elsteam
HUMIDIFIERS

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.

Operating and maintenance manual

924EHKTE4.01 - 02/2024

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IMPORTANT INFORMATION

Liability and residual risks

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

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

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

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

Disclaimer

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

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

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

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

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

Terms and Conditions of use

Permitted use

The **Zephyr** steam (isothermal) humidifier is only intended for air humidification via a linear steam distributor or a ventilated steam distributor.

The device must be installed and used in accordance with the instructions provided and, in particular, hazardous live parts must not be accessible nor come into contact with highly pressurised water under normal conditions.

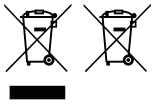
The electrical section of the humidifier must be properly protected from water and dust during operation and must also only be accessible with the aid of a tool.
Only qualified personnel may install the product or perform technical support procedures on it.

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.

AUTHORIZED QUALIFIED PERSONNEL

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

UNAUTHORIZED PERSONNEL

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

SAFETY INFORMATION RELATING TO THE PRODUCT

Zephyr 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

SECTION content

This section contains the following information:

1. INTRODUCTION

CHAPTER content

This chapter contains the following information:

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

1.2.2 EHKX models

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

1.3 Product overview

1.3.1 External view of the product

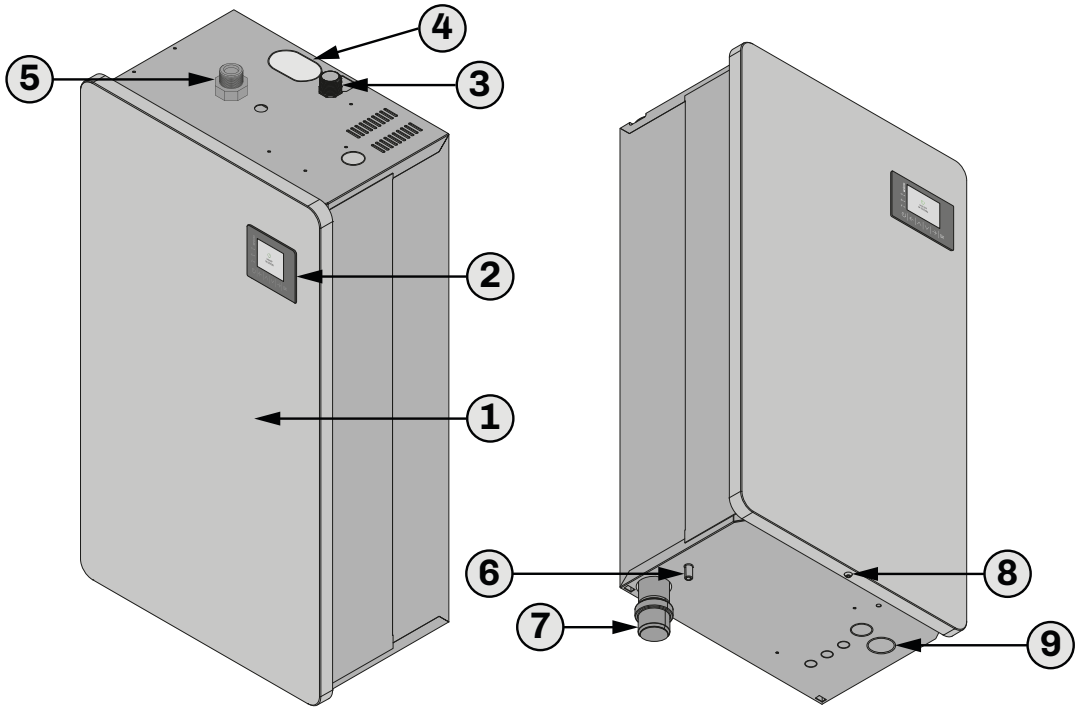


Fig. 1. *External overview of the product*

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

1.3.2 Internal view of the product

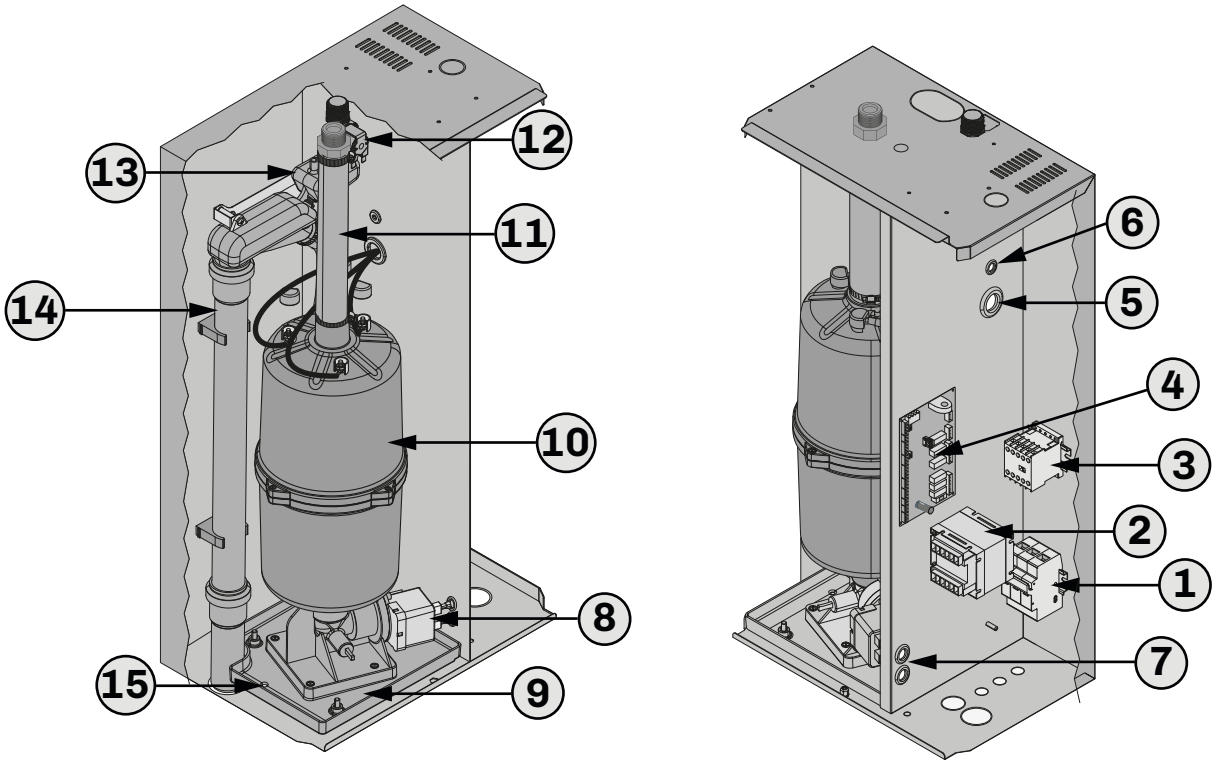


Fig. 2. *Internal overview of the product*

Reference	Description
1	Fuse holder base
2	Isolation transformer
3	Contactor
4	Control board
5	Cable gland for electrode wiring
6	Cable gland for inlet solenoid valve and maximum level sensor wiring
7	Cable gland for electric pump wiring
8	Electric outlet pump

Reference	Description
9	Bottom tray to collect water leaks
10	Boiler
11	Steam outlet pipe
12	Inlet solenoid valve
13	Filling and overflow tank
14	Water drain circuit
15	Water outlet hole in the bottom tray

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;
- Cleanable and reusable fire-retardant boiler;
- 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 operation;
- Remote communication with EPoCA (optional via **EVIF25** interface).

1.6 Accessories

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

1.6.1 Linear distributors

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

1.6.2 Boilers

P/n	Description
EHBK005MHCM	Cleanable boiler for 3–5 kg/h single-phase models with high conductivity water.
EHBK005MLCM	Cleanable boiler for 3–5 kg/h single-phase models with conductivity water.
EHBK005T00M	Standard cleanable boiler for 3–5 kg/h three-phase models.
EHBK005THCM	Cleanable boiler for 3–5 kg/h three-phase models with high conductivity water.
EHBK005TLCM	Cleanable boiler for 3–5 kg/h three-phase models with low conductivity water.
EHBK015T00M	Standard cleanable boiler for 10–15 kg/h three-phase models.
EHBK015THCM	Cleanable boiler for 10–15 kg/h three-phase models with high conductivity water.

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

1.6.3 Sensors and control accessories

P/n	Description
EVIF25TW4X0001	EVLINK TTL/Wi-Fi + RTC 12-30VDC
EV3411M7	1-output electronic controller, 230 VAC power supply, 1 multi-sensor analogue input.
EVHTP520	Temperature/humidity sensor with 5...95% r.H. and -10...70 °C range.
EVHP523	4...20 mA humidity transducer with 5...95% r.H. range.
EVHTP523	Humidity and temperature transducer, 8...28 VDC power supply, 2 x 4...20 mA output signals.
EVTPNW30F200	NTC sensor, 3 m long 2-wire thermoplastic cable, 5x20 mm comoulded bulb, IP68 protection.

1.6.4 Plumbing components

P/n	Description
0031000048	¾" GAS female hose to connect the water mains to the water inlet solenoid valve, 300 mm (11.81in.)
EHTV038	Steam pipe, Ø38 mm (1.50 in.)
EHTC010	Condensate outlet pipe, Ø10 mm
EHVI	Stainless steel drainage tank
EHFILLTANK	Low/high pressure tank filling kit
EH090DRAIN	90° drain elbow, Ø40 mm
EHKTBOTTOM15	Metal base for stand-alone installation of 3–15 kg/h models.
EHKTBOTTOM40	Metal base for stand-alone installation of 20–40 kg/h models.
EHKTBOTTOM100	Metal base for stand-alone installation of 60–100 kg/h models.
EHKBLOCK15	Cable gland kit for metal base for stand-alone installation of 3–15 kg/h models.
EHKBLOCK40	Cable gland kit for metal base for stand-alone installation of 20–40 kg/h models.
EHKBLOCK100	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(*)	---	---	---	---	---	---	---
EHSD060•	X	X	X	X(**)	X(**)	---	X(**)	---	---	---
EHSD080•	X	X	X	X	X	X(***)	X(***)	X(#)	X(#)	X(#)
EHSD100•	---	---	X	X	X	X	X	X2	X2	X(##)
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(###)	X(###)	---	---	---	---

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

Chapter content

This chapter contains the following information:

2.1 Technical specifications

2.1.1 Models EHK•003M2 ... EHK•010T4

Description	MU	EHKT0•••• / EHKX0••••							
		03M2	05M2	03T2	05T2	03T4	05T4	10T2	10T4
Steam production									
Production capacity	kg/h	3	5	3	5	3	5	10	
Maximum pressure	Pa (mmH_2O)	1650 (165)							
Connection outside diameter	mm (in.)	38 (1.50)							
Steam distribution									
Number of linear distributors that can be connected	---	1							
Number of ventilated distributors that can be connected	---	1							
Electrical properties									
Power absorbed	kW	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
Water properties									
Supply water quality	---	***SEE "3.2.1 WATER SPECIFICATIONS" ON PAGE 50***							
Supply water electrical conductivity	µS*cm	70...1250 (Standard boiler 300...700)							
Supply water hardness	°f	5...50 (Standard boiler 10...30)							
Supply water pressure	MPa/bar	0.02...1/0.2...10							
Supply water connection	---	M 3/4" GAS							
Water drain outer dimensions	mm (in.)	40 (1.57)							
General specifications									
Dimensions	mm (in.)	***SEE "2.1 DIMENSIONS AND WEIGHTS" ON PAGE 41***							
IP protection level of the water module	---	IP20							
Regulation									
Control type/Command signal	---	ON/OFF Proportional Probe							
Supervision/Configuration	---	RS-485 MODBUS Supervision Wi-Fi							

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•040T4

Description	MU	EHKT0•••• / EHKX0••••					
		15T2	15T4	20T2	20T4	30T4	40T4
Steam production							
Production capacity	kg/h	15	15	20	20	30	40
Maximum pressure	Pa (mmH_2O)	1650 (165)		2000 (200)			
Connection outside diameter	mm (in.)	38 (1.50)					
Steam distribution							
Number of linear distributors that can be connected	---	1					
Number of ventilated distributors that can be connected	---	1		2			---
Electrical properties							
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
Water properties							
Supply water quality	---	***SEE "3.2.1 WATER SPECIFICATIONS" ON PAGE 50***					
Supply water electrical conductivity	µS*cm	70...1250 (Standard boiler 300...700)					
Supply water hardness	°f	5...50 (Standard boiler 10...30)					
Supply water pressure	MPa/bar	0.02...1/0.2...10					
Supply water connection	---	M 3/4" GAS					
Water drain outer dimensions	mm (in.)	40 (1.57)					
General specifications							
Dimensions	mm (in.)	***SEE "2.1 DIMENSIONS AND WEIGHTS" ON PAGE 41***					
IP protection level of the water module	---	IP20					
Regulation							
Control type/Command signal	---	ON/OFF Proportional Probe					
Supervision/Configuration	---	RS-485 MODBUS Supervision Wi-Fi					

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

2.1.3 Models EHK•060T4 / EHKX080T4 / EHKX100T4

Description	MU	EHK•060T4	EHKX080T4	EHKX100T4
Steam production				
Production capacity	kg/h	60	80	100
Maximum pressure	Pa (mmH_2O)	2000 (200)		
Connection outside diameter	mm (in.)	38 (1.50)		
Steam distribution				
Number of linear distributors that can be connected	---	2		
Number of ventilated distributors that can be connected	---	---		
Electrical properties				
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
Water properties				
Supply water quality	---	***SEE "3.2.1 WATER SPECIFICATIONS" ON PAGE 50***		
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	---	***2x*** M 3/4" GAS		
Water drain outer dimensions	mm (in.)	***2x*** 40 (1.57)		
General specifications				
Dimensions	mm (in.)	***SEE "2.1 DIMENSIONS AND WEIGHTS" ON PAGE 41***		
IP protection level of the water module	---	IP20		
Regulation				
Control type/Command signal	---	ON/OFF Proportional Probe		
Supervision/Configuration	---	RS-485 MODBUS Supervision Wi-Fi		

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

3. OPERATION

Chapter content

This chapter contains the following information:

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

4. USER INTERFACE

Chapter content

This chapter contains the following information:

4.1 EHKT humidifier user interface

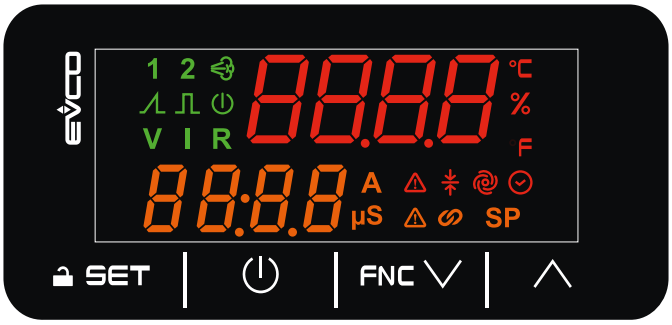


Fig. 3. ***EHKT*** *humidifier user interface*

4.1.1 Icons

Icon	Lit steadily	OFF
1	• Main sensor configured and present • **CFG** = 1T (one temperature probe)	In all other cases
2	• Limit sensor configured and present • **CFG** = 2T (two temperature probes)	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	• Scroll down through the values • Navigate within the menu	Go to the maintenance and reset operating hours menu
	• Scroll up through the values • Navigate within the menu	Activate manual draining
SET	• Confirm the values on the display • Set/change the humidity setpoint	Enter the main menu

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

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

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 = 0-1)

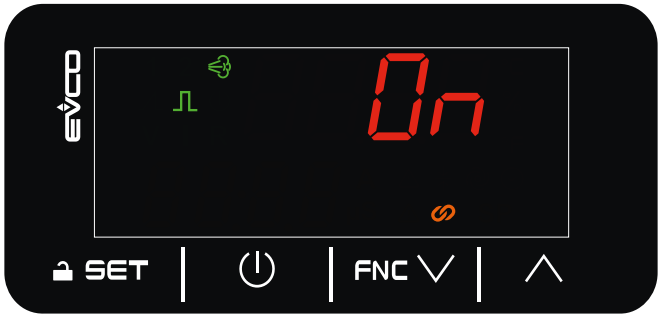


Fig. 6. *Home screen with ON/OFF regulation from digital input (**CFG** = 0-1)*

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

HOME screen with proportional regulation (CFG = PROP)

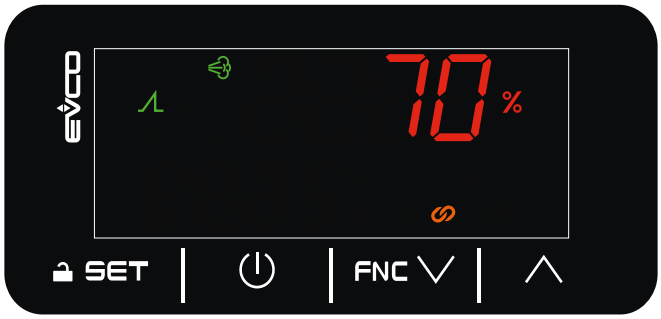


Fig. 7. *Home screen with proportional regulation (**CFG** = PROP)*

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

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

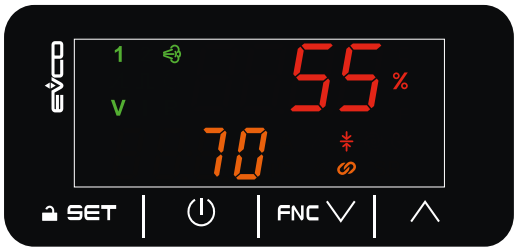


Fig. 8. *Home screen with humidity sensor alone*

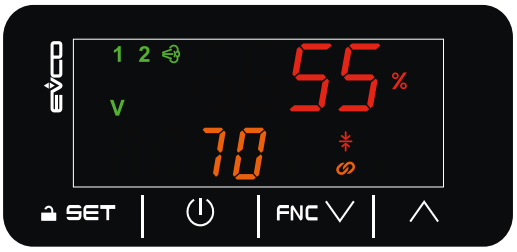


Fig. 9. *Home screen with humidity sensor and limit sensor*

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

4.2.2 Changing the main sensor humidity setpoint

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

To change the humidity setpoint:

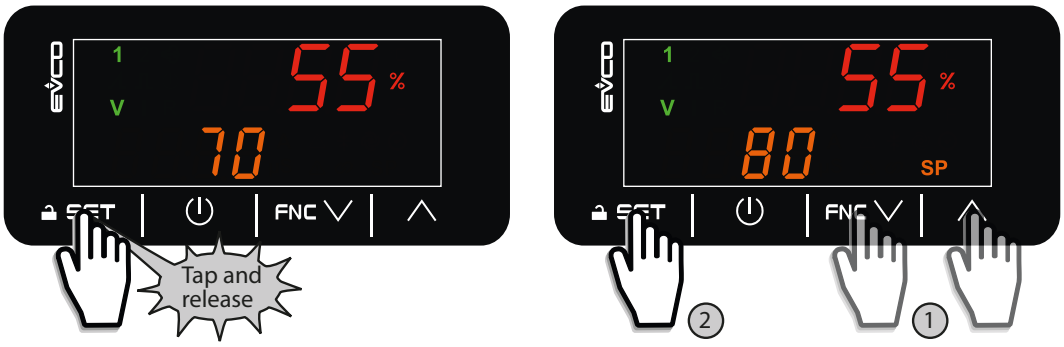


Fig. 10. *Changing the humidity setpoint*

4.2.3 Changing the temperature setpoint

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

To change the temperature setpoint:

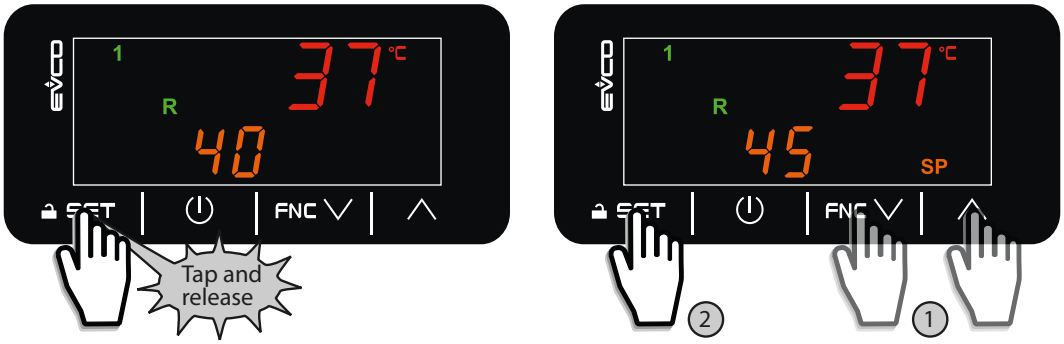


Fig. 11. *Changing the temperature setpoint*

4.2.4 Manual draining

To start manual draining:

