

# Zephyr Series

Stand-alone immersed electrode humidifiers



**WARNING**

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

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



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# IMPORTANT INFORMATION

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## Liability and residual risks

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

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

The customer/manufacturer is responsible for ensuring their machine complies with these regulations.

ELSTEAM's responsibility is limited to the correct and professional use of the product in accordance with regulations and the instructions contained in this manual and other product support documents.

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

## Disclaimer

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

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

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

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

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

## Terms and Conditions of use

### Permitted use

Only use the device for humidification in a non-residential environment.

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.

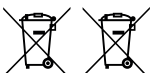
Only qualified personnel may install the product or perform technical support procedures on it.

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 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.

## 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.

# SAFETY INFORMATION RELATING TO THE PRODUCT

**Zephyr** 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.

## USER SECTION

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### SECTION content

This section contains the following information:

<b>Subject</b>	<b>Page</b>
<b>Introduction</b>	<b>13</b>
<b>Technical data</b>	<b>20</b>
<b>Receiving the product</b>	<b>38</b>
<b>Operation</b>	<b>24</b>
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# 1. INTRODUCTION

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## CHAPTER content

This chapter contains the following information:

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<b><i>Applications</i></b>	<b>16</b>
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## 1.1 Introduction to Zephyr

The **Zephyr** series is the ELSTEAM immersed electrode humidifier solution.

**Zephyr** 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 (emission in an AHU - air handler unit - or air-conditioning duct), or via a ventilated distributor (steam emission into the room).

## 1.2 Available models

The **Zephyr** series consists of two models:

- **EHKT**: Immersed electrode humidifier with basic LED user interface:
  - Production capacity 3...60 kg/h;
- **EHKX**: Immersed electrode humidifier with 3.5" TFT graphic display:
  - Production capacity 3...100 kg/h.

### 1.2.1 EHKT models

P/n	Description
<b>EHKT003M2</b>	<b>EHKT</b> immersed electrode humidifier, 3 kg/h, 230 Vac single-phase
<b>EHKT003T2</b>	<b>EHKT</b> immersed electrode humidifier, 3 kg/h, 230 Vac three-phase
<b>EHKT003T4</b>	<b>EHKT</b> immersed electrode humidifier, 3 kg/h, 400 Vac three-phase
<b>EHKT005M2</b>	<b>EHKT</b> immersed electrode humidifier, 5 kg/h, 230 Vac single-phase
<b>EHKT005T2</b>	<b>EHKT</b> immersed electrode humidifier, 5 kg/h, 230 Vac three-phase
<b>EHKT005T4</b>	<b>EHKT</b> immersed electrode humidifier, 5 kg/h, 400 Vac three-phase
<b>EHKT010T2</b>	<b>EHKT</b> immersed electrode humidifier, 10 kg/h, 230 Vac three-phase
<b>EHKT010T4</b>	<b>EHKT</b> immersed electrode humidifier, 10 kg/h, 400 Vac three-phase
<b>EHKT015T2</b>	<b>EHKT</b> immersed electrode humidifier, 15 kg/h, 230 Vac three-phase
<b>EHKT015T4</b>	<b>EHKT</b> immersed electrode humidifier, 15 kg/h, 400 Vac three-phase
<b>EHKT020T2</b>	<b>EHKT</b> immersed electrode humidifier, 20 kg/h, 230 Vac three-phase
<b>EHKT020T4</b>	<b>EHKT</b> immersed electrode humidifier, 20 kg/h, 400 Vac three-phase
<b>EHKT030T4</b>	<b>EHKT</b> immersed electrode humidifier, 30 kg/h, 400 Vac three-phase
<b>EHKT040T4</b>	<b>EHKT</b> immersed electrode humidifier, 40 kg/h, 400 Vac three-phase
<b>EHKT060T4</b>	<b>EHKT</b> immersed electrode humidifier, 60 kg/h, 400 Vac three-phase

### 1.2.2 EHKX models

P/n	Description
<b>EHKX003M2</b>	<b>EHKX</b> immersed electrode humidifier, 3 kg/h, 230 Vac single-phase
<b>EHKX003T2</b>	<b>EHKX</b> immersed electrode humidifier, 3 kg/h, 230 Vac three-phase
<b>EHKX003T4</b>	<b>EHKX</b> immersed electrode humidifier, 3 kg/h, 400 Vac three-phase
<b>EHKX005M2</b>	<b>EHKX</b> immersed electrode humidifier, 5 kg/h, 230 Vac single-phase
<b>EHKX005T2</b>	<b>EHKX</b> immersed electrode humidifier, 5 kg/h, 230 Vac three-phase
<b>EHKX005T4</b>	<b>EHKX</b> immersed electrode humidifier, 5 kg/h, 400 Vac three-phase
<b>EHKX010T2</b>	<b>EHKX</b> immersed electrode humidifier, 10 kg/h, 230 Vac three-phase
<b>EHKX010T4</b>	<b>EHKX</b> immersed electrode humidifier, 10 kg/h, 400 Vac three-phase
<b>EHKX015T2</b>	<b>EHKX</b> immersed electrode humidifier, 15 kg/h, 230 Vac three-phase
<b>EHKX015T4</b>	<b>EHKX</b> immersed electrode humidifier, 15 kg/h, 400 Vac three-phase
<b>EHKX020T2</b>	<b>EHKX</b> immersed electrode humidifier, 20 kg/h, 230 Vac three-phase
<b>EHKX020T4</b>	<b>EHKX</b> immersed electrode humidifier, 20 kg/h, 400 Vac three-phase
<b>EHKX030T4</b>	<b>EHKX</b> immersed electrode humidifier, 30 kg/h, 400 Vac three-phase
<b>EHKX040T4</b>	<b>EHKX</b> immersed electrode humidifier, 40 kg/h, 400 Vac three-phase
<b>EHKX060T4</b>	<b>EHKX</b> immersed electrode humidifier, 60 kg/h, 400 Vac three-phase
<b>EHKX080T4</b>	<b>EHKX</b> immersed electrode humidifier, 80 kg/h, 400 Vac three-phase
<b>EHKX0100T4</b>	<b>EHKX</b> immersed electrode humidifier, 100 kg/h, 400 Vac three-phase

## 1.3 Product overview

### 1.3.1 External view of the product

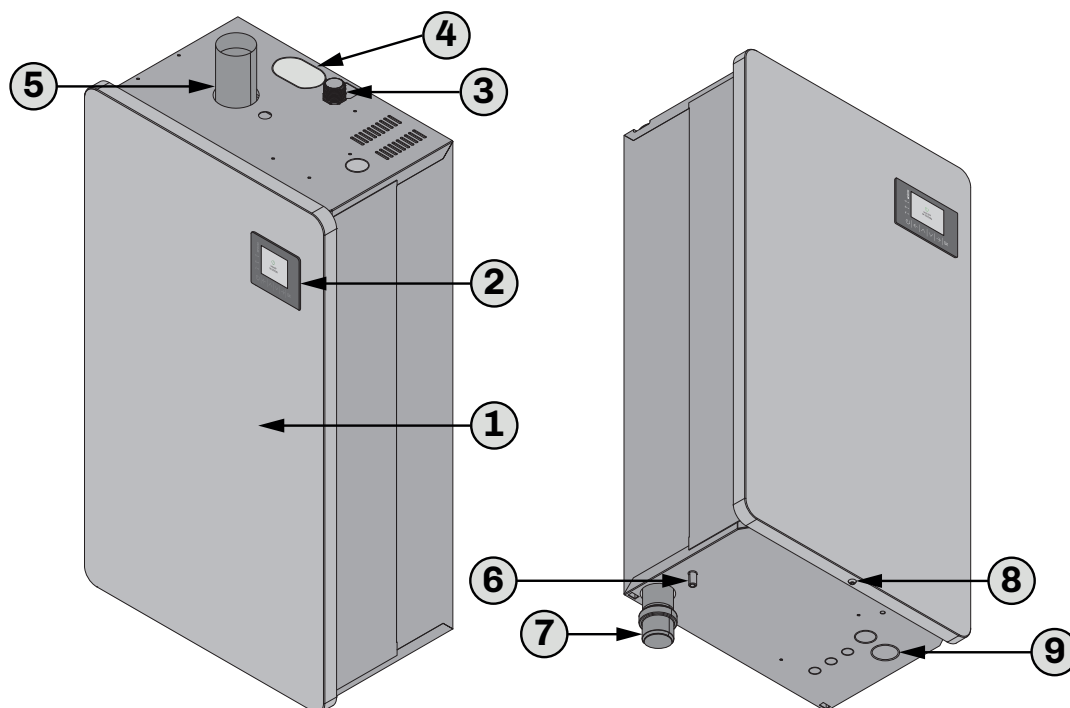


Fig. 1. External overview of the product

Reference	Description
①	Front wall
②	User interface
③	Water inlet (supply) fitting
④	Condensate drain inlet
⑤	Steam outlet
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

### 1.3.2 Internal view of the product

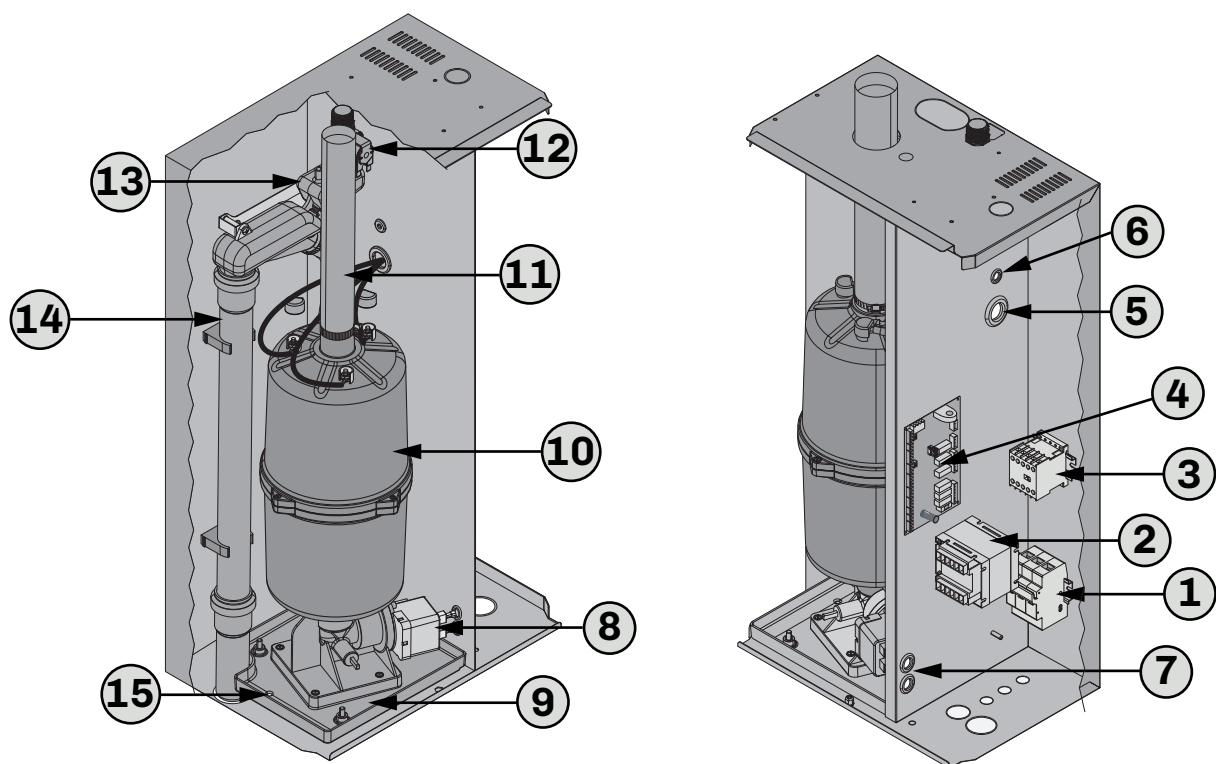


Fig. 2. Internal overview of the product

Reference	Description	Reference	Description
①	Fuse holder base	⑨	Bottom tray to collect water leaks
②	Isolation transformer	⑩	Boiler
③	Contacteur	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		

## 1.4 Applications

The **Zephyr** series is mainly used in applications requiring sterile steam, including:

- Hospital settings;
- Medical settings;
- Commercial settings (offices, industrial premises, etc.);
- Wellness settings.

## 1.5 Main features

- Isothermal humidifier;
- Sterile steam (steam with a temperature of approximately 100 °C (212 °F));
- Automatic boiler cleaning;
- Automatic limescale removal from the electrodes and boiler (cleanable and reusable);
- Operating algorithm optimises energy and water efficiency;
- Broad range of steam production (3...100 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.

### 1.5.1 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 control;
- Remote communication with EPoCA.

## 1.6 Accessories

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

### 1.6.1 Linear distributors

P/n	Description
<b>EHSD040T</b>	Linear steam distributor, 400 mm (1.31 ft).
<b>EHSD060T</b>	Linear steam distributor, 600 mm (1.97 ft).
<b>EHSD080T</b>	Linear steam distributor, 800 mm (2.62 ft).
<b>EHSD100T</b>	Linear steam distributor, 1000 mm (3.28 ft).
<b>EHSD130T</b>	Linear steam distributor, 1300 mm (4.26 ft).
<b>EHSD160T</b>	Linear steam distributor, 1600 mm (5.25 ft).
<b>EHSD200T</b>	Linear steam distributor, 2000 mm (6.56 ft).
<b>EHSDP000T</b>	Custom linear steam distributor.
<b>EHSD040X</b>	Linear steam distributor with high thermal efficiency, 400 mm (1.31 ft).
<b>EHSD060X</b>	Linear steam distributor with high thermal efficiency, 600 mm (1.97 ft).
<b>EHSD080X</b>	Linear steam distributor with high thermal efficiency, 800 mm (2.62 ft).
<b>EHSD100X</b>	Linear steam distributor with high thermal efficiency, 1000 mm (3.28 ft).
<b>EHSD130X</b>	Linear steam distributor with high thermal efficiency, 1300 mm (4.26 ft).
<b>EHSD160X</b>	Linear steam distributor with high thermal efficiency, 1600 mm (5.25 ft).
<b>EHSD200X</b>	Linear steam distributor with high thermal efficiency, 2000 mm (6.56 ft).
<b>EHSDP000X</b>	Custom steam distributor with high thermal efficiency.
<b>EHSDW022</b>	Steam distributor with 22 mm (0.87 in.) nozzle.
<b>EHSDY038</b>	Y steam distribution connection, Ø38 mm (1.50 in.).
<b>EHSDC038</b>	90° steam distribution connection, Ø38 mm (1.50 in.).
<b>EHSR015M2</b>	Ventilated steam distributor, 3–15 kg/h.
<b>EHSR0REM</b>	Mount for remote installation of ventilated steam distributor.

### 1.6.2 Boilers

P/n	Description
<b>EBBK005MHCM</b>	Cleanable boiler for 3–5 kg/h single-phase models with high conductivity water.
<b>EBBK005MLCM</b>	Cleanable boiler for 3–5 kg/h single-phase models with conductivity water.
<b>EBBK005T00M</b>	Standard cleanable boiler for 3–5 kg/h three-phase models.
<b>EBBK005THCM</b>	Cleanable boiler for 3–5 kg/h three-phase models with high conductivity water.
<b>EBBK005TLCM</b>	Cleanable boiler for 3–5 kg/h three-phase models with low conductivity water.
<b>EBBK015T00M</b>	Standard cleanable boiler for 10–15 kg/h three-phase models.
<b>EBBK015THCM</b>	Cleanable boiler for 10–15 kg/h three-phase models with high conductivity water.

P/n	Description
<b>EHBK015TLCM</b>	Cleanable boiler for 10–15 kg/h three-phase models with low conductivity water.
<b>EHBK040T00L</b>	Standard cleanable boiler for 20–30–40 kg/h three-phase models.
<b>EHBK040THCL</b>	Cleanable boiler for 20–30–40 kg/h three-phase models with high conductivity water.
<b>EHBK040TLCL</b>	Cleanable boiler for 20–30–40 kg/h three-phase models with low conductivity water.
<b>EHBK050T00L</b>	Standard cleanable boiler for 50 kg/h three-phase models.
<b>EHBK050THCL</b>	Cleanable boiler for 50 kg/h three-phase models with high conductivity water.
<b>EHBK050TLCL</b>	Cleanable boiler for 50 kg/h three-phase models with low conductivity water.
<b>EHBKISOL00L</b>	Insulating jacket for 20–50 kg/h boilers.
<b>EHBKISOL00M</b>	Insulating jacket for 3–15 kg/h boilers.

### 1.6.3 Sensors and control accessories

P/n	Description
<b>EVIF25SWX</b>	EVLINK RS-485/Wi-Fi + RTC.
<b>EV3411M7</b>	1-output electronic controller, 230 VAC power supply, 1 multi-sensor analogue input.
<b>EVHTP520</b>	Temperature/humidity sensor with 5...95% r.H. and -10...70 °C range.
<b>EVHP523</b>	4...20 mA humidity transducer with 5...95% r.H. range.
<b>EVHTP523</b>	Humidity and temperature transducer, 8...28 VDC power supply, 2 x 4...20 mA output signals.
<b>EVTNW30F200</b>	NTC sensor, 3 m long 2-wire thermoplastic cable, 5x20 mm comoulded bulb, IP68 protection.

### 1.6.4 Plumbing components

P/n	Description
<b>0031000048</b>	¾" GAS female hose to connect the water mains to the water inlet solenoid valve, 300 mm (11.81in.)
<b>EHTV038</b>	Steam pipe, Ø38 mm (1.50 in.)
<b>EHTC010</b>	Condensate outlet pipe, Ø10 mm
<b>EHVI</b>	Drain tank
<b>EHFILLTANK</b>	Low/high pressure tank filling kit
<b>EH090DRAIN</b>	90° drain elbow, Ø40 mm
<b>EHKTBOTTOM15</b>	Metal base for stand-alone installation of 3–15 kg/h models.
<b>EHKTBOTTOM40</b>	Metal base for stand-alone installation of 20–40 kg/h models.
<b>EHKTBOTTOM100</b>	Metal base for stand-alone installation of 60–100 kg/h models.
<b>EHKBLOCK15</b>	Cable gland kit for metal base for stand-alone installation of 3–15 kg/h models.
<b>EHKBLOCK40</b>	Cable gland kit for metal base for stand-alone installation of 20–40 kg/h models.
<b>EHKBLOCK100</b>	Cable gland kit for metal base for stand-alone installation of 60–100 kg/h models.

## 1.7 Steam distributor/humidifier configuration table

Steam distributor	EHK humidifier•									
	EHK•3	EHK•5	EHK•10	EHK•15	EHK•20	EHK•30	EHK•40	EHK•60	EHKX80	EHKX100
EHSD040•	X	X	X <sup>(*)</sup>	—	—	—	—	—	—	—
EHSD060•	X	X	X	X <sup>(**)</sup>	X <sup>(**)</sup>	—	X <sup>(**)</sup>	—	—	—
EHSD080•	X	X	X	X	X	X <sup>(***)</sup>	X <sup>(***)</sup>	X <sup>(#)</sup>	X <sup>(#)</sup>	X <sup>(#)</sup>
EHSD100•	—	—	X	X	X	X	X	X2	X2	X <sup>(##)</sup>
EHSD130•	—	—	X	X	X	X	X	X2	X2	X2
EHSD160•	—	—	—	—	—	X	X	X2	X2	X2
EHSD200•	—	—	—	—	—	X	X	X2	X2	X2
EHSDY038	Can be used to double the steam output and for small steam emission ducts with short steam distributors									
EHSDC038	X	X	X	X	X	X	X	X	X	X
EHSDW022										
EHSR015M2	X	X	X	X	X <sup>(###)</sup>	X <sup>(###)</sup>	—	—	—	—

**NOTE:** The • symbol indicates that the data applies to every p/n (X/T); contact the ELSTEAM sales office for further information.

(\*) = Use 2 EHSD040• + 1 EHSDY038 manifold

(\*\*) = Use 2 EHSD060• + 1 EHSDY038 manifold

(\*\*\*) = Use 2 EHSD080• + 1 EHSDY038 manifold

(#) = Use 4 EHSD080• + 2 EHSDY038 manifolds

(##) = Use 4 EHSD100• + 2 EHSDY038 manifolds

(###) = Use 2 EHSR015M2 + 1 EHSDY038 manifold

## 2. TECHNICAL DATA

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### Chapter content

This chapter contains the following information:

<b>Subject</b>	<b>Page</b>
<i>Technical specifications</i>	<b>21</b>



## 2.1 Technical specifications

### 2.1.1 Models EHK•003M2 ... EHK•010T4

Description	MU	EHKT0•••• / EHKX0••••								
		03M2	05M2	03T2	05T2	03T4	05T4	10T2	10T4	
<b>Steam production</b>										
Production capacity	kg/h	3	5	3	5	3	5	10.		
Maximum pressure	Pa (mmH <sub>2</sub> O)	1650 (165)								
Connection outside diameter	mm (in.)	38 (1.50)								
<b>Steam distribution</b>										
Number of linear distributors that can be connected	---	1								
Number of ventilated distributors that can be connected	---	1								
<b>Electrical properties</b>										
Power absorbed	kW	2.2	3.75	2.2	3.75	2.2	3.75	7.5		
Power supply	Vac, Hz	230 V, 50/60				400 V, 50/60		230 V, 50/60	400 V, 50/60	
Phases	---	Single-phase			Three-phase					
Rated absorption per phase	A	9.6	16.3	5.5	9.4	3.2	5.4	18.8	10.8	
<b>Water properties</b>										
Supply water quality	---	<b>SEE "3.2.1 WATER SPECIFICATIONS" ON PAGE 49</b>								
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)								
<b>General specifications</b>										
Dimensions	mm (in.)	<b>SEE "2.1 DIMENSIONS" ON PAGE 41</b>								
IP protection level of the water module	---	IP20								
<b>Regulation</b>										
Control type	---	ON/OFF Proportional 0...10 V 0...10 V / 4...20 mA sensor								
Control signal	---	RS-485 MODBUS Supervision Wi-Fi								

**NOTE:** The • symbol indicates that the data applies to every p/n (X/T); contact the ELSTEAM sales office for further information.

## 2.1.2 Models EHK•015T2 ... EHK•060T4

Description	MU	EHKT0•••• / EHKX0••••					
		15T2	15T4	20T2	20T4	30T4	40T4
<b>Steam production</b>							
Production capacity	kg/h	15	15	20	20	30	40
Maximum pressure	Pa (mmH <sub>2</sub> O)	1650 (165)		2000 (200)			
Connection outside diameter	mm (in.)	38 (1.50)					
<b>Steam distribution</b>							
Number of linear distributors that can be connected	---	1					
Number of ventilated distributors that can be connected	---	1	2			---	
<b>Electrical properties</b>							
Power absorbed	kW	11.3	11.3	15	15	22.5	30
Power supply	Vac, Hz	230 V, 50/60	400 V, 50/60	230 V, 50/60	400 V, 50/60		
Phases	---	Three-phase					
Rated absorption per phase	A	28.4	16.3	37.7	21.7	32.5	43.3
<b>Water properties</b>							
Supply water quality	---	<b>SEE "3.2.1 WATER SPECIFICATIONS" ON PAGE 49</b>					
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)					
<b>General specifications</b>							
Dimensions	mm (in.)	<b>SEE "2.1 DIMENSIONS" ON PAGE 41</b>					
IP protection level of the water module	---	IP20					
<b>Regulation</b>							
Control type	---	ON/OFF Proportional 0...10 V 0...10 V / 4...20 mA sensor					
Control signal	---	RS-485 MODBUS Supervision Wi-Fi					

**NOTE:** The • symbol indicates that the data applies to every p/n (EHKX or EHKT); contact the ELSTEAM sales office for further information.

### 2.1.3 Models EHK•060T4 / EHKX080T4 / EHKX100T4

Description	MU	EHK•060T4	EHKX080T4	EHKX100T4
<b>Steam production</b>				
Production capacity	kg/h	60	80	100
Maximum pressure	Pa (mmH <sub>2</sub> O)	2000 (200)		
Connection outside diameter	mm (in.)	38 (1.50)		
<b>Steam distribution</b>				
Number of linear distributors that can be connected	---	2		
Number of ventilated distributors that can be connected	---	---		
<b>Electrical properties</b>				
Power absorbed	kW	45	60	75
Power supply	Vac, Hz	400 V, 50/60		
Phases	---	Three-phase		
Rated absorption per phase	A	65	86.6	108.3
<b>Water properties</b>				
Supply water quality	---	<b>SEE "3.2.1 WATER SPECIFICATIONS" ON PAGE 49</b>		
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	---	<b>2x M 3/4" GAS</b>		
Water drain outer dimensions	mm (in.)	<b>2x 40 (1.57)</b>		
<b>General specifications</b>				
Dimensions	mm (in.)	<b>SEE "2.1 DIMENSIONS" ON PAGE 41</b>		
IP protection level of the water module	---	IP20		
<b>Regulation</b>				
Control type	---	ON/OFF Proportional 0...10 V 0...10 V / 4...20 mA sensor		
Control signal	---	RS-485 MODBUS Supervision Wi-Fi		

### 3. OPERATION

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#### Chapter content

This chapter contains the following information:

<b>Subject</b>	<b>Page</b>
<i>Zephyr operating principle</i>	<b>25</b>

---

### 3.1 Zephyr operating principle

The **ZEPHYR** series is the ELSTEAM immersed electrode humidifier solution.

**ZEPHYR** 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 current strength transferred to the water via the immersed electrodes. When there is a humidity request, the inlet solenoid valve lets water into the boiler until the required production is reached, at which point the solenoid valve is closed. When the steam production is below the required level, the inlet solenoid valve is activated again until the optimal working condition is reached.

The steam is emitted into the room via a special hose and a steam distributor made of stainless steel and engineering polymer (emission in an AHU - air handler unit - or air-conditioning duct), or via a ventilated distributor (steam emission into the room).

## 4. USER INTERFACE

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### Chapter content

This chapter contains the following information:

<b>Subject</b>	<b>Page</b>
<i><b>EHKT humidifier user interface</b></i>	<b>27</b>
<i><b>EHKT user interface menu</b></i>	<b>28</b>
<i><b>EHKX humidifier user interface</b></i>	<b>32</b>
<i><b>EHKX user interface menu</b></i>	<b>33</b>

## 4.1 EHKT humidifier user interface



Fig. 3. EHKT humidifier user interface

### 4.1.1 Icons

Icon	Lit steadily	OFF
1	Main sensor configured and present	In all other cases
2	Limit sensor configured and present	In all other cases
☁	Steam request	In all other cases
∧	Proportional operating mode	In all other cases
⏻	ON/OFF operating mode	In all other cases
⏻	Humidifier OFF	Humidifier ON
V	Voltage sensor operating mode	In all other cases
I	Current sensor operating mode	In all other cases
R	Resistive sensor operating mode	In all other cases
A	Display shows the current absorbed by the electrodes	In all other cases
μS	Changing value of P1 in progress	In all other cases
⚠	Warning in progress	No warning in progress
🔌	CV input closed (enable signal given)	CV input open (enable signal not given)
SP	Changing humidity setpoint in progress	In all other cases
⚠	Alarm in progress	No alert in progress
⚡	Contactor ON	Contactor OFF
🌀	Washing or draining in progress	In all other cases
🕒	Displayed value is operating hours	In all other cases
F	Display shows temperature in °F	In all other cases
%	Display shows humidity in %	In all other cases
°C	Display shows temperature in °C	In all other cases

### 4.1.2 Keys

Key...	Tap and release to...	Tap and hold for at least 3 seconds to...
⏻	Go back a level	Humidifier ON/OFF
FNC ✓	<ul style="list-style-type: none"> <li>Scroll down through the values</li> <li>Navigate within the menu</li> </ul>	Go to the maintenance and reset operating hours menu
∧	<ul style="list-style-type: none"> <li>Scroll up through the values</li> <li>Navigate within the menu</li> </ul>	Activate manual draining
🔒 SET	<ul style="list-style-type: none"> <li>Confirm the values on the display</li> <li>Set/change the humidity setpoint</li> </ul>	Enter the main menu

### 4.1.3 First start-up

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

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



Fig. 4. First start-up - Setting the electrical conductivity

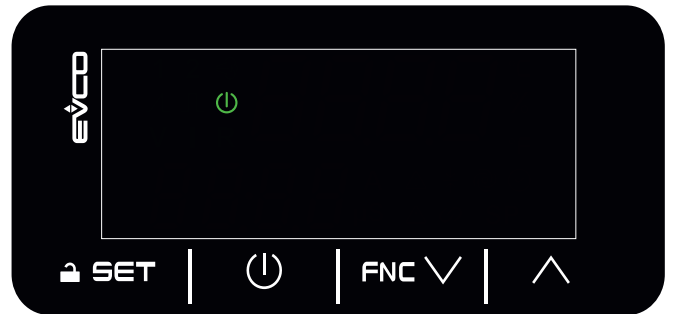


Fig. 5. Humidifier OFF

## 4.2 EHKT user interface menu

### 4.2.1 Home screen

HOME screen with ON/OFF regulations from digital input (CFG = 0)

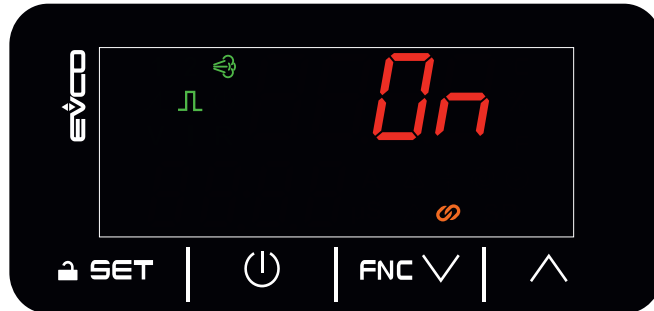


Fig. 6. Home screen with ON/OFF regulation from digital input (CFG = 0)

**Top line:** Shows the state of the digital control input (S0).

**NOTE:** The CV and 0/1 contacts must be closed to produce humidity.

HOME screen with proportional regulation (CFG = 1)

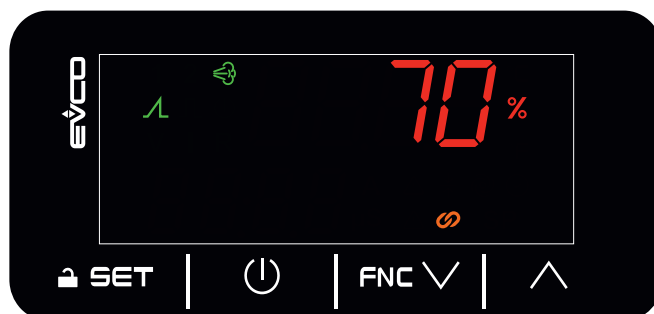


Fig. 7. Home screen with proportional regulation (CFG = 1)

**Top line:** Actual humidity request in %.

**NOTE:** The CV and 0/1 contacts must be closed to produce humidity.



HOME screen with regulation via humidity sensor (CFG = 2) or humidity sensor and limit sensor (CFG = 3)

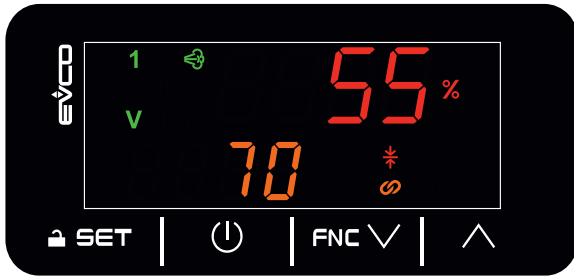


Fig. 8. Home screen with humidity sensor alone

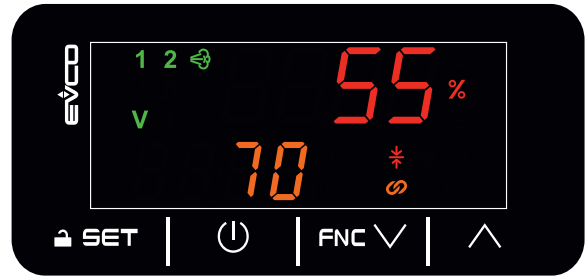


Fig. 9. Home screen with humidity sensor and limit sensor

**Top line:** Humidity measured by the room humidity sensor.

**Bottom line:** Humidity setpoint.

**NOTE:** The CV and O/1 contacts must be closed to produce humidity.

#### 4.2.2 Changing the main sensor humidity setpoint

With CFG = 2 or CFG = 3 only.

To change the humidity setpoint:

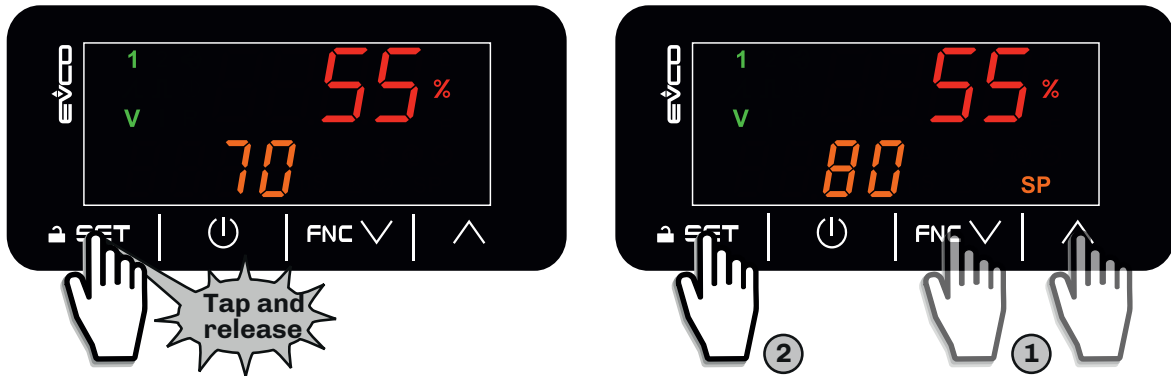


Fig. 10. Changing the humidity setpoint

#### 4.2.3 Manual draining

To start manual draining:

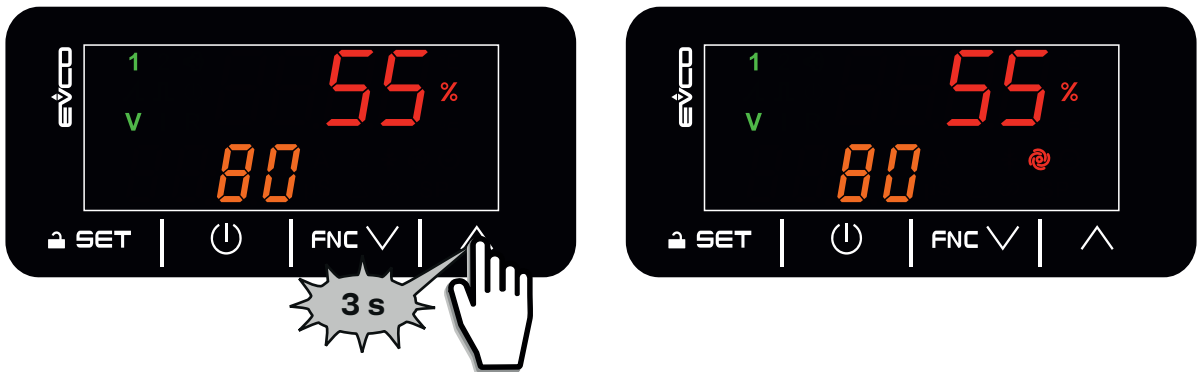


Fig. 11. Manual draining

#### 4.2.4 Menu

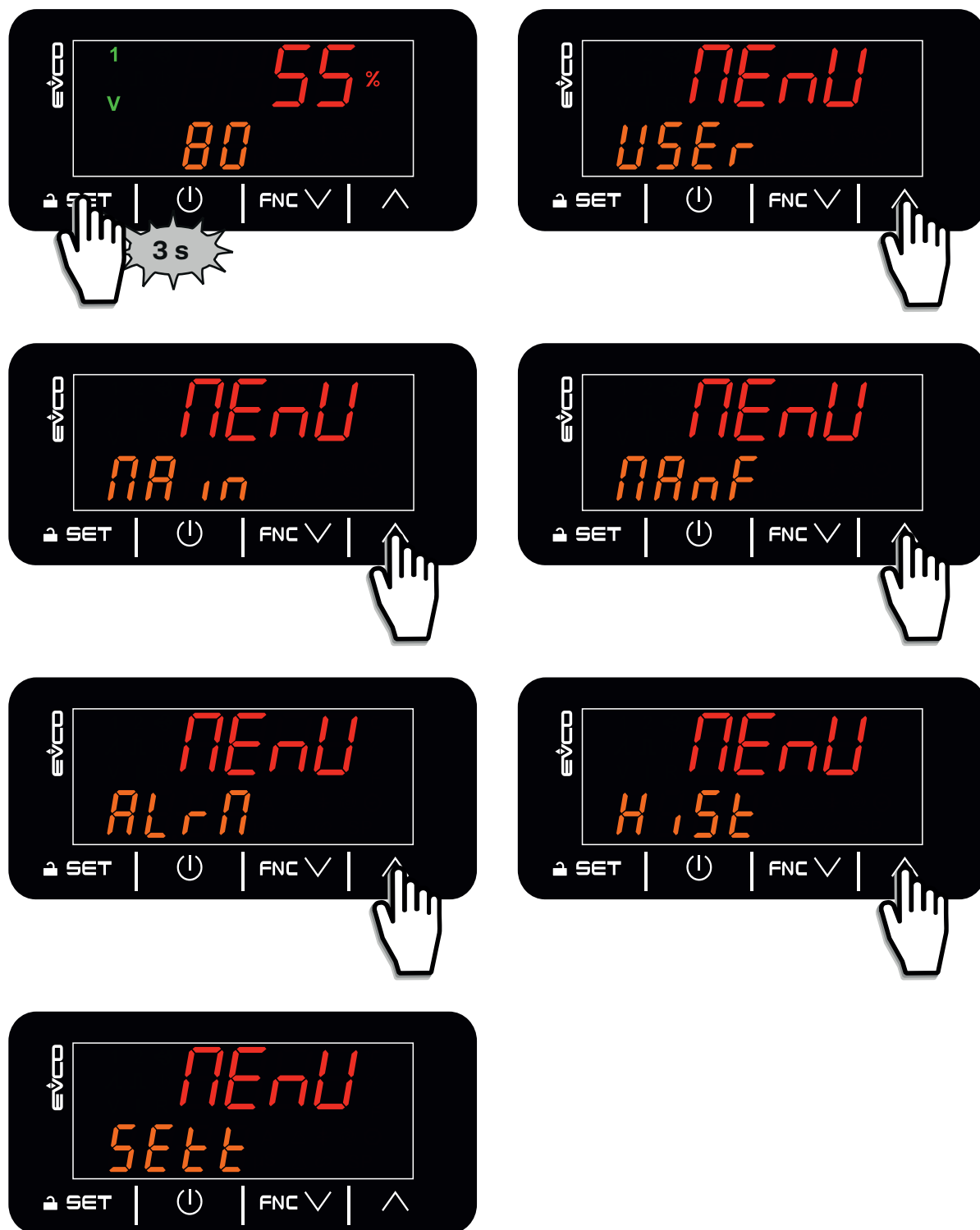


Fig. 12. Zephyr Menu - EV3K interface

Menu	Description
USER	Access the user menu
NA in	Access the maintenance technician menu
NAnF	RESERVED. NOT ACCESSIBLE TO THE PUBLIC.
ALrA	Currently accessing alarm control
H.5t	Access the alarm log
SEtt	Reset parameters to factory settings

## 4.2.5 User Menu

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

To access the user menu:

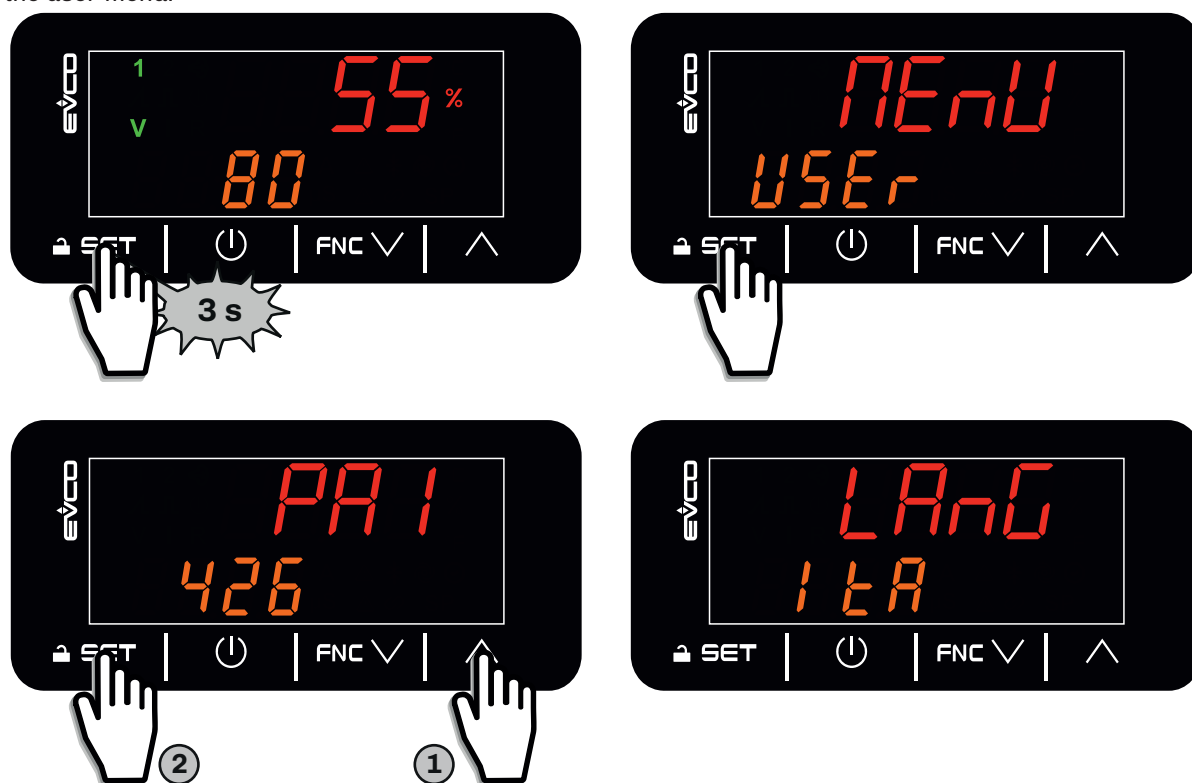


Fig. 13. User menu

Top line	Bottom line	Description
<b>LANG</b>	Set language	Sets the display language. <b>EnG</b> = English; <b>Ita</b> = Italian.
<b>SP1</b>	Humidity setpoint	Sets the humidity setpoint. See "6.1 TABLE OF ADJUSTMENT PARAMETERS" ON PAGE 77
<b>SP2</b>	Humidity limit setpoint	Sets the humidity limit setpoint. See "6.1 TABLE OF ADJUSTMENT PARAMETERS" ON PAGE 77

## 4.3 EHKX humidifier user interface

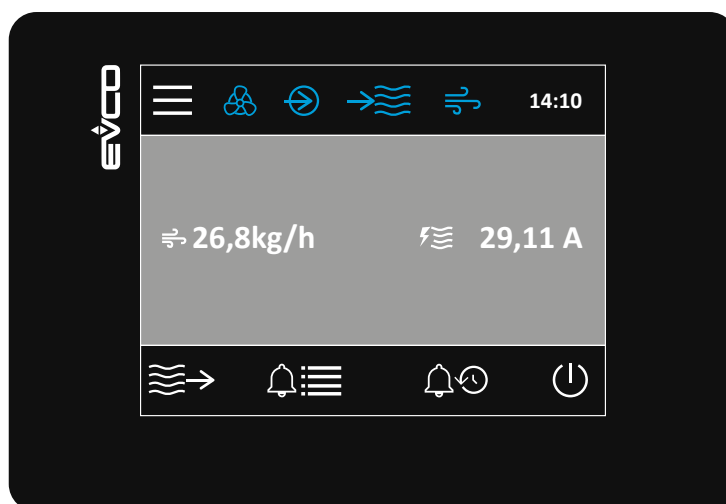


Fig. 14. EHKX humidifier user interface

### 4.3.1 Icons

Icon	Lit steadily	OFF
	Ventilated distributor ON	In all other cases
	Enable signal ON from digital inputs	In all other cases
	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 finished

### 4.3.2 Keys

Key...	Tap and release to...
	Access the menu
	Access the manual water draining start page
	Access the alarm menu
	Access the alarm log
	Switch the humidifier On/Off
	(When available) return by one level

### 4.3.3 First start-up

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

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

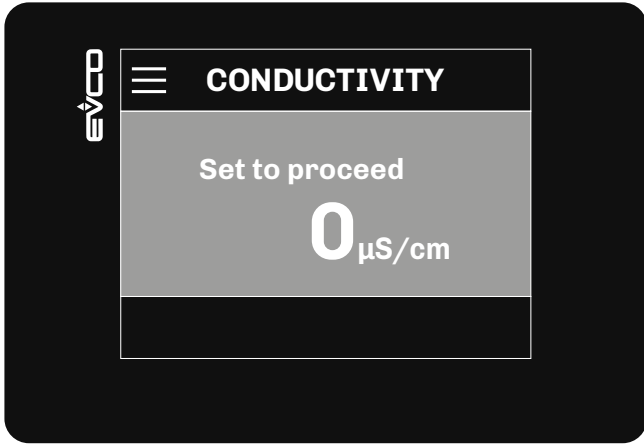


Fig. 15. First start-up - Setting the electrical conductivity

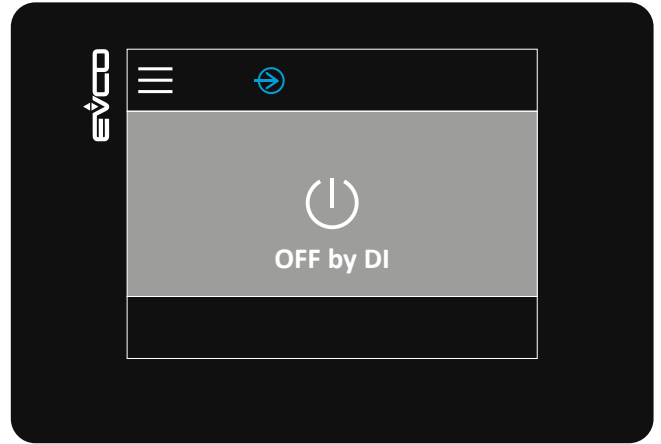


Fig. 16. Humidifier OFF (by digital input)

## 4.4 EHKX user interface menu

### 4.4.1 Home screen

HOME screen with ON/OFF regulations from digital input (CFG = 0)

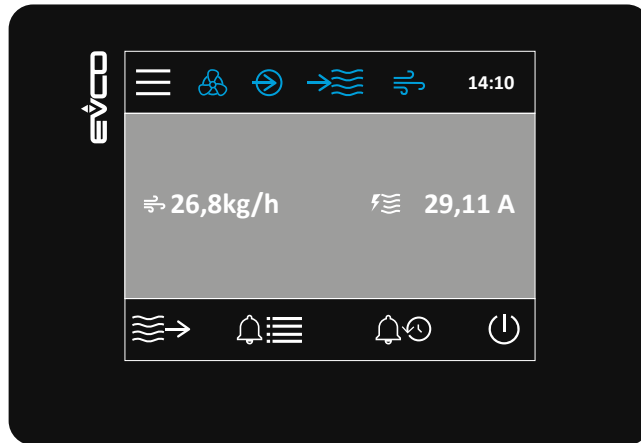


Fig. 17. HOME screen with ON/OFF regulation from digital input - EHKX interface

HOME screen with proportional regulation (CFG = 1)

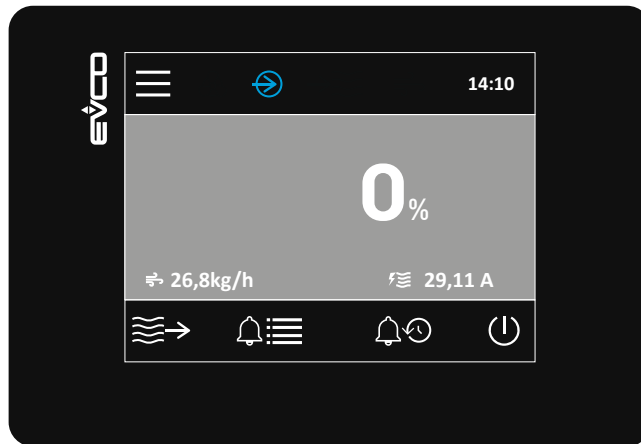


Fig. 18. Home screen with proportional regulation - EHKX interface

HOME screen with regulation via humidity sensor (CFG = 2) or humidity sensor and limit sensor (CFG = 3)

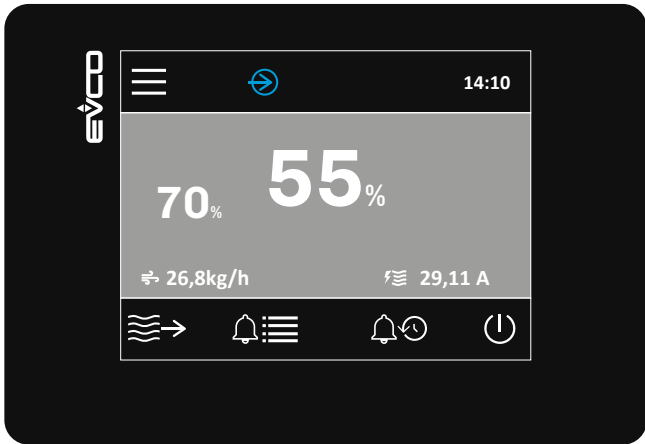


Fig. 19. Home screen with humidity sensor alone

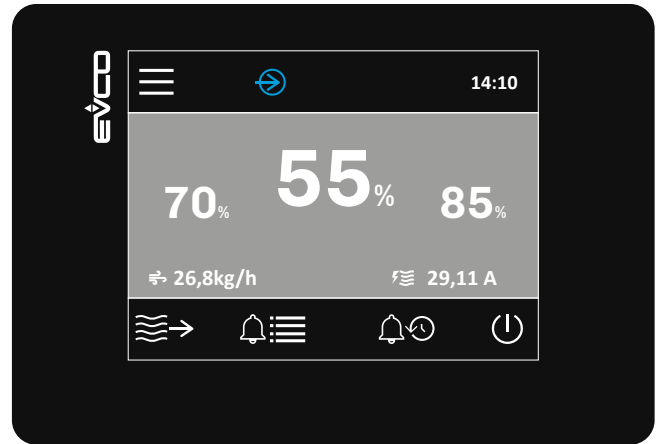


Fig. 20. Home screen with humidity sensor and limit sensor

Top line: Humidity measured by the room humidity sensor.  
Bottom line: Humidity setpoint.

