elsteam
HUMIDIFIERS

Zephyr Wellness

Stand-alone immersed electrode humidifiers dedicated to the world of wellness

⚠ **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.

Application guide

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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.

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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
The **Zephyr Wellness** steam (isothermal) humidifier is only intended for air humidification via a steam distributor in wellness settings or Turkish baths.
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 electrical section of the humidifier must be properly protected from water and dust during operation 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 strictly 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 risk of serious personal injury/burns.
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.

AUTHORIZED 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.

UNAUTHORISED 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

Zephyr Wellness 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 hatches or 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 open, 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.
- Provide safety interlocks (isolators) of a suitable size between the power supply and the humidifier.
- 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 steam at 100 °C (212 °F) and discharges water at a temperature of approximately 98 °C (208.4 °F).

⚠ ⚠ WARNING

HOT WATER VAPOUR

Do not touch the equipment while it is running.

⚠ WARNING

RISK OF BURNS

Before carrying out any work on the system, place the equipment out of service and wait for the machine to cool down (< 50 °C (122 °F)).

⚠ WARNING

REGULATORY INCOMPATIBILITY

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

1. INTRODUCTION

Chapter content

This chapter contains the following information:

1.1 Introduction to Zephyr Wellness

The **Zephyr Wellness** humidifier series is the ELSTEAM solution for immersed electrode humidifier systems dedicated to wellness and spa settings, and specifically to distributing steam in Turkish baths or hammam spas.

Zephyr Wellness series humidifiers generate steam by passing a current between two or more electrodes immersed in drinking water to bring it to boiling point.

The steam is controlled by adjusting the intensity of the current transferred to the water by the immersed electrodes, which indirectly controls the boiling of the water.

The steam is emitted into the room via a special pipe and a linear steam distributor, or via a steam distributor with a nozzle.

Steam production is activated when the Turkish bath cabin door is closed (if there is an enable connection). The steam production stops when the door is reopened.

1.2 Product overview

1.2.1 External view of the product

Fig. 1.   *External overview of the product*

Reference	Description
①	Front wall
②	User interface
③	Water inlet (supply) fitting
④	Condensate drain inlet
⑤	Steam outlet connection
⑥	Emergency water outlet from the internal tray
⑦	Water outlet
⑧	Screw for removing the front wall
⑨	Cable gland for the power supply and signal wiring

1.2.2 Internal view of the product

Fig. 2. *Internal overview of the product*

Reference	Description		Reference	Description
1	Fuse holder base		9	Bottom tray to collect water leaks
2	Isolation transformer		10	Boiler
3	Contactor		11	Steam outlet pipe
4	Control board		12	Inlet solenoid valve
5	Cable gland for electrode wiring		13	Filling and overflow tank
6	Cable gland for inlet solenoid valve and maximum level sensor wiring		14	Water drain circuit
7	Cable gland for electric pump wiring		15	Water outlet hole in the bottom tray
8	Electric outlet pump		16	NTC sensor (preheating/anti-freeze management)

1.3 Main features

- Isothermal humidifier;
- Sterile steam (steam with a temperature of approximately 100 °C (212 °F));
- Automatic boiler cleaning;
- Cleanable and reusable fire-retardant boiler;
- Operating algorithm optimises energy and water efficiency;
- Steam production range of 5 to 40 kg/h;
- Built-in electronic control;
- System to protect against water leaks on the steam side (overflow circuit with overpressure discharge function);
- Stainless steel water drain tray on request.

1.3.1 Electronic control features

- Proportional control of steam production:
  - High efficiency;
  - Rapid response to changes in requirements;
  - Production control.
- Electrode and boiler cleaning system:
  - Reduced maintenance frequency;
  - High performance levels;
  - Longer electrode and boiler life.
- Automatic or manual boiler draining:
  - Longer boiler life.
- Smart user interface indicates operating status:
  - Continuous monitoring of the operating status;
  - Automatic fault analysis;
  - Advanced error diagnostics;
  - Operating time counter.
- Master/Slave operation;
- Remote communication with EPoCA (optional via **EVIF25** interface).

1.4 Available models

The **Zephyr Wellness** series consists of two models:
- **EHKW**: Immersed electrode humidifier with 3.5" TFT graphic display:
  - Production capacity 5...40 kg/h.

1.4.1 EHKW models

P/n	Description
EHKW005M2	**EHKW** immersed electrode humidifier, 5 kg/h, 230 Vac single-phase.
EHKW005T4	**EHKW** immersed electrode humidifier, 5 kg/h, 400 Vac three-phase.
EHKW010T4	**EHKW** immersed electrode humidifier, 10 kg/h, 400 Vac three-phase.
EHKW015T4	**EHKW** immersed electrode humidifier, 15 kg/h, 400 Vac three-phase.
EHKW020T4	**EHKW** immersed electrode humidifier, 20 kg/h, 400 Vac three-phase.
EHKW030T4	**EHKW** immersed electrode humidifier, 30 kg/h, 400 Vac three-phase.
EHKW040T4	**EHKW** immersed electrode humidifier, 40 kg/h, 400 Vac three-phase.

1.5 Accessories

The following accessories are available for the **Zephyr Wellness** series of immersed electrode humidifiers:

1.5.1 Linear distributors

P/n	Description
EHSD040T	Linear steam distributor, 400 mm (1.31 ft).
EHSD060T	Linear steam distributor, 600 mm (1.97 ft).
EHSD080T	Linear steam distributor, 800 mm (2.62 ft).
EHSD100T	Linear steam distributor, 1000 mm (3.28 ft).
EHSD130T	Linear steam distributor, 1300 mm (4.26 ft).
EHSD160T	Linear steam distributor, 1600 mm (5.25 ft).
EHSD200T	Linear steam distributor, 2000 mm (6.56 ft).
EHSDP000T	Custom linear steam distributor.
EHSD040X	Linear steam distributor with high thermal efficiency, 400 mm (1.31 ft).
EHSD060X	Linear steam distributor with high thermal efficiency, 600 mm (1.97 ft).
EHSD080X	Linear steam distributor with high thermal efficiency, 800 mm (2.62 ft).
EHSD100X	Linear steam distributor with high thermal efficiency, 1000 mm (3.28 ft).
EHSD130X	Linear steam distributor with high thermal efficiency, 1300 mm (4.26 ft).
EHSD160X	Linear steam distributor with high thermal efficiency, 1600 mm (5.25 ft).
EHSD200X	Linear steam distributor with high thermal efficiency, 2000 mm (6.56 ft).
EHSDP000X	Custom steam distributor with high thermal efficiency.
EHSDW022	Steam distributor with 22 mm (0.87 in.) nozzle.
EHSDY038	Y steam distribution connection, Ø38 mm (1.50 in.).
EHSDC038	90° steam distribution connection, Ø38 mm (1.50 in.).

EHSD••••• | Steam line distributor
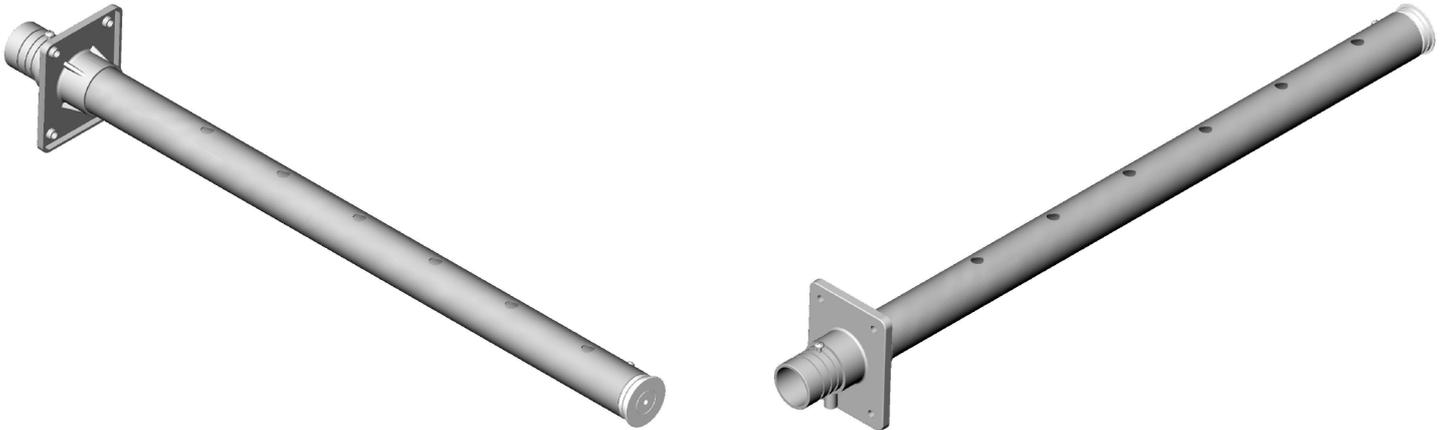
Fig. 3.   EHSD | Steam line distributor

EHSDW022 | Steam distributor with nozzle
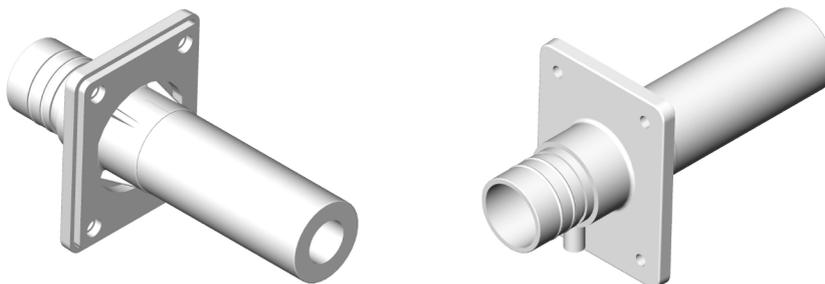
Fig. 4.   EHSDW022 | Steam distributor with nozzle

1.5.2 Boilers

P/n	Description
EHBK005MHCM	Cleanable boiler for 5 kg/h single-phase models with high conductivity water.
EHBK005MLCM	Cleanable boiler for 5 kg/h single-phase models with low conductivity water.
EHBK005T00M	Standard cleanable boiler for 5 kg/h three-phase models.
EHBK005THCM	Cleanable boiler for 5 kg/h three-phase models with high conductivity water.
EHBK005TLCM	Cleanable boiler for 5 kg/h three-phase models with low conductivity water.
EHBK015T00M	Standard cleanable boiler for 10–15 kg/h three-phase models.
EHBK015THCM	Cleanable boiler for 10–15 kg/h three-phase models with high conductivity water.
EHBK015TLCM	Cleanable boiler for 10–15 kg/h three-phase models with low conductivity water.
EHBK040T00L	Standard cleanable boiler for 20–30–40 kg/h three-phase models.
EHBK040THCL	Cleanable boiler for 20–30–40 kg/h three-phase models with high conductivity water.
EHBK040TLCL	Cleanable boiler for 20– 30–40 kg/h three-phase models with low conductivity water.
EHBKISOL00L	Insulating jacket for 20–40 kg/h boilers.
EHBKISOL00M	Insulating jacket for 5–15 kg/h boilers.

EHBKISOL00• | Insulating jacket for boilers

Fig. 5.   EHBKISOL00• | Insulating jacket for boilers

1.5.3 Sensors and control accessories

P/n	Description
EVIF25TW4X0001	EVLINK TTL/Wi-Fi + RTC 12–30 Vdc.
EV3411M7	1-output electronic controller, 230 VAC power supply, 1 multi-sensor analogue input.
EVHTP520	Temperature/humidity sensor with 5...95% r.H. and -10...70 °C range.
EVHP523	4...20 mA humidity transducer with 5...95% r.H. range.
EVHTP523	Humidity and temperature transducer, 8...28 Vdc power supply, 2 x 4...20 mA output signals.
EVTPNW30F200	NTC sensor, 3 m long 2-wire thermoplastic cable, 5x20 mm comoulded bulb, IP68 protection.
EHKBLOCK15	Cable gland kit for metal base for stand-alone installation of 5–15 kg/h models.
EHKBLOCK40	Cable gland kit for metal base for stand-alone installation of 20–40 kg/h models.

1.5.4 Plumbing components

P/n	Description
0031000048	¾" GAS female hose to connect the water mains to the water inlet solenoid valve, 300 mm (11.81 in.).
EHTV038	Steam pipe, Ø38 mm (1.50 in.).
EHTC010	Condensate outlet pipe, Ø10 mm (0.39 in.).
EHVI	Stainless steel drainage tank.
EH090DRAIN	90° outlet elbow, Ø40 mm (1.57 in.).

1.5.5 Installation accessories

P/n	Description
EHKTBOTTOM15	Metal base for stand-alone installation of 5–15 kg/h models.
EHKTBOTTOM40	Metal base for stand-alone installation of 20–40 kg/h models.

1.6 Sizing the humidifier based on the maximum steam production required

Turkish bath size [m³]	Steam required [kg/h]		Humidifier for the required steam	
	Plastic cabin	Masonry clad cabin	Plastic cabin	Masonry clad cabin
4	5	8	EHKW005M2 EHKW005T4	EHKW010T4
8	8	12	EHKW010T4	EHKW015T4
12	10	15	EHKW010T4	EHKW015T4
16	12	18	EHKW015T4	EHKW020T4
20	13	21	EHKW015T4	EHKW030T4
24	15	24	EHKW015T4	EHKW030T4
28	17	26	EHKW020T4	EHKW030T4
32	18	29	EHKW020T4	EHKW030T4
36	20	31	EHKW020T4	EHKW040T4
40	21	34	EHKW030T4	EHKW040T4
44	23	36	EHKW030T4	EHKW040T4
48	24	38	EHKW030T4	EHKW040T4
52	26	40	EHKW030T4	EHKW040T4

N.B.:
- The steam capacity established in the table above does not take into account any steam losses due to condensation in the steam distributor pipes, any heat losses from the unit or any humidity absorbed or released by the materials from which the steam bath is made.
- The steam capacity established in the table above does not take into account any losses due to the outlet speed.
- The total loss depends on the entire system, and must be evaluated and considered when choosing the humidifier for the required steam capacity.

2. TECHNICAL DATA

Chapter content

This chapter contains the following information:

2.1 Technical specifications

Description	MU	EHKW••••						
		05M2	05T4	10T4	15T4	20T4	30T4	40T4
Steam production								
Production capacity	kg/h	5	5	10	15	20	30	40
Maximum pressure	Pa (mmH$_2$O)	1650 (165)						
Connection outside diameter	mm (in.)	38 (1.50)						
Steam distribution								
Number of linear distributors that can be connected	---	1						
Number of ventilated distributors that can be connected	---	1						
Electrical properties								
Power absorbed	kW	3.75	3.75	7.5	11.3	15	22.5	30
Power supply	Vac, Hz	230 V, 50/60	400 V, 50/60					
Phases	---	Single-phase	Three-phase					
Rated absorption per phase	A	16.3	5.4	10.8	16.3	21.7	32.5	43.3
Water properties								
Supply water quality	---	*SEE "5.2.1 WATER SPECIFICATIONS" ON PAGE 29*						
Supply water electrical conductivity	µS*cm	70...1250 (Standard boiler 300...700)						
Supply water hardness	°f	5...50 (Standard boiler 10...30)						
Supply water pressure	MPa/bar	0.02...1 / 0.2...10						
Supply water connection	---	M 3/4" GAS						
Water drain outer dimensions	mm (in.)	40 (1.57)						
General specifications								
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						
Dimensions	mm (in.)	*SEE "4.1 DIMENSIONS AND WEIGHTS" ON PAGE 22*						
IP protection level of the water module	---	IP20						
Regulation								
Control type/Command signal	---	ON/OFF Proportional Probe						
Supervision/Configuration	---	RS-485 MODBUS Supervision Wi-Fi						

3. RECEIVING THE PRODUCT

Chapter content

This chapter contains the following information:

3.1 Before you start

NOTICE
MALFUNCTIONING OF THE EQUIPMENT • 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;
- Make sure the humidifier is intact upon delivery and inform the courier immediately, in writing, of any problems caused by careless or improper transportation (accept the package conditionally).

3.3 Opening the packaging

NOTICE
INADEQUATE PERSONNEL TRAINING AND PACKAGING CONTROL The customer is responsible for ensuring that personnel are properly trained on handling heavy parts and are familiar with and observe the corresponding workplace safety and accident prevention rules.

- Take the package to the humidifier installation site;
- Open the cardboard packaging and remove internal protection;
- Slide out the humidifier.

3.4 Checking the packaging contents

The product package contains:
- **Zephyr Wellness** series humidifier;
- Installation and connection instruction sheet;
- Water inlet connection pipe for use between the main supply and the solenoid valve at the humidifier inlet;
- Wall mounting bracket.

3.5 Disposing of the packaging

Keep the original packaging for future use.

If the packaging has to be disposed of, observe local environmental protection directives. Recycle the packaging material if possible.

4. DIMENSIONS AND MECHANICAL INSTALLATION

Chapter content

This chapter contains the following information:

4.1 Dimensions and weights

4.1.1 EHKW005... EHKW015 models

mm (in.)

370 (14.56)

247.6 (9.74)

740.8 (29.16)

819.7 (32.27)

412.2 (16.23)
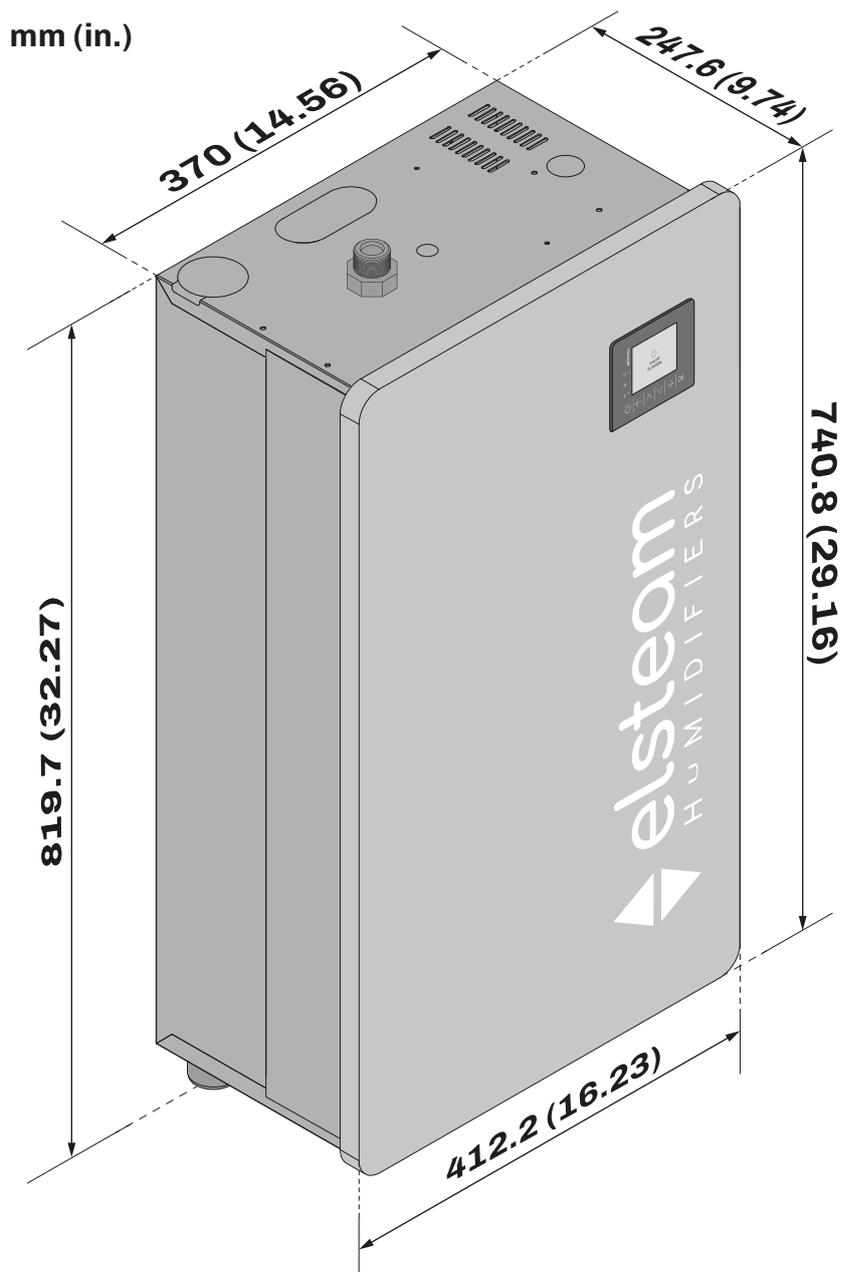
Fig. 6. *Dimensions of EHKW005... EHKW015 models*

Weights

Model	Weight [kg (lb)]
EHKW005	16.5 (36.37)
EHKW010	17.5 (38.58)
EHKW015	17.5 (38.58)

4.1.2 EHKW020... EHKW040 models

mm (in.)

480 (18.90)

379.5 (14.94)

893 (35.16)

522.4 (20.57)
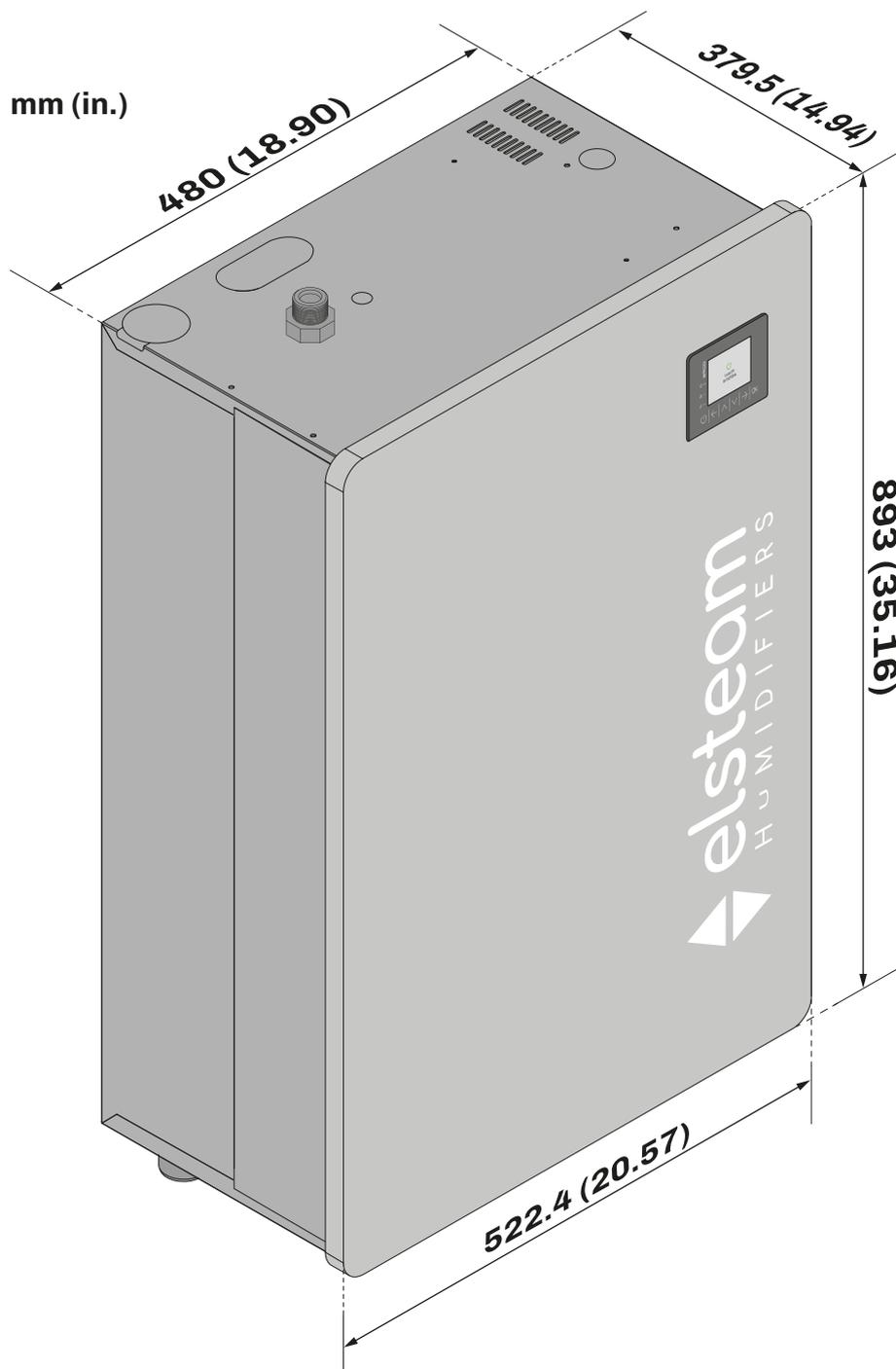
Fig. 7.   *Dimensions of **EHKW020**... **EHKW040** models*

Weights

Model	Weight [kg (lb)]
EHKW020	28.5 (62.83)
EHKW030	28.5 (62.83)
EHKW040	28.5 (62.83)

4.2 Minimum installation distances

⚠ 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.
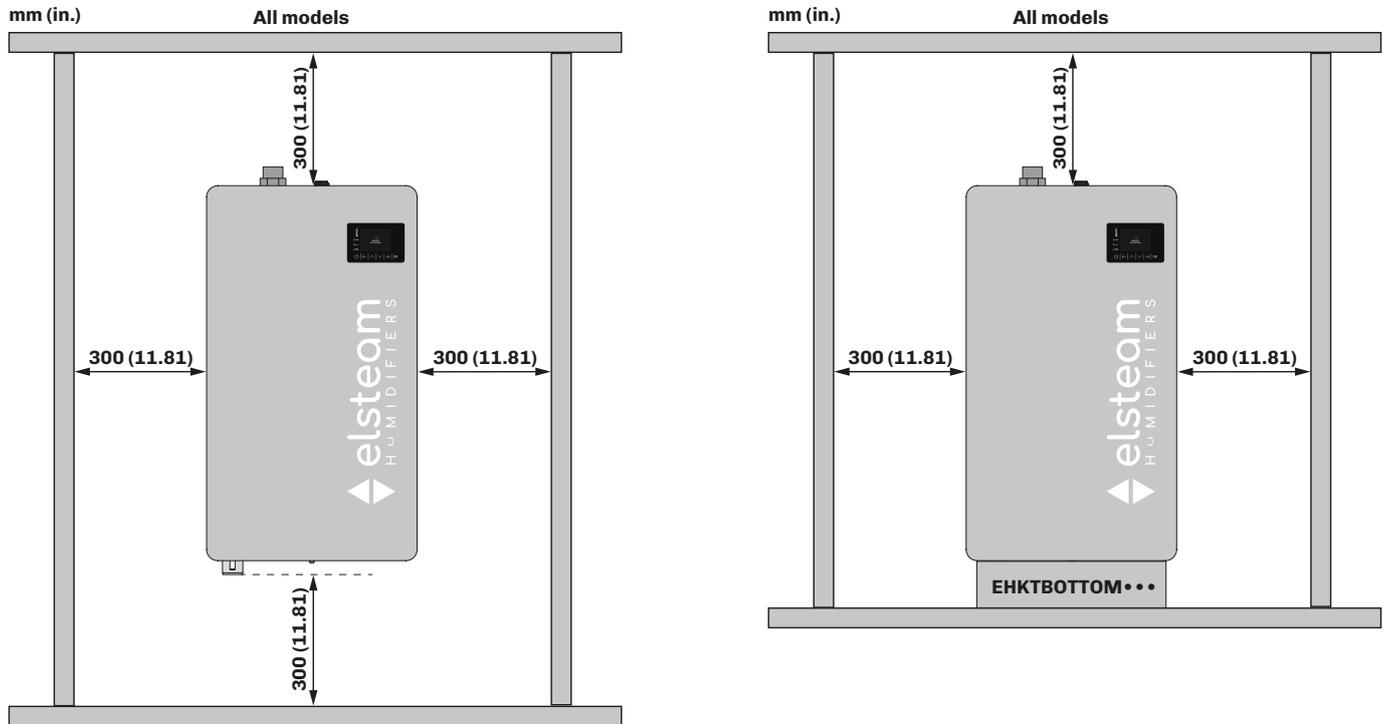
Fig. 8. *Minimum installation distances*

4.3 Installation
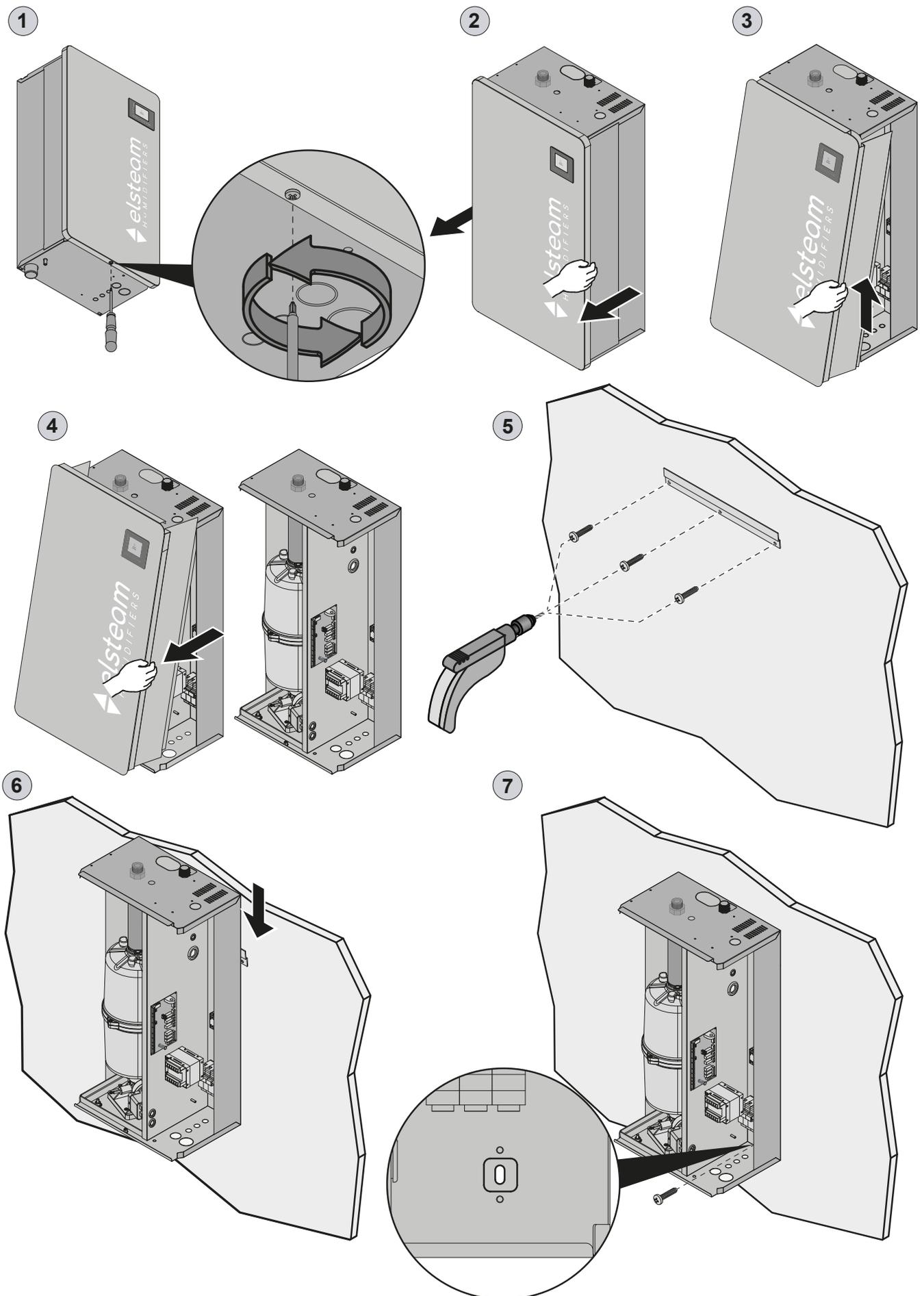
Fig. 9.   Installation instructions

4.3.1 Installation instructions

The humidifier must be installed exclusively in a technical area that is **not accessible to the public**, observing all the safety precautions indicated in this manual.

⚠ ⚠ DANGER
RISK OF ELECTRIC SHOCK, EXPLOSION OR ELECTRIC ARC
Make sure there is an effective earth connection.

NOTICE
FAULTY INSTALLATION
Use the bracket provided with a load-bearing capacity of at least 80 kg to install the equipment.

- If the power supply is connected: disconnect the humidifier power supply using the external isolator;
- Undo the PH2 pan head Phillips screw to open the walls of the humidifier;
- Remove the front wall by pulling it towards you and lifting it (see ***"FIG. 9. INSTALLATION INSTRUCTIONS" ON PAGE 25***);
- Fasten the humidifier to the wall with the bracket provided by attaching it to the mounting slots at the rear of the humidifier;
- Fasten the humidifier to the wall with a security screw.

4.3.2 Example of installation in the technical area of a Turkish bath

Fig. 10. *Example of installation in the technical area of a Turkish bath*

5. PLUMBING CONNECTIONS AND INSTALLATION

Chapter content

This chapter contains the following information:

5.1 Humidifier composition
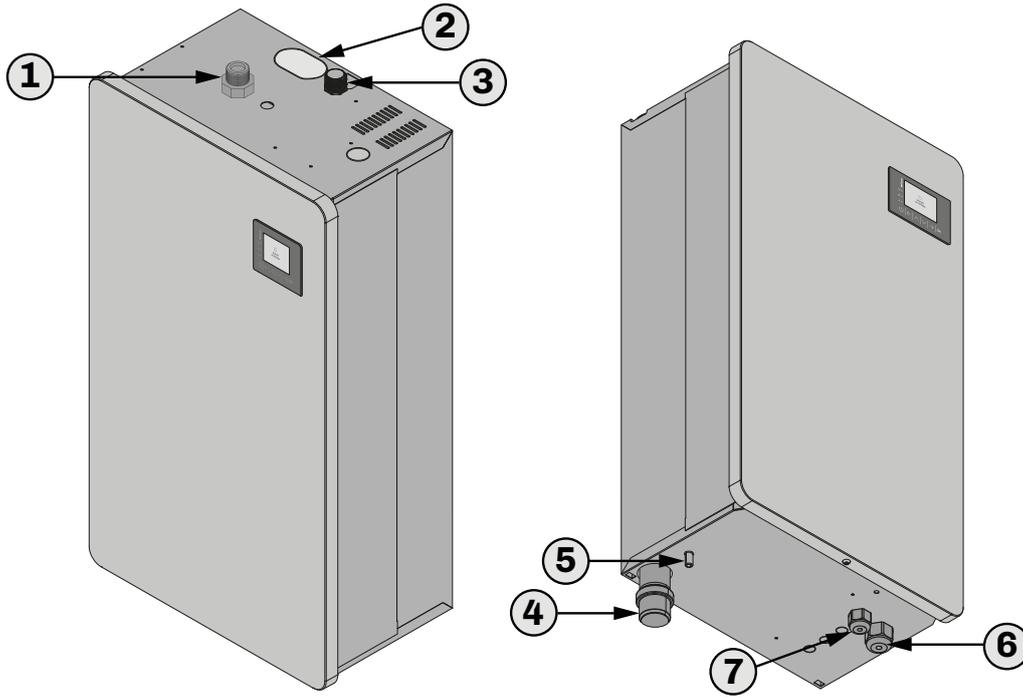
Fig. 11. *Humidifier composition overview*

Reference	Description		Reference	Description
1	Steam outlet (Ø38 mm (1.50 in.))		5	Water outlet from the bottom tray (Ø10 mm (0.39 in.))
2	Condensate drain inlet (Ø10 mm (0.39 in.))		6	Pull resistant cable glands for power supply wiring
3	3/4" GAS male water supply fitting		7	Pull-resistant cable glands for regulation wiring
4	Water outlet for connection to sewage pipes (Ø40 mm (1.57 in.));			

NOTE: The **EHTC** condensate outlet pipe can be used to drain the water, collected by the bottom tank, into the sewage pipe.