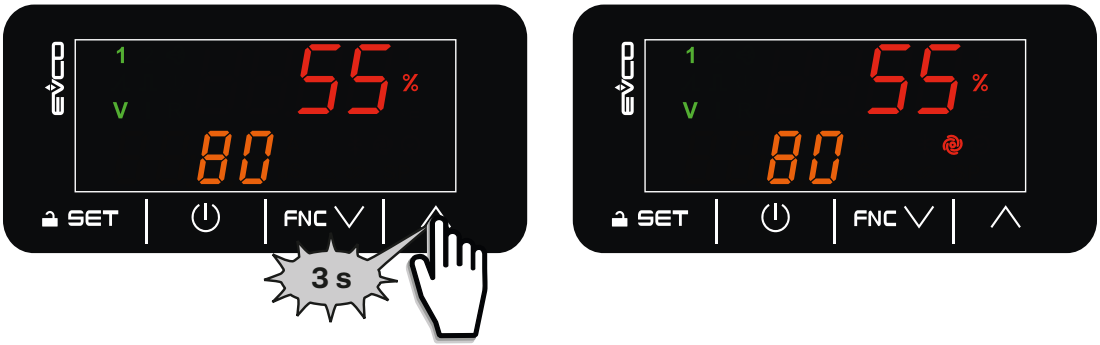


Fig. 12. *Manual draining*

4.2.5 Menu

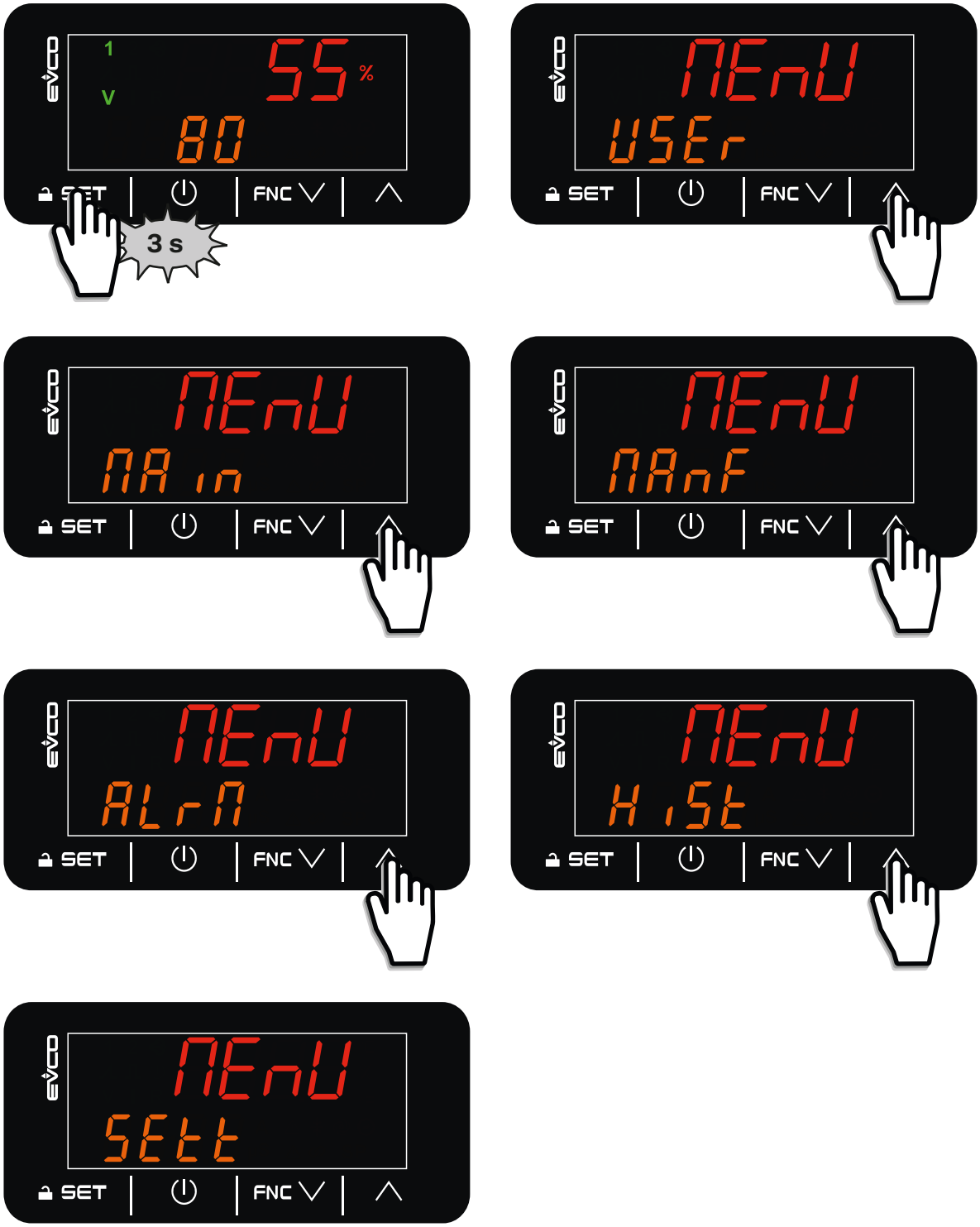


Fig. 13. *Zephyr Menu - EV3K interface*

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

4.2.6 User Menu

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

To access the user menu:

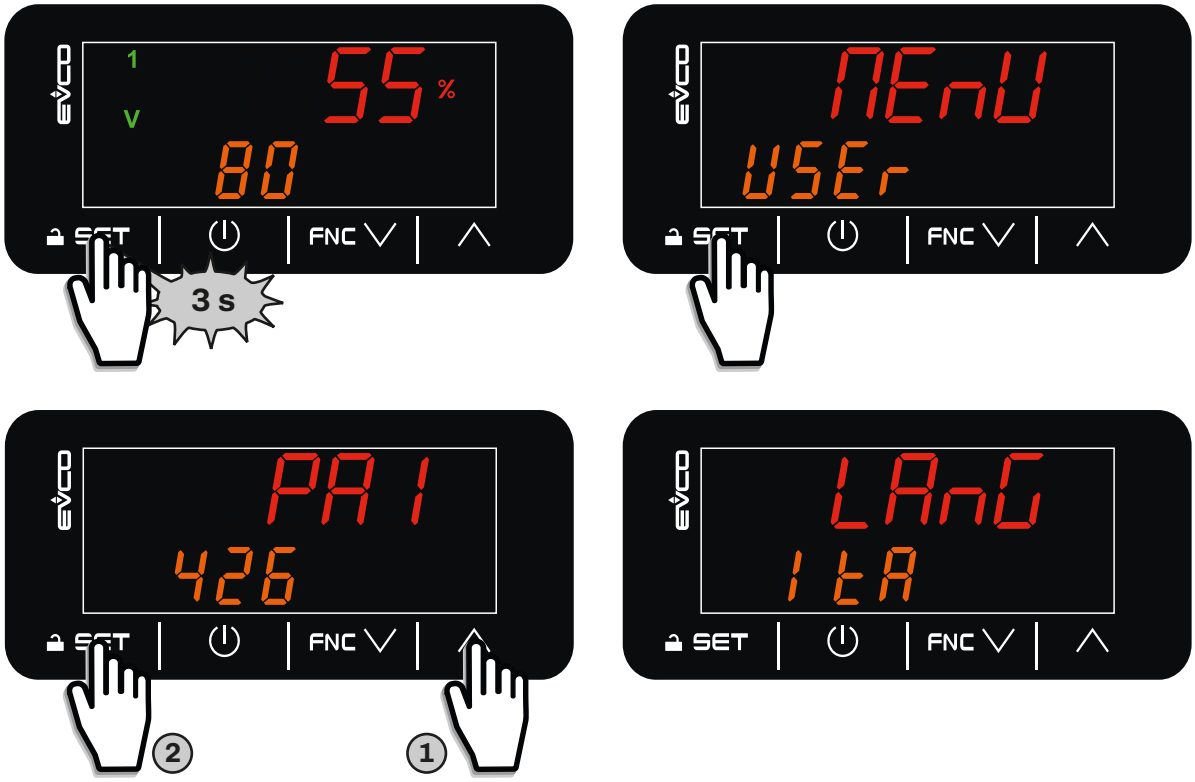


Fig. 14. *User menu*

Top line	Bottom line	Description
LAnG	Set language	Sets the display language. **EnG** = English; **Ita** = Italian.
SP1	Humidity setpoint	Sets the humidity setpoint. See ***"6.1 TABLE OF ADJUSTMENT PARAMETERS" ON PAGE 83***
SP2	Humidity limit setpoint	Sets the humidity limit setpoint`. See ***"6.1 TABLE OF ADJUSTMENT PARAMETERS" ON PAGE 83***
SP3	Temperature setpoint	Sets the temperature setpoint (wellness application). See ***"6.1 TABLE OF ADJUSTMENT PARAMETERS" ON PAGE 83***

4.3 EHKX humidifier user interface

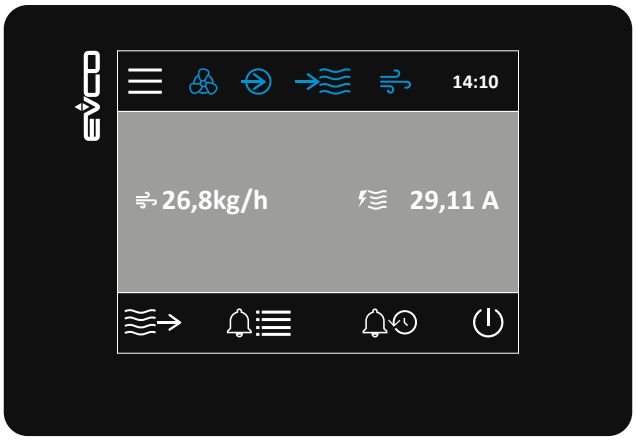


Fig. 15. ***EHKX*** *humidifier user interface*

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...	Key...	Tap and release to...
	Access the menu		Access the alarm log
	Access the manual water draining start page		Switch the humidifier On/Off
	Access the alarm menu		(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.

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

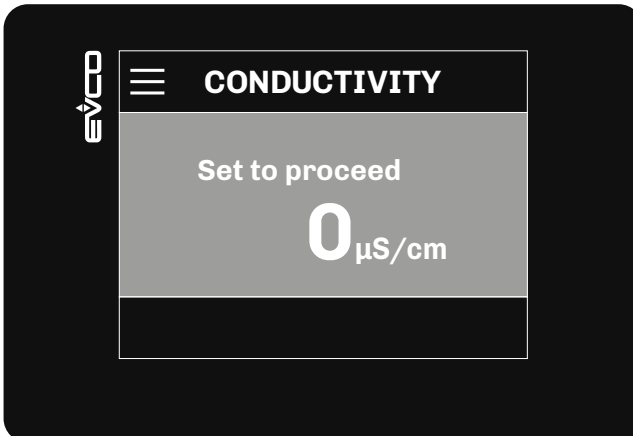


Fig. 16. *First start-up - Setting the electrical conductivity*

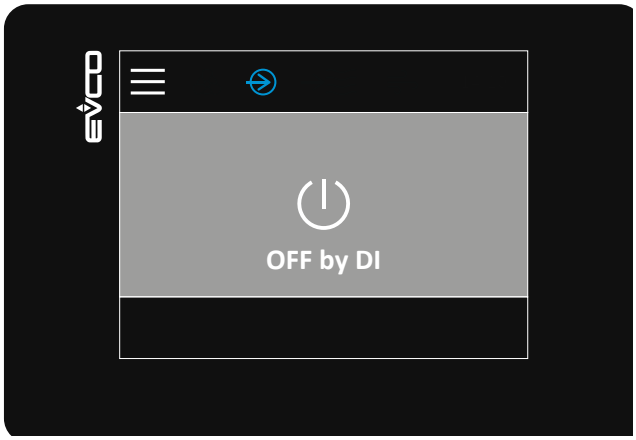


Fig. 17. *Humidifier OFF (by digital input)*

4.4 EHKX user interface menu

4.4.1 Home screen

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

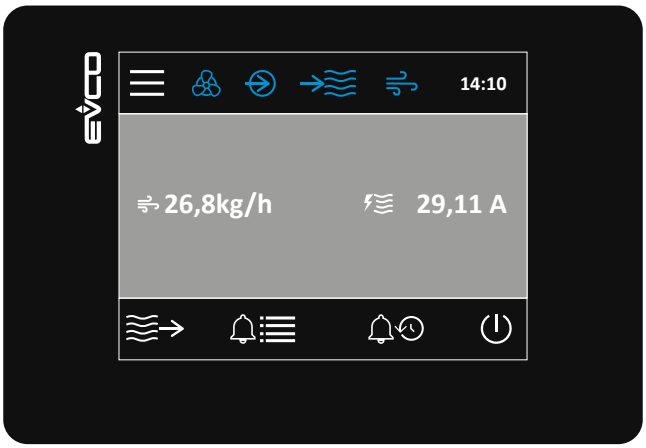


Fig. 18. *HOME screen with ON/OFF regulation from digital input - **EHKX**interface*

HOME screen with proportional regulation (CFG = PROP)

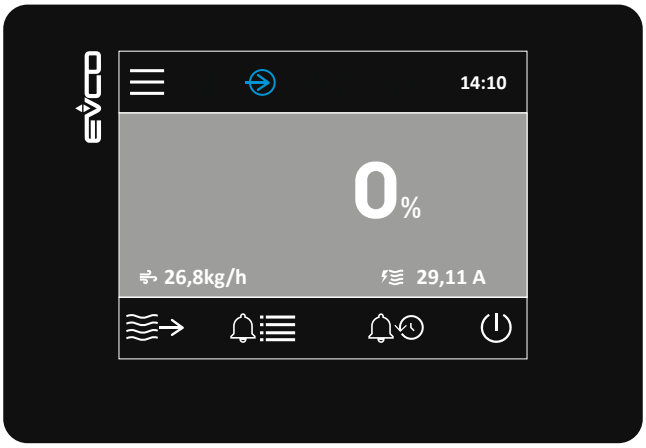


Fig. 19. *Home screen with proportional regulation - **EHKX** interface*

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

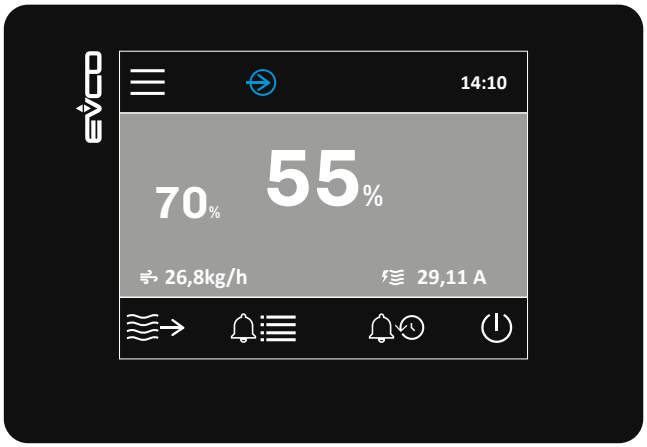


Fig. 20. *Home screen with humidity sensor alone*

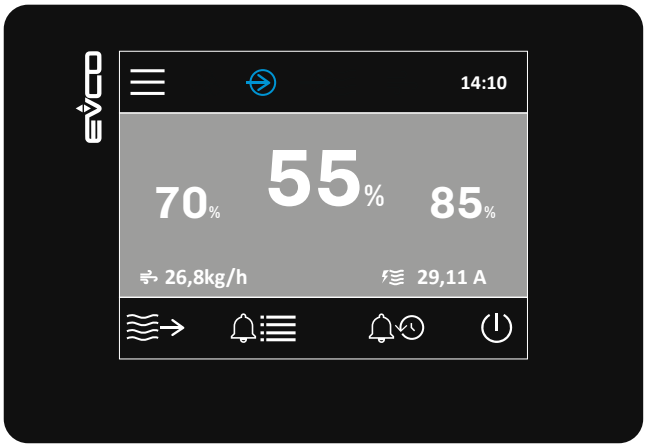


Fig. 21. *Home screen with humidity sensor and limit sensor*

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

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

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

To change the humidity setpoint:

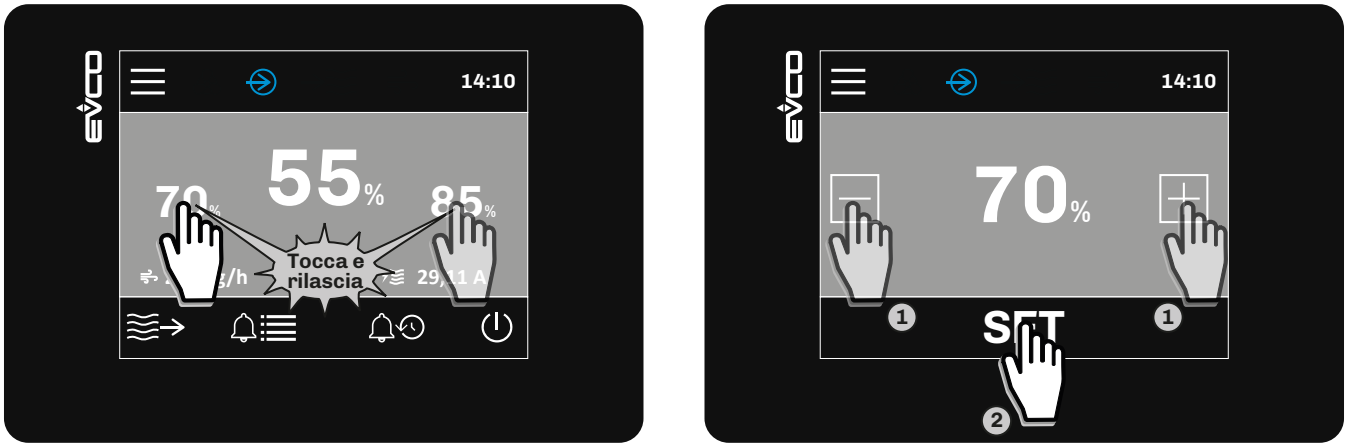


Fig. 22. *Changing the humidity setpoint*

4.4.3 Changing the temperature setpoint

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

To change the temperature setpoint:

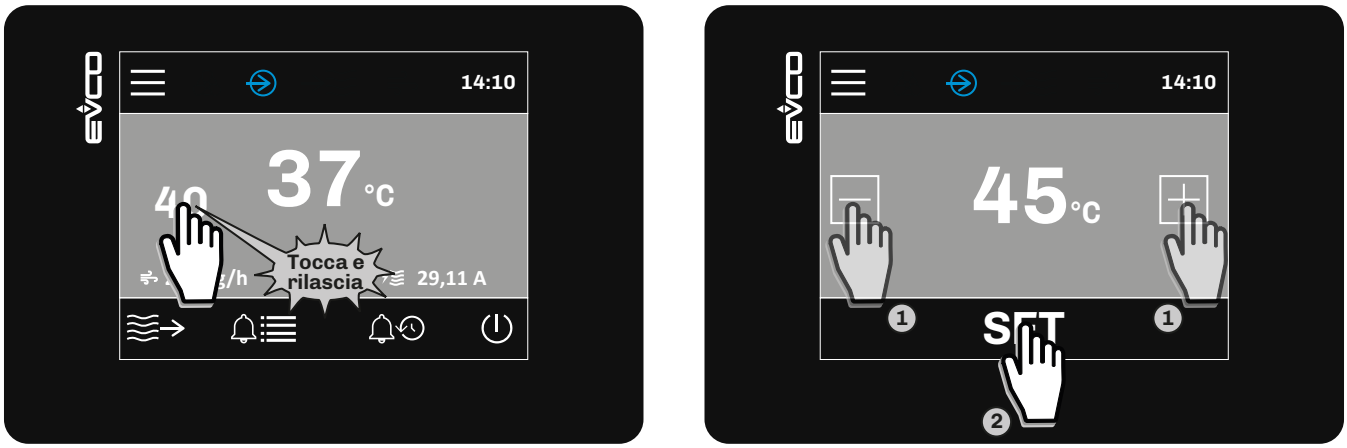


Fig. 23. *Changing the temperature setpoint*

4.4.4 Manual draining

To start manual draining:

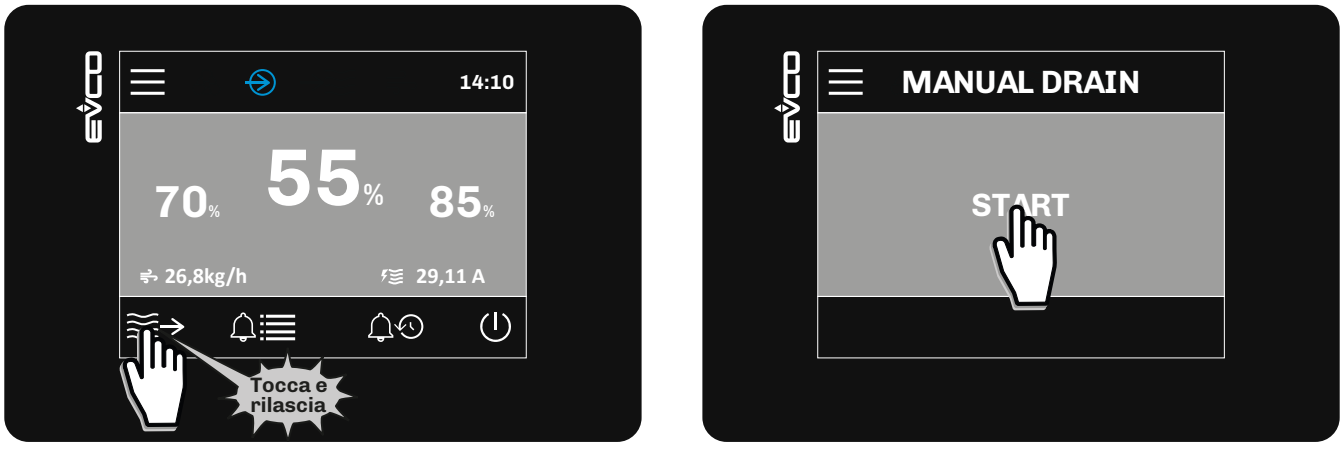
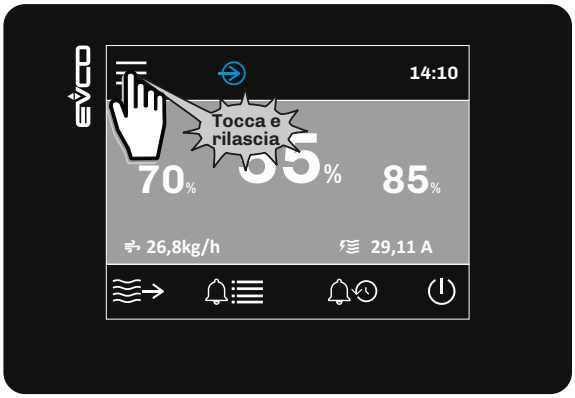
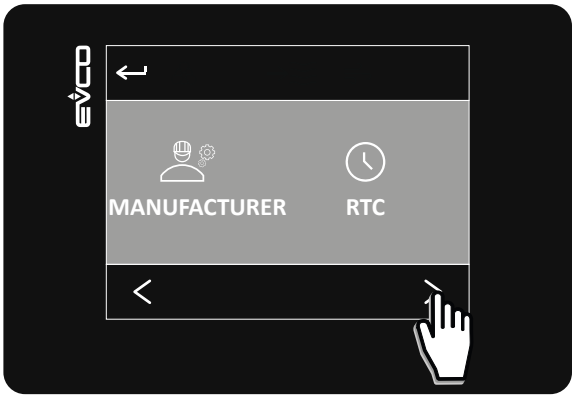
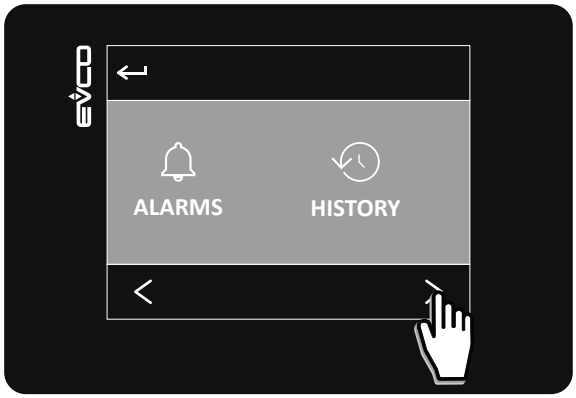