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

With CFG = 2 or CFG = 3 only.

To change the humidity setpoint:

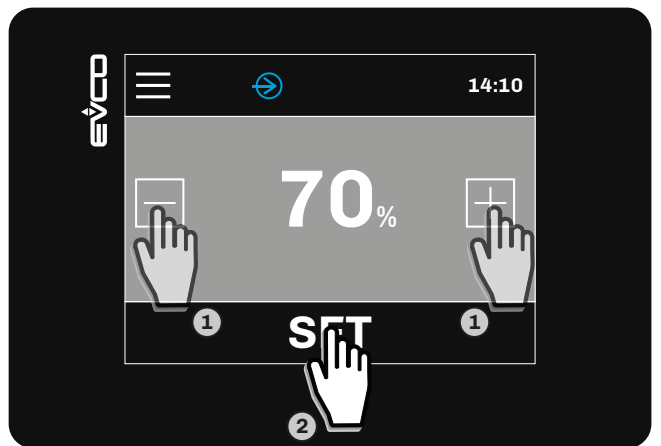
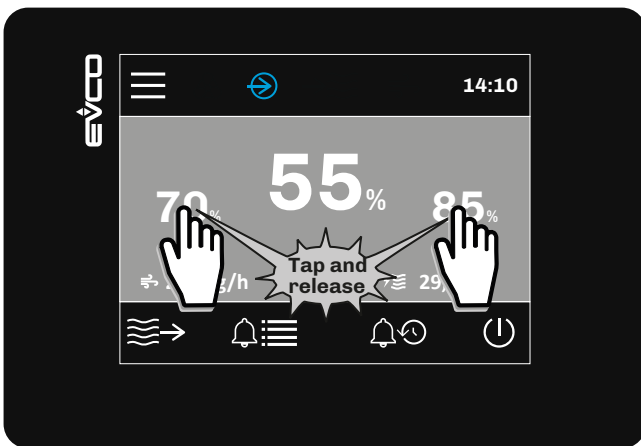


Fig. 21. Changing the humidity setpoint

4.4.3 Manual draining

To start manual draining:

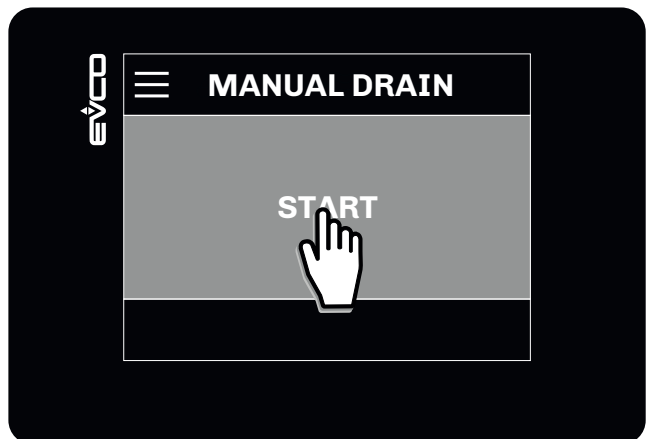
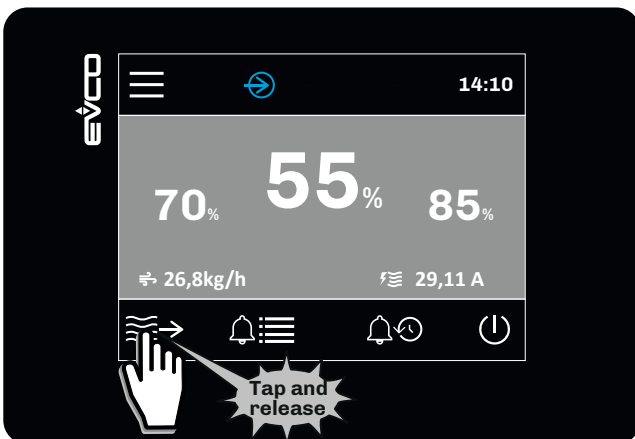
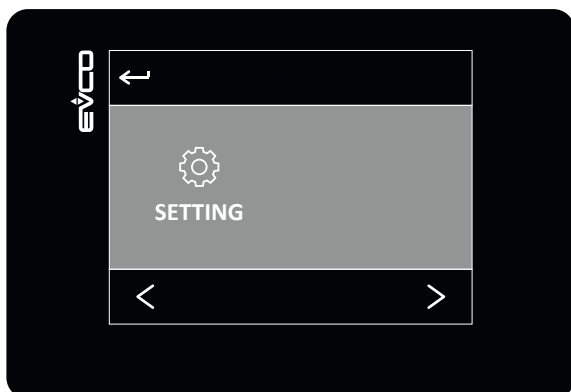
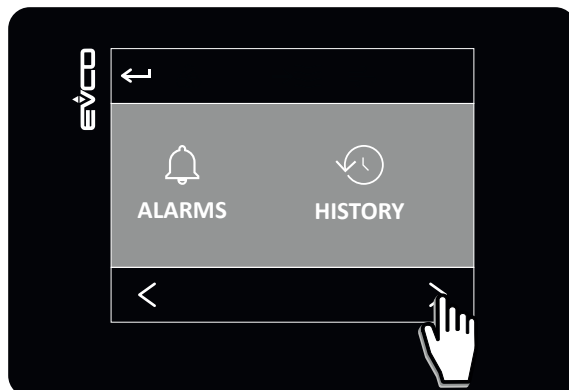
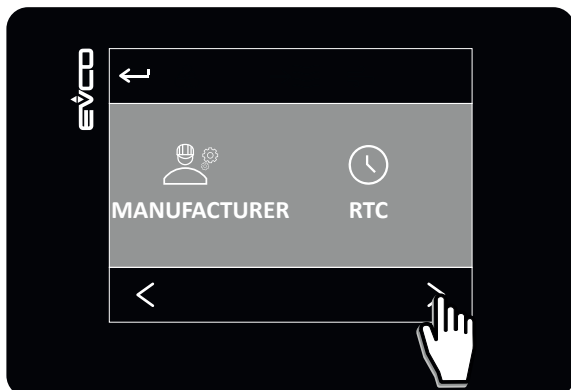
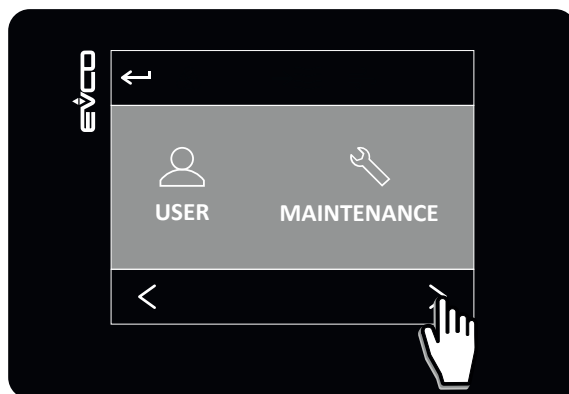
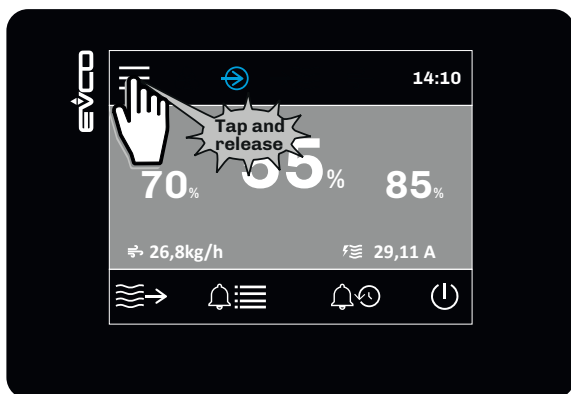









Fig. 22. Manual draining

#### 4.4.4 Menu

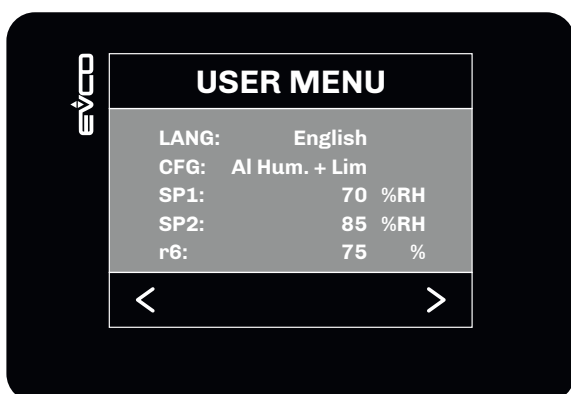
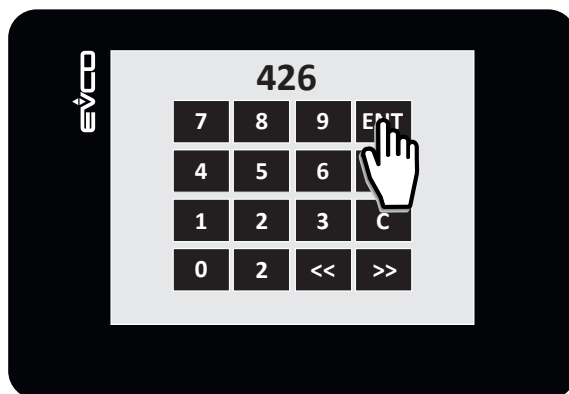
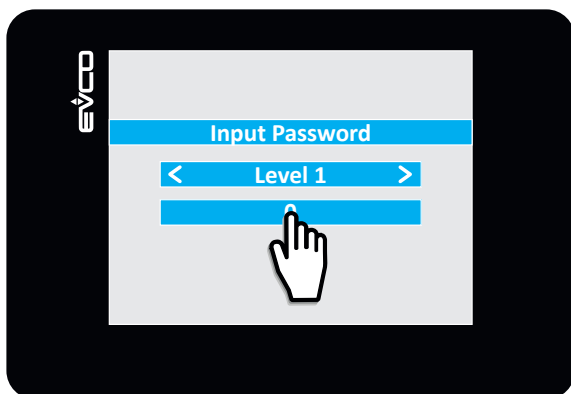
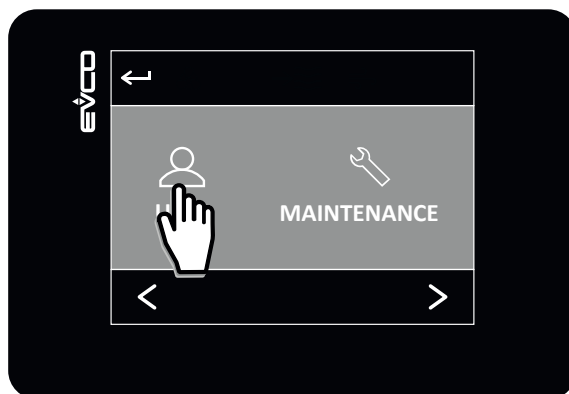
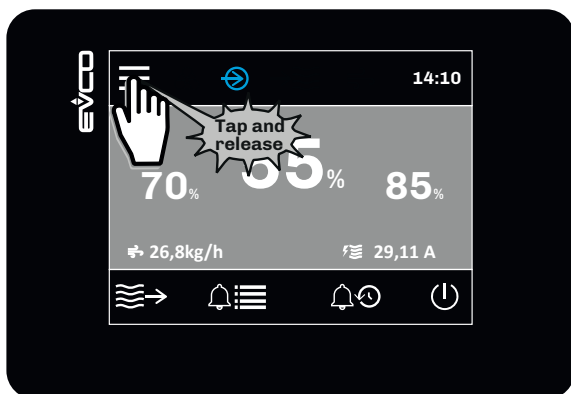


Menu	Description
 <b>USER</b>	Access the user menu
 <b>MAINTENANCE</b>	Access the maintenance technician menu
 <b>MANUFACTURER</b>	<b>RESERVED. NOT ACCESSIBLE TO THE PUBLIC.</b>
 <b>RTC</b>	Access to change the date/time
 <b>ALARMS</b>	Currently accessing alarm control
 <b>HISTORY</b>	Access the alarm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

#### 4.4.5 User Menu

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

To access the user menu:



Menu option	Description
<b>LANG</b>	Sets the display language. <b>English; Italian.</b>
<b>SP1</b>	Sets the humidity setpoint. See <b>"6.1 TABLE OF ADJUSTMENT PARAMETERS" ON PAGE 77</b>
<b>SP2</b>	Sets the humidity limit setpoint. See <b>"6.1 TABLE OF ADJUSTMENT PARAMETERS" ON PAGE 77</b>



# INSTALLER SECTION

---

## Section content

This section contains the following information:

<b>Subject</b>	<b>Page</b>
<b><i>Receiving the product</i></b>	<b>38</b>
<b><i>Dimensions and mechanical installation</i></b>	<b>40</b>
<b><i>Plumbing connections and installation</i></b>	<b>48</b>
<b><i>Electrical connections</i></b>	<b>59</b>
<b><i>Power-up and start-up</i></b>	<b>73</b>
<b><i>Configuration parameters</i></b>	<b>76</b>

# 1. RECEIVING THE PRODUCT

---

## Chapter content

This chapter contains the following information:

<b>Subject</b>	<b>Page</b>
<b><i>Receiving the product</i></b>	<b>38</b>
<b><i>Checking the packaging</i></b>	<b>39</b>
<b><i>Opening the packaging</i></b>	<b>39</b>
<b><i>Checking the packaging contents</i></b>	<b>39</b>

---

## 1.1 Before you start

<b>NOTICE</b>
---------------

<b>MALFUNCTIONING OF THE EQUIPMENT</b>
--

- |  |
|--|
| <ul style="list-style-type: none"><li>• Droppages and shocks can damage the humidifier beyond repair.</li><li>• Tampering with or removing the identification stickers invalidates the warranty.</li></ul> |
|--|

## 1.2 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).

## 1.3 Opening the packaging

<b>NOTICE</b>
---------------

<b>INADEQUATE PERSONNEL TRAINING AND PACKAGING CONTROL</b>
--

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.
--

- |  |
|--|
| <ul style="list-style-type: none"><li>• Take the package to the humidifier installation site;</li><li>• Open the cardboard packaging and remove internal protection;</li><li>• Slide out the humidifier.</li></ul> |
|--|

## 1.4 Checking the packaging contents

The product package contains:

- **Zephyr** 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;
- Hexagonal key to open the front cabinet;
- Fastening bracket.

## 1.5 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.

## 2. DIMENSIONS AND MECHANICAL INSTALLATION

---

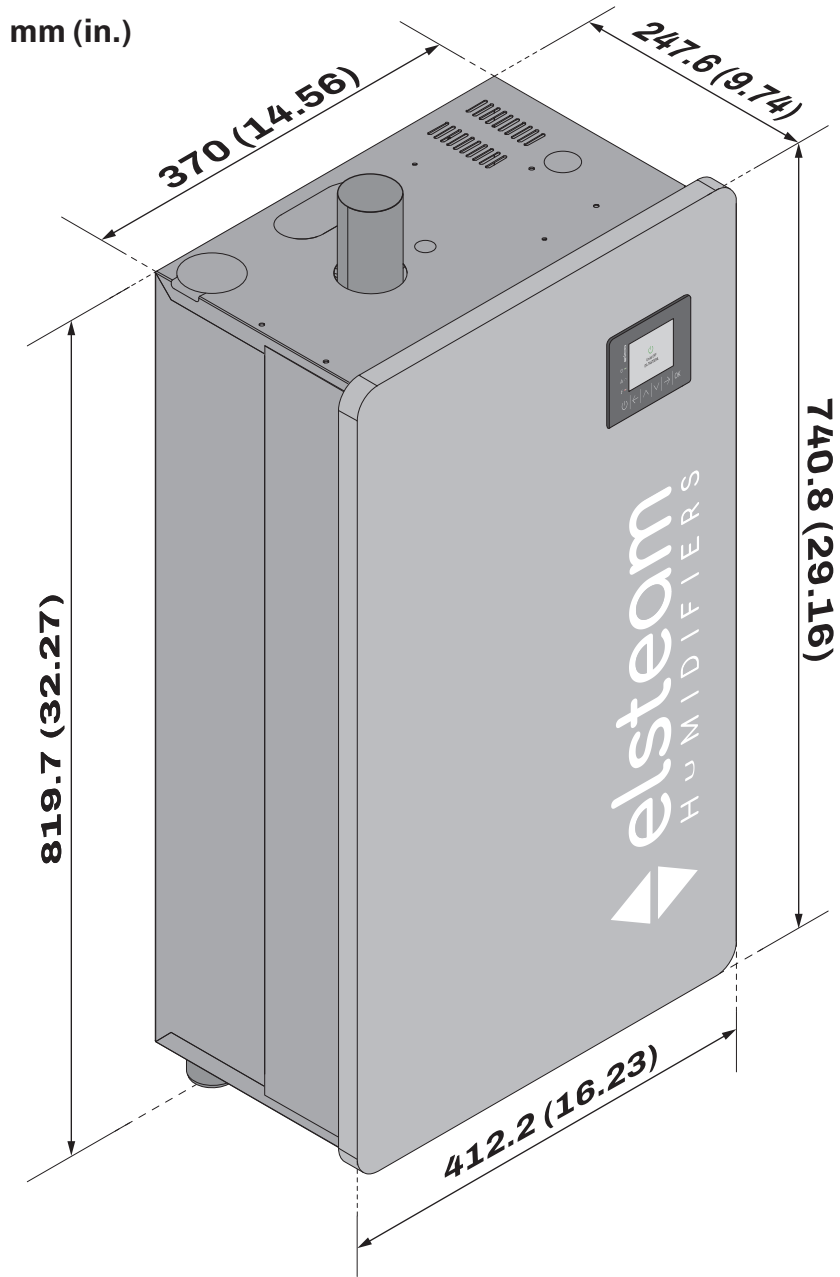
### Chapter content

This chapter contains the following information:

<b>Subject</b>	<b>Page</b>
<b><i>Dimensions</i></b>	<b>41</b>
<b><i>Minimum installation distances</i></b>	<b>45</b>
<b><i>Installation</i></b>	<b>46</b>

## 2.1 Dimensions

### 2.1.1 Single boiler models (small)



**Fig. 23.** Dimensions of single boiler models (small)

2.1.2 Single boiler models (large)

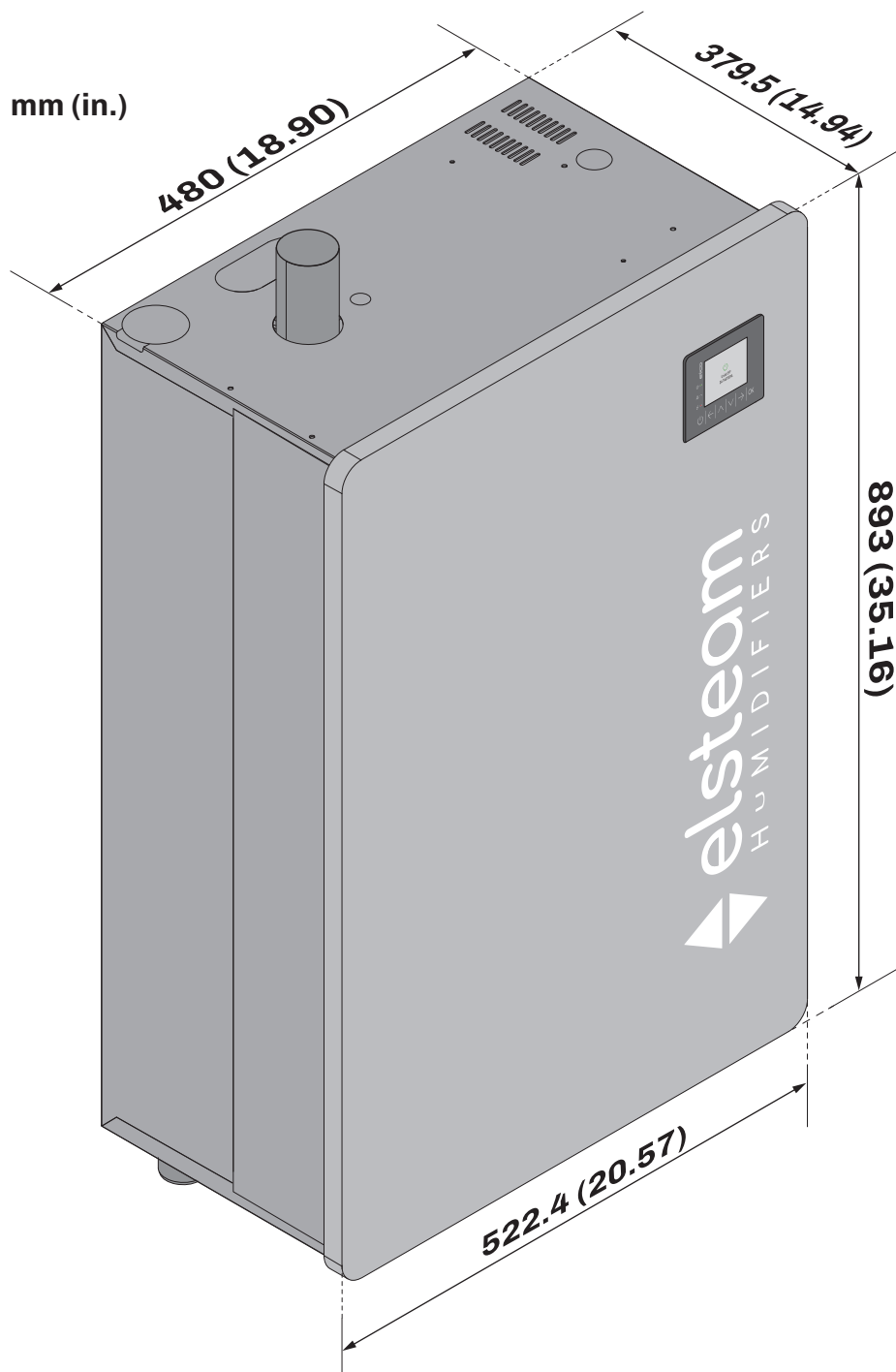


Fig. 24. Dimensions of single boiler models (large)

2.1.3 Double boiler models

mm (in.)

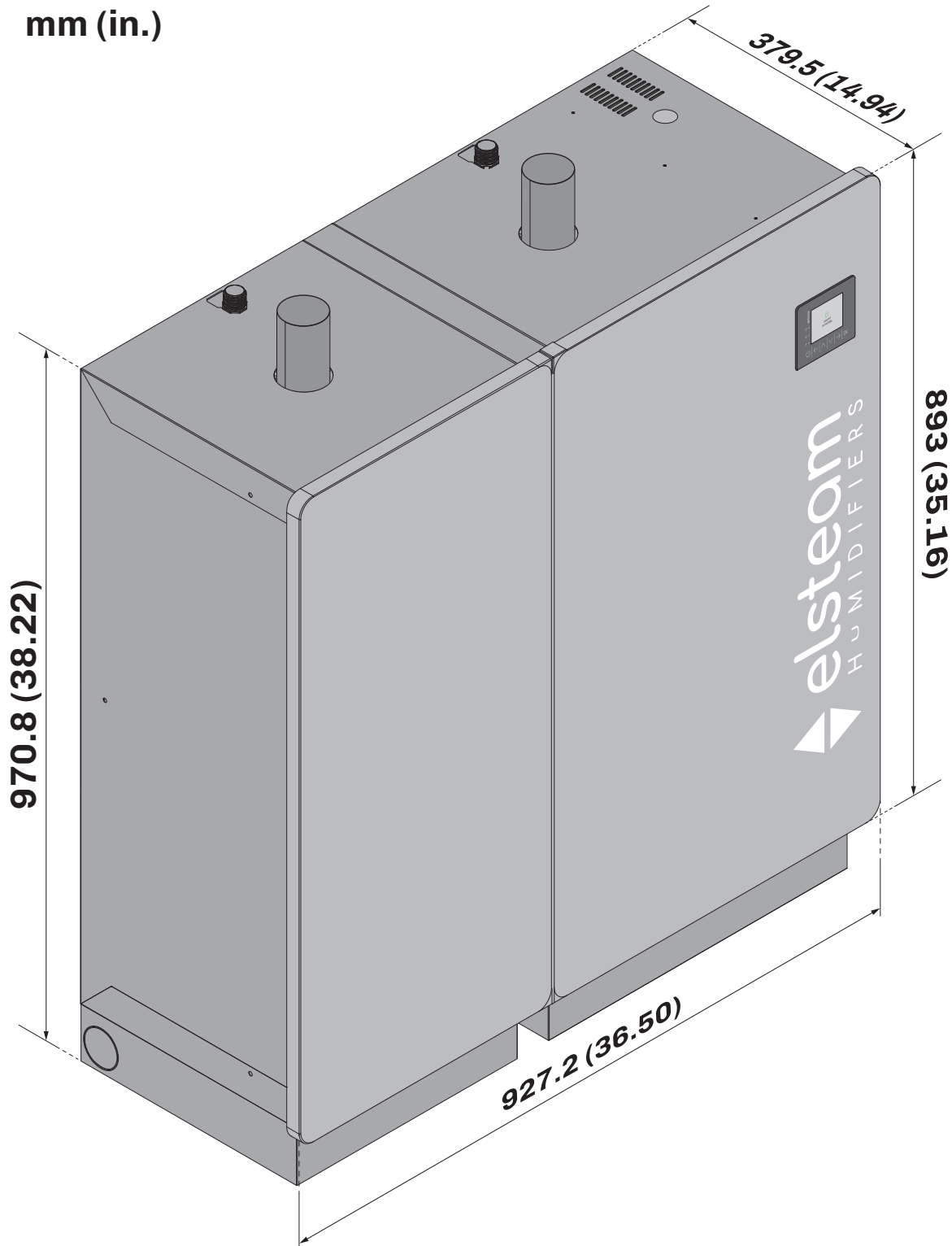


Fig. 25. Dimensions of double boiler models (with optional plinth)

mm (in.)

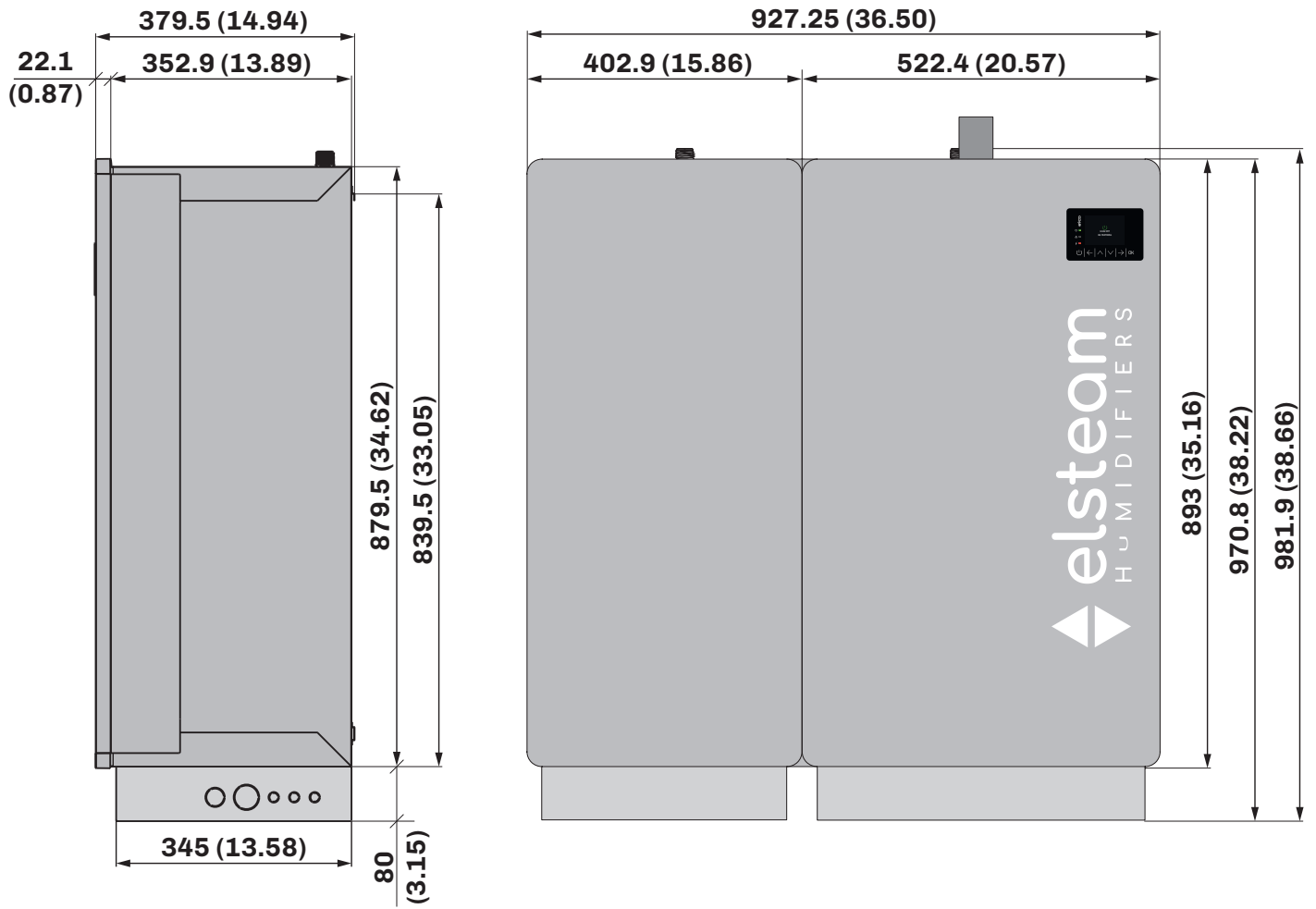


Fig. 26. Dimensions of double boiler models



## 2.2 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.

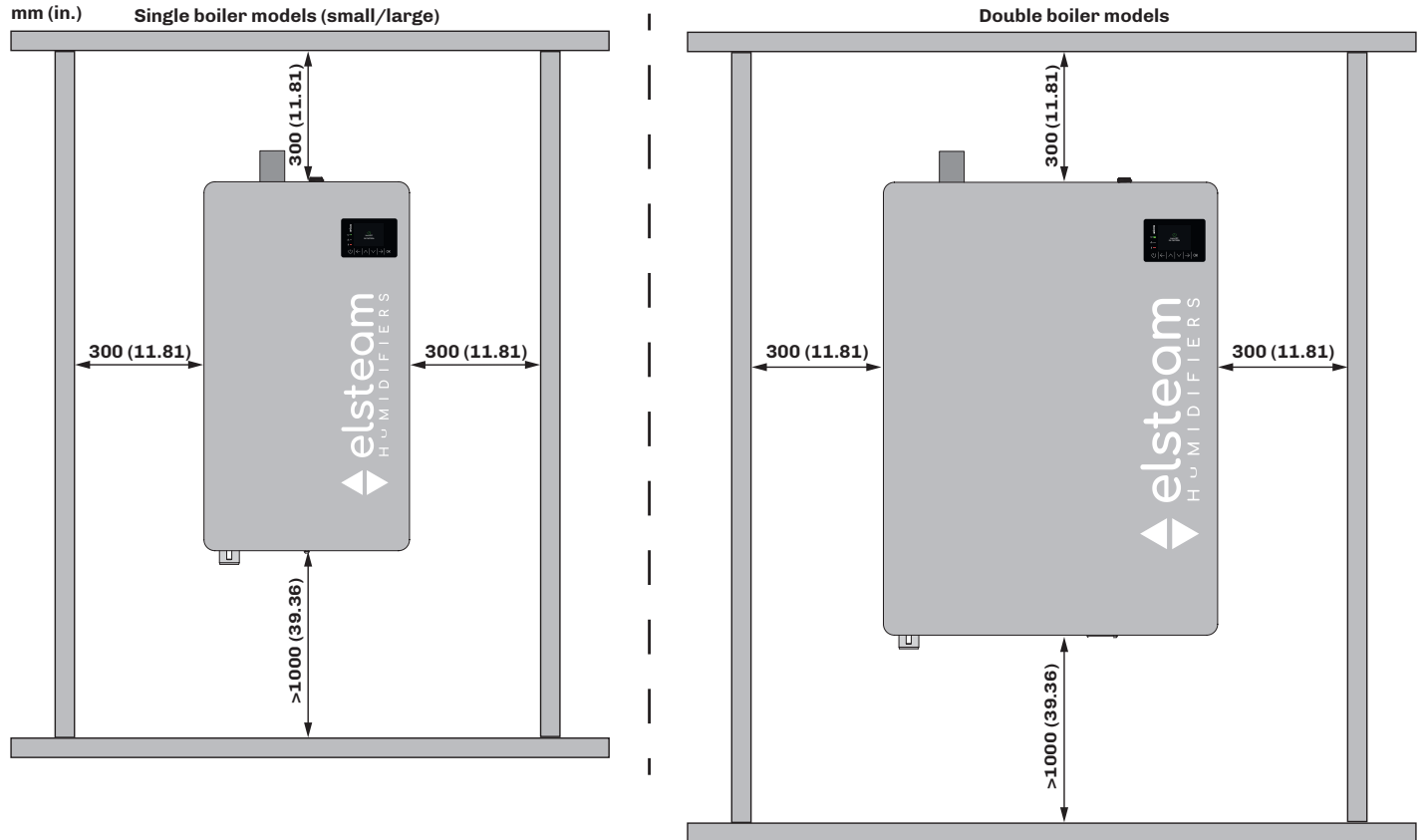
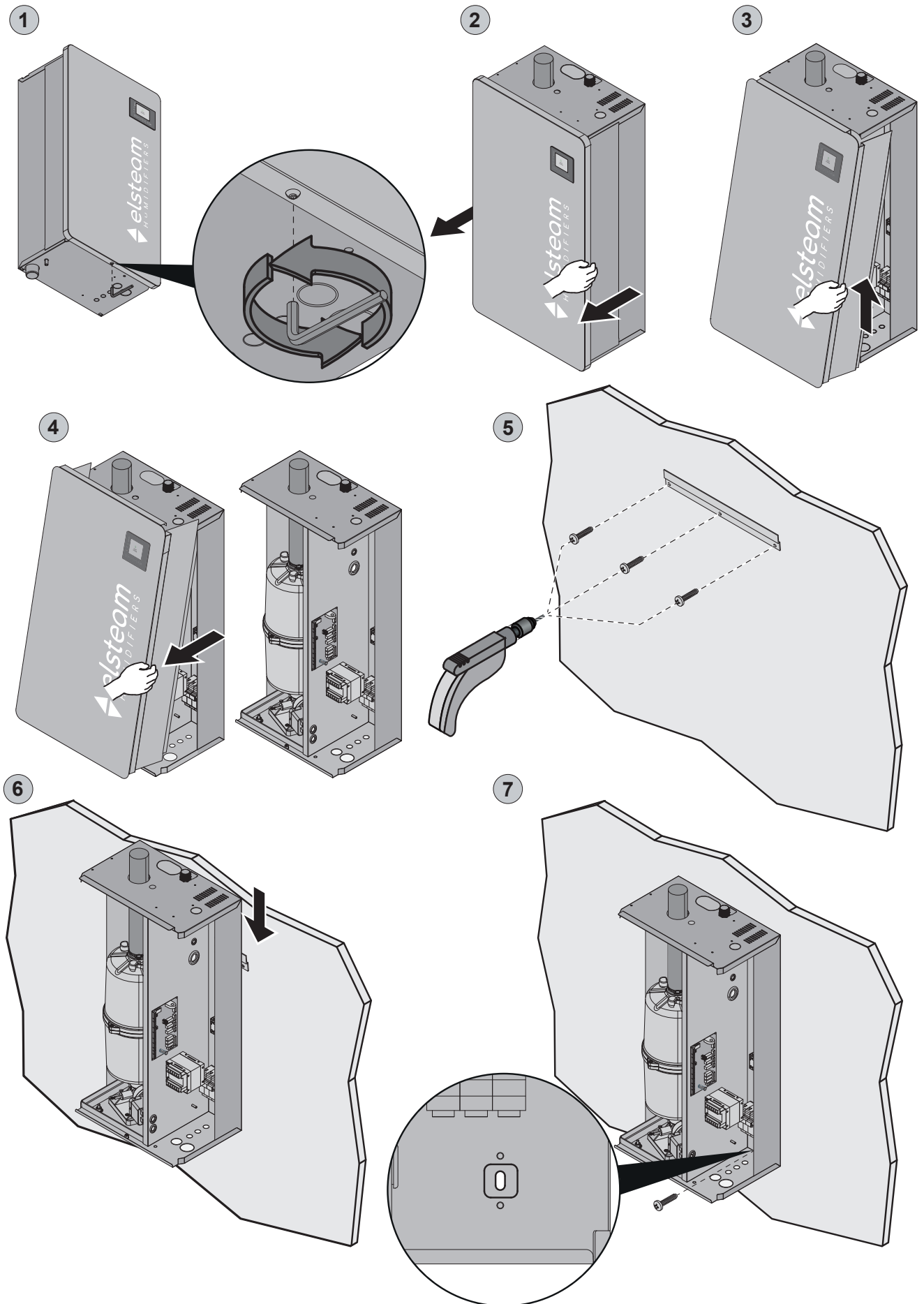


Fig. 27. Minimum installation distances

## 2.3 Installation



**Fig. 28.** Installation instructions

**NOTE:** Double boiler models are installed in the same way as described above.

### 2.3.1 Installation instructions

#### **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 SW2.5 hexagonal grub screw to open the walls of the humidifier;
- Remove the front wall by pulling it towards you and lifting it;
- 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.

### 3. PLUMBING CONNECTIONS AND INSTALLATION

---

#### Chapter content

This chapter contains the following information:

<b>Subject</b>	<b>Page</b>
<i>Humidifier composition</i>	<b>49</b>
<i>Plumbing installation</i>	<b>49</b>
<i>Water drainage system</i>	<b>50</b>
<i>Steam distribution in the AHU or duct</i>	<b>51</b>
<i>Installation overview</i>	<b>53</b>

## 3.1 Humidifier composition

### 3.1.1 Top

- Steam outlet;
- Condensate drain inlet
- 3/4" GAS male water supply fitting.

### 3.1.2 Bottom

- Water outlet for connection to sewage pipes (Ø 40 mm (1.57 in.));
- Water outlet from the bottom tray (Ø 10 mm (0.39 in.));
- Pull resistant cable gland for power supply wiring;
- Pull-resistant cable glands for regulation wiring.

**NOTE:** The EHTC condensate outlet pipe can be used to drain the water into the sewage pipe.

## 3.2 Plumbing installation

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 exceeds 1 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 provide access to the mechanical filter in the inlet solenoid valve to allow it to be cleaned.

### 3.2.1 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 CaCO<sub>3</sub> 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.

**3.3 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.

**3.3.1 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 collection basin at the bottom of the humidifier (p/n **EHVI**) (contact the Elsteam sales office for further information).

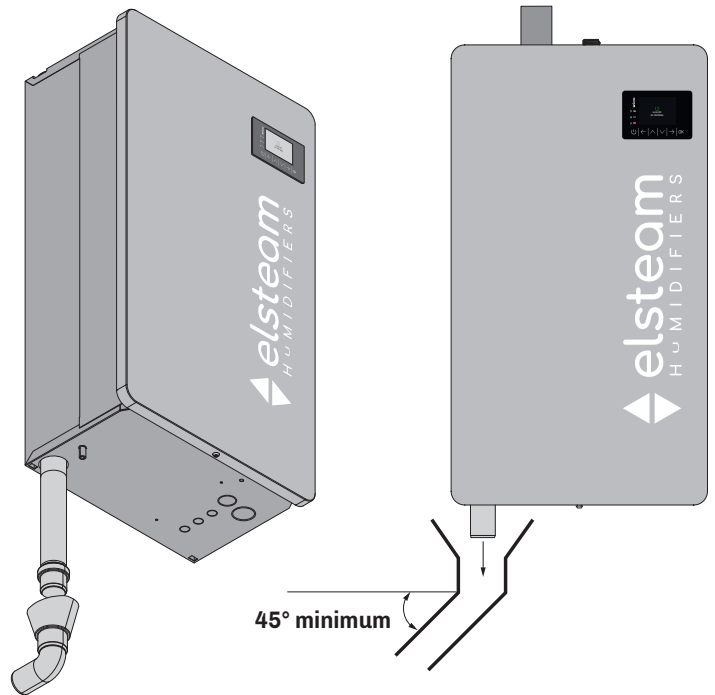
**Basin specifications**

- 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 basin at least twice a year.



**Fig. 29. Drain pipe features**

If the water hardness meets the specifications indicated in section “**3.2.1 WATER SPECIFICATIONS**” **ON PAGE 49**, the basin 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 basin 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.

**3.4 Steam distribution in the AHU or duct**

To distribute the steam inside the ventilation, 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 ISO846 method A and method C, for the purposes of subsequent certification of host systems according to VDI6022-1.

The 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);
- 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 is installed must be insulated, impermeable and drained at the bottom where the steam is distributed.

Maintain a minimum distance of 500 mm 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.

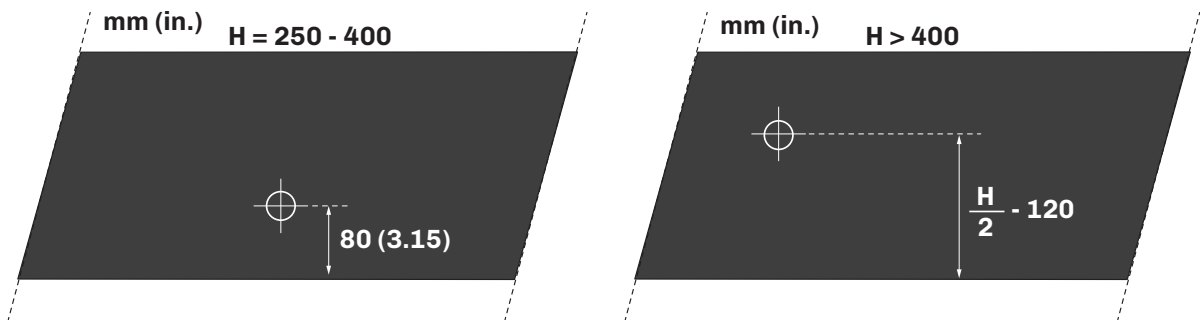
**⚠ WARNING**

**MATERIAL DETERIORATION**

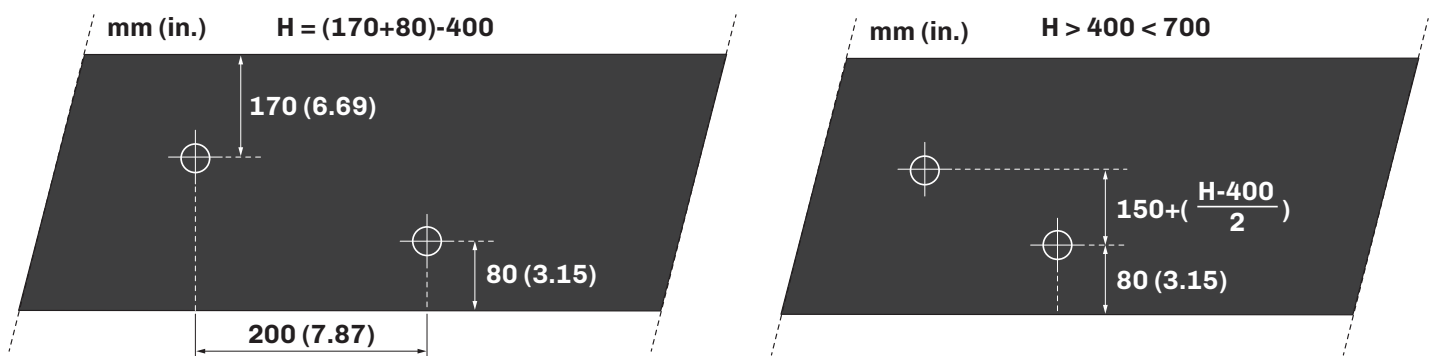
- Fasten the special steam pipe to the boiler and to the stainless steel ramp with stainless steel clamps.
- Only use material that is suitable for the application.

