	Subsequent oil change tolerance.	h	50...200

The **EHPN** calculates the pump operating hours threshold automatically.

Once the maintenance has been carried out, reset the operating hours in the Counter section of the Maintenance menu.

10.6 Operating hours

To allow periodic maintenance, the **EHPN** records the hours of humidifier operation divided as follows:

- Pump unit;
- Distribution rack.

10.6.1 Hours of pump unit operation

The following times are monitored:

- Hours of unit operation;
- Hours of pump operation;
- Hours of inverter operation;
- Hours of single-branch or room solenoid valve operation;
- Hours of outlet solenoid valve operation;
- Hours or reverse osmosis system operation (if reserved for the humidifier);
- Hours of filter operation (if installed);
- Hours of pump oil operation.

The configuration parameters (on the pump unit interface) for the maintenance warning thresholds are:

Par.	Description	MU	Range
M10	Maintenance hours warning threshold for the unit.	hx10	100...10000
M12	Maintenance hours warning threshold for the inverter.	hx10	100...10000
M13	Maintenance hours warning threshold for the single-branch or room solenoid valve.	hx10	100...10000
M14	Maintenance hours warning threshold for the disinfection valve.	hx10	100...10000
M15	Maintenance hours warning threshold for the outlet solenoid valve.	hx10	100...10000
M16	Maintenance hours warning threshold for the reverse osmosis system.	hx10	100...10000
M17	Maintenance hours warning threshold for the filters.	hx10	100...10000
M18	Number of activations warning for the solenoid valves.	nx1000	100...10000

10.6.2 Hours of distribution rack operation

The following times are monitored:

- Hours of unit operation;
- Hours of branch 1 solenoid valve operation;
- Hours of branch 2 solenoid valve operation;
- Hours of branch 3 solenoid valve operation;
- Hours of inlet solenoid valve operation;
- Hours of outlet solenoid valve operation;
- Hours of branch 4 solenoid valve operation;
- Hours of branch 5 solenoid valve operation;
- Hours of branch 6 solenoid valve operation;
- Hours of branch 7 solenoid valve operation;

The configuration parameters (on the distribution rack interface) for the maintenance warning thresholds are:

Par.	Description	MU	Range
M10	Maintenance hours warning threshold for the unit.	hx10	100...10000
M11	Maintenance hours warning threshold for the branch 1 solenoid valve.	hx10	100...10000
M12	Maintenance hours warning threshold for the branch 2 solenoid valve.	hx10	100...10000
M13	Maintenance hours warning threshold for the branch 3...7 solenoid valve.	hx10	100...10000
M14	Maintenance hours warning threshold for the inlet solenoid valve.	hx10	100...10000
M15	Maintenance hours warning threshold for the outlet solenoid valve.	hx10	100...10000
M18	Number of activations warning for the solenoid valves.	nx1000	100...10000

11. CONFIGURATION PARAMETERS

Chapter content

This chapter contains the following information:

Description of columns in the Table of Parameters

- **Par.**: List of configurable device parameters;
- **Description**: Indicates parameter operation and any possible selections;
- **MU**: Measurement unit relating to the parameter;
- **Range**: Describes the interval of values that the parameter can assume. This can be correlated with other instrument parameters (indicated with the parameter code).
  ***NOTE**: if the actual value is outside the permitted limits for that parameter (for example, because other parameters defining the aforementioned limits have been altered), the value of the violated limit is displayed instead of the actual value;*
- **Default**: Indicates the pre-set factory configuration;
- **PW**: Indicates the access level for the parameter:
  - **U** = User parameters;
  - **M** = Maintenance parameters.

11.1 Regulation parameter table for the pump unit

Par.	Description	MU	Range	Default	PW
	SETPOINT group				
SP1	Humidity only setpoint **P25** = 0.	%	**r1...r2**	70.0	U
SP4	Pressure setpoint.	bar	70...90	80	M
	CONFIGURATION group				
CFGp	Operating mode (see ***"10.2 HUMIDITY REGULATION" ON PAGE 78***) **0-1** (0) = ON/OFF from digital input; **HUM** (1) = Humidity sensor.	---	0-1 / HUM	0-1	U
P1	Electrical conductivity of the water.	µS/cm	0...1500	100	M
P2	**S2** sensor type (pressure transducer). **0-10** (1) = Proportional input 0...10 V; **0-5** (2) = Proportional input 0...5 V; **0.20** (3) = Input 0...20 mA; **4.20** (4) = Input 4...20 mA;	---	0-10 / 0-5 / 0.20 / 4.20	4.20	M
P3	**S2** minimum value (pressure transducer).	bar	0...200	0	M
P4	**S2** maximum value (pressure transducer).	bar	0...200	200	M
P5	**S2** sensor offset (pressure transducer).	bar	-10...10	0	M
P6	**S1** sensor offset (temperature).	°C/°F	-10.0...10.0	0.0	M
P7	**S3** sensor type. **0-10** (1) = Proportional input 0...10 V; **0-5** (2) = Proportional input 0...5 V; **0.20** (3) = Input 0...20 mA; **4.20** (4) = Input 4...20 mA; **E520** (5) = EVHTP520 proprietary probe.	---	0-10 / 0-5 / 0.20 / 4.20 / E520	0-10	M
P8	**S3** minimum value (if **CFGp** = HUM).	%rH	0...100	0	M
P9	**S3** maximum value (if **CFGp** = HUM).	%rH	0...100	100	M
P10	**S3** humidity sensor offset (if **CFGp** = HUM).	%rH	-10...10	0	M
P13	Number of nozzles on last branch (highest).	num	1...100	1	M
P14	Nozzle capacity. **0** = 4 l/h; **1** = 8 l/h.	---	0/1	1	M
P21	Temperature unit of measure (changing value means that the temperature parameter limits will need to be reset manually). **0** = °C; **1** = °F.	---	0/1	0	M
P22	Steam production unit of measurement. **0** = kg/h; **1** = lb/h.	---	0/1	0	M
P25	Rack number.	num	0...3	1	M
	REGULATION group				
r0	Standard pressure setpoint hysteresis (**SP4**).	%	0...10	5	U
r1	Minimum value for setting humidity setpoint.	%	0...**r2**	20	M
r2	Maximum value for setting humidity setpoint.	%	**r1**...100	95	M
r4	Humidity proportional band.	%	0...50	10	M
c4	Range to reach outlet pressure.	s	10...90	60	M
	MAINTENANCE/ALARMS group				
M0	Low pump temperature alarm threshold. The hysteresis is fixed at 2 °C/°F.	°C/°F	0.0...30.0	7.0	M

Par.	Description	MU	Range	Default	PW
M1	High pump temperature alarm threshold. The hysteresis is fixed at 2 °C/°F.	°C/°F	40.0...80.0	60.0	M
M2	Low outlet pressure alarm threshold.	bar	30...90	50	M
M3	Low outlet pressure alarm delay.	min	1...10	5	M
M4	High outlet pressure alarm threshold.	bar	80...100	95	M
M5	High outlet pressure alarm delay.	s	5...300	30	M
M6	Rack disinfection cycle on.	---	0/1	0	M
M7	AHU disinfection cycle on.	---	0/1	0	M
M8	VDI washing cycle duration.	s	5...60	30	M
M9	UTA washing cycle duration.	s	5...1800	600	M
M10	Maintenance hours warning threshold for the unit.	hx10	100...10000	4000	M
M12	Maintenance hours warning threshold for the inverter.	hx10	100...10000	2000	M
M13	Maintenance hours warning threshold for the branch 1 water inlet solenoid valve.	hx10	100...10000	1000	M
M14	Maintenance hours warning threshold for the disinfection valve.	hx10	100...10000	1000	M
M15	Maintenance hours warning threshold for the outlet solenoid valve.	hx10	100...10000	1000	M
M16	Maintenance hours warning threshold for the reverse osmosis system.	hx10	100...10000	0	M
M17	Maintenance hours warning threshold for the filters.	hx10	100...10000	0	M
M18	Number of activations warning for the solenoid valves.	nx1000	100...10000	2000	M
	COMMUNICATION group				
LA1	Modbus communication protocol address.	num	1...247	247	M
Lb1	Modbus transmission speed (baud rate). **0** = 2400; **1** = 4800; **2** = 9600; **3** = 19200; **4** = 38400.	---	0...4	4	M
LP1	Modbus parity bit. **0** = None; **1** = Odd; **2** = Even.	---	0...2	2	M
LS1	Modbus stop bit. **0** = 1 stop bit; **1** = 2 stop bits.	---	0/1	0	M
	PASSWORD group				
PA1	First level password. **0** = No password	---	-99...999	0	U
PA2	Second level password.	---	-99...999	824	M

11.2 Regulation parameter table for the distribution rack

Par.	Description	MU	Range	Default	PW
	SETPOINT group				
SP1	Humidity setpoint.	%	**r1...r2**	70	U
SP2	Humidity limit setpoint.	%	**r11...r12**	85	U
	CONFIGURATION group				
CFG	Operating mode (see ***"10.2 HUMIDITY REGULATION" ON PAGE 78***) **0-1** (0) = ON/OFF from digital input; **PROP** (1) = Proportional input; **HUM** (2) = Humidity sensor; **HUML** (3) = Humidity sensor + limit sensor;	---	0-1 / PROP / HUM / HUML	0-1	U
P2	Type of regulator/sensor/probe **S2** (regulation input). **NTC** (0) = NTC probe; **0-10** (1) = Proportional input 0...10 V; **0-5** (2) = Proportional input 0...5 V; **0.20** (3) = Input 0...20 mA; **4.20** (4) = Input 4...20 mA; **E520** (5) = EVHTP520 proprietary probe.	---	NTC / 0-10 / 0-5 / 0.20 / 4.20 / E520	0-10	M
P3	Minimum value **S2** (if **CFG** = HUM or **CFG** = HUML).	%rH	0...100	0	M
P4	Maximum value **S2** (if **CFG** = HUM or **CFG** = HUML).	%rH	0...100	100	M
P5	Sensor offset **S2** (if **CFG** = HUM or **CFG** = HUML).	%rH	-10...10	0	M
P7	**S3** sensor type(limit sensor). Similar to **P2**.	---	NTC / 0-10 / 0-5 / 0.20 / 4.20 / E520	0-10	M
P8	Minimum value **S3** (if **CFG** = HUML).	%rH	0...100	0	M
P9	Maximum value **S3** (if **CFG** = HUML).	%rH	0...100	100	M
P10	Sensor offset **S3** humidity (if **CFG** = HUML).	%rH	-10...10	0	M
P11	Number of branches installed.	num	1...7	3	M
P12	Number of nozzles from branch 1 to penultimate.	num	1...100	1	M
P13	Number of nozzles on last branch (highest).	num	1...100	1	M
P14	Nozzle capacity **0** = 4 l/h; **1** = 8 l/h.	---	0/1	1	M
P15	Rack network address.	---	1...3	1	M
	REGULATION group				
r0	Sensor 1 setpoint hysteresis.	%	0...20	2	U
r1	Minimum value for setting humidity setpoint.	%	0...**r2**	20	M
r2	Maximum value for setting humidity setpoint.	%	**r1**...100	95	M
r4	Humidity proportional band.	%	0...50	50	M
r5	Minimum production.	%	20...**r6**	20	M
r6	Maximum production.	%	**r5**...100	75	U
r10	Humidity limit probe setpoint hysteresis.	%	0...20	2	U
r11	Minimum value for setting humidity limit setpoint.	%	0...r12	20	M
r12	Maximum limit setpoint value.	%	**r11**...100	95	M
	MAINTENANCE/ALARMS group				
M5	Low humidity alarm threshold. The hysteresis is fixed at 2%. **0** = Disabled.	%	0...100	20	M
M6	High humidity alarm threshold. The hysteresis is fixed at 2%. **0** = Disabled.	%	0...100	95	M
M7	High/low humidity alarm delay. **0** = Disabled.	s	0...999	120	M
M8	VDI washing cycle duration.	s	5...60	30	M
M10	Maintenance hours warning threshold for the unit.	hx10	100...10000	4000	M
M11	Maintenance hours warning threshold for the branch 1 solenoid valve.	hx10	100...2000	1000	M
M12	Maintenance hours warning threshold for the branch 2 solenoid valve.	hx10	100...2000	1000	M
M13	Maintenance hours warning threshold for the branch 3...7 solenoid valve.	hx10	100...2000	1000	M
M14	Maintenance hours warning threshold for the inlet solenoid valve.	hx10	100...2000	1000	M
M15	Maintenance hours warning threshold for the outlet solenoid valve.	hx10	100...2000	1000	M
M18	Number of activations warning for the solenoid valves.	nx1000	100...10000	2000	M

Par.	Description	MU	Range	Default	PW
	COMMUNICATION group				
LA1	Modbus communication protocol address.	num	1...247	2	M
Lb1	Modbus transmission speed (baud rate). **0** = 2400; **1** = 4800; **2** = 9600; **3** = 19200; **4** = 38400.	---	0...4	2	M
LP1	Modbus parity bit. **0** = None; **1** = Odd; **2** = Even.	---	0...2	2	M
LS1	Modbus stop bit. **0** = 1 stop bit; **1** = 2 stop bits.	---	0/1	0	M
	PASSWORD group				
PA1	First level password. **0** = No password	---	-99...999	0	U
PA2	Second level password.	---	-99...999	824	M

12. MODBUS RTU FUNCTIONS AND RESOURCES

Chapter content

This chapter contains the following information:

12.1 Introduction

Modbus RTU (Remote Terminal Unit) protocol is a means of communication which allows data exchange between a computer and programmable logic controllers.

This protocol is based on the exchange of messages between master-slave and client-server devices. Master devices can receive information from slaves and write to their registers, while slave devices cannot initiate any information transfer until they receive a request from the slave device.

Modbus communication is used in industrial automation systems (IAS) and in the construction of building management systems (BMS). Modbus protocol is widely utilised due to the fact it is easy to use, very reliable and has an open source code that can be used royalty-free on any application or device.

Modbus RTU is the most common application and uses CRC error detection and binary encoding.