5.2 Installing the plumbing

For correct plumbing installation, provide the following:

- A shut-off tap;
- A filter supplementing the one already present inside the solenoid valve;
- A pressure reducer (if the mains pressure exceeds1 MPa (10 bar)).

NOTE: If using a pressure reducer, make sure it is effective and does not cause any drastic pressure drops when the mains pressure is very low.

NOTICE
MALFUNCTIONING OF THE EQUIPMENT
• The water supply must have a minimum pressure of 0.02 MPa (0.2 bar).
• Connect the solenoid valve to the mains using the hose supplied in order to reduce water hammer in the water supply to the humidifier.
• During installation, take care not to damage the plastic thread on the solenoid valve.
• The water connection should allow access to the mechanical filter in the inlet solenoid valve in order to clean it.

5.2.1 Water specifications

General specifications

Description	Features
Water pressure	0.02…1 MPa (0.2…10 bar)
Water temperature	1…50 °C (33.8…122 °F)
Electrical conductivity	75…1250 µS/cm (at a temperature of 20 °C (68 °F))
Total hardness	5…50 °f

NOTE: Higher water hardness or a higher organic matter content does not preclude equipment operation, nevertheless these factors mean that more frequent maintenance will be required.

Optimal properties

Description	Optimal properties with standard boiler
Water pressure	1…6 bar
Water temperature	7… 20 °C (44.6… 68 °F)
Electrical conductivity	300…550 µS/cm
Total hardness	10…25 °f

N.B.: There is no way to establish the precise reduction in maintenance when using water with optimal properties as water morphology varies greatly even with the same hardness and electrical conductivity. In fact, the sediments that form may have different structures, from very hard to crumbly, scaly or muddy, depending on the chemical composition of the water, which is not made up of *CaCO3* alone, but also of a range of other elements/compounds.

What should you do?
- Let the water drain for a few hours before making the final connection in order drain any residues left from manufacturing and installation and ensure a free flow to the humidifier during operation.
- Check the condition of the rubber connection regularly to prevent faults that may lead to water leaks in the room.

What should you NOT do?
- Soften the water. If the water hardness is over 50 °f or if the hardness is such that frequent maintenance is required, mix a percentage of demineralised water with drinking water to ensure a minimum electrical conductivity of 200 µS/cm and a hardness of at least 10 °f;

NOTICE
MALFUNCTIONING OF THE EQUIPMENT
• Do not use softened water.   • 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.

5.3 Water drainage system

The drainage system must be able to drain a water flow of at least 60 l/minute (for single boiler models) or 120 l/minute (for double boiler models).

NOTICE
MALFUNCTIONING OF THE EQUIPMENT
Dimension the outlet pipe correctly in order to prevent blocking/clogging due to limescale residues while draining.

5.3.1 Connection specifications

Single boiler models

Drain connection specifications
- Minimum diameter 40 mm (1.57 in.);
- A minimum average slope of 45° with no traps or obstructions.

If the installation fails to meet these specifications, install a water and limescale drain tank at the bottom of the humidifier (*p/n **EHVI***) (contact the Elsteam sales office for further information).

Tank specifications
- Outlet diameter 38 mm (1.50 in.);
- Drain pipe with trap for limescale collection.

NOTICE
MALFUNCTIONING OF THE EQUIPMENT
If the water hardness is over 40 °f, carry out maintenance/ manual cleaning of the tank at least twice a year.
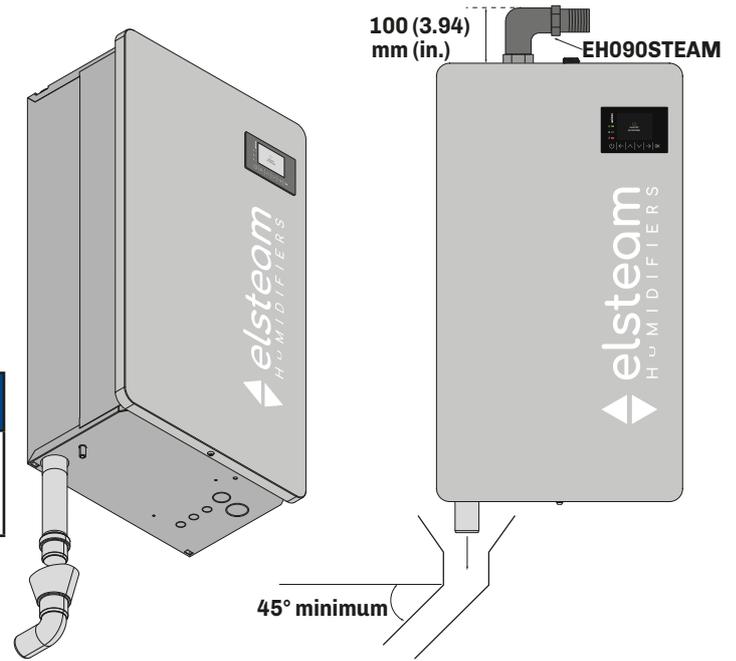
Fig. 12. *Specifications of drain pipe for single boiler models*

If the water hardness meets the specifications indicated in section *"**5.2.1 WATER SPECIFICATIONS" ON PAGE 29,**** the tank will only need to be cleaned once a year (water hardness in the range 5...30 °f) when only used during the winter. However, the maintenance technician is responsible for checking for deposits and cleaning them properly to ensure correct humidifier system operation and prevent water leaks on the surfaces around the **EHVI** basin.

⚡ ⚠ DANGER
RISK OF ELECTRIC SHOCK
If the tank or drain plumbing is made of electrically conductive material, earth both.

Drained water may reach a maximum temperature of 98 °C (208.4 °F).

⚠ WARNING
RISK OF BURNS
• Before starting to drain the water, wear all necessary personal protective equipment (PPE).
• Do not touch the equipment during draining.

5.4 Steam distribution in the cabin or duct

To distribute the steam inside the cabin, connect the humidifier to a stainless steel or engineering polymer steam distributor with an engineering polymer fastening flange. The engineering polymer steam distributor differs from the stainless steel model in that it has greater energy efficiency because the material is insulating and it is constructed with a double pipe and air chamber.

ELSTEAM steam distributors use materials verified in accordance with international standard ISO 846 method A and method C, for the purposes of subsequent certification of host systems according to VDI6022-1.

The steam distributor with nozzle must be installed:
- Horizontally with the condensate outlet at the bottom to allow the condensate to drain;
- The nozzle can be installed at the bottom of the Turkish bath, with the delivery pipe from the humidifier directed downwards (lower than the humidifier), taking care not to create pockets that can fill with condensate and obstruct the steam flow. The condensate that forms must be properly drained from the condensate outlet pipe.
- As close to the humidifier as possible (to prevent a loss of efficiency).

The linear steam distributor must be installed:
- In a horizontal or vertical position;
- At the bottom of the duct (so that the steam can mix properly with the air);
- Compatibly with the application, higher than the humidifier outlet port;
- As close to the humidifier as possible (to prevent a loss of efficiency).

The section of duct in which the linear steam distributor or distributor with nozzle is installed must be insulated, impermeable and drained at the bottom where the steam is distributed.

Maintain a minimum distance of 500 mm (1.64 ft.) between the steam outlet and the first obstacle in the direction of air flow.

The pipe connecting the humidifier to the insulated distributor must have no traps and must always slope toward the humidifier so that the condensate can drain through the condensate outlet pipe. The humidifier flange is designed to ensure this slope.

⚠ WARNING

MATERIAL DETERIORATION
- Fasten the special steam pipe to the boiler and to the stainless steel ramp with stainless steel clamps.
- Only use material that is suitable for the application.

5.4.1 Permissible distributor positions in the duct

Horizontal installation

mm (in.)   H = 250 - 400   80 (3.15)

mm (in.)   H > 400 $\dfrac{H}{2}$ - 120
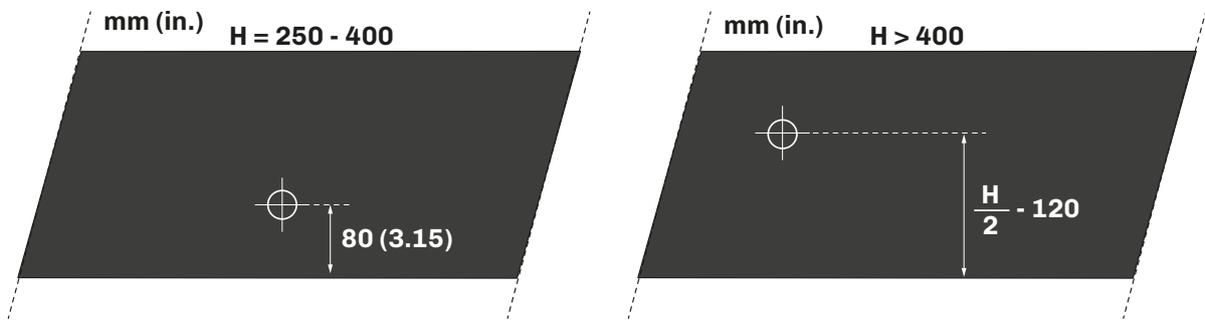
Fig. 13. *Horizontal installation - 1 distributor*

mm (in.)   H = (170+80)-400   170 (6.69)   80 (3.15)   200 (7.87)

mm (in.)   H > 400 < 700   150+($\dfrac{H-400}{2}$)   80 (3.15)
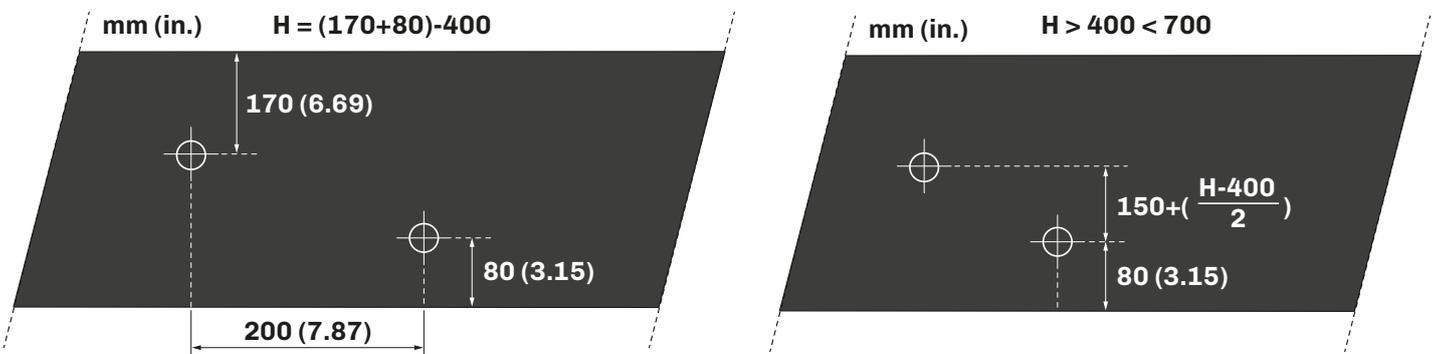
Fig. 14. *Horizontal installation - 2 distributors*

Vertical installation

$$C = B/2 \qquad\qquad C = B/4$$
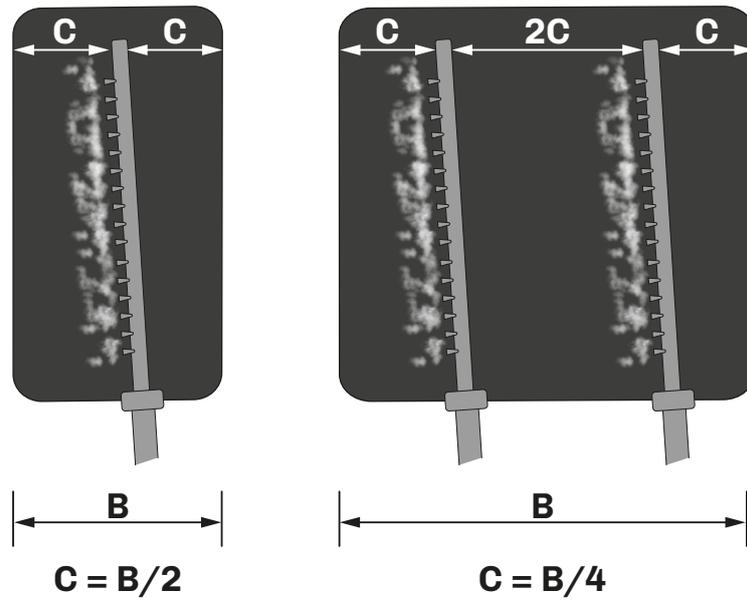
Fig. 15. *Vertical installation - 1–2 distributors*

Horizontal installation - wide duct
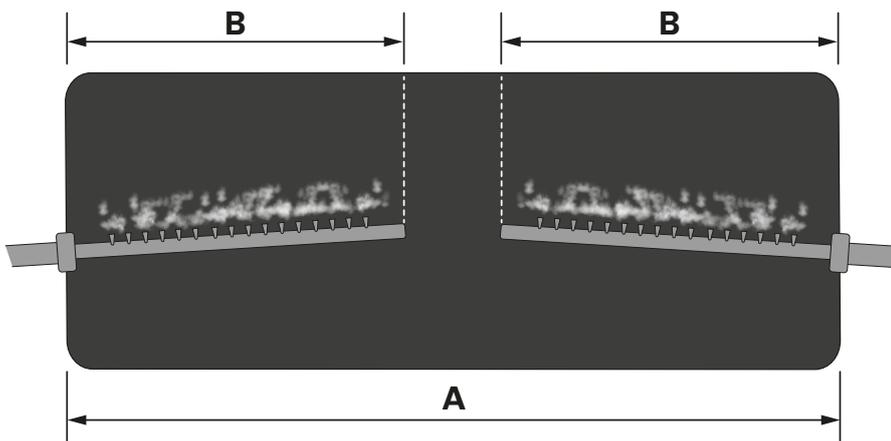
Example:

Ref.	Dimensions
A	2000 mm (6.56 ft)
B	600 mm (1.97 ft) (*p/n **EHSD060•***)

Fig. 16. *Horizontal installation in a wide duct - 2 distributors*

5.4.2 Steam distributor with nozzle (in wellness setting)
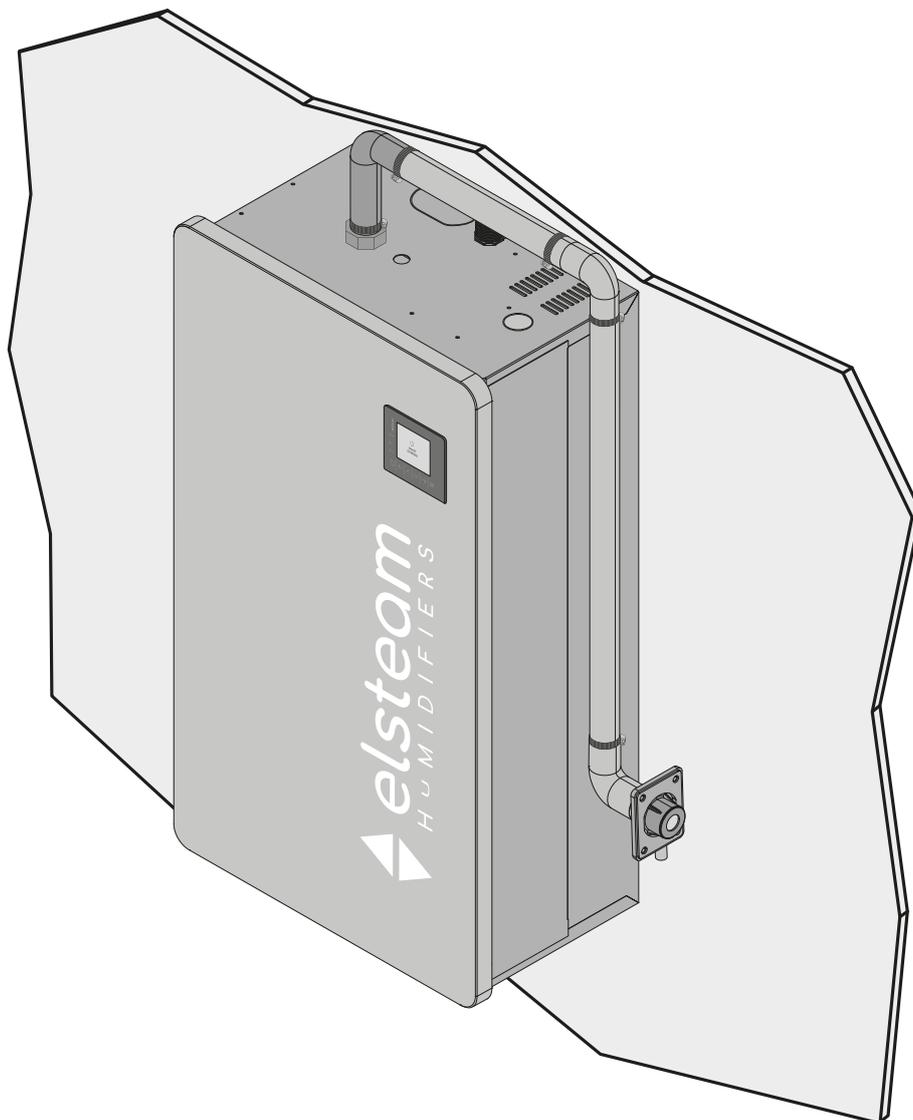
Fig. 17. *Steam distributor with nozzle (in wellness setting)*

5.4.3 Steam distributor with nozzle in a Turkish bath
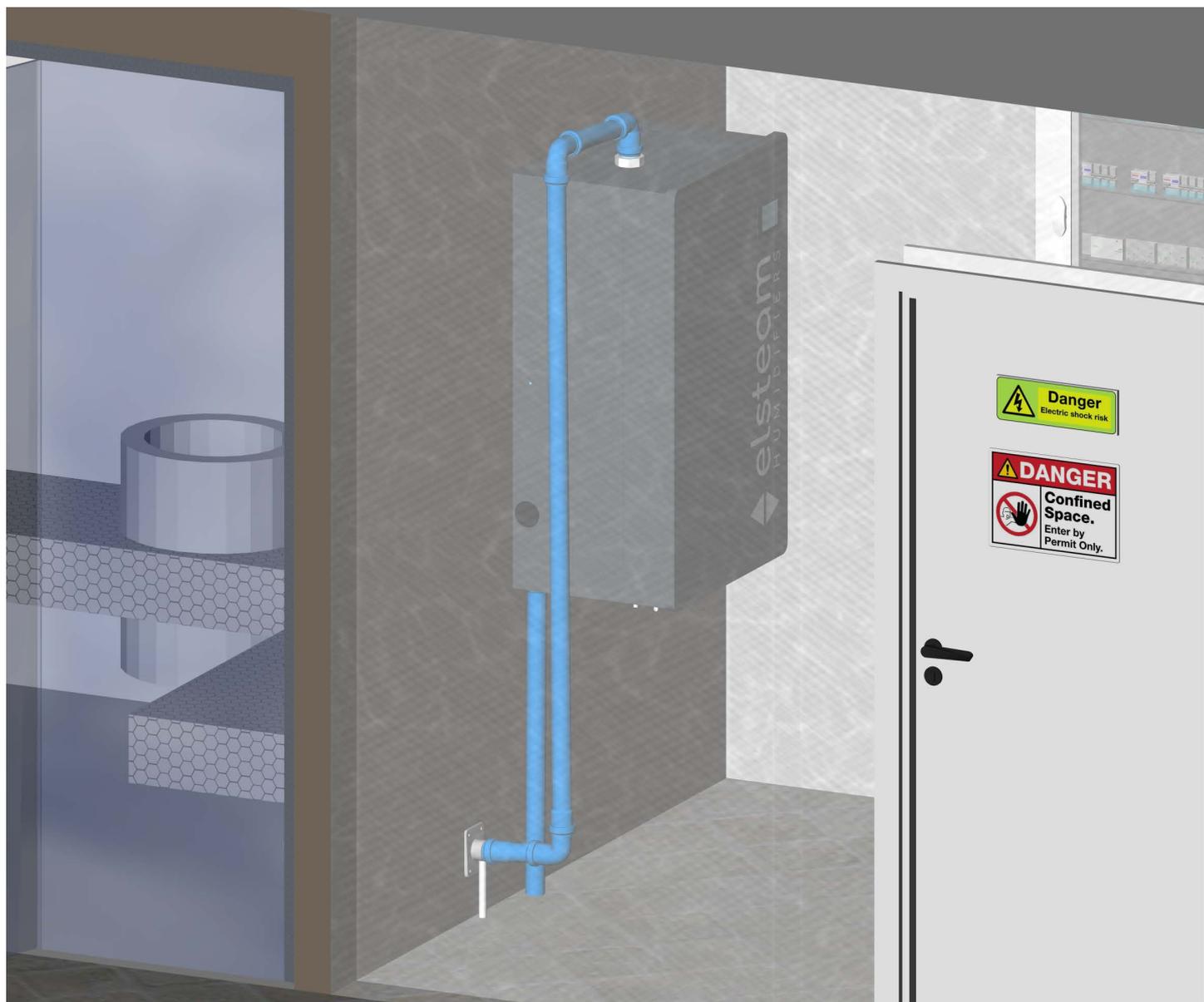
Fig. 18. *Steam distributor with nozzle (Turkish bath)*

5.5 Installation overview

5.5.1 Examples of distributor installation in the duct

Description	Example
Installation example no. 1 Distributor installed in a horizontal duct, higher than the humidifier. Air flow direction is not important.	
Installation example no. 2 Distributor installed in a horizontal duct, lower than the humidifier.	
Installation example no. 3 Distributor with nozzle installed in a Turkish bath (under the bench), lower than the humidifier.	
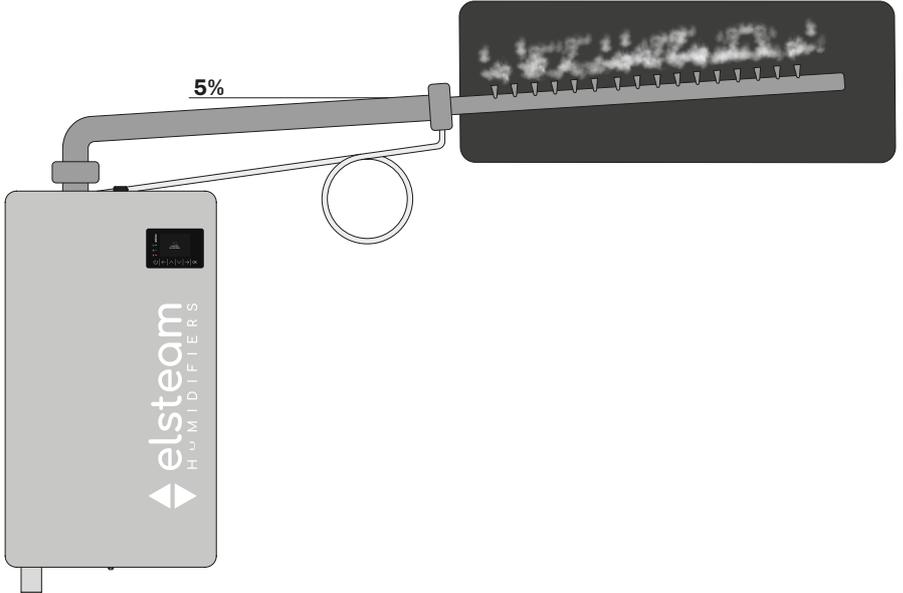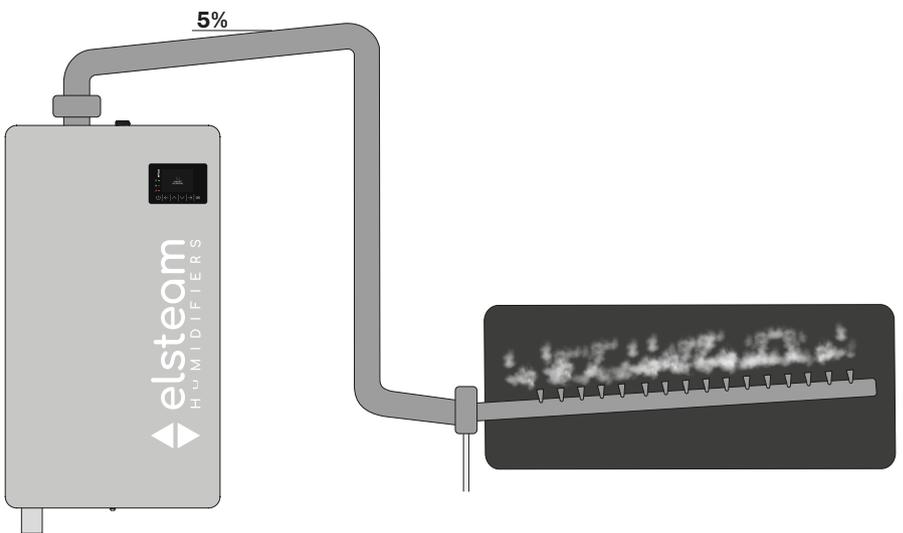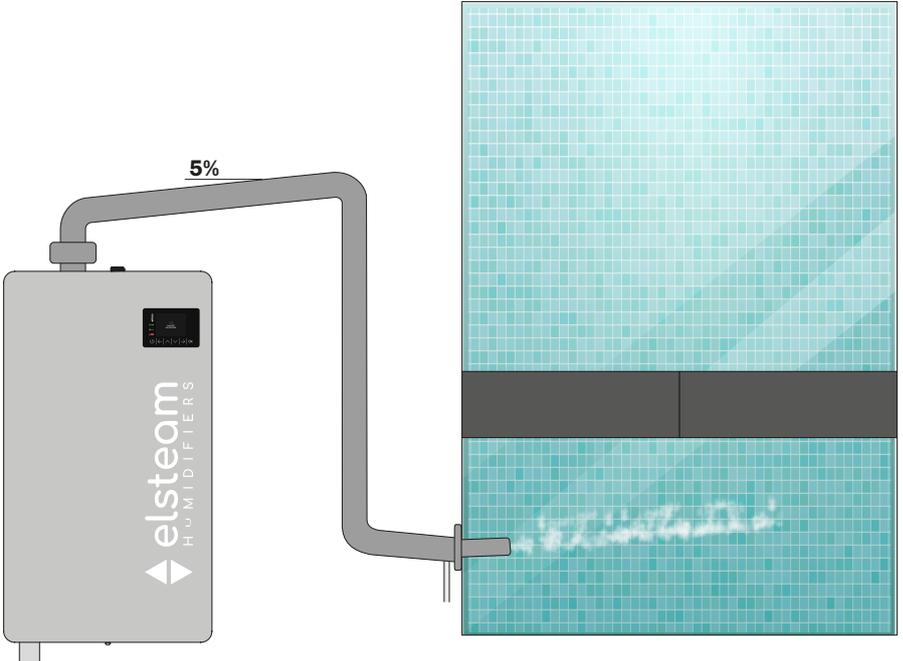
Description	Example
Installation example no. 4 Distributor installed in a horizontal duct, lower than the humidifier.	5%
Example of incorrect installation The delivery pipe must have no condensation pockets.	
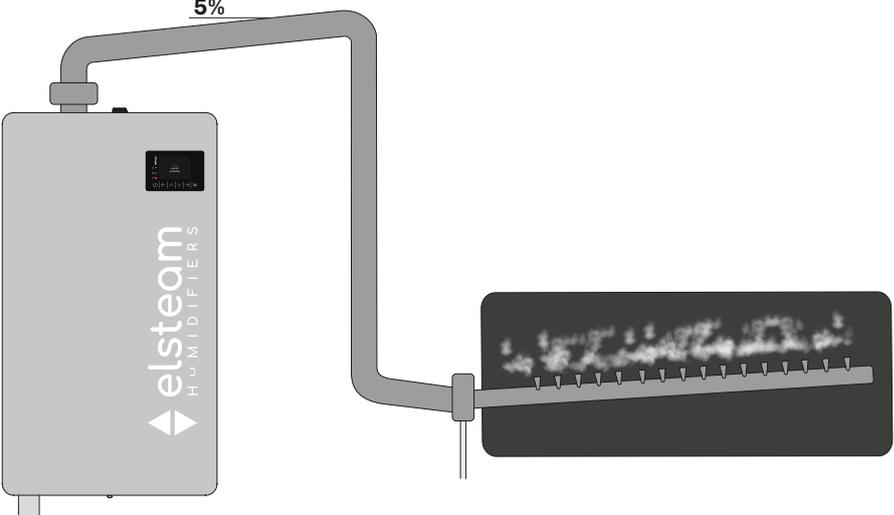
6. ELECTRICAL CONNECTIONS

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 and remove the power fuses, including any connected devices, before removing any hatches or installing/uninstalling accessories, hardware, cables or wires.
- Provide safety interlocks (isolators) of a suitable size between the power supply and the humidifier.
- 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; 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.

⚠ WARNING

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

6.2 Best connection practices

6.2.1 Wiring best practices

⚠ ⚠ 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.
- Provide safety interlocks (isolators) of a suitable size between the power supply and the humidifier.
- 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.

⚠ ⚠ 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.

Maximum power supply wiring

Step 17.8 mm (0.70 in.)

mm / in.	7 / 0.28			
mm²	16	16	16
AWG	8	8	8
no. of conductors		2	

Ø 3.5 mm (0.14 in.)   C

N•m	2,5
lb-in	22.12
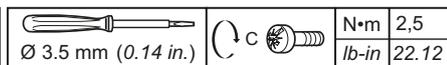
Applicable to models ...
EHKW005M2 / EHKW005T4 / EHKW010T4 / EHKW015T4

Fig. 19. *Maximum power supply wiring - See the table for the models*

Step 17.8 mm (0.70 in.)

mm / in.	7 / 0.28			
mm²	16	16	16
AWG	8	8	8
no. of conductors		2	

Ø 3.5 mm (0.14 in.)   C

N•m	2,5
lb-in	22.12
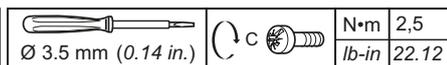
Applicable to models ...
EHKW020T4

Fig. 20. *Maximum power supply wiring - EHKW020T4*

Step 26.5 mm (1.04 in.)

mm / in.	7 / 0.28			
mm²	35	25	25
AWG	8	6	6
no. of conductors		3	

Ø 3.5 mm (0.14 in.)   C

N•m	3
lb-in	26.55
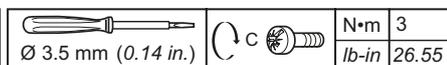
Applicable to models ...
EHKW030T4 / EHKW040T4

Fig. 21. *Maximum power supply wiring - EHKW030T4 / EHKW040T4*

Suitable wiring for the power supply

P/n	Wiring size	Maximum length	Permissible wiring type	Pitch [mm(in.)]
EHKW005M2	2G10	15 m (49.2 ft.)		17.8 (0.70)
EHKW005T4	3G2.5			
EHKW010T4	3G4			
EHKW015T4	3G6			
EHKW020T4	3G10			
EHKW030T4	3G16			26.5 (1.04)
EHKW040T4	3G16			

6.3 Suitable power supply protection devices

⚠ ⚠ **DANGER**
RISK OF ELECTRIC SHOCK
• Cut off the power supply to all equipment, including any connected devices, before removing any hatches or installing/ uninstalling accessories, hardware, fuses, cables or wires.
• Always use a properly calibrated Voltmeter to make sure the system is powered off.