**3.4.1 Permissible distributor positions in the duct**

**Horizontal installation**



**Fig. 30.** Horizontal installation - 1 distributor



**Fig. 31.** Horizontal installation - 2 distributors

**Vertical installation**

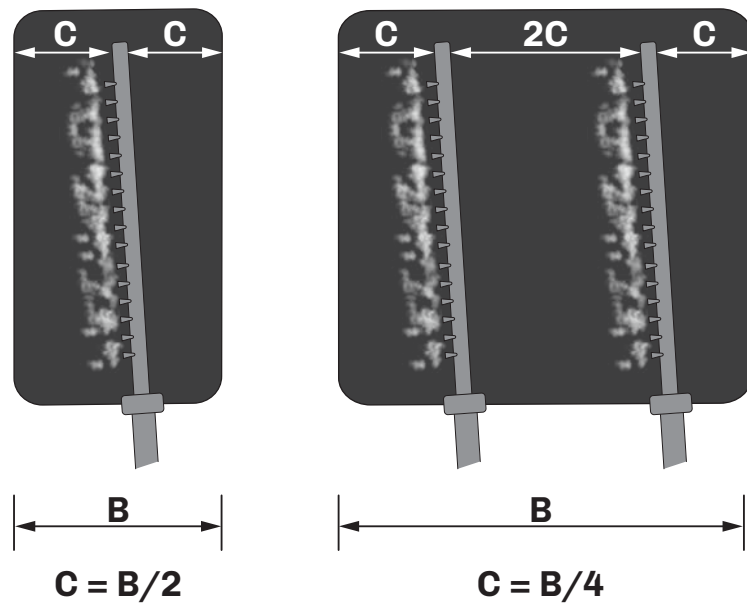
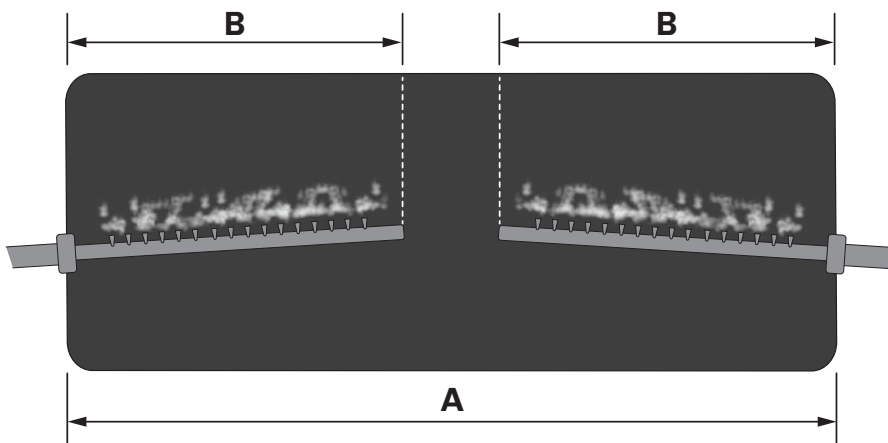


Fig. 32. Vertical installation - 1-2 distributors

Horizontal installation - wide duct



Example:

Ref.	Dimensions
A	2000 mm (6.56 ft)
B	600 mm (1.97 ft) (p/n <b>EHSD060</b> )

Fig. 33. Horizontal installation in a wide duct - 2 distributors



## 3.5 Installation overview

### 3.5.1 Typical installation for humidification in the duct

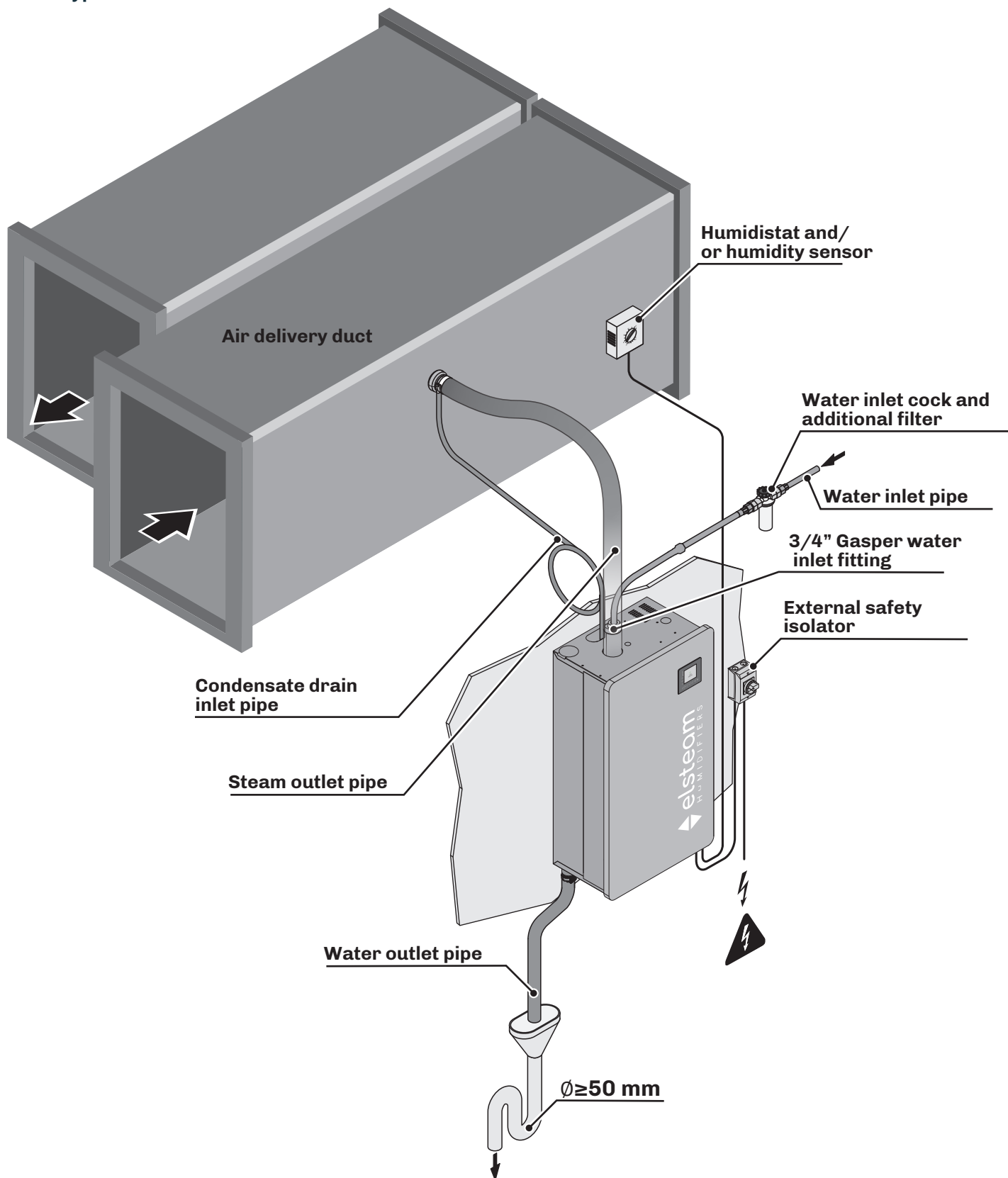
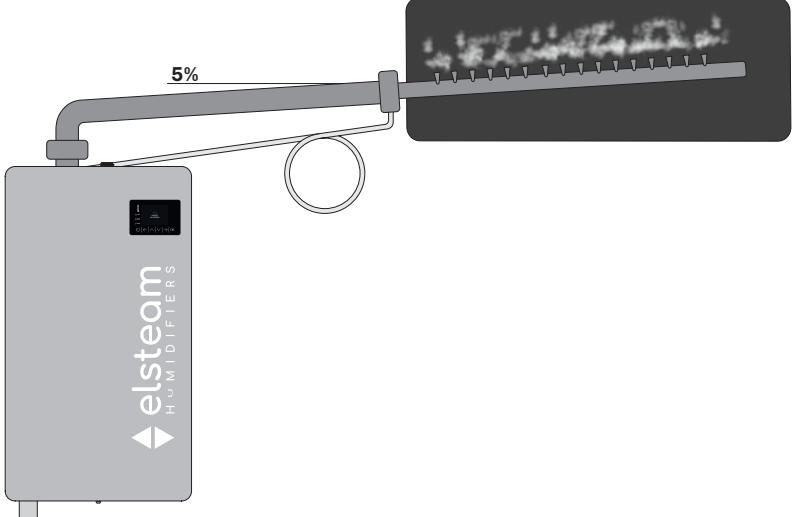
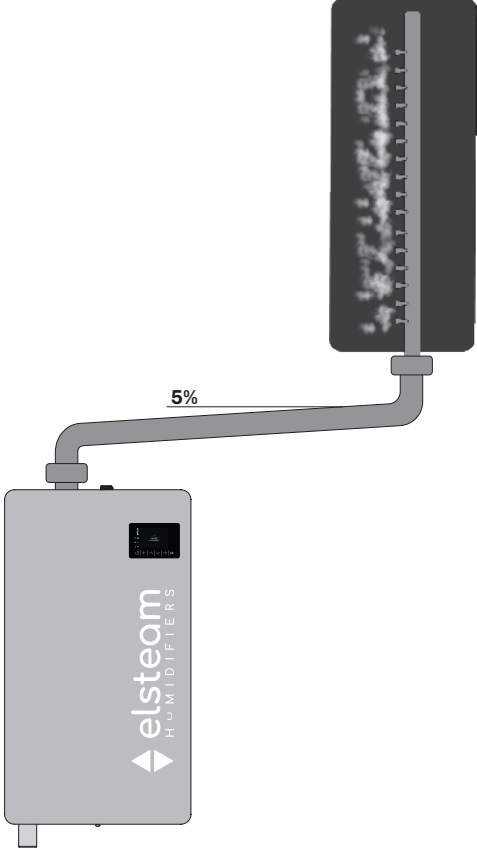
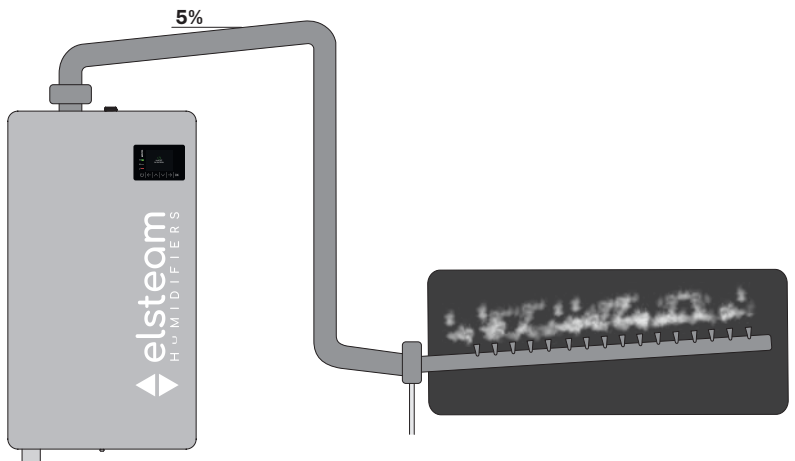
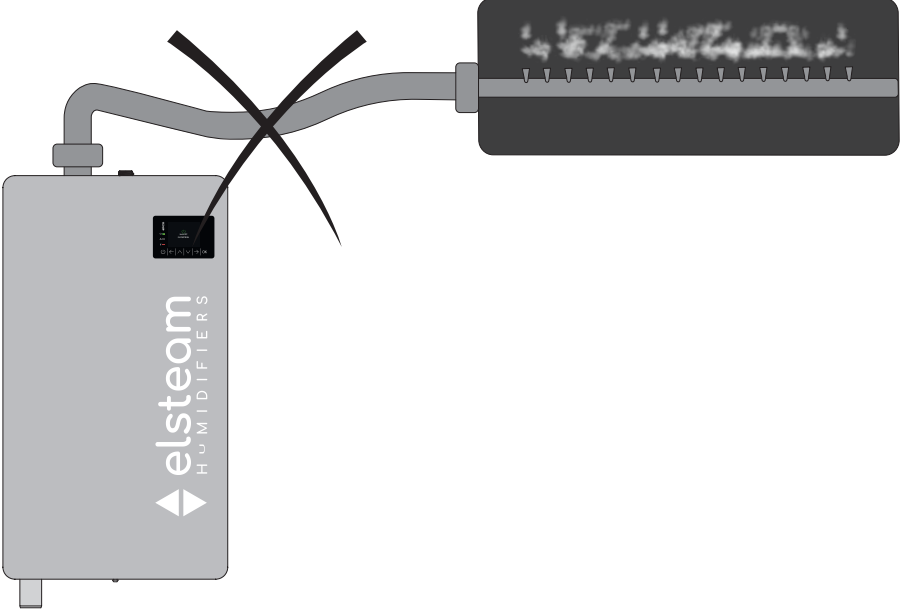


Fig. 34. Typical installation for humidification in the duct

### 3.5.2 Examples of distributor installation in the duct

Description	Example
<p><b>Installation example no. 1</b>            Distributor installed in a horizontal duct, higher than the humidifier.            Air flow direction is not important.</p>	
<p><b>Installation example no. 2</b>            Distributor installed vertically in a horizontal duct, higher than the humidifier.            Air flow in the direction of the ramp slope.  <b>NOTE:</b> Plug the condensate outlet on the ring nut side.</p>	
<p><b>Installation example no. 3</b>            Distributor installed in a horizontal duct, lower than the humidifier.</p>	

Description	Example
<p><b>Example of incorrect installation</b></p> <p>The delivery pipe must have no condensation pockets.</p>	

### 3.5.3 Distribution in the room

To vaporise directly into the room without the aid of ventilation ducts, install the ventilated distributor, p/n **EHSR015M2**. Visit the website [www.elsteam.it](http://www.elsteam.it) for further information.

Position the ventilated distributor horizontally, with the distribution holes pointing upward, at least 1 metre from any condensation points.

#### **WARNING**

##### **RISK OF BURNS**

The ventilated distributor must be installed so that it cannot be accessed by unauthorised persons.

#### **WARNING**

##### **HOT WATER VAPOUR**

Do not touch the equipment while it is running.

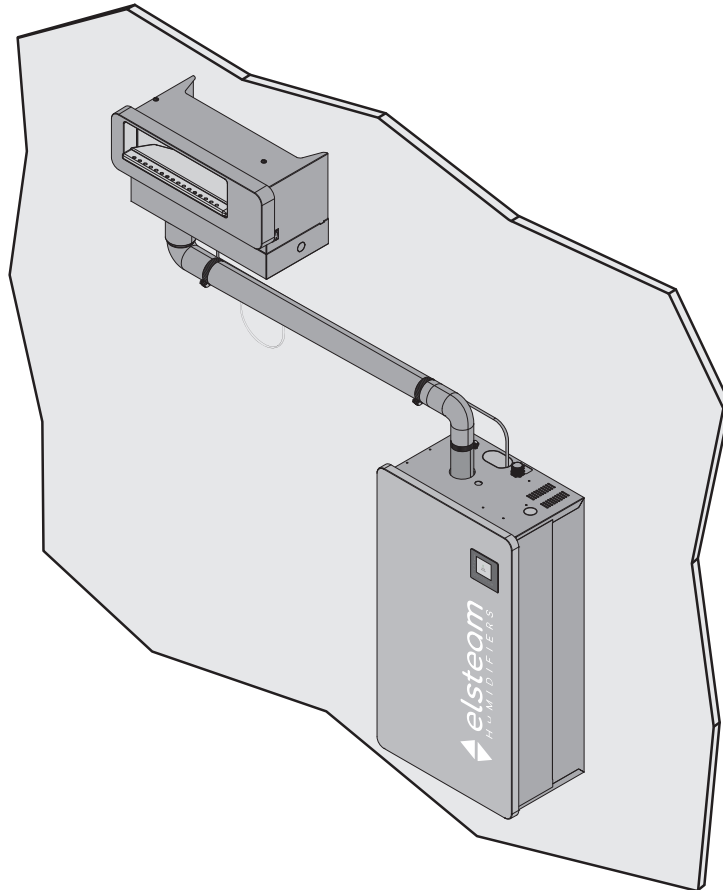
It must be at least 1 m (3.28 ft.) from the ceiling.

##### **Ventilated distributor power supply**

- **230 Vac models:** These must be powered directly from the fuse holder base.
- **Other models:** These must be powered directly from the 230 Vac mains line.

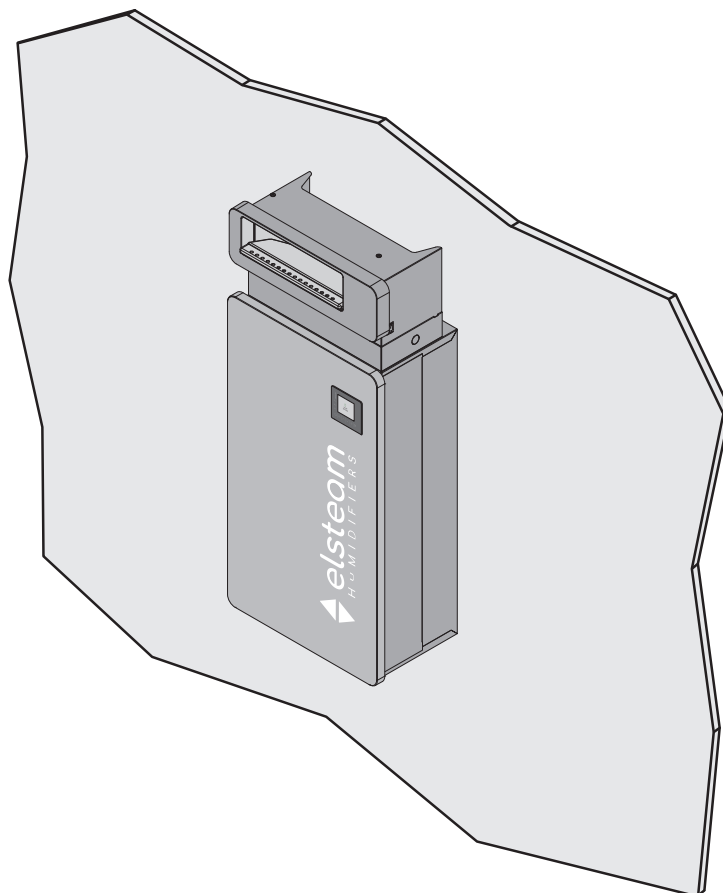
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**Remote ventilated steam distributor**



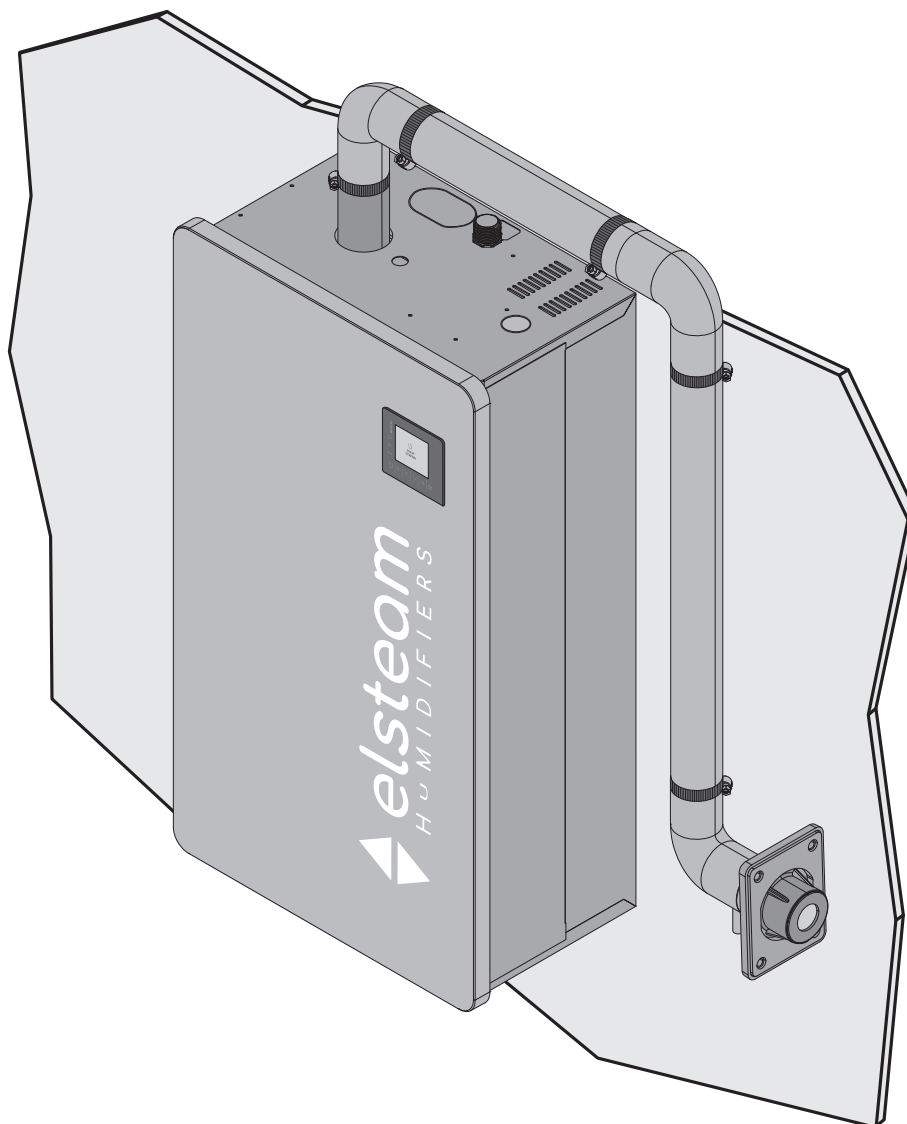
**Fig. 35.** Remote ventilated steam distribution

**Ventilated steam distributor above the humidifier**

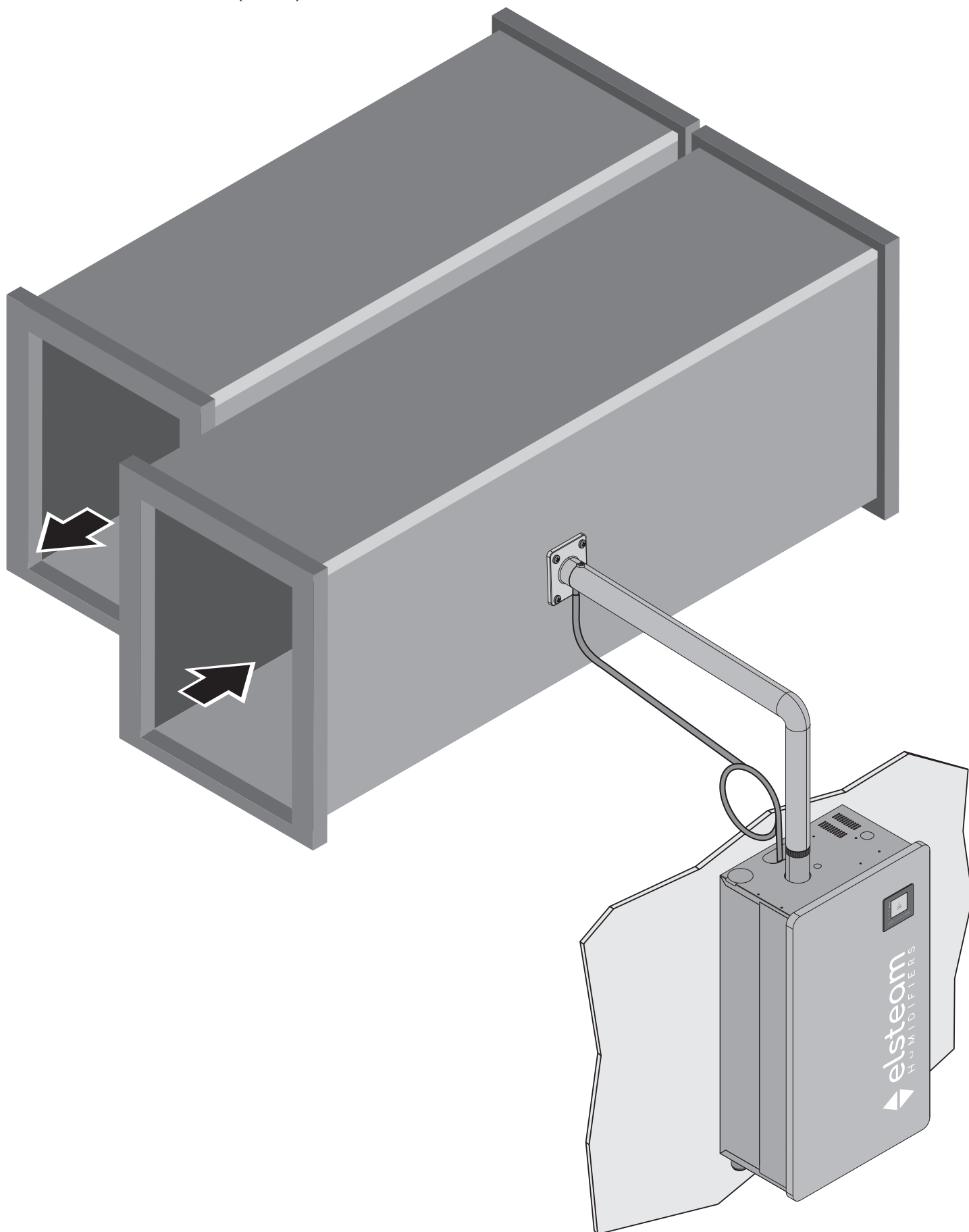


**Fig. 36.** Local ventilated steam distribution

Steam distributor with nozzle (in wellness setting)



**Fig. 37.** Steam distributor with nozzle (in wellness setting)



**Fig. 38.** Steam distributor with nozzle (in duct)

## 4. ELECTRICAL CONNECTIONS

---

### Chapter content

This chapter contains the following information:

<b>Subject</b>	<b>Page</b>
<b><i>Before you start</i></b>	<b>60</b>
<b><i>Best connection practices</i></b>	<b>60</b>
<b><i>Suitable power supply protection devices</i></b>	<b>62</b>
<b><i>Electrical connections</i></b>	<b>65</b>
<b><i>Cable glands and cable routing</i></b>	<b>71</b>
<b><i>Serial line connections</i></b>	<b>72</b>

## 4.1 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.

## 4.2 Best connection practices

### 4.2.1 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**

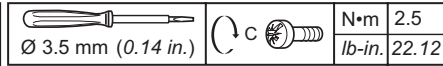
Make sure all the equipment used and systems designed conform to current local, regional and national standards.



## Maximum power supply wiring

### Step 17.8 mm (0.70 in.)

$\frac{\text{mm}}{\text{in.}}$ 7 0.28			
mm <sup>2</sup>	16	16	16
AWG	8	8	8
no. of conductors	2		



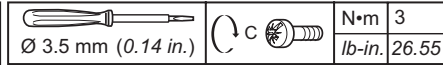
#### Applicable to models ...

EHK•003M2 / EHK•003T2 / EHK•003T4 /  
EHK•005M2 / EHK•005T2 / EHK•005T4 /  
EHK•010T4 / EHK•010T2 / EHK•015T4

**Fig. 39.** Maximum power supply wiring - See the table for the models

### Step 26.5 mm (1.04 in.)

$\frac{\text{mm}}{\text{in.}}$ 7 0.28			
mm <sup>2</sup>	35	25	25
AWG	8	6	6
no. of conductors	3		



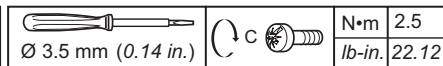
#### Applicable to models ...

EHK•015T2

**Fig. 40.** Maximum power supply wiring - EHK•015T2

### Step 17.8 mm (0.70 in.)

$\frac{\text{mm}}{\text{in.}}$ 7 0.28			
mm <sup>2</sup>	16	16	16
AWG	8	8	8
no. of conductors	2		



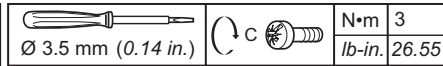
#### Applicable to models ...

EHK•020T4

**Fig. 41.** Maximum power supply wiring - EHK•020T4

### Step 26.5 mm (1.04 in.)

$\frac{\text{mm}}{\text{in.}}$ 7 0.28			
mm <sup>2</sup>	35	25	25
AWG	8	6	6
no. of conductors	3		



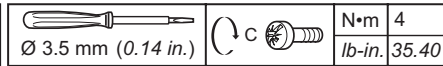
#### Applicable to models ...

EHK•020T2 / EHK•030T4 / EHK•040T4

**Fig. 42.** Maximum power supply wiring - EHK•020T2 / EHK•030T4 / EHK•040T4

### Step 35.5 mm (1.40 in.)

$\frac{\text{mm}}{\text{in.}}$ 7 0.28			
mm <sup>2</sup>	50	35	35
AWG	1	2	2
no. of conductors	4		



#### Applicable to models ...

EHK•060T4 / EHKX080T4 / EHKX100T4

**Fig. 43.** Maximum power supply wiring - EHK•060T4 / EHKX080T4 / EHKX100T4

## Suitable wiring for the power supply

P/n EHKT	P/n EHKX	Wiring size	Permissible wiring type	Pitch [mm(in.)]		
EHKT003M2	EHKX003M2	2G4		17.8 (0.70)		
EHKT003T2	EHKX003T2	3G2.5				
EHKT003T4	EHKX003T4	3G2.5				
EHKT005M2	EHKX005M2	2G10				
EHKT005T2	EHKX005T2	3G4				
EHKT005T4	EHKX005T4	3G2.5				
EHKT010T2	EHKX010T2	3G4				
EHKT010T4	EHKX010T4	3G10				
EHKT015T4	EHKX015T4	3G16				
EHKT015T2	EHKX015T2	3G6				
EHKT020T2	EHKX020T2	3G10				26.5 (1.04)
EHKT020T4	EHKX020T4	3G16				
EHKT030T4	EHKX030T4	3G16				
EHKT040T4	EHKX040T4	3G16				
EHKT060T4	EHKX060T4	3G25				
	EHKX080T4	3G35		35.5 (1.40)		
	EHKX100T4	3G50				

### 4.3 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.


	EHK● 003M2	EHK● 003T2	EHK● 003T4	EHK● 005M2	EHK● 005T2	EHK● 005T4	EHK● 010T4	EHK● 010T2	EHK● 015T4	EHK● 015T2	EHK● 020T4	EHK● 020T2	EHK● 030T4	EHK● 040T4	EHK● 060T4	EHKX 080T4	EHKX 100T4
Current	16	10	10	32	16	10	16	32	32	50	32		50		100		125
Type	Rapid			Rapid			Rapid			Rapid	Rapid	Rapid			Rapid		
Size	10x38			10x38			10x38			14x51	10x38	14x51			22x58		

Fig. 44. Overload protection devices according to model

#### 4.3.1 Changing fuses - Fuse holder base (single-phase models)

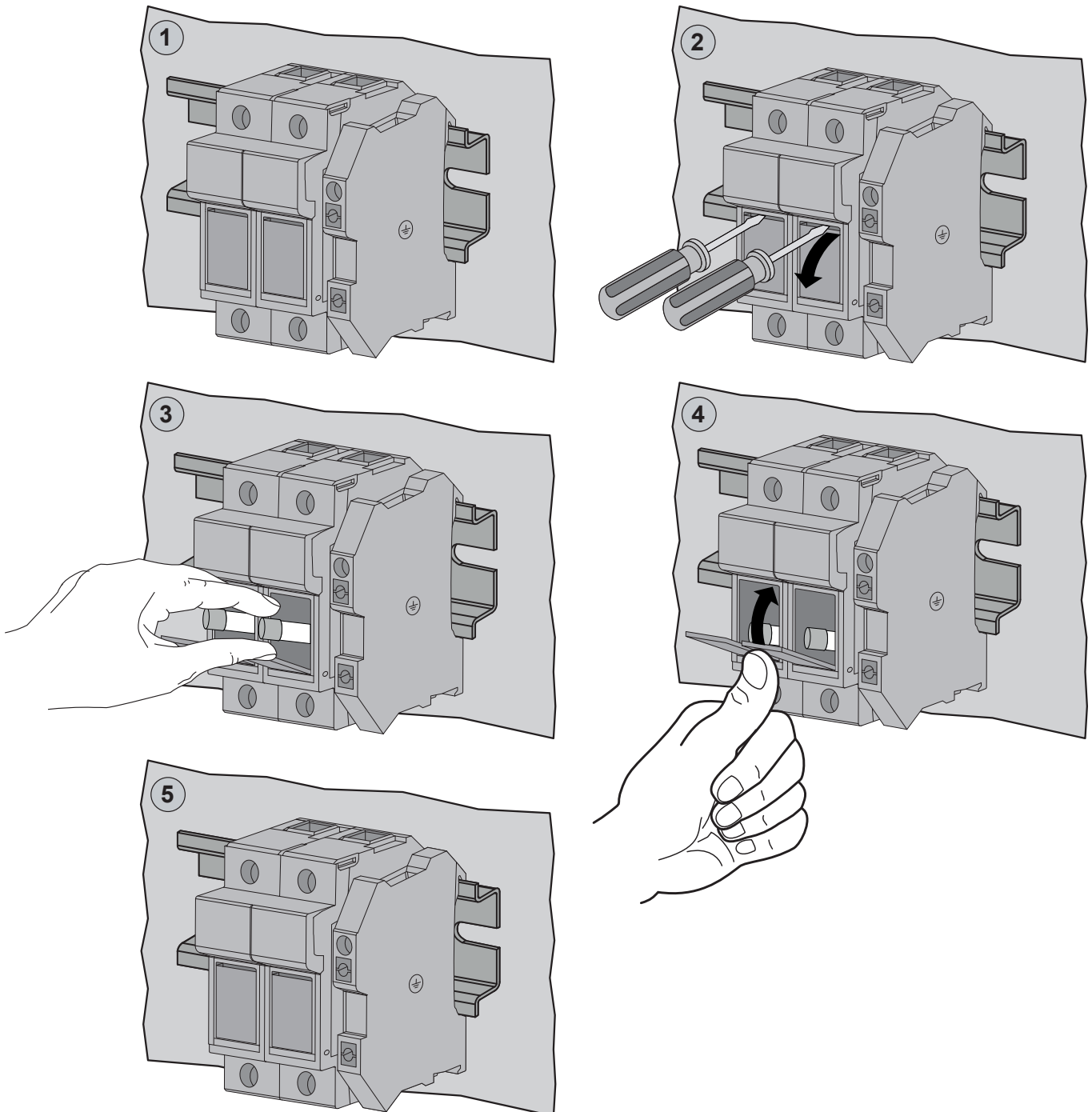
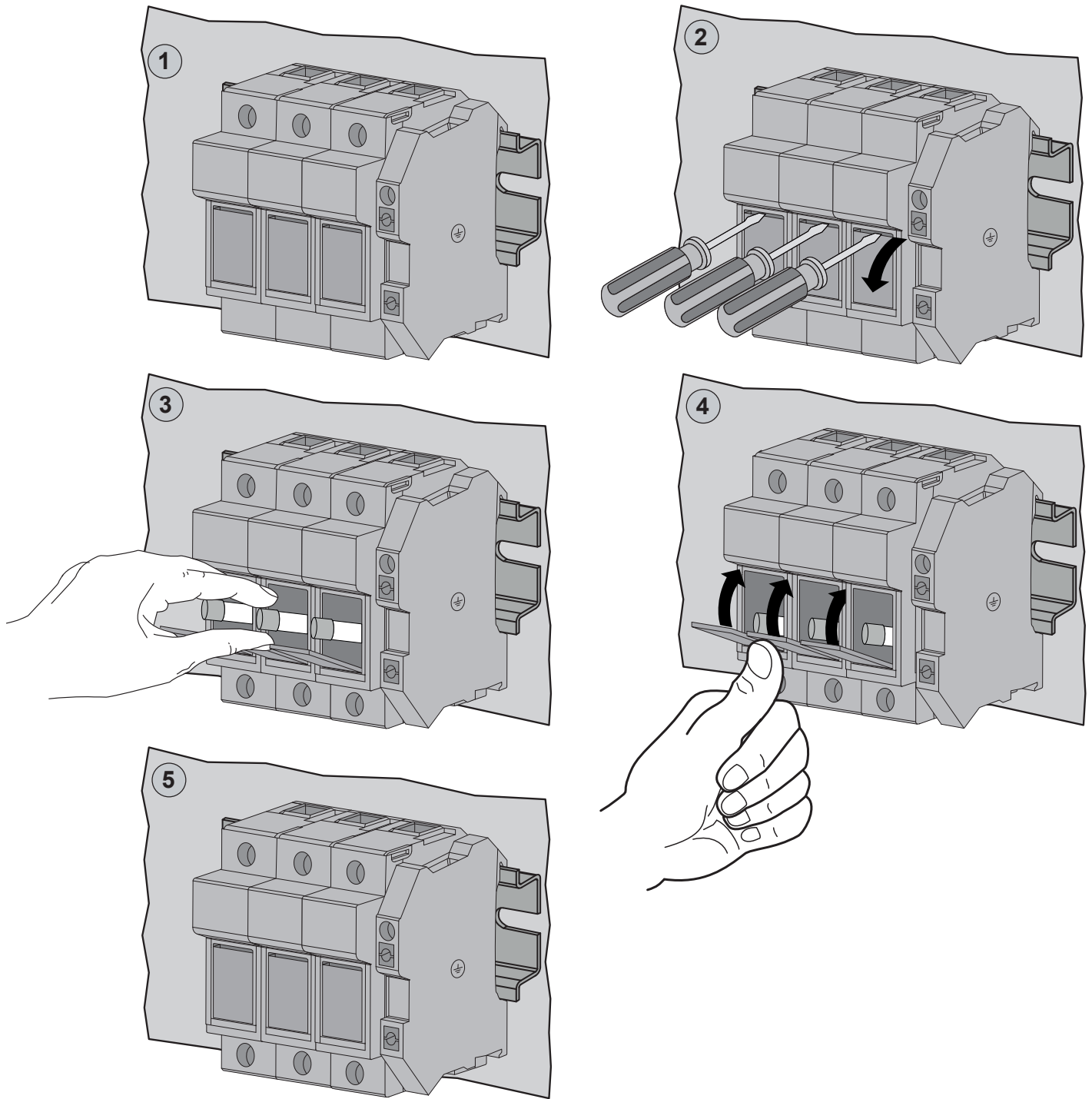


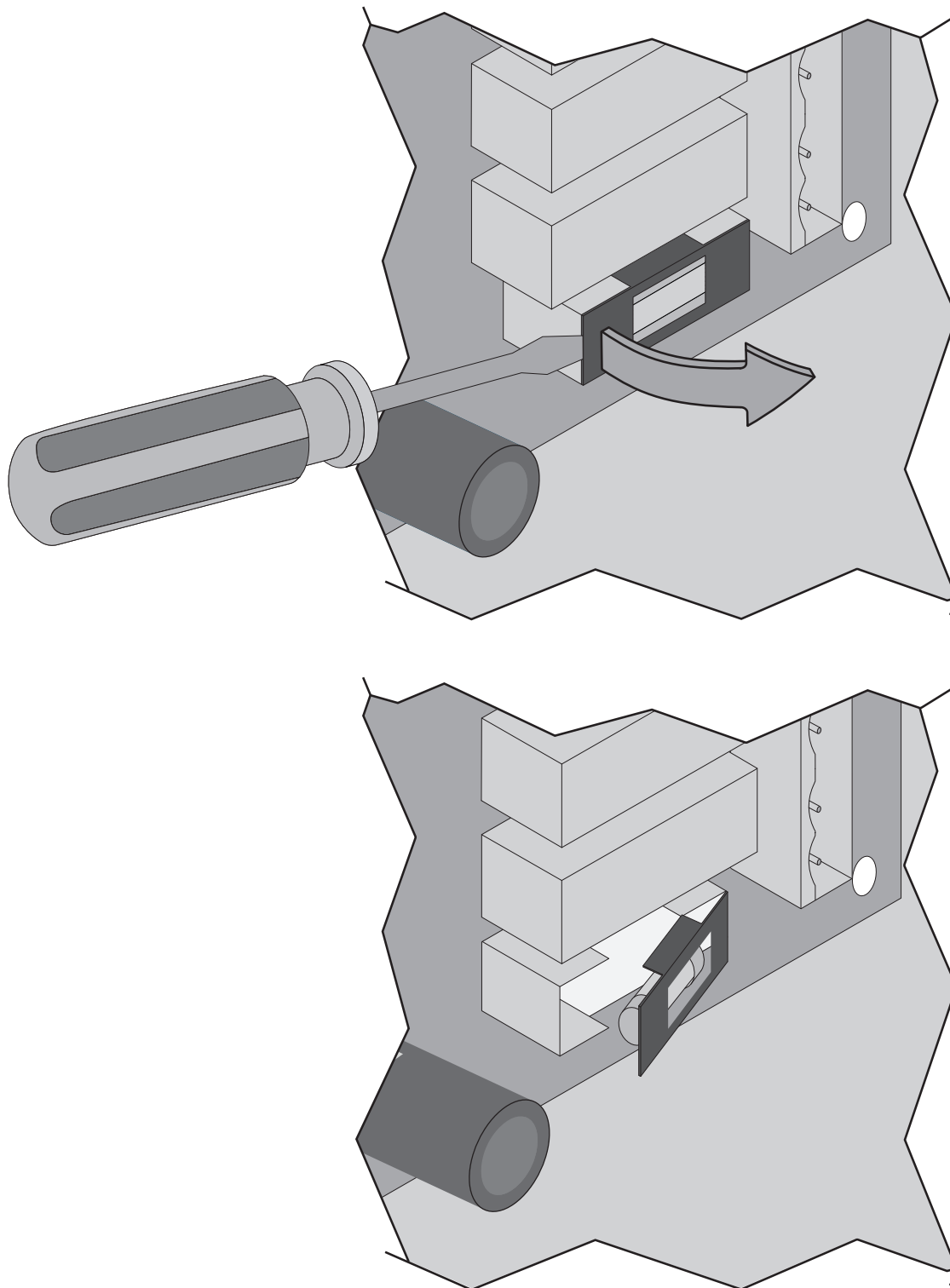
Fig. 45. Overload protection device

### 4.3.2 Changing fuses - Fuse holder base (three-phase models)



**Fig. 46.** Overload protection device

### 4.3.3 Changing fuses - Control board

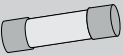


*Fig. 47. Protection devices on the control board*

#### 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

## 4.4 Electrical connections

### 4.4.1 Control board

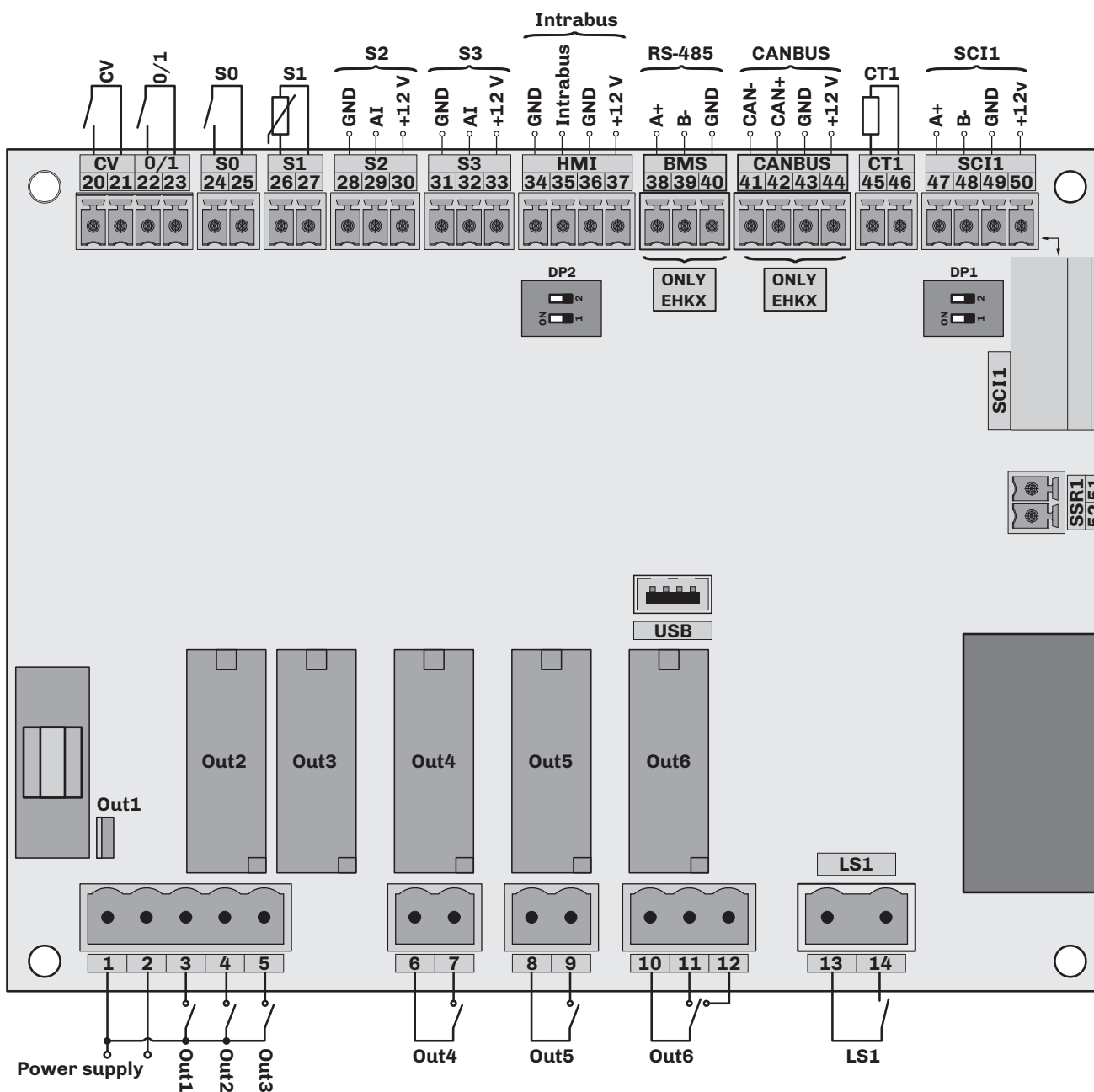


Fig. 48. Control board electrical connections

TERMINALS	
1-2	24 Vac power supply
1-3	Digital output: water outlet solenoid valve
1-4	Digital output: water outlet pump
1-5	Digital output: contactor (steam generation)
6-7	Digital output: humidification enable
8-9	Digital output: ventilated distributor control
10...12	Digital output: alarm
13-14	Hazardous voltage digital input: level sensor <b>LS1</b>
20-21	Digital input: fan enable ( <b>CV</b> )
22-23	Digital input: remote ON/OFF (0/1)
24-25	Digital input: humidistat ( <b>CFG</b> = 0) ( <b>S0</b> )
26-27	<b>S1</b> analogue input: temperature (anti-freezing and hold)
28...30	<b>S2</b> analogue input: humidity sensor
31...33	<b>S3</b> analogue input: humidity limit sensor
34...36	Serial line connection: HMI Intrabus
38...40	Serial line connection: RS-485 modbus for BMS slave ( <b>EHKX</b> only)
41...44	Serial line connection: CANBUS ( <b>EHKX</b> only)
45-46	Analogue connection: external current sensor <b>CT1</b> (TA)
47...50	Connection to expansion board <b>SCI1</b>
51-52	Reserved
<b>DP1</b>	Activate termination resistor on <b>SCI1</b> RS-485 serial line. 1 = <b>SCI1</b> RS-485 serial termination; 2 = Reserved
<b>DP2</b>	Termination resistor on <b>BMS</b> / <b>CANBUS</b> RS-485. 1 = <b>BMS</b> RS-485 serial termination 2 = <b>CANBUS</b> serial termination

#### 4.4.2 Expansion

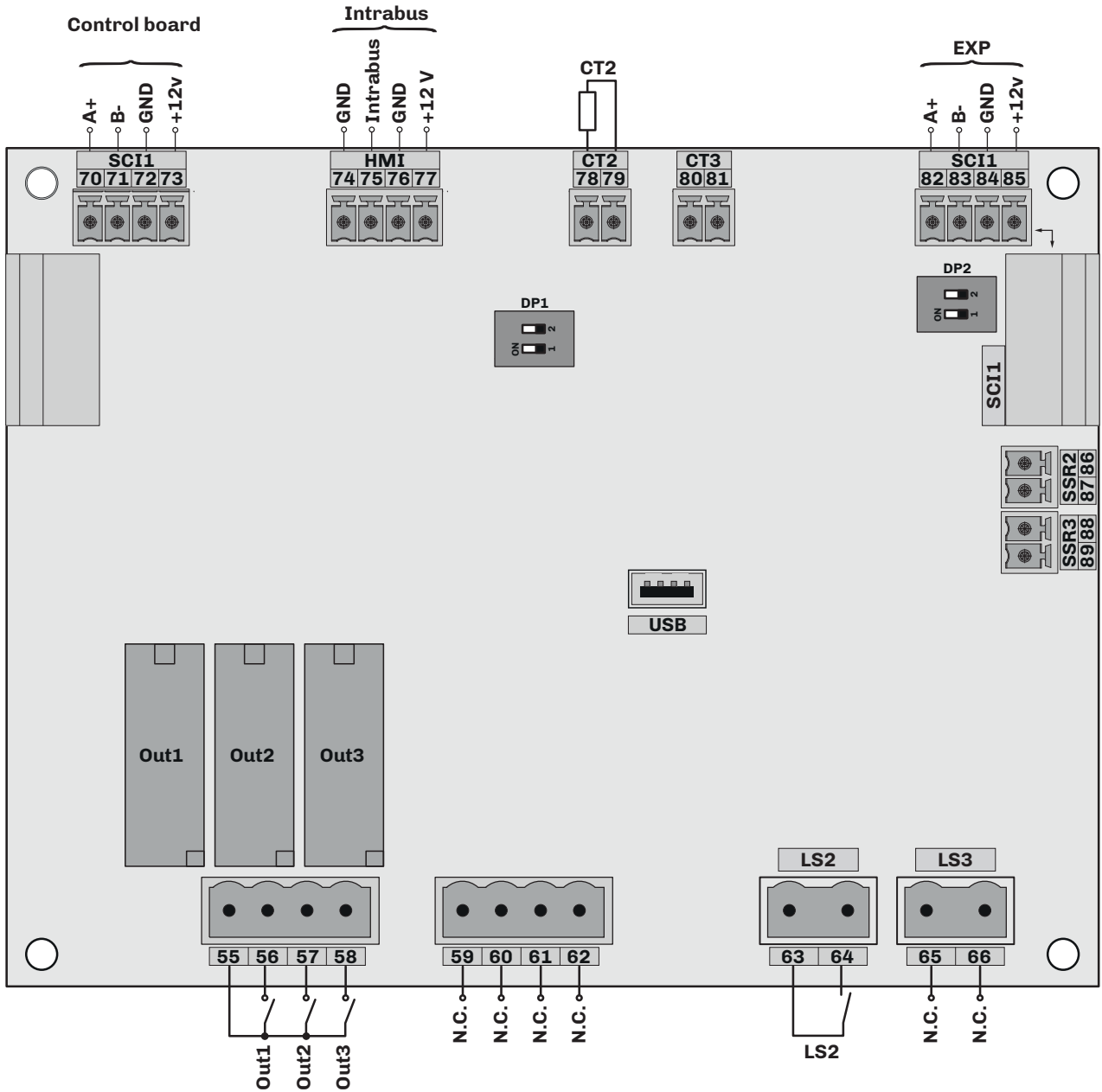


Fig. 49. Expansion electrical connections

TERMINALS	
55-56	Digital output: boiler 2 water outlet solenoid valve
55-57	Digital output: boiler 2 water outlet pump
55-58	Digital output: electrodes (steam generation)
63-64	Hazardous voltage digital input: level sensor LS12
70...73	Connection to control board SC11
74...77	Serial line input: HMI Intrabus
78-79	Analogue input: external current sensor CT2 (TA) for boiler 2
80-81	Reserved
82...85	Connection to expansion board SC11
	Modbus communication address of expansion board
	1 2 Address offset relative to LA1
DP1	OFF OFF LA1 + 0
	OFF ON LA1 + 1
	ON OFF LA1 + 2
	ON ON LA1 + 3
DP2	Activate termination resistor on SC11 RS-485 serial line. 1 = SC11 RS-485 serial termination; 2 = Reserved