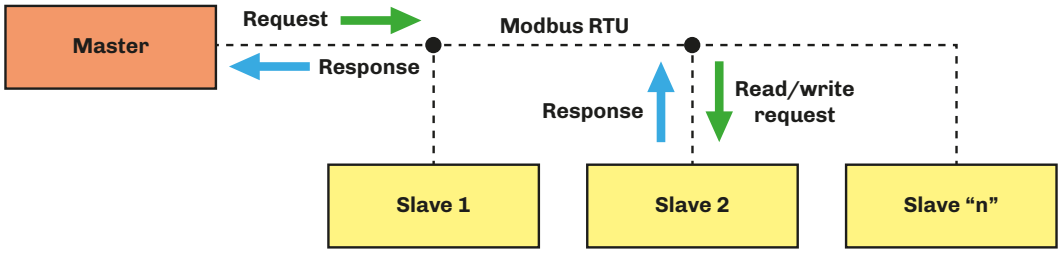


Fig. 73. *Diagram showing message exchange in a Modbus communication*

Modbus protocol establishes a Protocol Data Unit (PDU) independent from the communication layer below it, introducing some additional fields specified on the Application Data Unit (ADU) (***"FIG. 74. FRAMING OF A MESSAGE USING MODBUS PROTOCOL" ON PAGE 92***) to specific buses and networks.

Devices such as PLCs (Programmable Logic Controller), HMIs (Human Machine Interface), control panels, drivers, motion controllers, I/O devices, etc. can use Modbus to begin a remote procedure, and the protocol is often used to connect a supervising computer with a Remote Terminal Unit in a supervision, control and data acquisition (SCADA) system.

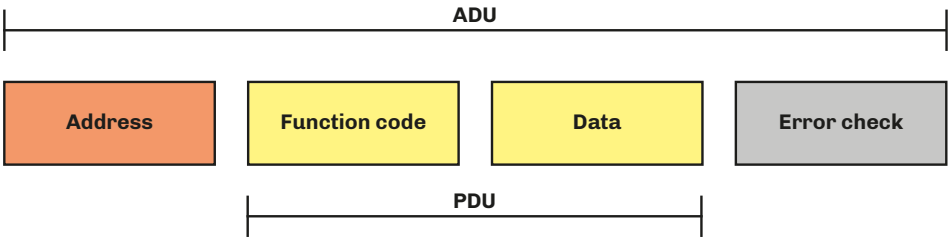


Fig. 74. *Framing of a message using Modbus protocol*

For further information relating to Modbus protocol, visit the official Modbus website: www.modbus.org.

12.2 Modbus message structure

Modbus RTU protocol requires the message to start with a silent time interval of at least 3.5 character times. This feature is often implemented by executing a time interval of multiple of character times at the baud rate used in the network. The characters available for each field are in binary form.

A description of the structure of a Modbus RTU message is provided below.

Start	Address	Function	Data	CRC	Stop
3.5 x character time	8 bit	8 bit	(N x 8 bit)	16 bit	3.5 x character time
Time period in which data must not be exchanged over the communication bus, to allow the connected instruments to recognise the end of one message and the start of the next	Corresponds to the address for the device with which the master has established dialogue; this is a value between 1...247. The address 0 is reserved for the broadcast message sent to all slave devices	Code for the function to execute or which has been executed	Contains the data sent by the master or sent back by the slave as a response to a question	Allows the master and the slave to check whether any errors are present during communication, and if there are, to ignore the message received	Time period in which data must not be exchanged over the communication bus, to allow the connected instruments to recognise the end of one message and the start of the next

12.3 Modbus functions and registers

The Modbus registers for the device are organised around the four types of basic data reference indicated above, and this type of data is further identified by the first number of the address.

12.3.1 Available Modbus commands and data areas

The commands implemented are as follows:

Command	Description
03 (hex 0x03)	Resource reading command
06 (hex 0x06)	Resource writing command

12.4 Address configuration

The RS-485 communication serial port can be used to configure the device, the parameters, the statuses and the Modbus variables and to monitor device operation using Modbus protocol.

The device address in a Modbus message is set by parameter **LA1**.

The address **0** is only used for broadcast messages, recognised by all slaves. Slave devices do not respond to a broadcast message.

Serial line configuration parameters, which can be accessed via the user interface menu, are:

Par.	Description	MU	Range	Default
LA1	Modbus communication protocol address.	---	0...247	247
Lb1	Modbus transmission speed (baud rate). **0** = 2400; **1** = 4800; **2** = 9600; **3** = 19200; **4** = 38400.	---	0...4	4
LP1	Modbus parity bit. **0** = None; **1** = Odd; **2** = Even.	---	0...2	2
LS1	Modbus stop bit. **0** = 1 stop bit; **1** = 2 stop bits.	---	0/1	0

The RS-485 RTU serial line has the following characteristics:

- RTU mode;
- Bit: 8 bit

12.5 Connections

For the entire system to work properly, including the RS-485 RTU serial line, observe the instructions provided in chapter ***"6. ELECTRICAL CONNECTIONS" ON PAGE 38***.

In particular, take care to make the connections correctly, observing the instructions in section ***"6.5 ELECTRICAL CONNECTIONS" ON PAGE 46***

12.6 Modbus table content

Table content description

The table below contains the information required to access the resources properly and directly.
There are two tables:

- The Modbus address table, which contains all the configuration parameters for the device and the corresponding Modbus addresses;
- Modbus resource table, which contains all the status (I/O) and alarm resources in the device memory.

Description of columns in the Table of addresses

- **Par.**: List of configurable device parameters;
- **Description**: Indicates parameter operation and any possible selections;
- **MU**: Measurement unit relating to the parameter;
- **Range**: Describes the interval of values that the parameter can assume. This can be correlated with other instrument parameters (indicated with the parameter code).
  NOTE: *if the actual value is outside the permitted limits for that parameter (for example, because other parameters defining the aforementioned limits have been altered), the value of the violated limit is displayed instead of the actual value;*
- **Val. Adr.**: Indicates the address of the Modbus register containing the resource you want to access;
- **R/W:** Indicates the option of reading or writing the resource:
  - **R**: The resource is read-only;
  - **W**: The resource is write-only;
  - **R/W**: The resource can be both read and written.
- **CPL**: When the fields indicates Y, the value read by the register needs to be converted because the value represents a number with a sign. In the other cases the value is always positive or zero.
- **DATA SIZE**: Indicates the size in data bits:
  - **DWORD** = 32 bit
  - **DOUBLE** = 32 bit
  - **WORD** = 16 bit
  - **Byte** = 8 bit
  - The "**n**" bits = 0...15 bit depending on the value of "n"

12.7 Pump unit

12.7.1 Modbus address table

Par.	Description	Val. Adr.	R/W	DATA SIZE	CPL	MU	Range
	SETPOINT group						
SP1	Humidity only setpoint **P25** = 0.	2079	R/W	SHORT	Y	%	**r1...r2**
SP4	Pressure setpoint.	2001	R/W	SHORT	Y	bar	70...90
	CONFIGURATION group						
PU01	Language. **ENG** (0) = English **ITA** (1) = Italian.	2000	R/W	1 BIT	---	---	0/1
CFGp	Operating mode. **0-1** (0) = ON/OFF from digital input; **HUM** (1) = Humidity sensor.	2080	R/W	1 BIT	---	---	0/1
P1	Electrical conductivity of the water.	2006	R/W	WORD	---	µS/cm	0...1500
P2	**S2** sensor type (pressure transducer). **0-10** (1) = Proportional input 0...10 V; **0-5** (2) = Proportional input 0...5 V; **0.20** (3) = Input 0...20 mA; **4.20** (4) = Input 4...20 mA;	2007	R/W	BYTES	---	---	1...4
P3	**S2** minimum value (pressure transducer).	2008	R/W	SHORT	---	bar	0.0 ... 3276.7
P4	**S2** maximum value (pressure transducer).	2009	R/W	SHORT	---	bar	0.0 ... 3276.7
P5	**S2** sensor offset (pressure transducer).	2010	R/W	SHORT	Y	bar	-145.0 ... 145.0
P6	**S1** sensor offset (temperature).	2011	R/W	SHORT	Y	°C/°F	-18.0...18.0
P7	**S3** sensor type. **0-10** (1) = Proportional input 0...10 V; **0-5** (2) = Proportional input 0...5 V; **0.20** (3) = Input 0...20 mA; **4.20** (4) = Input 4...20 mA; **E520** (5) = EVHTP520 proprietary probe.	2070	R/W	BYTES	---	---	1...5
P8	**S3** minimum value (if **CFGp** = HUM).	2071	R/W	BYTES	---	%rH	0...100
P9	**S3** maximum value (if **CFGp** = HUM).	2072	R/W	BYTES	---	%rH	0...100
P10	**S3** humidity sensor offset (if **CFGp** = HUM).	2073	R/W	SHORT	Y	%rH	-10...10
P13	Number of nozzles on last branch (highest).	2074	R/W	BYTES	---	num	1...100
P14	Nozzle capacity. **0** = 4 l/h; **1** = 8 l/h.	2075	R/W	1 BIT	---	---	0/1
P21	Temperature unit of measure (changing value means that the temperature parameter limits will need to be reset manually). **0** = °C; **1** = °F.	2017	R/W	1 BIT	---	---	0/1
P22	Steam production unit of measurement. **0** = kg/h; **1** = lb/h.	2018	R/W	1 BIT	---	---	0/1
P25	Rack number.	2021	R/W	3 BIT	---	num	0...3
	REGULATION group						
r0	Standard pressure setpoint hysteresis (**SP4**).	2028	R/W	BYTES	---	%	0...10
r1	Minimum value for setting humidity setpoint.	2076	R/W	BYTES	---	%	0...**r2**
r2	Maximum value for setting humidity setpoint.	2077	R/W	BYTES	---	%	**r1**...100
r4	Humidity proportional band.	2078	R/W	BYTES	---	%	0...50
c4	Range to reach outlet pressure.	2026	R/W	BYTES	---	s	10...90
	MAINTENANCE/ALARMS group						
M0	Low pump temperature alarm threshold. The hysteresis is fixed at 2 °C/°F.	2035	R/W	SHORT	---	°C/°F	0.0...30.0
M1	High pump temperature alarm threshold. The hysteresis is fixed at 2 °C/°F.	2036	R/W	SHORT	---	°C/°F	40.0...80.0
M2	Low outlet pressure alarm threshold.	2037	R/W	BYTES	---	bar	30...90
M3	Low outlet pressure alarm delay.	2038	R/W	BYTES	---	min	1...10

Par.	Description	Val. Adr.	R/W	DATA SIZE	CPL	MU	Range
M4	High outlet pressure alarm threshold.	2039	R/W	BYTES	---	bar	80...100
M5	High outlet pressure alarm delay.	2040	R/W	BYTES	---	s	5...300
M6	Rack disinfection cycle on.	2042	R/W	1 BIT	---	---	0/1
M7	AHU disinfection cycle on.	2043	R/W	1 BIT	---	---	0/1
M8	VDI washing cycle duration.	2067	R/W	BYTES	---	s	5...60
M9	UTA washing cycle duration.	2041	R/W	WORD	---	s	5...1800
M10	Maintenance hours warning threshold for the unit.	2044... 2045	R/W	DWORD	---	hx10	100...10000
M12	Maintenance hours warning threshold for the inverter.	2048 ... 2049	R/W	DWORD	---	hx10	100...10000
M13	Maintenance hours warning threshold for the branch 1 water inlet solenoid valve.	2050 ... 2051	R/W	DWORD	---	hx10	100...10000
M14	Maintenance hours warning threshold for the disinfection valve.	2052 ... 2053	R/W	DWORD	---	hx10	100...10000
M15	Maintenance hours warning threshold for the outlet solenoid valve.	2054 ... 2055	R/W	DWORD	---	hx10	100...10000
M16	Maintenance hours warning threshold for the reverse osmosis system.	2063 ... 2064	R/W	DWORD	---	hx10	100...10000
M17	Maintenance hours warning threshold for the filters.	2065 ... 2066	R/W	DWORD	---	hx10	100...10000
M18	Number of activations warning for the solenoid valves.	2068 ... 2069	R/W	DWORD	---	nx1000	100...10000
	COMMUNICATION group						
LA1	Modbus communication protocol address.	2056	R/W	BYTES	---	num	1...247
Lb1	Modbus transmission speed (baud rate). **0** = 2400; **1** = 4800; **2** = 9600; **3** = 19200; **4** = 38400.	2057	R/W	BYTES	---	---	0...4
LP1	Modbus parity bit. **0** = None; **1** = Odd; **2** = Even.	2058	R/W	BYTES	---	---	0...2
LS1	Modbus stop bit. **0** = 1 stop bit; **1** = 2 stop bits.	2059	R/W	1 BIT	---	---	0/1
	PASSWORD group						
PA1	First level password. **0** = No password	2060	R/W	SHORT	Y	---	-99...999
PA2	Second level password.	2061	R/W	SHORT	Y	---	-99...999