	EHKW 005M2	EHKW 005T4	EHKW 010T4	EHKW 015T4	EHKW 020T4	EHKW 030T4	EHKW 040T4
Current	32	10	16	32		50	
Type	Rapid		Rapid			Rapid	
Size	10x38		10x38			14x51	

Fig. 22. *Overload protection devices according to model*

6.3.1 Changing fuses - Fuse holder base (single-phase models)
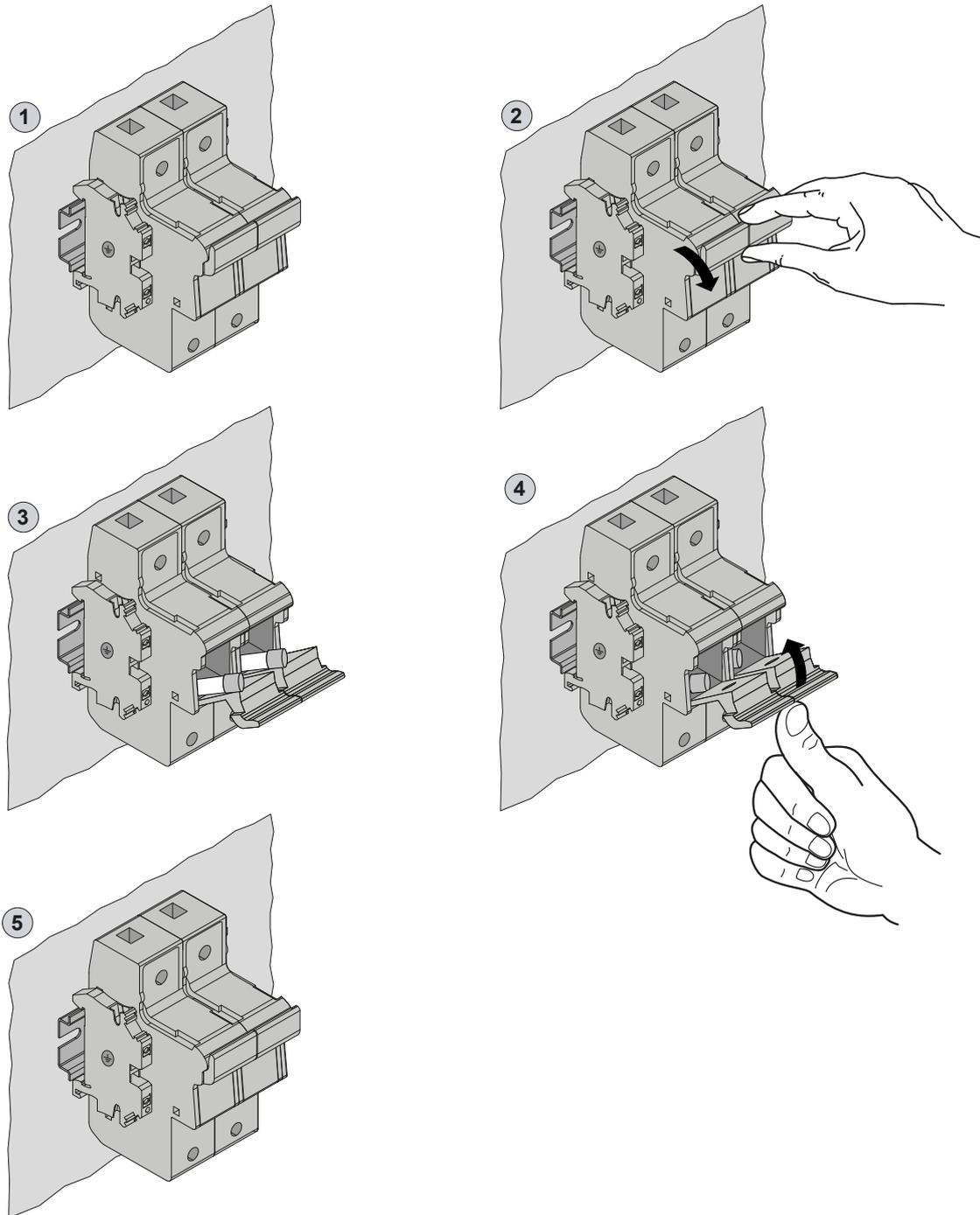
Fig. 23. *Overload protection device*

6.3.2 Changing fuses - Fuse holder base (three-phase models)
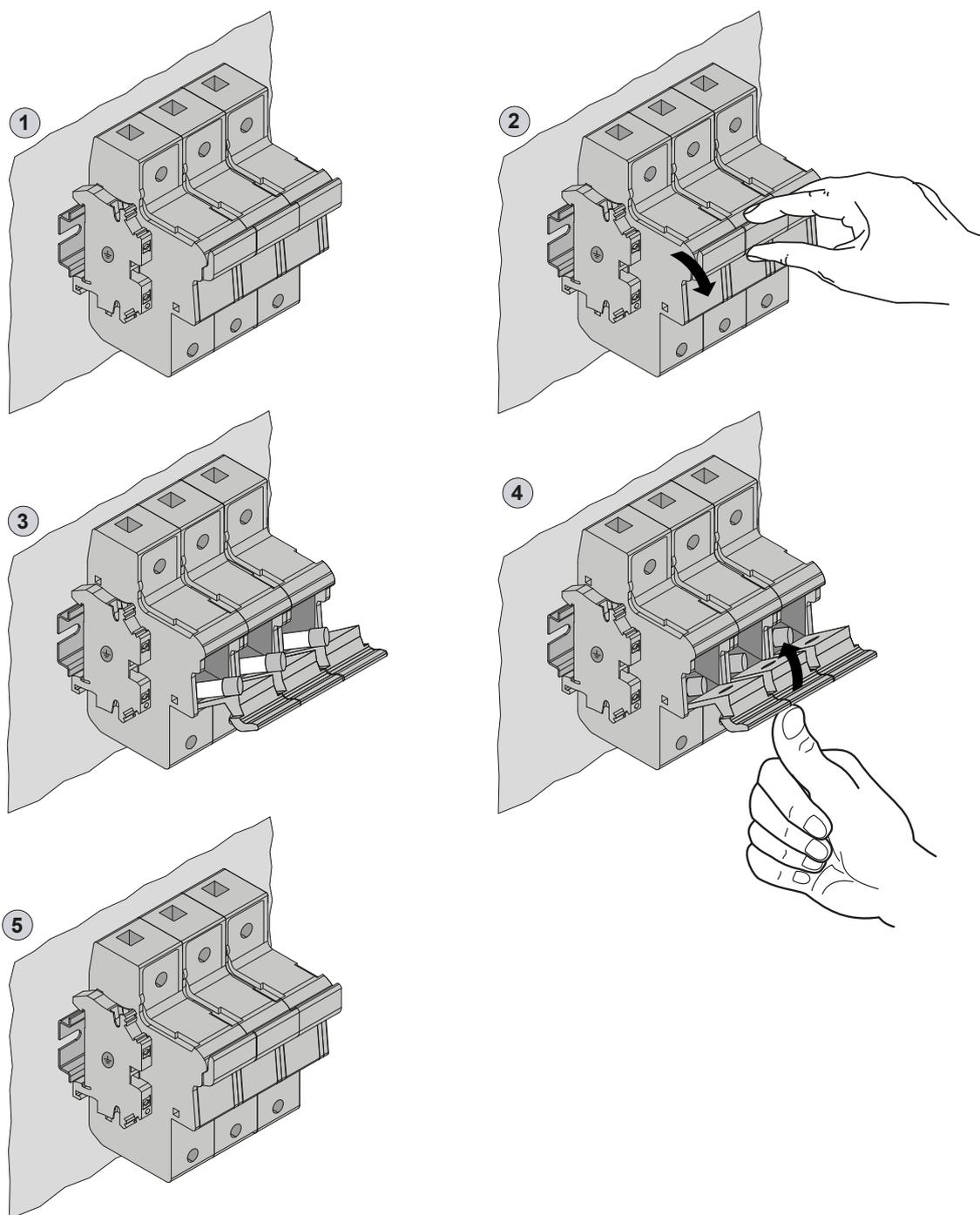
Fig. 24. *Overload protection device*

6.3.3 Changing fuses - Control board
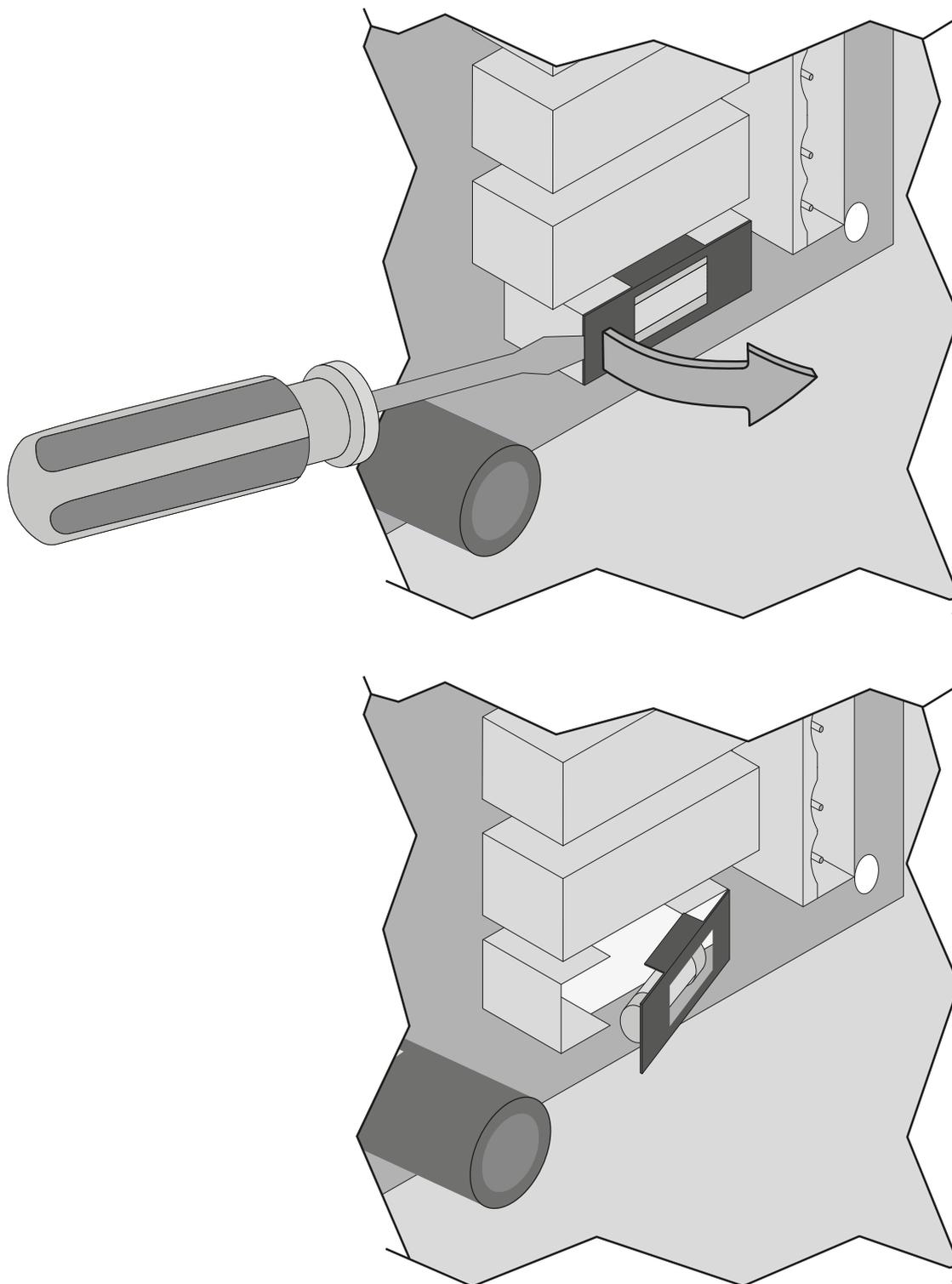
Fig. 25. *Protection devices on the control board*

Description
Overload protection devices for the control board power supply.

Control board overload protection devices

	Control board fuse
Current (A)	1 A
Type	Delayed
Size	5x20

6.4 Electrical connections

6.4.1 Control board
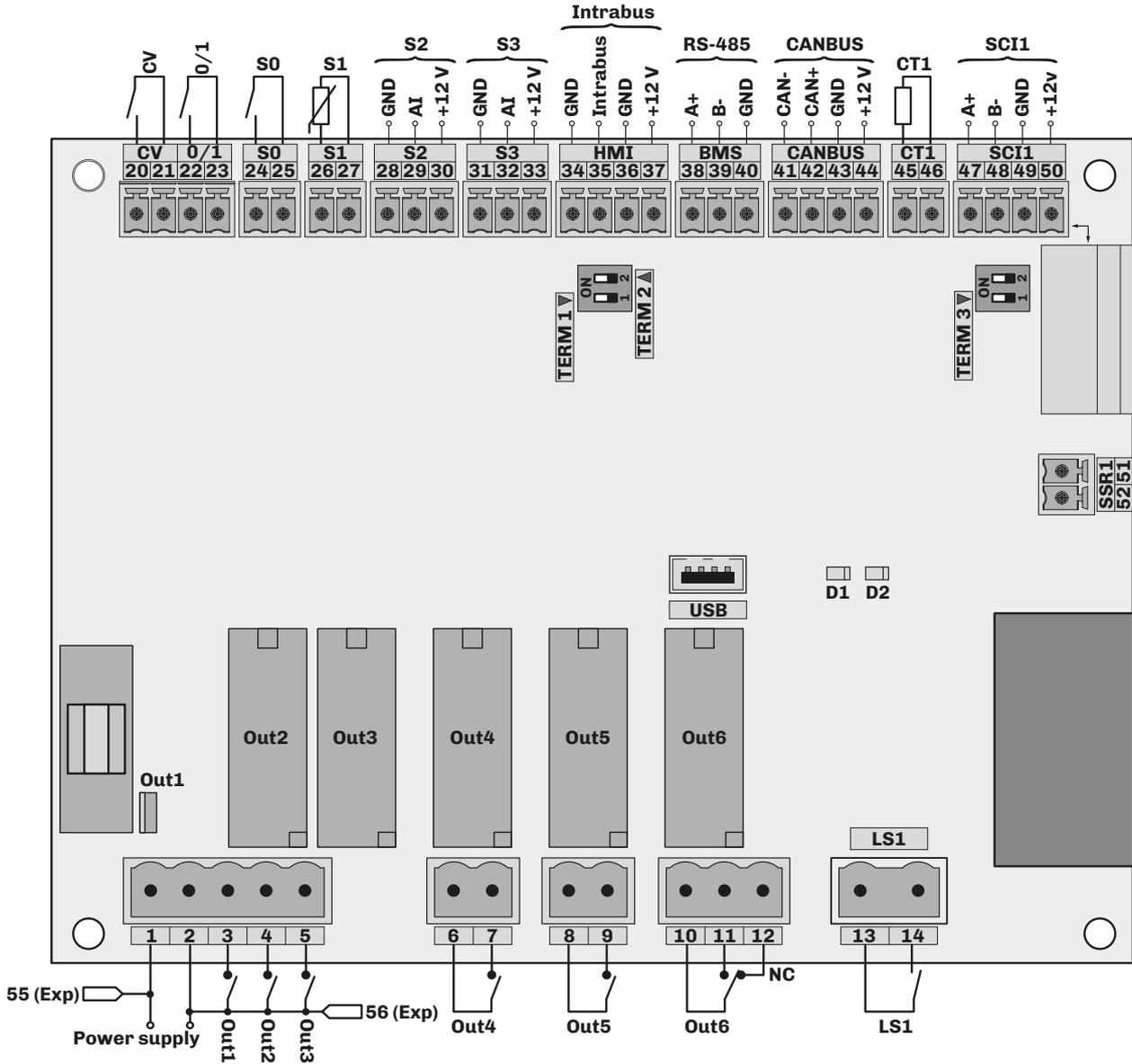
Fig. 26. Control board electrical connections

TERMINALS			
1-2	24 Vac power supply	**26-27**	**S1** analogue input: temperature
2-3	Digital output: water outlet solenoid valve	**28...30**	**S2** analogue input: humidity sensor
2-4	Digital output: water outlet pump	**31...33**	**S3** analogue input: humidity limit sensor
2-5	Digital output: contactor (steam generation)	**34...37**	Serial line connection: HMI Intrabus
6-7	Digital output: wellness sanitisation	**38...40**	Serial line connection: RS-485 modbus for BMS slave
8-9	Digital output: ventilated distributor control	**41...44**	CANBUS serial line connection
10...12	Digital output: alarm	**45-46**	Analogue connection: external current sensor **CT1** (TA)
13-14	Hazardous voltage digital input: level sensor **LS1**	**47...50**	Connection to wellness expansion board **SCI1**
20-21	Digital input: wellness door lock (**CV**)	**51-52**	Reserved
22-23	Digital input: remote ON/OFF (**0/1**)	**TERM3**	Activate termination resistor on the **SCI1 RS-485** serial line. **ON** = Termination resistor enabled; **OFF** = Disabled.
24-25	Digital input: humidistat (**CFG** = 0-1) (**S0**)	**TERM1**	Termination resistor on **BMS RS-485** serial line. **ON** = Termination resistor enabled; **OFF** = Disabled.
D1	Power Supply LED	**TERM2**	Termination resistor on **CANBUS** serial line. **ON** = Termination resistor enabled; **OFF** = Disabled.
D2	Alarm LED		

6.4.2 Wellness expansion
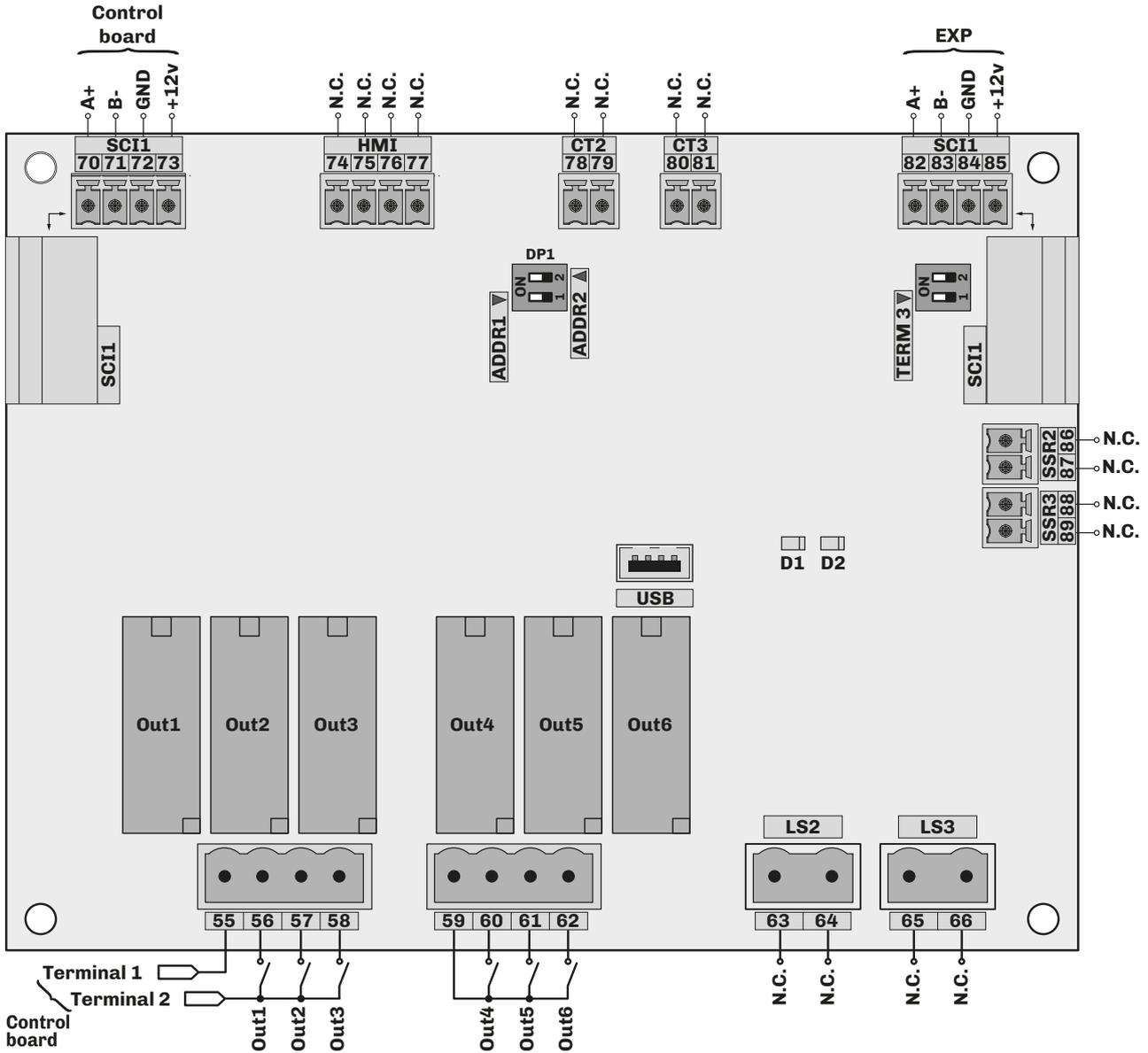
Fig. 27. *Wellness expansion electrical connections*

TERMINALS					
1-55	24 Vac connection for relay	**74...77**	Reserved		
2-56	Digital output: essence 1	**82...85**	Connection to expansion board **SCI1**		
2-57	Digital output: essence 2	**86...89**	Reserved		
2-58	Digital output: essence 3	**DP1**	Modbus communication address of expansion board		
59-60	Digital output: emission fan		**ADDR1**	**ADDR2**	Address offset relative to **LA1**
59-61	Digital output: extraction fan		OFF	OFF	LA1 + 0
59-62	Digital output: cabin lights		OFF	ON	LA1 + 1
63...66	Reserved		ON	OFF	LA1 + 2
70...73	Connection to control board **SCI1**		ON	ON	LA1 + 3
D1	Power Supply LED	**TERM3**	Activate termination resistor on SCI1 RS-485 serial line. **ON =** Termination resistor enabled; **OFF** = Disabled.		
D2	Alarm LED				

6.5 Configurations

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

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

Configuration
CFG = 0-1
CV digital input closed
0/1 digital input closed
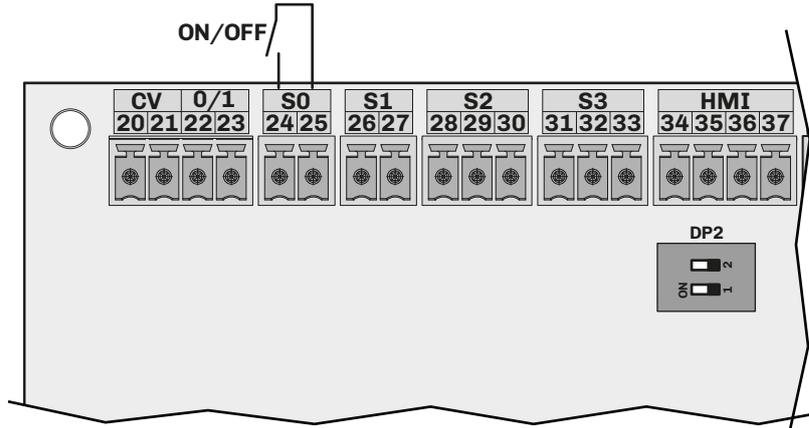
*Fig. 28. ON/OFF connection with humidistat or external contact (**CFG** = 0-1)*

6.5.2 External proportional humidistat connection (CFG = PROP)

Configuration
CFG = PROP
P2 = 0-10 **P2** = 0-5 **P2** = 0.20 **P2** = 4.20
CV digital input closed
0/1 digital input closed

28 = GND
29 = V+
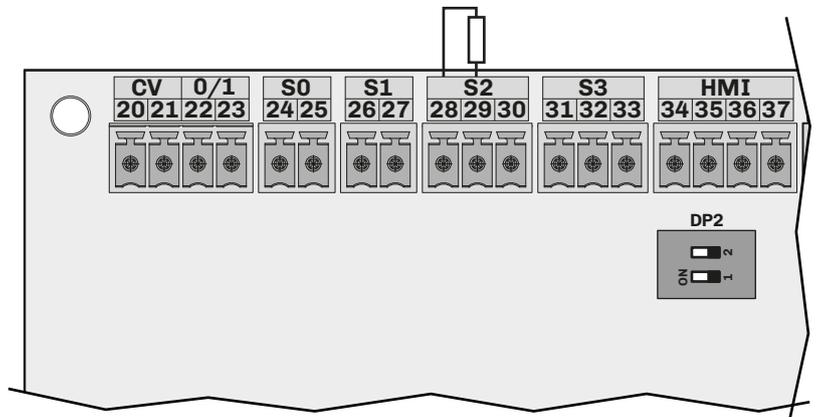
*Fig. 29. External proportional humidistat connection (**CFG** = PROP)*

6.5.3 Humidity sensor connection (CFG = HUM)

Configuration
CFG = HUM
P2 = 0-10 **P2** = 0-5 **P2** = 0.20 **P2** = 4.20
CV digital input closed
0/1 digital input closed

S2 input
29 = Sensor signal input
30 = Sensor power supply
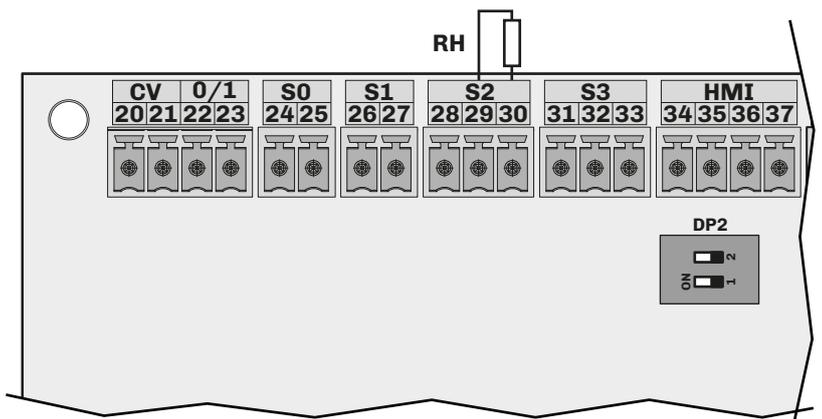
*Fig. 30. Humidity sensor connection (**CFG** = HUM)*

6.5.4 Humidity sensor connection EVHTP520 (CFG = HUM)

Configuration
CFG = HUM
P2 = E520
CV digital input closed
0/1 digital input closed

28 = GND
29 = V+
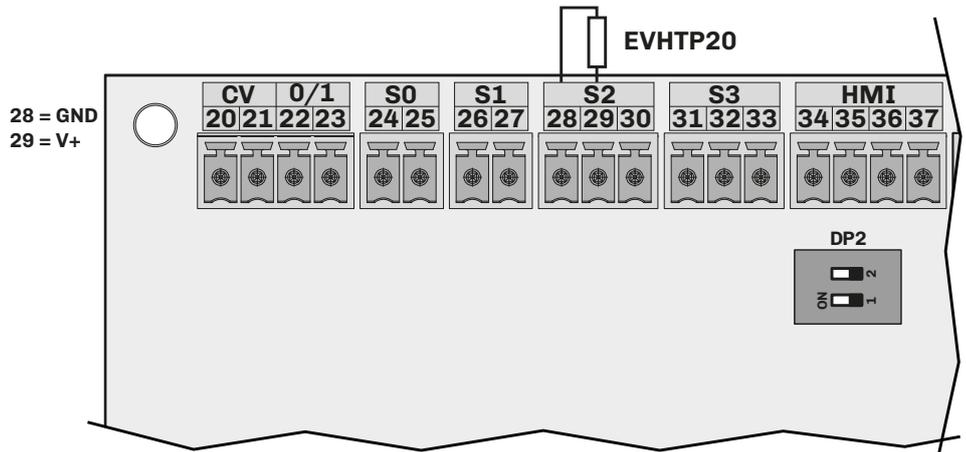
Fig. 31. *Humidity sensor connection EVHTP520 (**CFG** = HUM)*

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

Configuration
CFG = HUML
P2 = 0.20 **P2** = 4.20 **P2** = E520
P7 = 0.20 **P7** = 4.20
CV digital input closed
0/1 digital input closed

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

S3 input
32 = Sensor signal input
33 = Sensor power supply
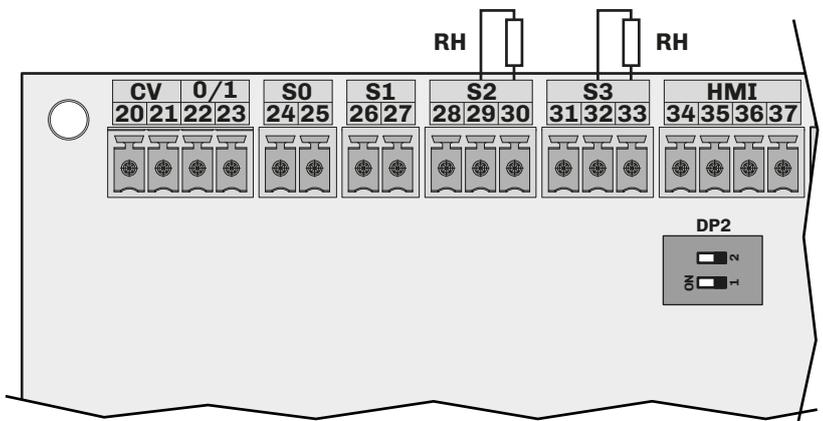
Fig. 32. *Connection for humidity sensor and limit sensor (**CFG** = HUML)*

6.5.6 Temperature sensor connection (CFG = 1T)

Configuration
CFG = 1T
P2 = PTC **P2** = 1000 **P2** = NTC
CV digital input closed
0/1 digital input closed
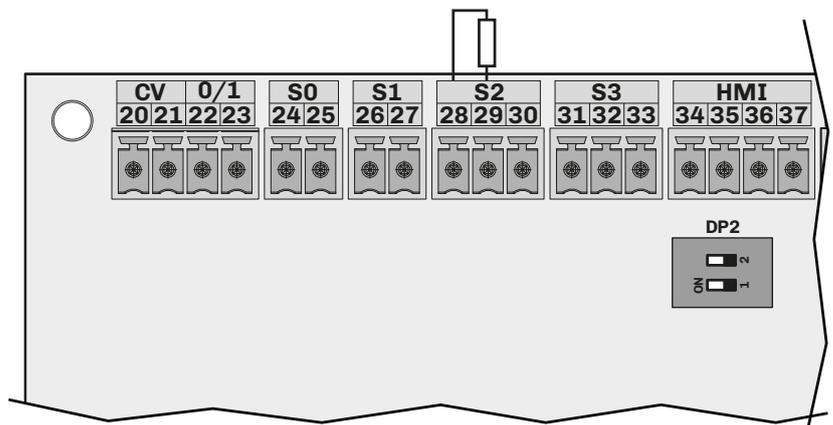
Fig. 33. *Temperature sensor connection (**CFG** = 1T)*

6.5.7 Connection for two temperature sensors (CFG = 2T)

Configuration
CFG = 2T
P2 = PTC **P2** = 1000 **P2** = NTC
P7 = PTC **P7** = 1000 **P7** = NTC
CV digital input closed
0/1 digital input closed
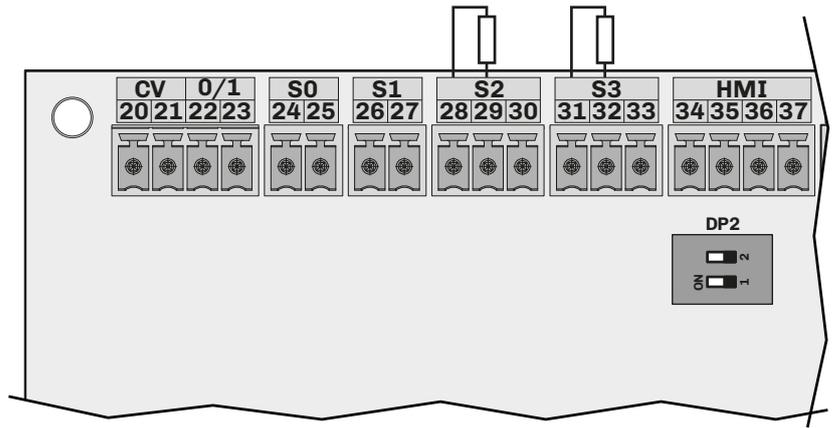
Fig. 34. *Temperature sensor connection (**CFG** = 2T)*

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

Configuration
CFG = HUM **CFG** = HUML
P2 = 0-5 **P2** = 0-10
P7 = 0-5 **P7** = 0-10
CV digital input closed
0/1 digital input closed

S2 input
28 = GND
29 = V+
30 = Sensor power supply

S3 input
31 = GND
32 = V+
33 = Sensor power supply
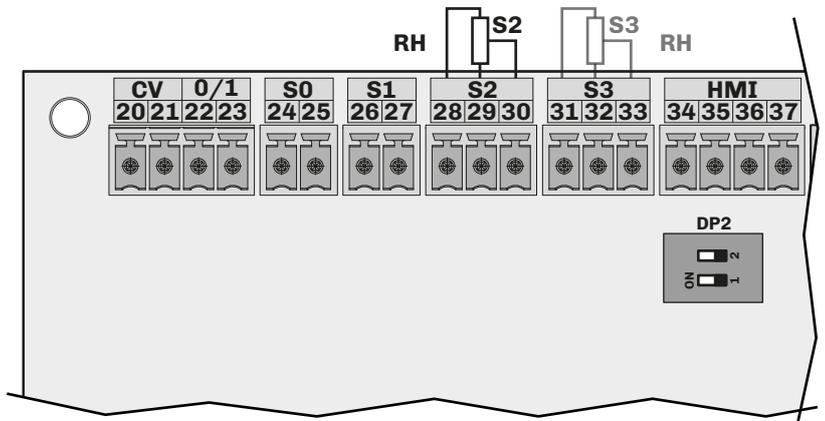
Fig. 35. *Humidity sensor connection 0...5 V*

6.6 Power supply and earth wiring connection

6.6.1 Single-phase models
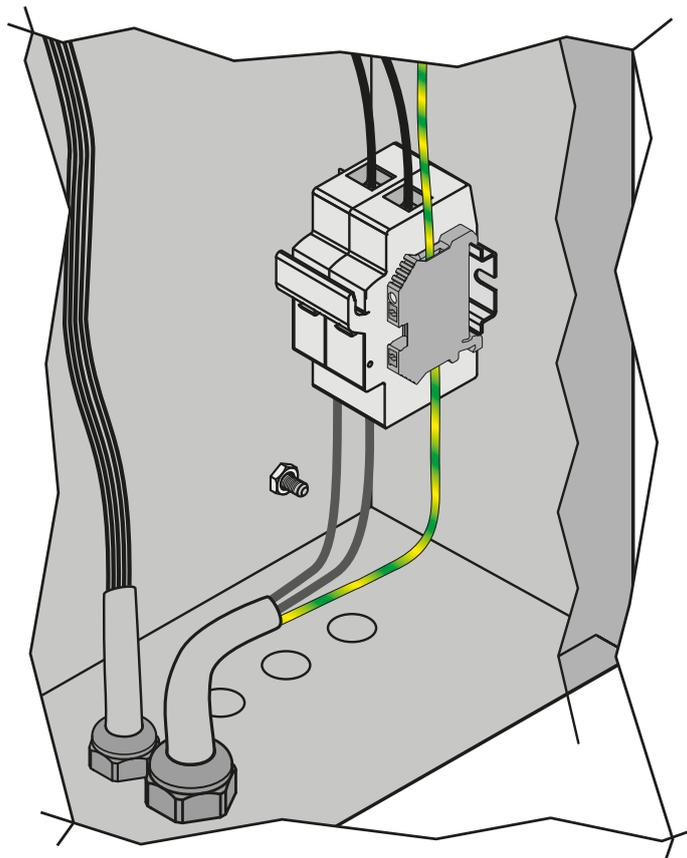
Fig. 36. *Power supply connections - single-phase models*