## 4.5 Configurations

### 4.5.1 ON/OFF connection with humidistat or external contact

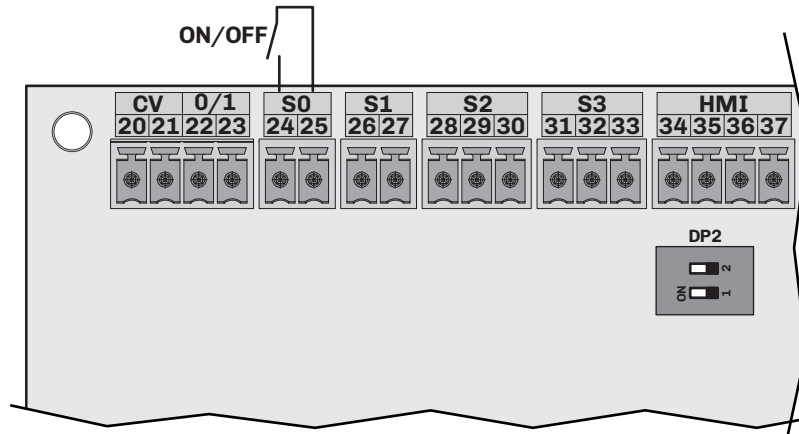


Fig. 50. ON/OFF connection with humidistat or external contact

### 4.5.2 External proportional humidistat connection with signal 0...10 V

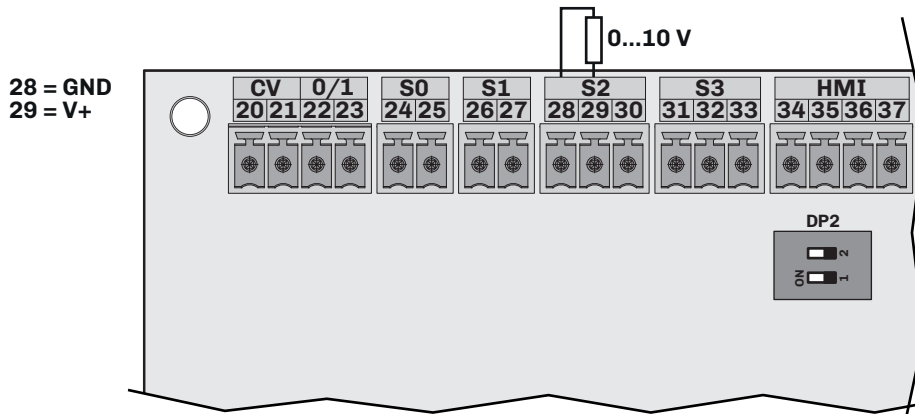


Fig. 51. External proportional humidistat connection with signal 0...10 V

### 4.5.3 Humidity sensor connection 4...20 mA

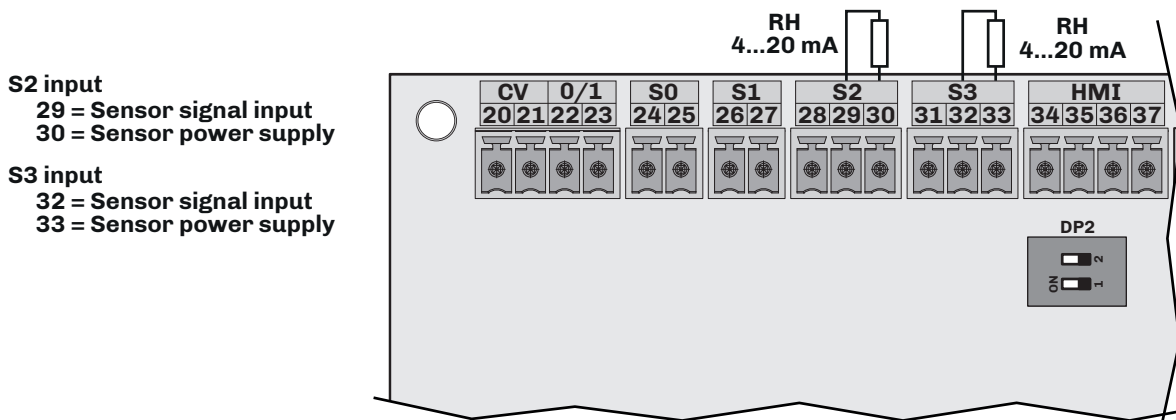


Fig. 52. Humidity sensor connection 4...20 mA

#### 4.5.4 Humidity sensor connection 0...20 mA

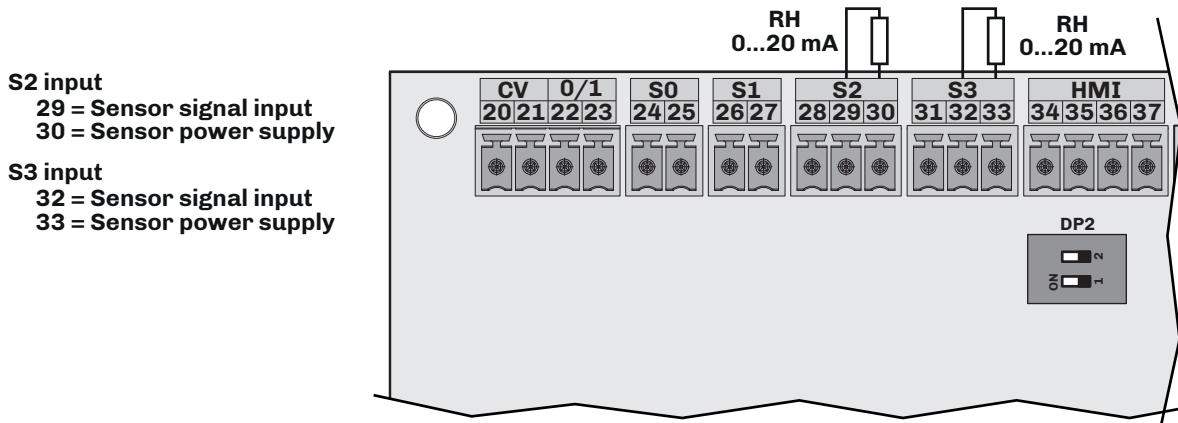


Fig. 53. Humidity sensor connection 0...20 mA

#### 4.5.5 Humidity sensor connection 0...10 V

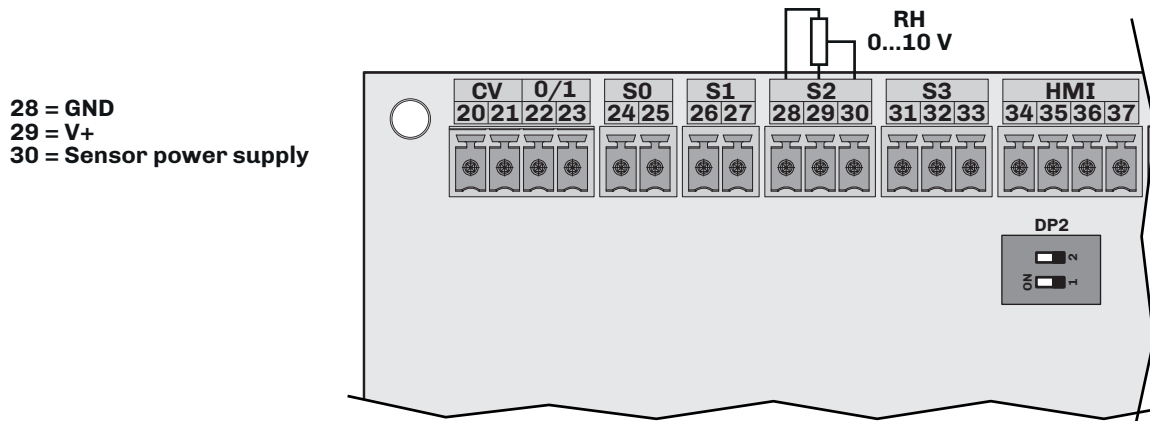


Fig. 54. Humidity sensor connection 0...10 V

#### 4.5.6 Humidity sensor connection 0...5 V

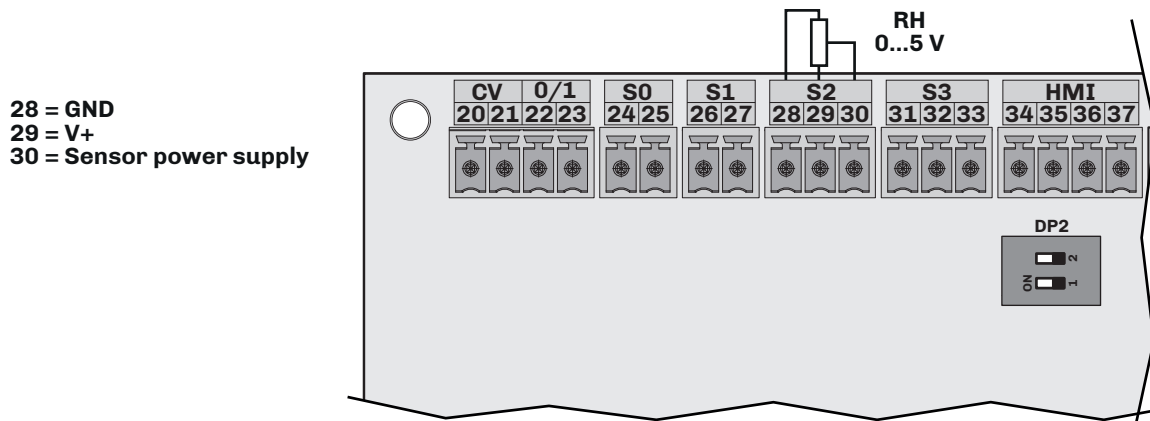


Fig. 55. Humidity sensor connection 0...5 V



#### 4.5.7 EVHTP520 humidity sensor connection

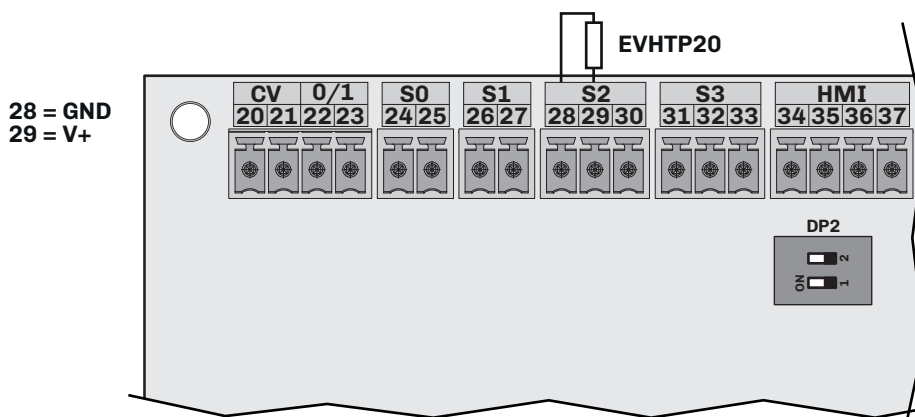


Fig. 56. EVHTP520 humidity sensor connection

#### 4.5.8 NTC/PTC/Pt1000 resistive sensor connection

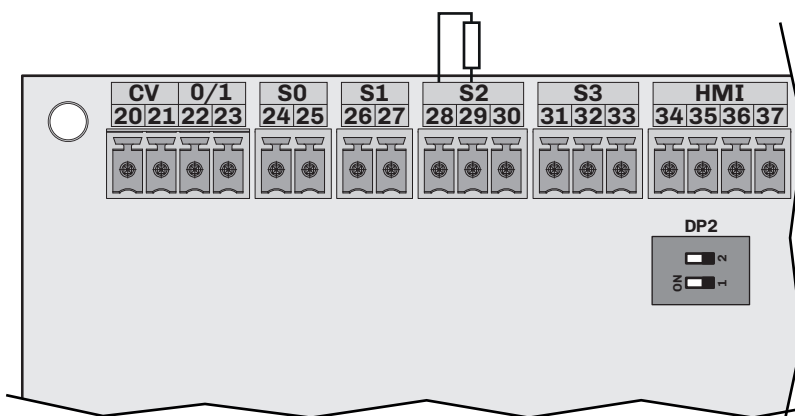
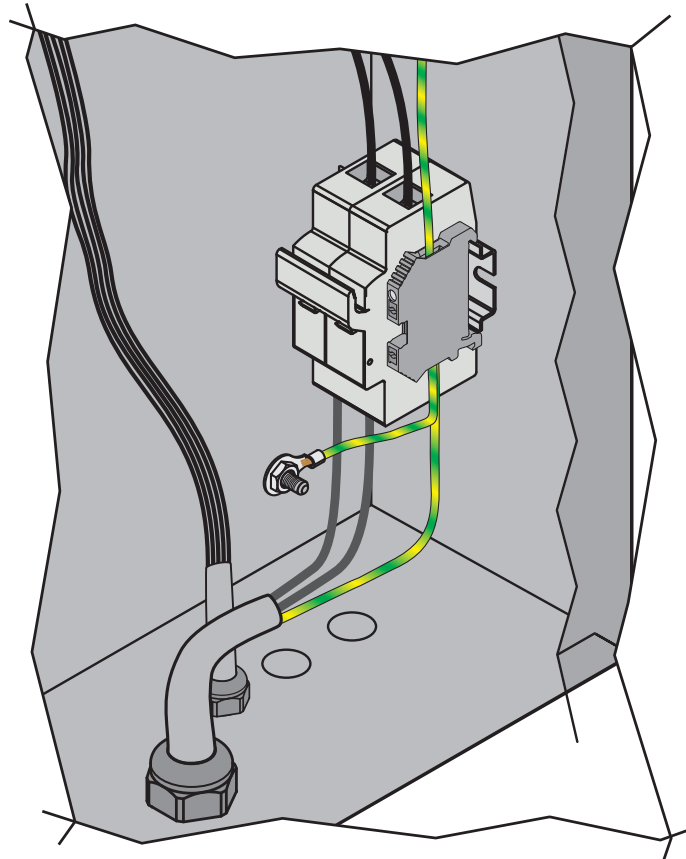


Fig. 57. NTC/PTC/Pt1000 resistive sensor connection

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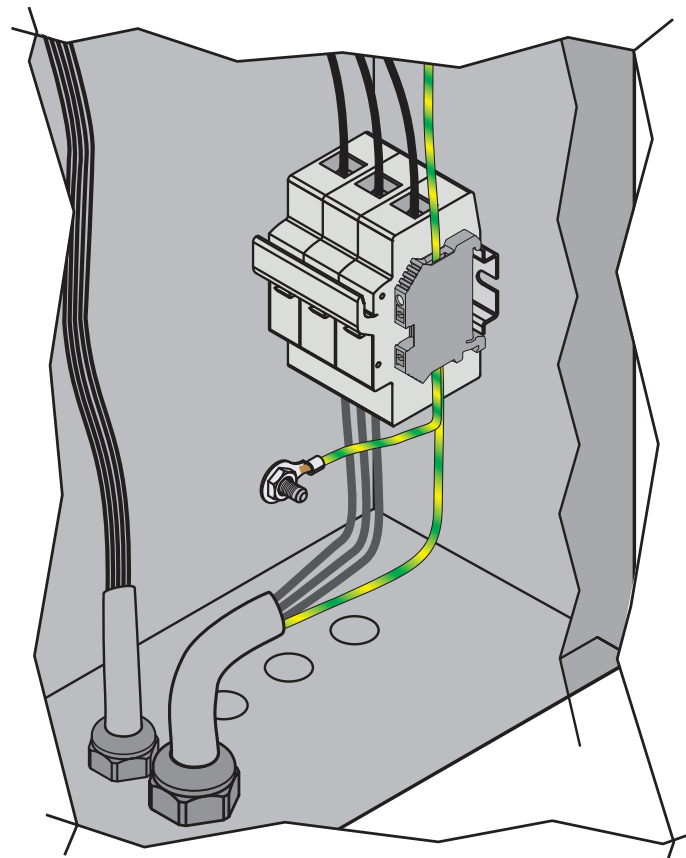
## 4.6 Power supply and earth wiring connection

### 4.6.1 Single-phase models



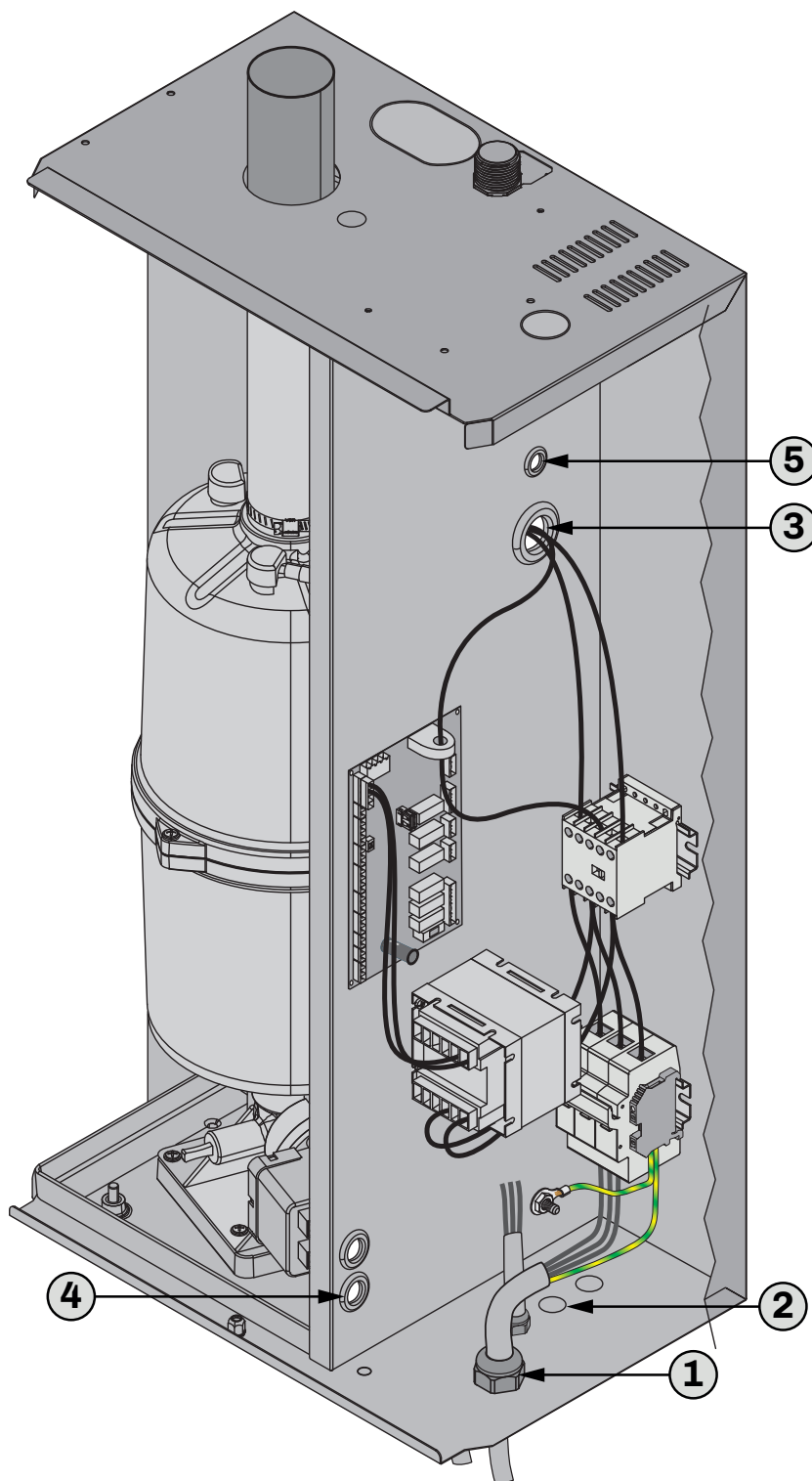
**Fig. 58.** Power supply connections - single-phase models

### 4.6.2 Three-phase models



**Fig. 59.** Power supply connections - three-phase models

## 4.7 Cable glands and cable routing



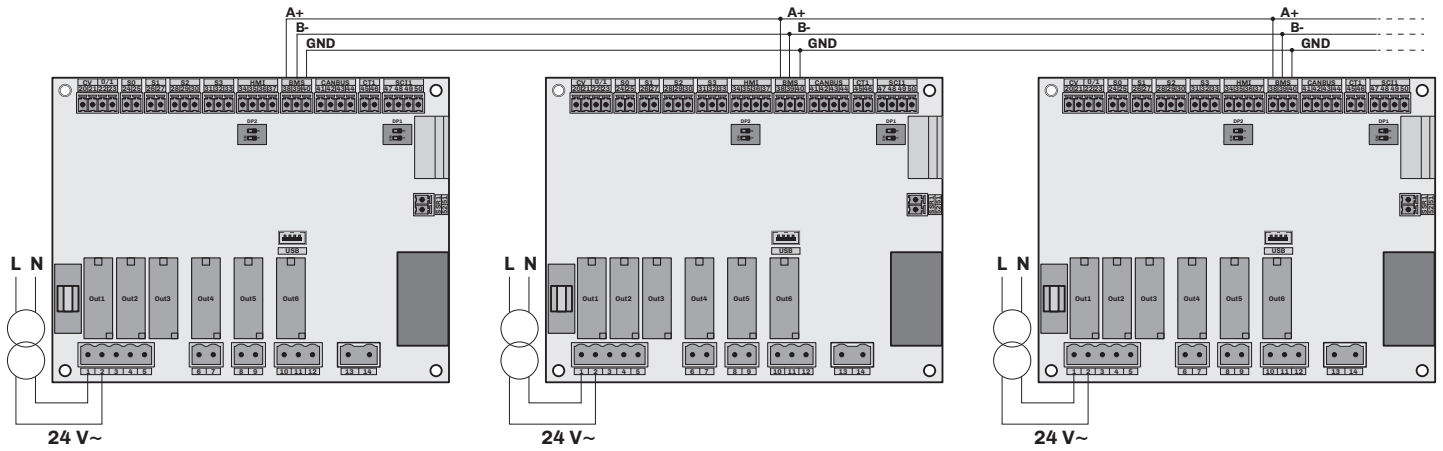
**Fig. 60.** Cable glands and cable routing

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

## 4.8 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

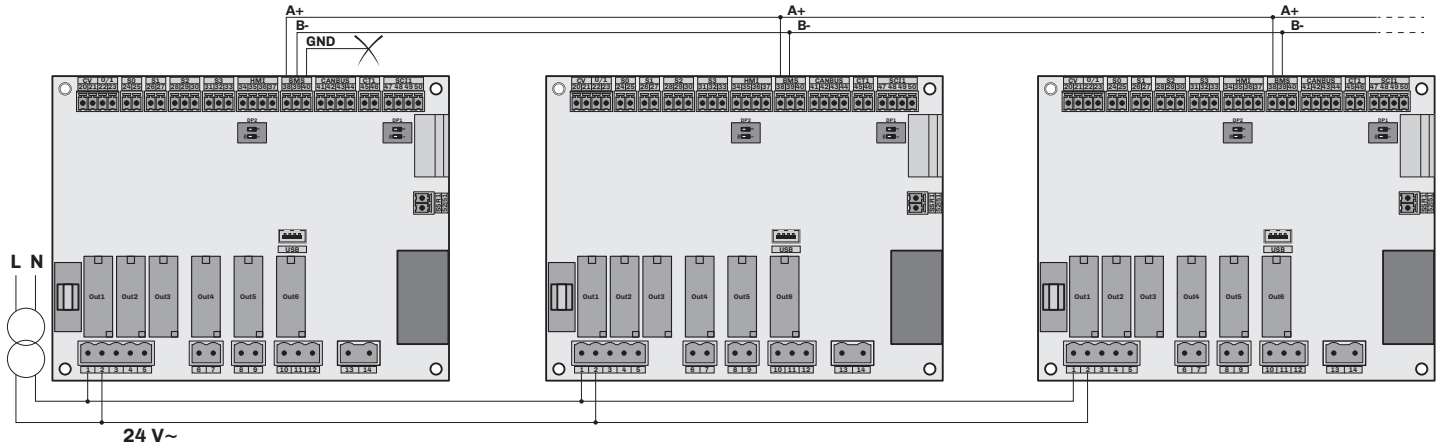


Fig. 61. Serial line connections

## 5. POWER-UP AND START-UP

---

### Chapter content

This chapter contains the following information:

<b>Subject</b>	<b>Page</b>
<i>First start-up instructions</i>	<b>74</b>
<i>Seasonal or long-term shut-down instructions</i>	<b>74</b>
<i>Start-up after a seasonal or long-term shut-down</i>	<b>75</b>

## 5.1 First start-up instructions

### **DANGER**

#### **RISK OF ELECTRIC SHOCK, EXPLOSION OR ELECTRIC ARC**

- Do not install the equipment while the power supply is connected.
- Cut off the power supply to all equipment 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.

### **NOTICE**

#### **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.

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 **"3.2 PLUMBING INSTALLATION" ON PAGE 49**, **"3.3 WATER DRAINAGE SYSTEM" ON PAGE 50** and **"3.4 STEAM DISTRIBUTION IN THE AHU OR DUCT" ON PAGE 51**);
- Let the water 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 **"4.4 ELECTRICAL CONNECTIONS" ON PAGE 65**);
- Check that the **CV** contact is closed, see **"4.4 ELECTRICAL CONNECTIONS" ON PAGE 65**;
- Close the humidifier wall;
- 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 humidity setpoint **SP** to 100%;
- The humidifier will start a boiler filling cycle to fill it to the minimum water level that guarantees rapid steam production;
- Set the humidity setpoint **SP** 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.

## 5.2 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 correctly and be maintained and cleaned properly at the prescribed intervals, as described in the chapter **MAINTENANCE**.

---

### 5.3 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 **“3.2 PLUMBING INSTALLATION” ON PAGE 49**, **“3.3 WATER DRAINAGE SYSTEM” ON PAGE 50** and **“3.4 STEAM DISTRIBUTION IN THE AHU OR DUCT” ON PAGE 51**);
- Let the water 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 **“4.4 ELECTRICAL CONNECTIONS” ON PAGE 65**);
- Check that the **CV** contact is closed, see **“4.4 ELECTRICAL CONNECTIONS” ON PAGE 65**;
- Close the humidifier wall;
- 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 humidity setpoint **SP** to 100%;
- The humidifier will start a boiler filling cycle to fill it to the minimum water level that guarantees rapid steam production;
- Set the humidity setpoint **SP** 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.

## 6. CONFIGURATION PARAMETERS

---

### Chapter content

This chapter contains the following information:

<b>Subject</b>	<b>Page</b>
<i>Table of adjustment parameters</i>	<i>77</i>



## 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.

## 6.1 Table of adjustment parameters

Par.	Description	MU	Range	Default	PW
<b>SETPOINT group</b>					
<b>SP1</b>	Humidity setpoint.	%	<b>r1...r2</b>	70	U
<b>SP2</b>	Humidity limit setpoint.	%	<b>r11...r12</b>	85	U
<b>CONFIGURATION group</b>					
<b>CFG</b>	Control input selection <b>0 (dI)</b> = ON/OFF from the <b>0/1</b> digital input; <b>1 (AI)</b> = Proportional from analogue input; <b>2 (HUM)</b> = Humidity sensor; <b>3 (HUML)</b> = Humidity sensor + limit sensor.	---	0...3	0	M
<b>tyP</b>	Type of boiler installed: <b>0</b> = Standard; <b>1</b> = Low electrical conductivity ( <b>LC</b> ); <b>2</b> = High electrical conductivity ( <b>HC</b> ).	---	0...2	0	M
<b>P0</b>	S1 sensor type (temperature) <b>0</b> = Disabled; <b>1</b> = PTC; <b>2</b> = NTC.	---	0...2	0	M
<b>P1</b>	Electrical conductivity of the water.	µS/cm	0...2000	0	M
<b>P2</b>	<b>S2</b> sensor type (humidity 1 / proportional sensor). <b>0</b> = PTC; <b>1</b> = Pt1000; <b>2</b> = NTC; <b>3</b> = 0...10 V; <b>4</b> = 0...5 V; <b>5</b> = 0...20 mA; <b>6</b> = 4...20 mA; <b>7</b> = EVHTP520.	---	0...7	6	M
<b>P3</b>	<b>S2</b> minimum value (if <b>CFG</b> = 2 or <b>CFG</b> = 3).	%rH	0...100	0	M
<b>P4</b>	<b>S2</b> maximum value (if <b>CFG</b> = 2 or <b>CFG</b> = 3).	%rH	0...100	100	M
<b>P5</b>	<b>S2</b> sensor offset (if <b>CFG</b> = 2 or <b>CFG</b> = 3).	%rH	-10...10	0	M
<b>P6</b>	<b>S1</b> sensor offset (temperature).	°C/°F	-10.0...10.0	0	M
<b>P7</b>	<b>S3</b> sensor type (humidity 2 limit). <b>0</b> = PTC; <b>1</b> = Pt1000; <b>2</b> = NTC; <b>3</b> = 0...10 V; <b>4</b> = 0...5 V; <b>5</b> = 0...20 mA; <b>6</b> = 4...20 mA; <b>7</b> = EVHTP520.	---	0...7	6	M
<b>P8</b>	<b>S3</b> minimum value (if <b>CFG</b> = 3).	%rH	0...100	0	M
<b>P9</b>	<b>S3</b> maximum value (if <b>CFG</b> = 3).	%rH	0...100	100	M
<b>P10</b>	<b>S3</b> sensor offset (if <b>CFG</b> = 3).	%rH	-10...10	0	M
<b>P11</b>	TA sensor K (1000 = current multiplier of 1.000).	---	0...2000	1000	M

Par.	Description	MU	Range	Default	PW
P12	Ventilation presence (enables maintenance management based on utility operating hours).	---	0/1	1	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...3	???	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
<b>REGULATION group</b>					
r0	Sensor 1 setpoint hysteresis.	%	0...20	2	M
r1	Minimum setpoint value.	%	0...r2	20	M
r2	Maximum setpoint value.	%	r1...100	95	M
r4	Proportional band.	%	0...50	50	M
r5	Minimum production.	%	20...r6	20	M
r6	Maximum production.	%	r5...100	75	U
r10	Limit sensor setpoint hysteresis.	%	0...20	2	M
r11	Minimum limit setpoint value.	%	0...r12	20	M
r12	Maximum limit setpoint value.	%	r11...100	95	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...10	5	M
c2	Number of cleaning cycles following emptying due to activity or inactivity.	num	0...10	0	M
c3	Type of draining for dilution. 0 = Current-based; 1 = Time-based.	---	0/1	0	M
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
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...1000	300	M
c11	Anti-foam process. 0 = Disabled; 1 = Enabled.	---	0/1	0	M
c14	Time to drain the boiler completely.	s	???	???	M
<b>MAINTENANCE/ALARMS group</b>					
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
M9	Maximum number of automatic attempts to rearm alarm AL05 "No water" after which the alarm blocks manual rearming.	num	1...10	3	M
M10	Operating hours threshold for unit maintenance warning.	hx10	100....1000	4000	M
M11	Operating hours threshold for partial boiler maintenance warning.	hx10	100....1000	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....1000	1000	M
M14	Operating hours threshold for pump maintenance warning.	hx10	100....1000	1000	M
M15	Operating hours threshold for fan maintenance warning.	hx10	100....1000	1000	M
<b>COMMUNICATION group</b>					
LA1	Modbus communication protocol address.	num	0...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
<b>LP1</b>	Modbus parity bit. <b>0</b> = None; <b>1</b> = Odd; <b>2</b> = Even.	---	0...2	2	E
<b>LS1</b>	Modbus stop bit. <b>0</b> = 1 stop bit; <b>1</b> = 2 stop bits.	---	0/1	0	E
<b>PASSWORD group</b>					
<b>PA1</b>	First level password. <b>0</b> = No password	---	-99...999	0	U
<b>PA2</b>	Second level password.	---	-99...999	824	M

## 7. MODBUS RTU FUNCTIONS AND RESOURCES

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### Chapter content

This chapter contains the following information:

<b>Subject</b>	<b>Page</b>
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<b>Modbus message structure</b>	<b>81</b>
<b>Modbus functions and registers</b>	<b>81</b>
<b>Address configuration</b>	<b>82</b>
<b>Connections</b>	<b>82</b>
<b>Modbus table content</b>	<b>82</b>
<b>Zephyr modbus addresses</b>	<b>83</b>

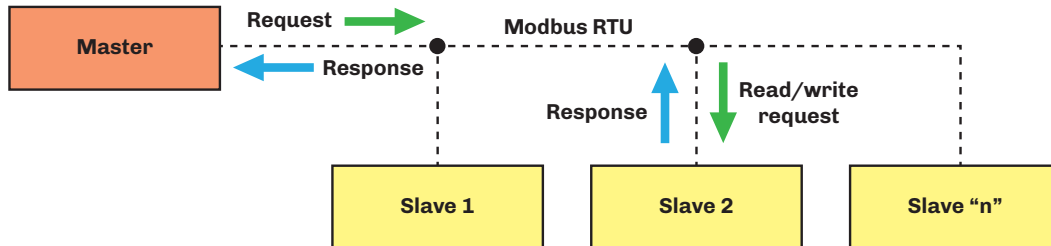
## 7.1 Introduction

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.

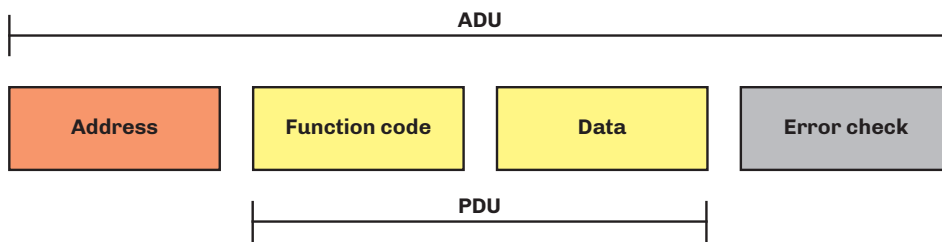
Modbus RTU is the most common application and uses CRC error detection and binary encoding.



**Fig. 62.** 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. 63. FRAMING OF A MESSAGE USING MODBUS PROTOCOL" ON PAGE 81**") 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. 63.** Framing of a message using Modbus protocol

For further information relating to Modbus protocol, visit the official Modbus website: [www.modbus.org](http://www.modbus.org).

## 7.2 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

## 7.3 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.

### 7.3.1 Available Modbus commands and data areas

The commands implemented are as follows:

Command	Description
<b>03 (hex 0x03)</b>	Resource reading command
<b>06 (hex 0x06)</b>	Resource writing command

## 7.4 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
<b>LA1</b>	Modbus communication protocol address.	---	0...247	247
<b>Lb1</b>	Modbus transmission speed (baud rate). <b>0</b> = 2400; <b>1</b> = 4800; <b>2</b> = 9600; <b>3</b> = 19200; <b>4</b> = 38400.	---	0...4	4
<b>LP1</b>	Modbus parity bit. <b>0</b> = None; <b>1</b> = Odd; <b>2</b> = Even.	---	0...2	2
<b>LS1</b>	Modbus stop bit. <b>0</b> = 1 stop bit; <b>1</b> = 2 stop bits.	---	0/1	0

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

- RTU mode;
- Bit: 8 bit

## 7.5 Connections

For the entire system to work properly, including the RS-485 RTU serial line, observe the instructions provided in chapter **"4. ELECTRICAL CONNECTIONS" ON PAGE 59**.

In particular, take care to make the connections correctly, observing the instructions in section **"4.4 ELECTRICAL CONNECTIONS" ON PAGE 65**

## 7.6 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:
  - **WORD** = 16 bit
  - **Byte** = 8 bit
  - The "n" bits = 0...15 bit depending on the value of "n"

## 7.7 Zephyr modbus addresses

### 7.7.1 Modbus address table

Par.	Description	Val. Adr.	R/W	DATA SIZE	CPL	MU	Range
<b>SETPOINT group</b>							
SP1	Humidity setpoint.	2001	R/W	BYTES	---	%	r1...r2
SP2	Humidity limit setpoint.	2002	R/W	BYTES	---	%	r11...r12
<b>CONFIGURATION group</b>							
CFG	Control input selection.	2003	R/W	BYTES	---	---	0...3
tyP	Type of boiler installed.	2005	R/W	BYTES	---	---	0...2
P1	Electrical conductivity of the water.	2006	R/W	WORD	---	μS/cm	0...2000
P2	S2 sensor type (humidity 1 / proportional input).	2007	R/W	BYTES	---	---	0...5
P3	S2 minimum value (if CFG = 2 or CFG = 3).	2008	R/W	BYTES	---	%rH	0...100
P4	S2 maximum value (if CFG = 2 or CFG = 3).	2009	R/W	BYTES	---	%rH	0...100
P5	S2 sensor offset (if CFG = 2 or CFG = 3).	2010	R/W	BYTES	Y	%rH	-10...10
P6	S1 sensor offset (temperature).	2011	R/W	BYTES	Y	°C/°F	-10.0...10.0
P7	S3 sensor type (humidity 2 limit).	2012	R/W	BYTES	---	---	0...5
P8	S3 minimum value (if CFG = 3).	2013	R/W	BYTES	---	%rH	0...100
P9	S3 maximum value (if CFG = 3).	2014	R/W	BYTES	---	%rH	0...100
P10	S3 sensor offset (if CFG = 3).	2015	R/W	BYTES	Y	%rH	-10...10
P20	Electrical conductivity of the water at 100°C (212 °F).	2016	R/W	BYTES	---	---	0...3
P21	Temperature unit of measure (changing value means that the temperature parameter limits will need to be reset manually).	2017	R/W	1 BIT	---	---	0/1
<b>REGULATION group</b>							
r0	Sensor 1 setpoint hysteresis.	2018	R/W	BYTES	---	%	0...20
r1	Minimum setpoint value.	2019	R/W	BYTES	---	%	0...r2
r2	Maximum setpoint value.	2020	R/W	BYTES	---	%	r1...100
r4	Proportional band.	2021	R/W	BYTES	---	%	0...50
r5	Minimum production.	1927	R/W	BYTES	---	%	0...r6
r6	Maximum production.	1926	R/W	BYTES	---	%	r5...100
r10	Limit sensor setpoint hysteresis.	2024	R/W	BYTES	---	%	0...20
r11	Minimum limit setpoint value.	2025	R/W	BYTES	---	%	0...r12
r12	Maximum limit setpoint value.	2026	R/W	BYTES	---	%	r11...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...10
c2	Number of cleaning cycles (filling+draining) following emptying due to activity or inactivity.	2029	R/W	BYTES	---	num	0...10
c3	Type of draining for dilution.	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	---	min	30...999
c6	Draining value for dilution (if C3 = 0).	2033	R/W	BYTES	---	%	20...80
c8	Preheating set-point for temperature hold.	2034	R/W	BYTES	---	°C/°F	0.0...90.0
c9	Anti-freezing enable (temperature fixed at 7 °C (44.6 °F)).	2035	R/W	1 BIT	---	---	0/1
c10	Maximum initial water filling time for water inlet check, depending on the model.	2036	R/W		---	???	???
c11	Anti-foam process.	2037	R/W	1 BIT	---	---	0/1
c12	Time to detect foam after lowering the current by 30%.	2038	R/W		---	???	???
c13	Enable water filling with steam generation active.	2039	R/W	1 BIT	---	---	0/1
c14	Time to drain the boiler completely.	2040	R/W		---	s	???
<b>MAINTENANCE/ALARMS group</b>							
A5	Low humidity alarm threshold. The hysteresis is fixed at 2%.	2041	R/W	BYTES	---	%	0...100

Par.	Description	Val. Adr.	R/W	DATA SIZE	CPL	MU	Range
A6	High humidity alarm threshold. The hysteresis is fixed at 2%.	2042	R/W	BYTES	---	%	0...100
A7	High/low humidity alarm delay.	2043	R/W	WORD	---	s	0...999
A10	Operating hours threshold for unit maintenance warning.	2044	R/W	32 BIT	---	hx10	100....1000
A11	Operating hours threshold for partial boiler maintenance warning.	2046	R/W	32 BIT	---	hx10	100....1000
A12	Operating hours threshold for full boiler maintenance warning.	2048	R/W	32 BIT	---	hx10	100....1000
A13	Operating hours threshold for valve maintenance warning.	2050	R/W	32 BIT	---	hx10	100....1000
A14	Operating hours threshold for pump maintenance warning.	2052	R/W	32 BIT	---	hx10	100....1000
A15	Operating hours threshold for fan maintenance warning.	2054	R/W	32 BIT	---	hx10	100....1000
<b>COMMUNICATION group</b>							
LA1	Modbus communication protocol address.	2056	R/W	BYTES	---	num	0...247
Lb1	Modbus transmission speed (baud rate).	2057	R/W	BYTES	---	---	0...4
LP1	Modbus parity bit.	2058	R/W	BYTES	---	---	0...2
LS1	Modbus stop bit.	2059	R/W	1 BIT	---	---	0/1
<b>PASSWORD group</b>							
PA1	First level password.	2061	R/W	BYTES	Y	---	-99...999
PA2	Second level password.	2062	R/W	BYTES	Y	---	-99...999

### 7.7.2 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_Is	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
DO4_DEH	Dehumidification output status.	388	---	R	1 BIT	---	---	0/1
DO5_FANS	Ventilated distributor output status.	389	---	R	1 BIT	---	---	0/1
DO6_AL	Alarm output status.	390	---	R	1 BIT	---	---	0/1
AI_temperature	Temperature sensor S1 value.	516	---	R	WORD	Y	°C/°F	-3276.8... 3276.7
AI_Humidity	Humidity sensor S2 value.	517	---	R	WORD	Y	%rH	-32768... 32767
AI_Humidity_L	Humidity limit sensor S3 value.	518	---	R	WORD	Y	%rH	-32768... 32767
AI_Request	Proportional input S2 value.	519	---	R	WORD	Y	%	-32768... 32767
AI_Current	Current sensor CT1 value.	520	---	R	WORD	Y	A	-327.68... 327.67
--	Alarm AL01 status.	769	0	R	1 BIT	---	---	0/1
--	Alarm AL02 status.	769	1	R	1 BIT	---	---	0/1
--	Alarm AL03 status.	769	2	R	1 BIT	---	---	0/1
--	Alarm AL04 status.	769	3	R	1 BIT	---	---	0/1
--	Alarm AL05 status.	769	4	R	1 BIT	---	---	0/1
--	Alarm AL06 status.	769	5	R	1 BIT	---	---	0/1
--	Alarm AL09 status.	769	8	R	1 BIT	---	---	0/1
--	Alarm AL10 status.	769	9	R	1 BIT	---	---	0/1
--	Alarm AL11 status.	769	10	R	1 BIT	---	---	0/1
--	Alarm AL12 status.	769	11	R	1 BIT	---	---	0/1
--	Alarm AL13 status.	769	12	R	1 BIT	---	---	0/1



Code	Description	Val. Adr.	Filter value	R/W	DATA SIZE	CPL	MU	Range
--	Alarm <b>AL14</b> status.	769	13	R	1 BIT	---	---	0/1
--	Alarm <b>AL15</b> status.	769	14	R	1 BIT	---	---	0/1
--	Alarm <b>AL16</b> status.	769	15	R	1 BIT	---	---	0/1
--	Alarm <b>AL17</b> status.	770	0	R	1 BIT	---	---	0/1
--	Alarm <b>AL18</b> status.	770	1	R	1 BIT	---	---	0/1
--	Alarm <b>AL19</b> status.	770	2	R	1 BIT	---	---	0/1
--	Alarm <b>AL20</b> status.	770	3	R	1 BIT	---	---	0/1
--	Alarm <b>AL21</b> status.	770	4	R	1 BIT	---	---	0/1
--	Alarm <b>AL22</b> status.	770	5	R	1 BIT	---	---	0/1
--	Alarm <b>AL23</b> status.	770	6	R	1 BIT	---	---	0/1
<b>BMS_AL2</b>	<b>AL02</b> manual reset.	773	---	R/W	1 BIT	---	---	0/1
<b>BMS_AL5</b>	<b>AL05</b> manual reset.	774	---	R/W	1 BIT	---	---	0/1
<b>BMS_AL6</b>	<b>AL06</b> manual reset.	775	---	R/W	1 BIT	---	---	0/1
<b>manWash</b>	Manual draining command (OFF/ON).	1282	---	R/W	1 BIT	---	---	0/1
<b>GeneralAlarm</b>	General alarm status (OFF/ON).	1283	---	R/W	1 BIT	---	---	0/1
<b>unitOn</b>	Unit status (OFF/ON).	1284	---	R/W	1 BIT	---	---	0/1
---	Restore default parameters command	1285	---	R/W	1 BIT	---	---	0/1
<b>HoursService</b>	Hours of humidifier operation.	1286 ... 1287	---	R/W	WORD	---	h x 10	0.0 ... 429496729.5
<b>HoursBoilerP</b>	Partial hours of boiler operation.	1288 ... 1289	---	R/W	WORD	---	h x 10	0.0 ... 429496729.5
<b>HoursBoilerT</b>	Total hours of boiler operation (hours x 10)	1290 ... 1291	---	R/W	WORD	---	h x 10	0.0 ... 429496729.5
<b>HoursEV1</b>	Hours of water inlet solenoid valve operation (hours x 10)	1292 ... 1293	---	R/W	WORD	---	h x 10	0.0 ... 429496729.5
<b>HoursPump</b>	Hours of outlet pump operation (hours x 10)	1294 ... 1295	---	R/W	WORD	---	h x 10	0.0 ... 429496729.5
<b>HoursFan</b>	Hours of fan operation (hours x 10)	1296 ... 1297	---	R/W	WORD	---	h x 10	0.0 ... 429496729.5
<b>curr100</b>	Nominal current.	1298	---	R/W	WORD	---	A	0.00...655.35
<b>tevap</b>	Evaporation time.	1299	---	R/W	WORD	---	s	0.0 ... 6553.5
<b>actProd</b>	Actual steam production.	1303	---	R/W	WORD	Y	kg/h	-3276.8 ... 3276.7
<b>limH</b>	Humidity limit sensor status (ON/OFF)	1304	---	R/W	1 BIT	---	---	0/1
<b>HoursAct</b>	Hours of continuous activity.	1316 ... 1317	---	R/W	WORD	---	h x 10	0.0 ... 429496729.5
<b>HoursNotAct</b>	Hours of continuous inactivity.	1318 ... 1319	---	R/W	WORD	---	h x 10	0.0 ... 429496729.5
<b>MBS_SwEn</b>	On/Off command from BMS.	1922	---	R/W	1 BIT	---	---	0/1

# MAINTENANCE SECTION

---

## Section content

This section contains the following information:

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<b><i>Dimensions and mechanical installation</i></b>	<b>96</b>
<b><i>Electrical connections</i></b>	<b>104</b>
<b><i>Operation</i></b>	<b>118</b>
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<b><i>Spare parts</i></b>	<b>132</b>
<b><i>Diagnostics</i></b>	<b>136</b>
<b><i>Wiring diagrams</i></b>	<b>139</b>

# 1. MAINTENANCE USER INTERFACE

---

## Chapter content

This chapter contains the following information:

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## 1.1 EHKT user interface

### 1.1.1 Maintenance menu

To access the maintenance menu:

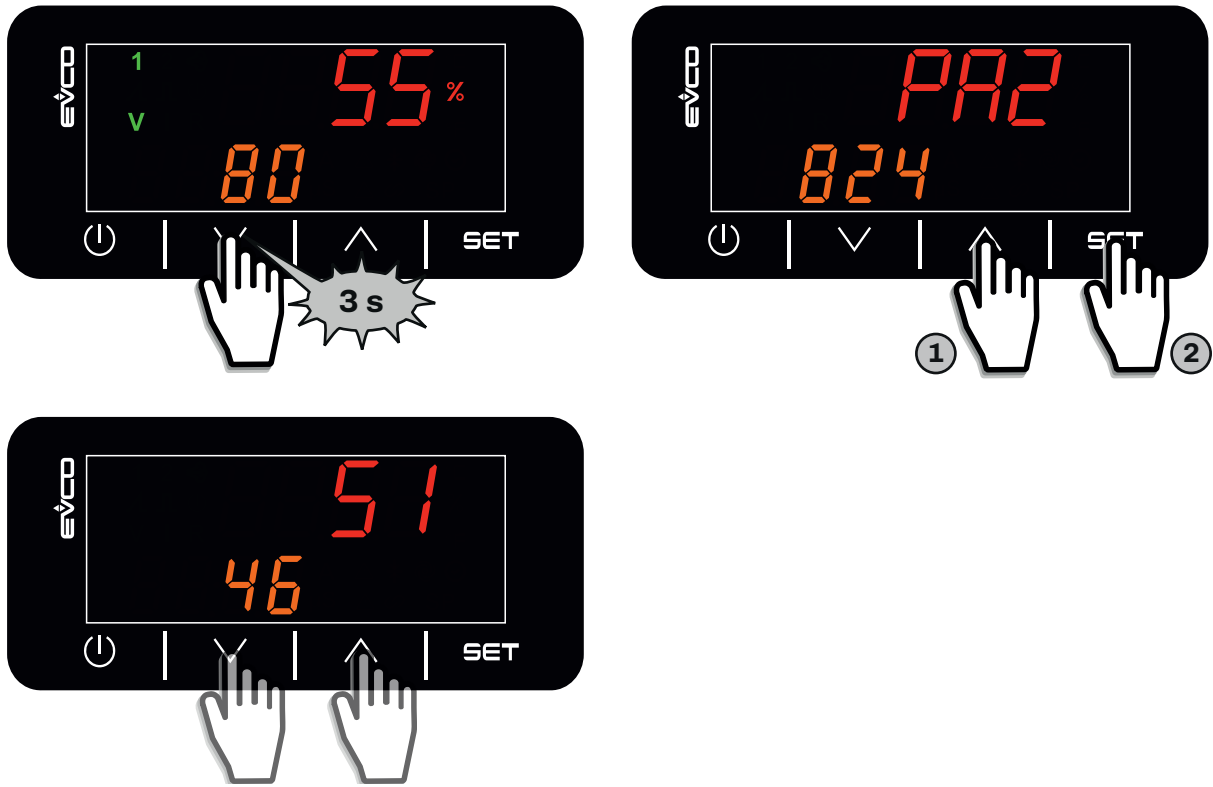


Fig. 64. Maintenance menu

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

Top line	Bottom line	Description
<b>SP1</b>	Setpoint <b>SP1</b> value	Displays the value of setpoint <b>SP1</b> .
<b>SP2</b>	Setpoint <b>SP2</b> value	Displays the value of setpoint <b>SP2</b> .
<b>CFG</b>	Set operating mode	Sets the operating mode See "6.1 TABLE OF ADJUSTMENT PARAMETERS" ON PAGE 77
<b>c0...c11</b>	Parameter value	See "6.1 TABLE OF ADJUSTMENT PARAMETERS" ON PAGE 77
<b>S1</b>	Sensor S1 value	Displays the value read by sensor S1 if it is connected.
<b>S2</b>	Sensor S2 value	Displays the value read by sensor S2 if it is connected.
<b>S3</b>	Sensor S3 value	Displays the value read by sensor S3 if it is connected.
<b>tA</b>	Sensor tA value	Displays the value read by sensor CT1 if it is connected.
<b>CU</b>	<b>CV</b> input status.	Displays the status of the <b>CV</b> digital input (fan enable) if it is connected. <b>OFF</b> = <b>CV</b> input closed; <b>On</b> = <b>CV</b> input open.
<b>OI</b>	<b>0/1</b> input status	Displays the status of the <b>0/1</b> digital input (remote ON/OFF) if it is connected. <b>OFF</b> = <b>0/1</b> input closed; <b>On</b> = <b>0/1</b> input open.
<b>SO</b>	<b>S0</b> input status	Displays the status of the <b>S0</b> digital input (remote humidistat enable) if it is connected. <b>OFF</b> = <b>S0</b> input closed; <b>On</b> = <b>S0</b> input open.
<b>LS</b>	<b>LS1</b> input status	Displays the status of the <b>LS1</b> digital input (level sensor) if it is connected. <b>OFF</b> = <b>LS1</b> input closed; <b>On</b> = <b>LS1</b> input open.
<b>oEU</b>	Inlet solenoid valve output status	Displays the status of the inlet solenoid valve. <b>OFF</b> = Inlet solenoid valve output OFF; <b>ON</b> = Inlet solenoid valve output ON.
<b>oP</b>	Outlet pump status	Displays the status of the outlet pump. <b>OFF</b> = Outlet pump output OFF; <b>ON</b> = Outlet pump output ON.