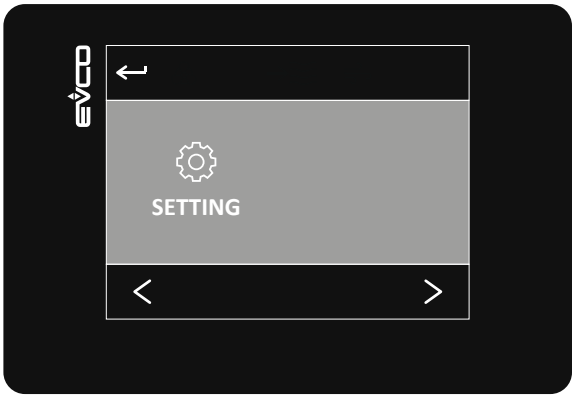
Fig. 24. *Manual draining*

4.4.5 Menu





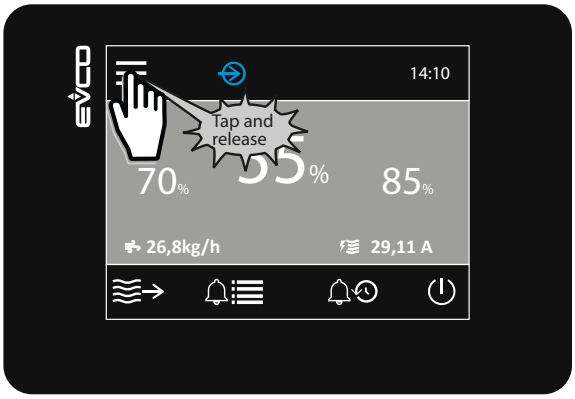


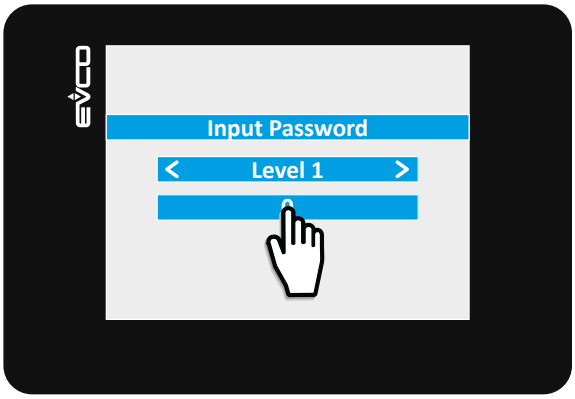


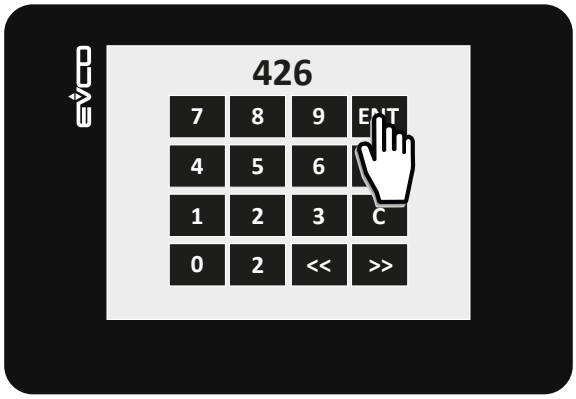
Menu	Description
USER	Access the user menu
MAINTENANCE	Access the maintenance technician menu
MANUFACTURER	**RESERVED. NOT ACCESSIBLE TO THE PUBLIC.**
RTC	Access to change the date/time
ALARMS	Currently accessing alarm control
HISTORY	Access the alarm log
SETTING	Reset parameters to factory settings

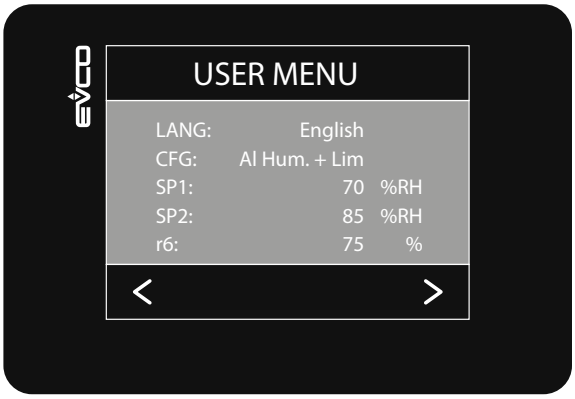
4.4.6 User Menu

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









Menu option	Description
LANG	Sets the display language. **English**; **Italian**.
SP1	Sets the humidity setpoint. See ***"6.1 TABLE OF ADJUSTMENT PARAMETERS" ON PAGE 83***
SP2	Sets the humidity limit setpoint`. See ***"6.1 TABLE OF ADJUSTMENT PARAMETERS" ON PAGE 83***
SP3	Sets the temperature setpoint. See ***"6.1 TABLE OF ADJUSTMENT PARAMETERS" ON PAGE 83***

INSTALLER SECTION

Section content

This section contains the following information:

1. RECEIVING THE PRODUCT

Chapter content

This chapter contains the following information:

1.1 Before you start

NOTICE
MALFUNCTIONING OF THE EQUIPMENT • Droppages and shocks can damage the humidifier beyond repair. • Tampering with or removing the identification stickers invalidates the warranty.

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

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

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

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;
- Wall mounting 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:

2.1 Dimensions and weights

2.1.1 Models EHK•003 ... EHK•015

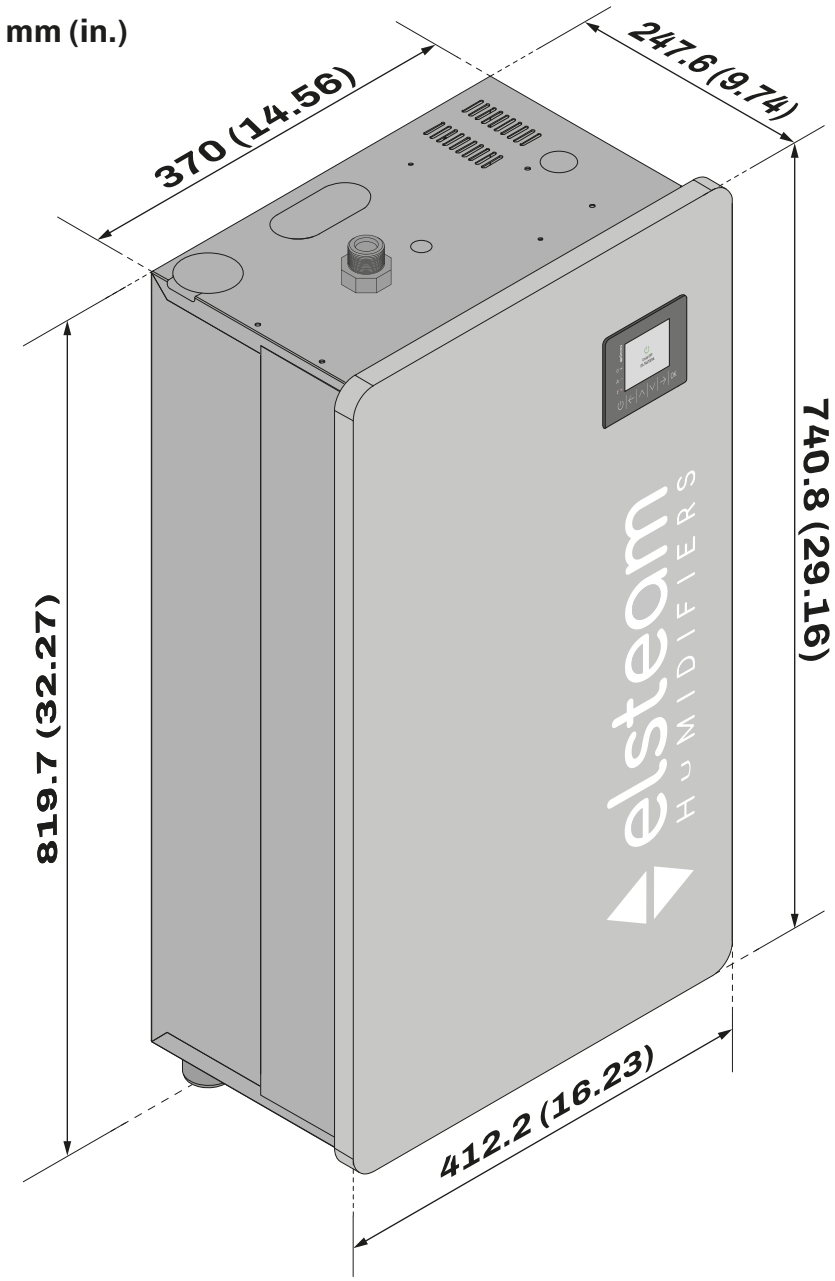


Fig. 25. *Dimensions of models EHK•003 ... EHK•015*

Weights

Model	Weight [kg(lb)]
EHKT003	16.5 (36.37)
EHKT005	16.5 (36.37)
EHKT010	17.5 (38.58)
EHKT015	17.5 (38.58)
EHKX003	16.5 (36.37)
EHKX005	16.5 (36.37)
EHKX010	17.5 (38.58)
EHKX015	17.5 (38.58)

2.1.2 Models EHK•020 ... EHK•040

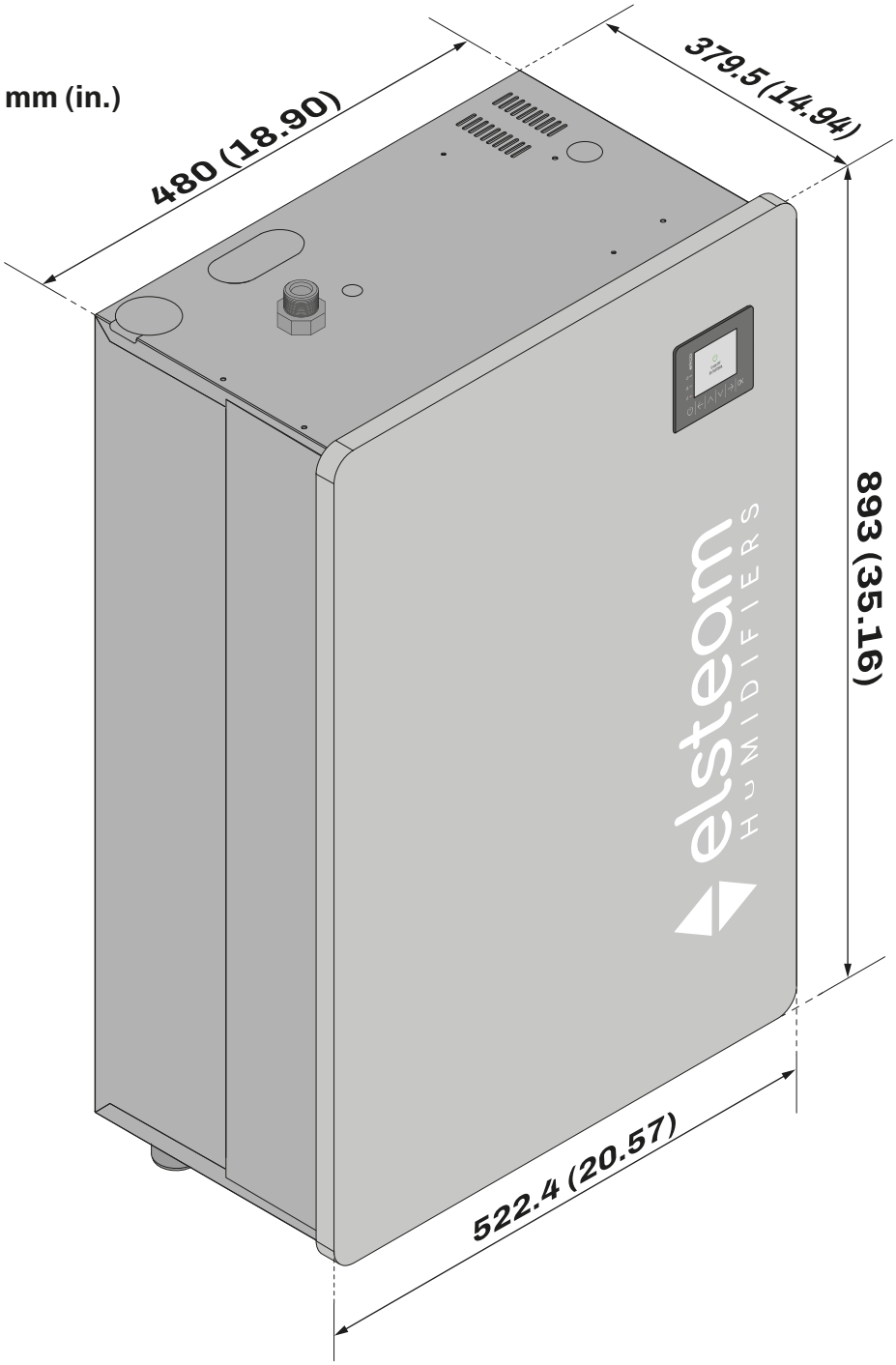


Fig. 26. *Dimensions of models EHK•020 ... EHK•040*

Weights

Model	Weight [kg(lb)]
EHKT020	28.5 (62.83)
EHKT030	28.5 (62.83)
EHKT040	28.5 (62.83)
EHKX020	28.5 (62.83)
EHKX030	28.5 (62.83)
EHKX040	28.5 (62.83)

2.1.3 Models EHK•060 ... EHKX100

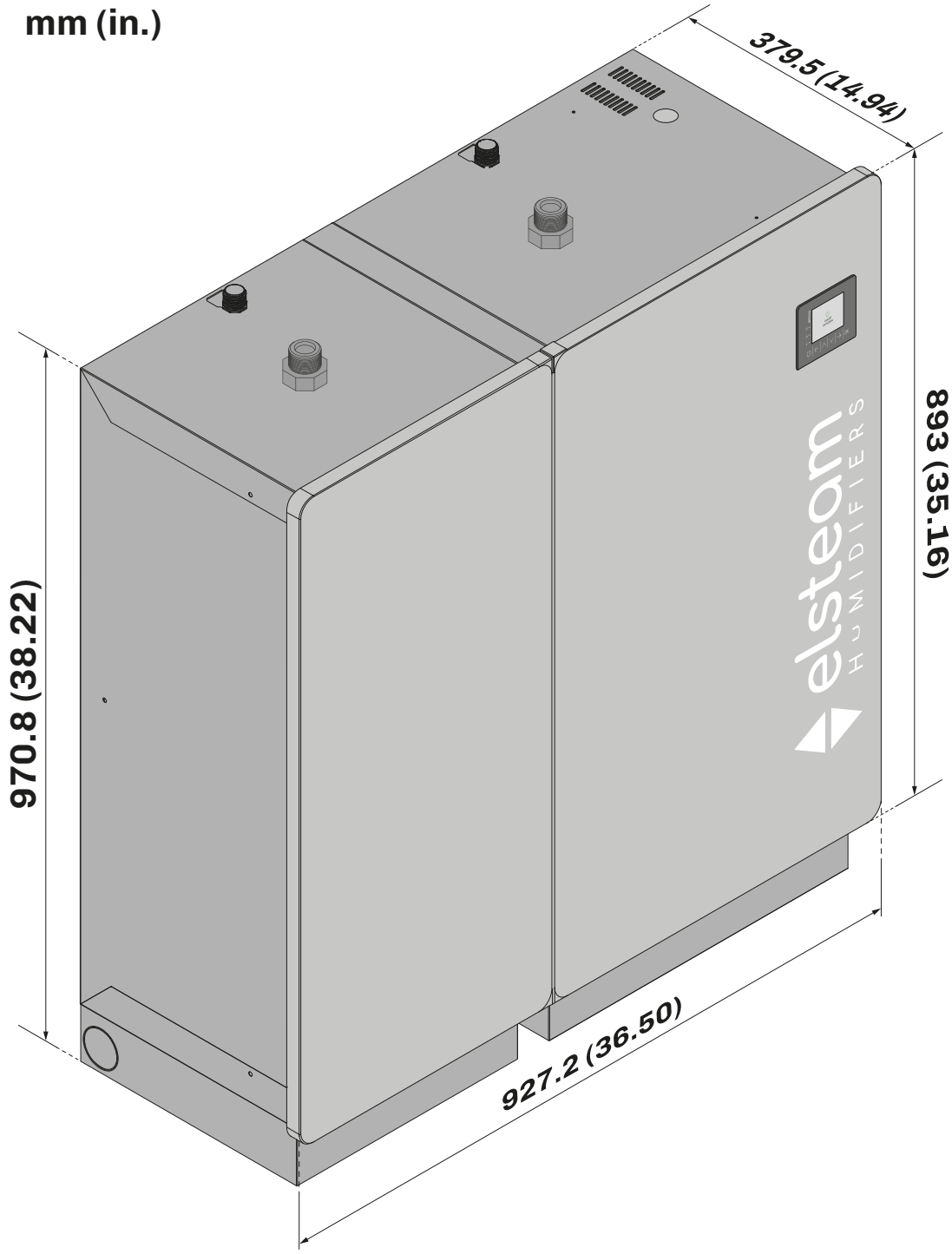


Fig. 27. *Dimensions of models EHK•060 ... EHKX100 (with optional socket)*

Weights

Model	Weight [kg(lb)]
EHKT060	42 (92.59)
EHKX060	42 (92.59)
EHKX080	42 (92.59)
EHKX100	42 (92.59)

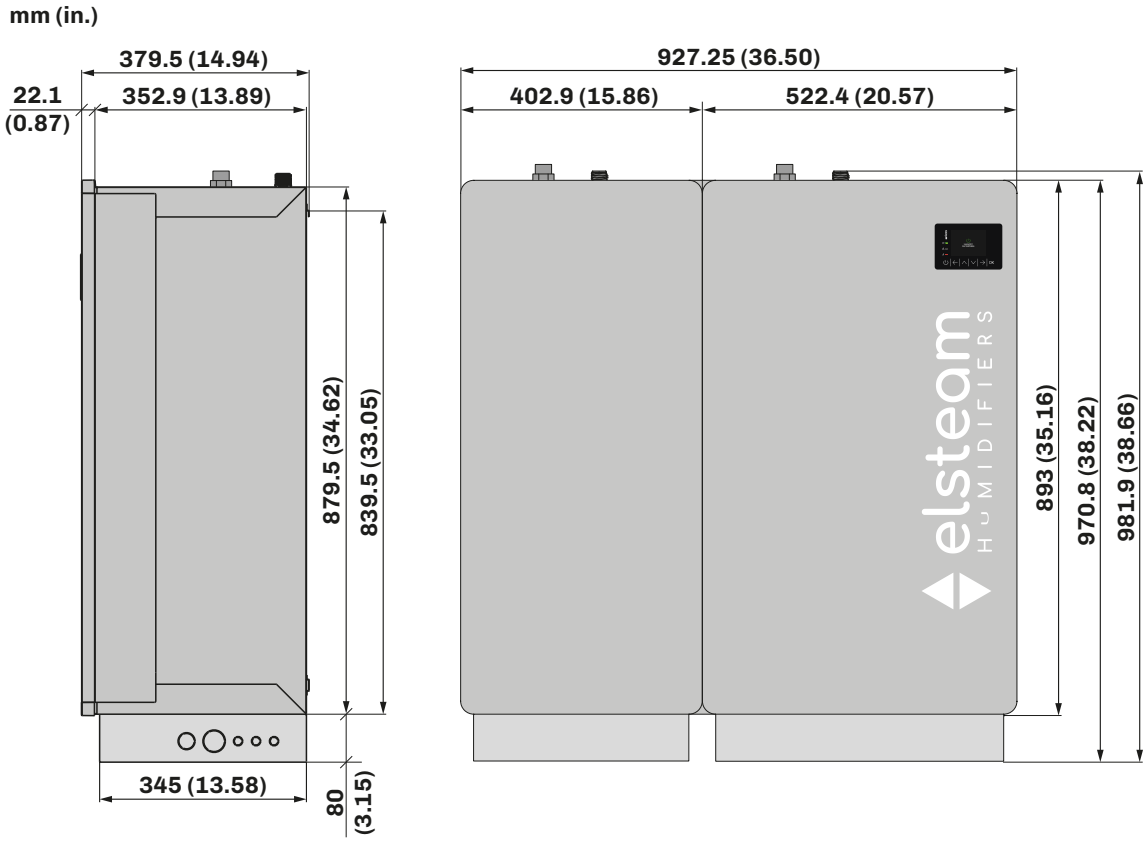


Fig. 28. *Dimensions of double boiler models*

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.