6.6.2 Three-phase models
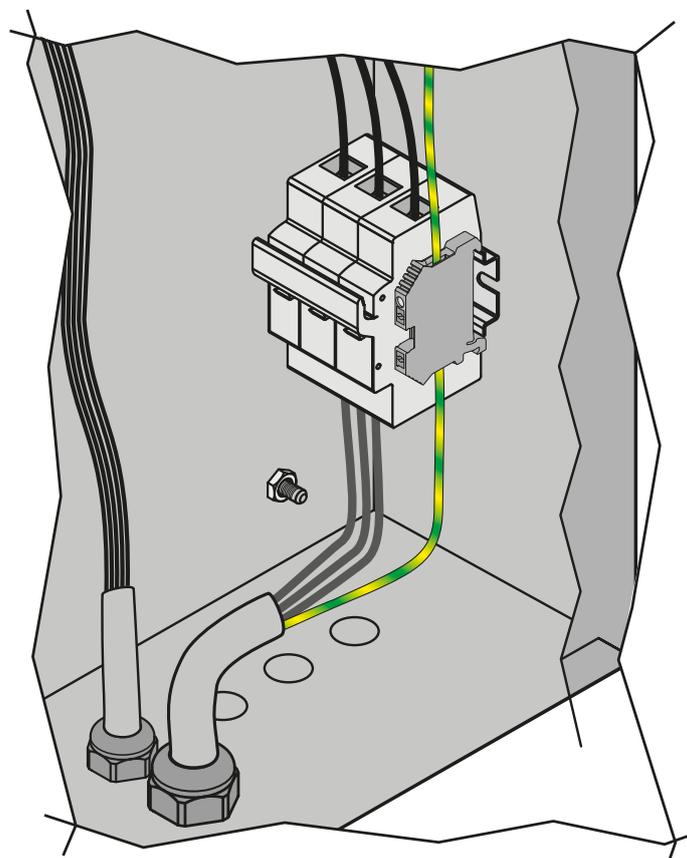
Fig. 37. *Power supply connections - three-phase models*

6.7 Cable glands and cable routing

6.7.1 Single boiler models
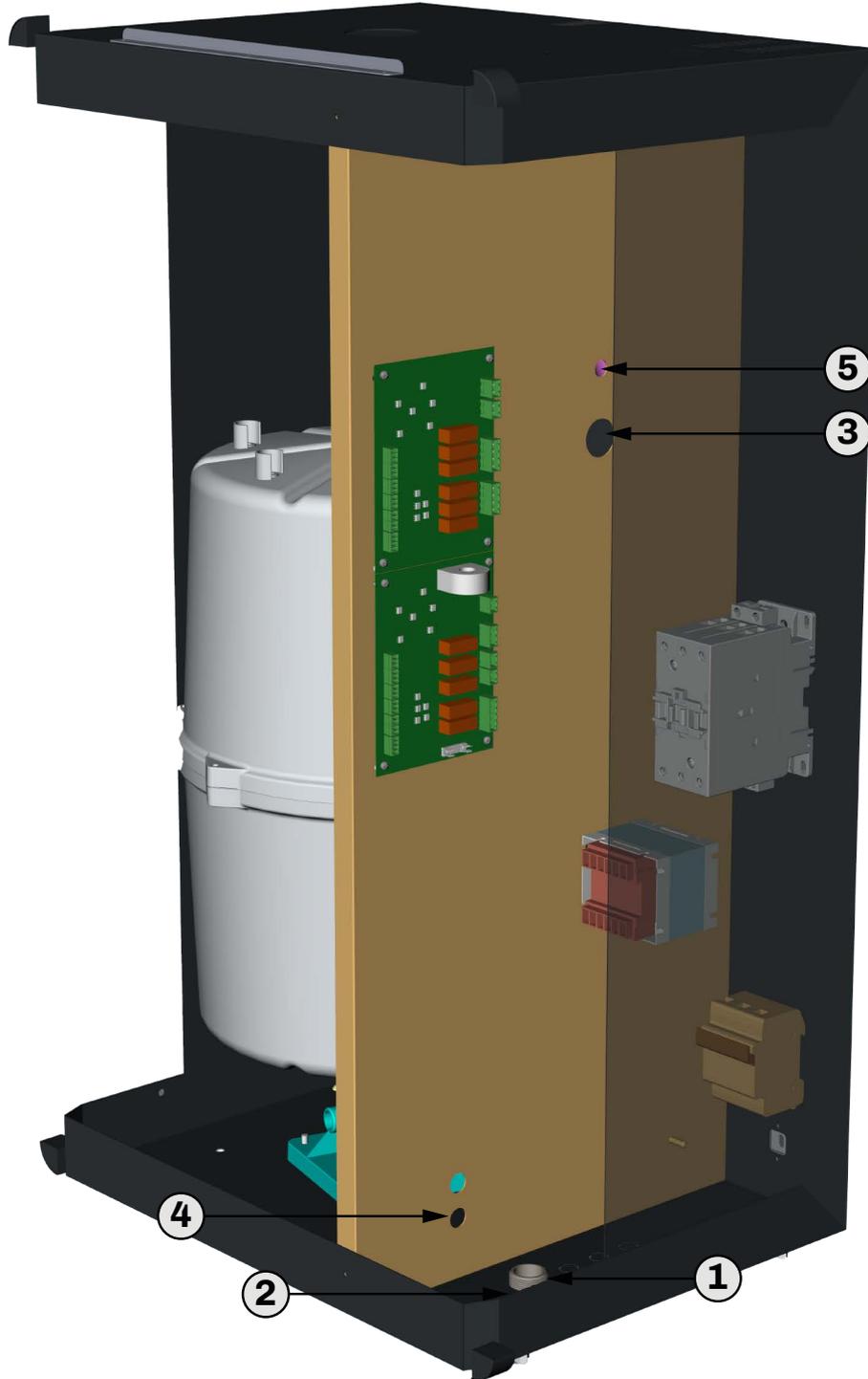
Fig. 38. Cable glands and cable routing

Ref.	Description
①	Pull-resistant cable gland for power cable entry
②	Pull-resistant cable glands for control signal/serial cable entry
③	Cable gland for power cables from contactor to boiler
④	Cable gland for outlet pump power supply cables
⑤	Cable gland for outlet solenoid valve power supply cables and maximum level sensor cable

6.8 Serial line connections

The device power supply inputs are not isolated. Use separate isolated power supplies if the RS-485 network GND connection or the CAN expansion bus is connected to multiple devices. Alternatively, do not connect the RS-485 or CAN GND signal if the equipment is connected to a single power supply. Take extra care when connecting serial lines. A wiring error may put the equipment out of service.

EXAMPLE OF RS-485 CONNECTION WITH SEPARATE POWER SUPPLIES
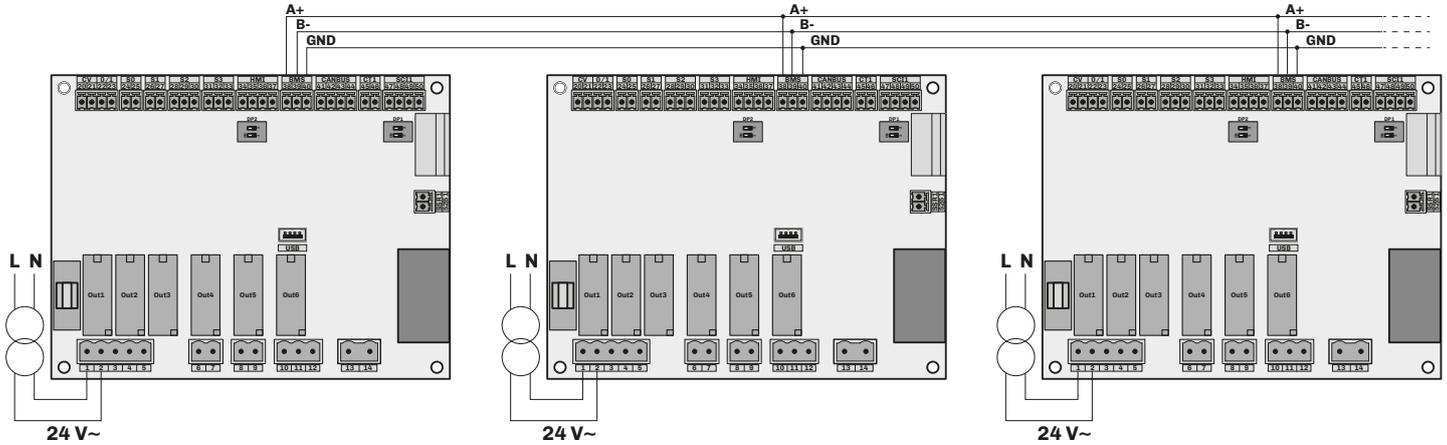
EXAMPLE OF RS-485 CONNECTION WITH COMMON POWER SUPPLY AND GND SIGNAL NOT CONNECTED
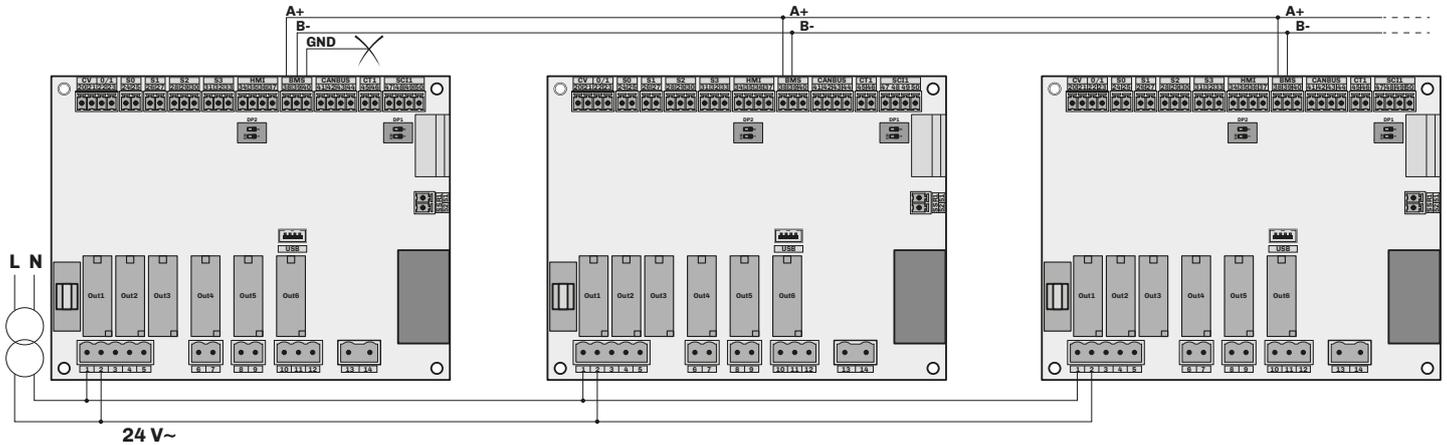
Fig. 39. *Serial line connections*

6.9 DIP switch functions

The control board and the expansion board have dip switches to configure the termination resistors and the Modbus address of the expansion board.

6.9.1 DIP switch | Control board

DIP	Description	Description
TERM3	Activate termination resistor on the **SCI1 RS-485** serial line. **ON** = Termination resistor enabled; **off** = Disabled.	Set to ON if connected to the expansion, but only if it is the first or last element wired in the network.
TERM1	Termination resistor on **BMS RS-485** serial line. **ON** = Termination resistor enabled; **off** = Disabled.	Set to ON if connected to the MODBUS network, but only if it is the first or last element wired in the network.
TERM2	Termination resistor on **CANBUS** serial line. **ON** = Termination resistor enabled; **off** = Disabled.	Set to ON only if it is the first or last element wired in the network. It must be ON if wired to an EPJ terminal.

6.9.2 DIP switch | Expansion

DIP	Description			Description
DP1	Modbus communication address of expansion board			Used to set the Modbus communication address of the expansion board.
	ADDR1	**ADDR2**	Expansion board address	
	OFF	OFF	2	
	OFF	ON	3	
	ON	OFF	4	
	ON	ON	5	
TERM1	Activate termination resistor on SCI1 RS-485 serial line. **ON** = Termination resistor enabled; **off** = Disabled.			Set to ON if connected to the expansion, but only if it is the first or last element wired in the network.

7. USER INTERFACE

Chapter content

This chapter contains the following information:
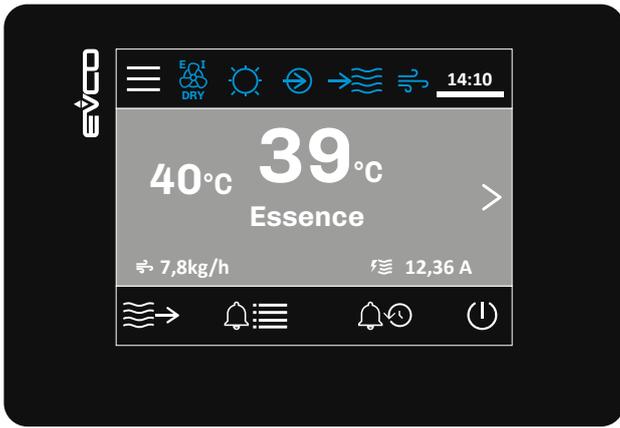
7.1 User interface

Fig. 40. *EHKW humidifier user interface*

Icon	Lit steadily	OFF
E (fan)	Extraction fan ON	In all other cases
I (fan)	Emission fan ON	
DRY (fan)	Drying ON	
☼	Cabin light ON	Cabin light OFF
14:10	Time slots active	In all other cases
14:10	Manual mode with timer active	
14:10	Sanitizing in progress	
→	Cabin door closed	Cabin door open
→≋	Inlet solenoid valve ON Water filling in progress	Inlet solenoid valve OFF Water filling finished
≋→	Outlet pump ON Water draining in progress	Outlet pump OFF Water draining finished
⇌	Contactor ON Steam generation in progress	Contactor OFF Steam generation OFF

7.1.1 Keys

Key...	Tap and release to...	Key...	Tap and release to...
☰	Access the menu	⏻	Switch the humidifier On/Off
≋→	Access the manual water draining start page	←	(When available) return by one level
🔔☰	Access the alarm menu	>	Access the wellness functions page
🔔⏱	Access the alarm log		

7.1.2 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.

When starting up for the first time, enter the electrical conductivity of the inlet water, 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.
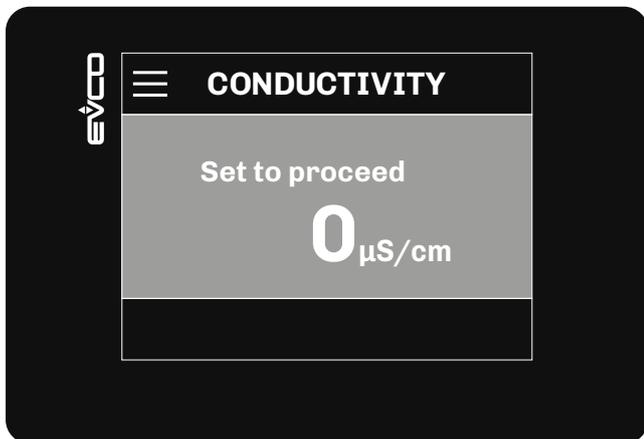
Fig. 41. *First start-up - Setting the electrical conductivity*
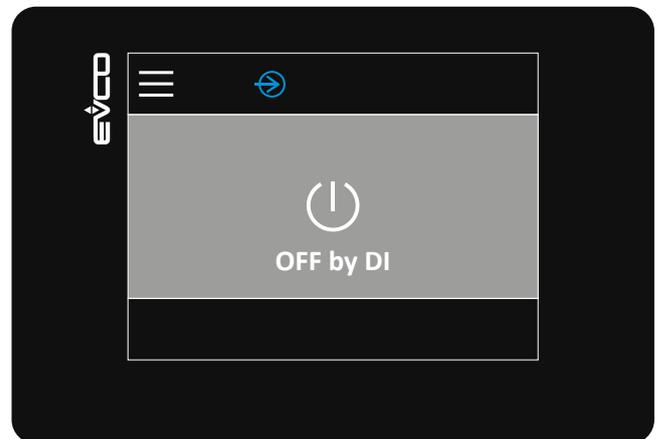
Fig. 42. *Humidifier OFF (by digital input)*

7.2 Menu

7.2.1 Home screen

HOME screen with ON/OFF regulation from digital input (CFG = 0-1)
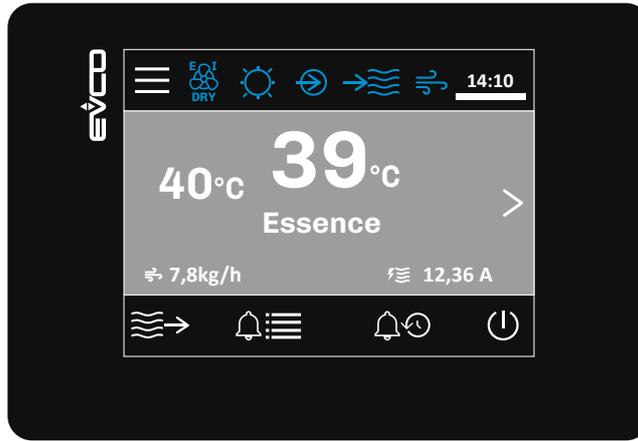
*Fig. 43. HOME screen with ON/OFF regulation from digital input - **EHKX**interface*

HOME screen with proportional regulation (CFG = PROP)
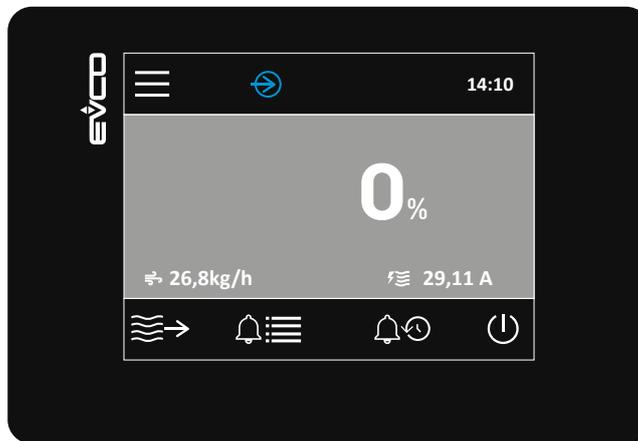
*Fig. 44. Home screen with proportional regulation - **EHKX** interface*

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

Fig. 45. Home screen with humidity sensor alone
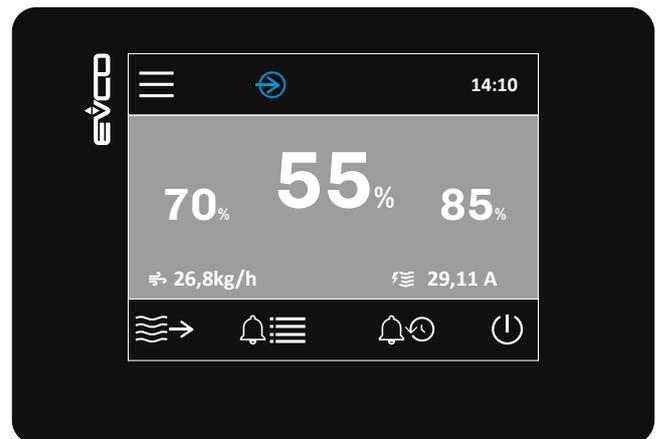
Fig. 46. Home screen with humidity sensor and limit sensor

Top line: Humidity measured by the room humidity sensor.
Bottom line (lh): Humidity setpoint.
Bottom line (rh): Limit sensor humidity setpoint (if **CFG** = HUML).

7.2.2 Changing the humidity setpoint (main sensor and limit sensor)

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

To change the humidity setpoint:
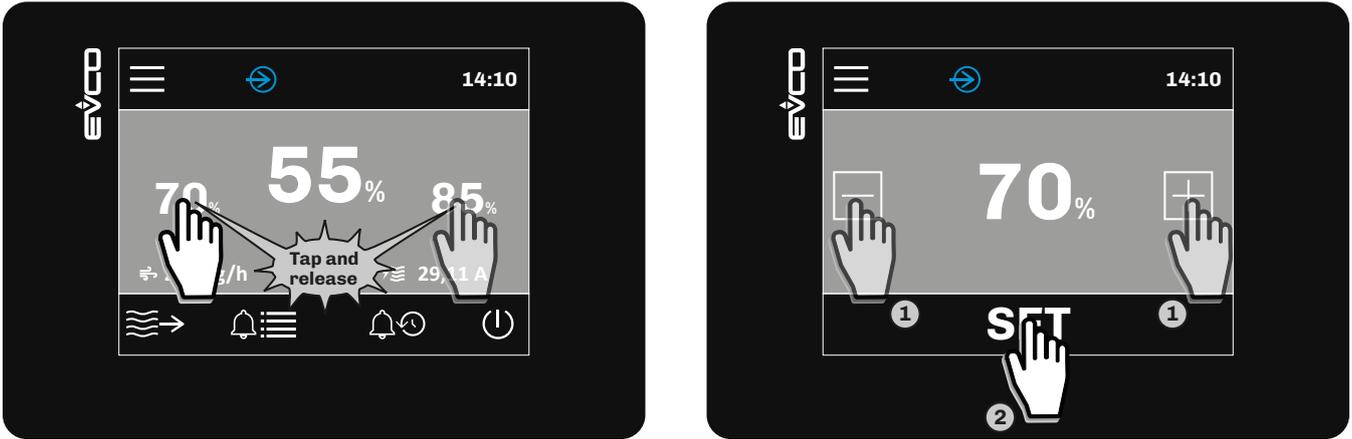
Fig. 47. *Changing the humidity setpoint*

7.2.3 Changing the temperature setpoint

With **CFG** = 1T or **CFG** = 2T only.

To change the temperature setpoint:
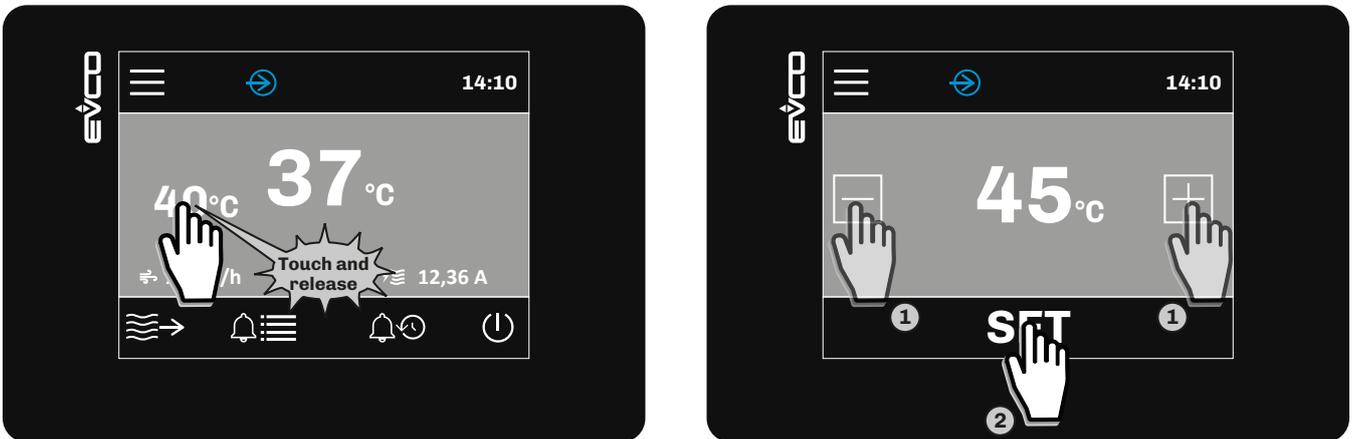
Fig. 48. *Changing the temperature setpoint*

7.2.4 Manual draining

To start manual draining:
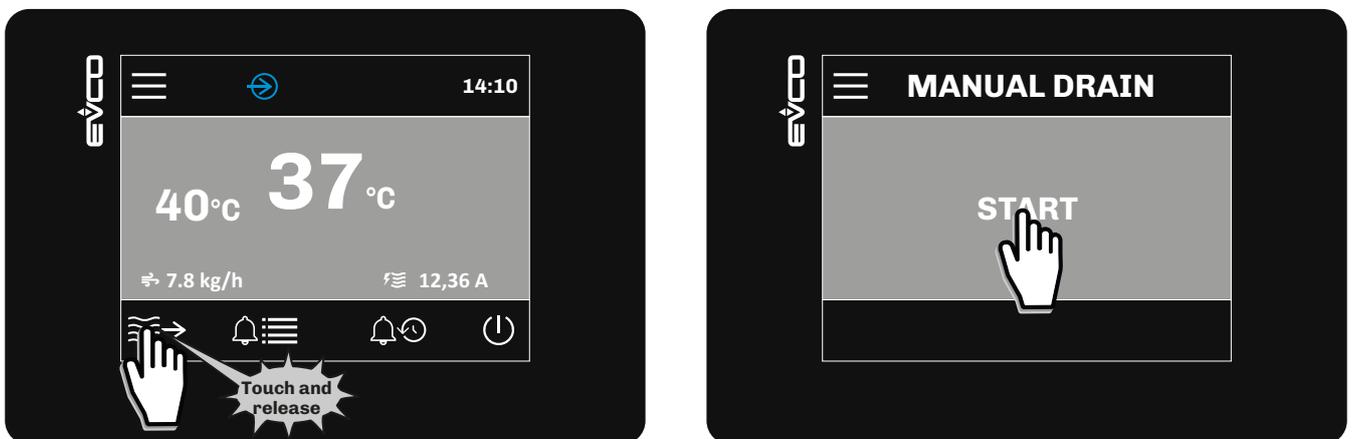
Fig. 49. *Manual draining*

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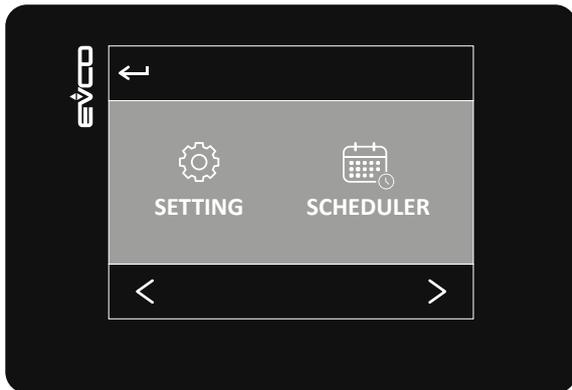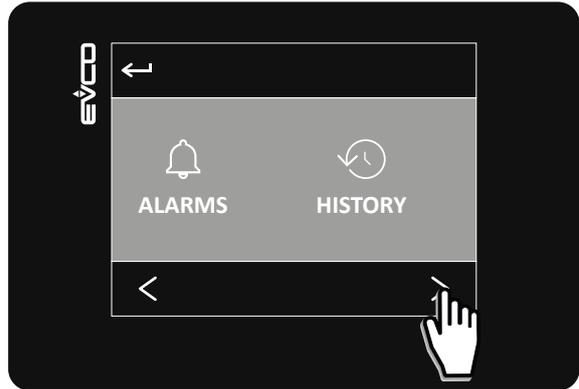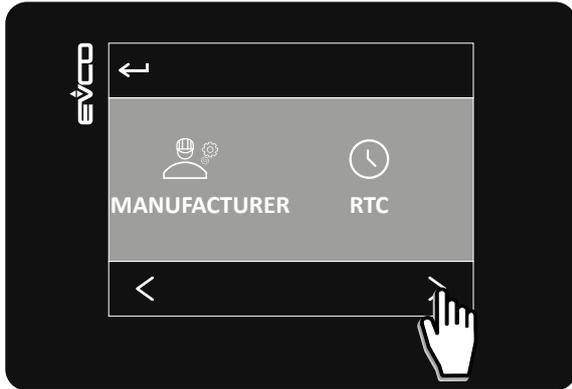
Menu	Description
USER	Access the user menu
MAINTENANCE	Access the maintenance technician menu
MANUFACTURER	**RESERVED. NOT ACCESSIBLE TO THE PUBLIC.**
RTC	Access to change the date/time
ALARMS	Currently accessing alarm control
HISTORY	Access the alarm log
SETTING	Reset parameters to factory settings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

7.2.6 User Menu

The user menu can be used to display and change user parameters.
To access the user menu:
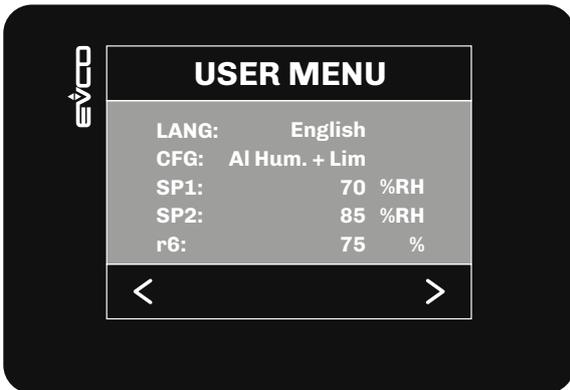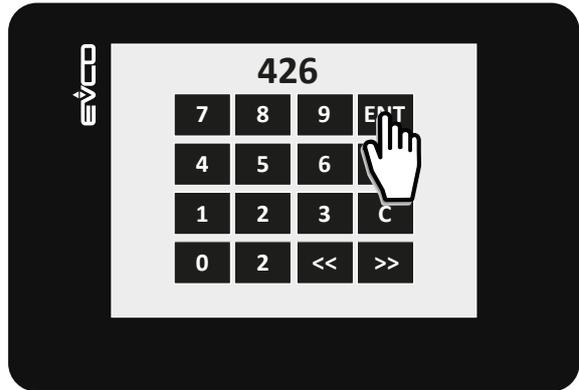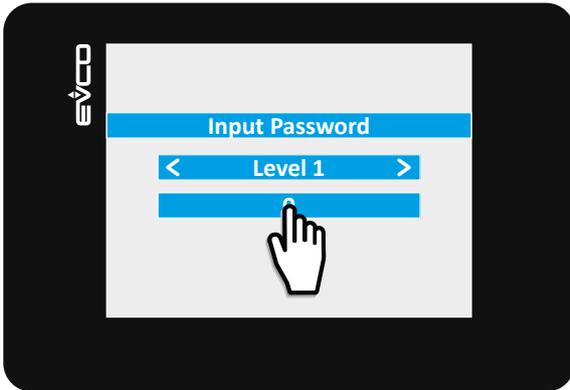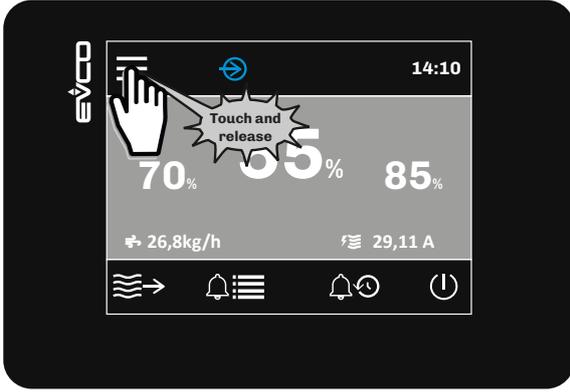
Menu option	Description
LANG	Sets the display language. **English**; **Italian**.
SP1	Sets the humidity setpoint. See *"11.1 TABLE OF ADJUSTMENT PARAMETERS" ON PAGE 78*
SP2	Sets the humidity limit setpoint `. See *"11.1 TABLE OF ADJUSTMENT PARAMETERS" ON PAGE 78*
SP3	Sets the temperature setpoint. See *"11.1 TABLE OF ADJUSTMENT PARAMETERS" ON PAGE 78*

7.2.7 Maintenance menu

To access the maintenance menu:
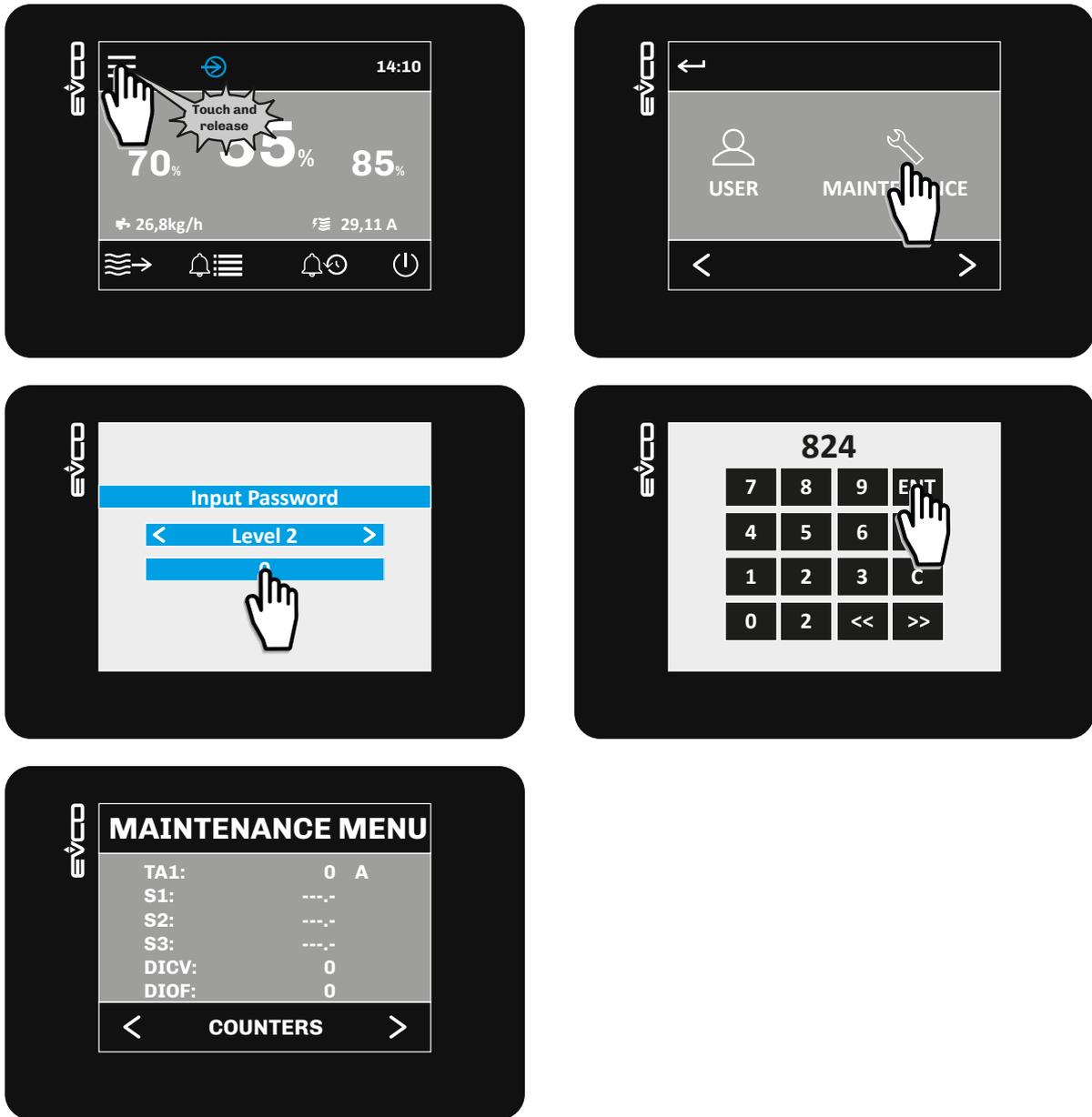
Fig. 50. *Maintenance menu*

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

Menu option	Description
CFG	Sets the operating mode. See **"11.1 TABLE OF ADJUSTMENT PARAMETERS" ON PAGE 78**
c0...c11	See **"11.1 TABLE OF ADJUSTMENT PARAMETERS" ON PAGE 78**
r0...r12	See **"11.1 TABLE OF ADJUSTMENT PARAMETERS" ON PAGE 78**
TA1	Displays the value read by sensor CT1 if it is connected.
S1	Displays the value read by sensor S1 if it is connected.
S2	Displays the value read by sensor S2 if it is connected.
S3	Displays the value read by sensor S3 if it is connected.
DICV	Displays the status of the **CV** digital input (wellness door lock) 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
DIS0	Displays the status of the **S0** digital input (steam generator enable) if it is connected. **OFF** = **S0** input closed; **ON** = **S0** input open.
DILS1	Displays the status of the **LS1** digital input (level sensor) if it is connected. **OFF** = **LS1** input closed; **ON** = **LS1** input open.
DOEV1	Displays the status of the inlet solenoid valve output. **OFF** = Inlet solenoid valve output OFF; **ON** = Inlet solenoid valve output ON.
DODP1	Displays the status of the outlet pump. **OFF** = Outlet pump output OFF; **ON** = Outlet pump output ON.
DOG1	Displays the status of the steam generator electrode output. **OFF** = Steam generator electrode output OFF; **ON** = Steam generator electrode output ON.
DOSAN	Displays the status of the wellness sanitisation. **OFF** = Dehumidification enable output OFF; **ON** = Dehumidification enable output ON.
DOFAN	Displays the status of the fan digital output. **OFF** = Fan output OFF; **ON** = Fan output ON.
DOAL	Displays the status of the general alarm output. **OFF** = General alarm output OFF; **ON** = General alarm output ON.