Top line	Bottom line	Description
oS	Steam generation contactor status	Displays the status of the steam generator contactor. <b>OFF</b> = Steam generator electrode output OFF; <b>ON</b> = Steam generator electrode output ON.
od	Dehumidification enable output status	Displays the status of the dehumidification enable output. <b>OFF</b> = Dehumidification enable output OFF; <b>ON</b> = Dehumidification enable output ON.
oF	Fan output status	Displays the status of the fan digital output. <b>OFF</b> = Fan output OFF; <b>ON</b> = Fan output ON.
oAL	General alarm output status	Displays the status of the general alarm output. <b>OFF</b> = General alarm output OFF; <b>ON</b> = General alarm ON.
HrS	Operating hours management page	Enters the page that displays the operating hours of the humidifier and its parts. To access the page: Double tap the <b>SET</b> key, enter password <b>PA2</b> using the <b>FNC</b> $\checkmark$ or $\wedge$ keys, and tap <b>SET</b> to confirm.
MAnu	Output forcing page	Enters the output forcing page. To access the page: Double tap the <b>SET</b> key, enter password <b>PA2</b> using the <b>FNC</b> $\checkmark$ or $\wedge$ keys, and tap <b>SET</b> to confirm.

### 1.1.2 Displaying/resetting the operating hours

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

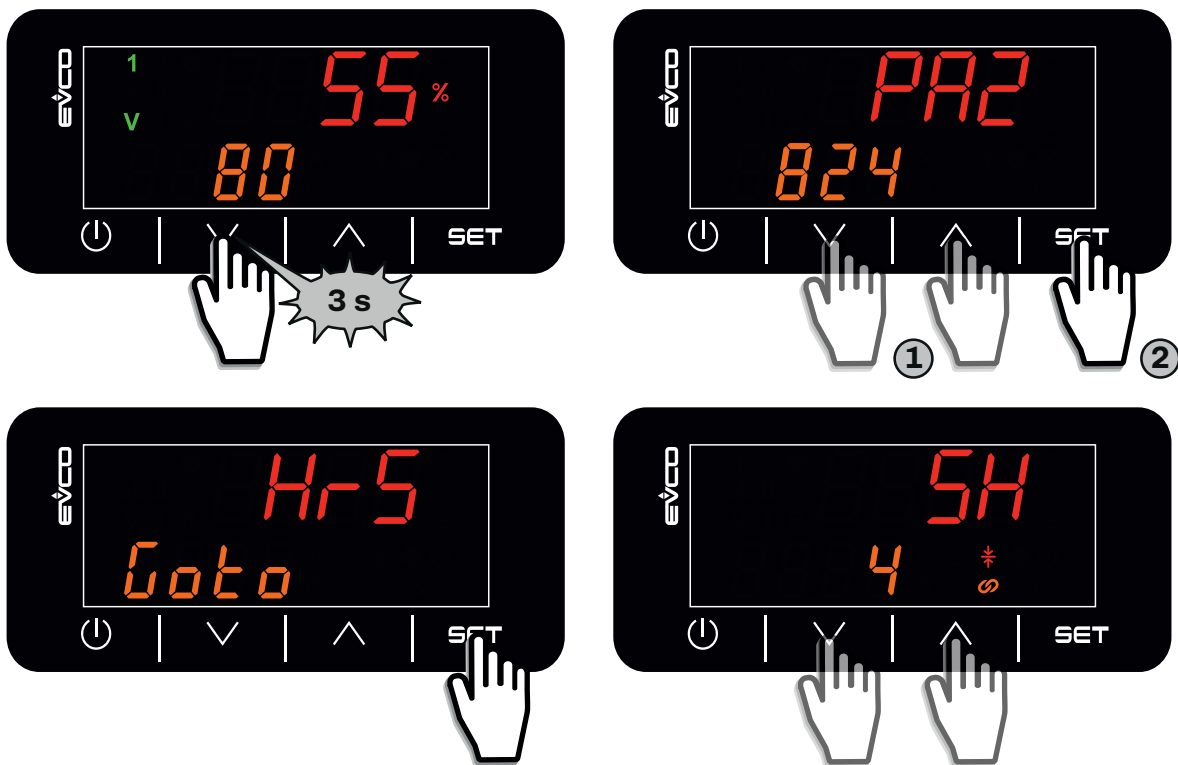


Fig. 65. Displaying the operating hours

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

Top line	Bottom line	Description
SH	Humidifier hours	Displays the hours of humidifier operation.
PbH	Partial boiler hours	Displays the partial hours of boiler operation.
tbH	Total boiler hours	Displays the total hours of boiler operation.
EUH	Inlet SV hours	Displays the hours of outlet solenoid valve operation.
PH	Outlet pump hours	Displays the hours of outlet pump operation.
FH	Fan hours	Displays the hours of fan operation.

#### Resetting the operating hours

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

### 1.1.3 Output functional test

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

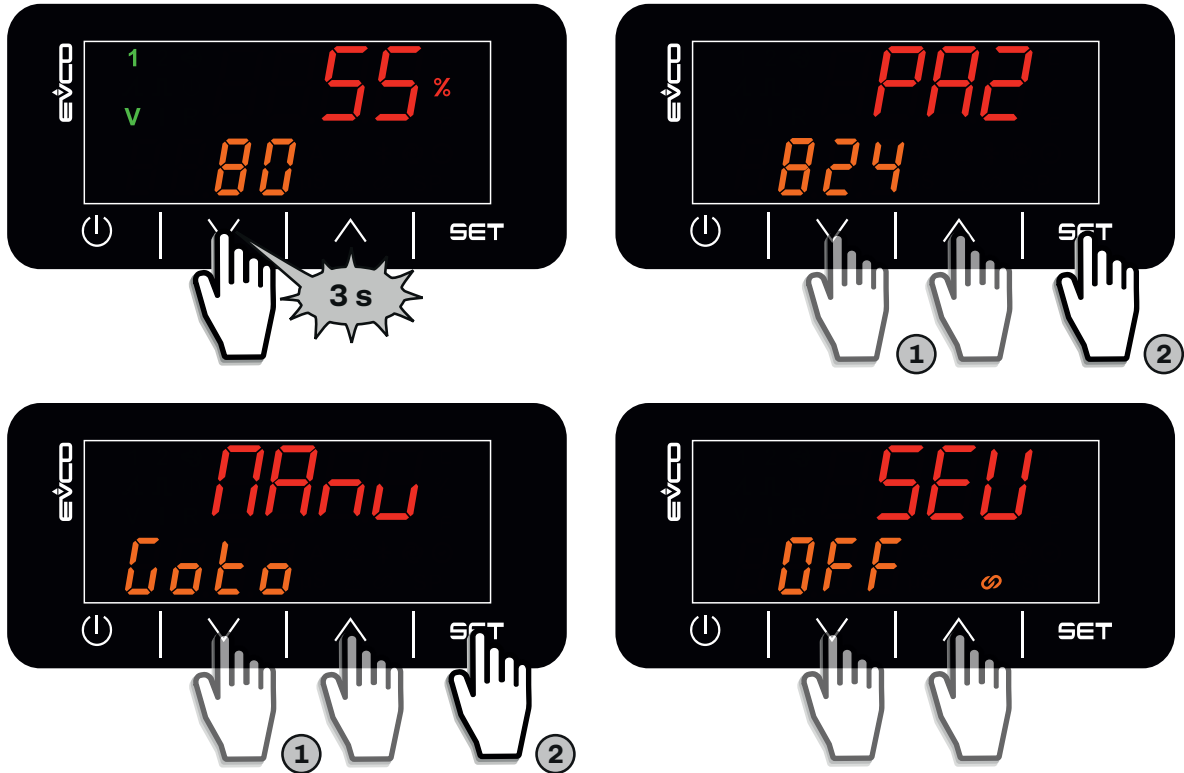


Fig. 66. Output functional test

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

Top line	Bottom line	Description
SEU	Inlet SV output status	Forces the inlet solenoid valve output on/off. <b>OFF</b> = Inlet solenoid valve output forced OFF; <b>ON</b> = Inlet solenoid valve output forced ON.
SP	Outlet pump output status	Forces the outlet pump output on/off. <b>OFF</b> = Outlet pump output forced OFF; <b>ON</b> = Outlet pump output forced ON.
SS	Steam generation contactor status	Forces the steam generation contactor on/off. <b>OFF</b> = Steam generator electrode output forced OFF; <b>ON</b> = Steam generator electrode output forced ON.
Sd	Dehumidification enable output status	Forces the dehumidifier enable output on/off. <b>OFF</b> = Dehumidification enable output forced OFF; <b>ON</b> = Dehumidification enable output forced ON.
SF	Fan output status	Forces the fan output on/off. <b>OFF</b> = Fan output forced OFF; <b>ON</b> = Fan output forced ON.
SAL	General alarm output status	Forces the general alarm output on/off. <b>OFF</b> = General alarm output forced OFF; <b>ON</b> = General alarm output forced ON.

## 1.2 EHKX user interface

### 1.2.1 Maintenance menu

To access the maintenance menu:

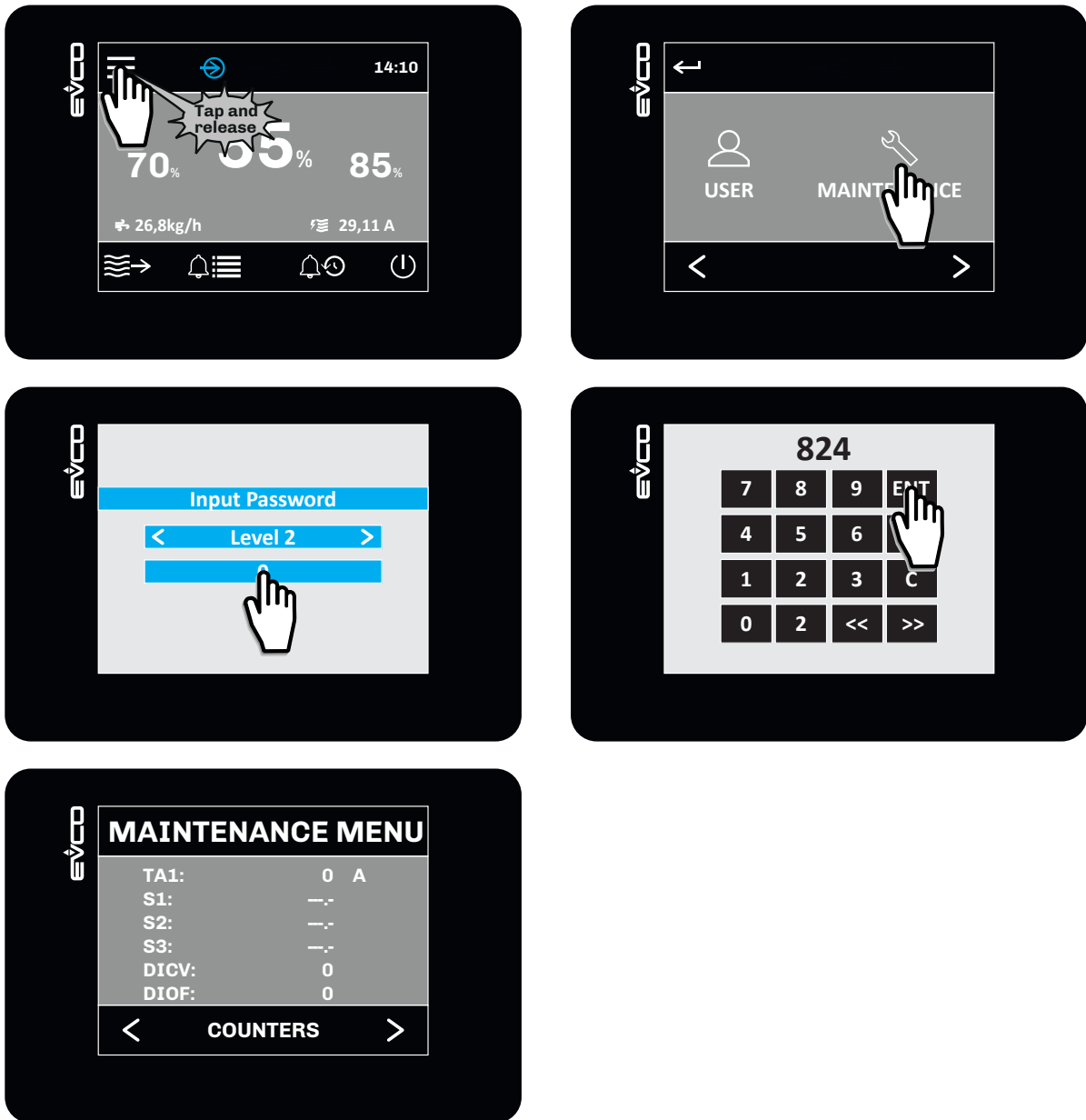


Fig. 67. Maintenance menu

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

Menu option	Description
<b>CFG</b>	Sets the operating mode. See "6.1 TABLE OF ADJUSTMENT PARAMETERS" ON PAGE 77
<b>c0...c11</b>	See "6.1 TABLE OF ADJUSTMENT PARAMETERS" ON PAGE 77
<b>r0...r12</b>	See "6.1 TABLE OF ADJUSTMENT PARAMETERS" ON PAGE 77
<b>TA1</b>	Displays the value read by sensor CT1 if it is connected.
<b>S1</b>	Displays the value read by sensor S1 if it is connected.
<b>S2</b>	Displays the value read by sensor S2 if it is connected.
<b>S3</b>	Displays the value read by sensor S3 if it is connected.
<b>DICV</b>	Displays the status of the <b>CV</b> digital input (fan enable) if it is connected. <b>OFF</b> = <b>CV</b> input closed; <b>On</b> = <b>CV</b> input open.

Menu option	Description
<b>DIOF</b>	Displays the status of the <b>0/1</b> digital input (remote ON/OFF) if it is connected. <b>OFF</b> = <b>0/1</b> input closed; <b>On</b> = <b>0/1</b> input open.
<b>DISO</b>	Displays the status of the <b>S0</b> digital input (remote humidistat enable) if it is connected. <b>OFF</b> = <b>S0</b> input closed; <b>On</b> = <b>S0</b> input open.
<b>DILS1</b>	Displays the status of the <b>LS1</b> digital input (level sensor) if it is connected. <b>OFF</b> = <b>LS1</b> input closed; <b>On</b> = <b>LS1</b> input open.
<b>DOEV1</b>	Displays the status of the inlet solenoid valve. <b>OFF</b> = Inlet solenoid valve output OFF; <b>ON</b> = Inlet solenoid valve output ON.
<b>DODP1</b>	Displays the status of the outlet pump. <b>OFF</b> = Outlet pump output OFF; <b>ON</b> = Outlet pump output ON.
<b>DOG1</b>	Displays the status of the steam generator electrode output. <b>OFF</b> = Steam generator electrode output OFF; <b>ON</b> = Steam generator electrode output ON.
<b>DODEH</b>	Displays the status of the dehumidification enable output. <b>OFF</b> = Dehumidification enable output OFF; <b>ON</b> = Dehumidification enable output ON.
<b>DOFAN</b>	Displays the status of the fan digital output. <b>OFF</b> = Fan output OFF; <b>ON</b> = Fan output ON.
<b>DOAL</b>	Displays the status of the general alarm output. <b>OFF</b> = General alarm output OFF; <b>ON</b> = General alarm output ON.



### 1.2.2 Displaying/resetting the operating hours

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

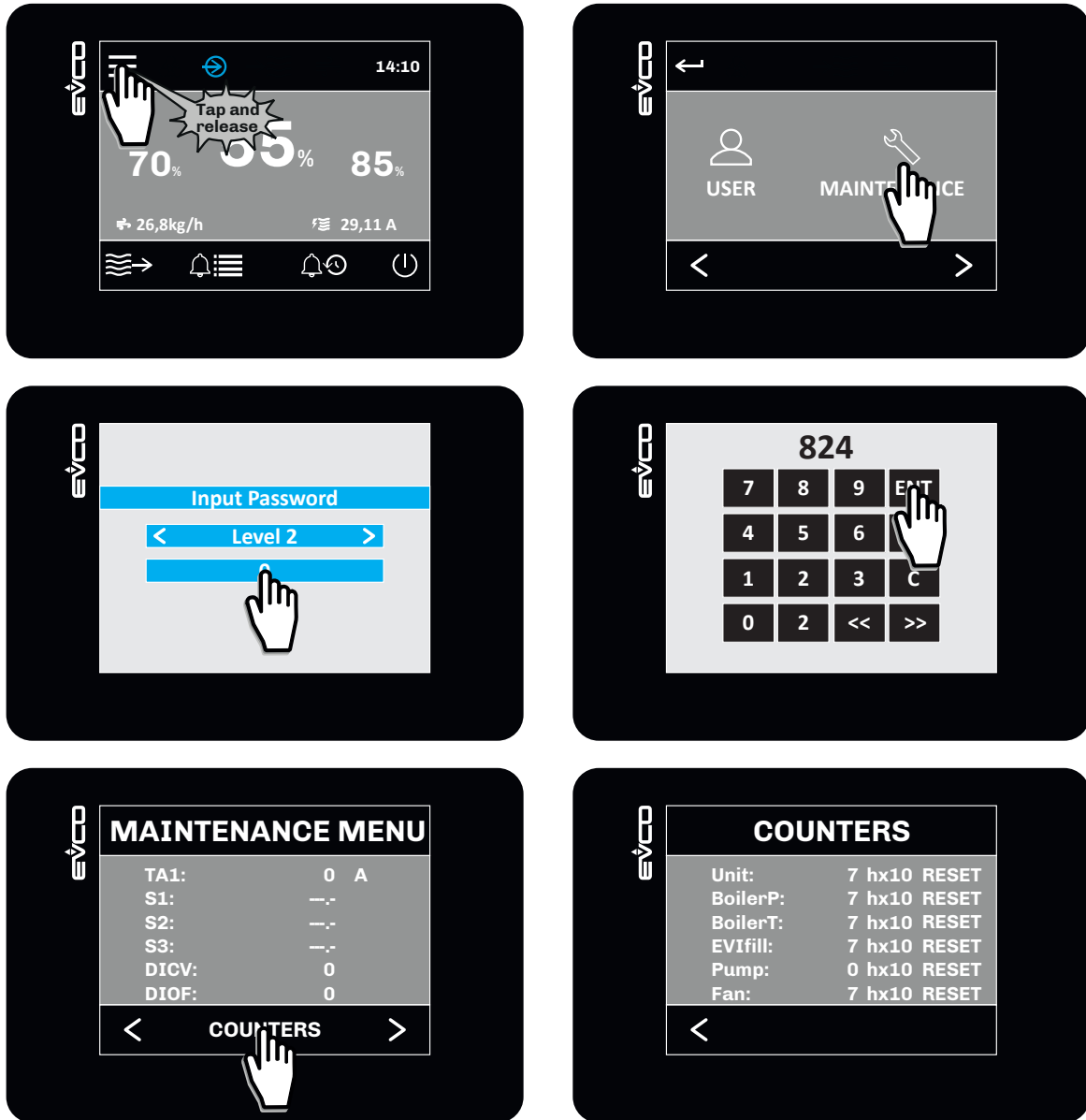


Fig. 68. Displaying the operating hours

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

Menu option	Description
<b>Unit</b>	Displays the hours of humidifier operation.
<b>BoilerP</b>	Displays the partial hours of boiler operation.
<b>BoilerT</b>	Displays the total hours of boiler operation.
<b>EVIfill</b>	Displays the hours of outlet solenoid valve operation.
<b>Pump</b>	Displays the hours of outlet pump operation.
<b>Fan</b>	Displays the operating hours of the fans.

#### Resetting the operating hours

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

### 1.2.3 Output functional test

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

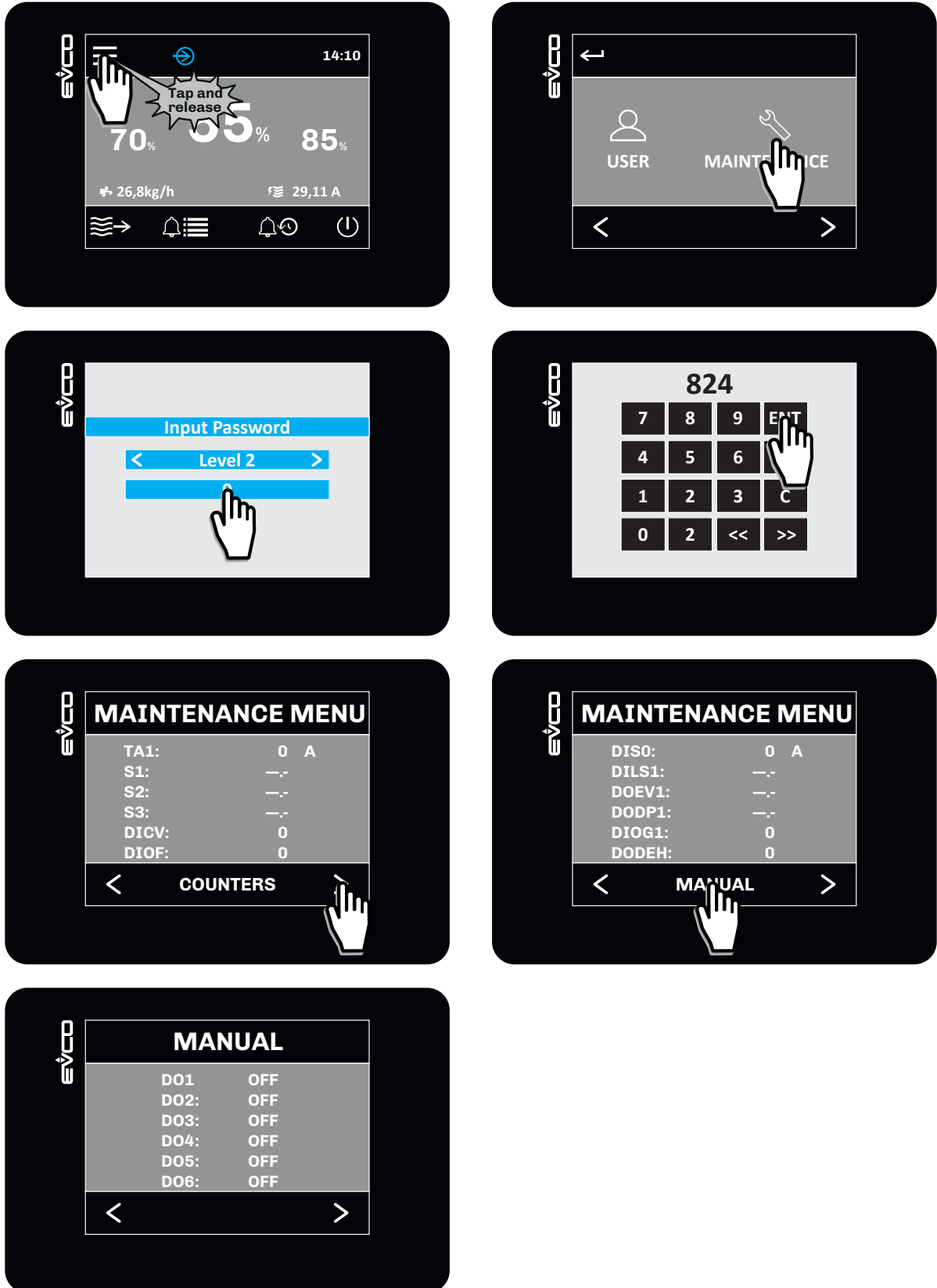


Fig. 69. Displaying the operating hours

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

<b>Menu option</b>	<b>Description</b>
<b>D01</b>	Forces the inlet solenoid valve output on/off. <b>OFF</b> = Inlet solenoid valve output forced OFF; <b>ON</b> = Inlet solenoid valve output forced ON.
<b>D02</b>	Forces the outlet pump output on/off. <b>OFF</b> = Outlet pump output forced OFF; <b>ON</b> = Outlet pump output forced ON.
<b>D03</b>	Forces the steam generator electrode output on/off. <b>OFF</b> = Steam generator electrode output forced OFF; <b>ON</b> = Steam generator electrode output forced ON.
<b>D04</b>	Forces the dehumidifier enable output on/off. <b>OFF</b> = Dehumidification enable output forced OFF; <b>ON</b> = Dehumidification enable output forced ON.
<b>D05</b>	Forces the fan output on/off. <b>OFF</b> = Fan output forced OFF; <b>ON</b> = Fan output forced ON.
<b>D06</b>	Forces the general alarm output on/off. <b>OFF</b> = General alarm output forced OFF; <b>ON</b> = General alarm output forced ON.

## 2. DIMENSIONS AND MECHANICAL INSTALLATION

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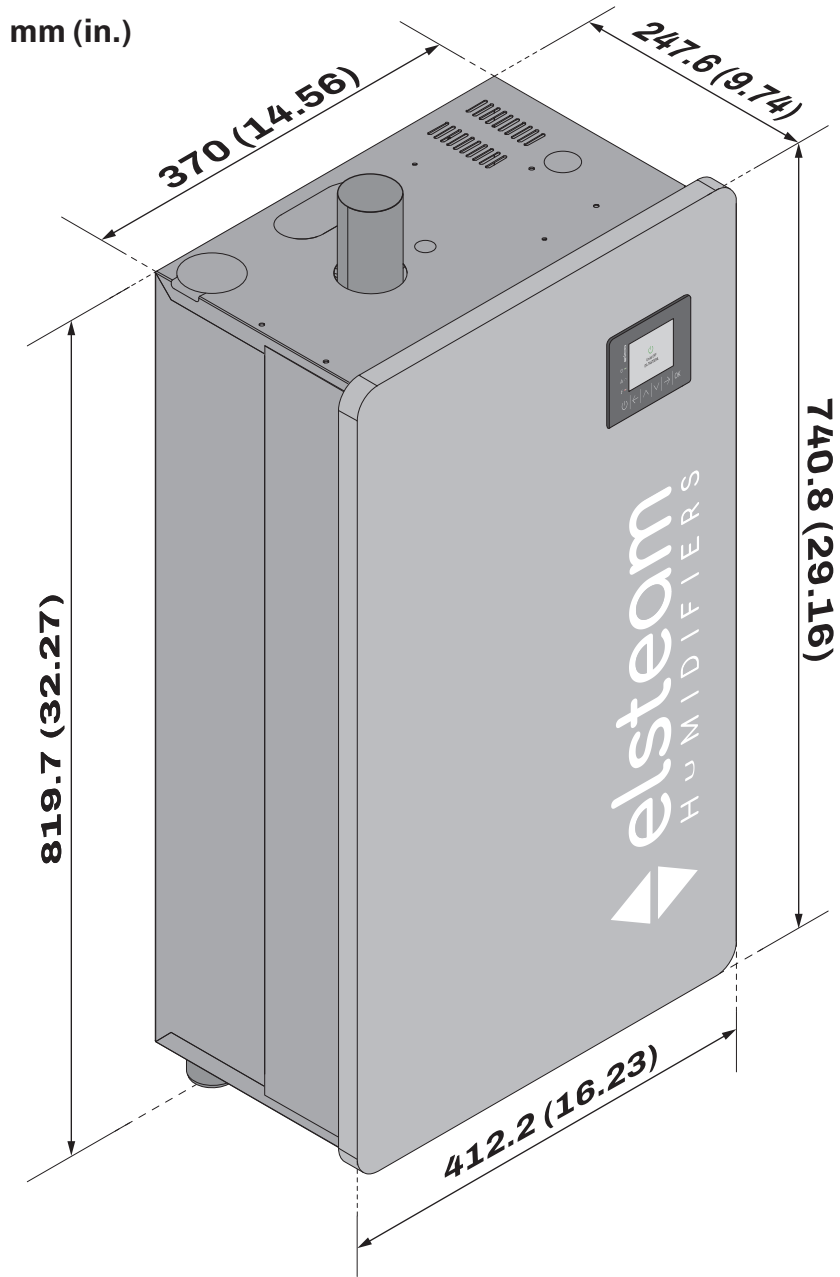
### Chapter content

This chapter contains the following information:

<b>Subject</b>	<b>Page</b>
<b><i>Dimensions</i></b>	<b>97</b>
<b><i>Minimum installation distances</i></b>	<b>101</b>
<b><i>Installation</i></b>	<b>102</b>

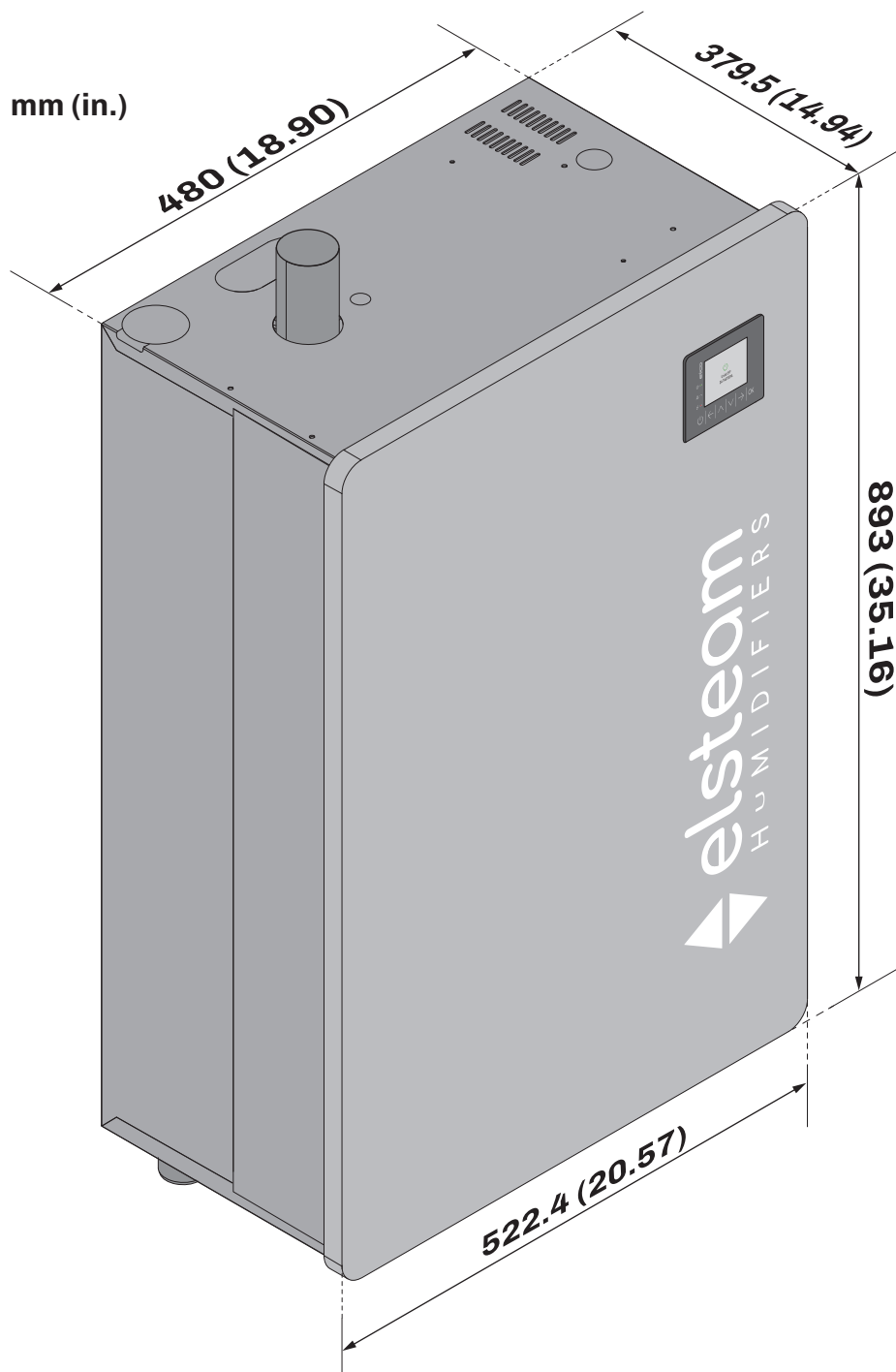
## 2.1 Dimensions

### 2.1.1 Single boiler models (small)



**Fig. 70.** Dimensions of single boiler models (small)

### 2.1.2 Single boiler models (large)



**Fig. 71.** Dimensions of single boiler models (large)

2.1.3 Double boiler models

mm (in.)

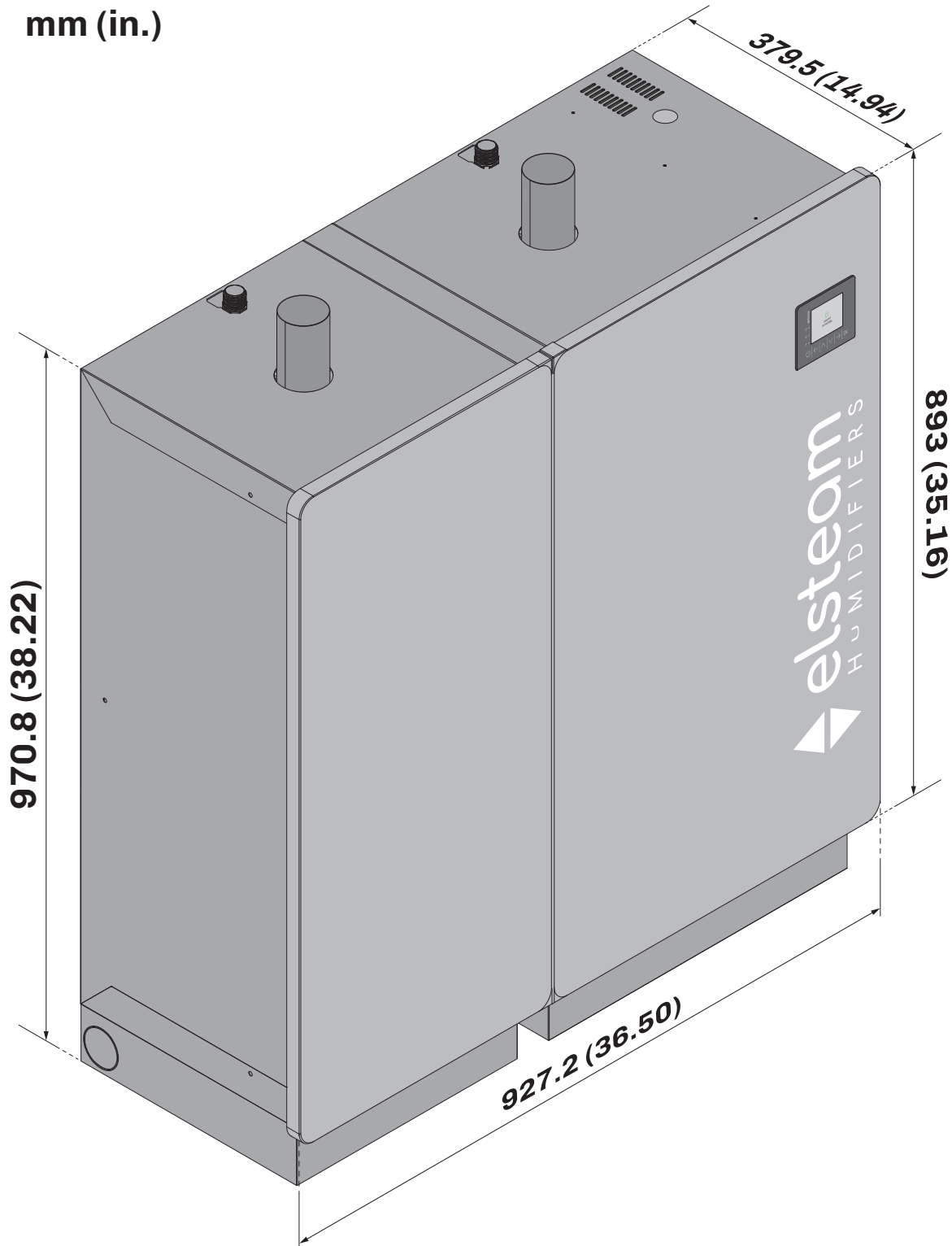


Fig. 72. Dimensions of double boiler models (with optional plinth)

mm (in.)

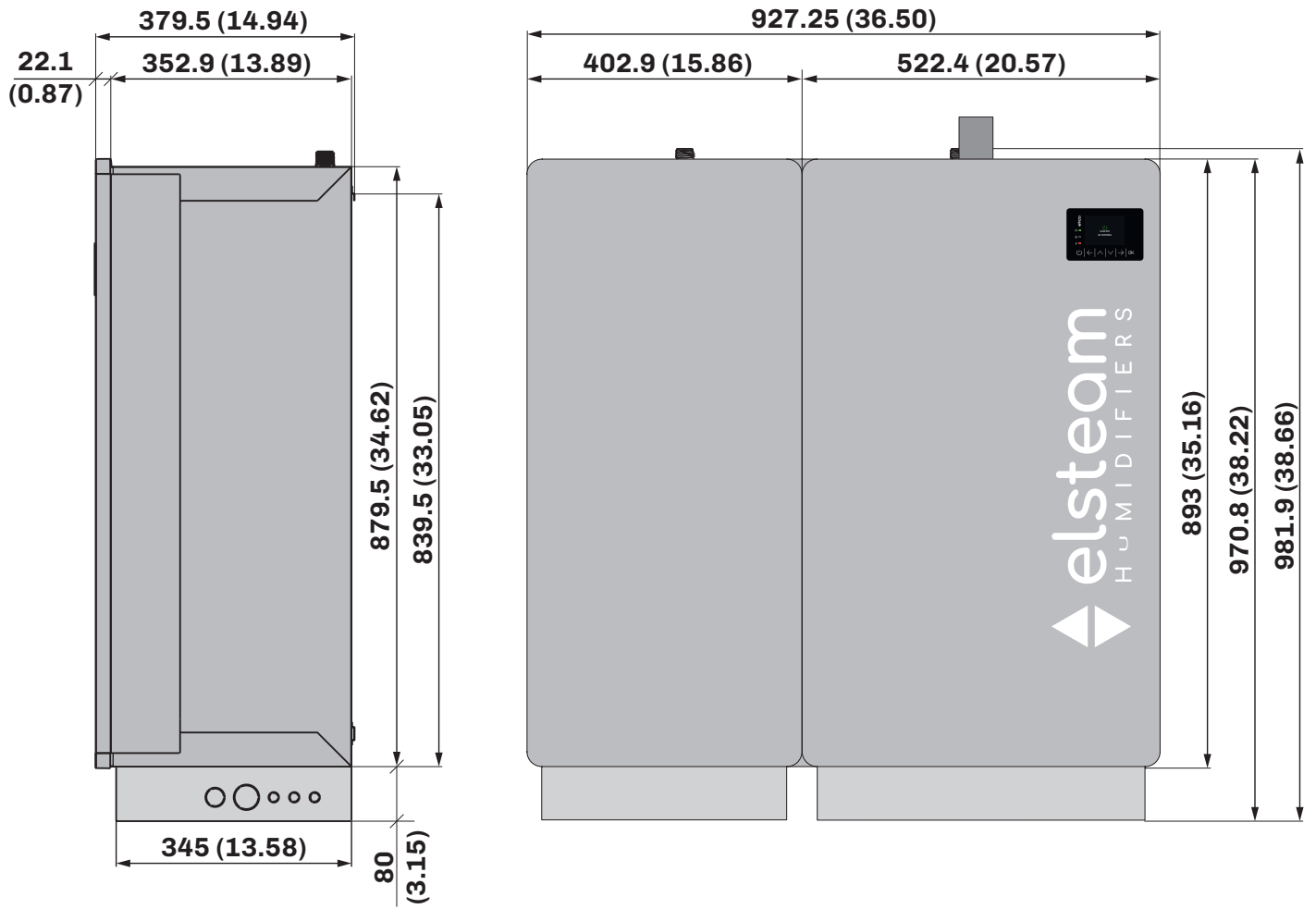


Fig. 73. Dimensions of double boiler models



## 2.2 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.

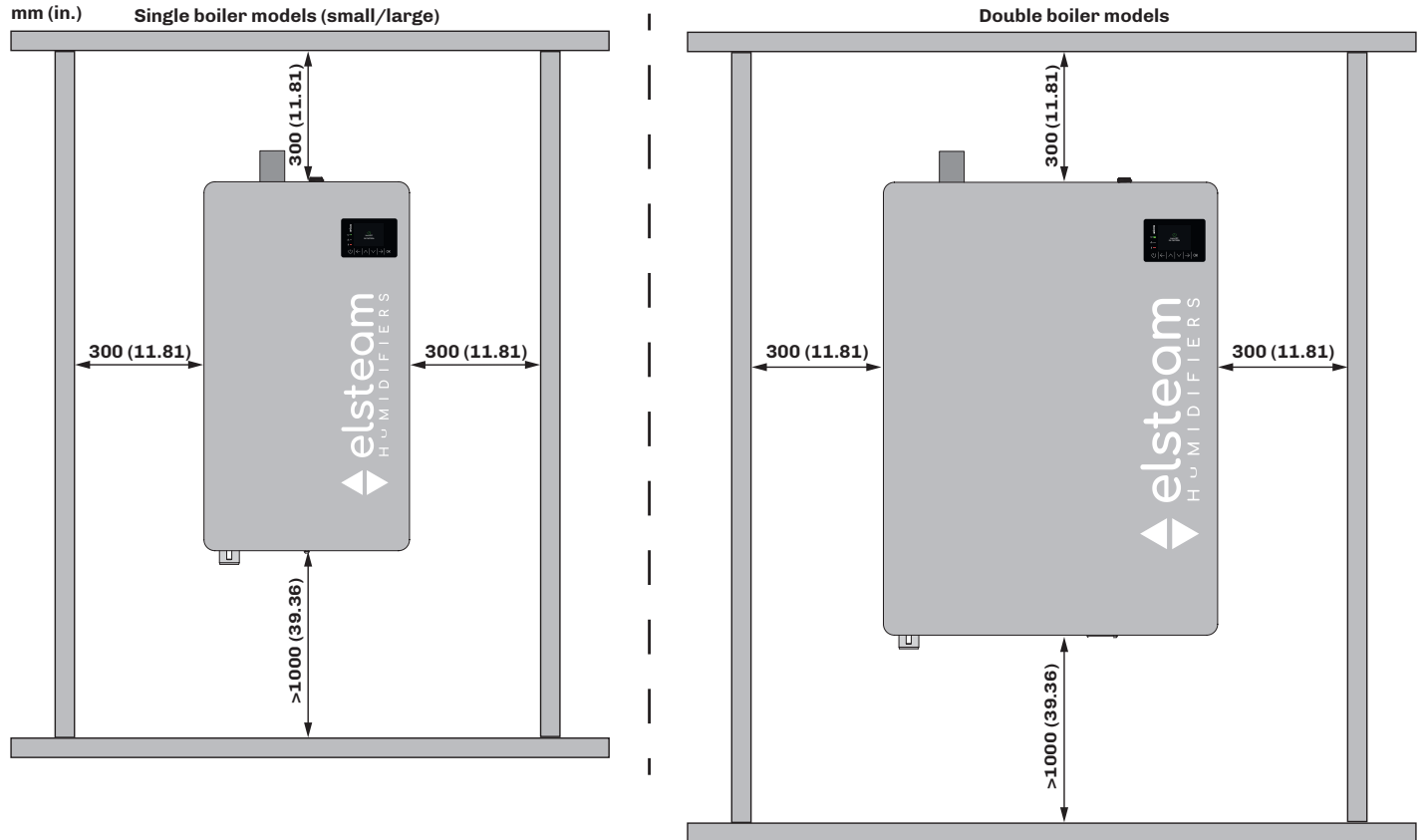


Fig. 74. Minimum installation distances

## 2.3 Installation

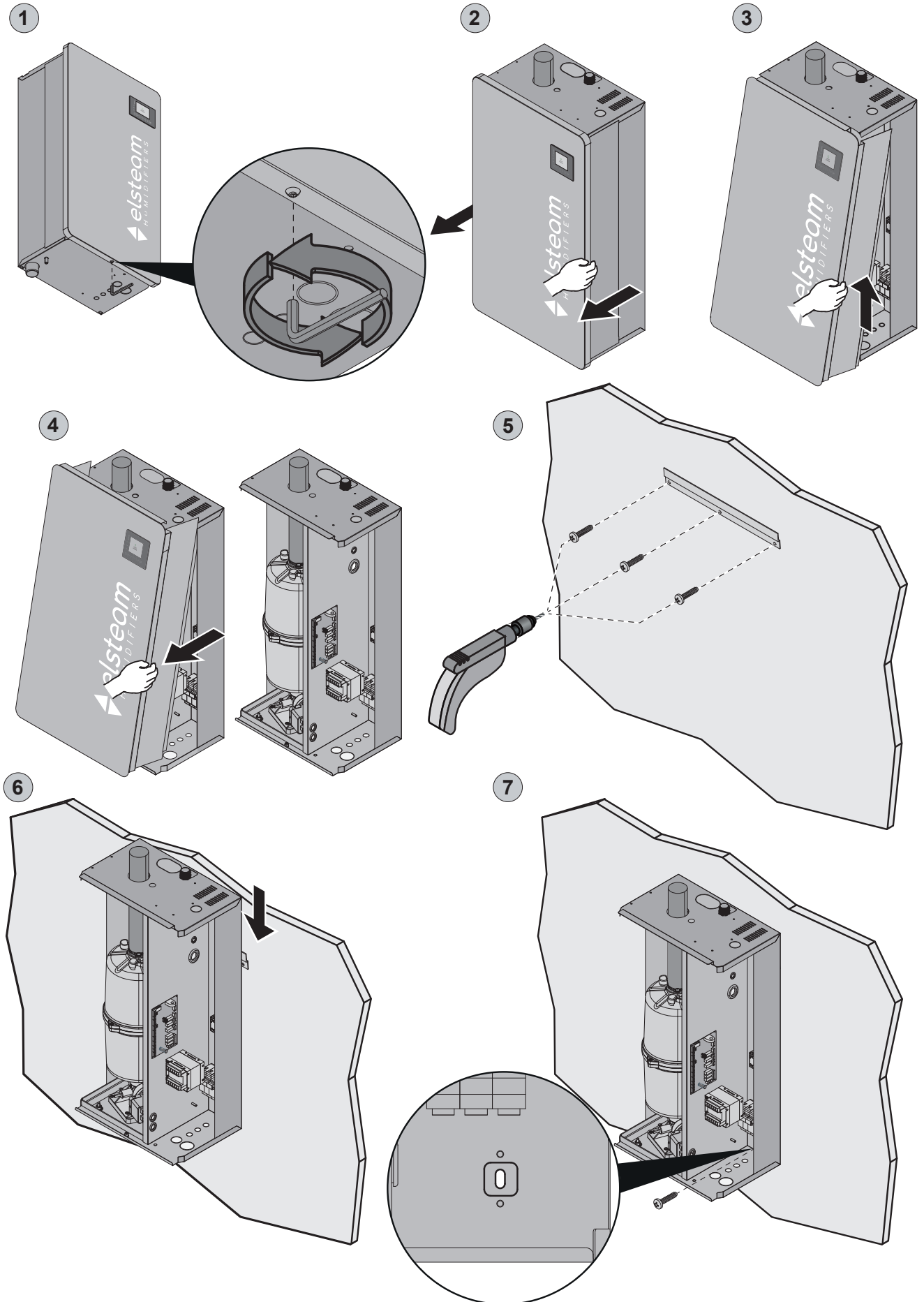


Fig. 75. Installation instructions

**NOTE:** Double boiler models are installed in the same way as described above.

### 2.3.1 Installation instructions

#### **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 SW2.5 hexagonal grub screw to open the walls of the humidifier;
- Remove the front wall by pulling it towards you and lifting it;
- 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.