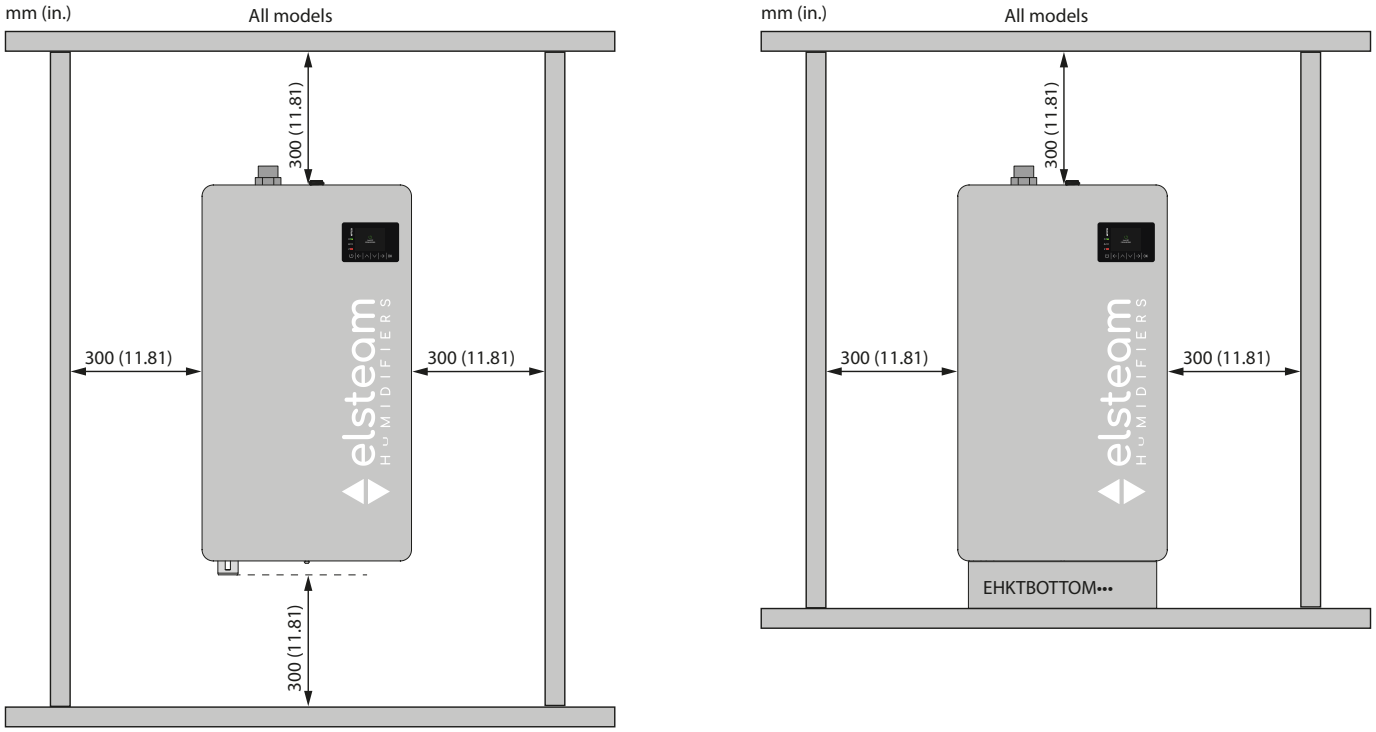


Fig. 29. *Minimum installation distances*

2.3 Fitting single boiler models

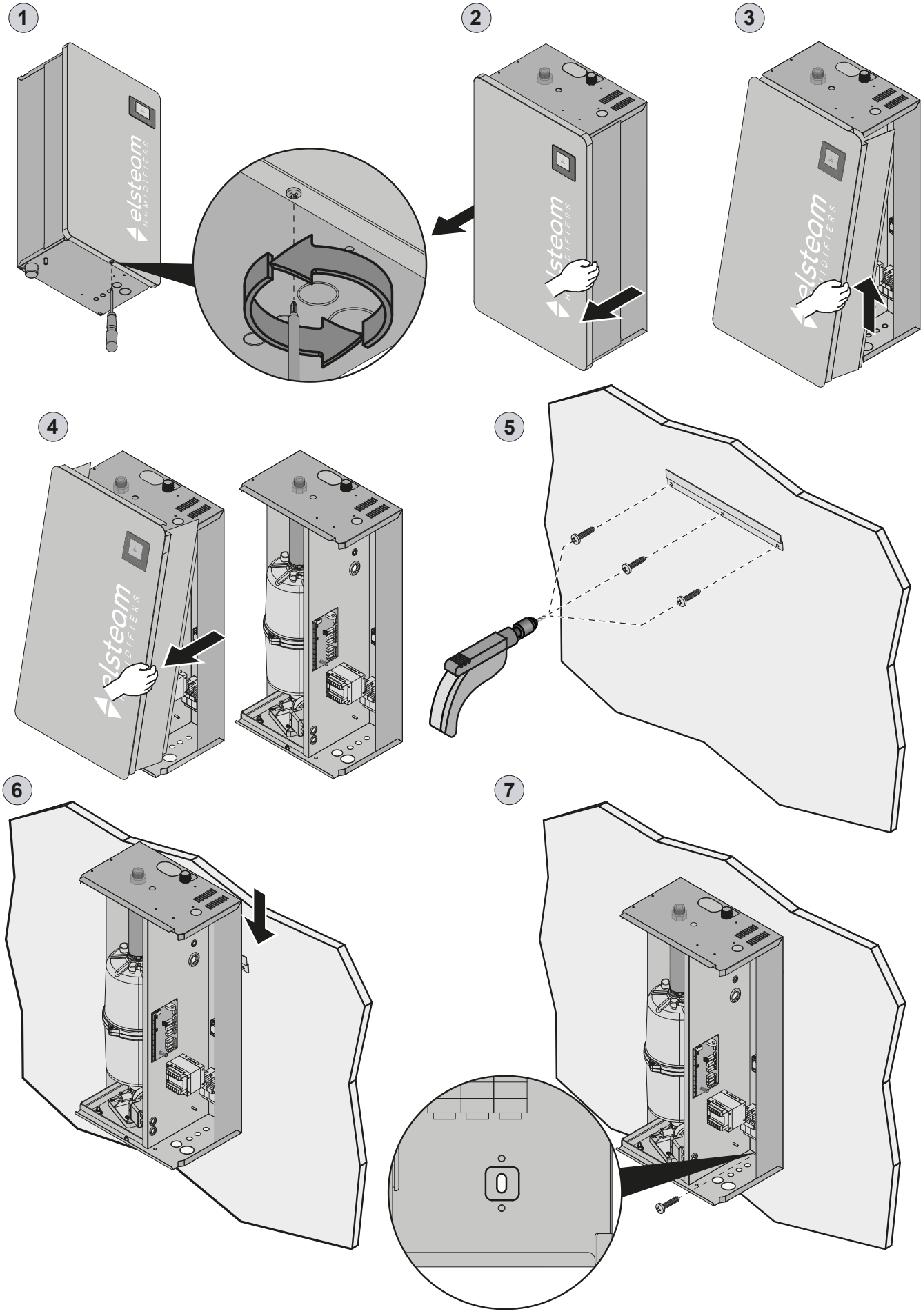


Fig. 30. *Installation instructions*

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 PH2 pan head Phillips 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.

2.4 Fitting double boiler models

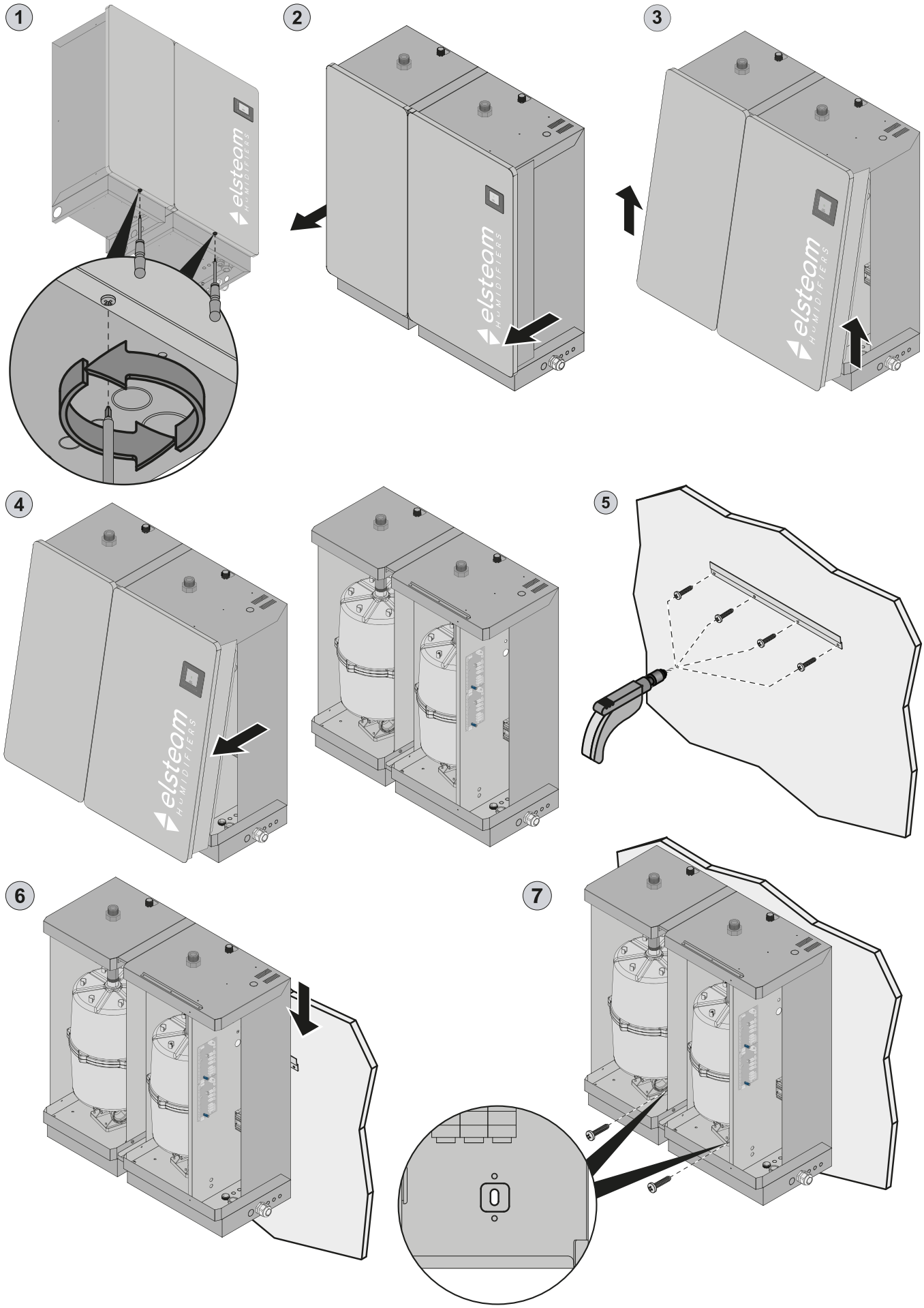


Fig. 31. *Installation instructions*

2.4.1 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 PH2 pan head Phillips screw to open the walls of the humidifier;
- Remove the front walls by pulling them towards you from the bottom and lifting;
- 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 the security screws.

3. PLUMBING CONNECTIONS AND INSTALLATION

Chapter content

This chapter contains the following information:

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 glands for power supply wiring;
- Pull-resistant cable glands for regulation wiring.

NOTE: The **EHTC** condensate outlet pipe can be used to drain the water, collected by the bottom tank, 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 exceeds1 MPa (10 bar)).

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

NOTICE
MALFUNCTIONING OF THE EQUIPMENT • The water supply must have a minimum pressure of 0.02 MPa (0.2 bar). • Connect the solenoid valve to the mains using the hose supplied in order to reduce water hammer in the water supply to the humidifier. • During installation, take care not to damage the plastic thread on the solenoid valve. • The water connection should 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 *CaCO3* alone, but also of a range of other elements/compounds.

What should you do?

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

What should you <u>NOT</u> 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

Single boiler models

Drain connection specifications

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

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

Tank specifications

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

NOTICE

MALFUNCTIONING OF THE EQUIPMENT

If the water hardness is over 40 °f, carry out maintenance/ manual cleaning of the tank at least twice a year.

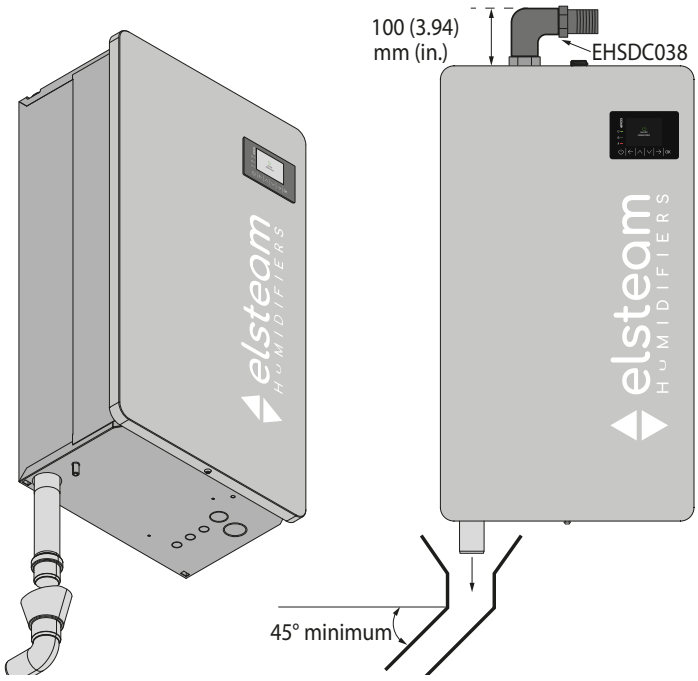


Fig. 32. *Specifications of drain pipe for single boiler models*

If the water hardness meets the specifications indicated in section ***"3.2.1 WATER SPECIFICATIONS" ON PAGE 50,*** the tank will only need to be cleaned once a year (water hardness in the range 5...30 °f) when only used during the winter. However, the maintenance technician is responsible for checking for deposits and cleaning them properly to ensure correct humidifier system operation and prevent water leaks on the surfaces around the **EHVI** basin.

⚠⚠ DANGER

RISK OF ELECTRIC SHOCK

If the tank or drain plumbing is made of electrically conductive material, earth both.

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

⚠ WARNING

RISK OF BURNS

- Before starting to drain the water, wear all necessary personal protective equipment (PPE).
- Do not touch the equipment during draining.

Double boiler models

Drain connection specifications

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

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

Tank specifications

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

NOTICE
MALFUNCTIONING OF THE EQUIPMENT If the water hardness is over 40 °f, carry out maintenance/manual cleaning of the tank at least twice a year.

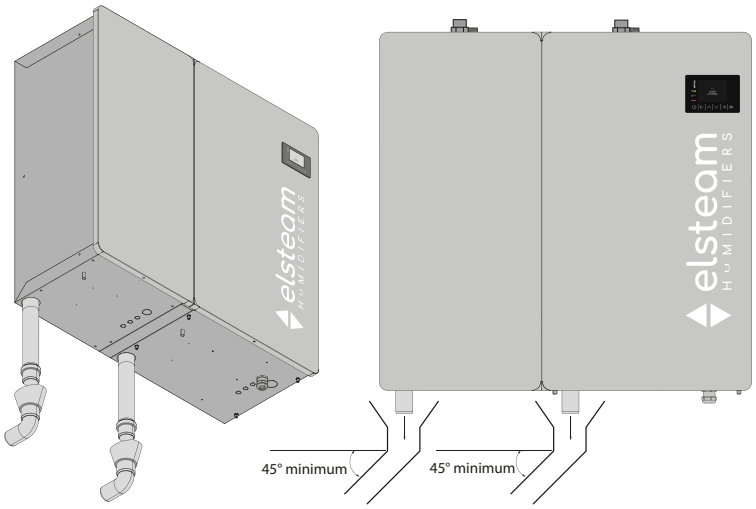


Fig. 33. *Specifications of drain pipe for double boiler models - separate drains*

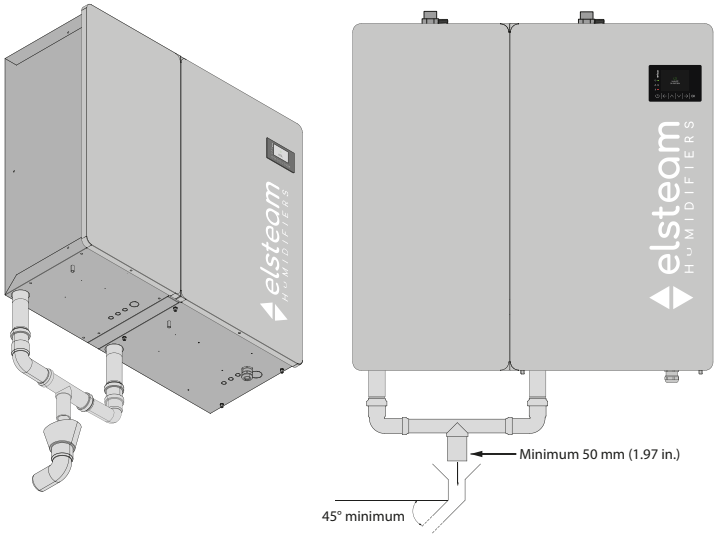


Fig. 34. *Specifications of drain pipe for double boiler models - single drain*

The T-connection must have a minimum outlet diameter of 50 mm (1.97 in.).

If the water hardness meets the specifications indicated in section ***"3.2.1 WATER SPECIFICATIONS" ON PAGE 50,*** the tank will only need to be cleaned once a year (water hardness in the range 5...30 °f) when only used during the winter. However, the maintenance technician is responsible for checking for deposits and cleaning them properly to ensure correct humidifier system operation and prevent water leaks on the surfaces around the **EHVI** basin.

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

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

⚠ WARNING

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

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);
- Compatibly with the application, higher than the humidifier outlet port;
- As close to the humidifier as possible (to prevent a loss of efficiency).

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

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

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

⚠ WARNING

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

3.4.1 Permissible distributor positions in the duct

Horizontal installation

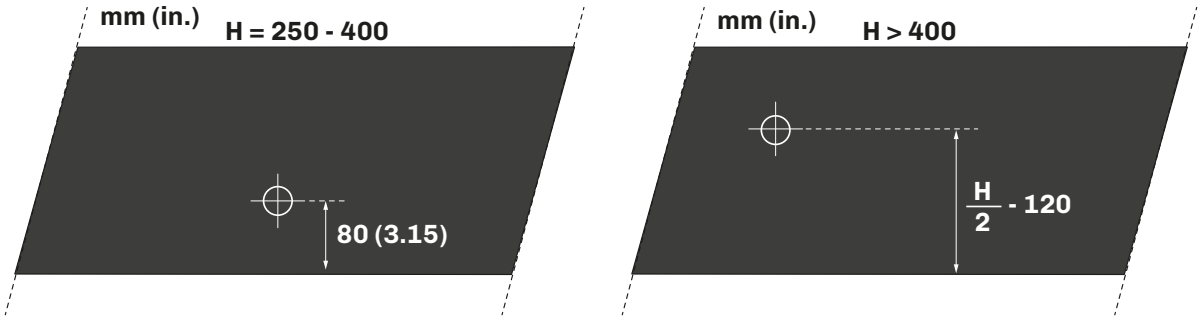


Fig. 35. *Horizontal installation - 1 distributor*

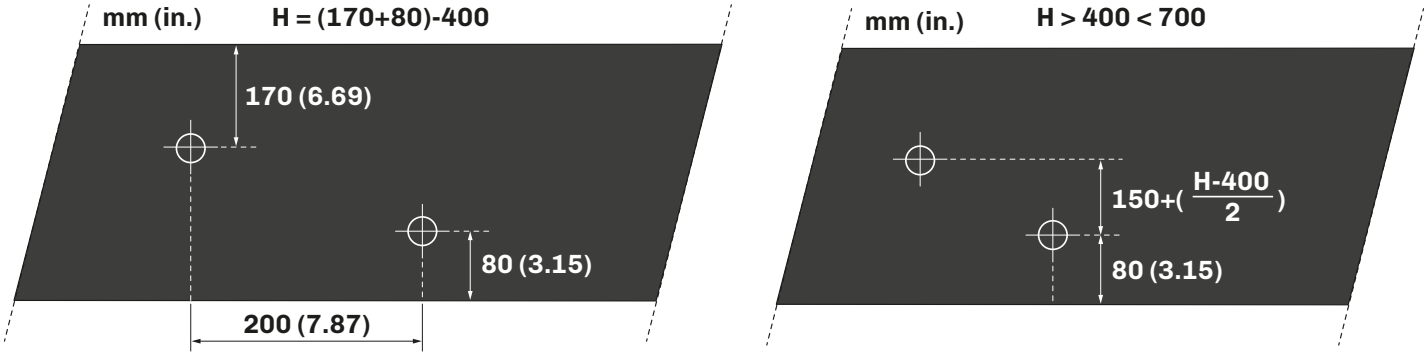


Fig. 36. *Horizontal installation - 2 distributors*

Vertical installation

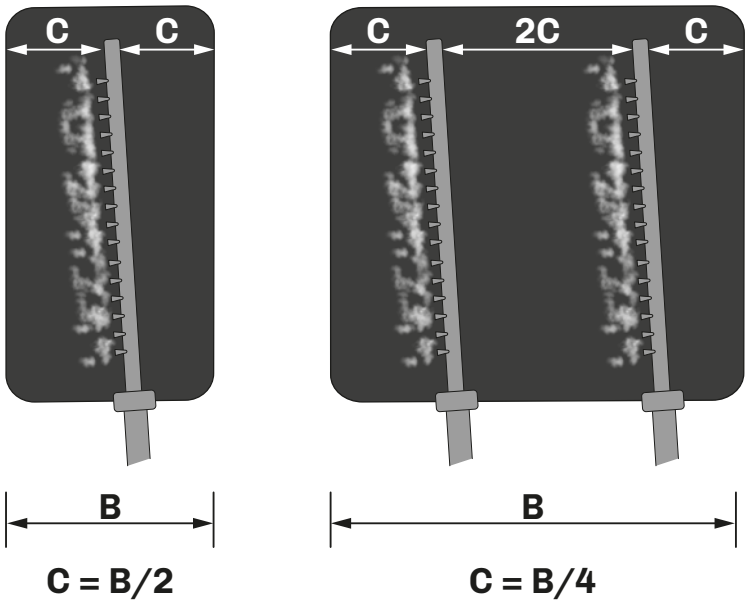
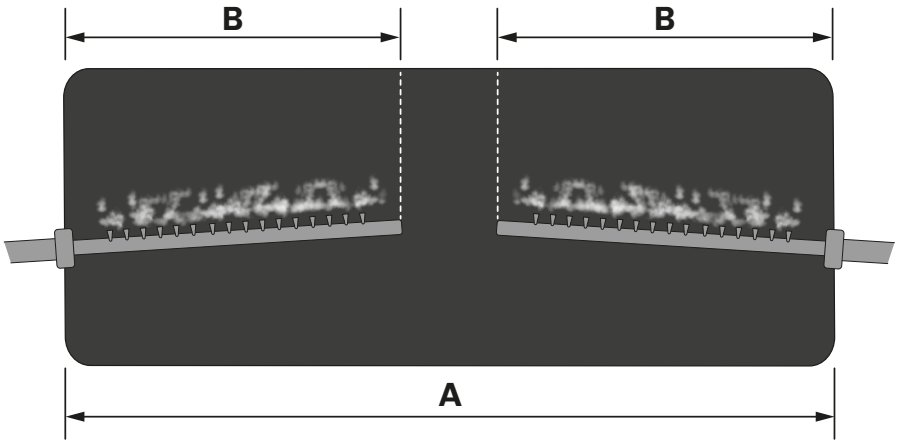


Fig. 37. *Vertical installation - 1–2 distributors*

Horizontal installation - wide duct



Example:

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

Fig. 38. *Horizontal installation in a wide duct - 2 distributors*

3.5 Steam distribution in the room

Steam can be diffused directly in the room, without using ventilation ducts, by installing the ventilated steam dispenser (p/n **EHSR015M2**) directly above the humidifier or by wall mounting it.