7.2.8 Displaying/resetting the operating hours

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

Fig. 51. *Displaying the operating hours*

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

Menu option	Description
Unit	Displays the hours of humidifier operation.
BoilerP	Displays the partial hours of boiler operation.
BoilerT	Displays the total hours of boiler operation.
EVIfill	Displays the hours of outlet solenoid valve operation.
Pump	Displays the hours of outlet pump operation.
Fan	Displays the hours of fan operation.
AUX	The operating hours of the auxiliary functions if **M16** > 0

Reset operating hours

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

7.2.9 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. 52. *Displaying the operating hours*

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

Menu option	Description	Menu option	Description
DO1	Forces the inlet solenoid valve output on/off. **OFF** = Inlet solenoid valve output forced OFF; **ON** = Inlet solenoid valve output forced ON.	DO4	Forces the wellness sanitisation output on/off. **OFF** = wellness sanitisation output forced OFF; **ON** = wellness sanitisation output forced ON.
DO2	Forces the outlet pump output on/off. **OFF** = Outlet pump output forced OFF; **ON** = Outlet pump output forced ON.	DO5	Forces the fan output on/off. **OFF** = Fan output forced OFF; **ON** = Fan output forced ON.
DO3	Forces the steam generator electrode output on/off. **OFF** = Steam generator electrode output forced OFF; **ON** = Steam generator electrode output forced ON.	DO6	Forces the general alarm output on/off. **OFF** = General alarm output forced OFF; **ON** = General alarm output forced ON.

7.2.10 Configuring the time slots
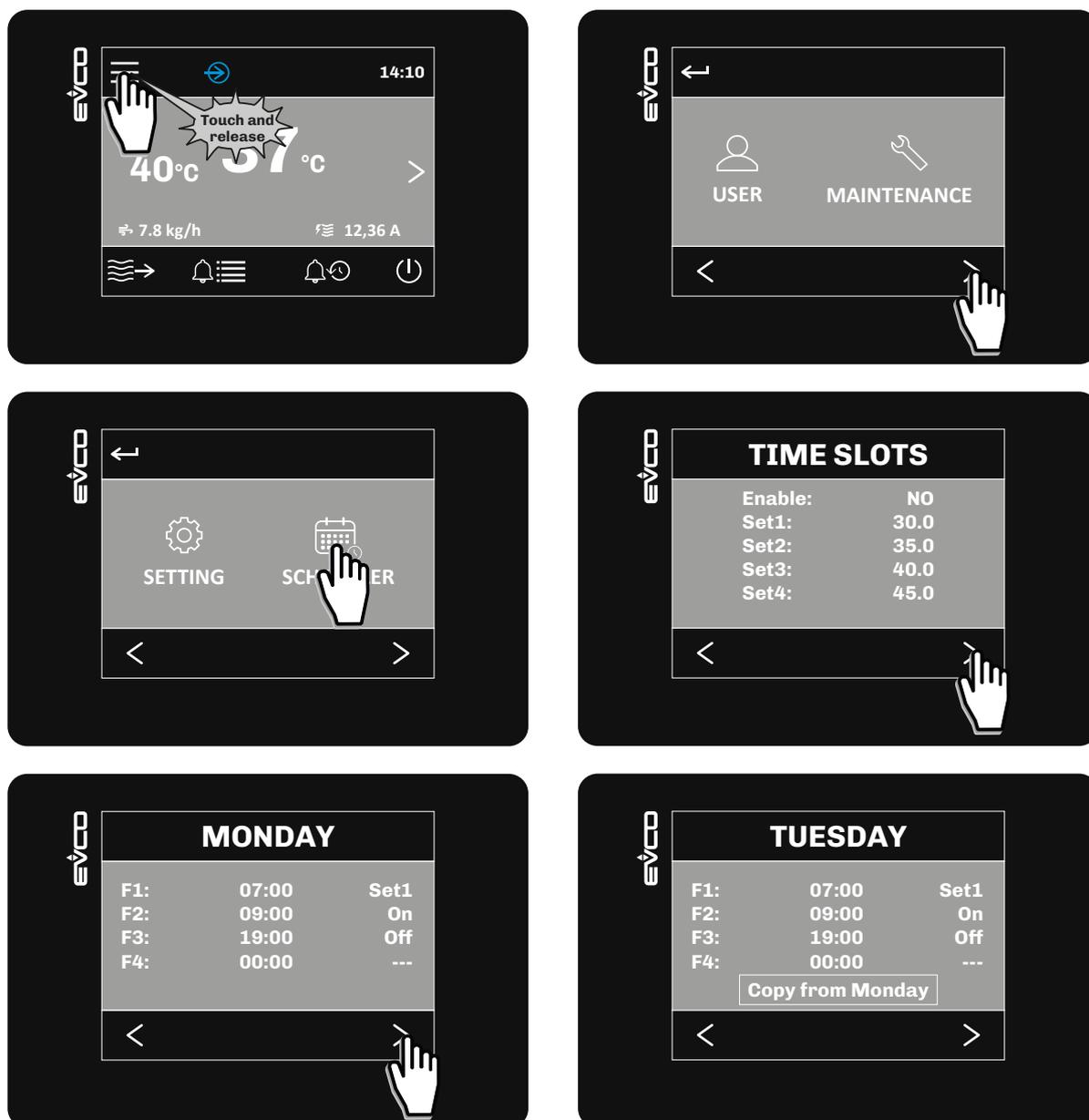
Fig. 53. *Configure the time slots*

Up to 4 time slots (**F1**...**F4**) can be configured for each day by setting the start time and operating mode of the slot:

- **---** : Time slot disabled (the previous slot remains valid)
- **Off**: Turkish bath OFF
- **On**: Turkish bath ON with setpoint **SP3**
- **Set1**: Turkish bath ON with setpoint **Set1**
- **Set2**: Turkish bath ON with setpoint **Set2**
- **Set3**: Turkish bath ON with setpoint **Set3**
- **Set4**: Turkish bath ON with setpoint **Set4**

7.3 Wellness functions
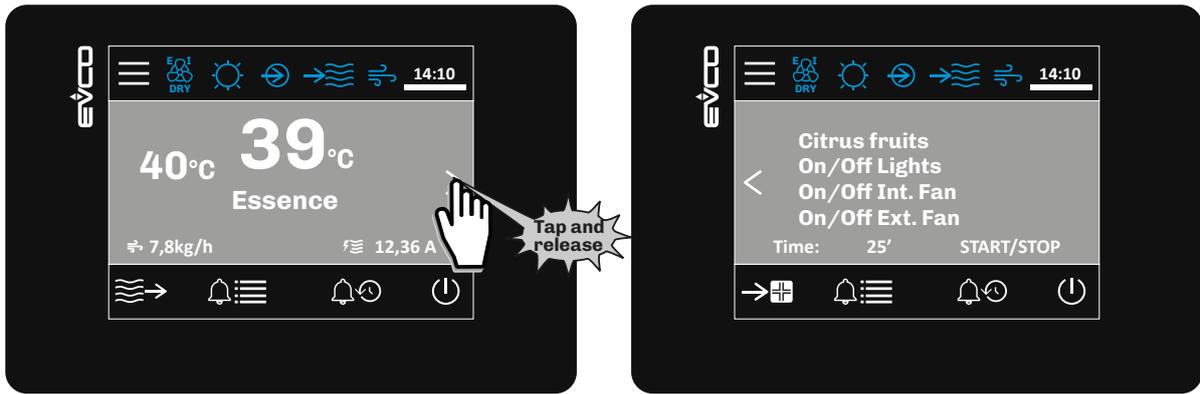
Fig. 54. *Wellness functions page*

On the wellness functions page, you can:
- Change the essence;
- Turn the cabin lights on/off
- Turn the emission fan on/off;
- Turn the extraction fan on/off;
- Change the time for manual timer operation.

7.3.1 Sanitising
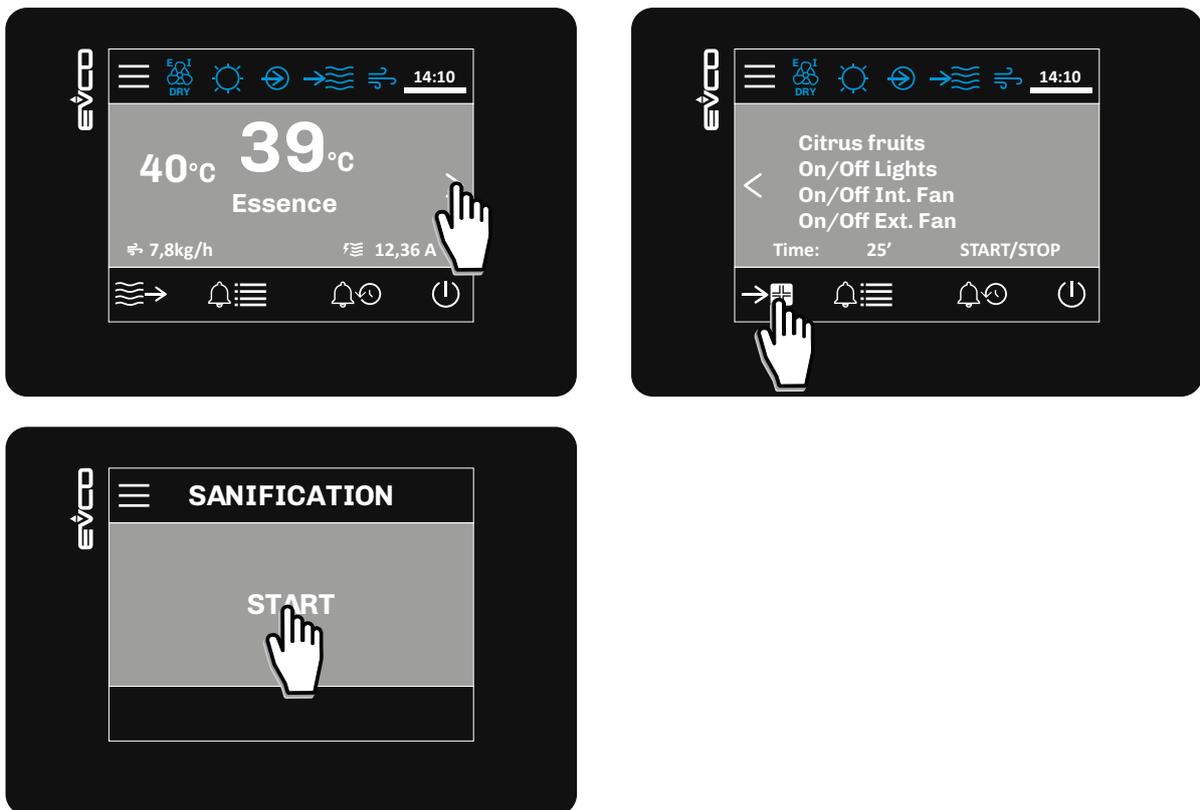
Fig. 55. *Sanitising the cabin*

8. POWER-UP AND START-UP

Chapter content

This chapter contains the following information:

8.1 First start-up instructions

<table>
<tr><td colspan="2" align="center">⚠ ⚠ DANGER</td></tr>
<tr><td colspan="2">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 and remove the power fuses, including any connected devices, before removing any hatches or 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.</td></tr>
</table>

<table>
<tr><td align="center">NOTICE</td></tr>
<tr><td>MALFUNCTIONING OF THE EQUIPMENT

• Make sure the water mains is correctly connected.

• Make sure there are no traps in the drainage duct.

• Make sure the steam outlet closure clamps are properly tightened.

• Make sure there are no pockets of condensate or throttling in the steam delivery channel.</td></tr>
</table>

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 inlet water conductivity has been entered, after which the humidifier OFF screen will open automatically.

To start the humidifier (with the humidistat connected):

- Check the inlet and outlet lines (see **"5.2 INSTALLING THE PLUMBING" ON PAGE 28, "5.3 WATER DRAINAGE SYSTEM" ON PAGE 29** and **"5.4 STEAM DISTRIBUTION IN THE CABIN OR DUCT" ON PAGE 31**);

- Let the water flow through the drain for a few hours before making the final connection;

- Fit the power fuses;

- Connect the humidistat or sensor, depending on the required operation (see **"6.4 ELECTRICAL CONNECTIONS" ON PAGE 43);**

- Check that the **CV** contact is closed, see **"6.4 ELECTRICAL CONNECTIONS" ON PAGE 43;**

- Close the humidifier port;

- 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);

- Set the temperature setpoint **SP3** to the maximum temperature;

- The humidifier starts a boiler loading cycle;

- Set the temperature setpoint **SP3** to the value required for the application;

- The humidifier drains the water and replenishes it cyclically to perform the dilution procedure in order to keep the humidifier in a good operating condition. The humidifier cyclically carries out a full wash and then restarts with a lower frequency. Operation has been developed to ensure maximum energy efficiency and optimal water use.

8.2 Seasonal or long-term shut-down instructions

If you need to switch off the humidifier for long periods of time, you must:

- Manually drain the product using the manual drainage launch procedure;
- When draining is complete, deactivate the isolator installed outside the humidifier and open the water supply source;
- Open the manual drain plug to complete draining the manifold and pump.

⚠ 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.

8.3 Start-up after a seasonal or long-term shut-down

- It is advisable to clean the boiler before a seasonal start-up;
- Check the inlet and outlet lines (see *"5.2 INSTALLING THE PLUMBING" ON PAGE 28, "5.3 WATER DRAINAGE SYSTEM" ON PAGE 29* and *"5.4 STEAM DISTRIBUTION IN THE CABIN OR DUCT" ON PAGE 31*);
- Let the water flow through the drain for a few hours before making the final connection;
- Check the power fuses;
- Check the humidistat or sensor connection, depending on the required operation (see *"6.4 ELECTRICAL CONNECTIONS" ON PAGE 43*);
- Check that the **CV** contact is closed, see *"6.4 ELECTRICAL CONNECTIONS" ON PAGE 43*;
- Close the humidifier port;
- 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;
- Set the temperature setpoint **SP3** to the maximum temperature;
- The humidifier starts a boiler loading cycle;
- Set the temperature setpoint **SP3** to the value required for the application;
- The humidifier drains the water and replenishes it cyclically to perform the dilution procedure in order to keep the humidifier in a good operating condition. The humidifier cyclically carries out a full wash and then restarts with a lower frequency. Operation has been developed to ensure maximum energy efficiency and optimal water use.

9. OPERATION

Chapter content

This chapter contains the following information:

9.1 Zephyr operating principle

The **Zephyr Wellness** humidifier series is the ELSTEAM solution for immersed electrode humidifier systems dedicated to wellness and spa settings, and specifically to distributing steam in Turkish baths or hammam spas.

Zephyr Wellness series humidifiers generate humidity (steam) by passing a current between two or more electrodes immersed in drinking water to bring it to boiling point.

The steam is controlled by adjusting the intensity of the current transferred to the water by the immersed electrodes, which indirectly controls the boiling of the water.

The steam is emitted into the room via a special pipe and a linear steam distributor, or via a steam distributor with a nozzle. Steam production is enabled when the Turkish bath cabin door is closed. The steam production stops when the door is reopened.

9.2 Humidity regulation

The humidity can be regulated in 6 ways, depending on how the **CFG** parameter is set:
- Regulation with a temperature probe (wellness applications) (**CFG** = 1T);
- Regulation with two temperature probes (wellness applications) (**CFG** = 2T)
- ON-OFF regulation (**CFG** = 0-1);
- Proportional regulation (**CFG** = PROP);
- Regulation with the humidity sensor (**CFG** = HUM);
- Regulation with the humidity sensor and limit sensor (**CFG** = HUML);

9.2.1 Regulation with a temperature probe | CFG = 1T

To use **Zephyr** with regulation with a temperature sensor, the following conditions must be met:
- **CFG** = 1T;
- Set parameter **P0** according to the sensor type to be used
- Set the minimum humidity production **r5**;
- Set the maximum humidity production **r6**;
- Digital input: wellness door lock closed (**CV**);
- Remote ON/OFF digital input closed (**0/1**).

Principle of operation

The humidity requirement is managed with a proportional temperature adjustment between SP3 and the proportional band r20, according to the following logic:
- Temperature ≥ **SP3**: 0% humidity required;
- Temperature ≤ **SP3** - **r20**: humidity requirement at **r6**;
- **SP3** < Temperature < **r20**: proportionally linearized humidity required (minimum production **r5**).

9.2.2 Regulation with two temperature probes | CFG = 2T

To use **Zephyr** with regulation with two temperature sensors, the following conditions must be met:
- **CFG** = 2T;
- Set parameter **P0** according to the sensor type to be used
- Set the minimum humidity production **r5**;
- Set the maximum humidity production **r6**;
- Set parameter **r23**;
- Set parameter **r24**;
- Digital input: wellness door lock closed (**CV**);
- Remote ON/OFF digital input closed (**0/1**).

9.2.3 ON-OFF regulation | CFG = 0-1

To use **Zephyr** with ON-OFF regulation, the following conditions must be met:
- **CFG** = 0-1;
- Enable digital input closed (**CV**);
- Remote ON/OFF digital input (**0/1**).

When the **S0**digital input is closed, **Zephyr** generates humidity according to the maximum value set in parameter **r6**.

9.2.4 Proportional regulation | CFG = PROP

To use **Zephyr** with proportional regulation, the following conditions must be met:
- **CFG** = PROP;
- Set the minimum humidity production **r5**;
- Set the maximum humidity production **r6**;
- Digital input: wellness door lock closed (**CV**);
- Remote ON/OFF digital input closed (**0/1**).

The humidity production varies with the value read at the **S1** analogue input, with the logic expressed in the graph below, without exceeding parameter **r6**:

KEY	
Line	**Description**
——	V_{in}
▬▬	Production
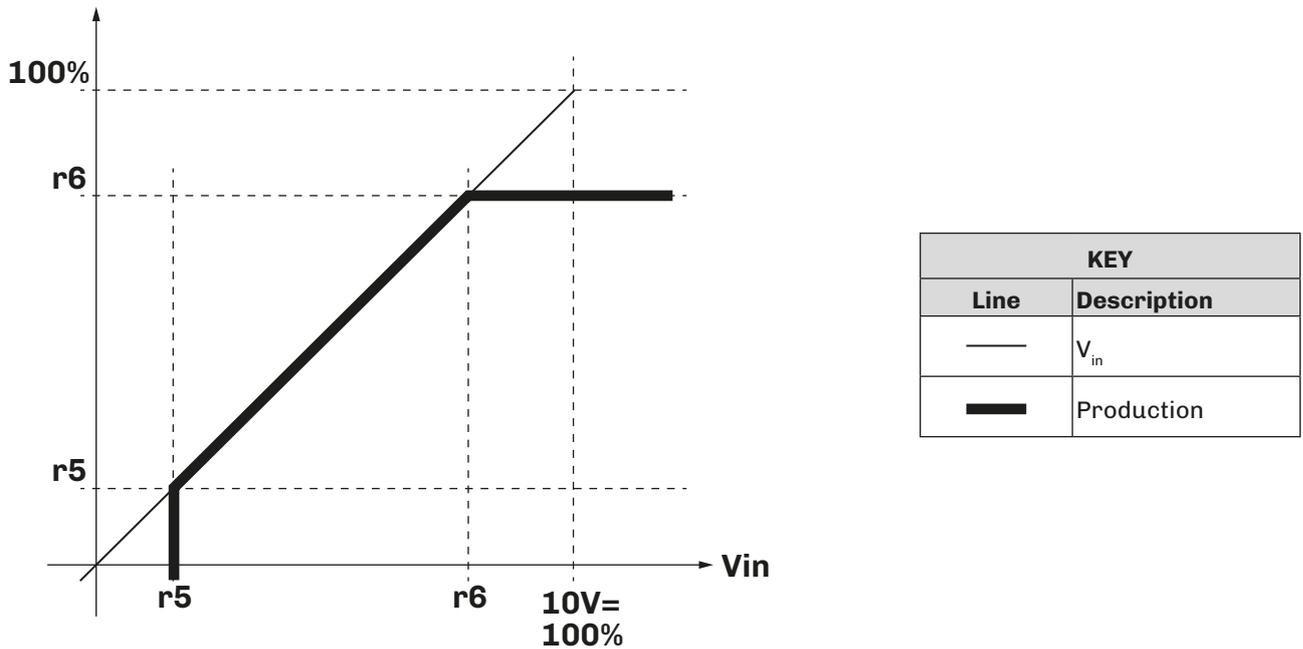
Fig. 56. *How proportional regulation works |* ***CFG*** *= PROP*

9.2.5 Regulation with the humidity sensor | CFG = HUM

To use **Zephyr** with regulation with the humidity sensor, the following conditions must be met:

- **CFG** = HUM or **CFG** = HUML;
- Set parameter **P2** according to the sensor type to be used;
- Set the minimum humidity production **r5**;
- Set the maximum humidity production **r6**;
- Digital input: wellness door lock closed (**CV**);
- Remote ON/OFF digital input closed (**0/1**).
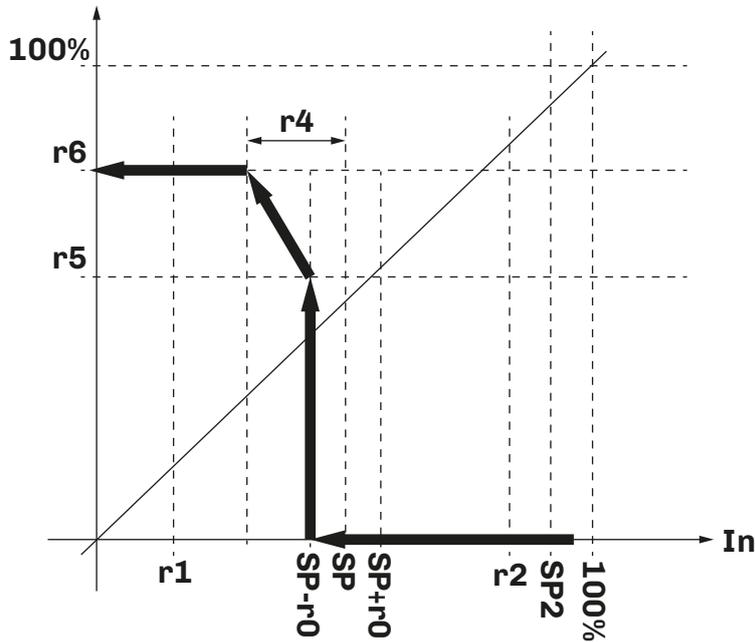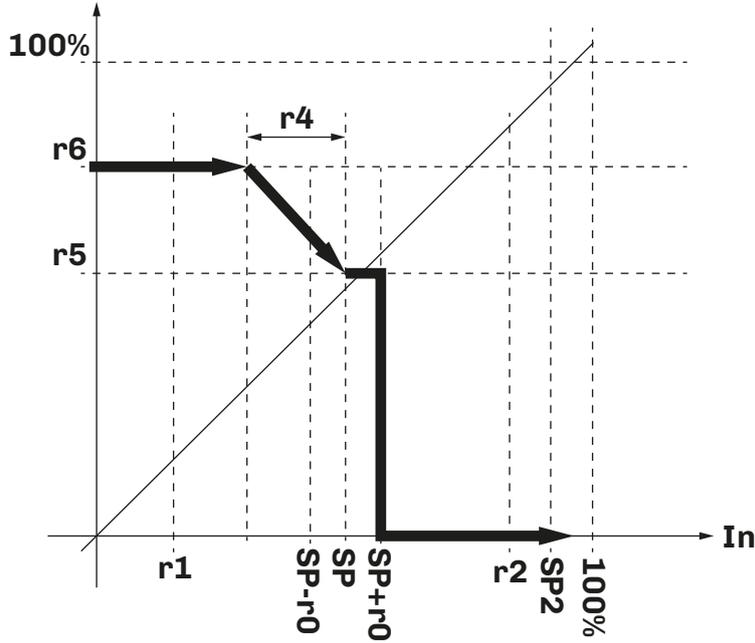
KEY	
Line	**Description**
——	V_{in}
▬▬	Production

Fig. 57. *How regulation with the humidity sensor works | **CFG** = HUM*

9.2.6 Regulation with the humidity sensor + limit sensor | CFG = HUML

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

- **CFG** = HUML;
- Set parameter **P2** according to the sensor type to be used;
- Set parameter **P7** according to the limit sensor type to be used;
- Set the minimum humidity production **r5**;
- Set the maximum humidity production **r6**;
- Digital input: wellness door lock closed (**CV**);
- Remote ON/OFF digital input closed (**0/1**).

KEY	
Line	**Description**
———	V_{in}
▬▬▬	Production
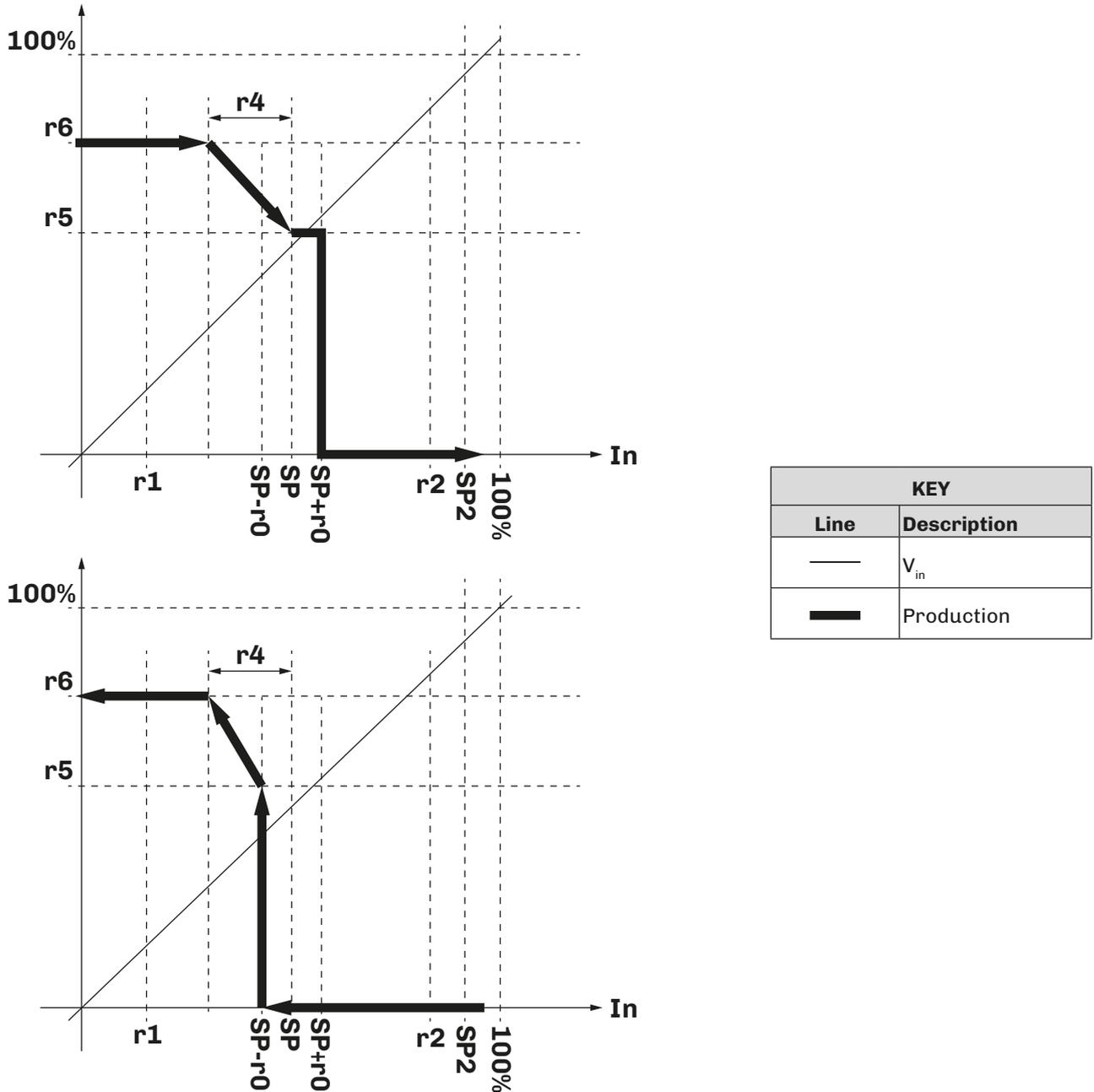
*Fig. 58. How regulation with the humidity sensor + limit sensor works | **CFG** = HUML*

Humidity production behaves in the same way as for regulation with the humidity sensor (**CFG** = HUM), but the second sensor connected to analogue input **S2** stops steam generation, depending on the humidity delivery.

The humidity limit activates when the humidity measured by sensor **S2** exceeds **SP2 + r10**.

9.3 Preheating and anti-freeze

Preheating is a function that holds the water in the boiler at a certain temperature so that production starts faster. Setting **c8** >0 enables the function. The water hold temperature is **c8** - 2 °C.

The anti-freeze function prevents the water from freezing. Setting **C9** = 1 enables the function and holds the water temperature in the boiler at 7°C (44.6 °F).

The preheating configuration parameters are:

Par.	Description	MU	Range
c8	Preheating set-point for temperature hold. **0** = Disabled.	°C/°F	0.0...90.0
c9	Anti-freezing enable (temperature fixed at 7 °C (44.6 °F)). **0** = Disabled; **1** = Enabled.	---	0/1

9.4 Boiler water dilution

Water dilution in the boiler is controlled in two ways, depending on how parameter **c3** is set:

Par.	Description	MU	Range
c3	Type of draining for dilution. **0** = Current-based; **1** = Time-based.	---	0/1

NOTE: The electrodes are off while draining the water. Draining is activated 3 seconds after turning the electrodes off.

9.4.1 Current-based water dilution

Setting **c3** = 0 configures the water dilution in the boiler according to the currents.

The evaporation cycle and water filling times to reach the required production are monitored during operation.

The electrical conductivity of the water tends to rise while producing humidity because it concentrates the substances in the water, and consequently the times mentioned above tend to reduce; during this stage, **Zephyr** activates the outlet pump until the internal current drops below the threshold set in parameter **c6**.

NOTE: The electrodes are off during draining to ensure safety.

The configuration parameters for current-based water dilution are:

Par.	Description	MU	Range
c6	Draining value for dilution (if **C3** = 0).	%	20...80

9.4.2 Time-based boiler water dilution

Setting **c3** = 1 configures time-based boiler water dilution to ensure that the water is diluted continually without waiting for the internal conditions to become critical.

Zephyr dilutes the water after time **c5** for a duration of **c4**.

The configuration parameters for time-based water dilution are:

Par.	Description	MU	Range
c4	Draining duration for dilution (if **C3** = 1).	s	0...9999
c5	Time between two dilution draining events (if **C3** = 1).	min	30...999

9.5 Boiler draining

When the electrical conductivity of the water becomes too high, the boiler must be drained completely to restore optimal operating conditions.

The evaporation cycle and water filling times to reach the required production are monitored during operation.

Once the boiler has been completely drained, the boiler is washed a second time if **Zephyr** detects that the unfavourable conditions persist; if the second washing fails to create optimal operating conditions, alarm **AL08** is generated and the humidifier is forced OFF until maintenance is carried out (see *"14.1 TABLE OF ALARMS" ON PAGE 98*).

9.6 Completely draining the boiler

Zephyr requires completely draining the boiler in the following cases:
- After the inactivity time set in parameter **c0**;
- After the activity time set in parameter **c1**;
- If the timer is not working, when the humidifier is powered up;
- For **EHKT** models: Whenever electrical power is supplied;
- When manual draining is activated from the user menu.

The configuration parameters for the cleaning cycles are:

Par.	Description	MU	Range
c0	Number of continuous days of inactivity after which the boiler is emptied. **0** = Function disabled.	days	0...10
c1	Number of continuous days of activity after which the boiler is emptied. **0** = Function disabled.	days	0...100

9.7 Level sensor

When the humidifier is running, the water may exceed the level sensor at the top of the boiler. This is caused by low electrical conductivity of the water in the boiler. **Zephyr** activates the outlet pump to drain it partially and resumes the evaporation cycles to achieve optimum electrical conductivity.