12.7.2 Modbus resource table

Code	Description	Val. Adr.	Filter value	R/W	DATA SIZE	CPL	MU	Range
DI1_s0	Digital input **S0** status.	257	---	R	1 BIT	---	---	0/1
DI2_cv	Digital input **CV** status.	258	---	R	1 BIT	---	---	0/1
DI3_of	Digital input **0/1** status.	259	---	R	1 BIT	---	---	0/1
DO1_EV1	Inlet solenoid valve output status.	385	---	R	1 BIT	---	---	0/1
DO2_EVout	Outlet solenoid valve output status.	386	---	R	1 BIT	---	---	0/1
DO3_EVdisinf	Disinfection solenoid valve output status.	387	---	R	1 BIT	---	---	0/1
DO4_DEH	Dehumidification output status.	388	---	R	1 BIT	---	---	0/1
DO5_WARN	Warning output status.	389	---	R	1 BIT	---	---	0/1
DO6_AL	General alarm status.	390	---	R	1 BIT	---	---	0/1
AI_ temperature	Temperature sensor value.	516	---	R	SHORT	Y	°C/°F	-3276.8... 3276.7
AI_pressure	Pressure sensor value.	517	---	R	SHORT	Y	bar (psi)	-3276.8... 3276.7
AI_Humidity	Humidity sensor value.	518	---	R	SHORT	Y	%rH	-3276.8... 3276.7
PackedAlarm1	Alarm **AL01** status.	769	0	R	1 BIT	---	---	0/1
PackedAlarm1	Alarm **AL02** status.	769	1	R	1 BIT	---	---	0/1
PackedAlarm1	Alarm **AL03** status.	769	2	R	1 BIT	---	---	0/1
PackedAlarm1	Alarm **AL04** status.	769	3	R	1 BIT	---	---	0/1
PackedAlarm1	Alarm **AL05** status.	769	4	R	1 BIT	---	---	0/1
PackedAlarm1	Alarm **AL06** status.	769	5	R	1 BIT	---	---	0/1
PackedAlarm1	Alarm **AL07** status.	769	6	R	1 BIT	---	---	0/1
PackedAlarm1	Alarm **AL08** status.	769	7	R	1 BIT	---	---	0/1
PackedAlarm1	Alarm **AL09** status.	769	8	R	1 BIT	---	---	0/1
PackedAlarm1	Alarm **AL10** status.	769	9	R	1 BIT	---	---	0/1
PackedAlarm1	Alarm **AL11** status.	769	10	R	1 BIT	---	---	0/1
PackedAlarm1	Alarm **AL12** status.	769	11	R	1 BIT	---	---	0/1
PackedAlarm1	Alarm **AL13** status.	769	12	R	1 BIT	---	---	0/1
PackedAlarm1	Alarm **AL14** status.	769	13	R	1 BIT	---	---	0/1
PackedAlarm1	Alarm **AL15** status.	769	14	R	1 BIT	---	---	0/1
PackedAlarm1	Alarm **AL16** status.	769	15	R	1 BIT	---	---	0/1
PackedAlarm2	Alarm **AL17** status.	770	0	R	1 BIT	---	---	0/1
PackedAlarm2	Alarm **AL18** status.	770	1	R	1 BIT	---	---	0/1
PackedAlarm2	Alarm **AL19** status.	770	2	R	1 BIT	---	---	0/1
PackedAlarm2	Alarm **AL20** status.	770	3	R	1 BIT	---	---	0/1
PackedAlarm2	Alarm **AL21** status.	770	4	R	1 BIT	---	---	0/1
PackedAlarm2	Alarm **AL22** status.	770	5	R	1 BIT	---	---	0/1
BMS_AL1	**AL01** manual reset.	772	---	R	1 BIT	---	---	0/1
BMS_AL2	**AL02** manual reset.	773	---	R	1 BIT	---	---	0/1
BMS_AL3	**AL03** manual reset.	774	---	R	1 BIT	---	---	0/1
BMS_AL4	**AL04** manual reset.	775	---	R	1 BIT	---	---	0/1
BMS_AL5	**AL05** manual reset.	776	---	R	1 BIT	---	---	0/1
BMS_AL6	**AL06** manual reset.	777	---	R	1 BIT	---	---	0/1
CLOCK1 (LOW)	RTC (LOW).	1268	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
CLOCK1 (HIGH)	RTC (HIGH),	1269	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
GeneralAlarm	General alarm status (OFF/ON).	1283	---	R	1 BIT	---	0/1	0/1
unitOn	Unit status (OFF/ON).	1284	---	R	1 BIT	---	0/1	0/1
---	Restore default parameters command.	1285	---	R	1 BIT	---	---	0/1

Code	Description	Val. Adr.	Filter value	R/W	DATA SIZE	CPL	MU	Range
HoursService	Hours of humidifier operation (LOW) (*).	1286	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
	Hours of humidifier operation (HIGH) (*).	1287	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
HoursPump	Hours of pump operation (LOW) (*).	1288	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
	Hours of pump operation (HIGH) (*).	1289	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
HoursInv	Hours of inverter operation (LOW) (*).	1290	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
	Hours of inverter operation. (HIGH) (*).	1291	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
HoursEV1	Hours of water inlet solenoid valve operation (LOW) (*).	1292	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
	Hours of water inlet solenoid valve operation (HIGH) (*).	1293	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
HoursDisinf	Hours of disinfection solenoid valve operation (LOW) (*).	1294	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
	Hours of disinfection solenoid valve operation (HIGH) (*).	1295	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
HoursEVout	Hours of water outlet solenoid valve operation (LOW) (*).	1296	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
	Hours of water outlet solenoid valve operation (HIGH) (*).	1297	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
HoursFilter	Hours of filter operation (LOW) (*).	1298	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
	Hours of filter operation (HIGH) (*).	1299	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
HoursOil	Hours of oil operation (LOW) (*).	1300	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
	Hours of oil operation (HIGH) (*).	1301	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
HoursOsmosis	The hours of reverse osmosis system operation (LOW) (*).	1302	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
	The hours of reverse osmosis system operation (HIGH) (*).	1303	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
inv_ActRPM	Current inverter speed in RPM.	1306	---	R	WORD	---	RPM	0...65535
inv_AL	Inverter alarm: **UV**.	1307	0	R	WORD	---	---	0...65535
inv_AL	Inverter alarm: **OV**.	1307	1	R	WORD	---	---	0...65535
inv_AL	Inverter alarm: **OC**.	1307	2	R	WORD	---	---	0...65535
inv_AL	Inverter alarm: **OL**.	1307	3	R	WORD	---	---	0...65535
inv_AL	Inverter alarm: **BT**.	1307	4	R	WORD	---	---	0...65535
inv_AL	Inverter alarm: **OT**.	1307	5	R	WORD	---	---	0...65535
inv_AL	Inverter alarm: **AI**.	1307	6	R	WORD	---	---	0...65535
inv_AL	Inverter alarm: **EP**.	1307	7	R	WORD	---	---	0...65535
inv_AL	Inverter alarm: **TO**.	1307	8	R	WORD	---	---	0...65535
inv_AL	Inverter alarm: **US**.	1307	9	R	WORD	---	---	0...65535
inv_AL	Inverter alarm: **STO**.	1307	10	R	WORD	---	---	0...65535
inv_AL	Inverter alarm: **PL**.	1307	11	R	WORD	---	---	0...65535
inv_AL	Inverter alarm: **MT**.	1307	12	R	WORD	---	---	0...65535
inv_AL	Inverter alarm: **MS**.	1307	13	R	WORD	---	---	0...65535
inv_AL	Inverter alarm: **IL**.	1307	14	R	WORD	---	---	0...65535
inv_AL	Inverter alarm: **GF**.	1307	15	R	WORD	---	---	0...65535
invStatus	Inverter status. **0** = OFF, **1** = Ready, **2** = ON, **3** = Acceleration, **4** = Deceleration, **5** = Alarm, **6** = Overload	1308	---	R	BYTES	---	---	0...6

Code	Description	Val. Adr.	Filter value	R/W	DATA SIZE	CPL	MU	Range
orReqRack	Rack activation request status.	1309	---	R	1 BIT	---	---	0/1
tot_lh	Total rack production (l/h)	1310	---	R	WORD	---	---	0...65535
w1rack1	Rack1: Request	1311	0	R	WORD	---	---	0...65535
w1rack1	Rack1: Nozzle type.	1311	1	R	WORD	---	---	0...65535
w1rack1	Rack1: EV1	1311	2	R	WORD	---	---	0...65535
w1rack1	Rack1: EV2	1311	3	R	WORD	---	---	0...65535
w1rack1	Rack1: EV3	1311	4	R	WORD	---	---	0...65535
w1rack1	Rack1: Inlet solenoid valve.	1311	5	R	WORD	---	---	0...65535
w1rack1	Rack1: Outlet solenoid valve.	1311	6	R	WORD	---	---	0...65535
w1rack1	Rack1: Digital input **CV**.	1311	7	R	WORD	---	---	0...65535
w1rack1	Rack1: VDI	1311	8	R	WORD	---	---	0...65535
w1rack1	Rack1: EV4	1311	9	R	WORD	---	---	0...65535
w1rack1	Rack1: EV5	1311	10	R	WORD	---	---	0...65535
w1rack1	Rack1: EV6	1311	11	R	WORD	---	---	0...65535
w1rack1	Rack1: EV7	1311	12	R	WORD	---	---	0...65535
w1rack2	Rack2: Request	1312	0	R	WORD	---	---	0...65535
w1rack2	Rack2: Nozzle type.	1312	1	R	WORD	---	---	0...65535
w1rack2	Rack2: EV1	1312	2	R	WORD	---	---	0...65535
w1rack2	Rack2: EV2	1312	3	R	WORD	---	---	0...65535
w1rack2	Rack2: EV3	1312	4	R	WORD	---	---	0...65535
w1rack2	Rack2: Inlet solenoid valve.	1312	5	R	WORD	---	---	0...65535
w1rack2	Rack2: Outlet solenoid valve.	1312	6	R	WORD	---	---	0...65535
w1rack2	Rack2: Digital input **CV**.	1312	7	R	WORD	---	---	0...65535
w1rack2	Rack2: VDI	1312	8	R	WORD	---	---	0...65535
w1rack2	Rack2: EV4	1312	9	R	WORD	---	---	0...65535
w1rack2	Rack2: EV5	1312	10	R	WORD	---	---	0...65535
w1rack2	Rack2: EV6	1312	11	R	WORD	---	---	0...65535
w1rack2	Rack2: EV7	1312	12	R	WORD	---	---	0...65535
w1rack3	Rack3: Request	1313	0	R	WORD	---	---	0...65535
w1rack3	Rack3: Nozzle type.	1313	1	R	WORD	---	---	0...65535
w1rack3	Rack3: EV1	1313	2	R	WORD	---	---	0...65535
w1rack3	Rack3: EV2	1313	3	R	WORD	---	---	0...65535
w1rack3	Rack3: EV3	1313	4	R	WORD	---	---	0...65535
w1rack3	Rack3: Inlet solenoid valve.	1313	5	R	WORD	---	---	0...65535
w1rack3	Rack3: Outlet solenoid valve.	1313	6	R	WORD	---	---	0...65535
w1rack3	Rack3: Digital input **CV**.	1313	7	R	WORD	---	---	0...65535
w1rack3	Rack3: VDI	1313	8	R	WORD	---	---	0...65535
w1rack3	Rack3: EV4	1313	9	R	WORD	---	---	0...65535
w1rack3	Rack3: EV5	1313	10	R	WORD	---	---	0...65535
w1rack3	Rack3: EV6	1313	11	R	WORD	---	---	0...65535
w1rack3	Rack3: EV7	1313	12	R	WORD	---	---	0...65535
wALrack1	Rack1 alarm **AL23**.	1314	0	R	WORD	---	---	0...65535
wALrack1	Rack1 alarm **AL11**.	1314	1	R	WORD	---	---	0...65535
wALrack1	Rack1 alarm **AL12**.	1314	2	R	WORD	---	---	0...65535
wALrack1	Rack1 alarm **AL13**.	1314	3	R	WORD	---	---	0...65535
wALrack1	Rack1 alarm **AL14**.	1314	4	R	WORD	---	---	0...65535
wALrack1	Rack1 alarm **AL15**.	1314	5	R	WORD	---	---	0...65535
wALrack1	Rack1 alarm **AL16**.	1314	6	R	WORD	---	---	0...65535
wALrack1	Rack1 alarm **AL17**.	1314	7	R	WORD	---	---	0...65535
wALrack1	Rack1 alarm **AL18**.	1314	8	R	WORD	---	---	0...65535
wALrack1	Rack1 alarm **AL20**.	1314	9	R	WORD	---	---	0...65535