Position the ventilated distributor horizontally, with the distribution holes pointing upward, observing the minimum distances stated in sections ***"3.5.4 MINIMUM DISTANCES TO BE OBSERVED WITH REMOTE INSTALLATION" ON PAGE 57*** and ***"3.5.5 MINIMUM DISTANCES TO BE OBSERVED WITH INSTALLATION ABOVE THE HUMIDIFIER" ON PAGE 58***.

⚠ 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.

3.5.1 Ventilated distributor power supply

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

For further information regarding:

- Installation;
- Electrical connections;
- Plumbing connections;

scan the QR code below or visit www.elsteam.it under the *Products/Zephyr* section.

3.5.2 Remote ventilated steam distributor

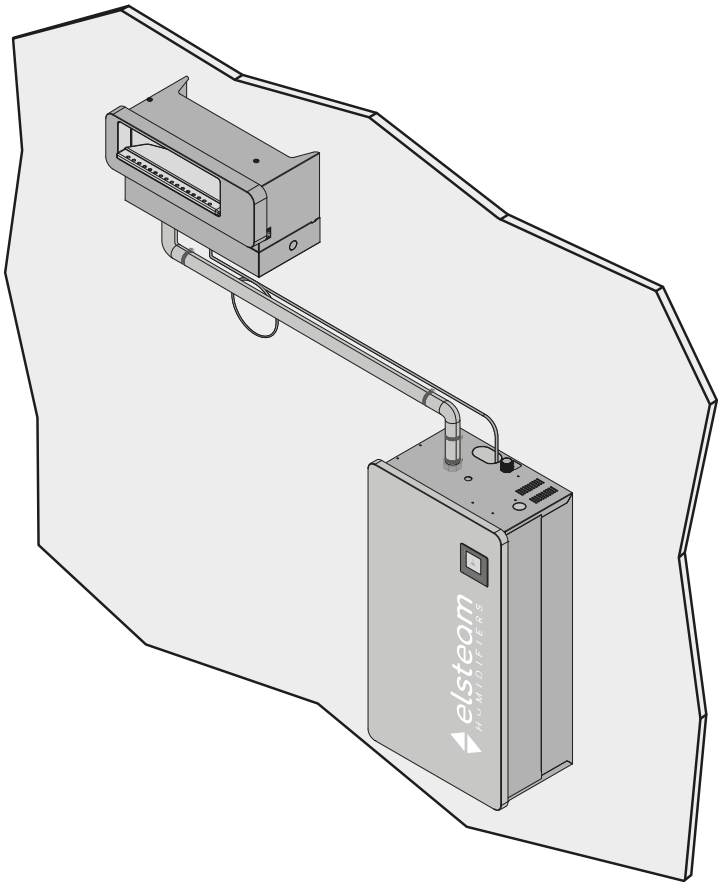


Fig. 39. *Remote ventilated steam distribution*

3.5.3 Ventilated steam distributor above the humidifier

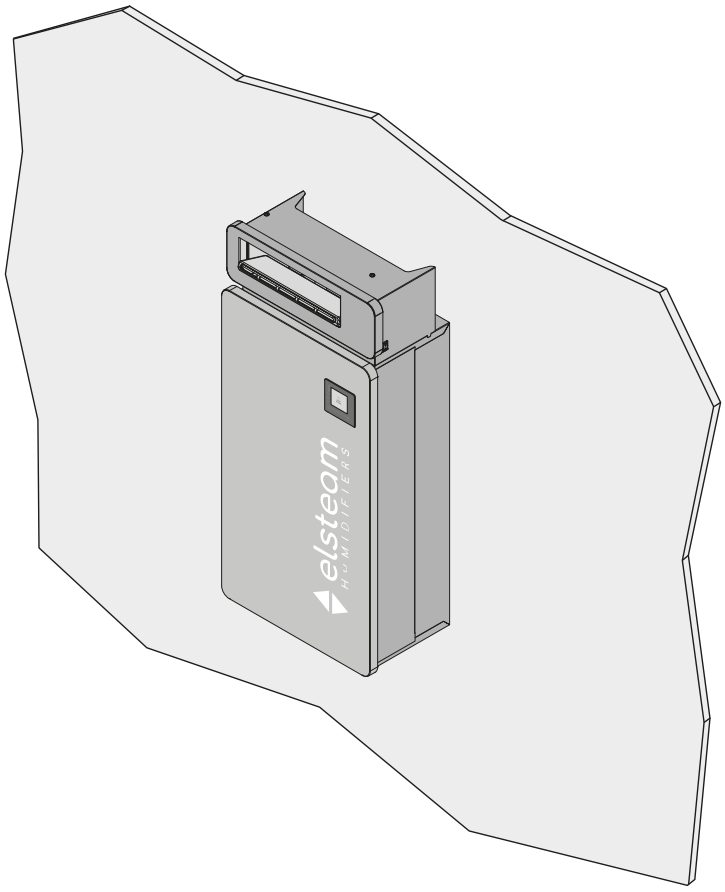


Fig. 40. *Local ventilated steam distribution*

3.5.4 Minimum distances to be observed with remote installation

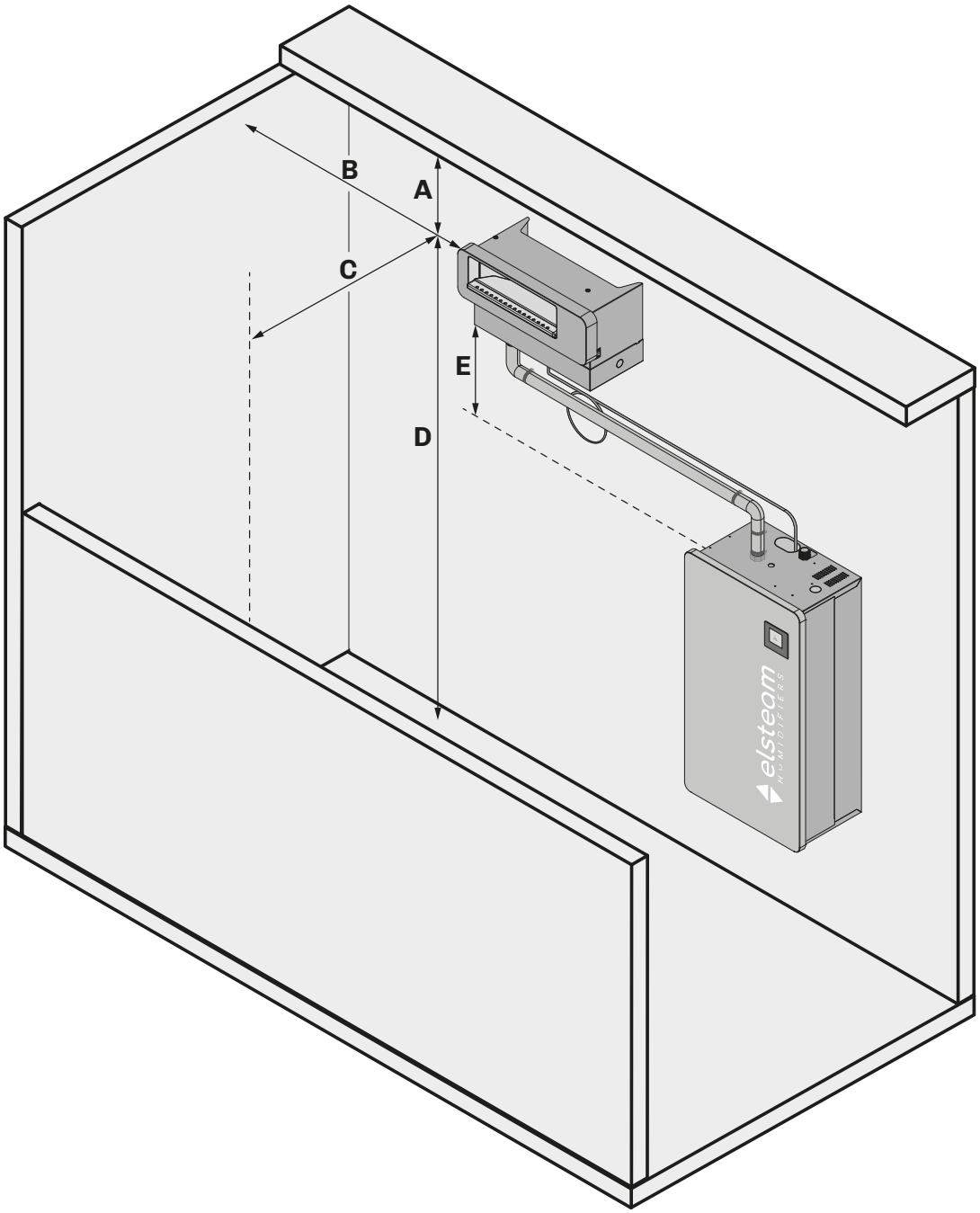


Fig. 41. *Minimum distances with remote installation*

Ref.	Dimensions
A	>1 m (3.3 ft.)
B	0.5 m (1.6 ft)
C	>3 m (9.8 ft.)
D	2.2 m (7.21ft.)
E	≤4 m (13.1 ft.)

3.5.5 Minimum distances to be observed with installation above the humidifier

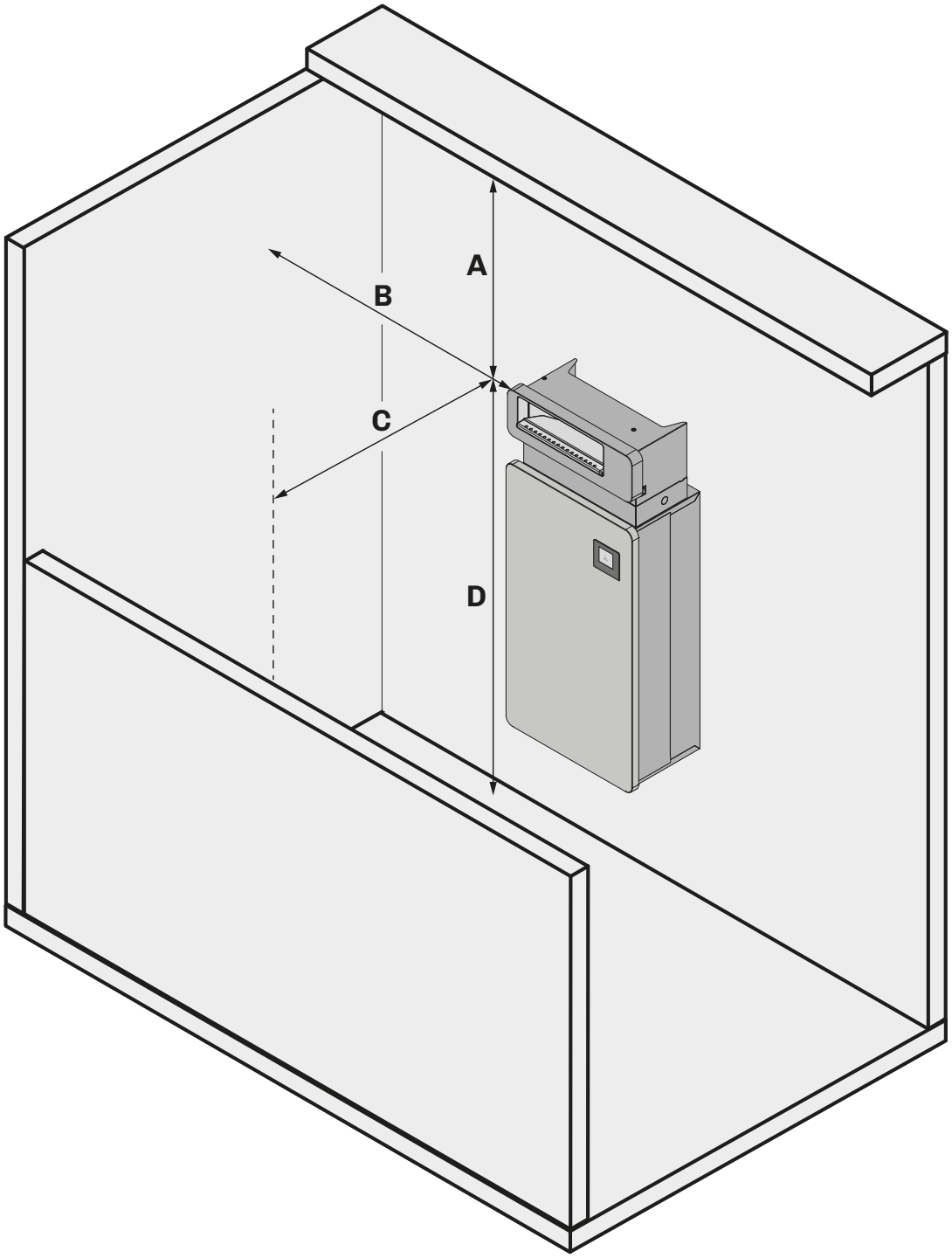


Fig. 42. *Minimum distances with installation above the humidifier*

Ref.	Dimensions
A	>1 m (3.3 ft.)
B	0.5 m (1.6 ft)
C	>5 m (16.40 ft.)
D	2.2 m (7.21ft.)