## 3. ELECTRICAL CONNECTIONS

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### Chapter content

This chapter contains the following information:

<b>Subject</b>	<b>Page</b>
<i>Before you start</i>	<b>105</b>
<i>Best connection practices</i>	<b>105</b>
<i>Suitable power supply protection devices</i>	<b>107</b>
<i>Electrical connections</i>	<b>110</b>
<i>Configurations</i>	<b>112</b>
<i>Power supply and earth wiring connection</i>	<b>115</b>
<i>Cable glands and cable routing</i>	<b>116</b>
<i>Serial line connections</i>	<b>117</b>

### 3.1 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.

### 3.2 Best connection practices

#### 3.2.1 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**

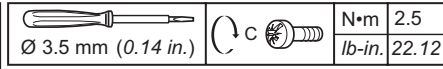
##### **REGULATORY INCOMPATIBILITY**

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.)**

$\frac{\text{mm}}{\text{in.}}$ 7 0.28			
mm <sup>2</sup>	16	16	16
AWG	8	8	8
no. of conductors	2		

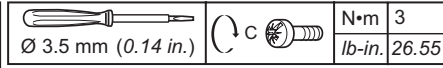


<b>Applicable to models ...</b>
EHK•003M2 / EHK•003T2 / EHK•003T4 / EHK•005M2 / EHK•005T2 / EHK•005T4 / EHK•010T4 / EHK•010T2 / EHK•015T4

**Fig. 76.** Maximum power supply wiring - See the table for the models

**Step 26.5 mm (1.04 in.)**

$\frac{\text{mm}}{\text{in.}}$ 7 0.28			
mm <sup>2</sup>	35	25	25
AWG	8	6	6
no. of conductors	3		

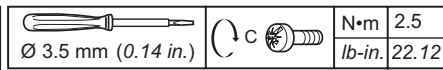


<b>Applicable to models ...</b>
EHK•015T2

**Fig. 77.** Maximum power supply wiring - EHK•015T2

**Step 17.8 mm (0.70 in.)**

$\frac{\text{mm}}{\text{in.}}$ 7 0.28			
mm <sup>2</sup>	16	16	16
AWG	8	8	8
no. of conductors	2		

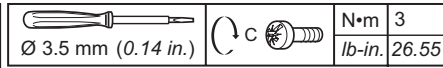


<b>Applicable to models ...</b>
EHK•020T4

**Fig. 78.** Maximum power supply wiring - EHK•020T4

**Step 26.5 mm (1.04 in.)**

$\frac{\text{mm}}{\text{in.}}$ 7 0.28			
mm <sup>2</sup>	35	25	25
AWG	8	6	6
no. of conductors	3		

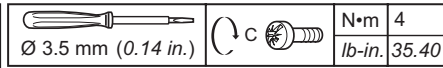


<b>Applicable to models ...</b>
EHK•020T2 / EHK•030T4 / EHK•040T4

**Fig. 79.** Maximum power supply wiring - EHK•020T2 / EHK•030T4 / EHK•040T4

**Step 35.5 mm (1.40 in.)**

$\frac{\text{mm}}{\text{in.}}$ 7 0.28			
mm <sup>2</sup>	50	35	35
AWG	1	2	2
no. of conductors	4		



<b>Applicable to models ...</b>
EHK•060T4 / EHKX080T4 / EHKX100T4

**Fig. 80.** Maximum power supply wiring - EHK•060T4 / EHKX080T4 / EHKX100T4

**Suitable wiring for the power supply**

P/n EHKT	P/n EHKX	Wiring size	Permissible wiring type	Pitch [mm(in.)]		
EHKT003M2	EHKX003M2	2G4		17.8 (0.70)		
EHKT003T2	EHKX003T2	3G2.5				
EHKT003T4	EHKX003T4	3G2.5				
EHKT005M2	EHKX005M2	2G10				
EHKT005T2	EHKX005T2	3G4				
EHKT005T4	EHKX005T4	3G2.5				
EHKT010T2	EHKX010T2	3G4				
EHKT010T4	EHKX010T4	3G10				
EHKT015T4	EHKX015T4	3G16				
EHKT015T2	EHKX015T2	3G6				
EHKT020T2	EHKX020T2	3G10				26.5 (1.04)
EHKT020T4	EHKX020T4	3G16				
EHKT030T4	EHKX030T4	3G16		17.8 (0.70)		
EHKT040T4	EHKX040T4	3G16				
EHKT060T4	EHKX060T4	3G25		26.5 (1.04)		
	EHKX080T4	3G35				
	EHKX100T4	3G50				
				35.5 (1.40)		

### 3.3 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.


	EHK● 003M2	EHK● 003T2	EHK● 003T4	EHK● 005M2	EHK● 005T2	EHK● 005T4	EHK● 010T4	EHK● 010T2	EHK● 015T4	EHK● 015T2	EHK● 020T4	EHK● 020T2	EHK● 030T4	EHK● 040T4	EHK● 060T4	EHKX 080T4	EHKX 100T4
Current	16	10	10	32	16	10	16	32	32	50	32		50		100		125
Type	Rapid			Rapid			Rapid			Rapid	Rapid	Rapid			Rapid		
Size	10x38			10x38			10x38			14x51	10x38	14x51			22x58		

Fig. 81. Overload protection devices according to model

#### 3.3.1 Changing fuses - Fuse holder base (single-phase models)

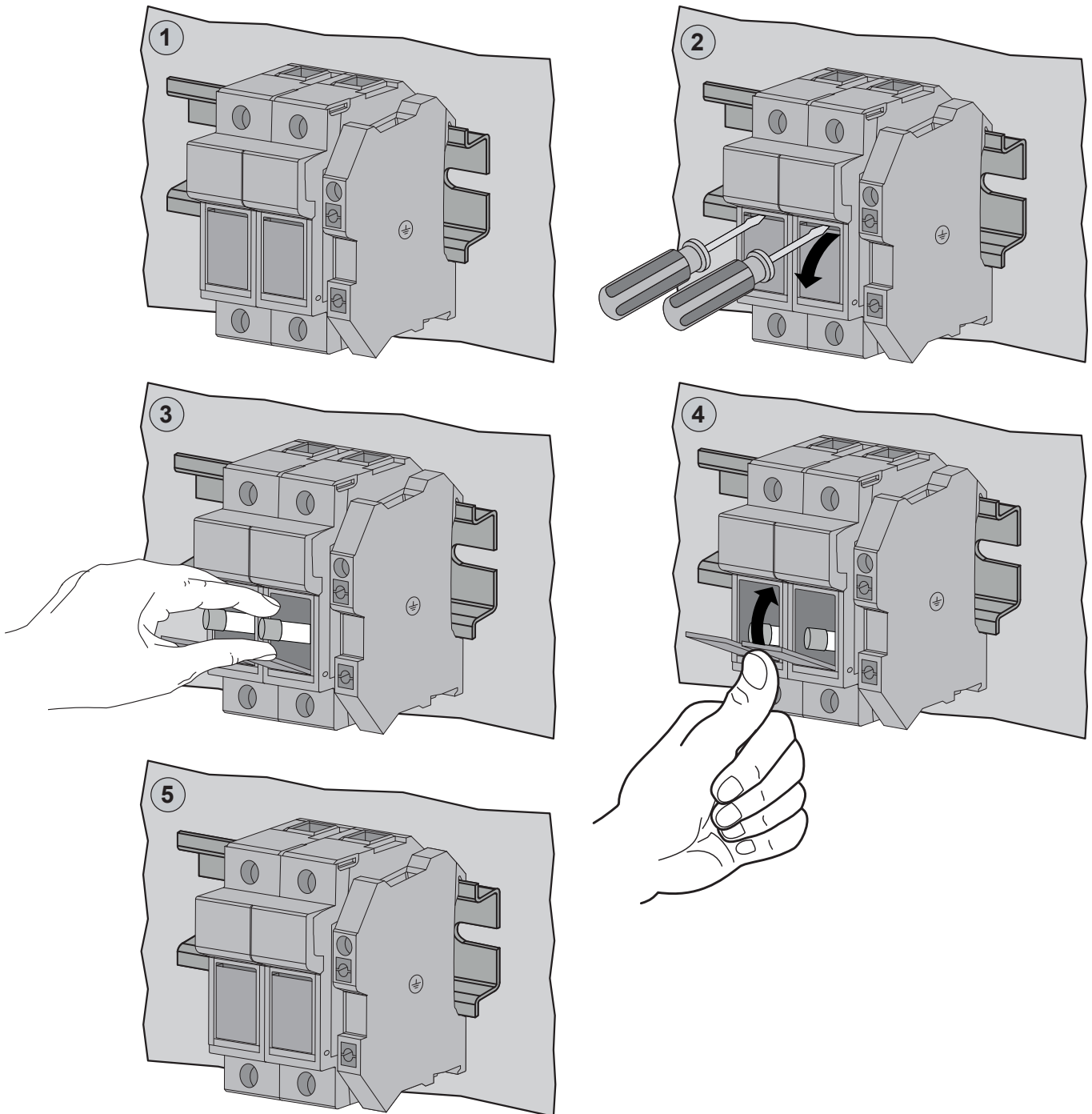
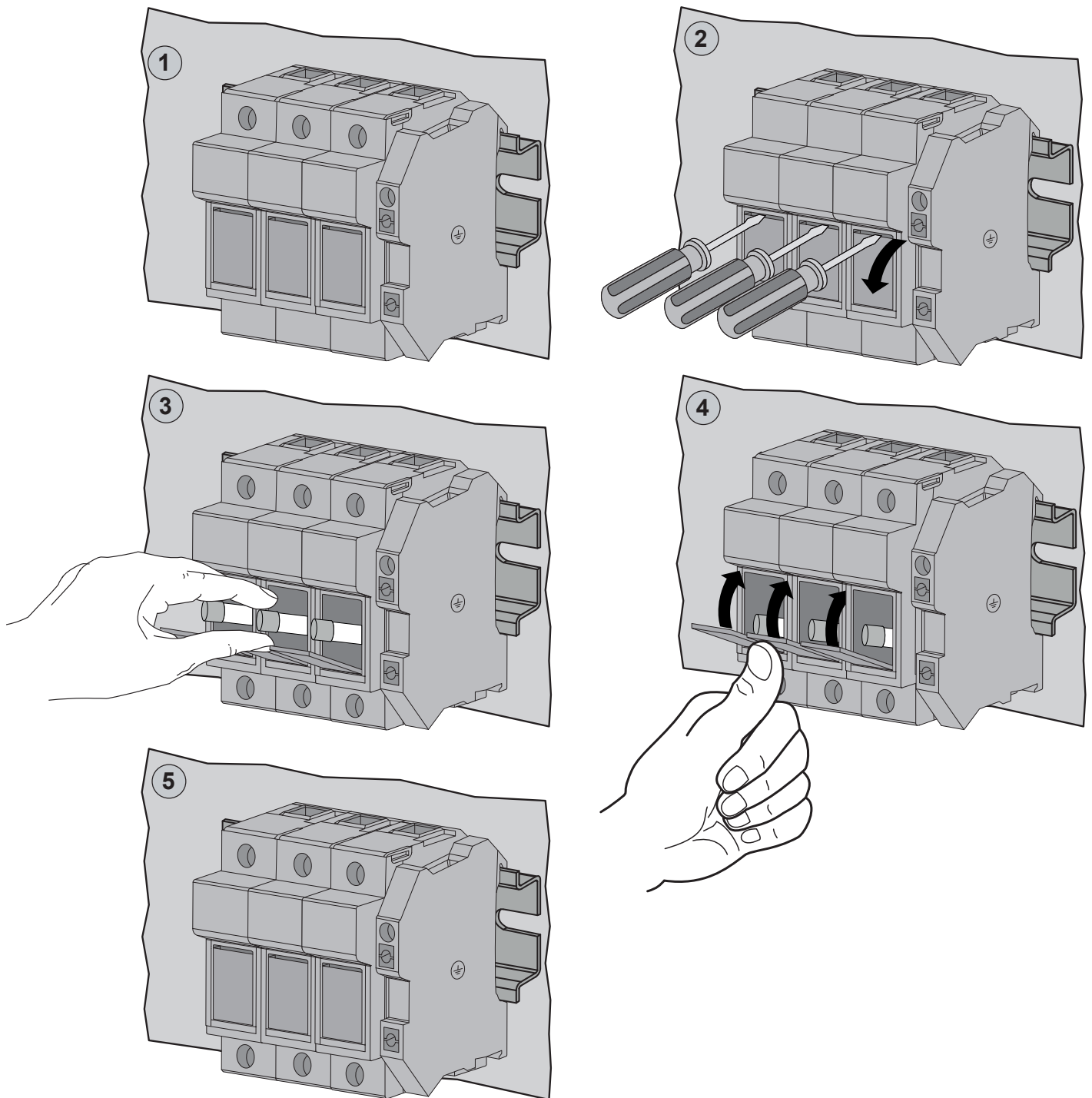


Fig. 82. Overload protection device

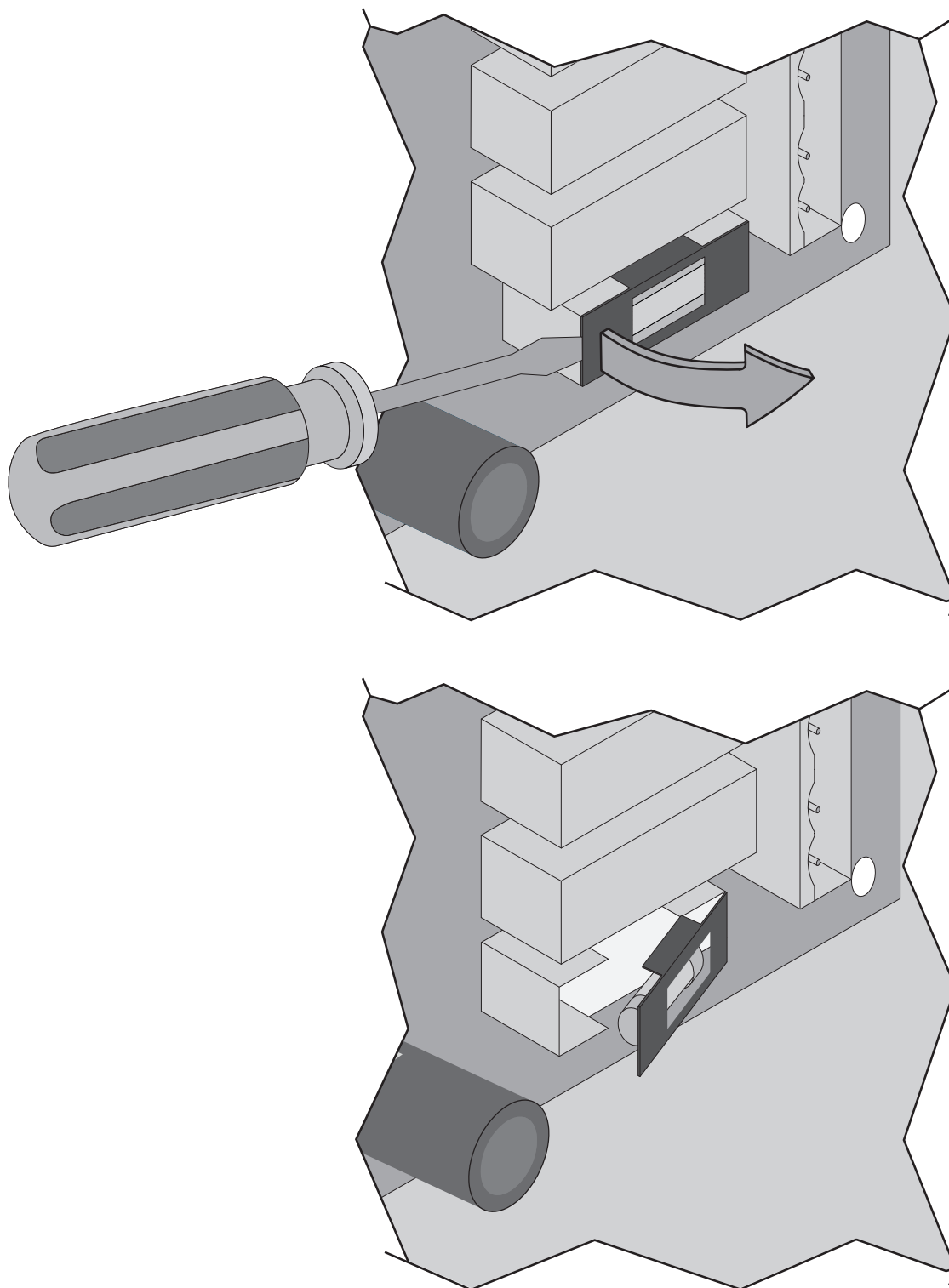
### 3.3.2 Changing fuses - Fuse holder base (three-phase models)



**Fig. 83.** Overload protection device



### 3.3.3 Changing fuses - Control board




**Fig. 84.** 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

## 3.4 Electrical connections

### 3.4.1 Control board

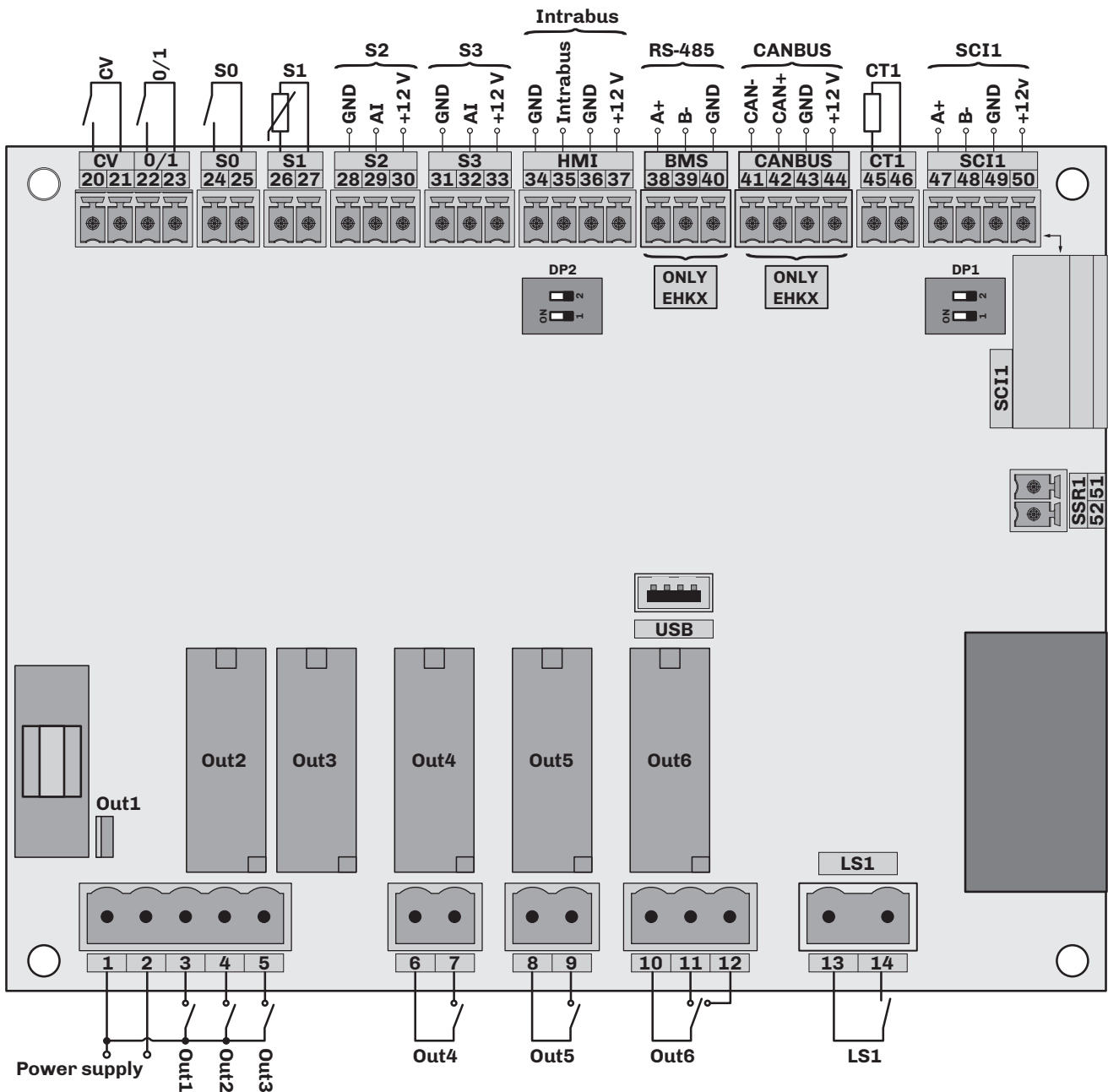


Fig. 85. Control board electrical connections

TERMINALS	
1-2	24 Vac power supply
1-3	Digital output: water outlet solenoid valve
1-4	Digital output: water outlet pump
1-5	Digital output: contactor (steam generation)
6-7	Digital output: humidification enable
8-9	Digital output: ventilated distributor control
10...12	Digital output: alarm
13-14	Hazardous voltage digital input: level sensor <b>LS1</b>
20-21	Digital input: fan enable ( <b>CV</b> )
22-23	Digital input: remote ON/OFF (0/1)
24-25	Digital input: humidistat ( <b>CFG</b> = 0) ( <b>S0</b> )
26-27	<b>S1</b> analogue input: temperature (anti-freezing and hold)
28...30	<b>S2</b> analogue input: humidity sensor
31...33	<b>S3</b> analogue input: humidity limit sensor
34...36	Serial line connection: HMI Intrabus
38...40	Serial line connection: RS-485 modbus for BMS slave ( <b>EHKX</b> only)
41...44	Serial line connection: CANBUS ( <b>EHKX</b> only)
45-46	Analogue connection: external current sensor <b>CT1</b> (TA)
47...50	Connection to expansion board <b>SCI1</b>
51-52	Reserved
<b>DP1</b>	Activate termination resistor on <b>SCI1 RS-485</b> serial line. 1 = <b>SCI1</b> RS-485 serial termination; 2 = Reserved
<b>DP2</b>	Termination resistor on <b>BMS / CANBUS RS-485</b> . 1 = <b>BMS</b> RS-485 serial termination 2 = <b>CANBUS</b> serial termination

### 3.4.2 Expansion

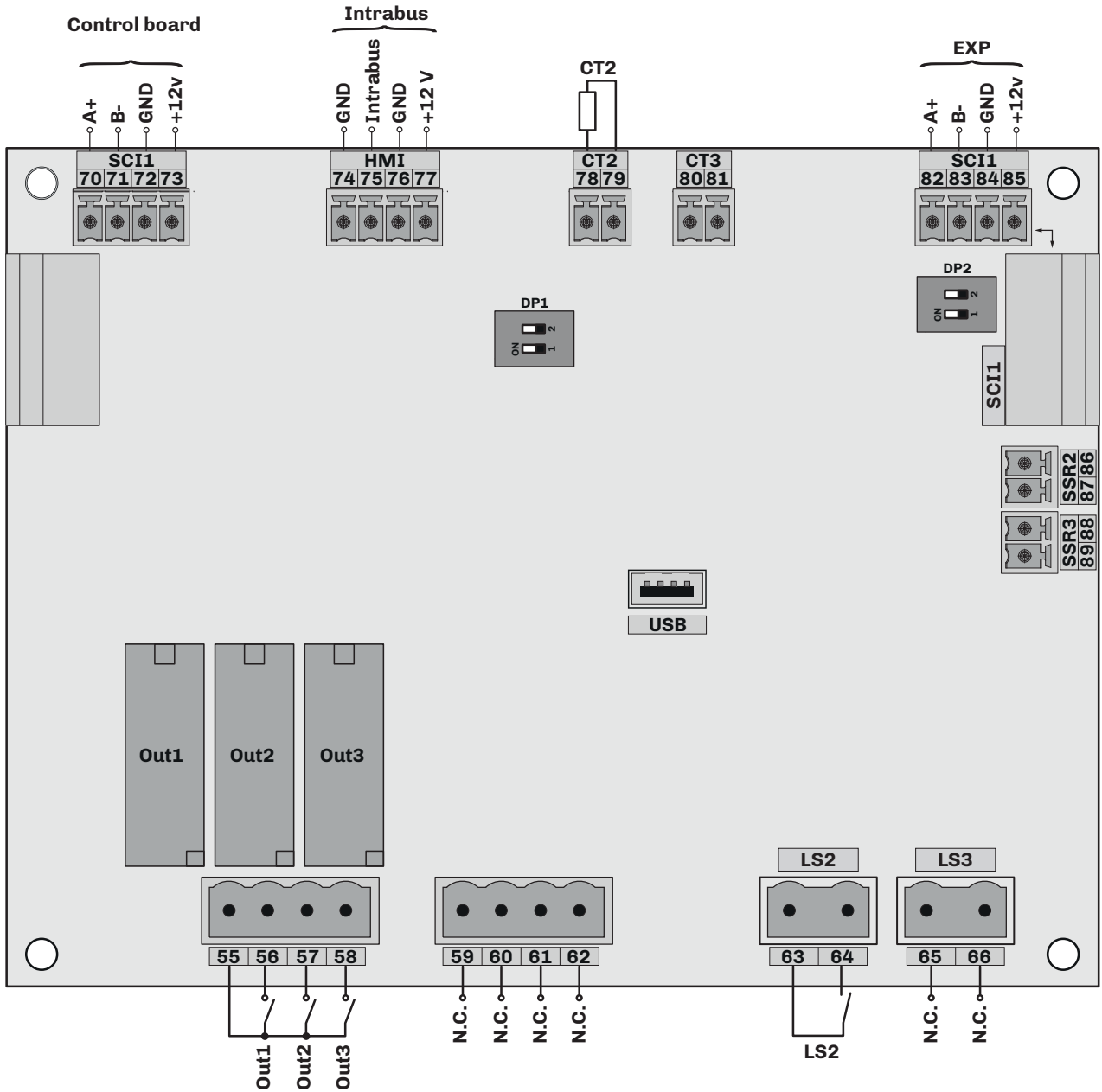


Fig. 86. Expansion electrical connections

TERMINALS					
55-56	Digital output: boiler 2 water outlet solenoid valve	80-81	Reserved		
		82...85	Connection to expansion board <b>SC11</b>		
55-57	Digital output: boiler 2 water outlet pump	DP1	Modbus communication address of expansion board		
55-58	Digital output: electrodes (steam generation)		1	2	Address offset relative to <b>LA1</b>
63-64	Hazardous voltage digital input: level sensor <b>LS12</b>		OFF	OFF	<b>LA1 + 0</b>
			OFF	ON	<b>LA1 + 1</b>
			ON	OFF	<b>LA1 + 2</b>
70...73	Connection to control board <b>SC11</b>	ON	ON	<b>LA1 + 3</b>	
74...77	Serial line input: HMI Intrabus	DP2	Activate termination resistor on <b>SC11 RS-485</b> serial line.		
78-79	Analogue input: external current sensor <b>CT2</b> (TA) for boiler 2		1	2	<b>SC11 RS-485</b> serial termination; 2 = Reserved

## 3.5 Configurations

### 3.5.1 ON/OFF connection with humidistat or external contact

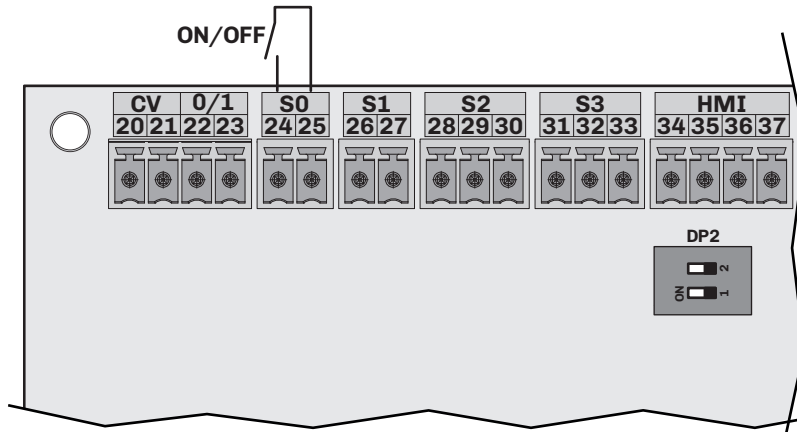


Fig. 87. ON/OFF connection with humidistat or external contact

### 3.5.2 External proportional humidistat connection with signal 0...10 V

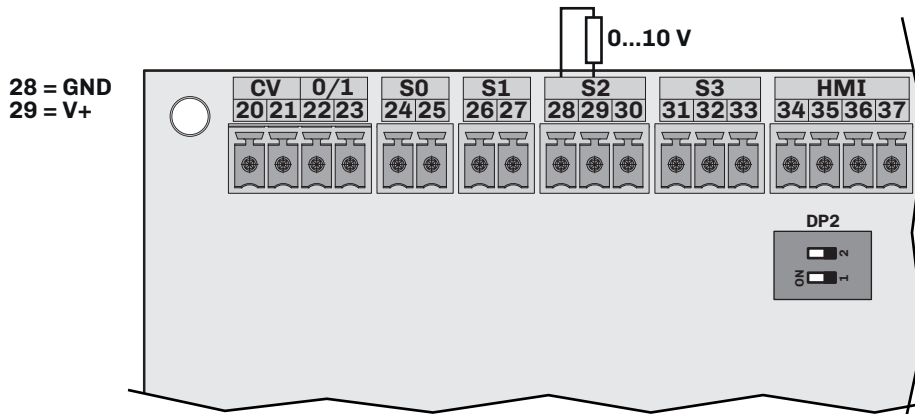


Fig. 88. External proportional humidistat connection with signal 0...10 V

### 3.5.3 Humidity sensor connection 4...20 mA

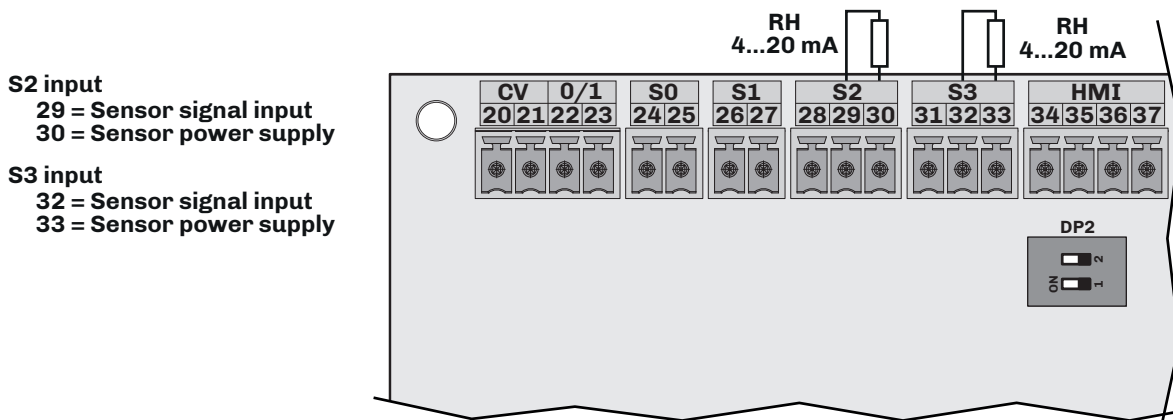


Fig. 89. Humidity sensor connection 4...20 mA

### 3.5.4 Humidity sensor connection 0...20 mA

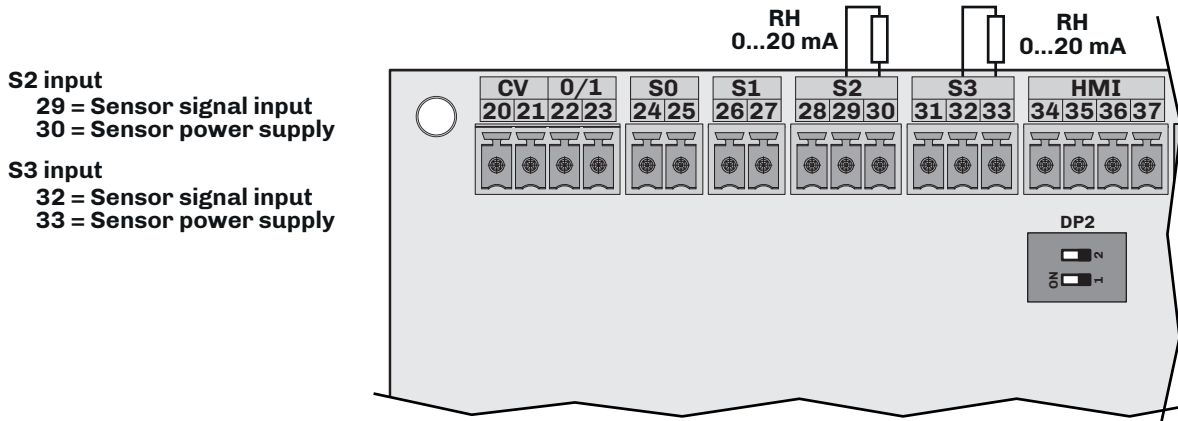


Fig. 90. Humidity sensor connection 0...20 mA

### 3.5.5 Humidity sensor connection 0...10 V

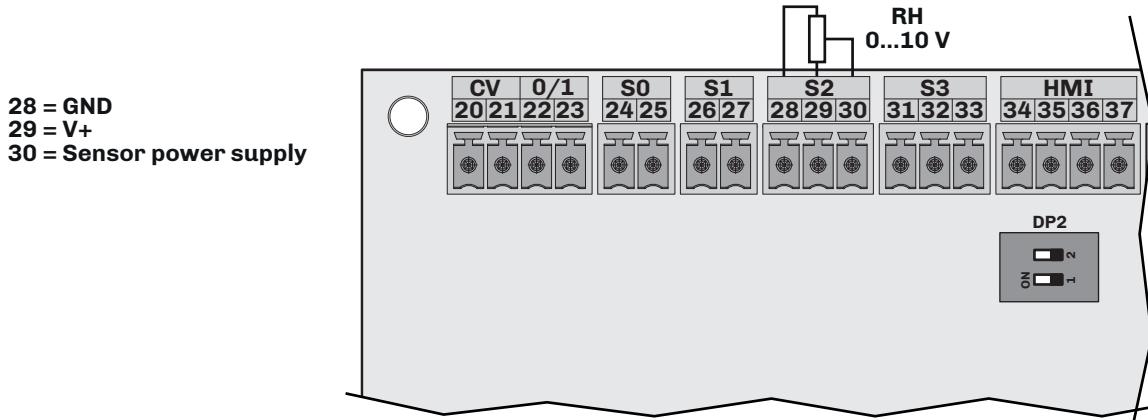


Fig. 91. Humidity sensor connection 0...10 V

### 3.5.6 Humidity sensor connection 0...5 V

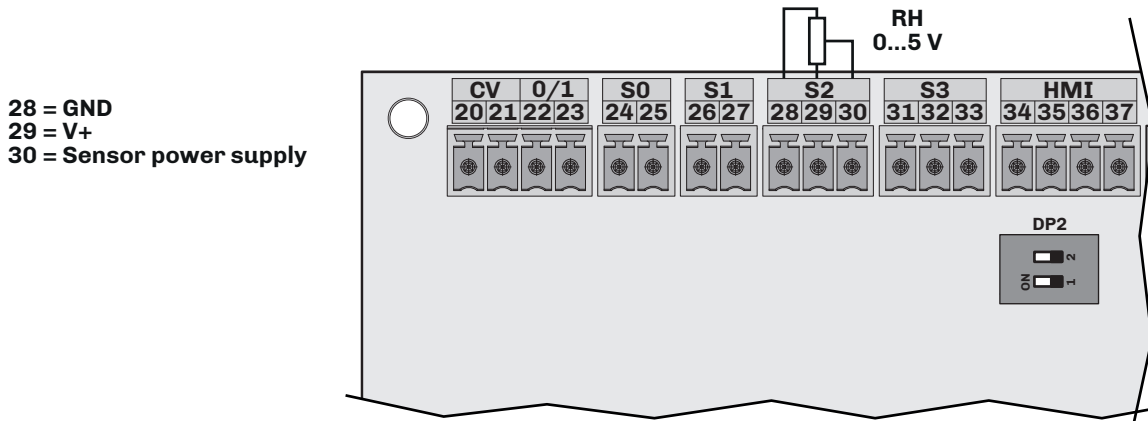


Fig. 92. Humidity sensor connection 0...5 V

### 3.5.7 EVHTP520 humidity sensor connection

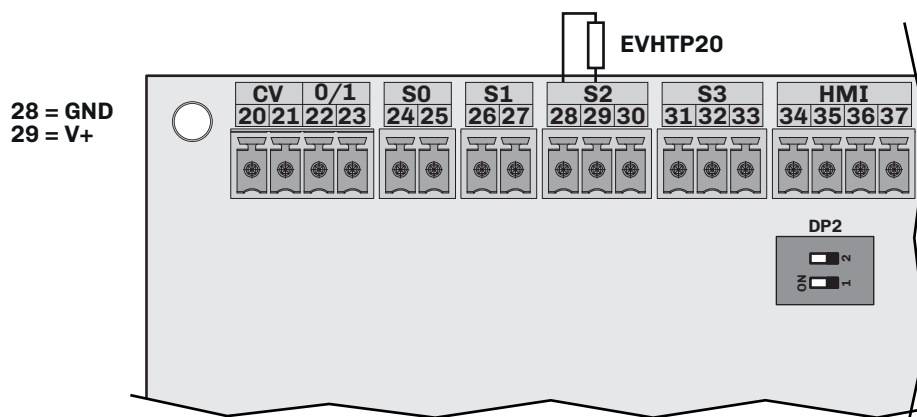


Fig. 93. EVHTP520 humidity sensor connection

### 3.5.8 NTC/PTC/Pt1000 resistive sensor connection

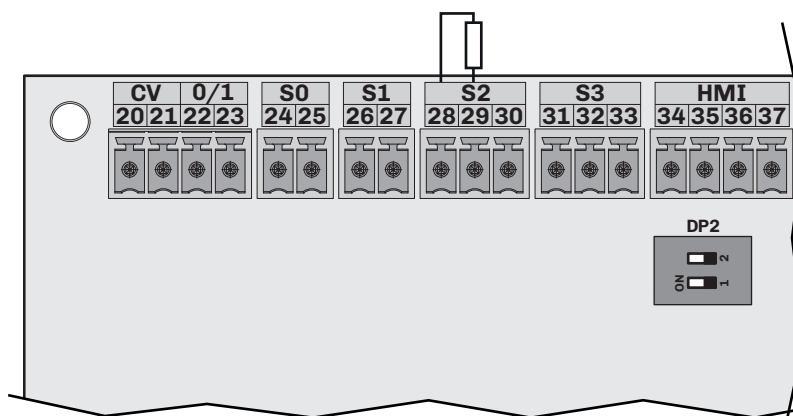
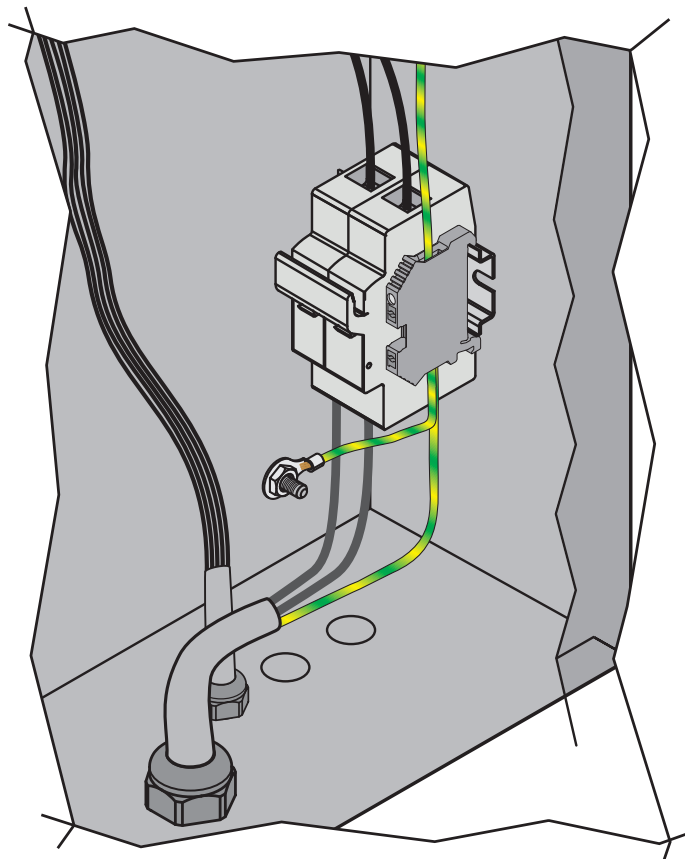


Fig. 94. NTC/PTC/Pt1000 resistive sensor connection

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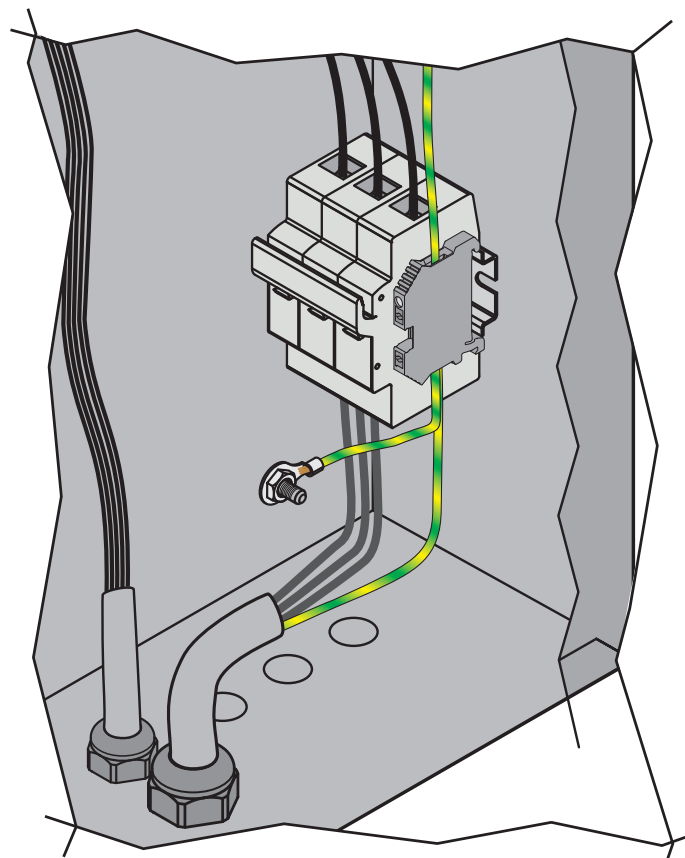
## 3.6 Power supply and earth wiring connection