Code	Description	Val. Adr.	Filter value	R/W	DATA SIZE	CPL	MU	Range
wALrack1	Rack1 alarm **AL21**.	1314	10	R	WORD	---	---	0...65535
wALrack1	Rack1 alarm **AL22**.	1314	11	R	WORD	---	---	0...65535
wALrack1	Rack1 alarm **AL24**.	1314	12	R	WORD	---	---	0...65535
wALrack1	Rack1 alarm **AL25**.	1314	13	R	WORD	---	---	0...65535
wALrack1	Rack1 alarm **AL26**.	1314	14	R	WORD	---	---	0...65535
wALrack1	Rack1 alarm **AL27**.	1314	15	R	WORD	---	---	0...65535
wALrack2	Rack2 alarm **AL23**.	1315	0	R	WORD	---	---	0...65535
wALrack2	Rack2 alarm **AL11**.	1315	1	R	WORD	---	---	0...65535
wALrack2	Rack2 alarm **AL12**.	1315	2	R	WORD	---	---	0...65535
wALrack2	Rack2 alarm **AL13**.	1315	3	R	WORD	---	---	0...65535
wALrack2	Rack2 alarm **AL14**.	1315	4	R	WORD	---	---	0...65535
wALrack2	Rack2 alarm **AL15**.	1315	5	R	WORD	---	---	0...65535
wALrack2	Rack2 alarm **AL16**.	1315	6	R	WORD	---	---	0...65535
wALrack2	Rack2 alarm **AL17**.	1315	7	R	WORD	---	---	0...65535
wALrack2	Rack2 alarm **AL18**.	1315	8	R	WORD	---	---	0...65535
wALrack2	Rack2 alarm **AL20**.	1315	9	R	WORD	---	---	0...65535
wALrack2	Rack2 alarm **AL21**.	1315	10	R	WORD	---	---	0...65535
wALrack2	Rack2 alarm **AL22**.	1315	11	R	WORD	---	---	0...65535
wALrack2	Rack2 alarm **AL24**.	1315	12	R	WORD	---	---	0...65535
wALrack2	Rack2 alarm **AL25**.	1315	13	R	WORD	---	---	0...65535
wALrack2	Rack2 alarm **AL26**.	1315	14	R	WORD	---	---	0...65535
wALrack2	Rack2 alarm **AL27**.	1315	15	R	WORD	---	---	0...65535
wALrack3	Rack3 alarm **AL23**.	1316	1	R	WORD	---	---	0...65535
wALrack3	Rack3 alarm **AL11**.	1316	1	R	WORD	---	---	0...65535
wALrack3	Rack3 alarm **AL12**.	1316	2	R	WORD	---	---	0...65535
wALrack3	Rack3 alarm **AL13**.	1316	3	R	WORD	---	---	0...65535
wALrack3	Rack3 alarm **AL14**.	1316	4	R	WORD	---	---	0...65535
wALrack3	Rack3 alarm **AL15**.	1316	5	R	WORD	---	---	0...65535
wALrack3	Rack3 alarm **AL16**.	1316	6	R	WORD	---	---	0...65535
wALrack3	Rack3 alarm **AL17**.	1316	7	R	WORD	---	---	0...65535
wALrack3	Rack3 alarm **AL18**.	1316	8	R	WORD	---	---	0...65535
wALrack3	Rack3 alarm **AL20**.	1316	9	R	WORD	---	---	0...65535
wALrack3	Rack3 alarm **AL21**.	1316	10	R	WORD	---	---	0...65535
wALrack3	Rack3 alarm **AL22**.	1316	11	R	WORD	---	---	0...65535
wALrack3	Rack3 alarm **AL24**.	1316	12	R	WORD	---	---	0...65535
wALrack3	Rack3 alarm **AL25**.	1316	13	R	WORD	---	---	0...65535
wALrack3	Rack3 alarm **AL26**.	1316	14	R	WORD	---	---	0...65535
wALrack3	Rack3 alarm **AL27**.	1316	15	R	WORD	---	---	0...65535
regRack1	Rack 1 humidity request.	1317	---	R	WORD	---	---	0...65535
regRack2	Rack 2 humidity request.	1318	---	R	WORD	---	---	0...65535
regRack3	Rack 3 humidity request.	1319	---	R	WORD	---	---	0...65535
lh_Rack1	Rack 1 current production.	1326	---	R	WORD	---	l/h	0...65535
lh_Rack2	Rack 2 current production.	1327	---	R	WORD	---	l/h	0...65535
lh_Rack3	Rack 3 current production.	1328	---	R	WORD	---	l/h	0...65535
disinfAhuON	AHU disinfection status.	1329	---	R	1 BIT	---	---	0/1
disinfRackON	Rack disinfection status.	1330	---	R	1 BIT	---	---	0/1
HumRack1	Rack 1 humidity sensor value.	1331	---	R	SHORT	Y	%rH	-32768 ... 32767
HumRack2	Rack 2 humidity sensor value.	1332	---	R	SHORT	Y	%rH	-32768 ... 32767
HumRack3	Rack 3 humidity sensor value.	1333	---	R	SHORT	Y	%rH	-32768 ... 32767

Code	Description	Val. Adr.	Filter value	R/W	DATA SIZE	CPL	MU	Range
LHumRack1	Rack 1 humidity limit sensor value.	1334	---	R	SHORT	Y	%rH	-32768 ... 32767
LHumRack2	Rack 2 humidity limit sensor value.	1335	---	R	SHORT	Y	%rH	-32768 ... 32767
LHumRack3	Rack 3 humidity limit sensor value.	1336	---	R	SHORT	Y	%rH	-32768 ... 32767
MBS_SwEn	On/Off command from BMS.	1922	---	R/W	1 BIT	---	---	0/1

(*) **Calculation of operating hours**
Operating hours = (HIGH register x 65536) + LOW register

12.8 Distribution rack

12.8.1 Modbus address table

Par.	Description	Val. Adr.	R/W	DATA SIZE	CPL	MU	Range
	SETPOINT group						
SP1	Humidity setpoint.	2001	R/W	SHORT	Y	%	**r1...r2**
SP2	Humidity limit setpoint.	2002	R/W	SHORT	Y	%	**r11...r12**
	CONFIGURATION group						
CFG	Operating mode **0-1** (0) = ON/OFF from digital input; **PROP** (1) = Proportional input; **HUM** (2) = Humidity sensor; **HUML** (3) = Humidity sensor + limit sensor;	2003	R/W	BYTES	---	---	0...3
P2	Type of regulator/sensor/probe **S2** (regulation input). **NTC** (0) = NTC probe; **0-10** (1) = Proportional input 0...10 V; **0-5** (2) = Proportional input 0...5 V; **0.20** (3) = Input 0...20 mA; **4.20** (4) = Input 4...20 mA; **E520** (5) = EVHTP520 proprietary probe.	2007	R/W	BYTES	---	---	0...5
P3	Minimum value **S2** (if **CFG** = HUM or **CFG** = HUML).	2008	R/W	BYTES	---	%rH	0...100
P4	Maximum value **S2** (if **CFG** = HUM or **CFG** = HUML).	2009	R/W	BYTES	---	%rH	0...100
P5	Sensor offset **S2** (if **CFG** = HUM or **CFG** = HUML).	2010	R/W	SHORT	---	%rH	-10...10
P7	**S3** sensor type(limit sensor). Similar to **P2**.	2012	R/W	BYTES	---	---	0...5
P8	Minimum value **S3** (if **CFG** = HUML).	2013	R/W	BYTES	---	%rH	0...100
P9	Maximum value **S3** (if **CFG** = HUML).	2014	R/W	BYTES	---	%rH	0...100
P10	Sensor offset **S3** humidity (if **CFG** = HUML).	2015	R/W	SHORT	---	%rH	-10...10
P11	Number of branches installed.	2064	R/W	BYTES	---	num	1...7
P12	Number of nozzles from branch 1 to penultimate.	2065	R/W	BYTES	---	num	1...100
P13	Number of nozzles on last branch (highest).	2066	R/W	BYTES	---	num	1...100
P14	Nozzle capacity **0** = 4 l/h; **1** = 8 l/h.	2067	R/W	1 BIT	---	---	0/1
P15	Rack network address.	2068	R/W	3 BIT	---	---	1...3
	REGULATION group						
r0	Sensor 1 setpoint hysteresis.	2018	R/W	BYTES	---	%	0...20
r1	Minimum value for setting humidity setpoint.	2019	R/W	BYTES	---	%	0...**r2**
r2	Maximum value for setting humidity setpoint.	2020	R/W	BYTES	---	%	**r1**...100
r4	Humidity proportional band.	2021	R/W	BYTES	---	%	0...50
r5	Minimum production.	1927	R/W	BYTES	---	%	20...**r6**
r6	Maximum production.	1926	R/W	BYTES	---	%	**r5**...100
r10	Humidity limit probe setpoint hysteresis.	2024	R/W	BYTES	---	%	0...20
r11	Minimum value for setting humidity limit setpoint.	2025	R/W	BYTES	---	%	0...r12
r12	Maximum limit setpoint value.	2026	R/W	BYTES	---	%	**r11**...100
	MAINTENANCE/ALARMS group						
M5	Low humidity alarm threshold. The hysteresis is fixed at 2%.	2041	R/W	BYTES	---	%	0...100
M6	High humidity alarm threshold. The hysteresis is fixed at 2%.	2042	R/W	BYTES	---	%	0...100
M7	High/low humidity alarm delay.	2043	R/W	WORD	---	s	0...999
M8	VDI washing cycle duration.	2063	R/W	BYTES	---	h	5...60
M10	Maintenance hours warning threshold for the unit.	2044 ... 2045	R/W	DWORD	---	hours x10	100...10000
M11	Maintenance hours warning threshold for the branch 1 solenoid valve.	2046 ... 2047	R/W	DWORD	---	hours x10	100...2000
M12	Maintenance hours warning threshold for the branch 2 solenoid valve.	2048 ... 2049	R/W	DWORD	---	hours x10	100...2000
M13	Maintenance hours warning threshold for the branch 3...7 solenoid valve.	2050 ... 2051	R/W	DWORD	---	hours x10	100...2000

Par.	Description	Val. Adr.	R/W	DATA SIZE	CPL	MU	Range
M14	Maintenance hours warning threshold for the inlet solenoid valve.	2052 ... 2053	R/W	DWORD	---	hours x10	100...2000
M15	Maintenance hours warning threshold for the outlet solenoid valve.	2054... 2055	R/W	DWORD	---	hours x10	100...2000
M18	Number of activations warning for the solenoid valves.	2069 ... 2070	R/W	DWORD	---	hours x10	100...10000
	COMMUNICATION group						
LA1	Modbus communication protocol address.	2056	R/W	BYTES	---	num	1...247
Lb1	Modbus transmission speed (baud rate). **0** = 2400; **1** = 4800; **2** = 9600; **3** = 19200; **4** = 38400.	2057	R/W	BYTES	---	---	0...4
LP1	Modbus parity bit. **0** = None; **1** = Odd; **2** = Even.	2058	R/W	BYTES	---	---	0...2
LS1	Modbus stop bit. **0** = 1 stop bit; **1** = 2 stop bits.	2059	R/W	1 BIT	---	---	0/1
	PASSWORD group						
PA1	User password. **0** = No password.	2060	R/W	SHORT	Y	---	-99...999
PA2	Maintenance password.	2061	R/W	SHORT	Y	---	-99...999

12.8.2 Modbus resource table

Code	Description	Val. Adr.	Filter value	R/W	DATA SIZE	CPL	MU	Range
DI1_s0	Digital input **S0** status.	257	---	R	1 BIT	---	---	0/1
DI2_cv	Digital input **CV** status.	258	---	R	1 BIT	---	---	0/1
DO1_EV1	Throttling solenoid valve **L1** output status	385	---	R	1 BIT	---	---	0/1
DO2_EV2	Throttling solenoid valve output **L2** status	386	---	R	1 BIT	---	---	0/1
DO3_EV3	Throttling solenoid valve output **L3** status	387	---	R	1 BIT	---	---	0/1
DO4_EVin	Inlet solenoid valve output status.	388	---	R	1 BIT	---	---	0/1
DO5_EVout	Outlet solenoid valve output status.	389	---	R	1 BIT	---	---	0/1
DO6_AL	General alarm status.	390	---	R	1 BIT	---	---	0/1
ExpIO[0]	Expansion output **Out1** status (branch 4 solenoid valve).	391	---	R	1 BIT	---	---	0/1
ExpIO[1]	Expansion output **Out2** status (branch 5 solenoid valve).	392	---	R	1 BIT	---	---	0/1
ExpIO[2]	Expansion output **Out3** status (branch 6 solenoid valve).	393	---	R	1 BIT	---	---	0/1
ExpIO[3]	Expansion output **Out4** status (branch 7 solenoid valve).	394	---	R	1 BIT	---	---	0/1
AI_Humidity	Humidity sensor value.	517	---	R	SHORT	Y	%rH	-3276.8... 3276.7
AI_Humidity	Humidity limit sensor value.	518	---	R	SHORT	Y	%rH	-3276.8... 3276.7
AI_Request	Proportional input value.	519	---	R	SHORT	Y	%	-32768... 32767
PackedAlarm1	Alarm **AL07** status.	769	6	R	1 BIT	---	---	0/1
PackedAlarm1	Alarm **AL11** status.	769	10	R	1 BIT	---	---	0/1
PackedAlarm1	Alarm **AL12** status.	769	11	R	1 BIT	---	---	0/1
PackedAlarm1	Alarm **AL13** status.	769	12	R	1 BIT	---	---	0/1
PackedAlarm1	Alarm **AL14** status.	769	13	R	1 BIT	---	---	0/1
PackedAlarm1	Alarm **AL15** status.	769	14	R	1 BIT	---	---	0/1
PackedAlarm1	Alarm **AL16** status.	769	15	R	1 BIT	---	---	0/1
PackedAlarm2	Alarm **W17** status.	770	0	R	1 BIT	---	---	0/1
PackedAlarm2	Alarm **W18** status.	770	1	R	1 BIT	---	---	0/1
PackedAlarm2	Alarm **AL20** status.	770	3	R	1 BIT	---	---	0/1
PackedAlarm2	Alarm **AL21** status.	770	4	R	1 BIT	---	---	0/1
PackedAlarm2	Alarm **AL22** status.	770	5	R	1 BIT	---	---	0/1
PackedAlarm2	Alarm **AL23** status.	770	6	R	1 BIT	---	---	0/1
PackedAlarm2	Alarm **AL24** status.	770	7	R	1 BIT	---	---	0/1
PackedAlarm2	Alarm **AL25** status.	770	8	R	1 BIT	---	---	0/1
PackedAlarm2	Alarm **AL26** status.	770	9	R	1 BIT	---	---	0/1
PackedAlarm2	Alarm **AL27** status.	770	10	R	1 BIT	---	---	0/1
BMS_AL2	**AL02** manual reset.	773	---	R	1 BIT	---	---	0/1
GeneralAlarm	General alarm status (OFF/ON).	1283	---	R	1 BIT	---	---	0/1
unitOn	Unit status (OFF/ON).	1284	---	R	1 BIT	---	---	0/1
---	Restore default parameters command.	1285	---	R	1 BIT	---	---	0/1
HoursService	Hours of humidifier operation (LOW) (*).	1286	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
	Hours of humidifier operation (HIGH) (*).	1287	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
HoursEV1	Hours of branch 1 solenoid valve operation (LOW) (*).	1288	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
	Hours of branch 1 solenoid valve operation (HIGH) (*).	1289	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5