3.5.6 Steam distributor with nozzle (in wellness setting)

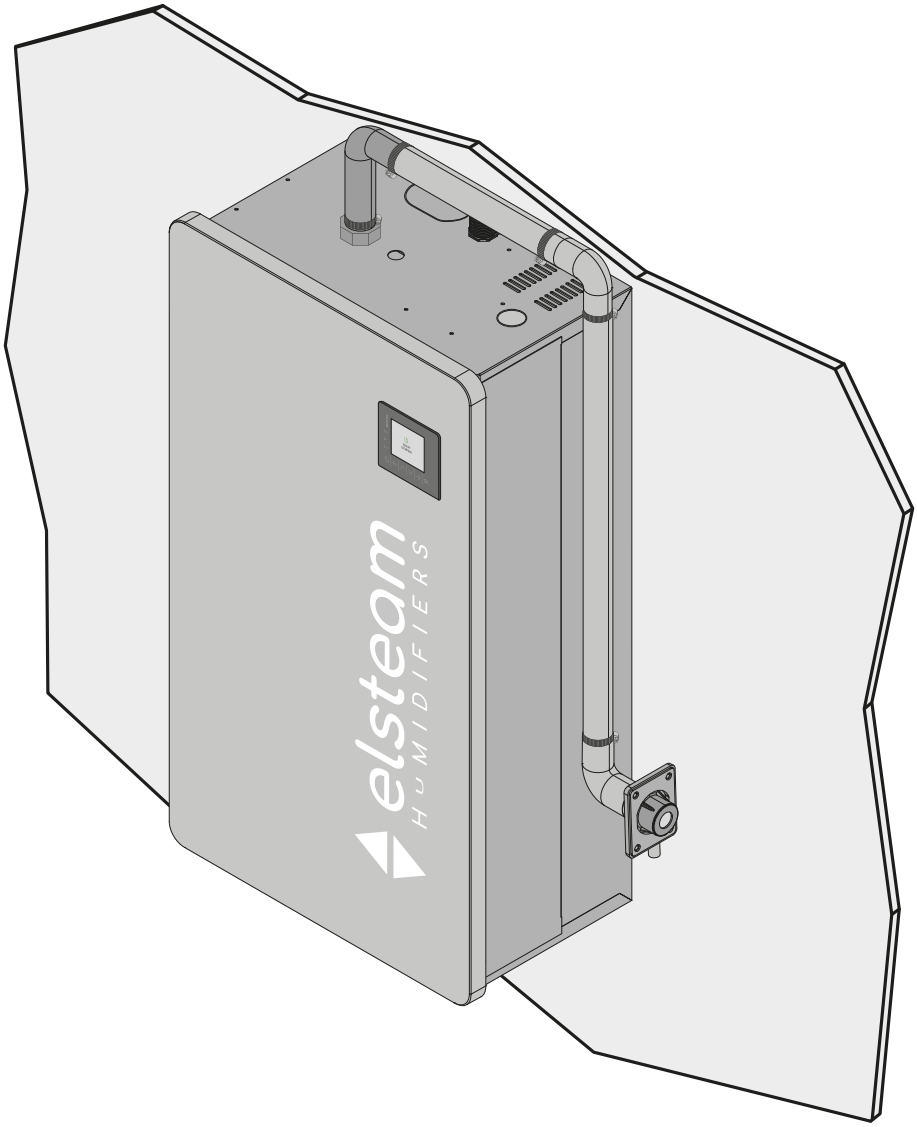


Fig. 43. *Steam distributor with nozzle (in wellness setting)*

3.5.7 Steam distributor with nozzle (in duct)

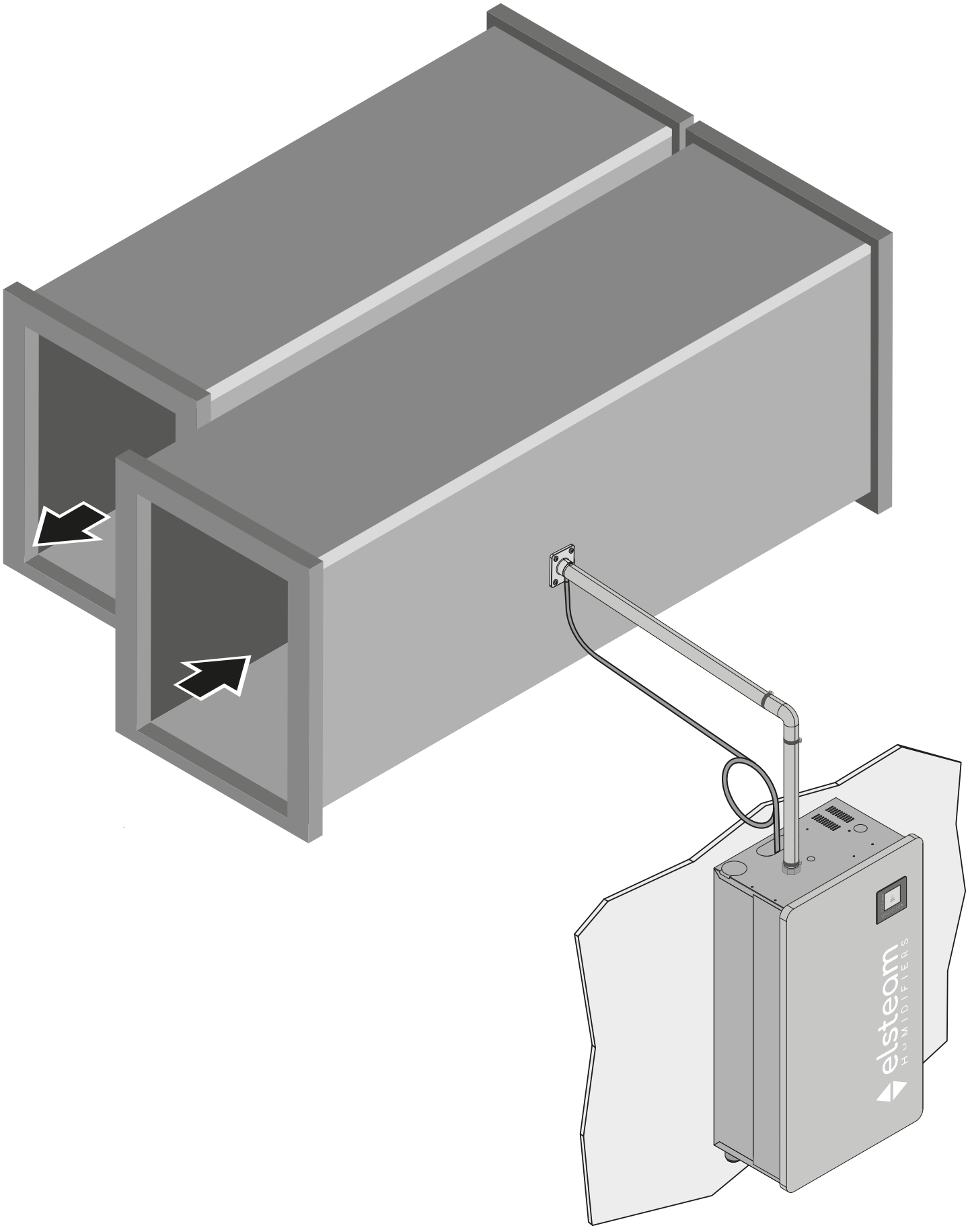


Fig. 44. *Steam distributor with nozzle (in duct)*

3.6 Installation overview

3.6.1 Typical installation for humidification in the duct

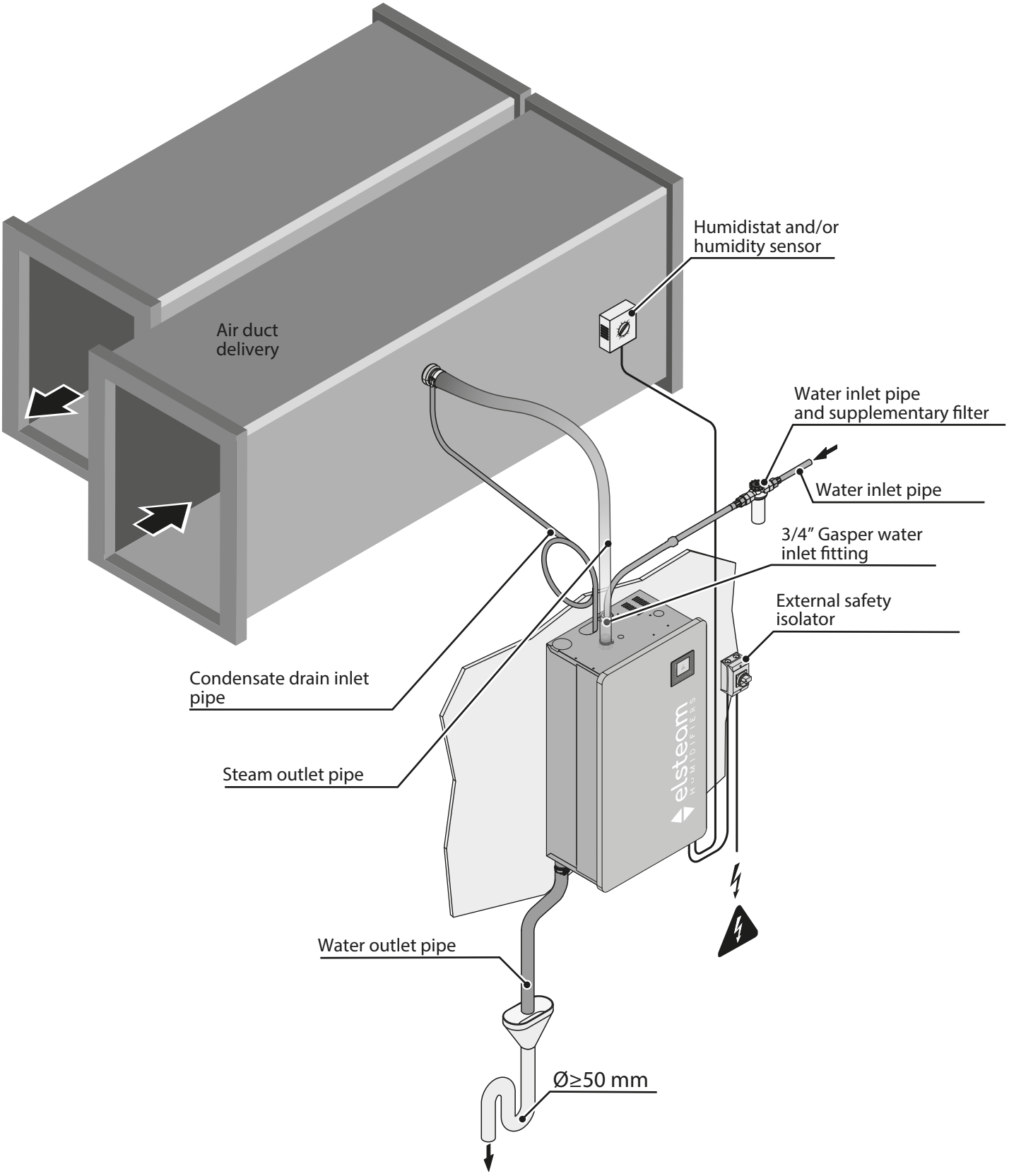
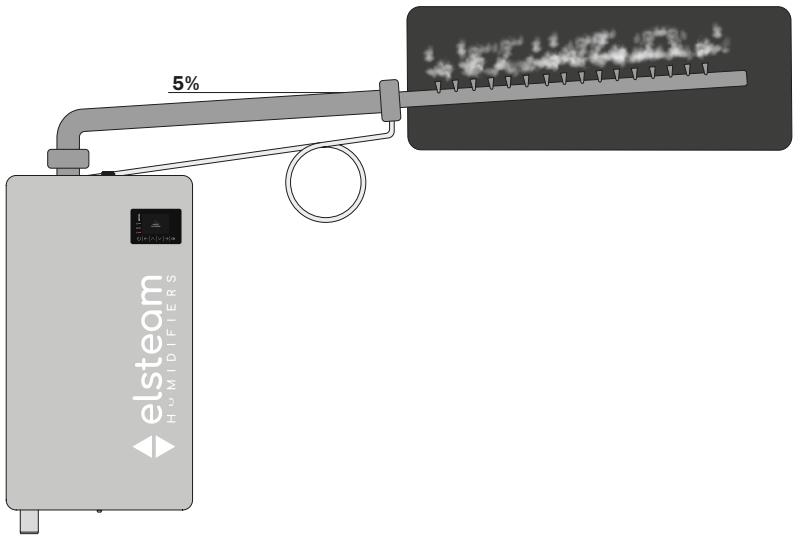
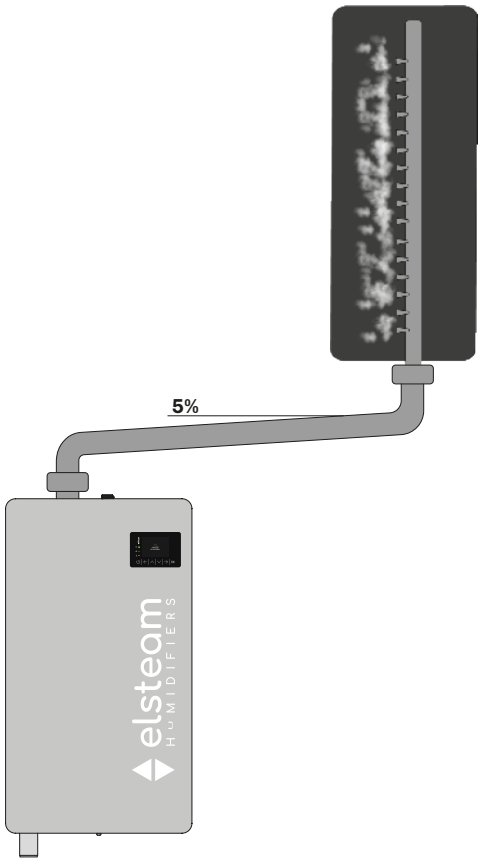
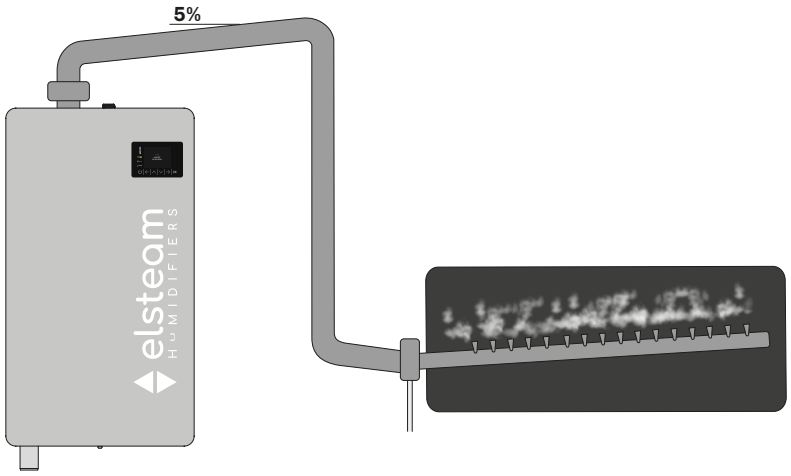
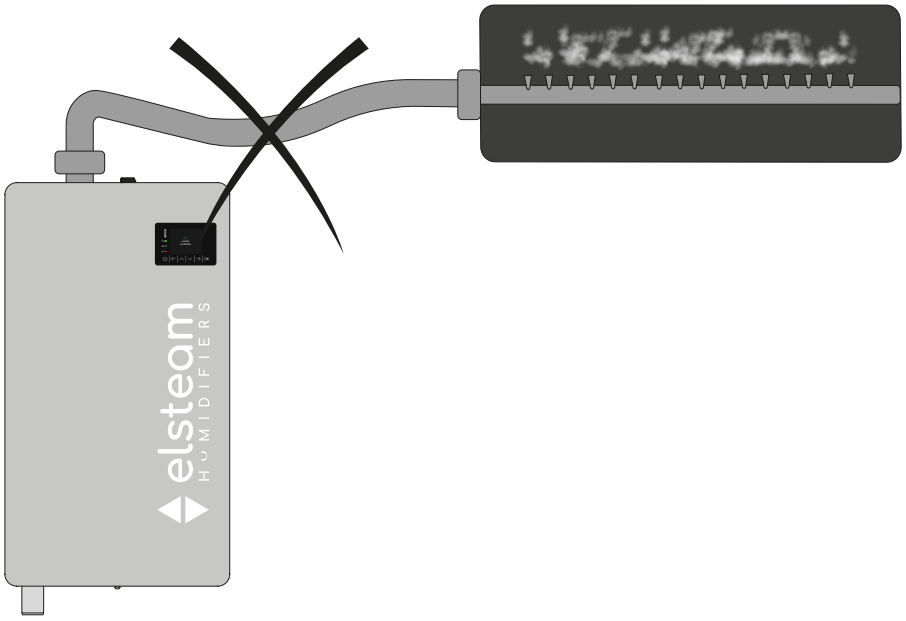


Fig. 45. *Typical installation for humidification in the duct*

3.6.2 Examples of distributor installation in the duct

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

Description	Example
Example of incorrect installation The delivery pipe must have no condensation pockets.	

4. ELECTRICAL CONNECTIONS

Chapter content

This chapter contains the following information:

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

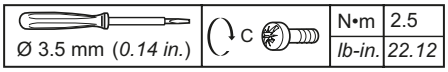
REGULATORY INCOMPATIBILITY

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.)

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

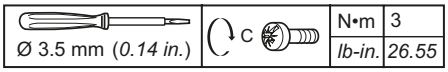


Applicable to models ...
EHK•003M2 / EHK•003T2 / EHK•003T4/ EHK•005M2 / EHK•005T2 / EHK•005T4 / EHK•010T4 / EHK•010T2 / EHK•015T4

Fig. 46. *Maximum power supply wiring -* ***See the table for the models***

Step 26.5 mm (1.04 in.)

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

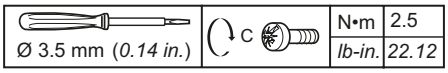


Applicable to models ...
EHK•015T2

Fig. 47. *Maximum power supply wiring -* ***EHK•015T2***

Step 17.8 mm (0.70 in.)

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

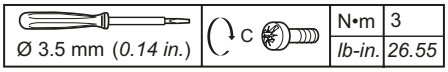


Applicable to models ...
EHK•020T4

Fig. 48. *Maximum power supply wiring -* ***EHK• 020T4***

Step 26.5 mm (1.04 in.)

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

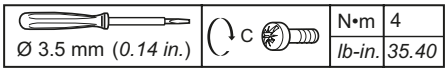


Applicable to models ...
EHK•020T2 / EHK•030T4 / EHK•040T4

Fig. 49. *Maximum power supply wiring -* ***EHK•020T2 / EHK•030T4 / EHK•040T4***

Step 35.5 mm (1.40 in.)

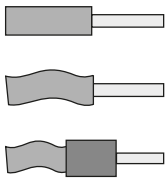
mm / in. 7 / 0.28			
mm²	50	35	35
AWG	1	2	2
no. of conductors	4		



Applicable to models ...
EHK•060T4 / EHKX080T4 / EHKX100T4

Fig. 50. *Maximum power supply wiring -* ***EHK•060T4 / EHKX080T4 / EHKX100T4***

Suitable wiring for the power supply

P/n EHKT	P/n EHKX	Wiring size	Maximum length	Permissible wiring type	Pitch [mm(in.)]
EHKT003M2	**EHKX003M2**	2G4	15 m (49.2 ft.)		17.8 (0.70)
EHKT003T2	**EHKX003T2**	3G2.5			
EHKT003T4	**EHKX003T4**	3G2.5			
EHKT005M2	**EHKX005M2**	2G10			
EHKT005T2	**EHKX005T2**	3G4			
EHKT005T4	**EHKX005T4**	3G2.5			
EHKT010T2	**EHKX010T2**	3G10			
EHKT010T4	**EHKX010T4**	3G4			
EHKT015T4	**EHKX015T4**	3G6			
EHKT015T2	**EHKX015T2**	3G16			26.5 (1.04)
EHKT020T2	**EHKX020T2**	3G16			
EHKT020T4	**EHKX020T4**	3G10			17.8 (0.70)
EHKT030T4	**EHKX030T4**	3G16			26.5 (1.04)
EHKT040T4	**EHKX040T4**	3G16			
EHKT060T4	**EHKX060T4**	3G25			35.5 (1.40)
	EHKX080T4	3G35			
	EHKX0100T4	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*
Corrente	16	10	10	32	16	10	16	32	32	50	32	50			100	125	
Tipologia	Rapido			Rapido			Rapido			Rapido	Rapido	Rapido			Rapido		
Dimensione	10x38			10x38			10x38			14x51	10x38	14x51			22x58		