### 3.6.1 Single-phase models



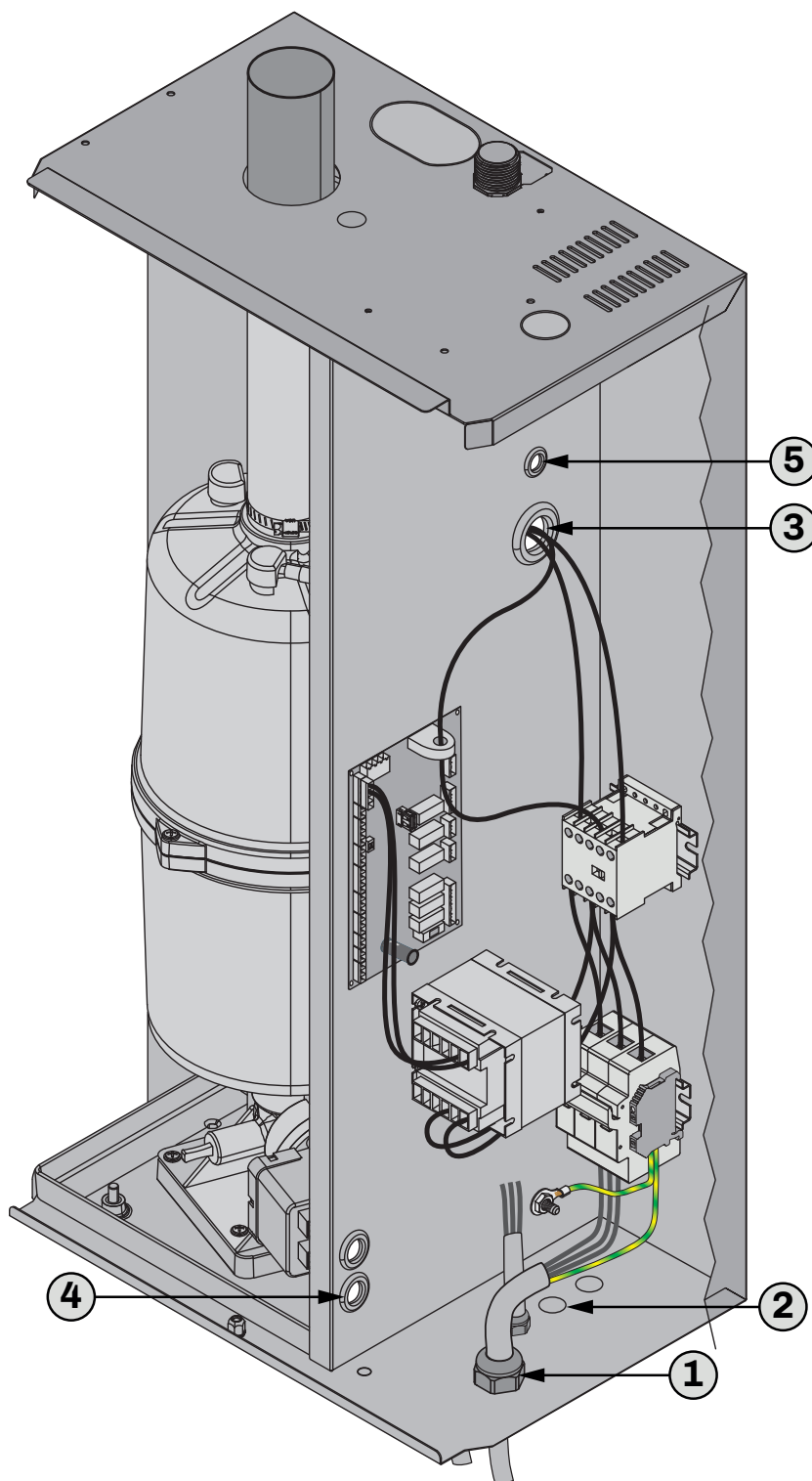
**Fig. 95.** Power supply connections - single-phase models

### 3.6.2 Three-phase models



**Fig. 96.** Power supply connections - three-phase models

### 3.7 Cable glands and cable routing



**Fig. 97.** Cable glands and cable routing

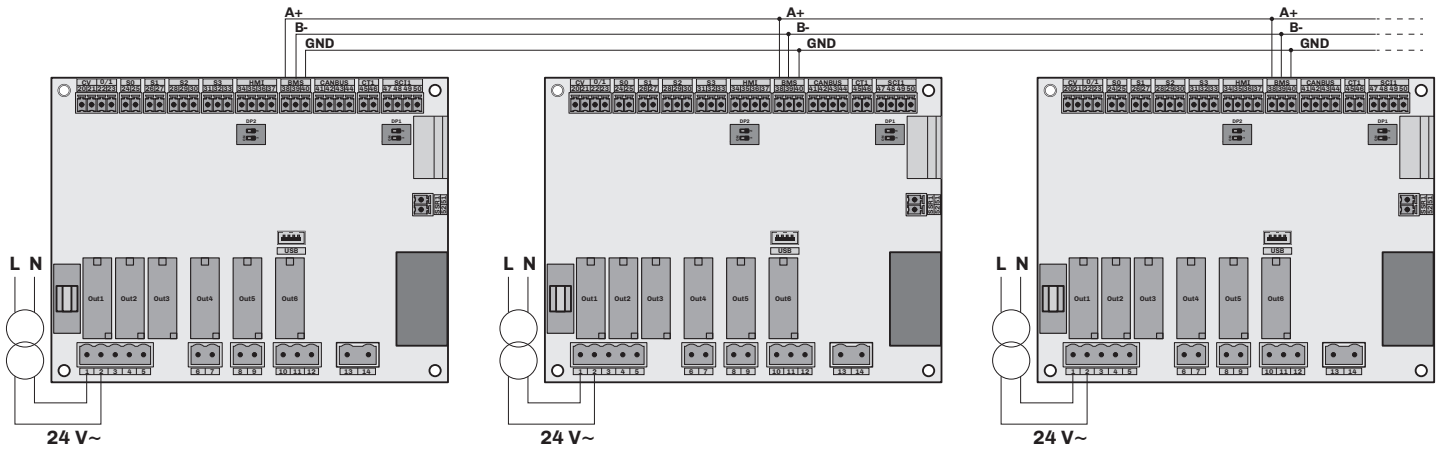
Ref.	Description
①	Pull-resistant cable gland for power cable entry
②	Pull-resistant cable glands for control signal/serial cable entry
③	Cable gland for power cables from contactor to boiler
④	Cable gland for outlet pump power supply cables
⑤	Cable gland for outlet solenoid valve power supply cables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



### 3.8 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

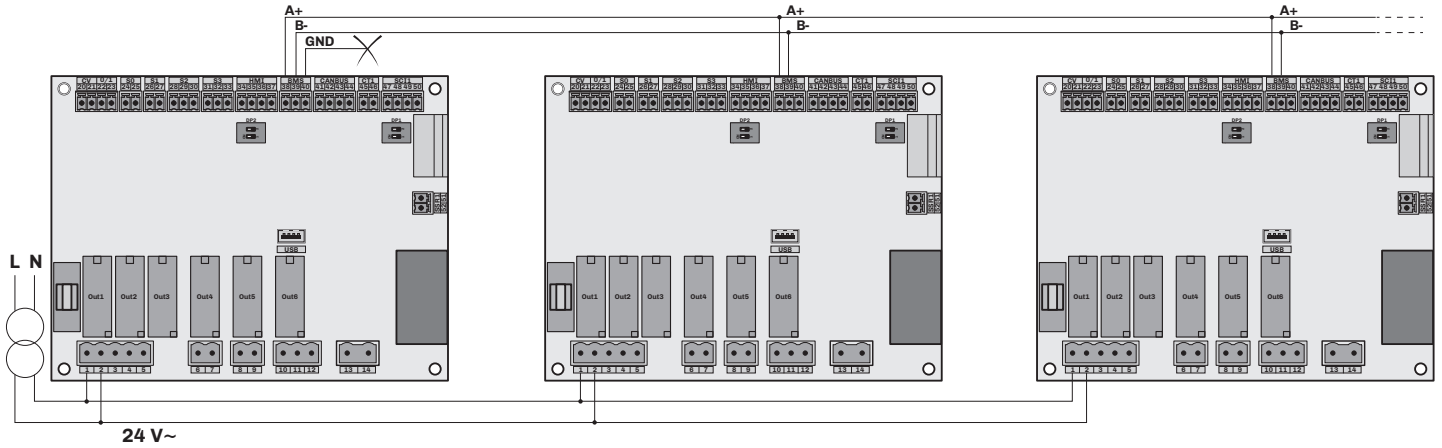


Fig. 98. Serial line connections

## 4. OPERATION

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### Chapter content

This chapter contains the following information:

<b>Subject</b>	<b>Page</b>
<b>Zephyr operating principle</b>	<b>119</b>
<b>Humidity regulation</b>	<b>119</b>
<b>Preheating and anti-freeze (EHKX only)</b>	<b>122</b>
<b>Boiler water dilution</b>	<b>122</b>
<b>Boiler draining</b>	<b>122</b>
<b>Cleaning cycles</b>	<b>122</b>
<b>Level sensor</b>	<b>123</b>
<b>Foam management</b>	<b>123</b>
<b>Operating hours</b>	<b>123</b>
<b>Overproduction</b>	<b>123</b>

## 4.1 Zephyr operating principle

The **ZEPHYR** series is the ELSTEAM immersed electrode humidifier solution.

**ZEPHYR** 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 current strength transferred to the water via the immersed electrodes. When there is a humidity request, the inlet solenoid valve lets water into the boiler until the required production is reached, at which point the solenoid valve is closed. When the steam production is below the required level, the inlet solenoid valve is activated again until the optimal working condition is reached.

The steam is emitted into the room via a special hose and a steam distributor made of stainless steel and engineering polymer (emission in an AHU - air handler unit - or air-conditioning duct), or via a ventilated distributor (steam emission into the room).

## 4.2 Humidity regulation

The humidity can be regulated in 4 ways, depending on how the **CFG** parameter is set:

- ON-OFF regulation (**CFG** = 0);
- Proportional regulation (**CFG** = 1);
- Regulation with the humidity sensor (**CFG** = 2);
- Regulation with the humidity sensor and limit sensor (**CFG** = 3).

### 4.2.1 ON-OFF regulation | **CFG** = 0

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

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

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

### 4.2.2 Proportional regulation | **CFG** = 1

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

- **CFG** = 1;
- Set the minimum humidity production **r5**;
- Set the maximum humidity production **r6**;
- Enable digital input closed (**CV**);
- Remote ON/OFF digital inputs (**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**:

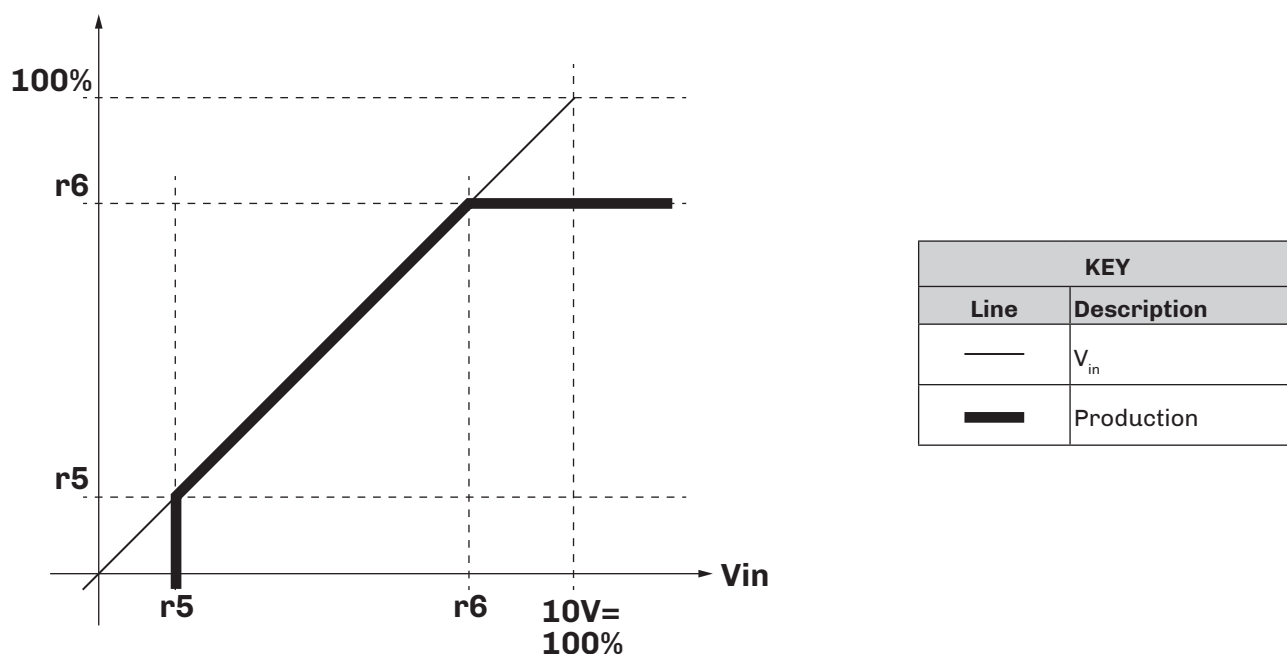


Fig. 99. How proportional regulation works | **CFG** = 1

### 4.2.3 Regulation with the humidity sensor | CFG = 2

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

- CFG = 2 or CFG = 3;
- Set parameter **P2** according to the sensor type to be used;
- Set the minimum humidity production **r5**;
- Set the maximum humidity production **r6**;
- Enable digital input closed (**CV**);
- Remote ON/OFF digital inputs (**0/1**).

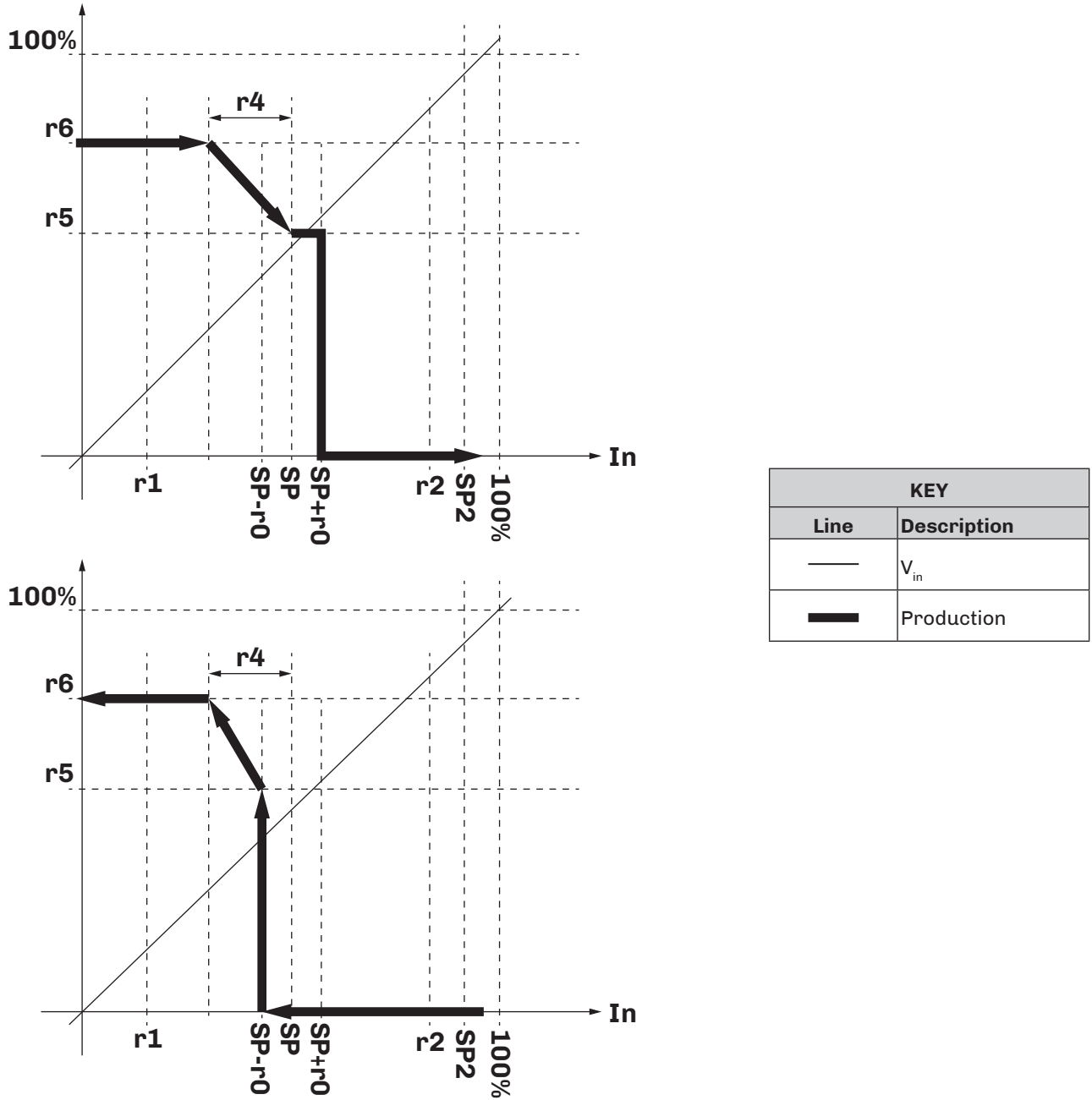
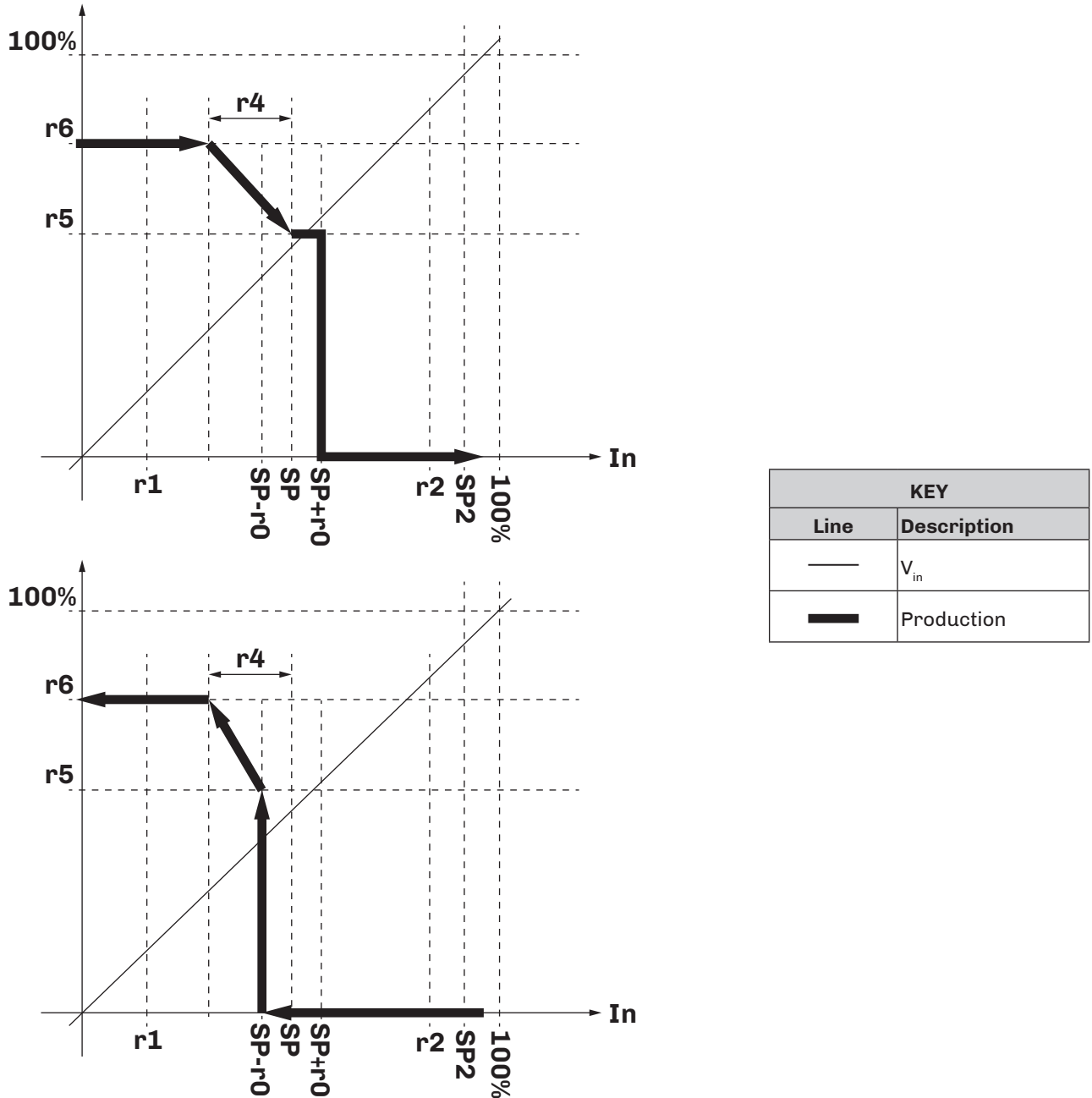


Fig. 100. How regulation with the humidity sensor works | CFG = 2

#### 4.2.4 Regulation with the humidity sensor + limit sensor | CFG = 3

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

- **CFG = 3**;
- 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**;
- Enable digital input closed (**CV**);
- Remote ON/OFF digital inputs (**0/1**).



**Fig. 101.** How regulation with the humidity sensor + limit sensor works | **CFG = 3**

The humidity production behaves in the same way as for regulation with the humidity sensor (**CFG = 2**), but the second sensor connected to the **S2** analogue input stops steam generation according to the humidity delivery.

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

### 4.3 Preheating and anti-freeze (EHKX only)

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
<b>c8</b>	Preheating set-point for temperature hold. <b>0</b> = Disabled.	°C/°F	0.0...90.0
<b>c9</b>	Anti-freezing enable (temperature fixed at 7 °C (44.6 °F)). <b>0</b> = Disabled; <b>1</b> = Enabled.	---	0/1

### 4.4 Boiler water dilution

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

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

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

#### 4.4.1 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
<b>c6</b>	Draining value for dilution (if <b>C3</b> = 0).	%	20...80

#### 4.4.2 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
<b>c4</b>	Draining duration for dilution (if <b>C3</b> = 1).	s	0...9999
<b>c5</b>	Time between two dilution draining events (if <b>C3</b> = 1).	min	30...999

### 4.5 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 **AL13** is generated and the humidifier is forced OFF until maintenance is carried out (see **"7.1 TABLE OF ZEPHYR ALARMS" ON PAGE 137**).

### 4.6 Cleaning cycles

**Zephyr** performs boiler cleaning cycles with full washing 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;
- When manual draining is activated from the user menu.

The configuration parameters for the cleaning cycles are:

Par.	Description	MU	Range
<b>c0</b>	Number of continuous days of inactivity after which the boiler is emptied. <b>0</b> = Function disabled.	days	0...10
<b>c1</b>	Number of continuous days of activity after which the boiler is emptied. <b>0</b> = Function disabled.	days	0...10
<b>c2</b>	Number of cleaning cycles (filling+draining) following emptying due to activity or inactivity.	num	0...10

Once parameter **c2** has been configured, the number of cleaning cycles (filling+draining) following emptying due to activity or inactivity can be set. A single cleaning cycle is performed for manual draining.

---

## 4.7 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.

## 4.8 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 **c11** = 1, **Zephyr** indicates and manages this condition:

If water or foam reaches the level sensor, **Zephyr** activates the outlet pump to drain some of the water from the boiler without activating the inlet solenoid valve. **Zephyr** maintains a lower amount of water and activates the electrodes to generate steam.

If the level sensor is not reached again within time **c12**, there is no foam in the boiler, but it was filled with too much water due to low internal electrical conductivity, in which case **Zephyr** resumes normal operation.

If the level sensor is reached again within time **c12**, there is foam in the boiler, in which case **Zephyr** empties the boiler completely. Thereafter, if the following occurs within time **c12**:

- The level sensor is reached again, **Zephyr** performs two complete cleaning cycles;
- The level sensor is not reached, **Zephyr** resumes normal operation.

If there is foam, **Zephyr** indicates the alarm on the display with the code **AL09**.

## 4.9 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
<b>A10</b>	Operating hours threshold for unit maintenance warning.	hx10	100....1000
<b>A11</b>	Operating hours threshold for partial boiler maintenance warning.	hx10	100....1000
<b>A12</b>	Operating hours threshold for full boiler maintenance warning.	hx10	100....1000
<b>A13</b>	Operating hours threshold for valve maintenance warning.	hx10	100....1000
<b>A14</b>	Operating hours threshold for pump maintenance warning.	hx10	100....1000
<b>A15</b>	Operating hours threshold for fan maintenance warning.	hx10	100....1000

### 4.9.1 Resetting the operating hours

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

#### Humidifier EHKT

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

#### Humidifier EHKX

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

## 4.10 Overproduction

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

## 5. MAINTENANCE

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### Chapter content

This chapter contains the following information:

<b>Subject</b>	<b>Page</b>
<i>Introduction to Zephyr</i>	<b>125</b>
<i>Product overview</i>	<b>125</b>
<i>Checking the status of the humidifier</i>	<b>127</b>
<i>Boiler maintenance</i>	<b>127</b>
<i>Cleaning the boiler</i>	<b>128</b>
<i>Replacing the boiler</i>	<b>130</b>
<i>Fitting the boiler</i>	<b>130</b>
<i>Cleaning/replacing the electrodes</i>	<b>131</b>
<i>Cleaning the optional stainless steel drain tray (EHVI accessory)</i>	<b>131</b>



## 5.1 Introduction to Zephyr

The **Zephyr** series is the ELSTEAM immersed electrode humidifier solution.

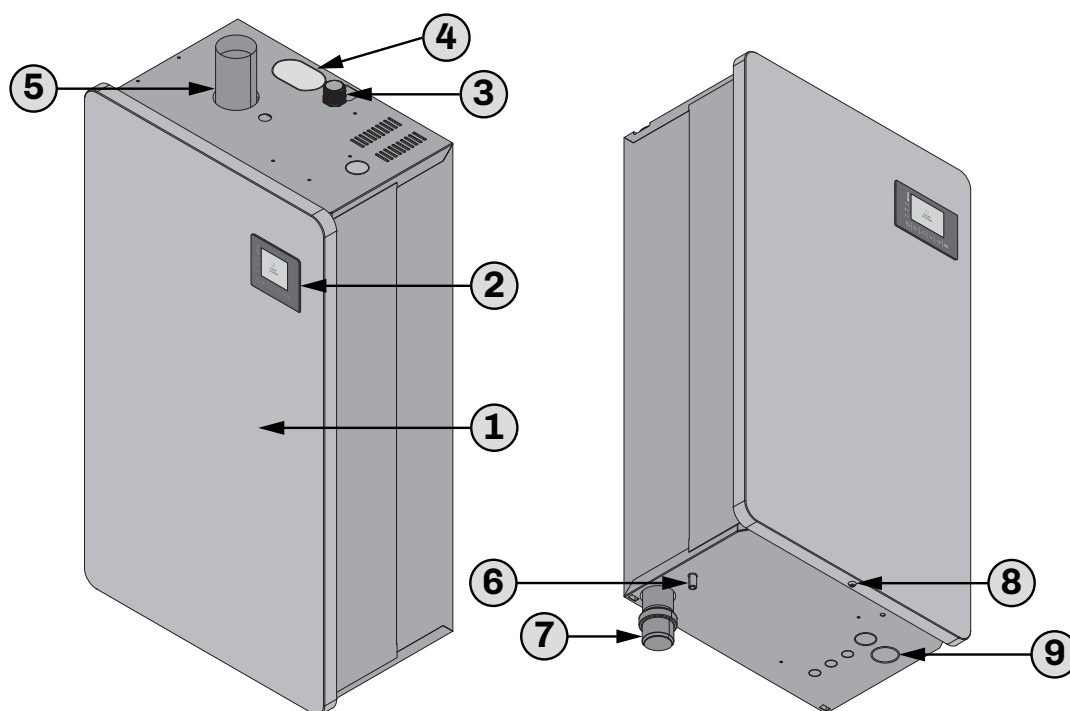
**Zephyr** series humidifiers generate humidity (steam) by passing a current between two or more electrodes immersed in drinking water to bring it to boiling point.

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 (emission in an AHU - air handler unit - or air-conditioning duct), or via a ventilated distributor (steam emission into the room).

## 5.2 Product overview

### 5.2.1 External view of the product



**Fig. 102.** 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
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

## 5.2.2 Internal view of the product

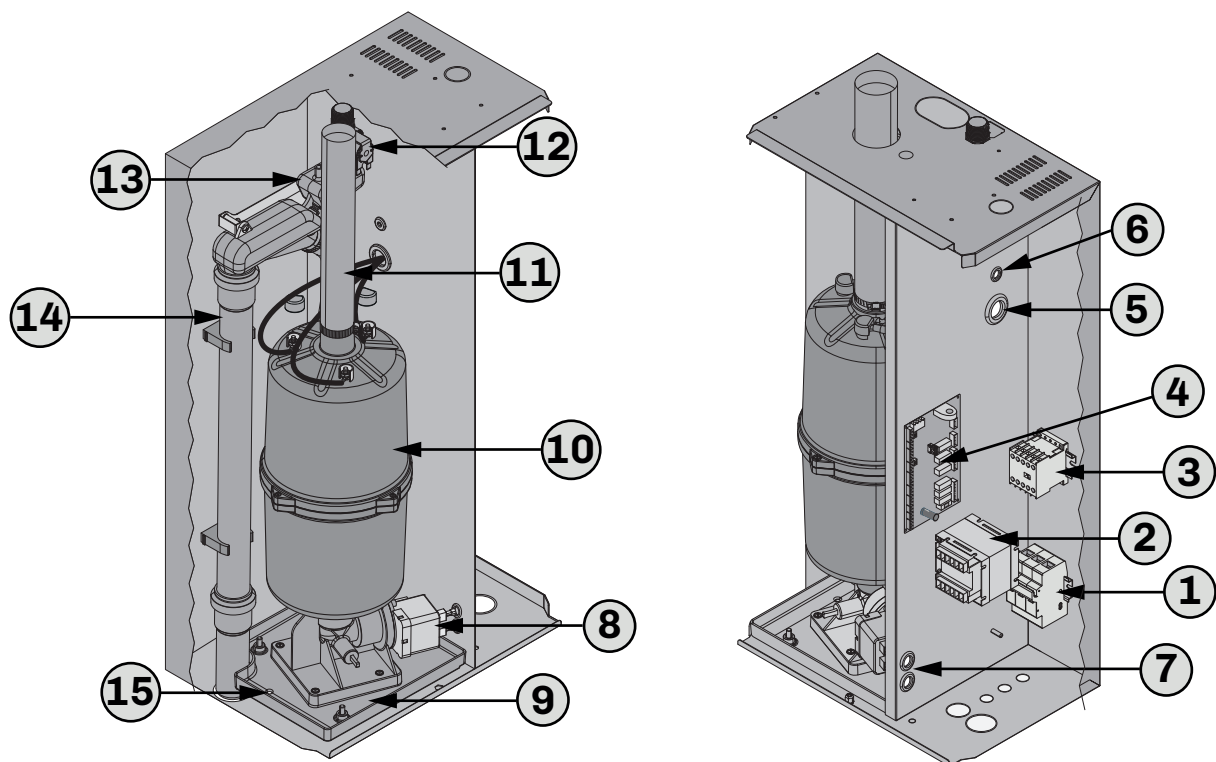


Fig. 103. Internal overview of the product

Reference	Description	Reference	Description
①	Fuse holder base	⑨	Bottom tray to collect water leaks
②	Isolation transformer	⑩	Boiler
③	Contacteur	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		

## 5.3 Checking the status of the humidifier

Perform the following scheduled checks on the humidifier:

When...	What to do...
<b>At first start-up</b>	Make sure there are no leaks after an hour of continuous operation.
<b>When replacing components</b>	Make sure there are no leaks after an hour of continuous operation.
<b>Every 7 days</b>	<ul style="list-style-type: none"> <li>• Make sure the humidifier works properly (based on the instructions provided in this manual);</li> <li>• Make sure there are no leaks in the plumbing system;</li> <li>• Make sure there is no unusual operation.</li> </ul>
<b>Every 30 days</b>	<ul style="list-style-type: none"> <li>• Make sure there are no blockages in the water drain;</li> <li>• Make sure the water drains effectively;</li> <li>• Remove any limescale residue from inside the drain.</li> </ul>
<b>Every 60 days</b>	<ul style="list-style-type: none"> <li>• Make sure that the limescale build up in the boiler is not excessive;</li> <li>• Wash the inside of the boiler with a 20% concentration of acetic acid, removing limescale from the electrodes and boiler;</li> <li>• If necessary, replace the electrodes and gaskets.</li> </ul>
<b>Every 3 years (*)</b>	Replace the boiler.
<b>Every 7 years (**)</b>	Replace the boiler.

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

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

## 5.4 Boiler maintenance

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

Electrical conductivity of the water	Water hardness
200...600 $\mu\text{S}/\text{cm}$	10...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 $\mu\text{S}/\text{cm}$	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 "**1.6 ACCESSORIES**" ON PAGE 17).

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 series** humidifiers normally renew the water in the boiler in a balanced way, optimising 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 operation (continuous with maintenance carried out in accordance with best practices);
- 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.

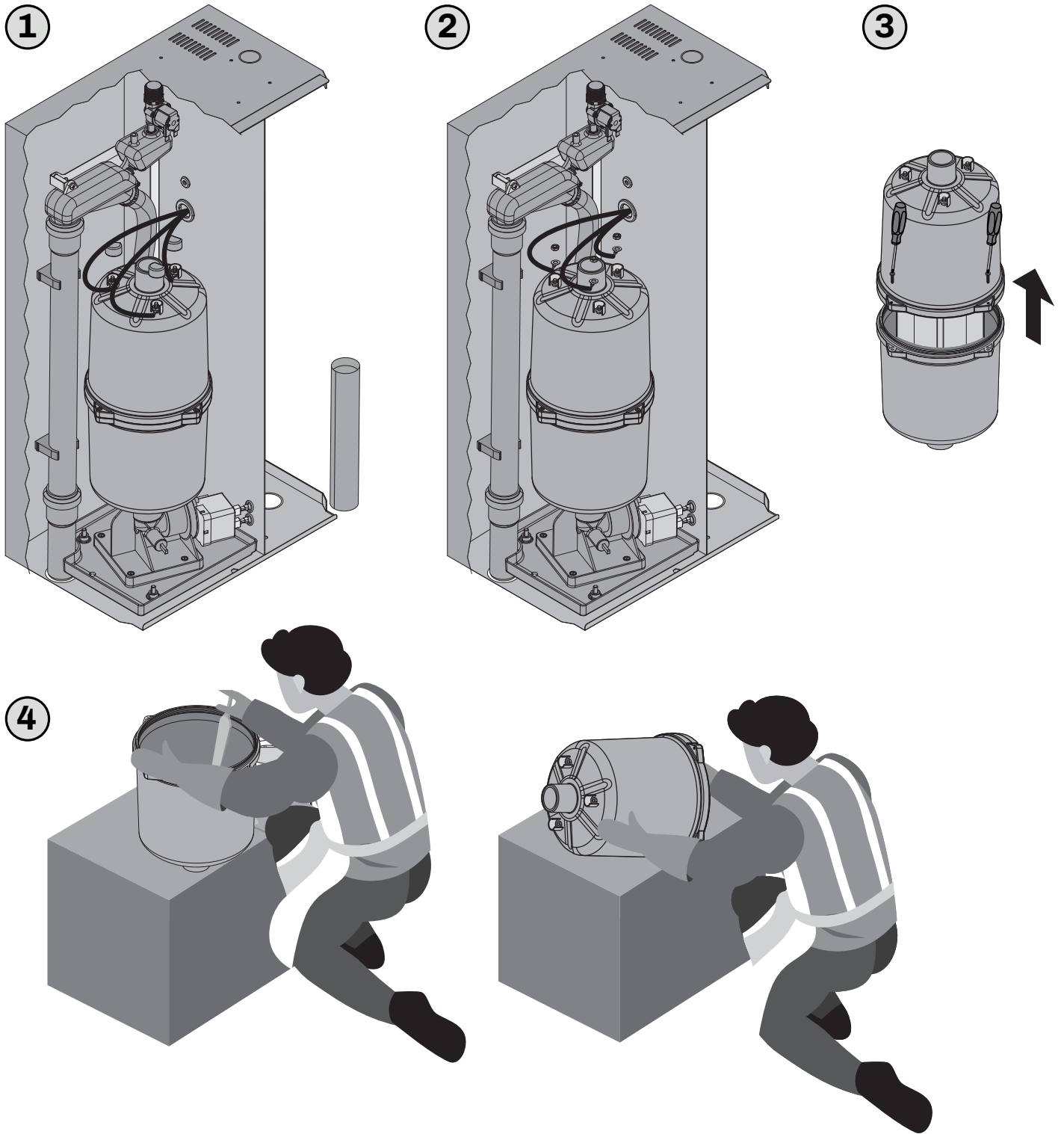
## 5.5 Cleaning the boiler

- Drain the humidifier manually (for **EHT** see: "**4.2.3 MANUAL DRAINING" ON PAGE 29**;  
for **EHX** see: "**4.4.3 MANUAL DRAINING" ON PAGE 34**);
- Disconnect the machine power supply using the external isolator;
- Open the humidifier walls as described in "**2.3 INSTALLATION" ON PAGE 102**;
- 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 supply manifold and water drain;
- 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 an acetic 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. 104.** *Cleaning the boiler*

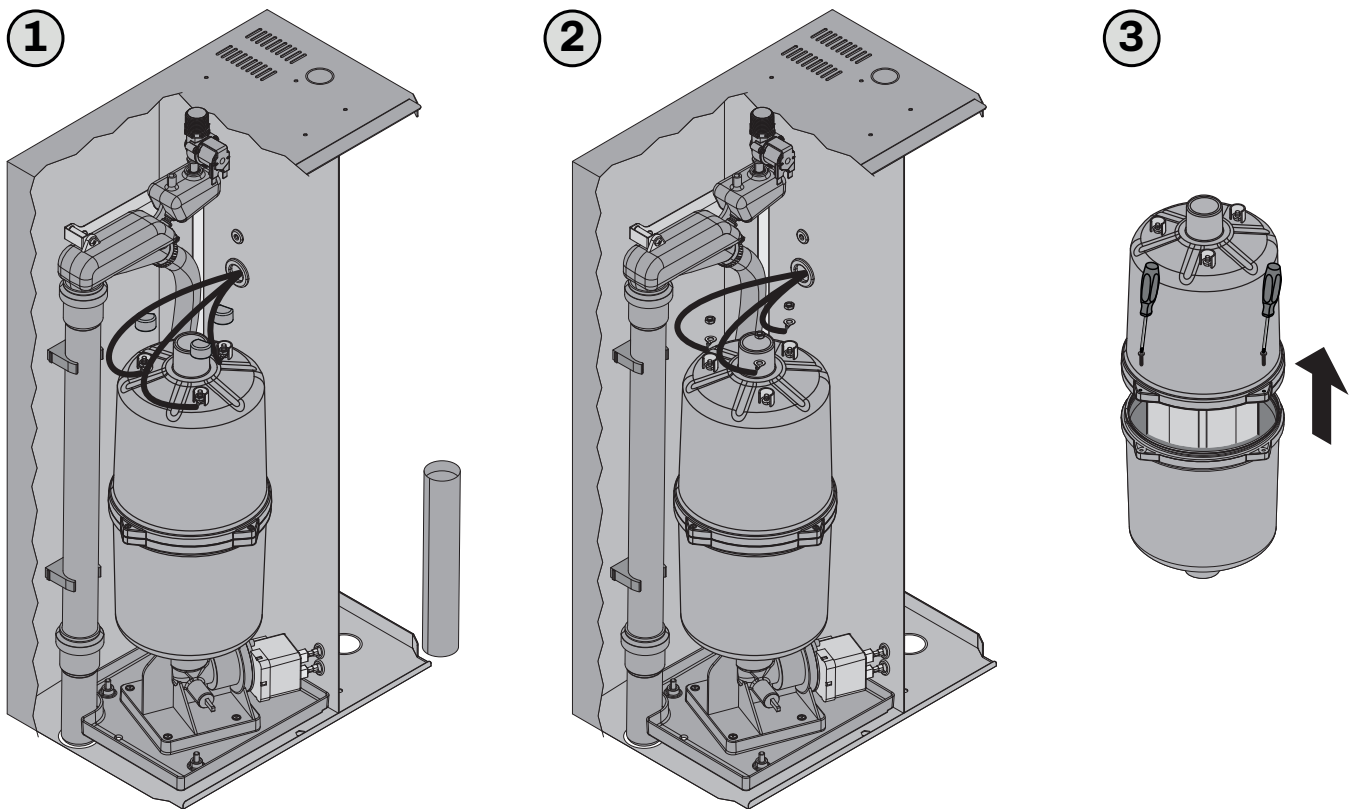
## 5.6 Replacing the boiler

- Drain the humidifier manually (for **EHKT** see: **"4.2.3 MANUAL DRAINING" ON PAGE 29**; for **EHKX** see: **"4.4.3 MANUAL DRAINING" ON PAGE 34**);
- Disconnect the machine power supply using the external isolator;
- Open the humidifier walls as described in **"2.3 INSTALLATION" ON PAGE 102**;
- 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 supply manifold and water drain;
- Insert the new boiler as described in **"5.7 FITTING THE BOILER" ON PAGE 130**;
- Depending on the **Zephyr** humidifier you have, make sure that the cable connections are tightened properly (see **"3. ELECTRICAL CONNECTIONS" ON PAGE 104**);
- 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. 105.** Replacing the boiler

## 5.7 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 walls as described in **"2.3 INSTALLATION" ON PAGE 102**;
- 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.

## 5.8 Cleaning/replacing the electrodes

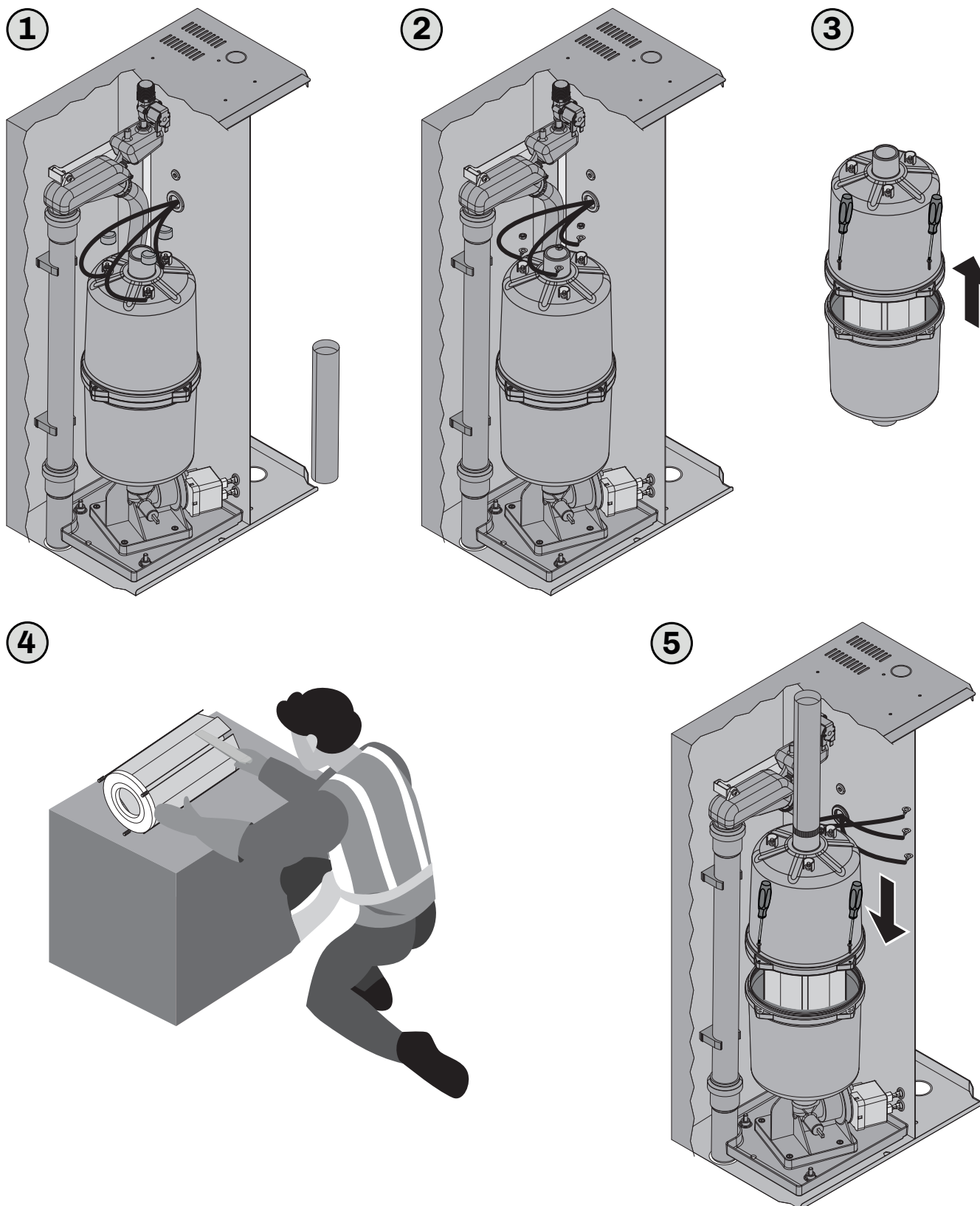


Fig. 106. Cleaning/replacing the electrodes

## 5.9 Cleaning the optional stainless steel drain tray (EHVI accessory)

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

## 6. SPARE PARTS

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### Chapter content

This chapter contains the following information:

<b>Subject</b>	<b>Page</b>
<b><i>Plumbing spare parts</i></b>	<b>133</b>
<b><i>Electrical spare parts</i></b>	<b>135</b>



## 6.1 Plumbing spare parts

### 6.1.1 Table of plumbing spare part codes

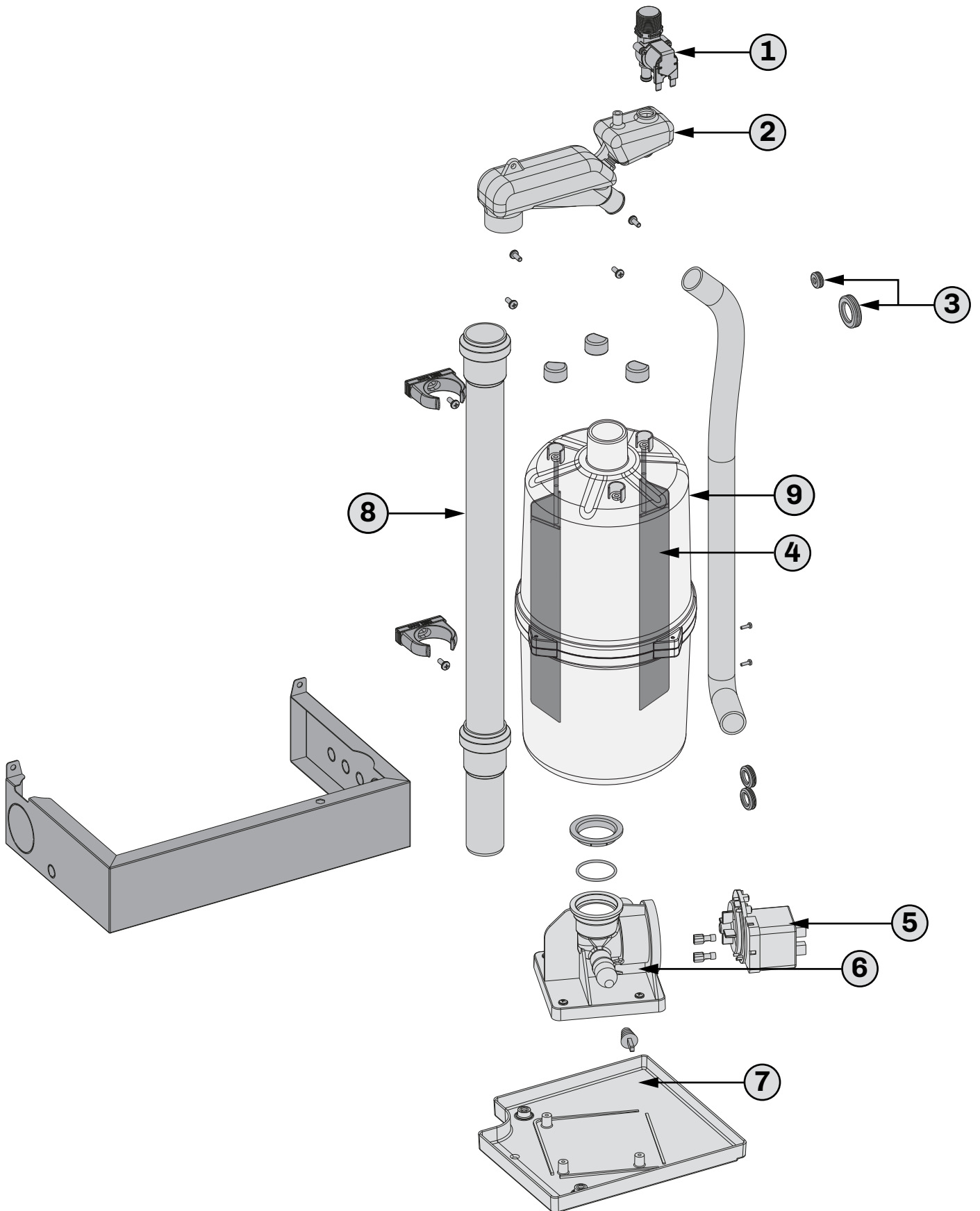


Fig. 107. EHKT/EHKX series spare parts - Plumbing Part

Ref.	P/n	Description
①	<b>EHKT0K01</b>	Inlet solenoid valve, 1.1 l/min
	<b>EHKT0K02</b>	Inlet solenoid valve, 2.7 l/min
	<b>EHKT0K03</b>	Inlet solenoid valve, 0.4 l/min
②	<b>EHKT0K07</b>	Filling tank
③	<b>EHKT0K09</b>	XS-S-M boiler seal kit
	<b>EHKT0K10</b>	L boiler seal kit
④	<b>EHKT0K21</b>	Set of two electrodes, boiler <b>EHBK005M00S</b>
	<b>EHKT0K22</b>	Set of two electrodes, boiler <b>EHBK005MHCS</b>
	<b>EHKT0K23</b>	Set of two electrodes, boiler <b>EHBK005MLCS</b>
	<b>EHKT0K24</b>	Set of three electrodes, boiler <b>EHBK005M00S</b>
	<b>EHKT0K25</b>	Set of three electrodes, boiler <b>EHBK005THCS</b>
	<b>EHKT0K26</b>	Set of three electrodes, boiler <b>EHBK005TLCS</b>
	<b>EHKT0K27</b>	Set of three electrodes, boiler <b>EHBK005M00S</b>
	<b>EHKT0K28</b>	Set of three electrodes, boiler <b>EHBK005THCS</b>
	<b>EHKT0K29</b>	Set of three electrodes, boiler <b>EHBK005TLCS</b>
	<b>EHKT0K30</b>	Set of three electrodes, boiler <b>EHBK015T00M</b>
	<b>EHKT0K31</b>	Set of three electrodes, boiler <b>EHBK015THCM</b>
	<b>EHKT0K32</b>	Set of three electrodes, boiler <b>EHBK015TLCM</b>
	<b>EHKT0K33</b>	Set of three electrodes, boiler <b>EHBK040T00L</b>
	<b>EHKT0K34</b>	Set of three electrodes, boiler <b>EHBK040THCL</b>
	<b>EHKT0K35</b>	Set of three electrodes, boiler <b>EHBK040TLCL</b>
	<b>EHKT0K36</b>	Set of three electrodes, boiler <b>EHBK050T00L</b>
	<b>EHKT0K37</b>	Set of three electrodes, boiler <b>EHBK050THCL</b>
	<b>EHKT0K38</b>	Set of three electrodes, boiler <b>EHBK050TLCL</b>