Code	Description	Val. Adr.	Filter value	R/W	DATA SIZE	CPL	MU	Range
HoursEV2	Hours of branch 2 solenoid valve operation (LOW) (*).	1290	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
	Hours of branch 2 solenoid valve operation (HIGH) (*).	1291	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
HoursEV3	Hours of branch 3 solenoid valve operation (LOW) (*).	1292	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
	Hours of branch 3 solenoid valve operation (HIGH) (*).	1293	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
HoursEVin	Hours of water inlet solenoid valve operation (LOW) (*).	1294	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
	Hours of water inlet solenoid valve operation (HIGH) (*).	1295	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
HoursEVout	Hours of water outlet solenoid valve operation (LOW) (*).	1296	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
	Hours of water outlet solenoid valve operation (HIGH) (*).	1297	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
actNozzle	Active nozzles.	1298	---	R	BYTES	---	num	0...255
limH	Humidity limit status (ON/OFF).	1304	---	R	1 BIT	---	---	0/1
outReq	Request.	1307	---	R	WORD	---	%	0...65535
orReqRack	Rack activation request status.	1309	---	R	1 BIT	---	---	0/1
tot_lh	Total rack production.	1310	---	R	WORD	---	l/h	0...65535
HoursEV4	Hours of branch 4 solenoid valve operation (LOW) (*).	1309	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
	Hours of branch 4 solenoid valve operation (HIGH) (*).	1310	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
HoursEV5	Hours of branch 5 solenoid valve operation (LOW) (*).	1311	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
	Hours of branch 5 solenoid valve operation (HIGH) (*).	1312	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
HoursEV6	Hours of branch 6 solenoid valve operation (LOW) (*).	1313	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
	Hours of branch 6 solenoid valve operation (HIGH) (*).	1314	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
HoursEV7	Hours of branch 7 solenoid valve operation (LOW) (*).	1315	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
	Hours of branch 7 solenoid valve operation (HIGH) (*).	1316	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
actsEV1	The number of branch 1 solenoid valve activations (LOW). (*)	1317	---	R/W	DWORD	---	n x 1000	0.0 ... 10000.000
	The number of branch 1 solenoid valve activations (HIGH). (*)	1318	---	R/W	DWORD	---	n x 1000	0.0 ... 10000.000
actsEV2	The number of branch 2 solenoid valve activations (LOW). (*)	1319	---	R/W	DWORD	---	n x 1000	0.0 ... 10000.000
	The number of branch 2 solenoid valve activations (HIGH). (*)	1320	---	R/W	DWORD	---	n x 1000	0.0 ... 10000.000
actsEV3	The number of branch 3 solenoid valve activations (LOW). (*)	1321	---	R/W	DWORD	---	n x 1000	0.0 ... 10000.000
	The number of branch 3 solenoid valve activations (HIGH). (*)	1322	---	R/W	DWORD	---	n x 1000	0.0 ... 10000.000
actsEV4	The number of branch 4 solenoid valve activations (LOW). (*)	1323	---	R/W	DWORD	---	n x 1000	0.0 ... 10000.000
	The number of branch 4 solenoid valve activations (HIGH). (*)	1324	---	R/W	DWORD	---	n x 1000	0.0 ... 10000.000
actsEV5	The number of branch 5 solenoid valve activations (LOW). (*)	1325	---	R/W	DWORD	---	n x 1000	0.0 ... 10000.000
	The number of branch 5 solenoid valve activations (HIGH). (*)	1326	---	R/W	DWORD	---	n x 1000	0.0 ... 10000.000

Code	Description	Val. Adr.	Filter value	R/W	DATA SIZE	CPL	MU	Range
actsEV6	The number of branch 6 solenoid valve activations (LOW). (*)	1327	---	R/W	DWORD	---	n x 1000	0.0 ... 10000.000
	The number of branch 6 solenoid valve activations (HIGH). (*)	1328	---	R/W	DWORD	---	n x 1000	0.0 ... 10000.000
actsEV7	The number of branch 7 solenoid valve activations (LOW). (*)	1329	---	R/W	DWORD	---	n x 1000	0.0 ... 10000.000
	The number of branch 7 solenoid valve activations (HIGH). (*)	1330	---	R/W	DWORD	---	n x 1000	0.0 ... 10000.000
actsEVin	The number of inlet solenoid valve activations (LOW). (*)	1331	---	R/W	DWORD	---	n x 1000	0.0 ... 10000.000
	The number of inlet solenoid valve activations (HIGH). (*)	1332	---	R/W	DWORD	---	n x 1000	0.0 ... 10000.000
actsEVout	The number of outlet solenoid valve activations (LOW). (*)	1333	---	R/W	DWORD	---	n x 1000	0.0 ... 10000.000
	The number of outlet solenoid valve activations (HIGH). (*)	1334	---	R/W	DWORD	---	n x 1000	0.0 ... 10000.000
MBS_SwEn	On/Off command from BMS.	1922	---	R/W	1 BIT	---	---	0/1

(*) **Calculation of operating hours**
Operating hours = (HIGH register x 65536) + LOW register

13. DIAGNOSTICS

Chapter content

This chapter contains the following information:

The table below lists alarms with corresponding solutions. Indication takes place via the alarm LED ⚠ and the buzzer. Each alarm is recorded in the alarm log.

13.1 Pump unit alarm table

Code	Description	Cause	Effects	Solution

AL01	Alarm: initial low pressure	The pump is unable to bring the distribution network pressure up to **SP4**	• Fixed alarm icon
			• **AL01** displayed
			• Humidifier OFF
			• **AL01** recorded in the log
				• Check:
				  • Outlet solenoid valve
				  • Nozzles not working
				  • Leaks from joints/pipes
				  • Water system supply

AL02	Alarm: low pump temperature	Pump temperature < **M0**	• Fixed alarm icon • **AL02** displayed • Humidifier OFF • **AL02** recorded in the log	Wait until the pump temperature > **M0**+2 °C/°F
AL03	Alarm: high pump temperature	Pump temperature > **M1**	• Fixed alarm icon • **AL03** displayed • Humidifier OFF • **AL03** recorded in the log	Wait until the pump temperature < **M1**-2 °C/°F

AL04	Alarm: low pump pressure	The distribution network pressure ≤ **M2**	• Fixed alarm icon
			• **AL04** displayed
			• Alarm relay ON
			• Humidifier OFF
			• **AL04** recorded in the log
				• Wait until the distribution network pressure ≥ **M2+0.1**
				• Check:
				  • Outlet solenoid valve
				  • Nozzles not working
				  • Leaks from joints/pipes
				  • Water system supply
				• Automatic reset

AL05	Alarm: high pump pressure	The distribution network pressure ≥ **M4**	• Fixed alarm icon
			• **AL05** displayed
			• Alarm relay ON
			• Humidifier OFF
			• **AL05** recorded in the log
				• Wait until the distribution network pressure ≤ **M4-0.1**
				• Check:
				  • Branch inlet solenoid valve
				  • Branch solenoid valve
				  • Blocked nozzles
				• Automatic reset

AL06	Alarm: inverter	Inverter not working	• Fixed alarm icon • **AL06** displayed • Alarm relay ON • Humidifier OFF • **AL06** recorded in the log	• Identify the inverter error • Refer to the inverter manual
W07	Alarm: rack offline	No communication between pump unit and distribution rack	• Fixed alarm icon • **W07** displayed • Alarm relay ON • Humidifier OFF • **W07** recorded in the log	• Restore communication between pump unit and distribution rack • Automatic reset
AL11	Alarm: machine service life	Hours of unit operation > **M10**	• Fixed alarm icon • **AL11** displayed • Alarm relay ON • No effect on regulation • **AL11** recorded in the log	• Carry out full maintenance • Reset the counter
AL12	Alarm: pump seal	Operating hours threshold exceeded for pump seals/gaskets	• Fixed alarm icon • **AL12** displayed • Alarm relay ON • Humidifier OFF • **AL12** recorded in the log	• Disassemble the pump and check/replace the pump seals/valves as described in the pump manual • Check/replace the following ever two oil changes: Valve units, pump seals.
AL13	Alarm: inverter maintenance	Hours of inverter operation > **M12**	• Fixed alarm icon • **AL13** displayed • Alarm relay ON • No effect on regulation • **AL13** recorded in the log	• Carry out inverter maintenance • Reset the counter

Code	Description	Cause	Effects	Solution
AL14	Alarm: branch 1 solenoid valve maintenance	Hours of branch 1 solenoid valve operation > **M13**	• Fixed alarm icon • **AL14** displayed • Alarm relay ON • No effect on regulation • **AL14** recorded in the log	• Check the water mains flow rate • Check that the solenoid valve is working • Carry out maintenance on the solenoid valve • Replace the solenoid valve • Check and clean the internal pipes and inlet/outlet manifold
AL15	Alarm: disinfection inlet solenoid valve maintenance	Hours of disinfection inlet solenoid valve operation > **M14**	• Fixed alarm icon • **AL15** displayed • No effect on regulation • **AL15** recorded in the log	
AL16	Alarm: outlet solenoid valve maintenance	Hours of outlet solenoid valve operation > **M15**	• Fixed alarm icon • **AL16** displayed • No effect on regulation • **AL16** recorded in the log	
AL17	Alarm: reverse osmosis system maintenance	Hours of reverse osmosis system operation > **M16**	• Fixed alarm icon • **AL17** displayed • No effect on regulation • **AL17** recorded in the log	• Check the water mains flow rate • Check that the reverse osmosis system is working • Carry out reverse osmosis system maintenance • Reset the counter
AL18	Alarm: filter maintenance	Hours of filter operation > **M17**	• Fixed alarm icon • **AL18** displayed • Alarm relay ON • **AL18** recorded in the log	• Replace the filters • Reset the counter
AL19	Alarm: change pump oil	The pump oil operating hours limit has been reached	• Fixed alarm icon • **AL19** displayed • Alarm relay ON • **AL19** recorded in the log	• Change the pump oil • Reset the counter
AL20	Alarm: temperature sensor	• Probe not working • Probe not connected properly • Incorrect probe type	• Fixed alarm icon • **AL20** displayed • Humidifier OFF • **AL20** recorded in the log	• Check the sensor type • Check the sensor wiring • Change the sensor type • Check for electrical noise
AL21	Alarm: pressure sensor	• Sensor not working • Sensor not connected correctly • Control board not working	• Fixed alarm icon • **AL21** displayed • Alarm relay ON • Humidifier OFF • **AL21** recorded in the log	• Check the sensor type • Check the sensor wiring • Change the sensor type • Check for electrical noise
AL22	Alarm: humidity sensor		• Fixed alarm icon • **AL22** displayed • Alarm relay ON • Humidifier OFF • **AL22** recorded in the log	

13.2 Distribution rack alarm table

Code	Description	Cause	Effects	Solution
AL07	Alarm: master	No communication with the pump unit	• Fixed alarm icon • **AL07** displayed • Alarm relay ON • **AL07** recorded in the log	• Restore communication between slave humidifier and master humidifier • Automatic reset
AL11	Alarm: machine service life	Hours of unit operation > **M10**	• Fixed alarm icon • **AL11** displayed • Alarm relay ON • **AL11** recorded in the log	Carry out full maintenance
AL12	Warning: branch 1 solenoid valve maintenance	Hours of branch 1 solenoid valve operation > **M11** or number of solenoid valve activations > **M18**	• Fixed alarm icon • **AL12** displayed • Alarm relay ON • No effect on regulation • **AL12** recorded in the log	• Check the water mains flow rate • Check that the solenoid valve is working • Carry out maintenance on the solenoid valve • Replace the solenoid valve • Check and clean the internal pipes and inlet/outlet manifold
AL13	Warning: branch 2 solenoid valve maintenance	Hours of branch 2 solenoid valve operation > **M12** or number of solenoid valve activations > **M18**	• Fixed alarm icon • **AL13** displayed • Alarm relay ON • No effect on regulation • **AL13** recorded in the log	
AL14	Warning: branch 3 solenoid valve maintenance	Hours of branch 3 solenoid valve operation > **M13** or number of solenoid valve activations > **M18**	• Fixed alarm icon • **AL14** displayed • Alarm relay ON • No effect on regulation • **AL14** recorded in the log	
AL15	Warning: inlet solenoid valve maintenance	Hours of inlet solenoid valve operation > **M14** or number of solenoid valve activations > **M18**	• Fixed alarm icon • **AL15** displayed • Alarm relay ON • No effect on regulation • **AL15** recorded in the log	
AL16	Warning: outlet solenoid valve maintenance	Hours of outlet solenoid valve operation > **M15** or number of solenoid valve activations > **M18**	• Fixed alarm icon • **AL16** displayed • Alarm relay ON • No effect on regulation • **AL16** recorded in the log	
W17	Warning: low humidity	Humidity production < **M5** for a time > **M7**	• Fixed alarm icon • **W17** displayed • Alarm relay ON • **W17** recorded in the log	• If it occurs together with other alarms, check accordingly • If the humidifier is underdimensioned, contact the system designer • Check **r6** and set it > 70%
W18	Warning: high humidity	Humidity production > **M6** for a time > **M7**	• Fixed alarm icon • **W18** displayed • Alarm relay ON • **W18** recorded in the log	• If it occurs together with other alarms, check accordingly • If the humidifier is underdimensioned, contact the system designer • Check **r6** and set it < 70%
AL20	Alarm: humidity sensor	• Sensor not working • Sensor not connected correctly • Control board not working	• Fixed alarm icon • **AL20** displayed • Alarm relay ON • Humidifier OFF • **AL20** recorded in the log	• Check the sensor type • Check the sensor wiring • Change the sensor type • Check for electrical noise
AL21	Alarm: humidity limit sensor		• Fixed alarm icon • **AL21** displayed • Alarm relay ON • Humidifier OFF • **AL21** recorded in the log	
AL22	Alarm: request from sensor		• Fixed alarm icon • **AL22** displayed • Alarm relay ON • Humidifier OFF • **AL22** recorded in the log	
AL23	Alarm: HPN offline	No communication between rack and expansion board that manages rack branch EV4-EV5-EV6-EV7	• Fixed alarm icon • **AL23** displayed • Alarm relay ON • • **AL23** recorded in the log	• Restore communication between distribution rack and pump unit • Automatic reset

Code	Description	Cause	Effects	Solution
AL24	Alarm: branch 4 solenoid valve maintenance	Hours of branch 4 solenoid valve operation > **M13** or number of solenoid valve activations > **M18**	• Fixed alarm icon • **AL24** displayed • Alarm relay ON • Humidifier OFF • **AL24** recorded in the log	• Check the water mains flow rate • Check that the solenoid valve is working • Carry out maintenance on the solenoid valve • Replace the solenoid valve • Check and clean the internal pipes and inlet/outlet manifold
AL25	Alarm: branch 5 solenoid valve maintenance	Hours of branch 5 solenoid valve operation > **M13** or number of solenoid valve activations > **M18**	• Fixed alarm icon • **AL25** displayed • Alarm relay ON • Humidifier OFF • **AL25** recorded in the log	
AL26	Alarm: branch 6 solenoid valve maintenance	Hours of branch 6 solenoid valve operation > **M13** or number of solenoid valve activations > **M18**	• Fixed alarm icon • **AL26** displayed • Alarm relay ON • Humidifier OFF • **AL26** recorded in the log	
AL27	Alarm: branch 7 solenoid valve maintenance	Hours of branch 7 solenoid valve operation > **M13** or number of solenoid valve activations > **M18**	• Fixed alarm icon • **AL27** displayed • Alarm relay ON • Humidifier OFF • **AL27** recorded in the log	

14. MAINTENANCE

Chapter content

This chapter contains the following information:

EHPN series humidifiers are defined as "**NOT ACCESSIBLE TO THE PUBLIC**".