Fig. 51. *Overload protection devices according to model*

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

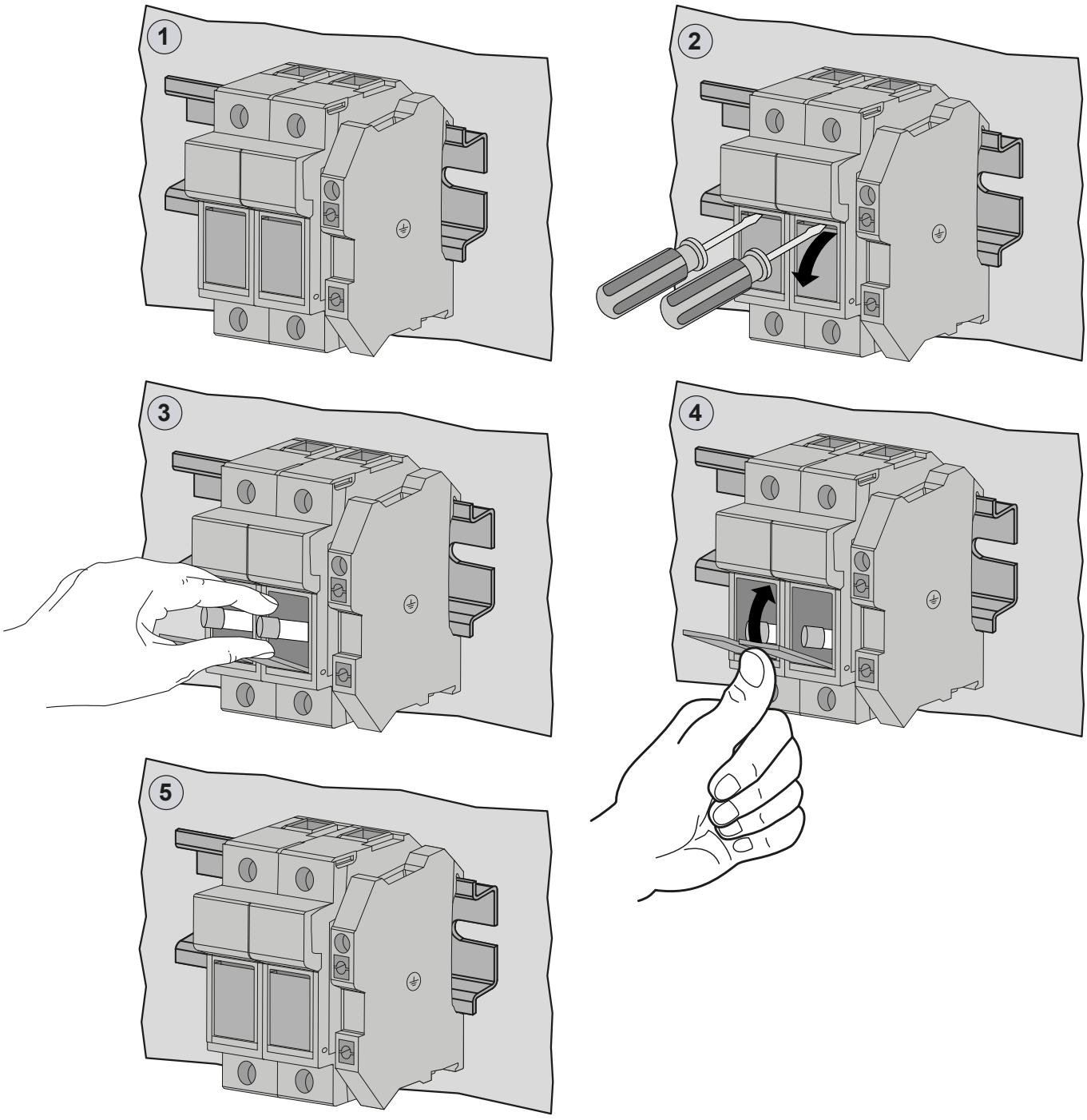


Fig. 52. *Overload protection device*

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

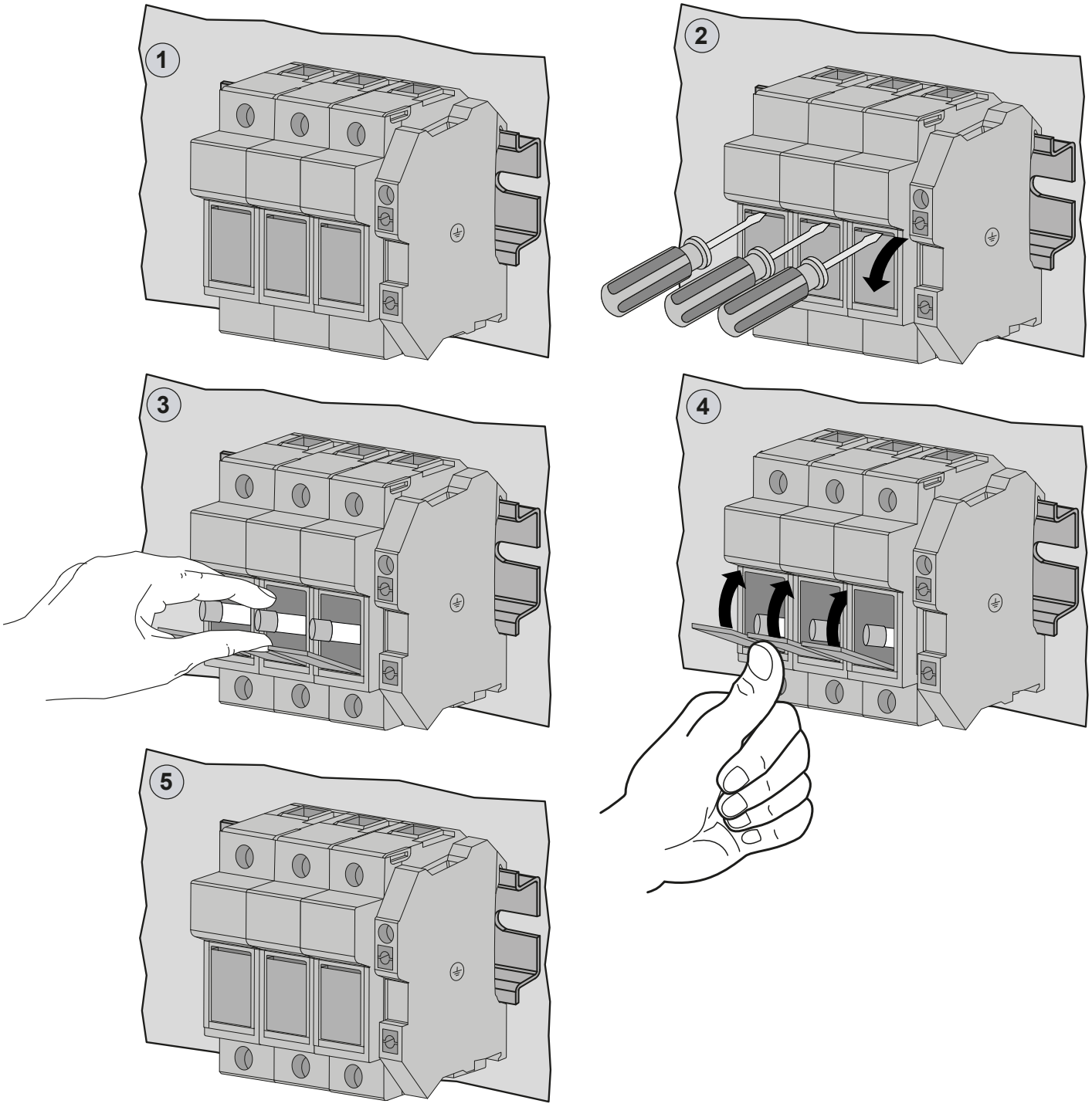


Fig. 53. *Overload protection device*

4.3.3 Changing fuses - Control board

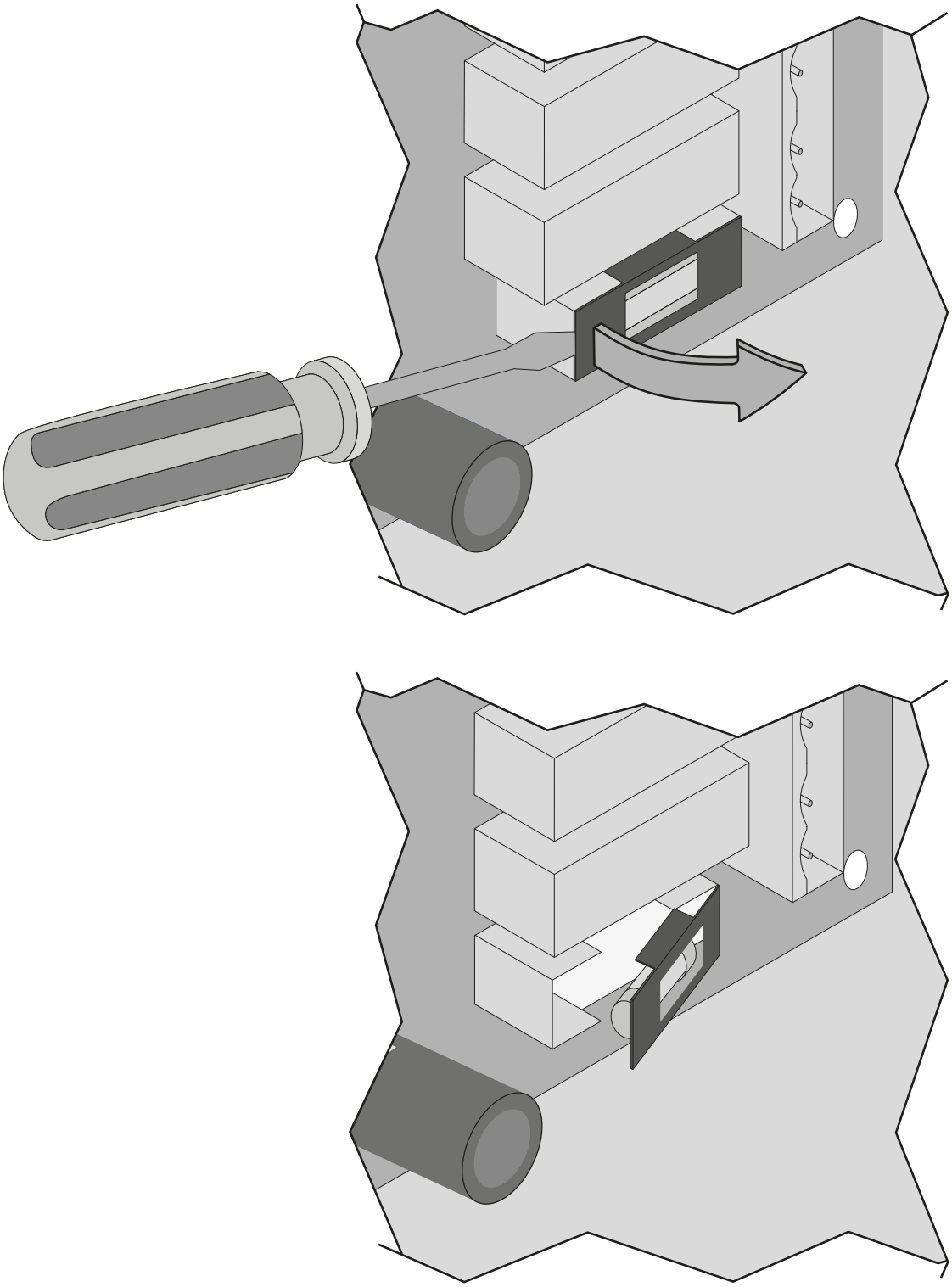
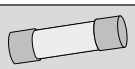


Fig. 54. *Protection devices on the control board*

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

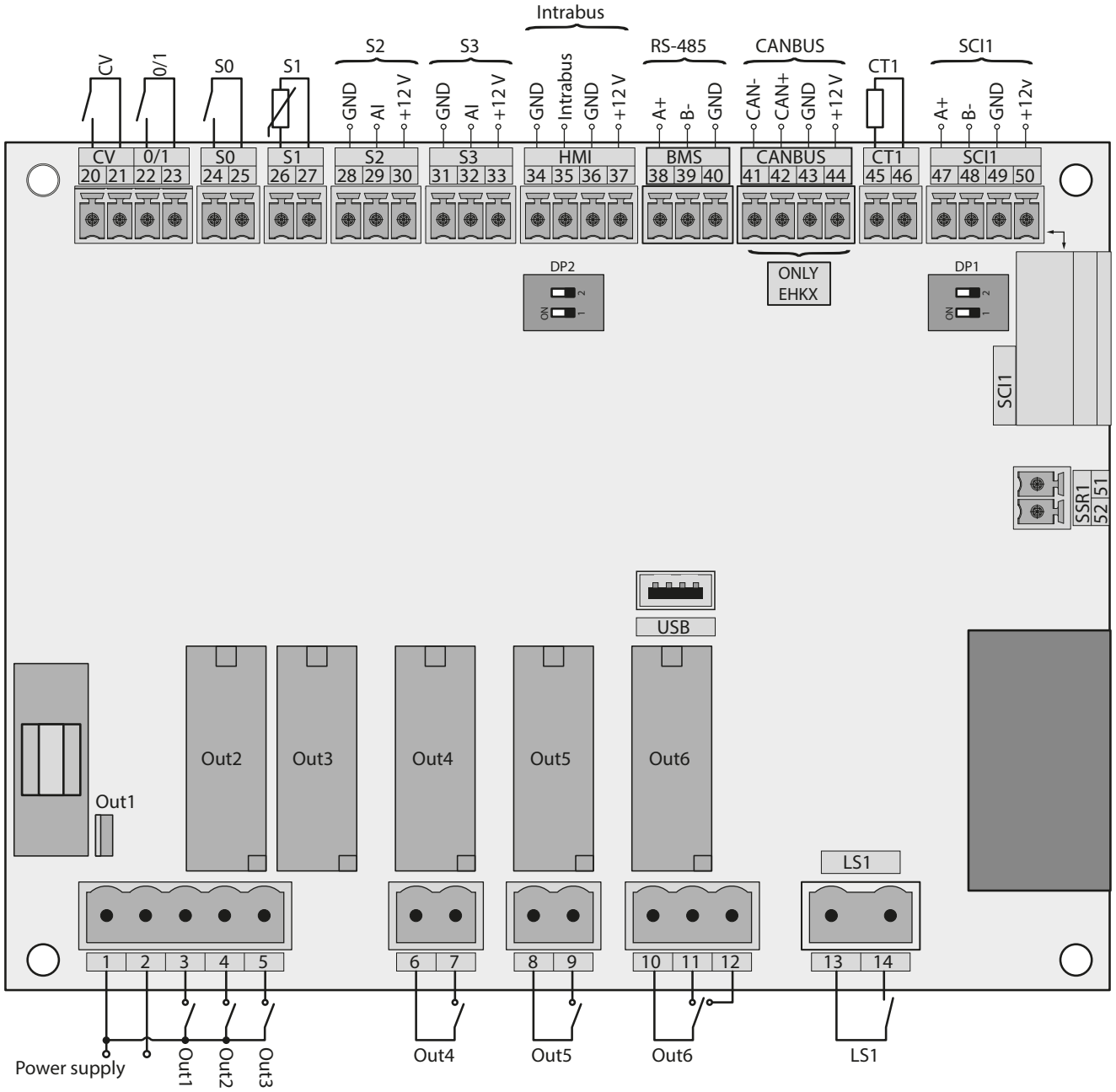


Fig. 55. *Control board electrical connections*

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

4.4.2 Expansion

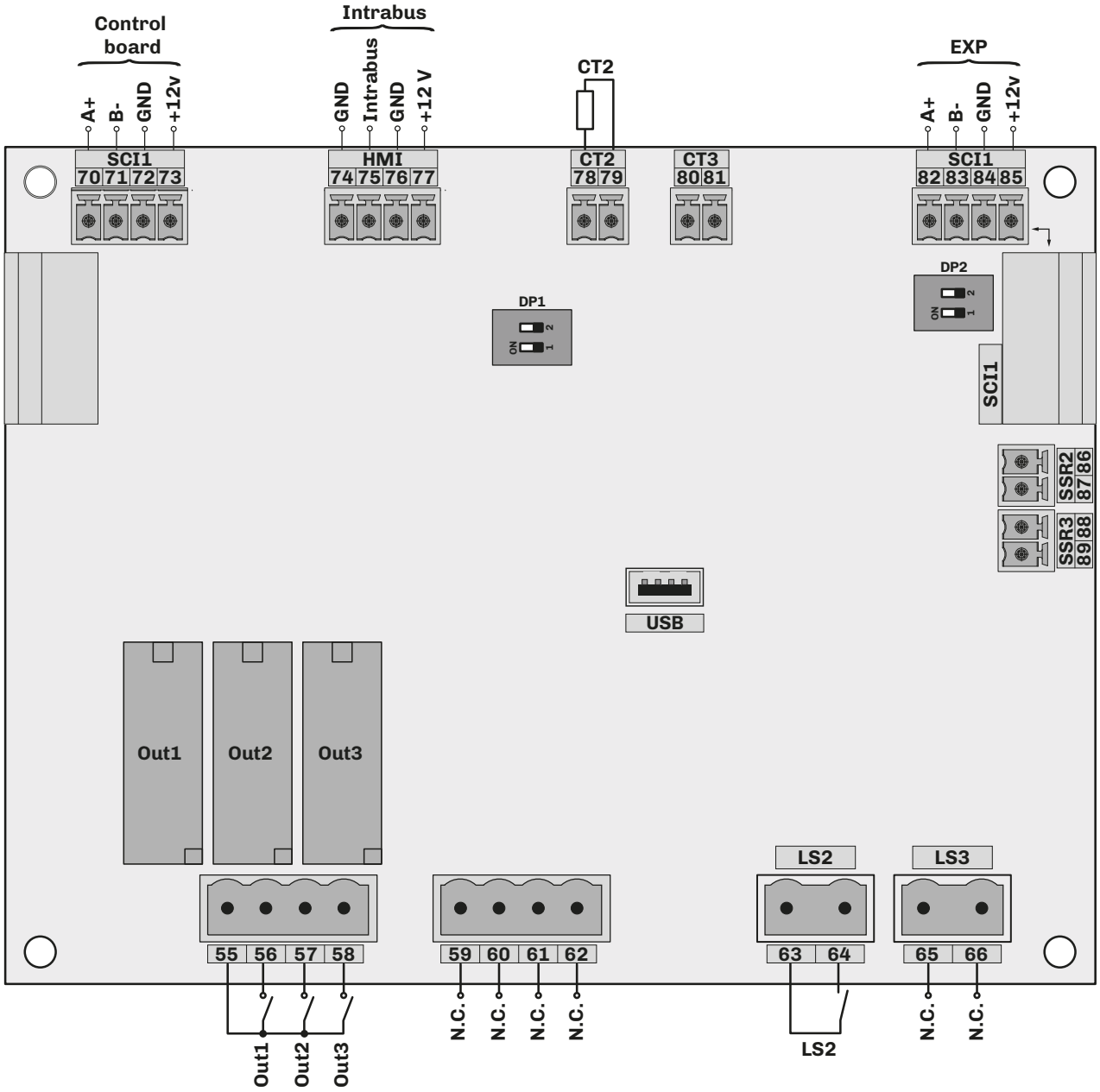


Fig. 56. *Expansion electrical connections*

TERMINALS					
55-56	Digital output: boiler 2 water outlet solenoid valve	**80-81**	Reserved		
55-57	Digital output: boiler 2 water outlet pump	**82...85**	Connection to expansion board **SCI1**		
55-58	Digital output: electrodes (steam generation)	**DP1**	Modbus communication address of expansion board		
63-64	Hazardous voltage digital input: level sensor **LS2**		**1**	**2**	Address offset relative to **LA1**
70...73	Connection to control board **SCI1**		OFF	OFF	**LA1 + 0**
74...77	Serial line input: HMI Intrabus		OFF	ON	**LA1 + 1**
78-79	Analogue input: external current sensor **CT2** (TA) for boiler 2		ON	OFF	**LA1 + 2**
			ON	ON	**LA1 + 3**
		DP2	Activate termination resistor on **SCI1 RS-485** serial line. **1** = SCI1 RS-485 serial termination; **2** = Reserved		

4.5 Configurations

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

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

Parameter configuration
CFG = 0-1

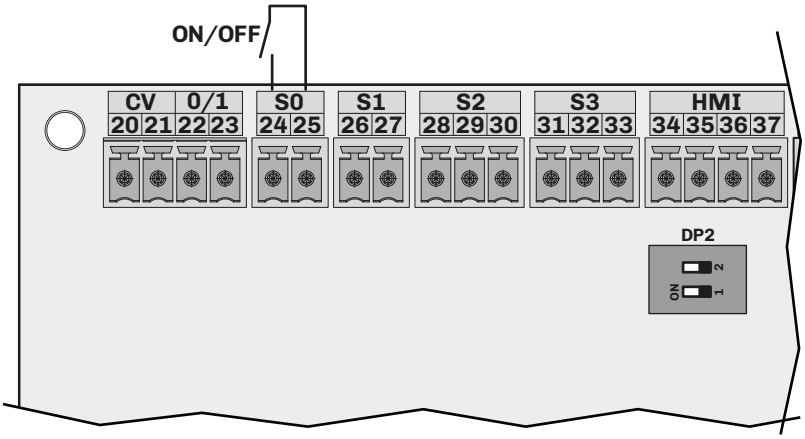


Fig. 57. *ON/OFF connection with humidistat or external contact (**CFG** = 0-1)*

4.5.2 External proportional humidistat connection (CFG = PROP)

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

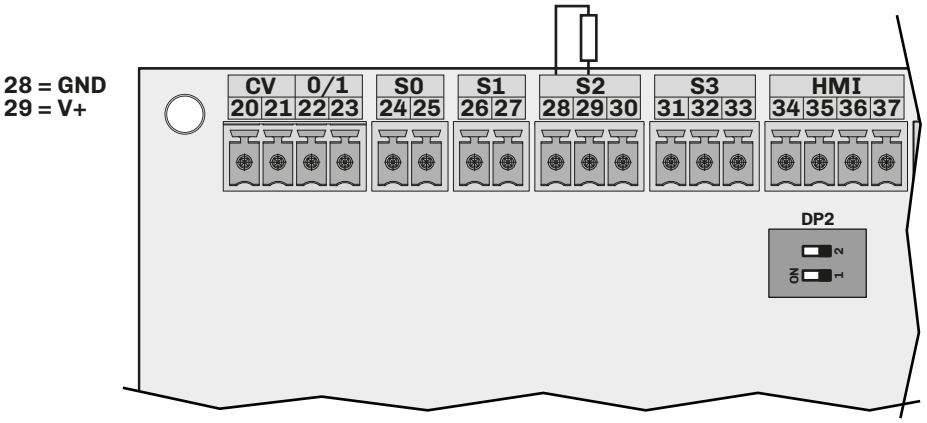


Fig. 58. *External proportional humidistat connection (**CFG** = PROP)*

4.5.3 Humidity sensor connection (CFG = HUM)

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

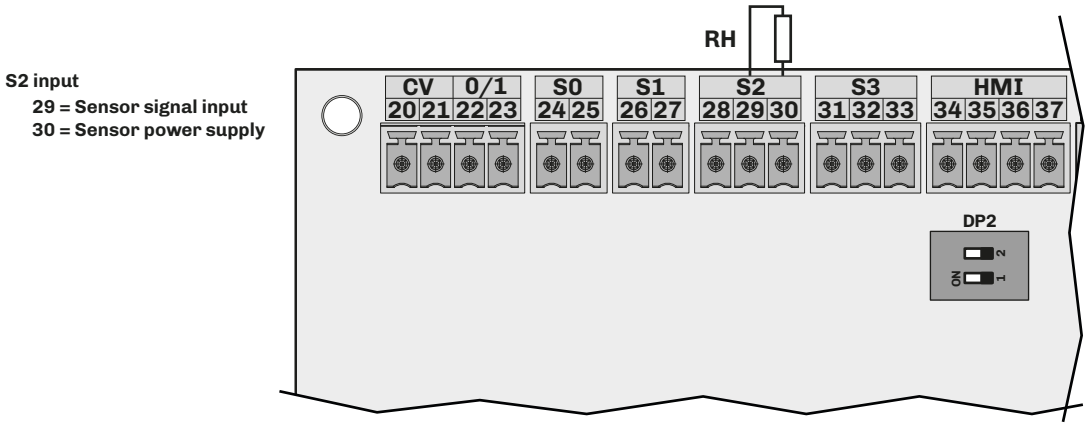


Fig. 59. *Humidity sensor connection (**CFG** = HUM)*

4.5.4 Humidity sensor connection EVHTP520 (CFG = HUM)

Parameter configuration
CFG = HUM
P2 = E520

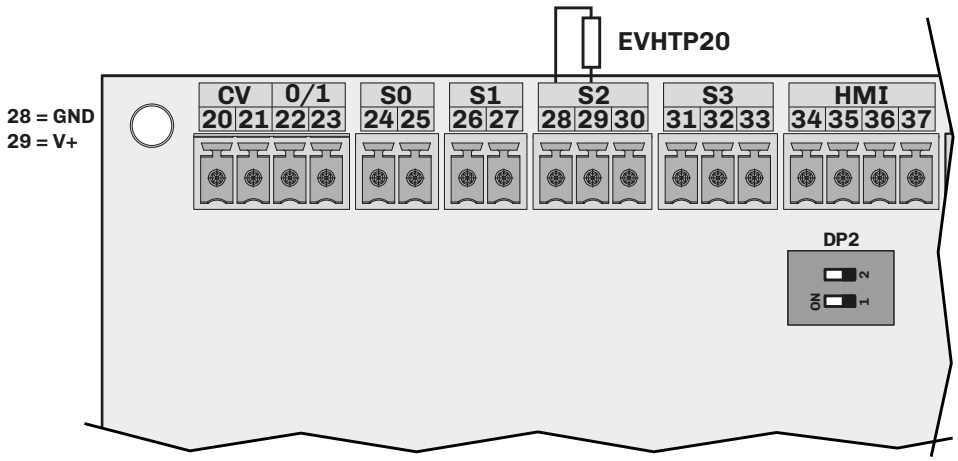


Fig. 60. *Humidity sensor connection EVHTP520 (**CFG** = HUM)*

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

Parameter configuration
CFG = HUML
P2 = 0.20 **P2** = 4.20 **P2** = E520
P7 = 0.20 **P7** = 4.20

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

S3 input
32 = Sensor signal input
33 = Sensor power supply

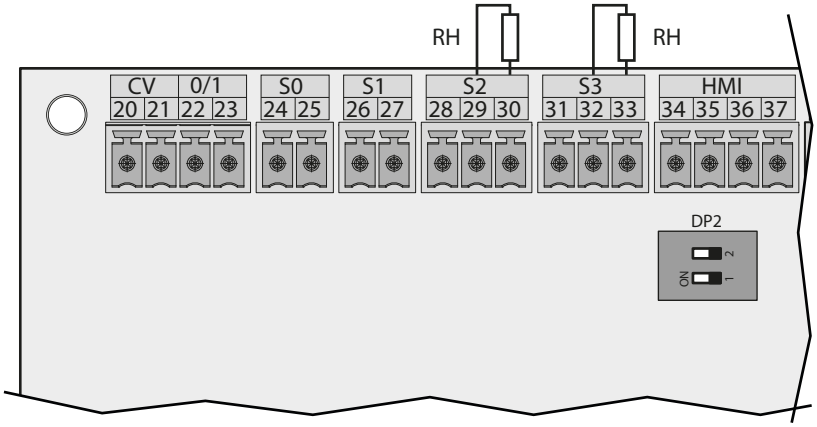


Fig. 61. *Connection for humidity sensor and limit sensor (**CFG** = HUML)*

4.5.6 Temperature sensor connection (CFG = 1T)

Parameter configuration
CFG = 1T
P2 = PTC **P2** = 1000 **P2** = NTC

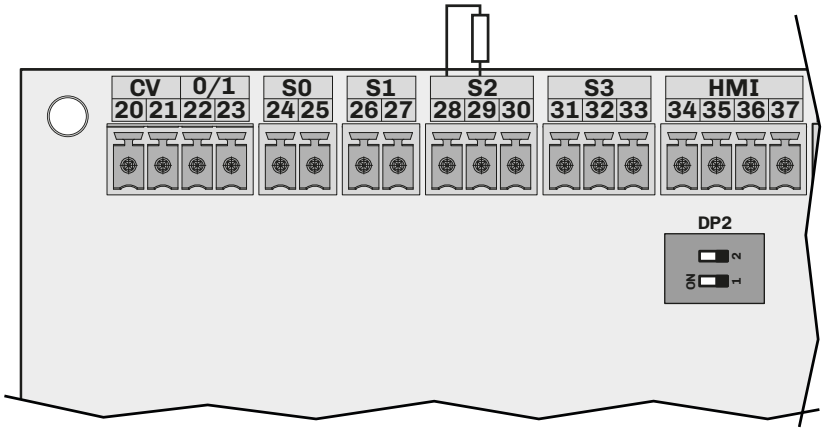


Fig. 62. *Temperature sensor connection (**CFG** = 1T)*

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

Parameter configuration
CFG = 2T
P2 = PTC **P2** = 1000 **P2** = NTC
P7 = PTC **P7** = 1000 **P7** = NTC