Ref.	P/n	Description
⑤	<b>EHKT0K04</b>	Electric outlet pump
⑥	<b>EHKT0K05</b>	Inlet/outlet manifold
⑦	<b>EHKT0K08</b>	Bottom tray
⑧	<b>EHKT0K06</b>	Outlet circuit kit
⑨	<b>EHBK005M00S</b>	Standard cleanable boiler, 3–5 kg/h single-phase models
	<b>EHBK005MLCS</b>	Cleanable boiler, 3–5 kg/h single-phase models, low conductivity
	<b>EHBK005MHCS</b>	Cleanable boiler, 3–5 kg/h single-phase models, high conductivity
	<b>EHBK005T00S</b>	Standard cleanable boiler, 3–5 kg/h three-phase models
	<b>EHBK005TLCS</b>	Cleanable boiler, 3–5 kg/h three-phase models, low conductivity
	<b>EHBK005THCS</b>	Cleanable boiler, 3–5 kg/h three-phase models, high conductivity
	<b>EHBK015T00M</b>	Standard cleanable boiler, 10–15 kg/h three-phase models
	<b>EHBK015TLCM</b>	Cleanable boiler, 10–15 kg/h three-phase models, low conductivity
	<b>EHBK015THCM</b>	Cleanable boiler, 10–15 kg/h three-phase models, high conductivity
	<b>EHBK040T00L</b>	Standard cleanable boiler, 20–30–40 kg/h three-phase models
	<b>EHBK040TLCL</b>	Cleanable boiler, 20–30–40 kg/h three-phase models, low conductivity
	<b>EHBK040THCL</b>	Cleanable boiler, 20–30–40 kg/h three-phase models, high conductivity
	<b>EHBK050T00L</b>	Standard cleanable boiler, 50 kg/h three-phase models
	<b>EHBK050TLCL</b>	Cleanable boiler, 50 kg/h three-phase models, low conductivity
	<b>EHBK050THCL</b>	Cleanable boiler, 50 kg/h three-phase models, high conductivity

## 6.2 Electrical spare parts

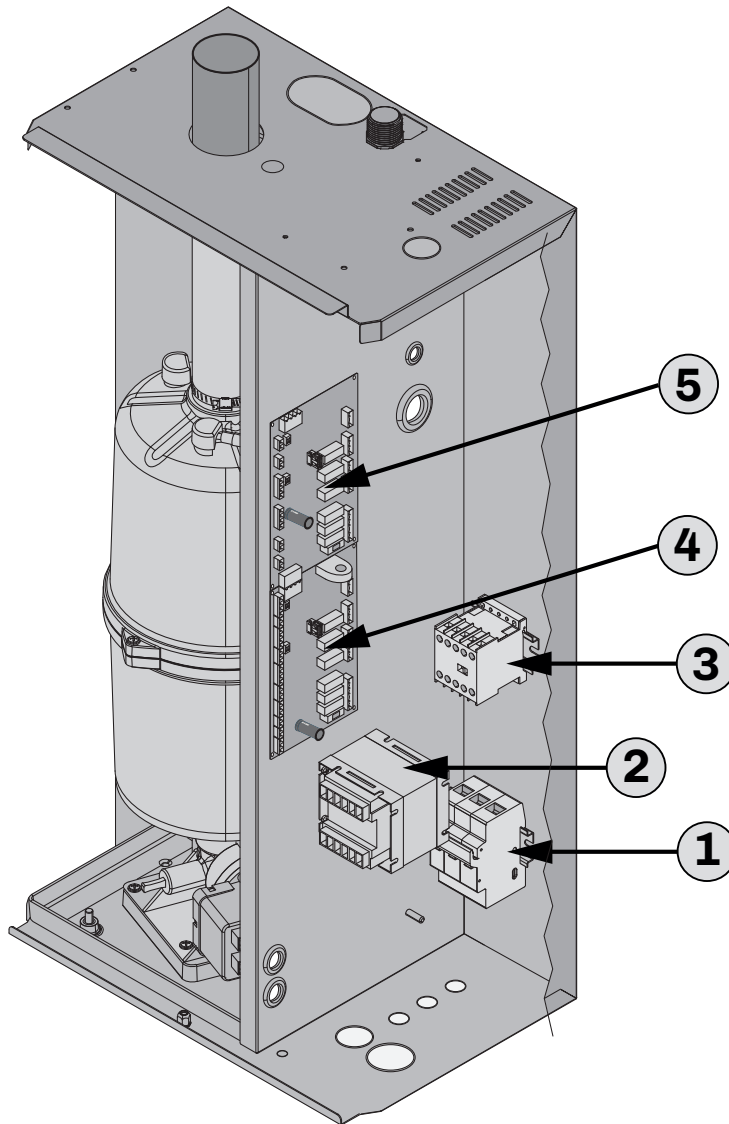


Fig. 108. EHKT/EHKX series spare parts - Electrical Part

### 6.2.1 Table of electrical spare part codes

Ref.	P/n	Description	Ref.	P/n	Description	
①	EHKTOK71	Fuse holder base, 2P 10x38 gG	---	EHKTOK51	Boiler cable kit, MxxS 230 Vac single-phase	
	EHKTOK72	Fuse holder base, 3P 10x38 gG		EHKTOK52	Boiler cable kit, TxxS 400 Vac three-phase	
	EHKTOK73	Fuse holder base, 3P 14x51 gG		EHKTOK53	Boiler cable kit, TxxS 230 Vac three-phase	
	EHKTOK74	Fuse holder base, 3P 22x58 gG		EHKTOK54	Boiler cable KIT, TxxM 230 Vac three-phase	
②	0101010020	Transformer, 230/24 V		EHKTOK55	Boiler cable KIT, TxxM 400 Vac three-phase	
	0101014020	Transformer, 400/24 V		EHKTOK56	Boiler cable kit, TxxL 230 Vac three-phase	
③	0153411020	Contactora, 230/400 Vac 24 Vac 20 A		EHKTOK57	Boiler cable kit, TxxL 400 Vac three-phase	
	0153431001	Contactora, 230/400 Vac 24 Vac 25 A		---	EHKTOK75FUSE	Fuse kit, 10pcs 10x38 gG 10 A
	0153431003	Contactora, 230/400 Vac 24 Vac 45 A			EHKTOK76FUSE	Fuse kit, 10pcs 10x38 gG 16 A
	0153431004	Contactora, 230/400 Vac 24 Vac 56–60 A			EHKTOK77FUSE	Fuse kit, 10pcs 10x38 gG 32 A
	0153431005	Contactora, 400 Vac 24 Vac 70 A	EHKTOK78FUSE		Fuse kit, 10pcs 14x51 gG 50 A	
④	EHKTOK90	EHKT electronic control	EHKTOK79FUSE		Fuse kit, 10pcs 22x58 gG 100 A	
	EHKXOK90	EHKX electronic control	EHKTOK80FUSE	Fuse kit, 10pcs 22x58 gG 125 A		
⑤	EHKXOK91	Expansion electronic control for EHKX060 / EHKX080 / EHKX100				


## 7. DIAGNOSTICS

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### Chapter content

This chapter contains the following information:

<b>Subject</b>	<b>Page</b>
<i>Table of Zephyr alarms</i>	<b>137</b>

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.

## 7.1 Table of Zephyr alarms

Code	Description	Cause	Effects	Solution
AL01	Warning: +30% overcurrent	<ul style="list-style-type: none"> <li>Overcurrent between the electrodes</li> <li>Electrodes not working or shorted</li> </ul>	<ul style="list-style-type: none"> <li>Fixed alarm icon</li> <li><b>AL01</b> displayed</li> <li>Partial draining</li> <li><b>AL01</b> recorded in the log</li> </ul>	<ul style="list-style-type: none"> <li>Carry out maintenance</li> <li>Replace the boiler</li> <li>Check that the outlet pump is working</li> </ul>
AL02	Alarm: +50% overcurrent	<ul style="list-style-type: none"> <li>Current sensor not working</li> <li>Control board not working</li> <li>Boiler compromised</li> <li>High electrical conductivity</li> <li>Use softened water</li> </ul>	<ul style="list-style-type: none"> <li>Fixed alarm icon</li> <li><b>AL02</b> displayed</li> <li>Humidifier OFF</li> <li><b>AL02</b> recorded in the log</li> </ul>	<ul style="list-style-type: none"> <li>Check that the TA is working (if external)</li> <li>Check the water properties</li> </ul>
AL03	Warning: no production	<ul style="list-style-type: none"> <li>Foam in the boiler</li> <li>Water inlet flow rate too low</li> <li>Boiler failing</li> </ul>	<ul style="list-style-type: none"> <li>Fixed alarm icon</li> <li><b>AL03</b> displayed</li> <li>No effect on regulation</li> <li><b>AL03</b> recorded in the log</li> </ul>	<ul style="list-style-type: none"> <li>Check the water mains flow rate</li> <li>Check that the solenoid valve is working</li> </ul>
AL04	Alarm: no production	<ul style="list-style-type: none"> <li>Water pipes or filter clogged</li> <li>Backpressure at the steam outlet is greater than rated value</li> <li>Very low electrical conductivity</li> <li>No production for a long time</li> </ul>	<ul style="list-style-type: none"> <li>Fixed alarm icon</li> <li><b>AL04</b> displayed</li> <li>Alarm relay ON</li> <li>Humidifier OFF if <b>AL04</b> &gt; 100 h</li> <li><b>AL04</b> recorded in the log</li> </ul>	<ul style="list-style-type: none"> <li>Carry out maintenance on the solenoid valve</li> <li>Replace the solenoid valve</li> <li>Check for foam</li> <li>Check the backpressure in the steam outlet duct</li> </ul>
AL05	Warning: no water	<ul style="list-style-type: none"> <li>Inlet filter clogged</li> <li>Solenoid valve not working</li> <li>Water pressure too low</li> <li>Water inlet circuit leaking</li> </ul>	<ul style="list-style-type: none"> <li>Fixed alarm icon</li> <li><b>AL05</b> displayed</li> <li>No effect on regulation</li> <li><b>AL05</b> recorded in the log</li> </ul>	<ul style="list-style-type: none"> <li>Check the water mains flow rate</li> <li>Check that the solenoid valve is working</li> <li>Carry out maintenance on the solenoid valve</li> <li>Replace the solenoid valve</li> <li>Check and clean the internal pipes and inlet/outlet manifold</li> <li>Cleaning the boiler</li> <li>Replace the boiler (if there is significant limescale residue)</li> </ul>
AL06	Warning: insufficient draining	<ul style="list-style-type: none"> <li>Insufficient water drained</li> <li>Water inlet/outlet clogged</li> </ul>	<ul style="list-style-type: none"> <li>Fixed alarm icon</li> <li><b>AL06</b> displayed</li> <li>Alarm relay ON</li> <li><b>AL06</b> recorded in the log</li> </ul>	<ul style="list-style-type: none"> <li>Cleaning the boiler</li> <li>Replace the boiler (if there is significant limescale residue)</li> <li>Clean the pump, outlet manifold and outlet circuit</li> <li>Replace the outlet pump if it is not working</li> </ul>
AL09	Warning: foam	The water in the boiler reaches the maximum level sensor	<ul style="list-style-type: none"> <li>Fixed alarm icon</li> <li><b>AL09</b> displayed</li> <li>Anti-foam washing activated</li> <li><b>AL09</b> recorded in the log</li> </ul>	<ul style="list-style-type: none"> <li>Automatic reset</li> <li>If it persists over time, disconnect the humidifier water connections and let the water drain, then wash and clean the boiler</li> <li>Check if the filling water is softened</li> </ul>
AL10	Warning: suspected high electrical conductivity	<ul style="list-style-type: none"> <li>High current</li> <li>Low filling frequency</li> </ul>	<ul style="list-style-type: none"> <li>Fixed alarm icon</li> <li><b>AL10</b> displayed</li> <li>Automatic washing activated</li> <li><b>AL10</b> recorded in the log</li> </ul>	<ul style="list-style-type: none"> <li>Carry out maintenance</li> <li>Check the inlet water properties</li> </ul>
AL11	Alarm: machine service life	Hours of unit operation > <b>A10</b>	<ul style="list-style-type: none"> <li>Fixed alarm icon</li> <li><b>AL11</b> displayed</li> <li>Alarm relay ON</li> <li><b>AL11</b> recorded in the log</li> </ul>	Carry out full maintenance
AL12	Warning: boiler maintenance	Hours of boiler operation > <b>A11</b>	<ul style="list-style-type: none"> <li>Fixed alarm icon</li> <li><b>AL12</b> displayed</li> <li>Alarm relay ON</li> <li><b>AL12</b> recorded in the log</li> </ul>	Cleaning the boiler

Code	Description	Cause	Effects	Solution
AL13	Alarm: boiler service life	Hours of boiler operation > A12	<ul style="list-style-type: none"> <li>Fixed alarm icon</li> <li>AL13 displayed</li> <li>Alarm relay ON</li> <li>Humidifier OFF</li> <li>AL13 recorded in the log</li> </ul>	Replace the boiler
AL14	Alarm: solenoid valve maintenance	Hours of solenoid valve operation > A13	<ul style="list-style-type: none"> <li>Fixed alarm icon</li> <li>AL14 displayed</li> <li>No effect on regulation</li> <li>AL14 recorded in the log</li> </ul>	<ul style="list-style-type: none"> <li>Clean the water inlet filter</li> <li>Check for leaks</li> <li>Replace the inlet solenoid valve if necessary</li> <li>Reset the counter</li> </ul>
AL15	Alarm: pump maintenance	Hours of pump operation > A14	<ul style="list-style-type: none"> <li>Fixed alarm icon</li> <li>AL15 displayed</li> <li>No effect on regulation</li> <li>AL15 recorded in the log</li> </ul>	<ul style="list-style-type: none"> <li>Clean the pump and the inlet and outlet manifold</li> <li>Clean the inlet/outlet circuit</li> <li>Check for leaks</li> <li>Replace the outlet pump if necessary</li> <li>Reset the counter</li> </ul>
AL16	Alarm: fan maintenance	Hours of fan operation > A15	<ul style="list-style-type: none"> <li>Fixed alarm icon</li> <li>AL16 displayed</li> <li>No effect on regulation</li> <li>AL16 recorded in the log</li> </ul>	<ul style="list-style-type: none"> <li>Clean the fans and grilles</li> <li>Remove residues and dust incrustations</li> <li>Replace any fans that are not working</li> <li>Reset the counter</li> </ul>
AL17	Warning: low humidity	Humidity production < A5 for a time > A7	<ul style="list-style-type: none"> <li>Fixed alarm icon</li> <li>AL17 displayed</li> <li>Alarm relay ON</li> <li>AL17 recorded in the log</li> </ul>	<ul style="list-style-type: none"> <li>If it occurs together with other alarms, check accordingly</li> <li>If the humidifier is underdimensioned, contact the system designer</li> <li>Check R6 and set it &gt; 70%</li> </ul>
AL18	Warning: high humidity	Humidity production > A6 for a time > A7	<ul style="list-style-type: none"> <li>Fixed alarm icon</li> <li>AL18 displayed</li> <li>Alarm relay ON</li> <li>AL18 recorded in the log</li> </ul>	<ul style="list-style-type: none"> <li>If it occurs together with other alarms, check accordingly</li> <li>If the humidifier is overdimensioned, contact the system designer</li> <li>Check R6 and set it &lt; 70%</li> </ul>
AL19	Alarm: temperature sensor S1	<ul style="list-style-type: none"> <li>Probe not working</li> <li>Probe not connected properly</li> <li>Incorrect probe type</li> </ul>	<ul style="list-style-type: none"> <li>Fixed alarm icon</li> <li>AL19 displayed</li> <li>Humidifier OFF</li> <li>AL19 recorded in the log</li> </ul>	<ul style="list-style-type: none"> <li>Check the sensor type</li> <li>Check the sensor wiring</li> <li>Change the sensor type</li> <li>Check for electrical noise</li> </ul>
AL20	Alarm: humidity sensor S2	<ul style="list-style-type: none"> <li>Sensor not working</li> <li>Sensor not connected correctly</li> <li>Control board not working</li> </ul>	<ul style="list-style-type: none"> <li>Fixed alarm icon</li> <li>AL20 displayed</li> <li>Alarm relay ON</li> <li>Humidifier OFF</li> <li>AL20 recorded in the log</li> </ul>	<ul style="list-style-type: none"> <li>Check the sensor type (P2)</li> <li>Check the sensor wiring</li> <li>Change the sensor type</li> <li>Check for electrical noise</li> </ul>
AL21	Alarm: humidity limit sensor S3		<ul style="list-style-type: none"> <li>Fixed alarm icon</li> <li>AL21 displayed</li> <li>Alarm relay ON</li> <li>Humidifier OFF</li> <li>AL21 recorded in the log</li> </ul>	<ul style="list-style-type: none"> <li>Check the sensor type (P7)</li> <li>Check the sensor wiring</li> <li>Change the sensor type</li> <li>Check for electrical noise</li> </ul>
AL22	Alarm: proportional request from sensor		<ul style="list-style-type: none"> <li>Fixed alarm icon</li> <li>AL22 displayed</li> <li>Alarm relay ON</li> <li>Humidifier OFF</li> <li>AL22 recorded in the log</li> </ul>	<ul style="list-style-type: none"> <li>Check the regulator wiring</li> <li>Check the regulator type</li> </ul>
AL23	Alarm: current sensor CT		<ul style="list-style-type: none"> <li>Fixed alarm icon</li> <li>AL23 displayed</li> <li>Alarm relay ON</li> <li>Humidifier OFF</li> <li>AL23 recorded in the log</li> </ul>	<ul style="list-style-type: none"> <li>Check for water leaks</li> <li>Check the electrical phase wiring on the boiler and contactor</li> <li>Check that the TA is working</li> <li>If the control board or current sensor are not working, replace the control board</li> </ul>

## 8. WIRING DIAGRAMS

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### Chapter content

This chapter contains the following information:

<b>Subject</b>	<b>Page</b>
<i>Wiring diagram EHKT 230 Vac single-phase, single boiler 3...5 kg/h</i>	<b>140</b>
<i>Wiring diagram EHKT 400 Vac three-phase, single boiler 3...15 kg/h</i>	<b>141</b>
<i>Wiring diagram EHKT 400 Vac three-phase, single boiler 20...40 kg/h</i>	<b>142</b>
<i>Wiring diagram EHKT 400 Vac three-phase, double boiler 60 kg/h</i>	<b>143</b>
<i>Wiring diagram EHKX 230 Vac single-phase, single boiler 3...5 kg/h</i>	<b>144</b>
<i>Wiring diagram EHKX 230 Vac three-phase, single boiler 3...15 kg/h</i>	<b>145</b>
<i>Wiring diagram EHKX 400 Vac three-phase, single boiler 3...40 kg/h</i>	<b>146</b>
<i>Wiring diagram EHKX 400 Vac three-phase, double boiler 60...100 kg/h</i>	<b>147</b>

## 8.1 Wiring diagram EHKT 230 Vac single-phase, single boiler 3...5 kg/h

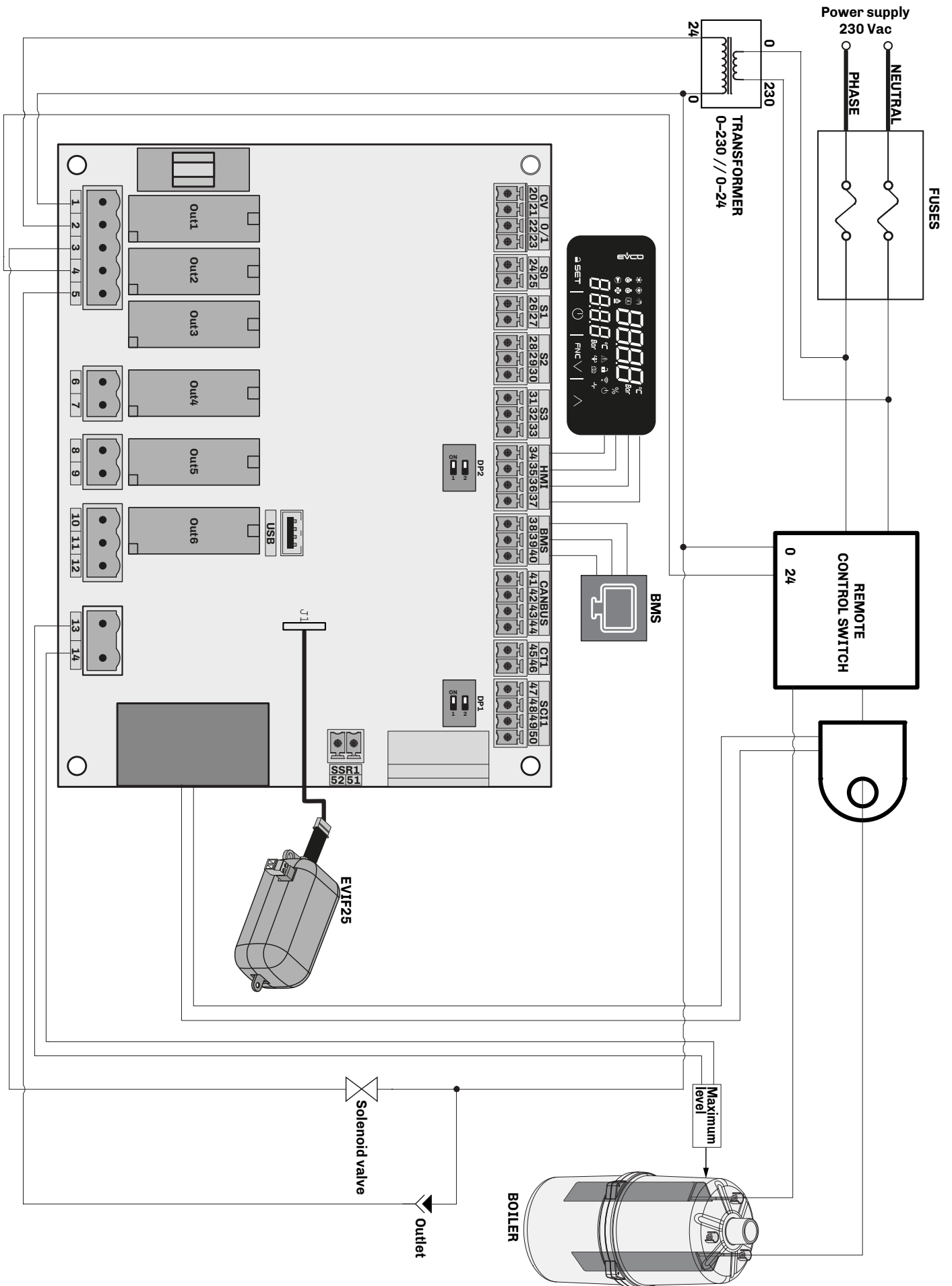


Fig. 109. Wiring diagram for EHKT models, 230 Vac single-phase, single boiler 3...5 kg/h



## 8.2 Wiring diagram EHKT 400 Vac three-phase, single boiler 3...15 kg/h

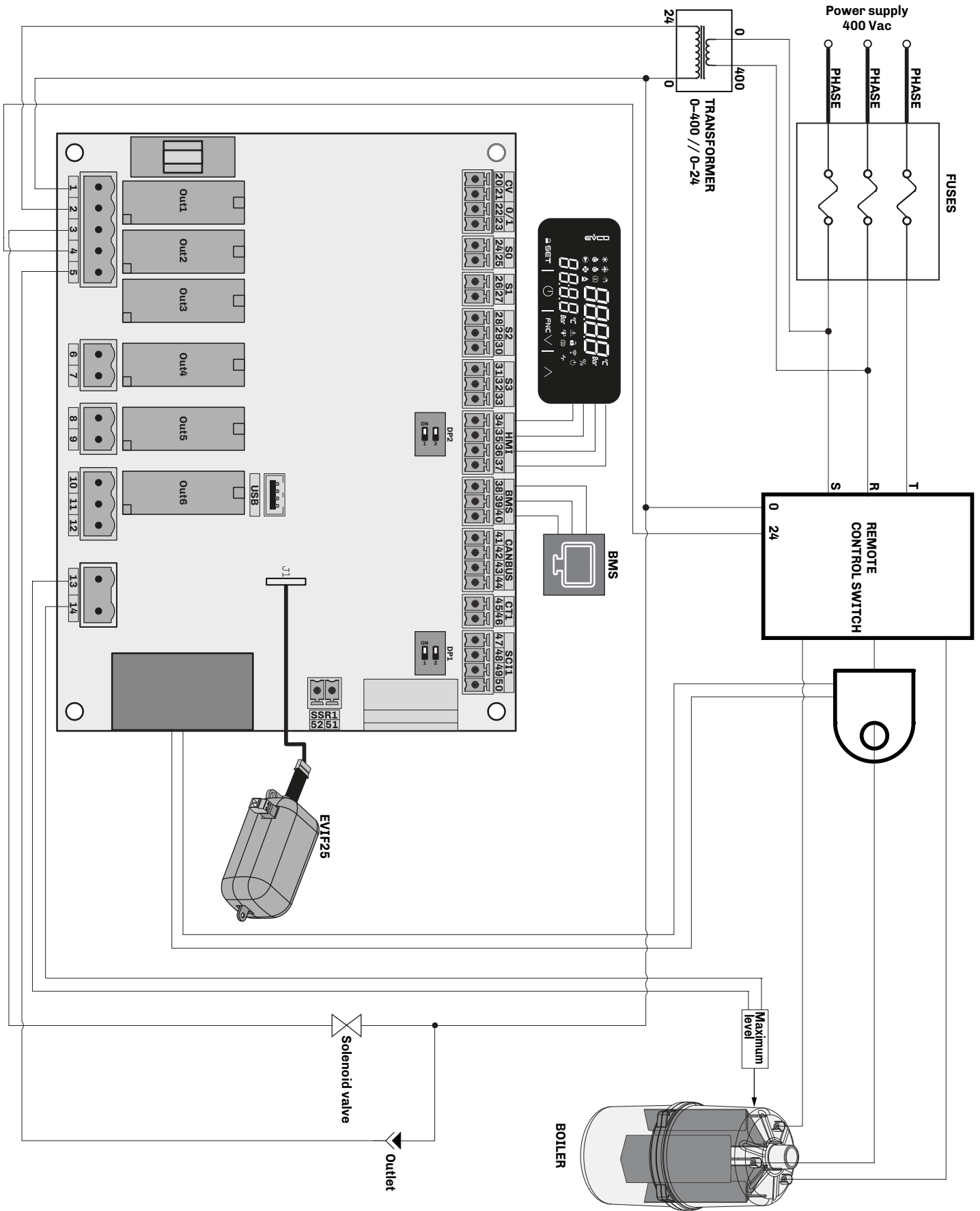


Fig. 110. Wiring diagram for EHKT models, 400 Vac three-phase, single boiler 3...15 kg/h

### 8.3 Wiring diagram EHKT 400 Vac three-phase, single boiler 20...40 kg/h

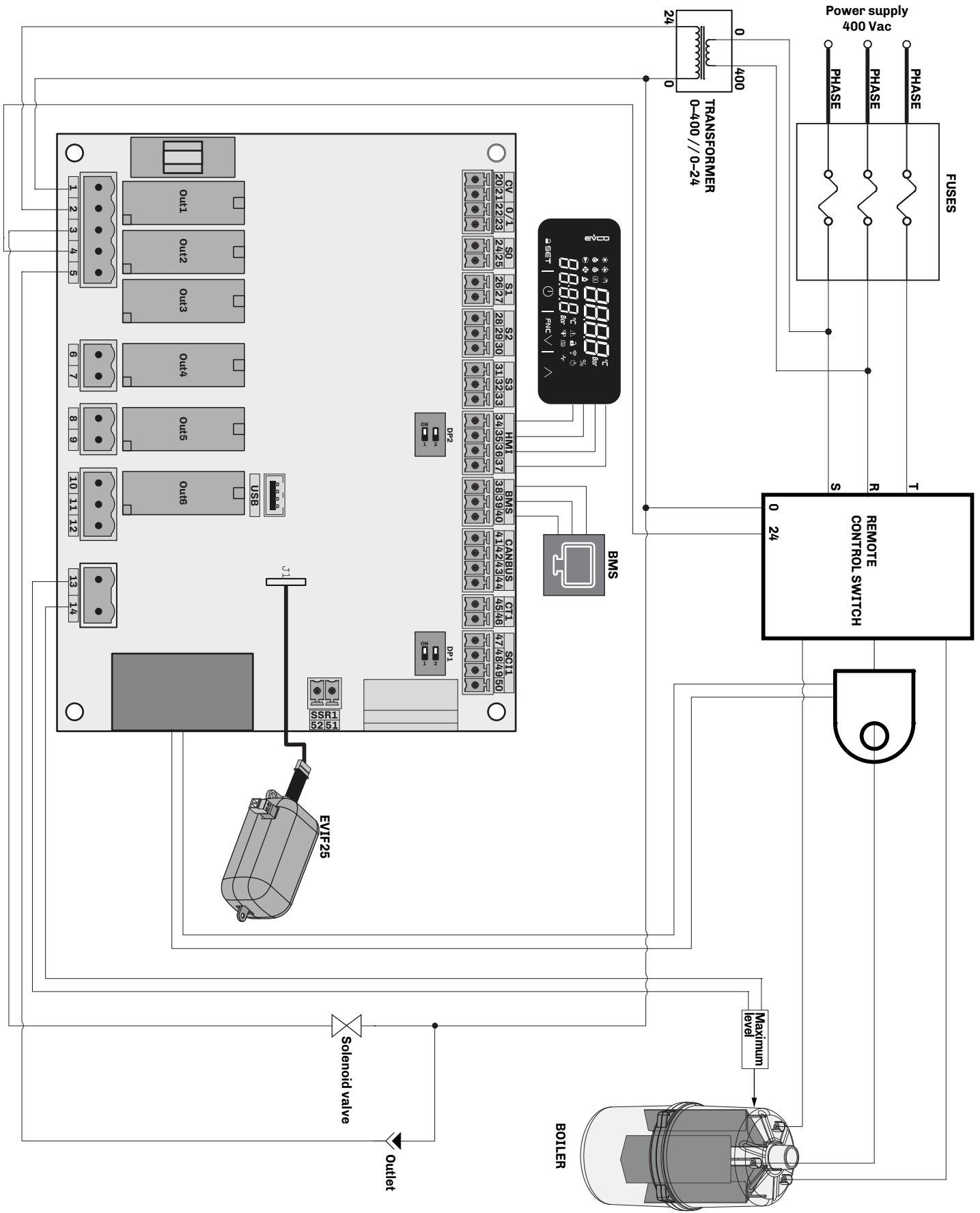


Fig. 111. Wiring diagram for EHKT models, 400 Vac three-phase, single boiler 20...40 kg/h

## 8.4 Wiring diagram EHKT 400 Vac three-phase, double boiler 60 kg/h

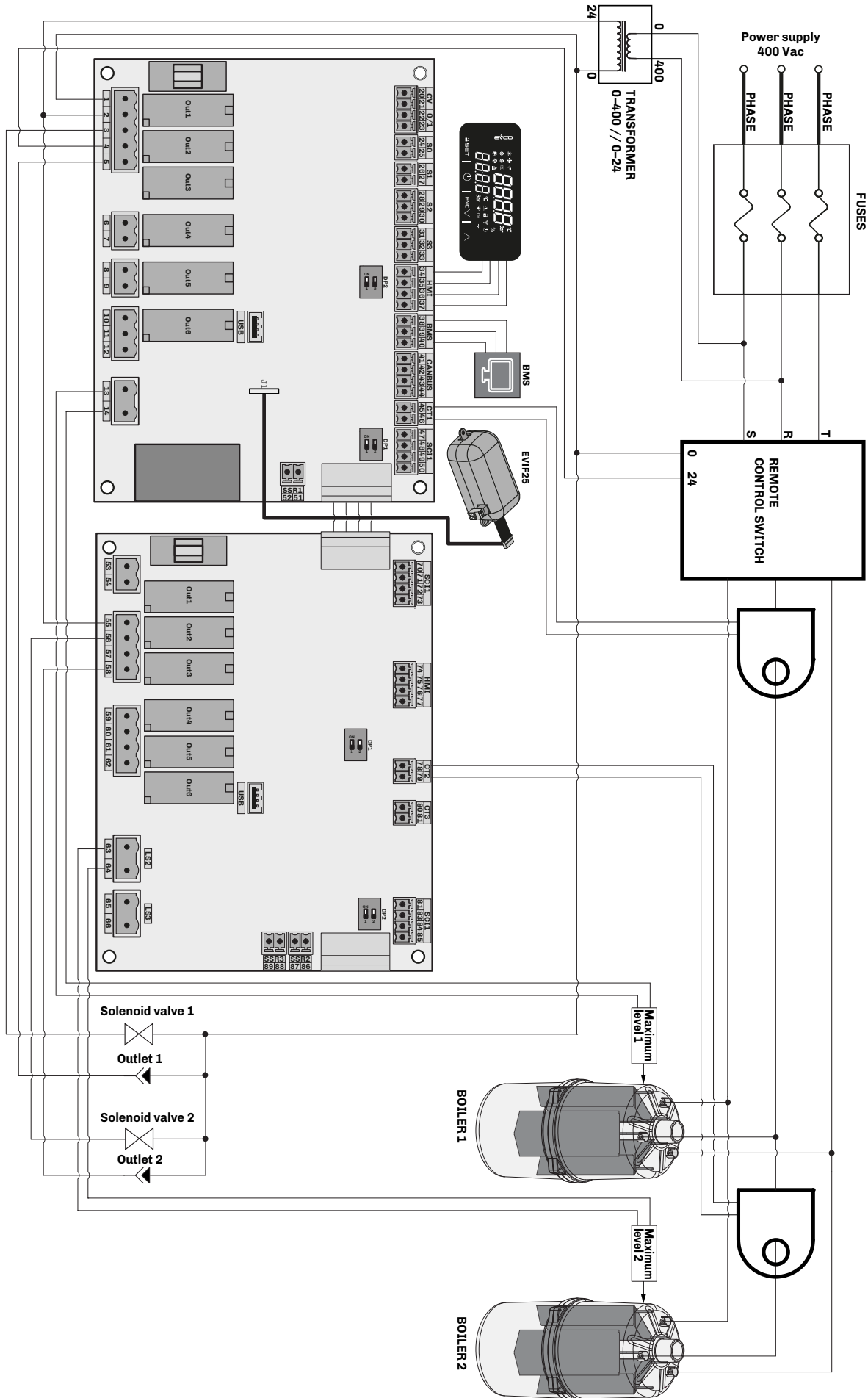


Fig. 112. Wiring diagram for EHKT models, 400 Vac three-phase, double boiler 60 kg/h

## 8.5 Wiring diagram EHKX 230 Vac single-phase, single boiler 3...5 kg/h

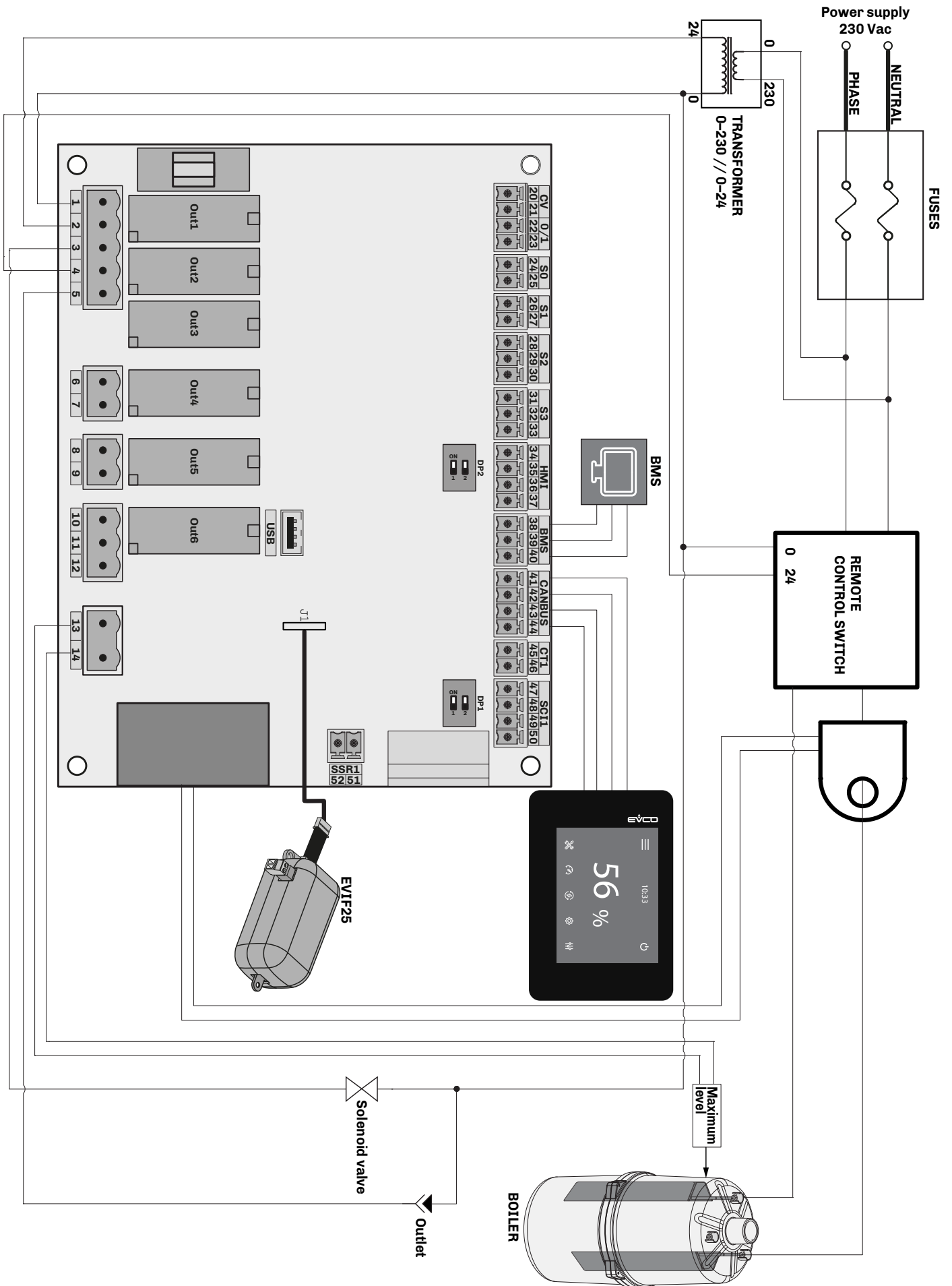


Fig. 113. Wiring diagram for EHKX models, 230 Vac single-phase, single boiler 3...5 kg/h

## 8.6 Wiring diagram EHKX 230 Vac three-phase, single boiler 3...15 kg/h

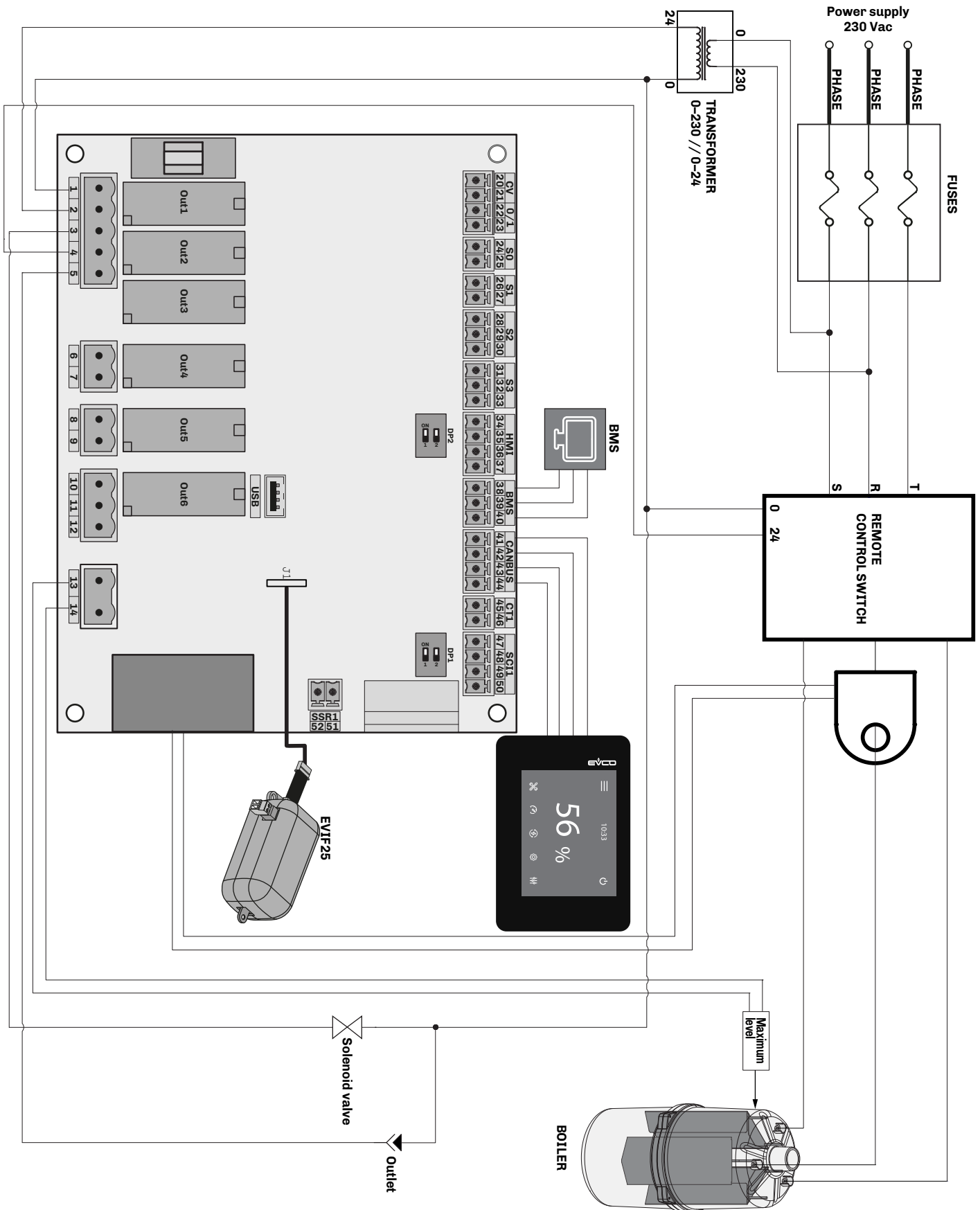


Fig. 114. Wiring diagram for EHKX models, 230 Vac three-phase, single boiler 3...15 kg/h

## 8.7 Wiring diagram EHKX 400 Vac three-phase, single boiler 3...40 kg/h

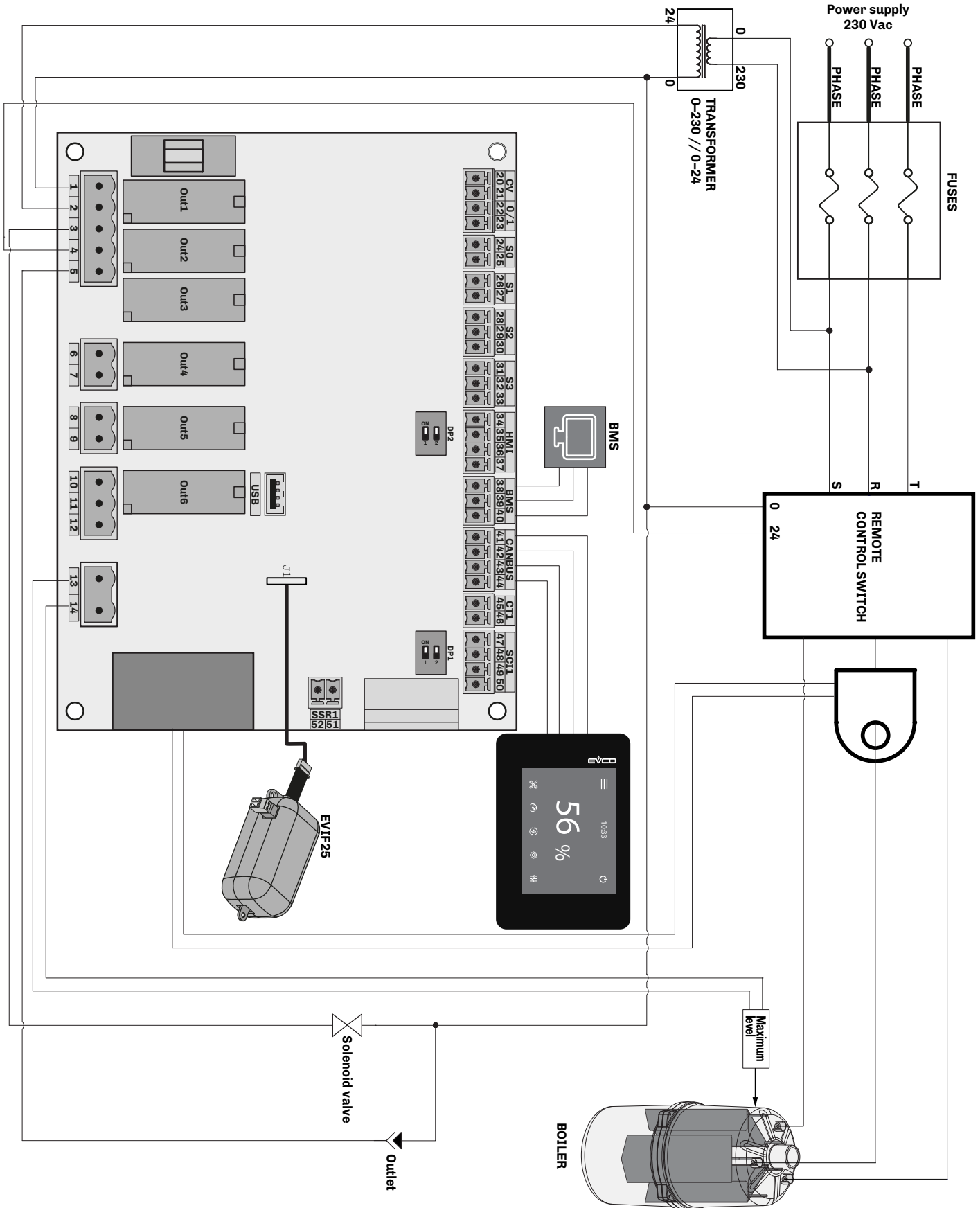


Fig. 115. Wiring diagram for EHKX models, 400 Vac three-phase, single boiler 3...40 kg/h



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The customer (manufacturer, installer or end user) assumes all responsibility for device configuration.

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## **MADE IN ITALY**

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