⚠ ⚠ DANGER

RISK OF ELECTRIC SHOCK, EXPLOSION OR ELECTRIC ARC

- Any procedure on the humidifier, including maintenance of any type, must only be carried out while the power supply is disconnected.
- The maintenance, repair, installation and use of the equipment must only be entrusted to qualified personnel.

The humidifier produces humidity (mist) at a pressure of 80 bar (8 MPa).

⚠ WARNING

HIGH-PRESSURE WATER SYSTEM

Do not approach or touch the equipment while it is running.

Inadequate use and/or poor maintenance of the humidifier can damage your health.

⚠ ⚠ WARNING

BIOLOGICAL RISK

- In the event of poor maintenance/cleaning after the humidifier has been shut-down for a long time, microorganisms (including the bacteria that cause Legionellosis) may proliferate and be transferred into the air treatment system.
- The humidifier must be used properly and be maintained and cleaned properly at prescribed intervals, as described in the ***MAINTENANCE*** chapter.

Thoroughly remove any limescale residues and biofilm from the distribution nozzles with a 20% formic acid solution and suitable biocides. Thoroughly brush and mechanically clean the microscopic holes to ensure the nozzles are perfectly clean and free.

Periodically flush the complete pumping and distribution circuit with demineralised water and suitable biocides that are not corrosive to the STAINLESS STEEL and PTFE parts of the system components. Do so with a suitable frequency based on the quality of the supply water used.

14.1 Before you start

EHPN series humidifiers are designed for operation with the water properties specified in the sub-section ***"WATER SPECIFICATIONS" ON PAGE 33.***
Using water with other properties and/or with a hardness level approaching the limit of 50 °f means that maintenance will be required more frequently and much greater attention must be paid to the biological risk.

It is not possible to provide certain instructions to determine the maintenance frequency, as it depends heavily on the morphology of the water used, which can also vary under equal specifications (conductivity and hardness).

NOTICE

MALFUNCTIONING OF THE EQUIPMENT

Only use the humidifier with the water specifications indicated in this manual.

If frequent maintenance takes place, check the quality of the water supply.

NOTICE

MALFUNCTIONING OF THE EQUIPMENT

Only carry out maintenance on the humidification system as described in the instructions in the Maintenance chapter of this manual.

If any adverse event not described in this documentation arises, carry out maintenance and/or replace the pump unit. Moreover, contact ELSTEAM customer service for the relevant guidelines and instructions.

⚠ ⚠ DANGER

RISK OF ELECTRIC SHOCK, EXPLOSION OR ELECTRIC ARC

If an adverse event occurs, disconnect the humidifier power supply immediately.

⚠ DANGER

RISK OF ELECTRIC SHOCK OR ELECTRIC ARC

- In the event of water leakage, disconnect the humidifier power supply immediately.
- Check the pump unit sealing gaskets and replace them if necessary.

Checking the status of the humidifier

Perform the following checks on the humidifier at each oil change:

- The replaced oil does not contain water (visibly separate or in the form of an opaque grey emulsion), in which case the pump seals need to be serviced before they fail completely and block the humidification system.
- Check that there is no dripping from the seals in the distribution system and pump unit inside.
- Check the condition of the nozzles and the outlet duct from the NO outlet solenoid valve; both should not be occluded but perfectly free and working correctly.
- Check that the nozzles are not clogged.
  Increased pump noise is a sign that the nozzles may be clogged.
- Periodically check the nozzles for wear.
  Worn nozzles may cause the machine to block due to excessive drop in outlet pressure.
- Check the oil level in the pump every month.

Each component is monitored by diagnostics (in operating hours), so the system will give warnings that allow you to plan maintenance or replacement of components that have reached the maximum number of operating hours. Always heed these warnings as exceeding the operating hours without maintenance would drastically increase the likelihood of malfunctions and failures resulting in the **EHPN** generating blocking alarms.

It is important to periodically check that the quality of the water entering the humidifier remains in the range given in the chapter ***"5.3 INSTALLING THE PLUMBING" ON PAGE 33***. In water treatment systems that are not regularly maintained, there is a risk of significantly falling short of the specifications.

Service the seals in the high-pressure pump every 5000 hours of operation, however they may need to be serviced earlier as it is highly dependent on the system type and operating conditions.

For systems that cannot remain without humidification, it is advisable to purchase a backup pump unit so that the original pump unit can be serviced at the appropriate time (2 to 4 weeks at a specific service centre).

The inlet water flow rate must be at least twice the nominal humidity flow rate (l/min) and the pressure must be the range specified in the chapter ***"5.3 INSTALLING THE PLUMBING" ON PAGE 33*** to avoid pump cavitation, which may compromise proper unit operation and reliability.

Inadequate use and/or poor maintenance of the humidifier can damage your health.

⚠ WARNING

BIOLOGICAL RISK

- In the event of improper use and installation, microorganisms (including the bacteria that cause Legionellosis) may proliferate and be transferred into the air treatment system after the humidifier has been shut down for a long time.
- In the event of poor maintenance/cleaning after the humidifier has been shut-down for a long time, microorganisms (including the bacteria that cause Legionellosis) may proliferate and be transferred into the air treatment system.
- The humidifier must be used properly and be maintained and cleaned properly at prescribed intervals, as described in the ***MAINTENANCE*** chapter.

14.2 Opening the pump unit

For installers and maintenance personnel **only**.

To open the pump unit, undo the 9 hexagon head screws in the unit as shown in the photo below, after which you can remove the panel.

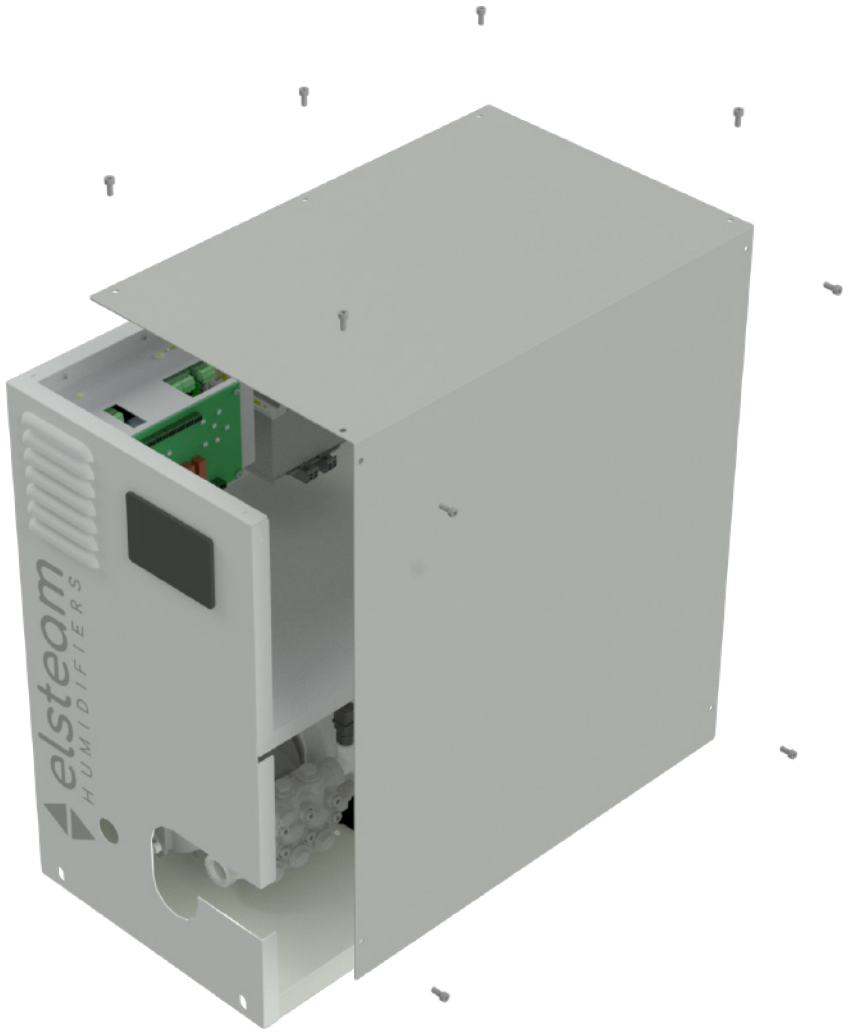


Fig. 75. *Opening the pump unit*

14.3 Changing the oil cap

During installation, always replace the red cap used exclusively for transporting the humidifier with the yellow cap provided.

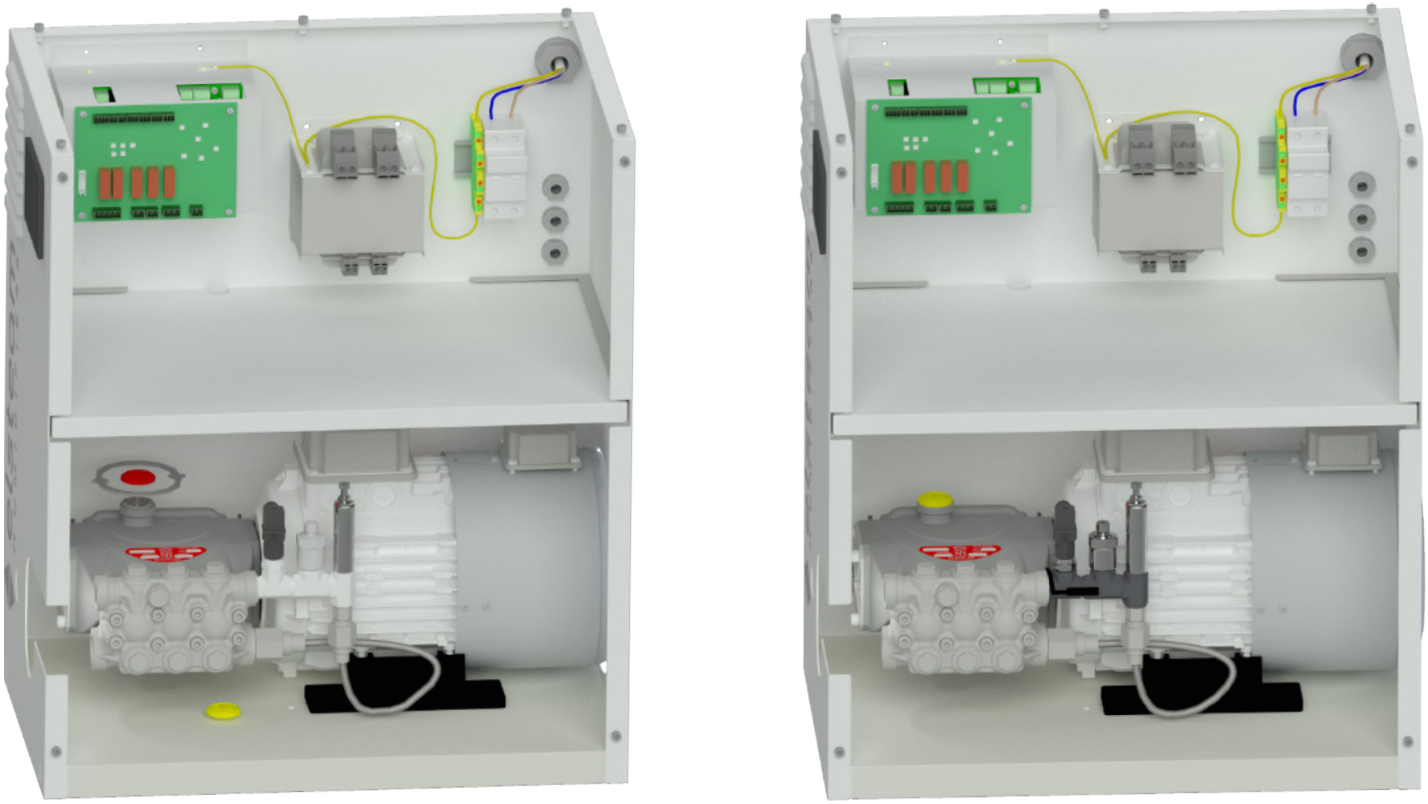


Fig. 76. *Changing the oil cap*

14.4 Changing oil

Change the oil 50 h after starting up the humidifier for the first time, and every 1500 h thereafter. The figure shows the oil change intervals, taking into account pre-alarm margins before the humidifier is blocked.