9.8 Foam management

Foaming may occur while the water is boiling in the boiler. Foaming is generally due to surfactants (manufacturing residues in the water filling system, water treatment agents, softeners) or an excessive concentration of dissolved salts in the water.

If c_{11} = 1, **Zephyr** indicates and manages this condition.

If there is no foam in the boiler, **Zephyr** resumes normal operation.

If the level sensor is reached again within time c_{12}, there is foam in the boiler. **Zephyr** empties the boiler completely. Thereafter, if the following occurs within time c_{12}:
*   The level sensor is reached again, **Zephyr** performs two complete cleaning cycles;
*   The level sensor is not reached, **Zephyr** resumes normal operation.

When there is foam, **Zephyr** displays code **W05** (see *"14.1 TABLE OF ALARMS" ON PAGE 98*).

9.9 Operating hours

Zephyr records the operating hours of the humidifier to allow periodic maintenance.
The following times are monitored:
*   Hours of unit operation;
*   Partial hours of boiler operation;
*   Total hours of boiler operation;
*   Hours of inlet solenoid valve operation;
*   Hours of outlet pump operation;
*   Hours of fan operation.

The configuration parameters for the maintenance warning thresholds are:

Par.	Description	MU	Range
M10	Operating hours threshold for unit maintenance warning.	hx10	100....1000
M11	Operating hours threshold for partial boiler maintenance warning.	hx10	100....1000
M12	Operating hours threshold for full boiler maintenance warning.	hx10	100....1000
M13	Operating hours threshold for valve maintenance warning.	hx10	100....1000
M14	Operating hours threshold for pump maintenance warning.	hx10	100....1000
M15	Operating hours threshold for fan maintenance warning.	hx10	100....1000
M16	Operating hours threshold for auxiliary maintenance warning. **0** = Not used.	hx10	100....1000

9.9.1 Resetting the operating hours

The operating hours can be reset from the maintenance menu, depending on the user interface type.

Hours can be reset from the **counters** section of the maintenance menu (password protected).

9.10 Overproduction

When the humidity production exceeds 30% of the steam demand, draining is performed to return the steam production to the required value.

10. WELLNESS

Chapter content

This chapter contains the following information:

10.1 Introduction

The **Zephyr Wellness** humidifier can control:
- Up to 3 essences;
- The emission fan;
- The extraction fan;
- The cabin light;
- Cabin sanitising.

The cabin can be regulated as follows:
- By time slots;
- Manual operation with timer.

10.1.1 Time slots

Zephyr Wellness can manage up to 4 daily time slots with 4 setpoints each. Each time slot can be configured as follows:
- *Time slot disabled*: the humidifier continues to operate as set in the previous time slot;
- *Humidifier off*: the humidifier is off and the display shows "**OFF from time slots**";
- *Humidifier on*: the humidifier is on and operating with setpoint **SP3**;
- *Humidifier on with 4 dedicated setpoints:* The humidifier is on and can operate with 4 programmable setpoints.

During configuration, the settings for the previous day can be copied.

The configuration parameters are as follows:

Par.	Description	MU	Range
ScH	Time slot enable. **0** = Disabled; **1** = Enabled.	---	0/1
Sw1	Wellness time slots setpoint 1.	°C/°F	**r1...r2**
Sw2	Wellness time slots setpoint 2.	°C/°F	**r1...r2**
Sw3	Wellness time slots setpoint 3.	°C/°F	**r1...r2**
Sw4	Wellness time slots setpoint 4.	°C/°F	**r1...r2**

10.1.2 Manual operation with timer

The Turkish bath can be turned on manually by setting the desired time and tapping the **Start/Stop** key on the *Wellness Functions* page.

The desired essence, the state of the emission and extraction fans and the state of the light in the cabin can be selected during manual operation.

To stop manual timer operation before the time expires, simply press the **Start/Stop** key again.

10.2 Essence control

The **Zephyr Wellness** humidifier can control up to 3 essences. Each of these can have the following settings:
- Enable;
- Dispensing time (in seconds);
- Dispensing time delay (in seconds);
- Essence name;

The **Zephyr Wellness** humidifier activates the **essence** output when it produces steam and the cabin temperature reaches the desired temperature.

The essence to be used can be viewed and changed on the **Wellness Functions** page.

10.3 Emission fan

An emission fan in the cabin can be controlled. The configuration parameters are as follows:

Par.	Description	MU	Range
u12	Emission fan operation. **0** = Disabled; **1** = Manual; **2** = Automatic; **3** = Time slots.	---	0...3
u13	Temperature threshold to turn on the emission fan.	°C/°F	0.0...50.0
u14	Delay before turning on the emission fan (for automatic mode only).	min	0...999
u15	Delay before turning off the emission fan (for automatic mode only).	min	0...999

10.3.1 Operation

- **MANUAL**: the fan is controlled manually from the *Wellness Functions page.*
- **AUTOMATIC**: the fan is turned on automatically during steam production only. If a temperature threshold is set (**u13** > 0), the fan is turned on when the temperature in the cabin exceeds that threshold.
  Setting parameters **u14** and **u15** enables the fan on and off delays.
- **TIME SLOTS**: the fan is turned on automatically when the humidifier is turned on by the time slots. If a temperature threshold is set (**u13** > 0), the fan is only turned on when the temperature in the cabin exceeds that threshold.

If manual operation with timer is enabled, the emission fan is only controlled in manual mode by the commands set in the *Wellness Functions* page.

10.4 Extraction fan

An extraction fan in the cabin can be controlled. The configuration parameters are as follows:

Par.	Description	MU	Range
u16	Extraction fan operation. **0** = Disabled; **1** = Manual; **2** = Automatic; **3** = Time slots.	---	0...3
u17	Delay before turning on the extraction fan (for automatic mode only).	min	0...999
u18	Delay before turning off the extraction fan (for automatic mode only).	min	0...999
u19	Time at which to turn on the extraction fan (for timer mode only).	min	0...999
u20	Time at which to turn off the extraction fan (for timer mode only).	min	0...999

10.4.1 Operation

- **MANUAL**: the fan is controlled manually from the *Wellness Functions page.*
- **AUTOMATIC**: the fan is turned on at the end of steam production.
  Setting parameters **u17** and **u18** enables the fan on and off delays.
- **TIME SLOTS**: the fan is turned on automatically when the humidifier is turned off by the time slots.
- **TIMER**: the fan operates with on/off cycles set by parameters **u19** and **u20**.

If manual operation with timer is enabled, the emission fan is only controlled in manual mode by the commands set in the *Wellness Functions* page.

10.5 Drying

A drying phase can be set. The configuration parameters are as follows:

Par.	Description	MU	Range
u21	Drying operation. **0** = Disabled; **1** = Emission fan on; **2** = Extraction fan on; **3** = Emission and extraction fans on.	---	0...3
u22	Drying time.	min	0...999

If drying is enabled whenever the time slots turn the humidifier OFF or the manual timer on time ends, the fans selected by parameter **u21** are turned on for time **u22**.

10.6 Sanitising

Sanitisation of the Turkish bath cabin can be turned on only manually from the "**wellness**" page, after making sure that the environment is empty to avoid harming people. The configuration parameters are as follows:

Par.	Description	MU	Range
u23	Duration of sanitisation phase 1.	min	0...999
u24	Ventilation in sanitisation phase 1. **0** = Disabled; **1** = Emission; **2** = Extraction; **3** = Emission+Extraction.	---	0...3
u25	Percentage steam production in sanitisation phase 1.	%	0...100
u26	Liquid emission in sanitisation phase 1. **0** = No; **1** = Yes.	---	0/1
u27	Duration of sanitisation phase 2.	min	0...999
u28	Ventilation in sanitisation phase 2. **0** = Disabled; **1** = Emission; **2** = Extraction; **3** = Emission+Extraction.	---	0...3
u29	Percentage steam production in sanitisation phase 2.	%	0...100
u30	Liquid emission in sanitisation phase 2. **0** = No; **1** = Yes.	---	0/1

To start sanitisation, simply operate START/STOP on the *Wellness Functions* page.

The duration, behaviour of the emission and extraction fans, a fixed steam production set and the state of the sanitisation output can then be set for each phase.

To interrupt sanitisation, simply operate START/STOP again on the *Wellness Functions* page.

10.7 Cabin lights

The cabin lights can be controlled. The configuration parameters are as follows:

Par.	Description	MU	Range
u31	Cabin light operating mode. **0** = Disabled; **1** = Manual; **2** = By time slots.	---	0...2
u32	Delay before turning off the light (time slot operation only)	min	0...999

10.7.1 Operation

- **MANUAL**: the lights are only turned on and off manually from the *Wellness Functions* page.
- **TIME SLOTS**: the lights turn on when the humidifier is turned on by the time slots, and turn off when the humidifier is turned off by the time slots (if the delay parameter **u32**> 0, the lights will turn off this time after the end of the time slot). However, it is always possible to turn the lights on and off manually from the *Wellness Functions* page.

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 Table of adjustment parameters

Par.	Description	MU	Range	Default	PW
	SETPOINT group				
SP1	Humidity setpoint.	%	**r1...r2**	70.0	U
SP2	Humidity limit setpoint.	%	**r11...r12**	85.0	U
SP3	Wellness temperature setpoint.	°C/°F	**r21...r22**	40.0	U
	CONFIGURATION group				
CFG	Operating mode (see **"9.2 HUMIDITY REGULATION" ON PAGE 67**) **0-1** (0) = ON/OFF from digital input; **PROP** (1) = Proportional input; **HUM** (2) = Humidity sensor; **HUML** (3) = Humidity sensor + limit sensor; **1T** (4) = 1 temperature sensor; **2T** (5) = 2 temperature sensors.	---	0-1 / PROP / HUM / HUML / 1T / 2T	2T	M
Wel	Enables wellness operation with the dedicated expansion board. **0** = Disabled; **1** = Enabled.	---	0/1	1	M
duAL	Dual boiler humidifier operation. **0** = Parallel; **1** = Sequential.	---	0/1	0	U
tyP	Type of boiler installed: **0** = Standard; **1** = Low electrical conductivity (**LC**); **2** = High electrical conductivity (**HC**).	---	0...2	0	M
nTyp	Master/Slave operation. **0** = Disabled; **1** = Parallel; **2** = Rotation; **3** = Balancing.	---	0...3	0	M
nAdr	Networked master/slave module (only if enabled Master/Slave Operation **nTyp** ≠ 0). **1** = Master; **2** = Slave 1; **3** = Slave 2; **4** = Slave 3; **5** = Slave 4.	---	1...5	1	M
nPrE	Master/Slave machine pre-heating enabled. **0** = Disabled; **1** = Enabled.	---	0/1	0	M
ntot	Total number of Master/Slave machines.	num	2...5	2	M
nbAc	Number of Master/Slave backup machines (only for **nTyP** = 2 and/or **nTyP** = 3).	num	1...3	1	M
nHrs	Hours of Master/Slave machine rotation.	hours	10...500	150	M
P0	Type of sensor **S1** temperature of pre-heating + anti-freeze. **---** (0) = Disabled; **PTC** (1) = PTC; **NTC** (2) = NTC.	---	--- / PTC / NTC	---	M

Par.	Description	MU	Range	Default	PW
P1	Electrical conductivity of the water.	µS/cm	0…1250	0	M
P2	Type of regulator/sensor/probe **S2** (regulation input). **PTC** (0) = PTC probe; **1000** (1) = Pt1000 probe; **NTC** (2) = NTC probe; **0-10** (3) = Proportional input 0…10 V; **0-5** (4) = Proportional input 0…5 V; **0.20** (5) = Input 0…20 mA; **4.20** (6) = Input 4…20 mA; **E520** (7) = EVHTP520 proprietary probe.	---	PTC /1 000 / 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
P6	**S1** sensor offset (temperature).	°C/°F	-10.0…10.0	0.0	M
P7	Type of sensor/probe **S3** (limit or mediating probe with input **P2** if temperature). Similar to **P2**.	---	PTC /1 000 / 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	TA sensor K (1000 = current multiplier of 1.000).	---	0…2000	1000	M
P12	Ventilation presence (enables maintenance management based on utility operating hours). **No** = No ventilation; **Yes** = Ventilation present.	---	No/Yes	Yes	M
P13	Sensor offset **S2** temperature (if **CFG** = 1T or **CFG** = 2T).	°C/°F	-10.0…10.0	0.0	M
P14	Sensor offset **S3** temperature (if **CFG** = 1T or **CFG** = 2T).	°C/°F	-10.0…10.0	0.0	M
P20	Electrical conductivity of the water at 100°C (212 °F). **0** = 3000 µS/cm; **1** = 4000 µS/cm; **2** = 5000 µS/cm.	---	0…2	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
	REGULATION group				
r0	Humidity probe setpoint hysteresis.	%	0…20	2	M
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	M
r11	Minimum value for setting humidity limit setpoint.	%	0…r12	20	M
r12	Maximum limit setpoint value.	%	**r11**…100	95	M
r20	Temperature proportional band.	°C/°F	0.1… 10.0	5.0	M
r21	Minimum value for setting temperature setpoint.	°C/°F	10.0…**r22**	20.0	M
r22	Maximum value for setting temperature setpoint.	°C/°F	**r21**…60.0	50.0	M
r23	Wellness temperature probe 1 weight.	%	0…100	50	M
r24	Wellness temperature probe 2 weight.	%	0…100	50	M
c0	Number of continuous days of inactivity after which the boiler is emptied. **0** = Function disabled.	days	0…10	2	M
c1	Number of continuous days of activity after which the boiler is emptied. **0** = Function disabled.	days	0…100	14	M
c3	Type of draining for dilution. **0** = Current-based; **1** = Time-based.	---	0/1	0	PW
c4	Draining duration for dilution (if **c3** = 1).	s	0…9999	5	M
c5	Time between two dilution draining events (if **c3** = 1).	m	30…999	60	M
c6	Percentage draining for dilution (if **c3** = 0).	%	20…80	30	M

Par.	Description	MU	Range	Default	PW
c8	Preheating set-point for temperature hold. **0** = Disabled. (Not editable if temperature sensor **S1** is disabled).	°C/°F	0.0…90.0	0.0	M
c9	Anti-freezing enable (temperature fixed at 7 °C (44.6 °F)). **0** = Disabled; **1** = Enabled. (Not editable if temperature sensor **S1** is disabled).	---	0/1	0	M
c10	Maximum initial water filling time for water inlet check.	s	50…2000	1200	M
c11	Anti-foam process. **0** = Disabled; **1** = Enabled.	---	0/1	0	M
c14	Time to drain the boiler completely. **(*)** Default according to model, from: **3 kg/h** = 30 s; **5..15 kg/h** = 40 s; **20…100 kg/h** = 180 s.	s	0…240	(*)	M
c15	Hours of dual boiler machine rotation.	hours	10…500	150	M
c16	Low conductivity algorithm enable.	---	0/1	0	M
	WELLNESS group				
u0	Essence 1 enable. **0** = Disabled; **1** = Enabled.	---	0/1	0	M
u1	Essence 1 dispensing time.	s	0…9999	0	M
u2	Essence 1 dispensing delay time.	s	0…9999	0	M
u3	Name of essence 1.	---	---	---	M
u4	Essence 2 enable. **0** = Disabled; **1** = Enabled.	---	0/1	0	M
u5	Essence 2 dispensing time.	s	0…9999	0	M
u6	Essence 2 dispensing delay time.	s	0…9999	0	M
u7	Name of essence 2.	---	---	---	M
u8	Essence 3 enable. **0** = Disabled; **1** = Enabled.	---	0/1	0	M
u9	Essence 3 dispensing time.	s	0…9999	0	M
u10	Essence 3 dispensing delay time.	s	0…9999	0	M
u11	Name of essence 3.	---	---	---	M
u12	Emission fan operation. **0** = Disabled; **1** = Manual; **2** = Automatic; **3** = Time slots.	---	0…3	0	M
u13	Temperature threshold to turn on the emission fan.	°C/°F	0.0…50.0	0.0	M
u14	Delay before turning on the emission fan (for automatic mode only).	min	0…999	0	M
u15	Delay before turning off the emission fan (for automatic mode only).	min	0…999	0	M
u16	Extraction fan operation. **0** = Disabled; **1** = Manual; **2** = Automatic; **3** = Time slots.	---	0…3	0	M
u17	Delay before turning on the extraction fan (for automatic mode only).	min	0…999	0	M
u18	Delay before turning off the extraction fan (for automatic mode only).	min	0…999	0	M
u19	Time at which to turn on the extraction fan (for timer mode only).	min	0…999	0	M
u20	Time at which to turn off the extraction fan (for timer mode only).	min	0…999	0	M
u21	Drying operation. **0** = Disabled; **1** = Emission fan on; **2** = Extraction fan on; **3** = Emission and extraction fans on.	---	0…3	0	M
u22	Drying time.	min	0…999	0	M
u23	Duration of sanitisation phase 1.	min	0…999	0	M

Par.	Description	MU	Range	Default	PW
u24	Ventilation in sanitisation phase 1. **0** = Disabled; **1** = Emission; **2** = Extraction; **3** = Emission+Extraction.	---	0...3	0	M
u25	Percentage steam production in sanitisation phase 1.	%	0...100	0	M
u26	Liquid emission in sanitisation phase 1. **0** = No; **1** = Yes.	---	0/1	0	M
u27	Duration of sanitisation phase 2.	min	0...999	0	M
u28	Ventilation in sanitisation phase 2. **0** = Disabled; **1** = Emission; **2** = Extraction; **3** = Emission+Extraction.	---	0...3	0	M
u29	Percentage steam production in sanitisation phase 2.	%	0...100	0	M
u30	Liquid emission in sanitisation phase 2. **0** = No; **1** = Yes.	---	0/1	0	M
u31	Cabin light operating mode. **0** = Disabled; **1** = Manual; **2** = By time slots.	---	0...2	0	M
u32	Delay before turning off the light (time slot operation only)	min	0...999	0	M
	TIME SLOT group				
ScH	Time slot enable. **0** = Disabled; **1** = Enabled.	---	0/1	0	M
Sw1	Wellness time slots setpoint 1.	°C/°F	**r1...r2**	30	M
Sw2	Wellness time slots setpoint 2.	°C/°F	**r1...r2**	35	M
Sw3	Wellness time slots setpoint 3.	°C/°F	**r1...r2**	40	M
Sw4	Wellness time slots setpoint 4.	°C/°F	**r1...r2**	45	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	Delay in alarm for no production.	hours	1...100	48	M
M9	Maximum number of automatic attempts to rearm alarm **AL03** "No water" after which the alarm blocks manual rearming.	num	1...10	3	M
M10	Operating hours threshold for unit maintenance warning.	hx10	100....10000	4000	M
M11	Operating hours threshold for partial boiler maintenance warning.	hx10	100....2000	200	M
M12	Operating hours threshold for full boiler maintenance warning.	hx10	100....2000	1000	M
M13	Operating hours threshold for valve maintenance warning.	hx10	100....2000	1000	M
M14	Operating hours threshold for pump maintenance warning.	hx10	100....2000	1000	M
M15	Operating hours threshold for fan maintenance warning.	hx10	100....2000	1000	M
M16	Operating hours threshold for auxiliary maintenance warning. **0** = Disabled.	hx10	100....1000	200	M
M20	High temperature alarm threshold. Hysteresis = 0.5 °C. **0** = Disabled.	°C/°F	0.0...80.0	50.0	M
M21	Maximum number of automatic attempts to rearm the high temperature alarm after which the alarm blocks manual rearming (attempts every hour)	num	1...10	3	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	E

Par.	Description	MU	Range	Default	PW
LP1	Modbus parity bit. **0** = None; **1** = Odd; **2** = Even.	---	0…2	2	E
LS1	Modbus stop bit. **0** = 1 stop bit; **1** = 2 stop bits.	---	0/1	0	E
	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.
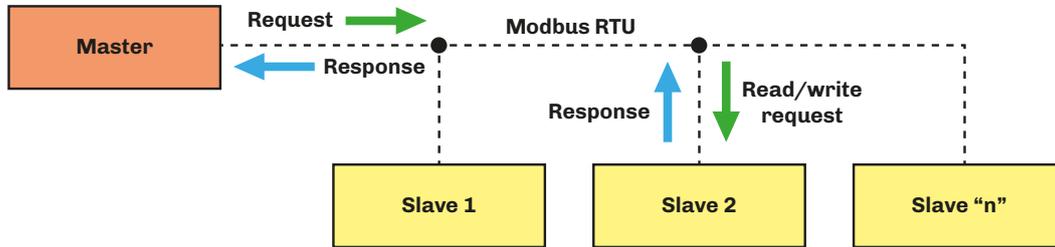
Fig. 59. *Diagram showing message exchange in a Modbus communication*

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. 60. FRAMING OF A MESSAGE USING MODBUS PROTOCOL" ON PAGE 84*) 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.
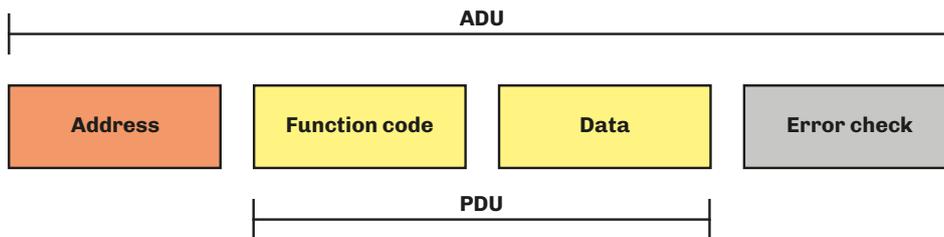
Fig. 60. *Framing of a message using Modbus protocol*

For further information relating to the 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 37**.

In particular, take care to make the connections correctly, observing the instructions in section
"6.4 ELECTRICAL CONNECTIONS" ON PAGE 43

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 Zephyr Wellness Modbus addresses

12.7.1 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**
SP3	Wellness temperature setpoint.	2086	R/W	SHORT	Y	°C/°F	**r21...r22**
	CONFIGURATION group						
CFG	Operating mode (see *"9.2 HUMIDITY REGULATION" ON PAGE 67*) **0-1** (0) = ON/OFF from digital input; **PROP** (1) = Proportional input; **HUM** (2) = Humidity sensor; **HUML** (3) = Humidity sensor + limit sensor; **1T** (4) = 1 temperature sensor; **2T** (5) = 2 temperature sensors.	2003	R/W	BYTES	---	---	0-1 / PROP / HUM / HUML / 1T / 2T
Wel	Enables wellness operation with the dedicated expansion board. **0** = Disabled; **1** = Enabled.	2253	R/W	1 BIT	---	---	0/1
duAL	Dual boiler humidifier operation. **0** = Parallel; **1** = Sequential.	2066	R/W	1 BIT	---	---	0/1
tyP	Type of boiler installed: **0** = Standard; **1** = Low electrical conductivity (**LC**); **2** = High electrical conductivity (**HC**).	2005	R/W	2 BIT	---	---	0...2
nTyp	Master/Slave operation. **0** = Disabled; **1** = Parallel; **2** = Rotation; **3** = Balancing.	2073	R/W	2 BIT	---	---	0...3
nAdr	Networked master/slave module (only if enabled Master/Slave Operation **nTyp** ≠ 0). **1** = Master; **2** = Slave 1; **3** = Slave 2; **4** = Slave 3; **5** = Slave 4.	2070	R/W	BYTES	---	---	1...5
nPrE	Master/Slave machine pre-heating enabled. **0** = Disabled; **1** = Enabled.	2074	R/W	1 BIT	---	---	0/1
ntot	Total number of Master/Slave machines.	2072	R/W	2 BIT	---	num	2...5
nbAc	Number of Master/Slave backup machines (for **nTyP** = 2 and/or **nTyP** = 3 only).	2071	R/W	2 BIT	---	num	1...3
nHrs	Hours of Master/Slave machine rotation.	2075	R/W	WORD	---	hours	10...500
P0	Type of sensor **S1** temperature of pre-heating + anti-freeze. **---** (0) = Disabled; **PTC** (1) = PTC; **NTC** (2) = NTC.	2076	R/W	2 BIT	---	---	--- / PTC / NTC
P1	Electrical conductivity of the water.	2006	R/W	WORD	---	µS/cm	0...1250
P2	Type of regulator/sensor/probe **S2** (regulation input). **PTC** (0) = PTC probe; **1000** (1) = Pt1000 probe; **NTC** (2) = NTC probe; **0-10** (3) = Proportional input 0...10 V; **0-5** (4) = Proportional input 0...5 V; **0.20** (5) = Input 0...20 mA; **4.20** (6) = Input 4...20 mA; **E520** (7) = EVHTP520 proprietary probe.	2007	R/W	BYTES	---	---	PTC /1 000 / NTC / 0-10 / 0-5 / 0.20 / 4.20 / E520
P3	Minimum value **S2** (if **CFG** = HUM or **CFG** = HUML).	2008	R/W	BYTES	---	%rH	0...100

Par.	Description	Val. Adr.	R/W	DATA SIZE	CPL	MU	Range
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	Y	%rH	-10...10
P6	**S1** sensor offset (temperature).	2011	R/W	SHORT	Y	°C/°F	-10.0...10.0
P7	Type of sensor/probe **S3** (limit or mediating probe with input **P2** if temperature). Similar to **P2**.	2012	R/W	BYTES	---	---	PTC /1 000 / NTC / 0-10 / 0-5 / 0.20 / 4.20 / E520
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	Y	%rH	-10...10
P11	TA sensor K (1000 = current multiplier of 1.000).	2063	R/W	WORD	---	---	0...2000
P12	Ventilation presence (enables maintenance management based on utility operating hours). **No** = No ventilation; **Yes** = Ventilation present.	2077	R/W	1 BIT	---	---	No/Yes
P13	Sensor offset **S2** temperature (if **CFG** = 1T or **CFG** = 2T).	2078	R/W	SHORT	Y	°C/°F	-10.0...10.0
P14	Sensor offset **S3** temperature (if **CFG** = 1T or **CFG** = 2T).	2079	R/W	SHORT	Y	°C/°F	-10.0...10.0
P20	Electrical conductivity of the water at 100°C (212 °F). **0** = 3000 μS/cm; **1** = 4000 μS/cm; **2** = 5000 μS/cm.	2016	R/W	2 BIT	---	---	0...2
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.	2080	R/W	1 BIT	---	---	0/1
	REGULATION group						
r0	Humidity probe 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.	1926	R/W	BYTES	---	%	20...**r6**
r6	Maximum production.	1927	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
r20	Temperature proportional band.	2081	R/W	BYTES	---	°C/°F	0.1... 10.0
r21	Minimum value for setting temperature setpoint.	2082	R/W	BYTES	---	°C/°F	10.0...**r22**
r22	Maximum value for setting temperature setpoint.	2083	R/W	BYTES	---	°C/°F	**r21**...60.0
r23	Wellness temperature probe 1 weight.	2084	R/W	BYTES	---	%	0...100
r24	Wellness temperature probe 2 weight.	2085	R/W	BYTES	---	%	0...100
c0	Number of continuous days of inactivity after which the boiler is emptied. **0** = Function disabled.	2027	R/W	BYTES	---	days	0...10
c1	Number of continuous days of activity after which the boiler is emptied. **0** = Function disabled.	2028	R/W	BYTES	---	days	0...100
c3	Type of draining for dilution. **0** = Current-based; **1** = Time-based.	2030	R/W	1 BIT	---	---	0/1
c4	Draining duration for dilution (if **c3** = 1).	2031	R/W	WORD	---	s	0...9999
c5	Time between two dilution draining events (if **c3** = 1).	2032	R/W	WORD	---	m	30...999
c6	Percentage draining for dilution (if **c3** = 0).	2033	R/W	BYTES	---	%	20...80
c8	Preheating set-point for temperature hold. **0** = Disabled. (Not editable if temperature sensor **S1** is disabled).	2034	R/W	BYTES	---	°C/°F	0.0...90.0
c9	Anti-freezing enable (temperature fixed at 7 °C (44.6 °F)). **0** = Disabled; **1** = Enabled.	2035	R/W	1 BIT	---	---	0/1
c10	Maximum initial water filling time for water inlet check.	2036	R/W	WORD	---	s	50...2000

Par.	Description	Val. Adr.	R/W	DATA SIZE	CPL	MU	Range
c11	Anti-foam process. **0** = Disabled; **1** = Enabled.	2037	R/W	1 BIT	---	---	0/1
c14	Time to drain the boiler completely.	2040	R/W	BYTES	---	s	0...240
c15	Hours of dual boiler machine rotation.	2065	R/W	WORD	---	hours	10...500
c16	Low conductivity algorithm enable.	1323	R/W	1 BIT	---	---	0/1
	WELLNESS group						
u0	Essence 1 enable. **0** = Disabled; **1** = Enabled.	2178	R/W	1 BIT	---	---	0/1
u1	Essence 1 dispensing time.	2179	R/W	WORD	---	s	0...9999
u2	Essence 1 dispensing delay time.	2180	R/W	WORD	---	s	0...9999
u3	Name of essence 1.	2181..2195	R/W	SHORT	---	---	---
u4	Essence 2 enable. **0** = Disabled; **1** = Enabled.	2196	R/W	1 BIT	---	---	0/1
u5	Essence 2 dispensing time.	2197	R/W	WORD	---	s	0...9999
u6	Essence 2 dispensing delay time.	2198	R/W	WORD	---	s	0...9999
u7	Name of essence 2.	2199...2213	R/W	SHORT	---	---	---
u8	Essence 3 enable. **0** = Disabled; **1** = Enabled.	2214	R/W	1 BIT	---	---	0/1
u9	Essence 3 dispensing time.	2215	R/W	WORD	---	s	0...9999
u10	Essence 3 dispensing delay time.	2216	R/W	WORD	---	s	0...9999
u11	Name of essence 3.	2217...2231	R/W	SHORT	---	---	---
u12	Emission fan operation. **0** = Disabled; **1** = Manual; **2** = Automatic; **3** = Time slots.	2232	R/W	2 BIT	---	---	0...3
u13	Temperature threshold to turn on the emission fan.	2233	R/W	BYTES	---	°C/°F	0.0...50.0
u14	Delay before turning on the emission fan (for automatic mode only).	2234	R/W	WORD	---	min	0...999
u15	Delay before turning off the emission fan (for automatic mode only).	2235	R/W	WORD	---	min	0...999
u16	Extraction fan operation. **0** = Disabled; **1** = Manual; **2** = Automatic; **3** = Time slots.	2236	R/W	2 BIT	---	---	0...3
u17	Delay before turning on the extraction fan (for automatic mode only).	2237	R/W	WORD	---	min	0...999
u18	Delay before turning off the extraction fan (for automatic mode only).	2238	R/W	WORD	---	min	0...999
u19	Time at which to turn on the extraction fan (for timer mode only).	2239	R/W	WORD	---	min	0...999
u20	Time at which to turn off the extraction fan (for timer mode only).	2240	R/W	WORD	---	min	0...999
u21	Drying operation. **0** = Disabled; **1** = Emission fan on; **2** = Extraction fan on; **3** = Emission and extraction fans on.	2241	R/W	2 BIT	---	---	0...3
u22	Drying time.	2242	R/W	WORD	---	min	0...999
u23	Duration of sanitisation phase 1.	2243	R/W	WORD	---	min	0...999

Par.	Description	Val. Adr.	R/W	DATA SIZE	CPL	MU	Range
u24	Ventilation in sanitisation phase 1. **0** = Disabled; **1** = Emission; **2** = Extraction; **3** = Emission+Extraction.	2244	R/W	2 BIT	---	---	0...3
u25	Percentage steam production in sanitisation phase 1.	2245	R/W	BYTES	---	%	0...100
u26	Liquid emission in sanitisation phase 1. **0** = No; **1** = Yes.	2246	R/W	1 BIT	---	---	0/1
u27	Duration of sanitisation phase 2.	2247	R/W	WORD	---	min	0...999
u28	Ventilation in sanitisation phase 2. **0** = Disabled; **1** = Emission; **2** = Extraction; **3** = Emission+Extraction.	2248	R/W	2 BIT	---	---	0...3
u29	Percentage steam production in sanitisation phase 2.	2249	R/W	BYTES	---	%	0...100
u30	Liquid emission in sanitisation phase 2. **0** = No; **1** = Yes.	2250	R/W	1 BIT	---	---	0/1
u31	Cabin light operating mode. **0** = Disabled; **1** = Manual; **2** = By time slots.	2251	R/W	2 BIT	---	---	0...2
u32	Delay before turning off the light (time slot operation only)	2252	R/W	WORD	---	min	0...999
TIME SLOT group							
ScH	Time slot enable. **0** = Disabled; **1** = Enabled.	2173	R/W	1 BIT	---	---	0/1
Sw1	Wellness time slots setpoint 1.	2174	R/W	WORD	---	°C/°F	**r1...r2**
Sw2	Wellness time slots setpoint 2.	2175	R/W	WORD	---	°C/°F	**r1...r2**
Sw3	Wellness time slots setpoint 3.	2176	R/W	WORD	---	°C/°F	**r1...r2**
Sw4	Wellness time slots setpoint 4.	2177	R/W	WORD	---	°C/°F	**r1...r2**
MAINTENANCE/ALARMS group							
M5	Low humidity alarm threshold. The hysteresis is fixed at 2%. **0** = Disabled.	2041	R/W	BYTES	---	%	0...100
M6	High humidity alarm threshold. The hysteresis is fixed at 2%. **0** = Disabled.	2042	R/W	BYTES	---	%	0...100
M7	High/low humidity alarm delay. **0** = Disabled.	2043	R/W	WORD	---	s	0...999
M8	Delay in alarm for no production.	2064	R/W	BYTES	---	hours	1...100
M9	Maximum number of automatic attempts to rearm alarm **AL03** "No water" after which the alarm blocks manual rearming.	2067	R/W	BYTES	---	num	1...10
M10	Operating hours threshold for unit maintenance warning. [LOW]	2044	R/W	WORD	---	hx10	100....10000
	Operating hours threshold for unit maintenance warning. [HIGH]	2045	R/W	WORD	---	hx10	100....10000
M11	Operating hours threshold for partial boiler maintenance warning. [LOW]	2046	R/W	WORD	---	hx10	100....2000
	Operating hours threshold for partial boiler maintenance warning. [HIGH]	2047	R/W	WORD	---	hx10	100....2000
M12	Operating hours threshold for full boiler maintenance warning. [LOW]	2048	R/W	WORD	---	hx10	100....2000
	Operating hours threshold for full boiler maintenance warning. [HIGH]	2049	R/W	WORD	---	hx10	100....2000
M13	Operating hours threshold for valve maintenance warning. [LOW]	2050	R/W	WORD	---	hx10	100....2000
	Operating hours threshold for valve maintenance warning. [HIGH]	2051	R/W	WORD	---	hx10	100....2000