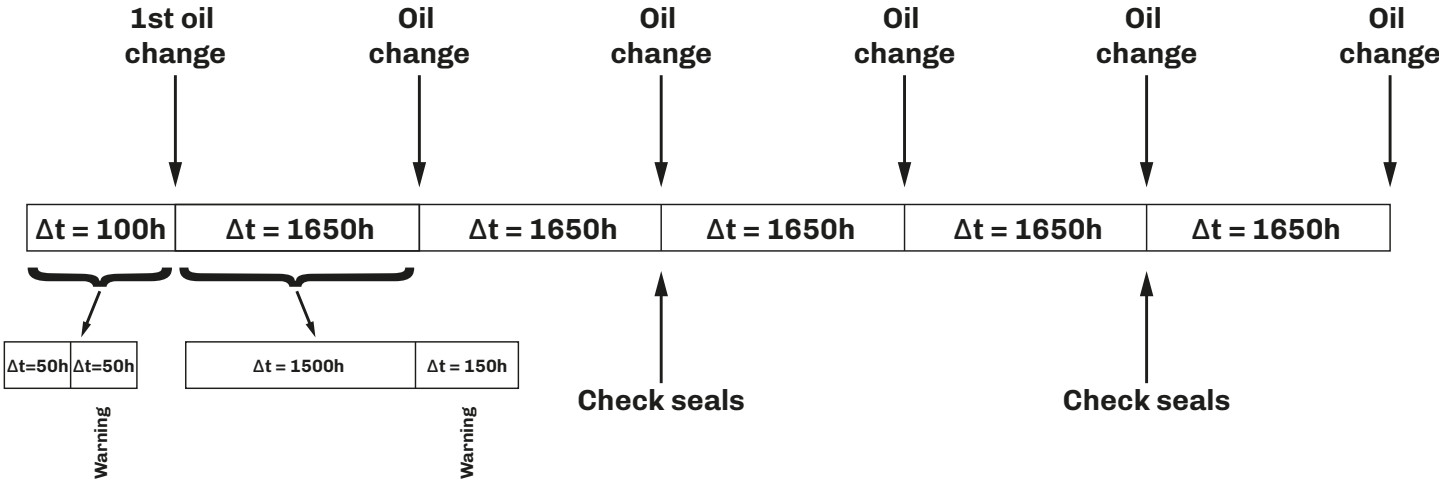


Fig. 77. *Oil change interval diagram*

14.4.1 Oil change instructions

To change the oil correctly, follow the pump manufacturer's instructions exactly.

1. Change the oil with the pump at its working temperature.
2. Place a container under the oil drain plug (3).
3. Remove the yellow cap with dipstick (1) followed by the drain plug (3).
4. Wait until all the oil has drained out, then screw the drain plug (3) back in with the tightening torque specified in the exploded view.
5. Fill up to the centre line on the oil level sight glass (2) and screw the cap with dipstick (1) back on.

⚠ WARNING

ENVIRONMENTAL POLLUTION

Collect used oil in containers and dispose of it at the appropriate centres in accordance with the regulations in force. Never dispose of it in the environment.

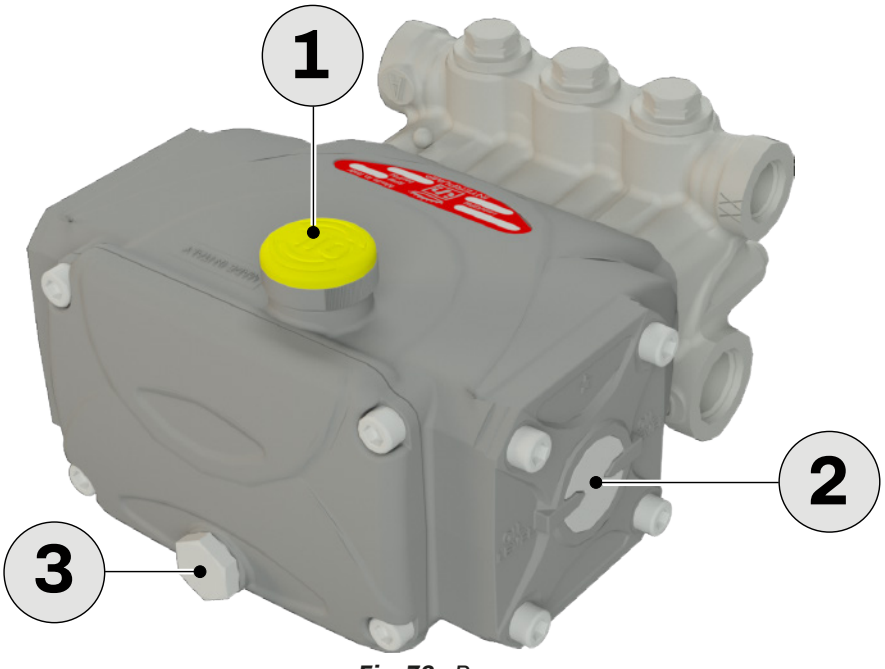


Fig. 78. *Pump*

14.4.2 Checking the oil level

If the oil level is not between the dashed lines, add or remove oil and check for leaks.

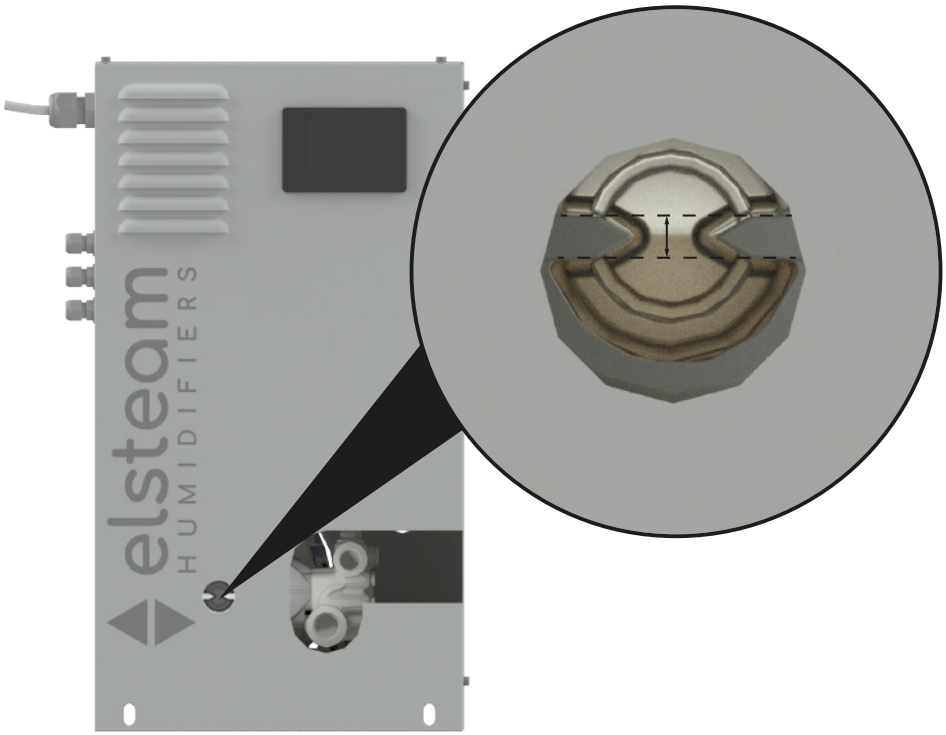


Fig. 79. *Checking the oil level*

NOTE: Take great care to avoid damaging the temperature sensor fitted at the outlet to the pump. Refer to the pump manual for more information.

15. SPARE PARTS

Chapter content

This chapter contains the following information:

15.1 Pump unit

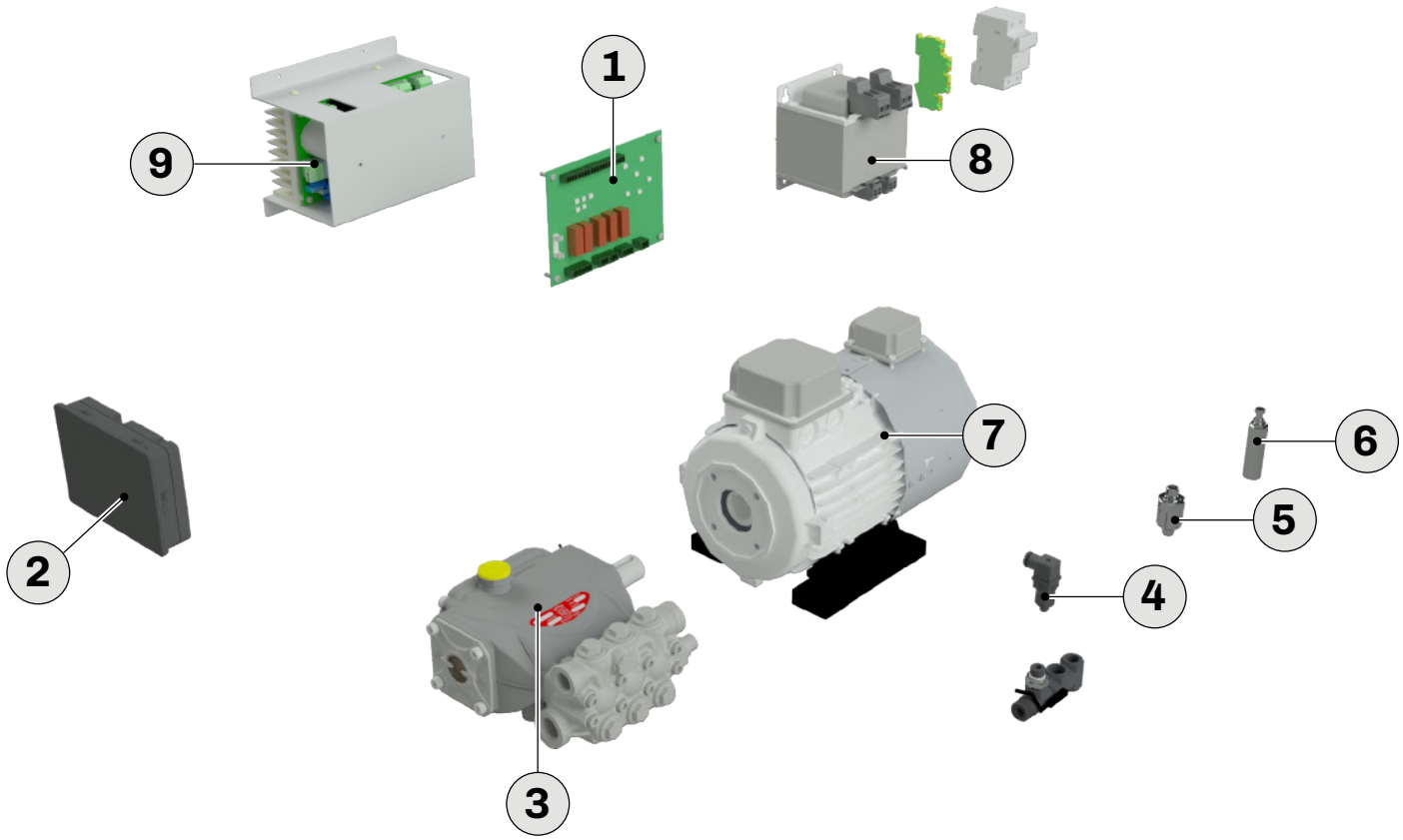


Fig. 80. ***EHPN*** *series spare parts - pump unit*

Ref.	P/n	Description
1	**EHHPN001P4**	**EHPN** electronic control
2	**EPJC940U4EHPN**	**EHPN** colour user interface, 24 Vac M+F CAN+RS485
3	**EHPNK25**	Steel pump kit, 120...300 kg/h
	EHPNK26	Steel pump kit, 360...420 kg/h
	EHPNK27	Steel pump kit, 480...540 kg/h
	EHPNK28	Steel pump kit, 660 kg/h
	EHPNK29	Steel pump kit, 840 kg/h
4	**EHPNK37**	**EHPN** pressure transducer
5	**EHPNK36**	**EHPN** pressure switch
6	**EHPNK38**	**EHPN** automatic safety valve
7	**EHPNK46**	**EHPN** servo-ventilated motor, 2.2 kW EHPD 480...840 kg/h
	EHPNK47	**EHPN** servo-ventilated motor, 1.5 kW EHPD 120...420 kg/h
8	**EHPNK50**	**EHPN** transformer
9	**EI1K5M2C04O0VXX**	Compact Inverter, 1.5 kW 1PH 230 Vac REV4 NAKED
	EI2K2M2C04O0VXX	Inverter Compact 2,2 kW 1PH 180-240 Vac REV4 NAKED
---	**EHPNK20**	Pump gasket kit, EHPN/EHPD CODE 337
---	**EHPNK21**	Delivery valve kit for EHPN/EHPD pump, PUMP CODE 334-53SS
---	**EHPNK22**	Intake valve kit, EHPN/EHPD PUMP CODE 341-53SS

15.2 Distribution rack

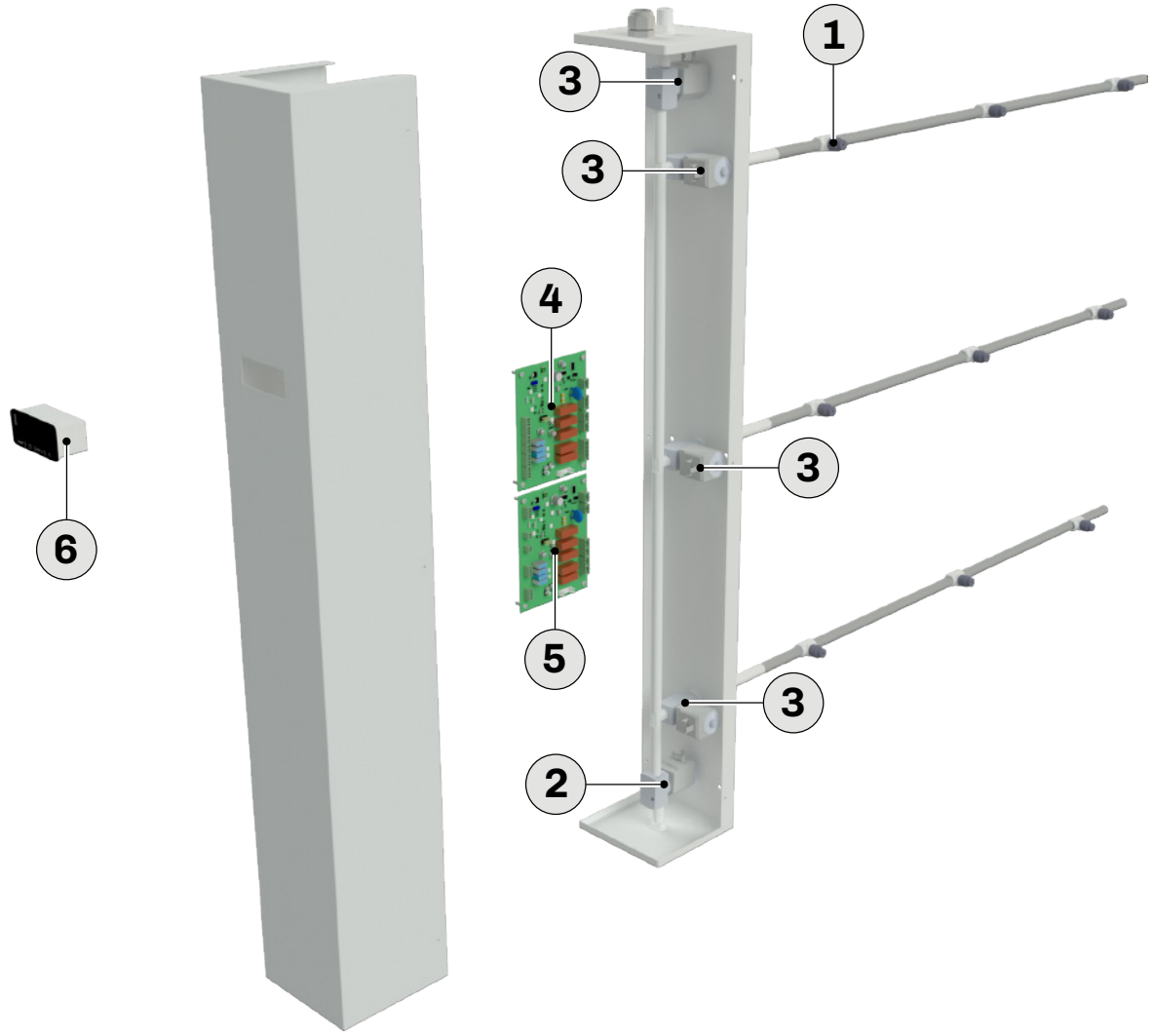


*Fig. 81. **EHPN** series spare parts - distribution rack*

Ref.	P/n	Description
1	**EHPNK10**	Kit of 10 nozzles, 4 kg/h
	EHPNK11	Kit of 10 nozzles, 8 kg/h
2	**EHPNK40**	Outlet solenoid valve, NO, 24V
3	**EHPNK41**	Inlet or step solenoid valve, NC, 24V
4	**EHHPD001P4**	**EHPD** electronic control
5	**EHHPD001E4**	**EHPD** electronic control expansion, 7 branches
6	**EV3K61X0CT**	User interface, TTL REM. KEYB. 4+4 DGT UMID.

16. WIRING DIAGRAMS

Chapter content

This chapter contains the following information:

16.1 Wiring diagram for EHPN 3-branch humidifier

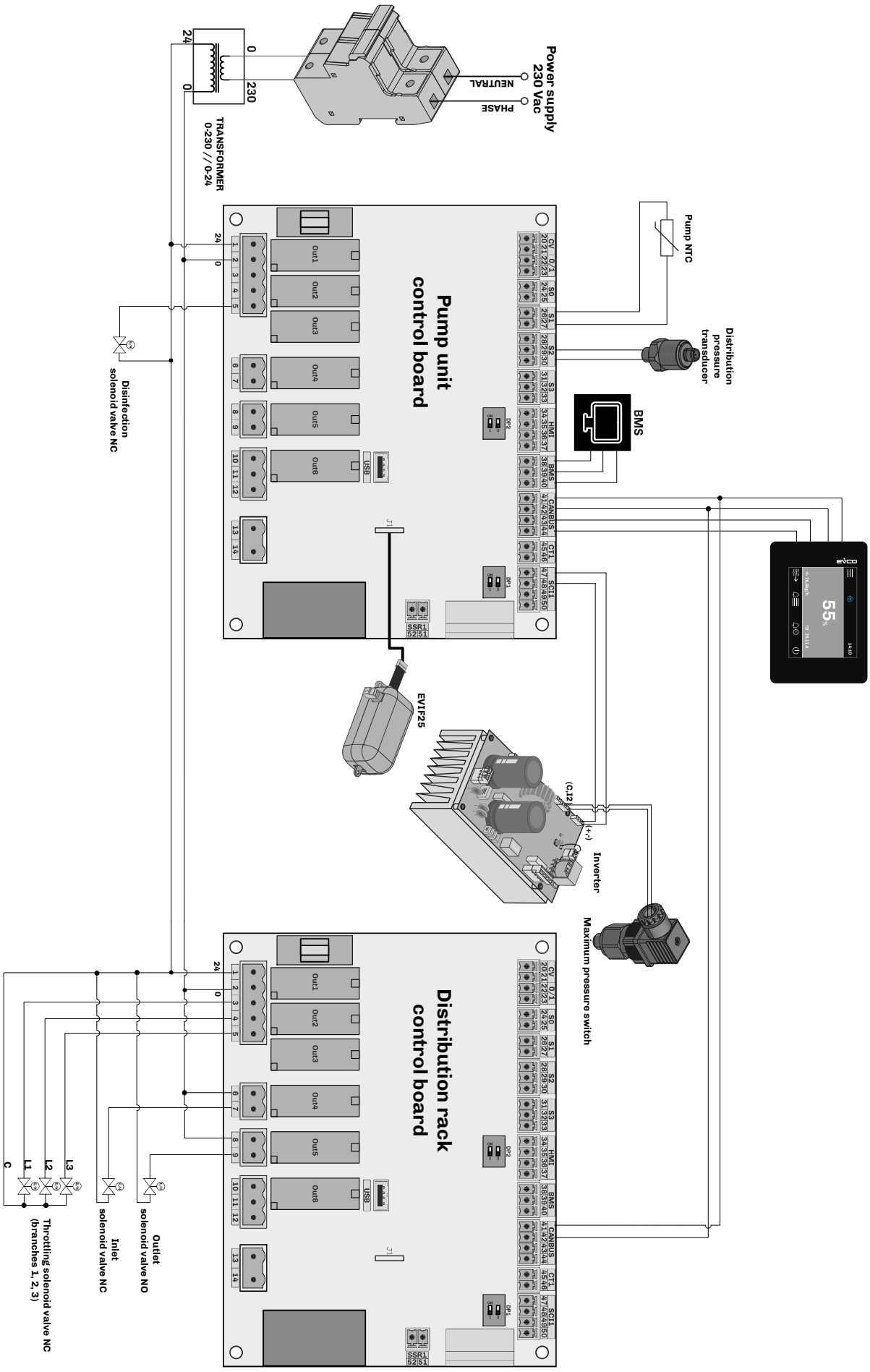


Fig. 82. *Wiring diagram for EHPN 3-branch humidifier*

16.2 Wiring diagram for EHPN 7-branch humidifier

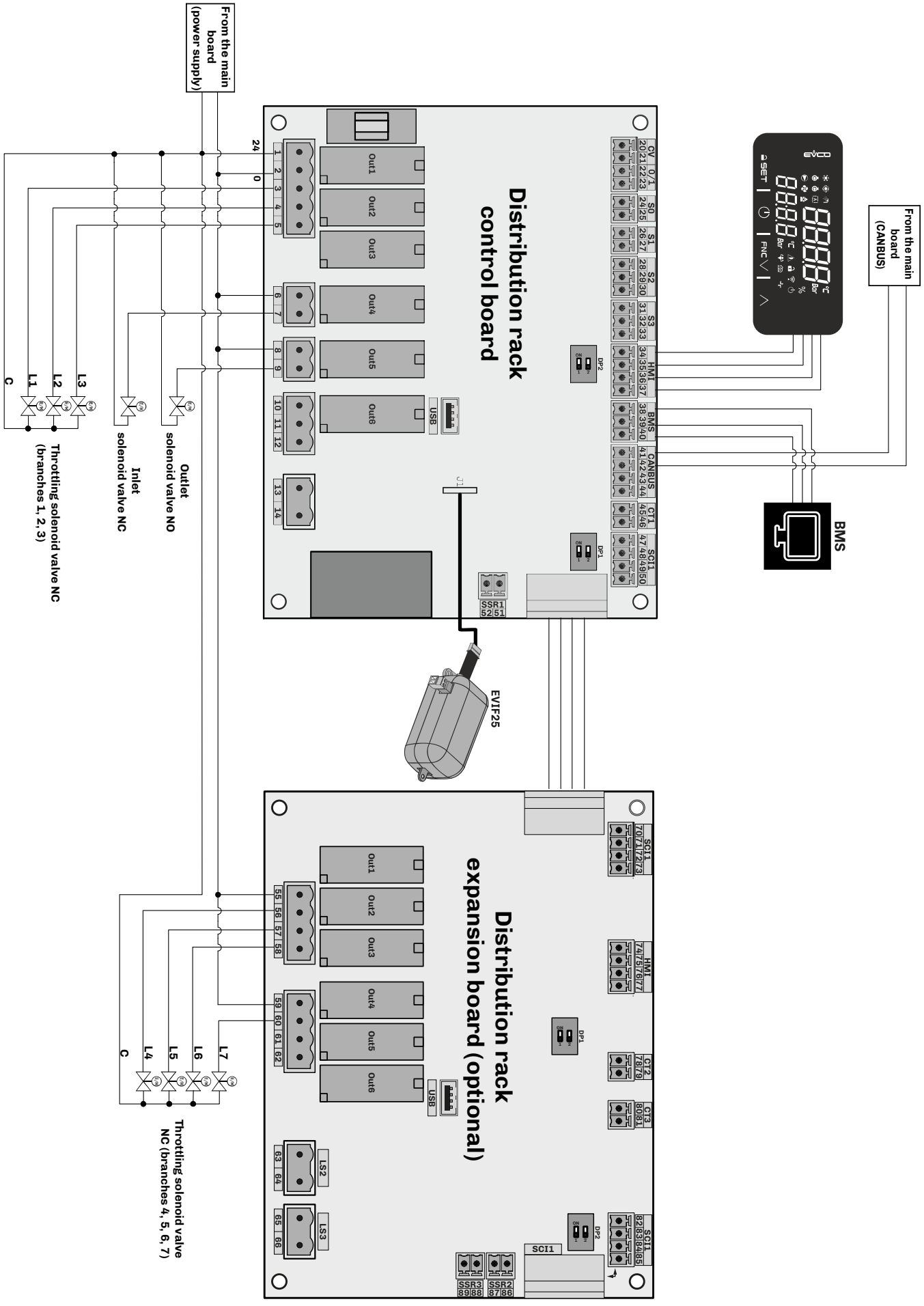


Fig. 83. *Wiring diagram for EHPN 7-branch humidifier*

16.3 Wiring diagram for EHPN single-branch humidifier

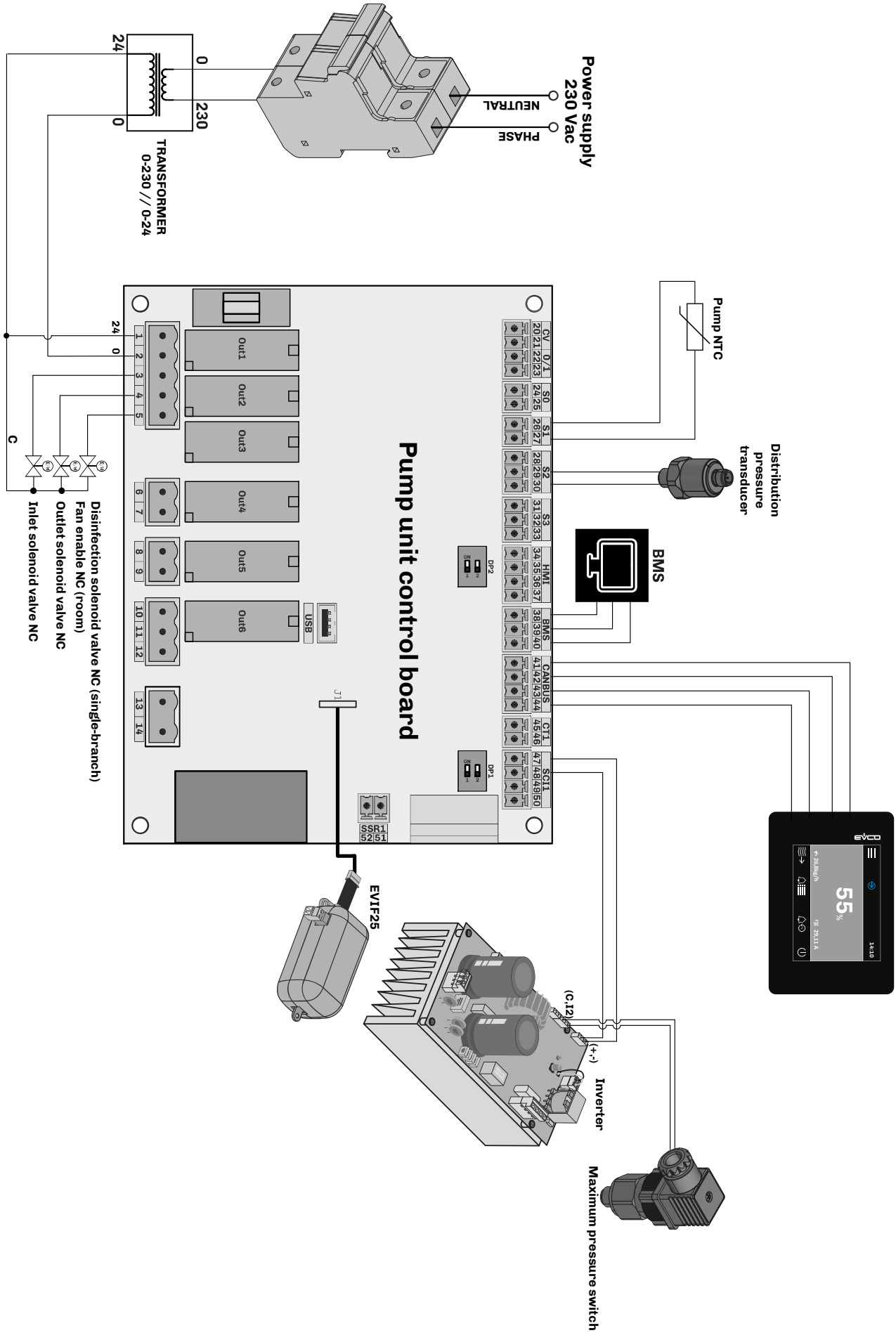


Fig. 84. *Wiring diagram for EHPN single-branch humidifier*

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