Par.	Description	Val. Adr.	R/W	DATA SIZE	CPL	MU	Range
M14	Operating hours threshold for pump maintenance warning. [LOW]	2052	R/W	WORD	---	hx10	100....2000
	Operating hours threshold for pump maintenance warning. [HIGH]	2053	R/W	WORD	---	hx10	100....2000
M15	Operating hours threshold for fan maintenance warning. [LOW]	2054	R/W	WORD	---	hx10	100....2000
	Operating hours threshold for fan maintenance warning. [HIGH]	2055	R/W	WORD	---	hx10	100....2000
M16	Operating hours threshold for auxiliary maintenance warning. **0** = Disabled. [LOW]	2171	R/W	WORD	---	hx10	100....1000
	Operating hours threshold for auxiliary maintenance warning. [HIGH]	2172	R/W	WORD	---	hx10	100....1000
M20	High temperature alarm threshold. Hysteresis = 0.5 °C. **0** = Disabled.	2068	R/W	BYTES	---	°C/°F	0.0...80.0
M21	Maximum number of automatic attempts to rearm the high temperature alarm after which the alarm blocks manual rearming (attempts every hour)	2069	R/W	BYTES	---	num	1...10
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	3 BIT	---	---	0...4
LP1	Modbus parity bit. **0** = None; **1** = Odd; **2** = Even.	2058	R/W	2 BIT	---	---	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	**S0** digital input status.	257	---	R	1 BIT	---	---	0/1
DI2_cv	**CV** digital input status.	258	---	R	1 BIT	---	---	0/1
DI3_of	**ON/OFF** digital input status.	259	---	R	1 BIT	---	---	0/1
DI4_ls	Level sensor input status.	260	---	R	1 BIT	---	---	0/1
DO1_EV1	Inlet solenoid valve output status.	385	---	R	1 BIT	---	---	0/1
DO2_DP1	Inlet pump output status.	386	---	R	1 BIT	---	---	0/1
DO3_G1	Steam generation output status.	387	---	R	1 BIT	---	---	0/1
DO6_AL	Alarm output status.	390	---	R	1 BIT	---	---	0/1
read100[10]	Expansion digital output status.	391	---	R	1 BIT	---	---	0/1
read100[11]	Expansion digital output status.	392	---	R	1 BIT	---	---	0/1
read100[12]	Expansion digital output status.	393	---	R	1 BIT	---	---	0/1
read100[13]	Expansion digital output status.	394	---	R	1 BIT	---	---	0/1
read100[14]	Expansion digital output status.	395	---	R	1 BIT	---	---	0/1
read100[15]	Expansion digital output status.	396	---	R	1 BIT	---	---	0/1
AI_Tboiler	Boiler temperature sensor value.	516	---	R	SHORT	Y	°C/°F	-3276.8... 3276.7
AI_Humidity	Humidity sensor **S2** value.	517	---	R	SHORT	Y	%rH	-32768... 32767
AI_Humidity_L	Humidity limit sensor **S3** value.	518	---	R	SHORT	Y	%rH	-32768... 32767
AI_Request	Proportional input **S2** value.	519	---	R	SHORT	Y	%	-32768... 32767
AI_Current	Current sensor **CT1** value.	520	---	R	SHORT	Y	A	-327.68... 327.67
AI_temperature1	Temperature sensor **S1** value.	522	---	R	SHORT	Y	°C/°F	-3276.8... 3276.7
AI_temperature2	Temperature sensor **S1** value.	523	---	R	SHORT	Y	°C/°F	-3276.8... 3276.7
PackedAlarm1	Status of warning **W01**.	769	0	R	1 BIT	---	---	0/1
PackedAlarm1	Status of alarm **AL01**.	769	1	R	1 BIT	---	---	0/1
PackedAlarm1	Status of warning **W02**.	769	2	R	1 BIT	---	---	0/1
PackedAlarm1	Status of alarm **AL02**.	769	3	R	1 BIT	---	---	0/1
PackedAlarm1	Status of alarm **AL03**.	769	4	R	1 BIT	---	---	0/1
PackedAlarm1	Status of warning **W04**.	769	5	R	1 BIT	---	---	0/1
PackedAlarm1	Status of warning **W05**.	769	6	R	1 BIT	---	---	0/1
PackedAlarm1	Status of warning **W06**.	769	7	R	1 BIT	---	---	0/1
PackedAlarm1	Status of alarm **AL07**.	769	8	R	1 BIT	---	---	0/1
PackedAlarm1	Status of warning **W08**.	769	9	R	1 BIT	---	---	0/1
PackedAlarm1	Status of alarm **AL08**.	769	10	R	1 BIT	---	---	0/1
PackedAlarm1	Status of alarm **AL09**.	769	11	R	1 BIT	---	---	0/1
PackedAlarm1	Status of alarm **AL10**.	769	12	R	1 BIT	---	---	0/1
PackedAlarm1	Status of alarm **AL11**.	769	13	R	1 BIT	---	---	0/1
PackedAlarm1	Status of warning **W12**.	769	14	R	1 BIT	---	---	0/1
PackedAlarm1	Status of warning **W13**.	769	15	R	1 BIT	---	---	0/1
PackedAlarm2	Status of alarm **AL14**.	770	0	R	1 BIT	---	---	0/1
PackedAlarm2	Status of alarm **AL15**.	770	1	R	1 BIT	---	---	0/1
PackedAlarm2	Status of alarm **AL16**.	770	2	R	1 BIT	---	---	0/1
PackedAlarm2	Status of alarm **AL17**.	770	3	R	1 BIT	---	---	0/1
PackedAlarm2	Status of alarm **AL18**.	770	4	R	1 BIT	---	---	0/1
PackedAlarm2	Status of alarm **AL19**.	770	5	R	1 BIT	---	---	0/1
PackedAlarm2	Status of alarm **AL20**.	770	6	R	1 BIT	---	---	0/1
PackedAlarm2	Status of alarm **AL22**.	770	8	R	1 BIT	---	---	0/1

Code	Description	Val. Adr.	Filter value	R/W	DATA SIZE	CPL	MU	Range
PackedAlarm2	Status of alarm **AL24**.	770	10	R	1 BIT	---	---	0/1
PackedAlarm2	Status of alarm **AL25**.	770	11	R	1 BIT	---	---	0/1
PackedAlarm2	Status of alarm **AL26**.	770	12	R	1 BIT	---	---	0/1
PackedAlarm2	Status of alarm **AL27**.	770	13	R	1 BIT	---	---	0/1
PackedAlarm2	Status of alarm **AL28**.	770	14	R	1 BIT	---	---	0/1
BMS_AL1	**AL01** manual reset.	773	---	R/W	1 BIT	---	---	0/1
BMS_AL3	**AL03** manual reset.	774	---	R/W	1 BIT	---	---	0/1
BMS_W04	**W04** manual reset.	775	---	R/W	1 BIT	---	---	0/1
BMS_AL22	**AL22** manual reset.	776	---	R/W	1 BIT	---	---	0/1
BMS_AL18	**AL18** manual reset.	780	---	R/W	1 BIT	---	---	0/1
BMS_AL21	**AL21** manual reset.	781	---	R/W	1 BIT	---	---	0/1
manWash	Manual draining command (OFF/ON).	1282	---	R/W	1 BIT	---	---	0/1
GeneralAlarm	General alarm status (OFF/ON).	1283	---	R/W	1 BIT	---	---	0/1
unitOn	Unit status (OFF/ON).	1284	---	R/W	1 BIT	---	---	0/1
---	Restore default parameters command	1285	---	R/W	1 BIT	---	---	0/1
HoursService	Hours of humidifier operation (LOW).(*)	1286	---	R/W	DWORD	---	h x 10	0.0 … 429496729.5
HoursService	Hours of humidifier operation (HIGH).(*)	1287	---	R/W	DWORD	---	h x 10	0.0 … 429496729.5
HoursBoilerP	Partial hours of boiler operation. (LOW).(*)	1288	---	R/W	DWORD	---	h x 10	0.0 … 429496729.5
HoursBoilerP	Partial hours of boiler operation. (HIGH).(*)	1289	---	R/W	DWORD	---	h x 10	0.0 … 429496729.5
HoursBoilerT	Total hours of boiler operation (hours x 10) (LOW).(*)	1290	---	R/W	DWORD	---	h x 10	0.0 … 429496729.5
HoursBoilerT	Total hours of boiler operation (hours x 10). (HIGH).(*)	1291	---	R/W	DWORD	---	h x 10	0.0 … 429496729.5
HoursEV1	Hours of water inlet solenoid valve operation (hours x 10) (LOW).(*)	1292	---	R/W	DWORD	---	h x 10	0.0 … 429496729.5
HoursEV1	Hours of water inlet solenoid valve operation (hours x 10) (HIGH).(*)	1293	---	R/W	DWORD	---	h x 10	0.0 … 429496729.5
HoursPump	Hours of outlet pump operation (hours x 10) (LOW).(*)	1294	---	R/W	DWORD	---	h x 10	0.0 … 429496729.5
HoursPump	Hours of outlet pump operation (hours x 10). (HIGH).(*)	1295	---	R/W	DWORD	---	h x 10	0.0 … 429496729.5
HoursFan	Hours of fan operation (hours x 10) (LOW).(*)	1296	---	R/W	DWORD	---	h x 10	0.0 … 429496729.5
HoursFan	Hours of fan operation (hours x 10). (HIGH).(*)	1297	---	R/W	DWORD	---	h x 10	0.0 … 429496729.5
curr100	Nominal current.	1298	---	R/W	WORD	---	A	0.00…655.35
tevap	Evaporation time.	1299	---	R/W	WORD	---	s	0.0 … 6553.5
actProd	Actual steam production.	1303	---	R/W	SHORT	Y	kg/h	-3276.8 … 3276.7
limH	Humidity limit sensor status (ON/OFF).	1304	---	R/W	1 BIT	---	---	0/1
HoursAct	Hours of continuous activity. (LOW).(*)	1316	---	R/W	DWORD	---	h x 10	0.0 … 429496729.5
HoursAct	Hours of continuous activity. (HIGH).(*)	1317	---	R/W	DWORD	---	h x 10	0.0 … 429496729.5
HoursNotAct	Hours of continuous inactivity. (LOW).(*)	1318	---	R/W	DWORD	---	h x 10	0.0 … 429496729.5
HoursNotAct	Hours of continuous inactivity. (HIGH).(*)	1319	---	R/W	DWORD	---	h x 10	0.0 … 429496729.5
wellNess	Wellness temperature request status (OFF/ON).	1336	---	R/W	1 BIT	---	---	0/1
manualMode	Enables Wellness manual mode.	1346	---	R/W	1 BIT	---	---	0/1
timerManual	Wellness manual mode with timer.	1347	---	R/W	1 BIT	---	---	0/1

Code	Description	Val. Adr.	Filter value	R/W	DATA SIZE	CPL	MU	Range
fanS_ manMode	Emission fan in manual mode.	1348	---	R/W	1 BIT	---	---	0/1
fanE_ manMode	Extraction fan in manual mode.	1349	---	R/W	1 BIT	---	---	0/1
light	Turns on the light in manual mode.	1350	---	R/W	1 BIT	---	---	0/1
essneceSwitch	Switches the essences in manual mode.	1351	---	R/W	1 BIT	---	---	0/1
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. MASTER/SLAVE OPERATION

Chapter content

This chapter contains the following information:

13.1 Introduction

Zephyr humidifiers can be connected in a Master/Slave modbus network, in order to increase the system's maximum production.

The maximum number of humidifiers that can be connected in Master/Slave operation is 5 (1 Master + 4 Slaves).
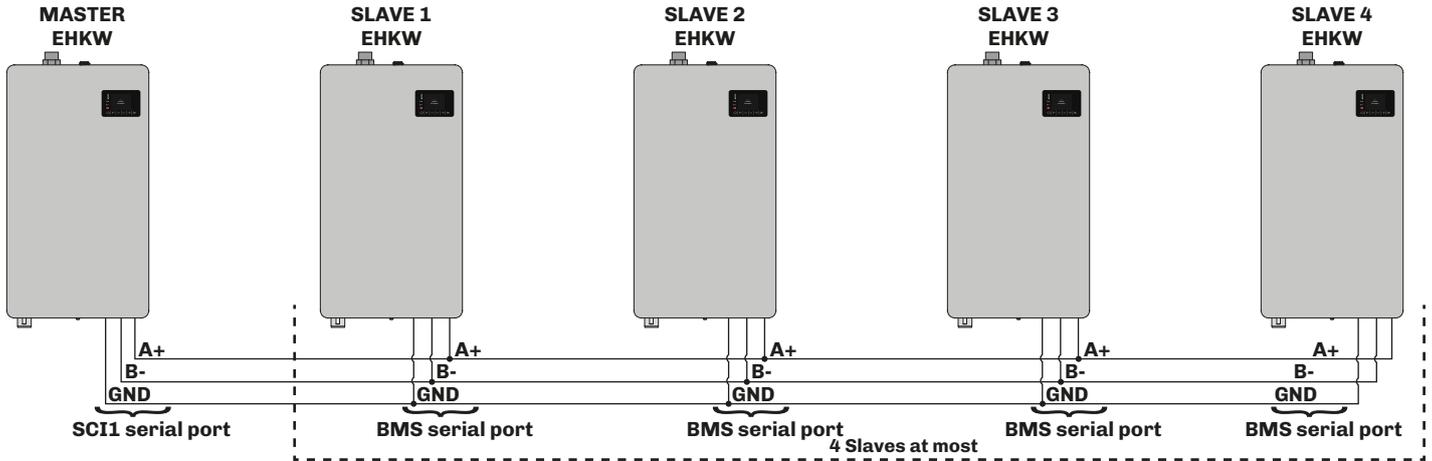

Fig. 61. External overview of the product

To enable and configure Master/Slave operation, the following parameters must be set:

Par.	Description	MU	Range
nTyp	Master/Slave operation. **0** = Disabled; **1** = Parallel; **2** = Rotation; **3** = Balancing.	---	0...3
nAdr	Networked master/slave module (only if enabled Master/Slave Operation **nTyp** ≠ 0). **1** = Master; **2** = Slave 1; **3** = Slave 2; **4** = Slave 3; **5** = Slave 4.	---	1...5
nPrE	Master/Slave machine pre-heating enabled. **0** = Disabled; **1** = Enabled.	---	0/1
ntot	Total number of Master/Slave machines.	num	2...5
nbAc	Number of Master/Slave backup machines (only for **nTyP** = 2 and/or **nTyP** = 3).	num	1...3
nHrs	Hours of Master/Slave machine rotation.	hours	10...500

13.2 Operation in Parallel | nTyp = 1

By setting **nTyp** = 1, the **Zephyr** humidifier network operates at the same power at the same time. The production request is handled by the humidifier set as Master (parameter **nAdr**) and is transmitted to all the slaves.

Example
Number of humidifiers in the network: **4**
Production request: **60%**

Actual result: All 4 humidifiers produce at 60%.

13.3 Operation in Rotation | nTyp = 2

By setting **nTyp** = 2, the humidifier set as Master (parameter **nAdr**) manages the enabling of all the **Zephyr** humidifiers in the network, each working according to its own configurations and adjustments.

Example
Number of humidifiers in the network: **5** (including 2 backups)

Actual result: The master humidifier enables only three humidifiers to operate at any one time, giving priority to machines with fewer operating hours and alternating with the backup humidifiers according to the time **nHrs**.
In the case of:
- Key off,
- Alarms inhibiting its operation;
- Maintenance of running machines l

the Master humidifier activates the backup machines to meet the demand for steam production.

13.4 Operation in Balancing | nTyp = 3

By setting **nTyp** = 3, the operation of the **Zephyr** humidifier network is the same as operation in Rotation (**nTyp** = 2) with the only difference being that the operating hours compared for humidifier rotation are normalized to the delivered production.

Example
Hours of humidifier operation: 2 hours at 50%

Actual result: Normalized hours of operation: 1 hour.

13.5 Protection management

In the event that there is an alarm that one humidifier stops its normal operation (due to a blocking alarm, maintenance or other reasons) and at the same time there is another humidifier in the network set as a backup, the latter will take over to meet the required production.

14. 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.

14.1 Table of alarms

Code	Description	Cause	Effects	Solution
W01	Warning: +30% overcurrent	• Overcurrent between the electrodes • Electrodes not working or shorted	• Fixed alarm icon • **W01** displayed • Partial draining • **W01** recorded in the log	• Carry out maintenance • Replace the boiler • Check that the outlet pump is working • Check that the TA is working (if external) • Check the water properties
AL01	Alarm: +50% overcurrent	• Current sensor not working • Control board not working • Boiler compromised • High electrical conductivity • Use softened water	• Fixed alarm icon • **AL01** displayed • Humidifier OFF • **AL01** recorded in the log	
W02	Warning: no production	• Foam in the boiler • Water inlet flow rate too low • Boiler failing • Water pipes or filter clogged • Backpressure at the steam outlet is greater than rated value • Very low electrical conductivity • No production for a long time	• Fixed alarm icon • **W02** displayed • No effect on regulation • **W02** 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 for foam • Check the backpressure in the outlet duct
AL02	Alarm: no production		• Fixed alarm icon • Showing **AL02** • Alarm relay ON • Humidifier OFF if **AL02** > 100 h • Recorded **AL02** in the log	
AL03	Alarm: no water	• Water fill time > **c10** • Inlet filter clogged • Solenoid valve not working • Water pressure too low • Water inlet circuit leaking	• Fixed alarm icon • **AL03** displayed • Humidifier inhibited for 15 minutes • **AL03** 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 • Cleaning the boiler • Replace the boiler (if there is significant limescale residue)
W04	Warning: insufficient draining	• Insufficient water drained • Water inlet/outlet clogged	• Fixed alarm icon • **W04** displayed • Alarm relay ON • **W04** recorded in the log	• Cleaning the boiler • Replace the boiler (if there is significant limescale residue) • Clean the pump, outlet manifold and outlet circuit • Replace the outlet pump if it is not working
W05	Warning: foam	The water in the boiler reaches the maximum level sensor	• Fixed alarm icon • **W05** displayed • Anti-foam washing activated • **W05** recorded in the log	• Automatic reset • If it persists over time, disconnect the humidifier water connections and let the water drain, then wash and clean the boiler • Check if the filling water is softened
W06	Warning: suspected high electrical conductivity	• High current • Low filling frequency	• Fixed alarm icon • **W06** displayed • Automatic washing activated • **W06** recorded in the log	• Carry out maintenance • Check the inlet water properties
AL07	Alarm: machine service life	Hours of unit operation > **M10**	• Fixed alarm icon • **AL07** displayed • Alarm relay ON • **AL07** recorded in the log	Carry out full maintenance
W08	Warning: boiler maintenance	Hours of boiler operation > **M11**	• Fixed alarm icon • **W08** displayed • Alarm relay ON • **W08** recorded in the log	Clean the boiler
AL08	Alarm: boiler service life	Hours of boiler operation > **M12**	• Fixed alarm icon • **AL08** displayed • Alarm relay ON • Humidifier OFF • **AL08** recorded in the log	Replace the boiler

Code	Description	Cause	Effects	Solution
AL09	Alarm: solenoid valve maintenance	Hours of solenoid valve operation > **M13**	• Fixed alarm icon • **AL09** displayed • No effect on regulation • **AL09** recorded in the log	• Clean the water inlet filter • Check for leaks • Replace the inlet solenoid valve if necessary • Reset the counter
AL10	Alarm: pump maintenance	Hours of pump operation > **M14**	• Fixed alarm icon • **AL10** displayed • No effect on regulation • **AL10** recorded in the log	• Clean the pump and the inlet and outlet manifold • Clean the inlet/outlet circuit • Check for leaks • Replace the outlet pump if necessary • Reset the counter
AL11	Alarm: fan maintenance	Hours of fan operation > **M15**	• Fixed alarm icon • **AL11** displayed • No effect on regulation • **AL11** recorded in the log	• Clean the fans and grilles • Remove residues and dust incrustations • Replace any fans that are not working • Reset the counter
W12	Warning: low humidity	Humidity production < **M5** for a time > **M7**	• Fixed alarm icon • **W12** displayed • Alarm relay ON • **W12** 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%
W13	Warning: high humidity	Humidity production > **M6** for a time > **M7**	• Fixed alarm icon • **W13** displayed • Alarm relay ON • **W13** recorded in the log	• If it occurs together with other alarms, check accordingly • If the humidifier is overdimensioned, contact the system designer • Check **R6** and set it < 70%
AL14	Alarm: temperature sensor **S1**	• Probe not working • Probe not connected properly • Incorrect probe type	• Fixed alarm icon • **AL14** displayed • Humidifier OFF • **AL14** recorded in the log	• Check the sensor type • Check the sensor wiring • Change the sensor type • Check for electrical noise
AL15	Alarm: humidity sensor **S2**	• Sensor not working • Sensor not connected correctly • Control board not working	• Fixed alarm icon • **AL15** displayed • Alarm relay ON • Humidifier OFF • **AL15** recorded in the log	• Check the sensor type (**P2**) • Check the sensor wiring • Change the sensor type • Check for electrical noise
AL16	Alarm: humidity limit sensor **S3**		• Fixed alarm icon • **AL16** displayed • Alarm relay ON • Humidifier OFF • **AL16** recorded in the log	• Check the sensor type (**P7**) • Check the sensor wiring • Change the sensor type • Check for electrical noise
AL17	Alarm: proportional request from regulator		• Fixed alarm icon • **AL17** displayed • Alarm relay ON • Humidifier OFF • **AL17** recorded in the log	• Check the regulator wiring • Check the regulator type
AL18	Alarm: current sensor **CT**		• Fixed alarm icon • **AL18** displayed • Alarm relay ON • Humidifier OFF • **AL18** recorded in the log	• Check for water leaks • Check the electrical phase wiring on the boiler and contactor • Check that the TA is working • If the control board or current sensor are not working, replace the control board
AL19	Alarm: temperature sensor 1	• Probe not working • Probe not connected properly • Incorrect probe type	• Fixed alarm icon • **AL19** displayed • Alarm relay ON • Humidifier OFF • **AL19** recorded in the log	• Check the sensor type • Check the sensor wiring • Change the sensor type • Check for electrical noise
AL20	Alarm: temperature sensor 2		• Fixed alarm icon • **AL20** displayed • Alarm relay ON • Humidifier OFF • **AL20** recorded in the log	

Code	Description	Cause	Effects	Solution
AL22	Alarm: high temperature in wellness room	Wellness room temperature > **M20**	• Fixed alarm icon • **AL22** displayed • Alarm relay ON • Humidifier OFF • **AL22** recorded in the log	• Wait until room temperature < **M20** - 3 °C • Check and eliminate the cause of wellness room temperature > **M20**
AL23	Alarm: wellness expansion board offline	No communication between control board and expansion device	• Fixed alarm icon • **AL23** displayed • Alarm relay ON • Humidifier OFF • **AL23** recorded in the log	• Restore communication between the control board and wellness expansion board • Automatic reset
AL24	Alarm master offline (only on slave)	No communication between slave humidifier and master humidifier when **nTyP** ≠ 0	• Fixed alarm icon • **AL24** displayed • Alarm relay ON • All regulators related to the Master humidifier are switched off (slaves operate as stand-alone) • **AL24** recorded in the log	• Restore communication between slave humidifier and master humidifier • Automatic reset
AL25	Alarm: slave 1 offline or alarmed (only on master)	• No communication between master humidifier and slave 1 humidifier when **nTyP** ≠ 0 • Slave 1 alarmed with regulation block	• Fixed alarm icon • **AL25** displayed • Alarm relay ON • Slave 1 OFF, other humidifiers operate normally • **AL25** recorded in the log	• Restore communication between master humidifier and slave 1 humidifier • Automatic reset
AL26	Alarm: slave 2 offline or alarmed (only on master)	• No communication between master humidifier and slave 2 humidifier when **nTyP** ≠ 0 • Slave 2 alarmed with regulation block	• Fixed alarm icon • **AL26** displayed • Alarm relay ON • Slave 2 OFF, other humidifiers operate normally • **AL26** recorded in the log	• Restore communication between master humidifier and slave 2 humidifier • Automatic reset
AL27	Alarm: slave 3 offline or alarmed (only on master)	• No communication between master humidifier and slave 3 humidifier when **nTyP** ≠ 0 • Slave 3 alarmed with regulation block	• Fixed alarm icon • **AL27** displayed • Alarm relay ON • Slave 3 OFF, other humidifiers operate normally • **AL27** recorded in the log	• Restore communication between master humidifier and slave 3 humidifier • Automatic reset
AL28	Alarm: slave 4 offline or alarmed (only on master)	• No communication between master humidifier and slave 4 humidifier when **nTyP** ≠ 0 • Slave 3 alarmed with regulation block	• Fixed alarm icon • **AL28** displayed • Alarm relay ON • Slave 4 OFF, other humidifiers operate normally • **AL28** recorded in the log	• Restore communication between master humidifier and slave 4 humidifier • Automatic reset

15. MAINTENANCE

Chapter content

This chapter contains the following information:

15.1 Product overview

15.1.1 External view of the product

Fig. 62. *External overview of the product*

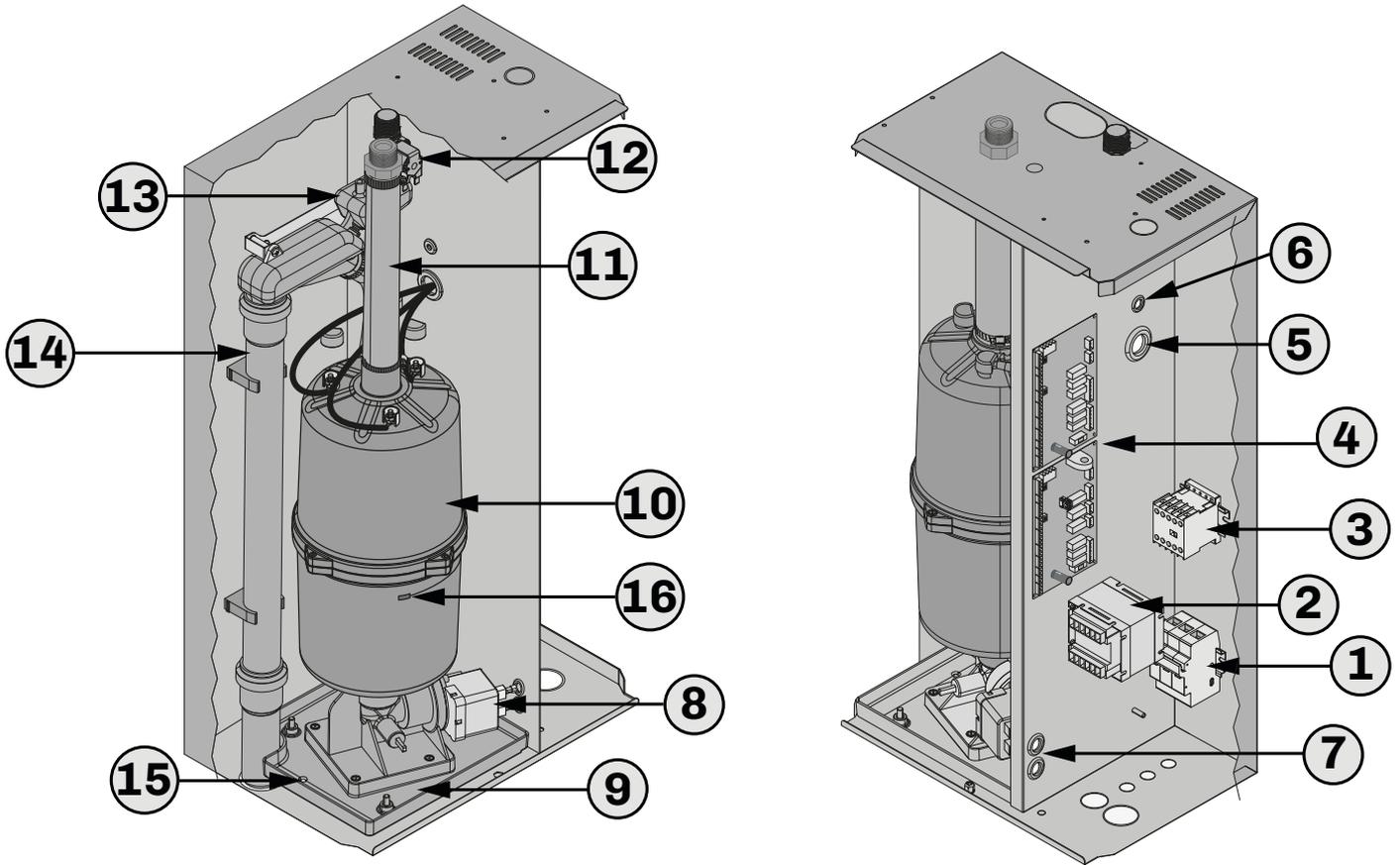| Reference	Description
①	Front wall
②	User interface
③	Water inlet (supply) fitting
④	Condensate drain inlet
⑤	Steam outlet connection
⑥	Emergency water outlet from the internal tray
⑦	Water outlet
⑧	Screw for removing the front wall
⑨	Cable gland for the power supply and signal wiring

15.1.2 Internal view of the product

Fig. 63. *Internal overview of the product*

Reference	Description	Reference	Description
1	Fuse holder base	9	Bottom tray to collect water leaks
2	Isolation transformer	10	Boiler
3	Contactor	11	Steam outlet pipe
4	Control and expansion board	12	Inlet solenoid valve
5	Cable gland for electrode wiring	13	Filling and overflow tank
6	Cable gland for inlet solenoid valve and maximum level sensor wiring	14	Water drain circuit
7	Cable gland for electric pump wiring	15	Water outlet hole in the bottom tray
8	Electric outlet pump	16	NTC sensor (preheating/anti-freeze management)

15.2 Checking the status of the humidifier

Perform the following scheduled checks on the humidifier:

When...	What to do...
At first start-up	Make sure there are no leaks after an hour of continuous operation.
When replacing components	Make sure there are no leaks after an hour of continuous operation.
Every 7 days	• Make sure the humidifier works properly (based on the instructions provided in this manual); • Make sure there are no leaks in the plumbing system; • Make sure there is no unusual operation.
Every 30 days	• Make sure there are no blockages in the water drain; • Make sure the water drains effectively; • Remove any limescale residue from inside the drain.
Every 60 days	• Make sure that the limescale build up in the boiler is not excessive; • Wash the inside of the boiler with a 20% concentration of citric acid, removing limescale from the electrodes and boiler. • If necessary, replace the electrodes and gaskets.
Every 3 years (*)	Replace the boiler.
Every 7 years (**)	Replace the boiler.

(*) **NOTE**: If humidifier used continuously.

(**) **NOTE**: If humidifier used seasonally.

15.3 Boiler maintenance

The boiler provided (equipped) requires frequent maintenance and seasonal cleaning in the following conditions:

Electrical conductivity of the water	Water hardness
75...600 µS/cm	5...30 °f

It is not possible to provide specific instructions to determine the maintenance frequency, as it depends heavily on the morphology of the water used, which can vary even with the same hardness and electrical conductivity.

When using **Zephyr series** humidifiers with more critical water conditions (harder with high electrical conductivity), for example:

Electrical conductivity of the water	Water hardness
700...1250 µS/cm	35...50 °f

that lead to an increase in maintenance frequency (even weekly in extreme cases), a special range of boilers designed and developed to operate with hard water can be used (see *"1.5 ACCESSORIES" ON PAGE 14*).

Using the special boiler reduces the maintenance and cleaning frequency, but cannot be quantified solely from the electrical conductivity and hardness of the water.

NOTICE
MALFUNCTIONING OF THE EQUIPMENT
Only use the humidifier with the water specifications indicated in this manual.

If frequent boiler maintenance is required, check the quality of the water supply.

Moreover, replace the boiler promptly when:

- The drain water is very dark (reddish/black) and demonstrates the start of electrode corrosion caused by the highly aggressive nature of concentrated water and the associated electrical phenomena;

- The humidifier frequently drains the water completely to dilute it and perform a complete wash; **Zephyr Wellnes series** humidifiers normally renew the water in the boiler in a balanced way to optimise efficiency while reducing the risk of malfunction in relation to the amount of steam produced.
  NOTE: A high concentration of salts in the water in the boiler results in high electrical conductivity, which can cause various high current alarms and lead to frequent draining cycles.

- The boiler has reached 5 seasons or 24 months of continuous operation with maintenance carried out in accordance with best practices or in any case at most 20000 hours;

- There are large amounts of limescale that lead to colour and surface variations on the outer walls of the boiler due to overheating caused by limescale bridging between the electrical phases;
  NOTE: Limescale inside the boiler is normal, even in large amounts, as the boiler collects the limescale present in the water; therefore performing maintenance/cleaning on it is essential for correct operation.

NOTICE
MALFUNCTIONING OF THE EQUIPMENT
Only carry out boiler maintenance in accordance with the instructions provided in the Maintenance chapter of this manual.

- There are leaks due to breakages, cracks and fissures.
  NOTE: The water in the boiler is subjected to an electrical voltage and therefore leaks from the boiler are dangerous.

⚡ ⚠ DANGER
RISK OF ELECTRIC SHOCK OR ELECTRIC ARC
• Any procedure on the humidifier, including maintenance of any type, must only be carried out while the power supply is disconnected.
• In the event of water leakage, disconnect the humidifier power supply immediately.

- If any adverse event not described in this documentation arises, carry out maintenance and/or replace the boiler. Plus, 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.

- After a period of activity and/or due to the water properties, limescale formation inside the boiler may bring the electrodes closer together and/or closer to the boiler walls. This could potentially form a conducting path that may lead to a temperature increase when there is no water (causing the boiler surfaces to become black) and melt the boiler wall, allowing live water to leak out (replace the hydraulic unit);

⚡ ⚠ DANGER
RISK OF ELECTRIC SHOCK OR ELECTRIC ARC
In the event of water leakage, disconnect the humidifier power supply immediately.

15.4 Cleaning the boiler

- Drain the humidifier manually (see: *"7.2.4 MANUAL DRAINING" ON PAGE 54*);
- Disconnect the machine power supply using the external isolator;
- Open the humidifier walls as described in chapter *"4. DIMENSIONS AND MECHANICAL INSTALLATION" ON PAGE 21*;
- Disconnect the electrode power cables and the signal cable of the high level sensor, which are connected at the top of the boiler (take care not to damage the amperometric transformer (TA) on the electronic board);
- Disconnect the steam delivery pipe from the top of the boiler;
- Release the boiler from the fastener holding it to the metal structure;
- Remove the boiler from the water supply and outlet manifolds;
- Undo the 4 screws in the coupling area between the top and bottom of the boiler;
- Clean any limescale residues from the boiler and its electrodes with a plastic scraper;
- Leave the boiler to soak in a citric acid solution for a few hours and then repeat the previous step;
- Wash the whole boiler in running water to flush away any material removed by hand;
- Carefully refit the central seal in position and close the boiler with the screws in the coupling area;
- Reassemble the boiler by following the removal procedure in reverse.
- Check that the electrodes are securely fastened to the boiler and make good electrical connections by securing the cable lugs in such a way that the wiring harness cannot become loose during normal humidifier operation.

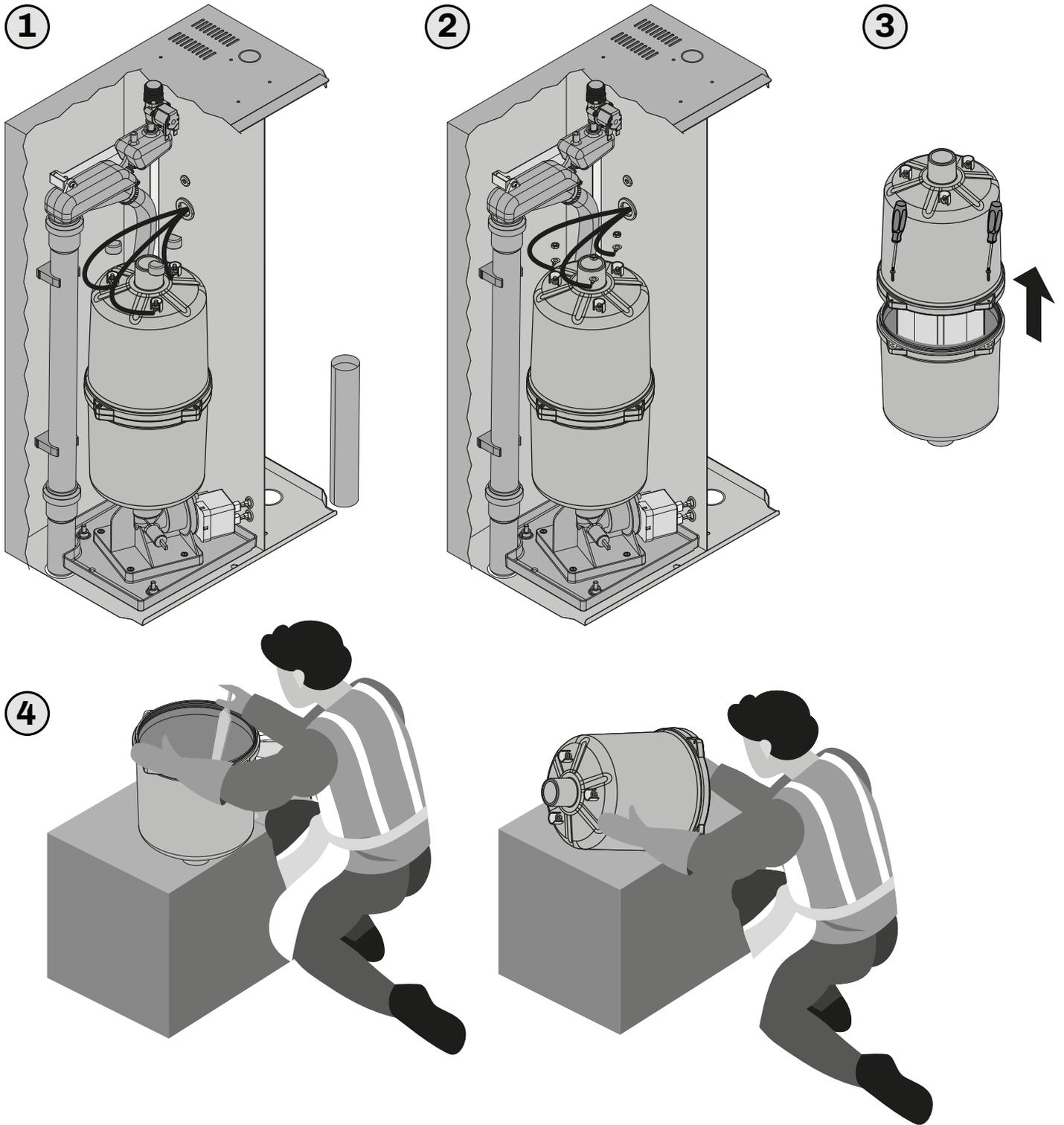| ⚡ ⚠ DANGER |
|---|
| **LOOSE WIRING CAUSES ELECTRIC SHOCKS AND OVERHEATING** |
| Tighten the connections in compliance with the technical specifications relating to tightening torques. |

Fig. 64. *Cleaning the boiler*

15.5 Replacing the boiler

- Drain the humidifier manually (see: *"7.2.4 MANUAL DRAINING" ON PAGE 54*);
- Disconnect the machine power supply using the external isolator;
- Open the humidifier walls as described in chapter *"4. DIMENSIONS AND MECHANICAL INSTALLATION" ON PAGE 21*;
- Disconnect the electrode power cables and the signal cable of the high level sensor, which are connected at the top of the boiler (take care not to damage the amperometric transformer (TA) on the electronic board);
- Disconnect the steam delivery pipe from the top of the boiler;
- Release the boiler from the fastener holding it to the metal structure;
- Remove the boiler from the water supply and outlet manifolds;
- Insert the new boiler as described in *"15.6 FITTING THE BOILER" ON PAGE 107*;
- Depending on the **Zephyr** humidifier you have, make sure that the cable connections are tightened properly (see *"6. ELECTRICAL CONNECTIONS" ON PAGE 37*);
- Check that the electrodes are securely fastened to the boiler and make good electrical connections by securing the cable lugs in such a way that the wiring harness cannot become loose during normal humidifier operation.

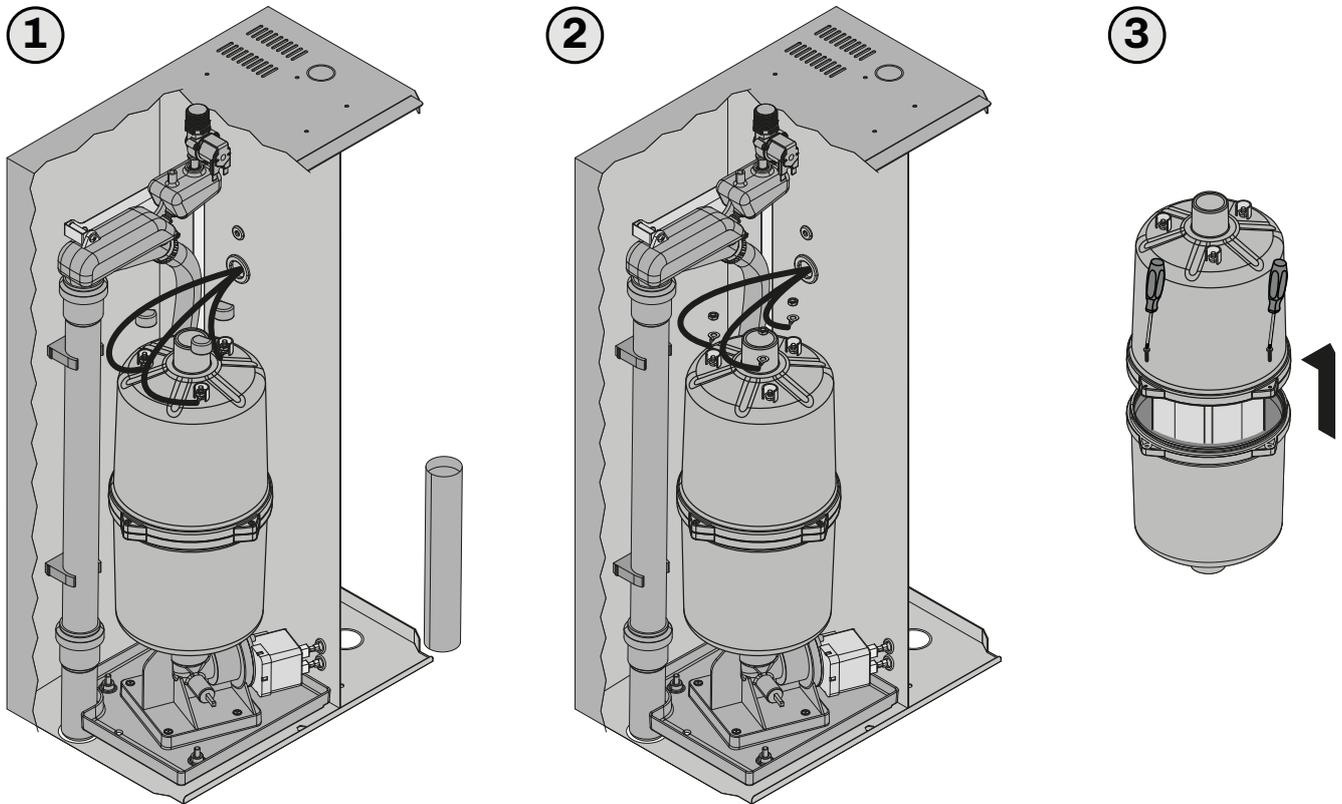| ⚡ ⚠ DANGER |
|---|
| **LOOSE WIRING CAUSES ELECTRIC SHOCKS AND OVERHEATING** |
| Tighten the connections in compliance with the technical specifications relating to tightening torques. |

Fig. 65. Replacing the boiler

15.6 Fitting the boiler

- Insert the boiler into the dedicated mounts;
- Connect the inlet solenoid valve and tighten the two screws on the top face of the humidifier;
- Insert the inspection plug and tighten its clamp;
- Insert the humidifier wall as described in chapter *"4. DIMENSIONS AND MECHANICAL INSTALLATION" ON PAGE 21*
- Check that the electrodes are securely fastened to the boiler and make good electrical connections by securing the cable lugs in such a way that the wiring harness cannot become loose during normal humidifier operation.

⚡ ⚠ DANGER
LOOSE WIRING CAUSES ELECTRIC SHOCKS AND OVERHEATING
Tighten the connections in compliance with the technical specifications relating to tightening torques.

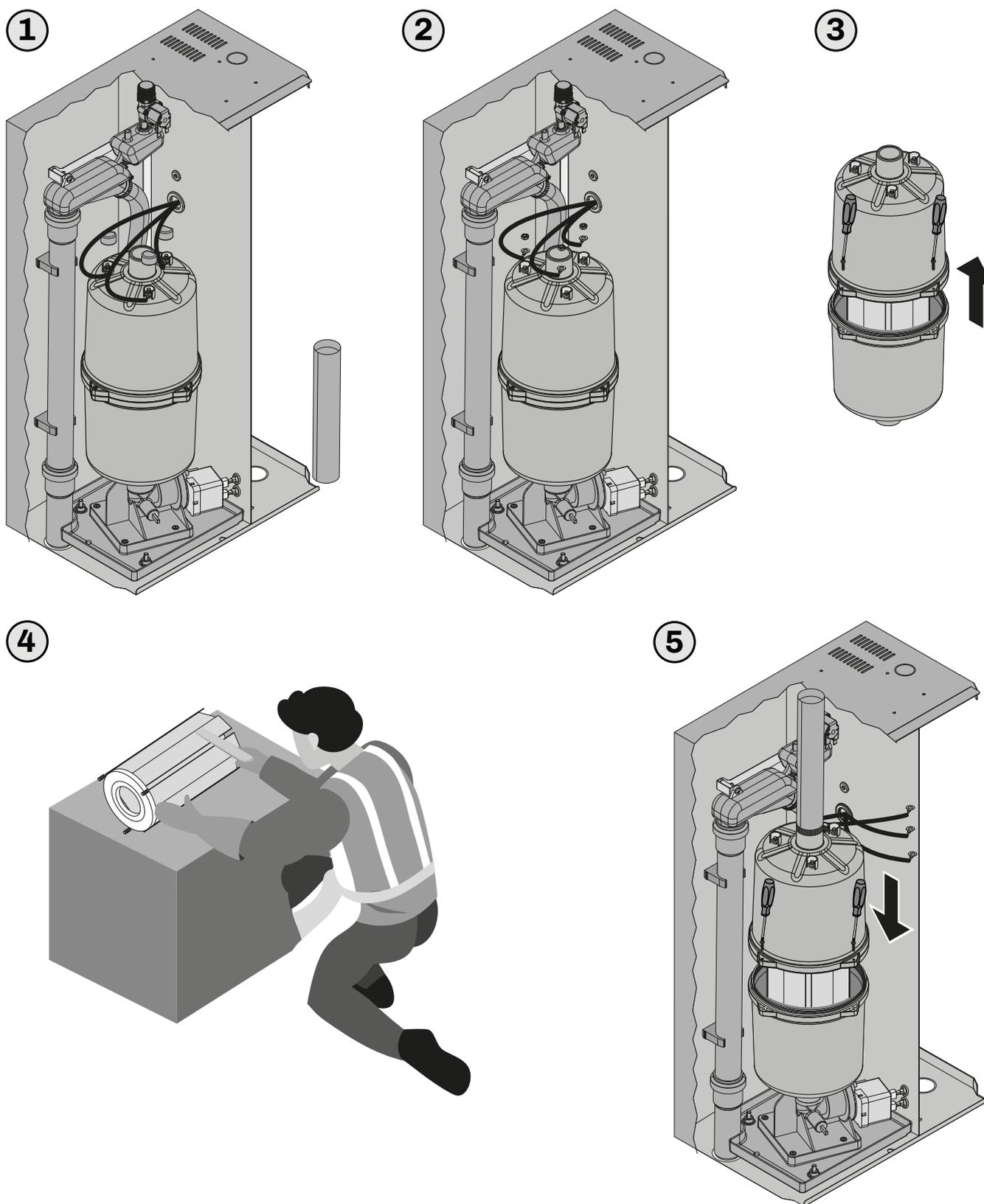## 15.7 Cleaning/replacing the electrodes

Fig. 66. *Cleaning/replacing the electrodes*

15.8 Cleaning the optional stainless steel drain tray (EHVI accessory)

- Remove the tank connection from the drain;
- Remove the drain tank from the bottom of the humidifier;
- Clean the tank by removing limescale deposits and rinsing it under running water;
- Re-fit the tank correctly and reconnect the drain.

16. SPARE PARTS

Chapter content

This chapter contains the following information:

16.1 Plumbing spare parts

16.1.1 Table of plumbing spare part codes
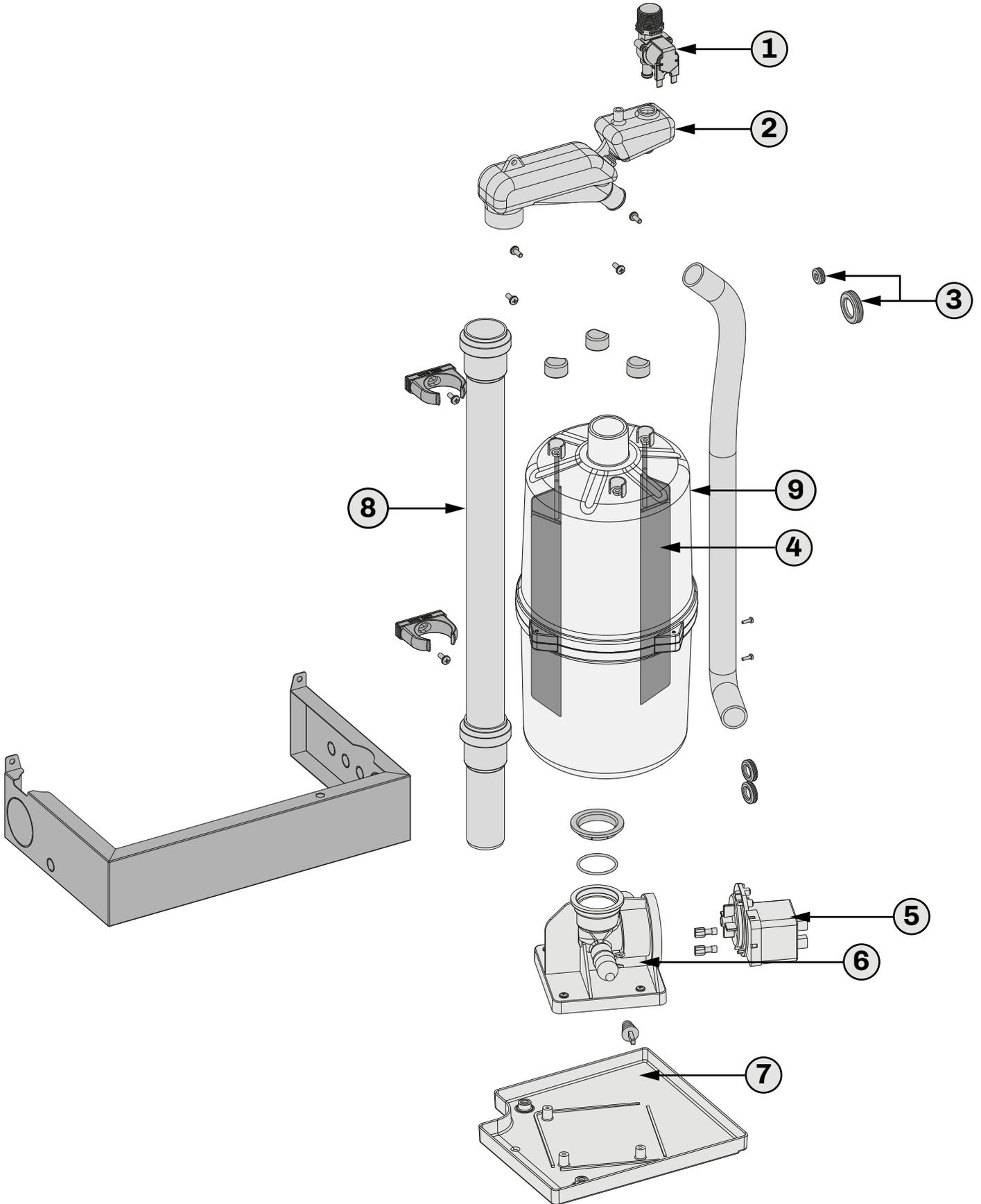
Fig. 67. EHKW series spare parts - Plumbing Part

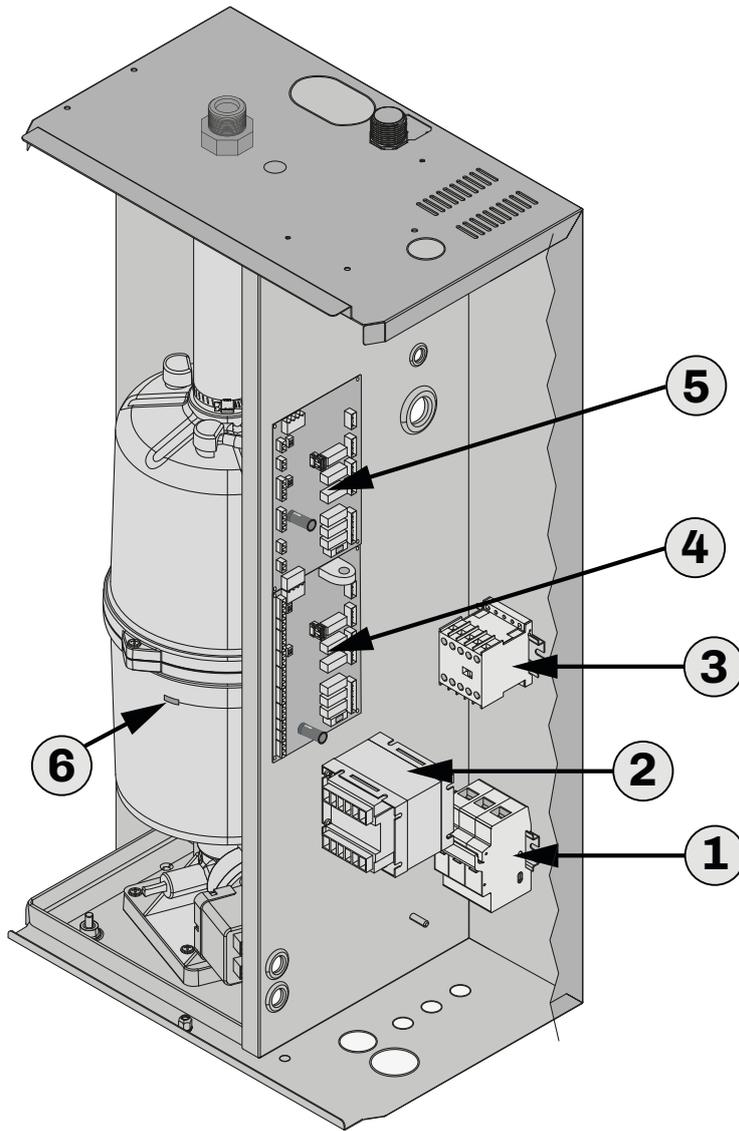| Ref.	P/n	Description	Ref.	P/n	Description
①	EHKT0K01	Inlet solenoid valve EHKW10...EHKW15	⑤	EHKT0K04	Electric outlet pump
	EHKT0K02	Inlet solenoid valve EHKW20...EHKW40	⑥	EHKT0K05	Inlet/outlet manifold
	EHKT0K03	Inlet solenoid valve EHKW05	⑦	EHKT0K08	Bottom tray
②	EHKT0K07	Filling reservoir	⑧	EHKT0K06	Outlet circuit kit
③	EHKT0K09	XS-S-M boiler seal kit	⑨	EHBK005M00M	Standard cleanable boiler, 5 kg/h single-phase models
	EHKT0K10	L boiler seal kit		EHBK005MLCM	Cleanable boiler, 5 kg/h single-phase models, low conductivity
④	EHKT0K21	Set of two electrodes, boiler **EHBK005M00S**		EHBK005MHCM	Cleanable boiler, 5 kg/h single-phase models, high conductivity
	EHKT0K22	Set of two electrodes, boiler **EHBK005MHCS**		EHBK005T00M	Standard cleanable boiler, 5 kg/h three-phase models
	EHKT0K23	Set of two electrodes, boiler **EHBK005MLCS**		EHBK005TLCM	Cleanable boiler, 5 kg/h three-phase models, low conductivity
	EHKT0K24	Set of three electrodes, boiler **EHBK005T00S**		EHBK005THCM	Cleanable boiler, 5 kg/h three-phase models, high conductivity
	EHKT0K25	Set of three electrodes, boiler **EHBK005THCS**		EHBK015T00M	Standard cleanable boiler, 10–15 kg/h three-phase models
	EHKT0K26	Set of three electrodes, boiler **EHBK005TLCS**		EHBK015TLCM	Cleanable boiler, 10–15 kg/h three-phase models, low conductivity
	EHKT0K27	Set of three electrodes, boiler **EHBK005T00S**		EHBK015THCM	Cleanable boiler, 10–15 kg/h three-phase models, high conductivity
	EHKT0K28	Set of three electrodes, boiler **EHBK005THCS**		EHBK040T00L	Standard cleanable boiler, 20–30–40 kg/h three-phase models
	EHKT0K29	Set of three electrodes, boiler **EHBK005TLCS**		EHBK040TLCL	Cleanable boiler, 20–30–40 kg/h three-phase models, low conductivity
	EHKT0K30	Set of three electrodes, boiler **EHBK015T00M**		EHBK040THCL	Cleanable boiler, 20–30–40 kg/h three-phase models, high conductivity
	EHKT0K31	Set of three electrodes, boiler **EHBK015THCM**			
	EHKT0K32	Set of three electrodes, boiler **EHBK015TLCM**			
	EHKT0K33	Set of three electrodes, boiler **EHBK040T00L**			
	EHKT0K34	Set of three electrodes, boiler **EHBK040THCL**			
	EHKT0K35	Set of three electrodes, boiler **EHBK040TLCL**			

16.2 Electrical spare parts

Fig. 68.   EHKT/EHKX series spare parts - Electrical Part

16.2.1 Table of electrical spare part codes

Ref.	P/n	Description	Ref.	P/n	Description
①	EHKT0K71	Fuse holder base, 2P 10x38 gG	⑥	EVTPNW30F200	NTC sensor, L = 3 m 2-wire thermoplastic cable, 5x20 mm comoulded bulb, IP68.
	EHKT0K72	Fuse holder base, 3P 10x38 gG	---	EHKT0K51	Boiler cable kit, MxxS 230 Vac single-phase
	EHKT0K73	Fuse holder base, 3P 14x51 gG		EHKT0K52	Boiler cable kit, TxxS 400 Vac three-phase
	EHKT0K74	Fuse holder base, 3P 22x58 gG		EHKT0K53	Boiler cable kit, TxxS 230 Vac three-phase
②	0101010020	Transformer, 230/24 V		EHKT0K54	Boiler cable KIT, TxxM 230 Vac three-phase
	0101014020	Transformer, 400/24 V		EHKT0K55	Boiler cable KIT, TxxM 400 Vac three-phase
③	0153411020	Contactor, 230/400 Vac 24 Vac 20 A		EHKT0K56	Boiler cable kit, TxxL 230 Vac three-phase
	0153431001	Contactor, 230/400 Vac 24 Vac 25 A		EHKT0K57	Boiler cable kit, TxxL 400 Vac three-phase
	0153431003	Contactor, 230/400 Vac 24 Vac 45 A		EHKT0K75FUSE	Fuse kit, 10pcs 10x38 gG 10 A
	0153431004	Contactor, 230/400 Vac 24 Vac 56–60 A		EHKT0K76FUSE	Fuse kit, 10pcs 10x38 gG 16 A
	0153431005	Contactor, 400 Vac 24 Vac 70 A		EHKT0K77FUSE	Fuse kit, 10pcs 10x38 gG 32 A
④	EHKT0K90	**EHKT** electronic control	---	EHKT0K78FUSE	Fuse kit, 10pcs 14x51 gG 50 A
	EHKX0K90	**EHKX** electronic control		EHKT0K79FUSE	Fuse kit, 10pcs 22x58 gG 100 A
⑤	EHKX0K91	Expansion electronic control for **EHKX060** / **EHKX080** / **EHKX100**		EHKT0K80FUSE	Fuse kit, 10pcs 22x58 gG 125 A

17. WIRING DIAGRAMS

Chapter content

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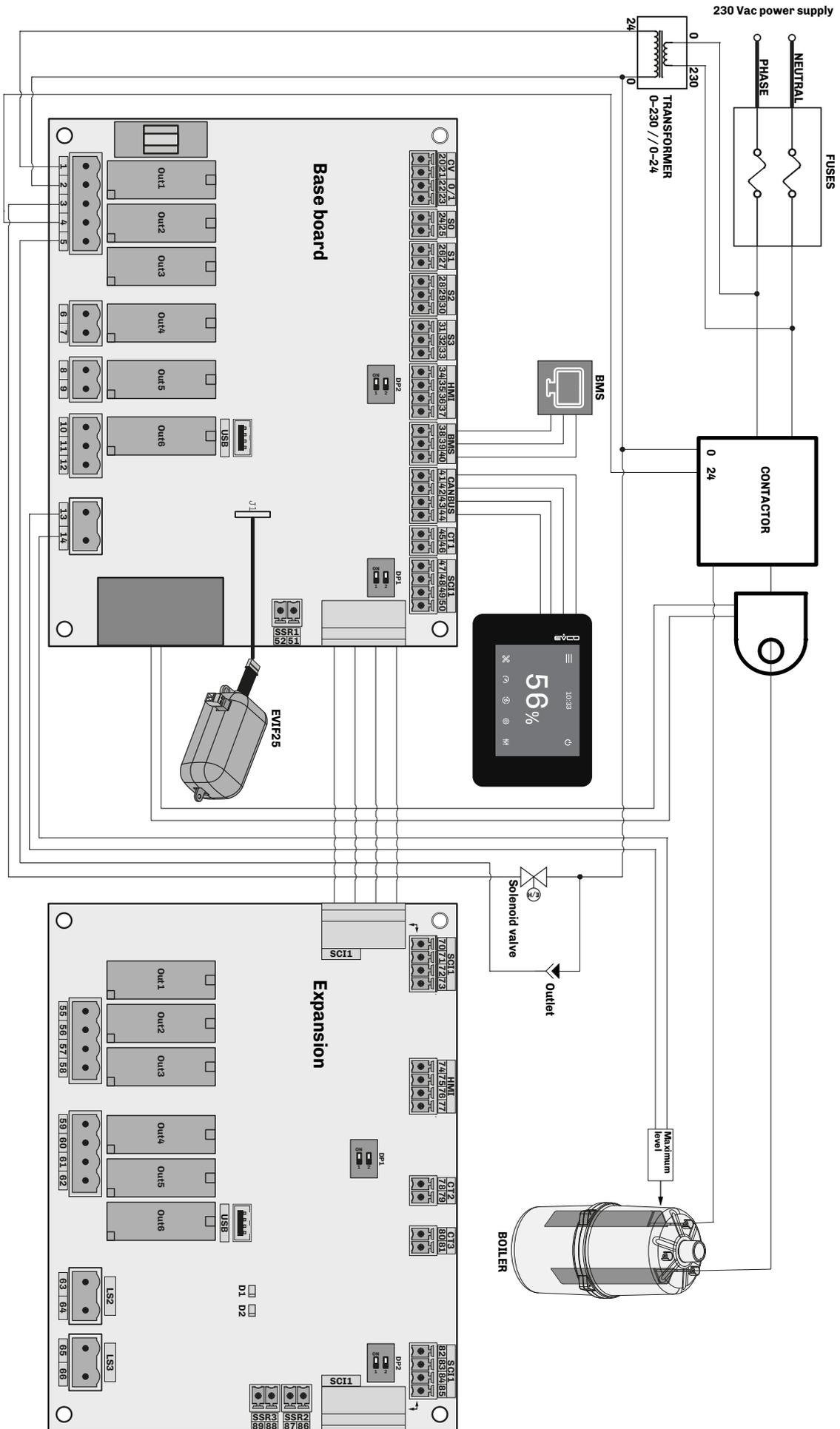
17.1 Wiring diagram for EHKW005M2

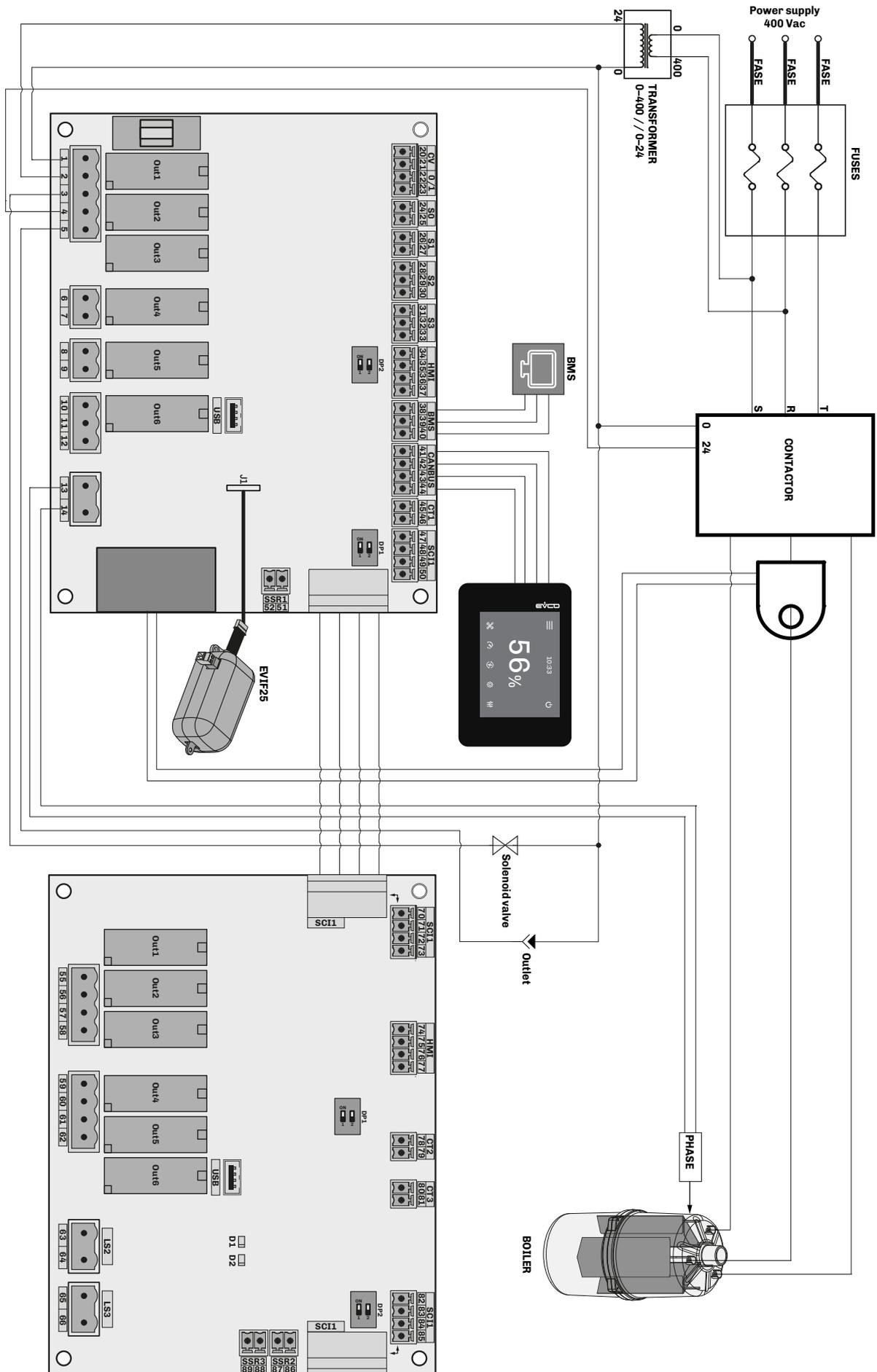*Fig. 69.* *Wiring diagram for EHKW005M2 models*

Fig. 70. *Wiring diagram for EHKW005T4 / EHKX010T4 / EHKW015T4 / EHKW020T4 / EHKW030T4 / EHKW040T4 models*

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