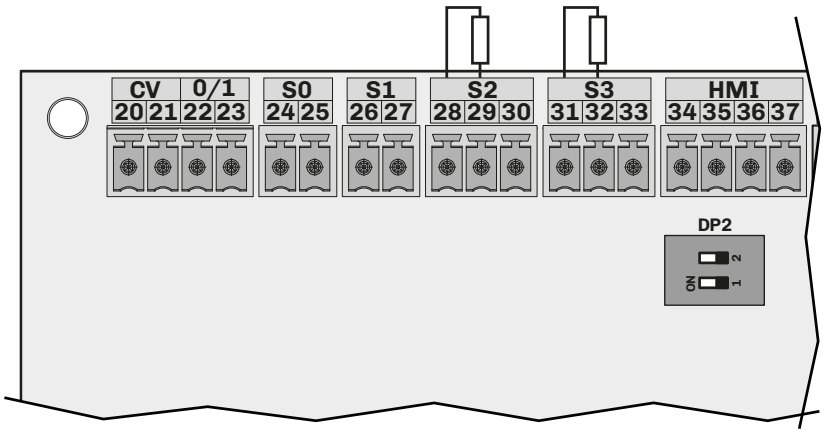


Fig. 63. *Temperature sensor connection (**CFG** = 2T)*

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

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

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

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

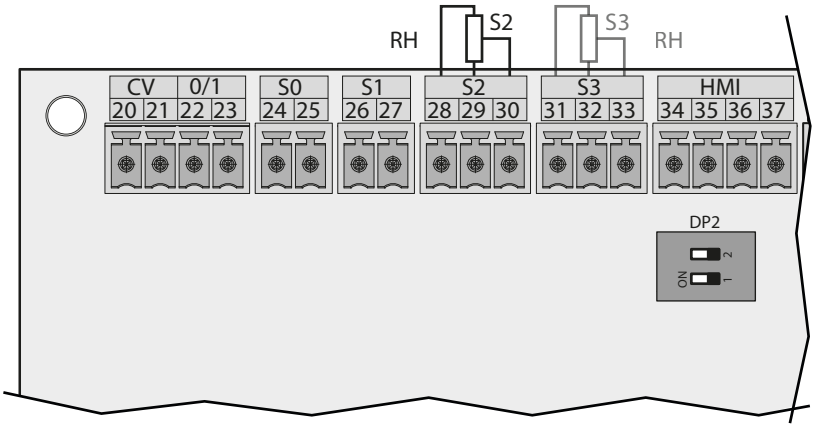


Fig. 64. *Humidity sensor connection 0...5 V*

4.6 Power supply and earth wiring connection

4.6.1 Single-phase models

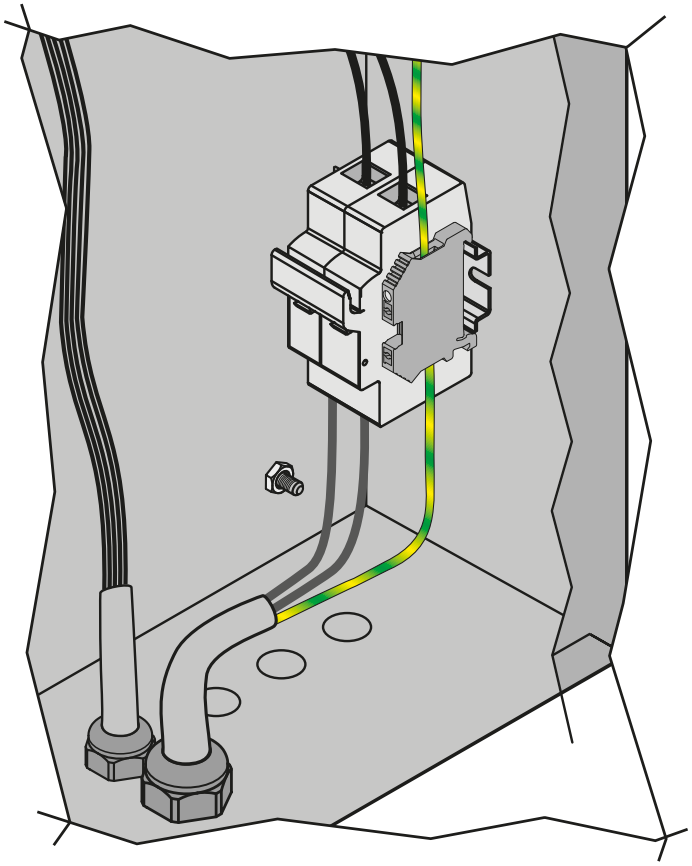


Fig. 65. *Power supply connections - single-phase models*

4.6.2 Three-phase models

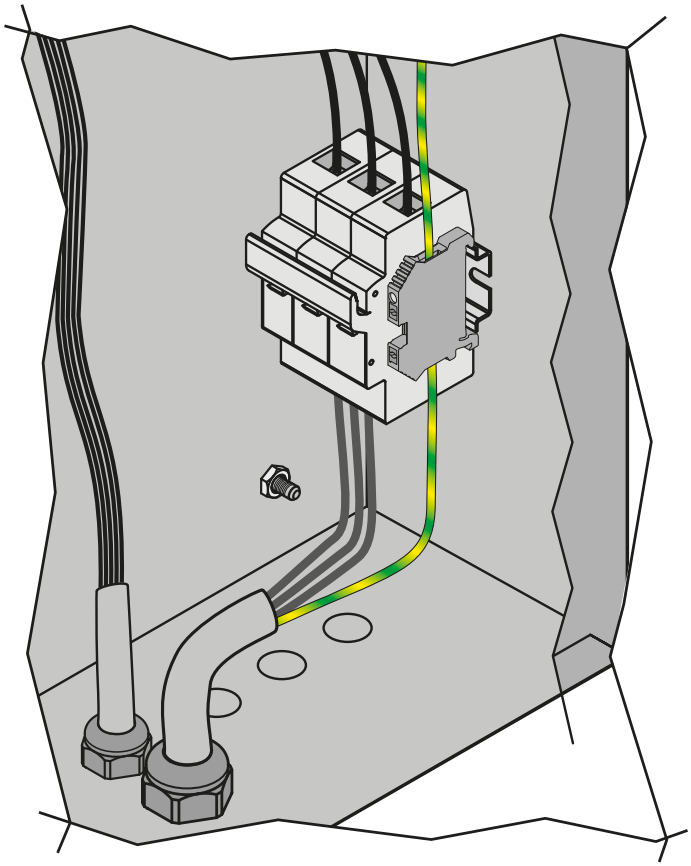
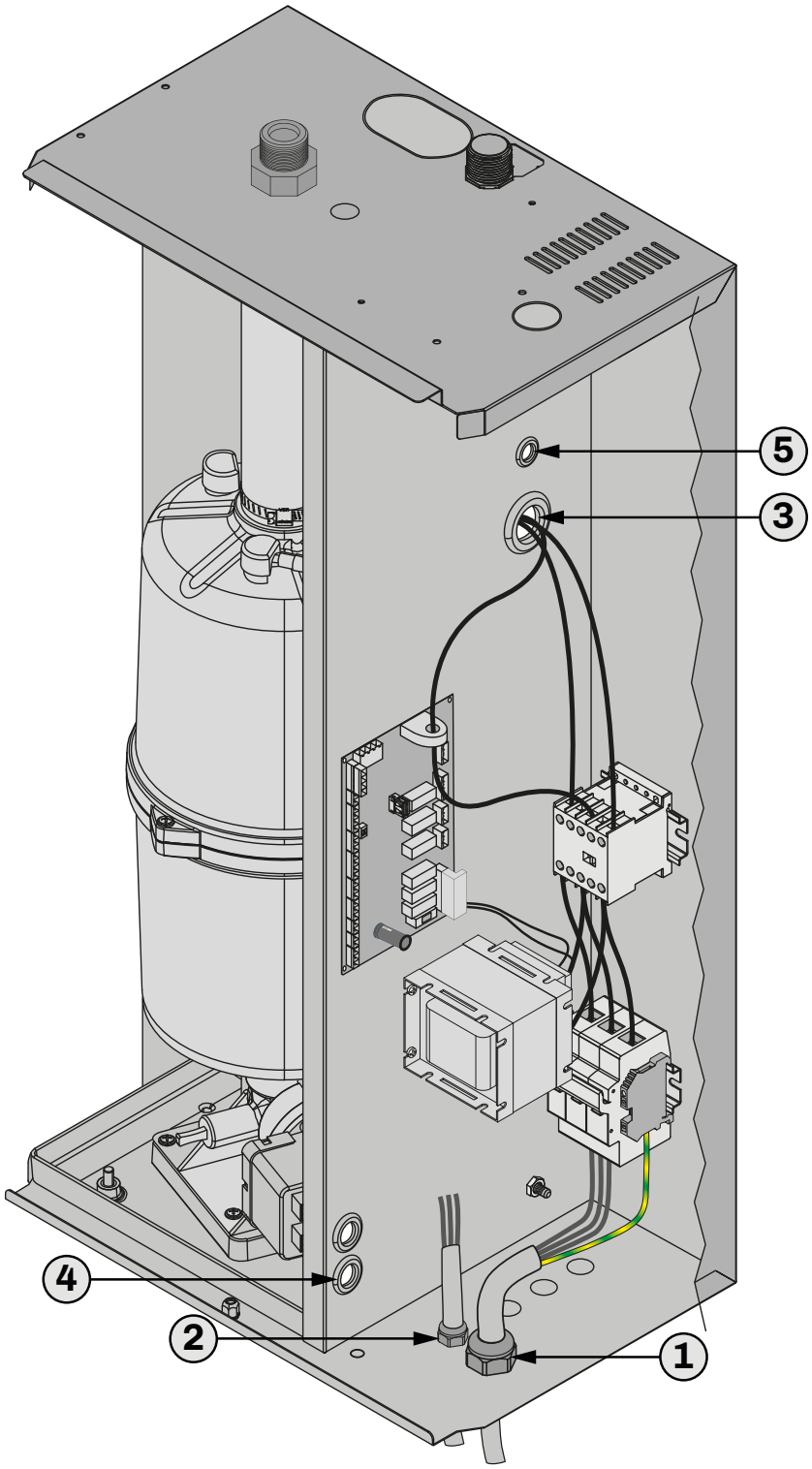


Fig. 66. *Power supply connections - three-phase models*

4.7 Cable glands and cable routing

4.7.1 Single boiler models



Reference models	
EHKT003M2	EHKX003M2
EHKT003T2	EHKX003T2
EHKT003T4	EHKX003T4
EHKT005M2	EHKX005M2
EHKT005T2	EHKX005T2
EHKT005T4	EHKX005T4
EHKT010T2	EHKX010T2
EHKT010T4	EHKX010T4
EHKT015T2	EHKX015T2
EHKT015T4	EHKX015T4
EHKT020T2	EHKX020T2
EHKT020T4	EHKX020T4
EHKT030T4	EHKX030T4
EHKT040T4	EHKX040T4

Fig. 67. *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

4.7.2 Double boiler models

Reference models	
EHKT060T4	EHKX060T4
	EHKX080T4
	EHKX0100T4

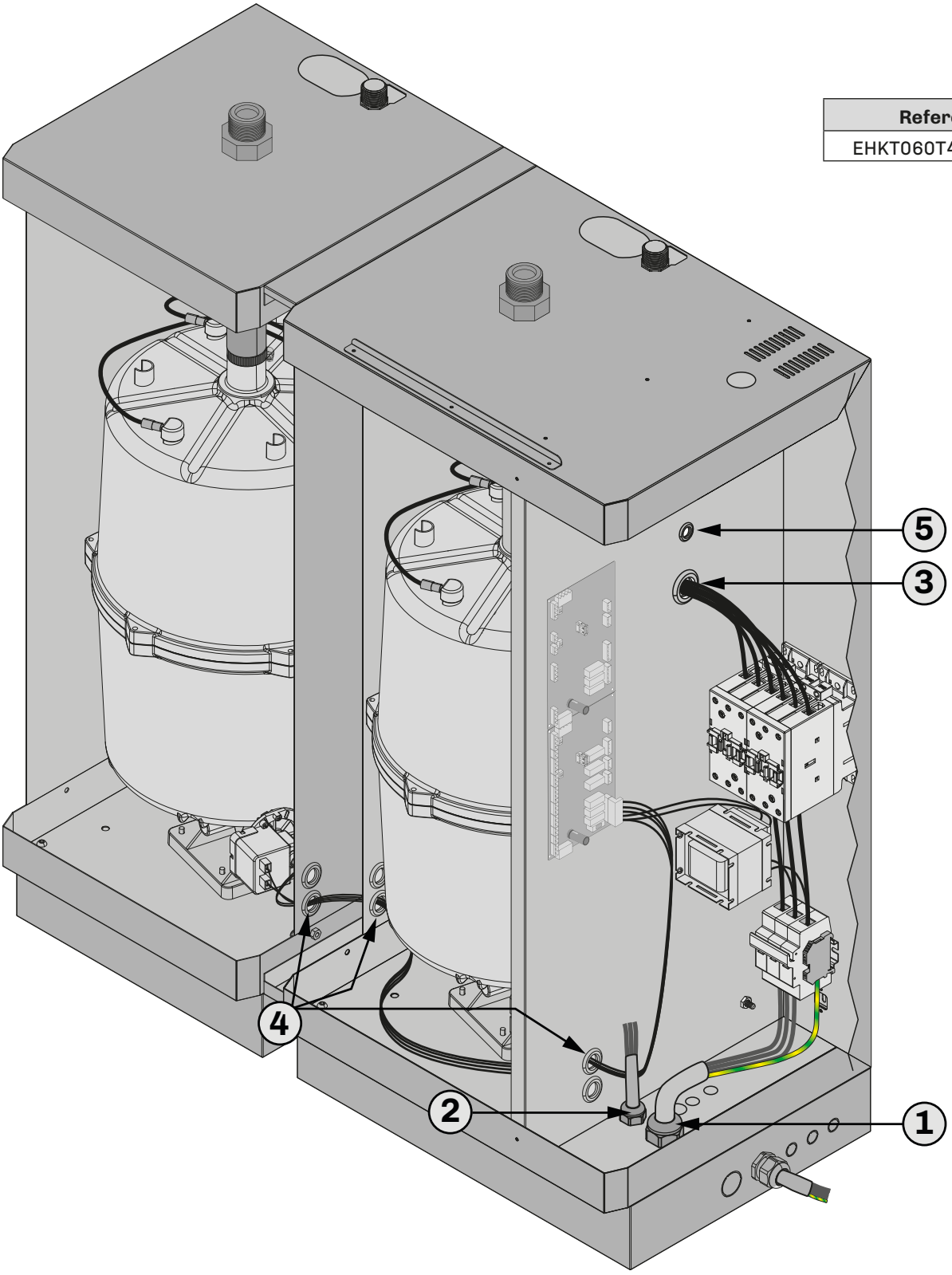


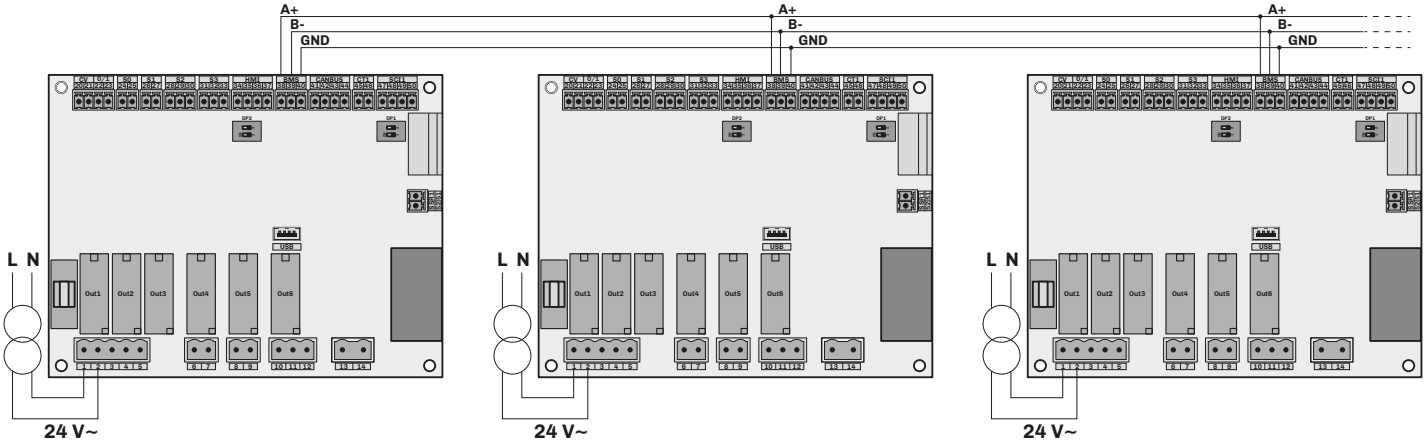
Fig. 68. *Cable glands and cable routing*

Ref.	Description
①	Pull-resistant cable glands 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

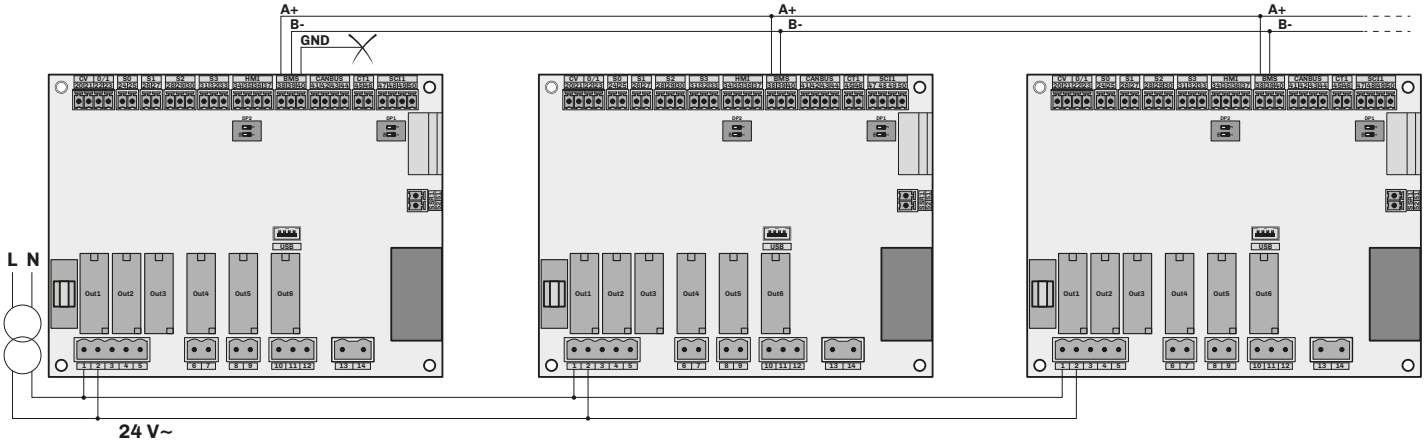


Fig. 69. *Serial line connections*

5. POWER-UP AND START-UP

Chapter content

This chapter contains the following information:

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 50, "3.3 WATER DRAINAGE SYSTEM" ON PAGE 51*** and ***"3.4 STEAM DISTRIBUTION IN THE AHU OR DUCT" ON PAGE 53***);
- Let the water flow through the drain for a few hours before making the final connection;
- Fit the power fuses;
- Connect the humidistat or sensor, depending on the required operation (see ***"4.4 ELECTRICAL CONNECTIONS" ON PAGE 70);***
- Check that the **CV** contact is closed, see ***"4.4 ELECTRICAL CONNECTIONS" ON PAGE 70;***
- Close the humidifier port;
- Activate the isolator installed outside the humidifier and open the water supply source;
- Press the ON/OFF button on the user interface to start the humidifier;
- Set the electrical conductivity of the incoming water (if you do not have the electrical conductivity value of the water, it can be obtained from the website of the drinking water supplier);
- Set the humidity setpoint **SP** to 100%;
- The humidifier starts a boiler loading cycle;
- 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 properly and be maintained and cleaned properly at prescribed intervals, as described in the ***MAINTENANCE*** chapter.

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 50***, ***"3.3 WATER DRAINAGE SYSTEM" ON PAGE 51*** and ***"3.4 STEAM DISTRIBUTION IN THE AHU OR DUCT" ON PAGE 53***);
- Let the water flow through the drain for a few hours before making the final connection;
- Check the power fuses;
- Check the humidistat or sensor connection, depending on the required operation (see ***"4.4 ELECTRICAL CONNECTIONS" ON PAGE 70);***
- Check that the **CV** contact is closed, see ***"4.4 ELECTRICAL CONNECTIONS" ON PAGE 70;***
- Close the humidifier port;
- Activate the isolator installed outside the humidifier and open the water supply source;
- Press the ON/OFF button on the user interface to start the humidifier;
- Set the electrical conductivity of the incoming water;
- Set the 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:

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
	SETPOINT group				
SP1	Humidity setpoint.	%	**r1...r2**	70.0	U
SP2	Humidity limit setpoint.	%	**r11...r12**	85.0	U
SP3	Wellness temperature setpoint.	°C/°F	**r21...r22**	40.0	U
	CONFIGURATION group				
CFG	Operating mode (see ***"4.2 HUMIDITY REGULATION" ON PAGE 130***) **0-1** (0) = ON/OFF from digital input; **PROP** (1) = Proportional input; **HUM** (2) = Humidity sensor; **HUML** (3) = Humidity sensor + limit sensor; **1T** (4) = 1 temperature sensor; **2T** (5) = 2 temperature sensors.	---	0-1 / PROP / HUM / HUML / 1T / 2T	0-1	M
duAL	Dual boiler humidifier operation. **0** = Parallel; **1** = Sequential.	---	0/1	0	U
tyP	Type of boiler installed: **0** = Standard; **1** = Low electrical conductivity (**LC**); **2** = High electrical conductivity (**HC**).	---	0...2	0	M
nTyp	Master/Slave operation. **0** = Disabled; **1** = Parallel; **2** = Rotation; **3** = Balancing.	---	0...3	0	M
nAdr	Networked master/slave module (only if enabled Master/Slave Operation **nTyp** ≠ 0). **1** = Master; **2** = Slave 1; **3** = Slave 2; **4** = Slave 3; **5** = Slave 4.	---	1...5	1	M
nPrE	Master/Slave machine pre-heating enabled. **0** = Disabled; **1** = Enabled.	---	0/1	0	M
ntot	Total number of Master/Slave machines.	num	2...5	2	M
nbAc	Number of Master/Slave backup machines (only for **nTyP** = 2 and/or **nTyP** = 3).	num	1...3	1	M
nHrs	Hours of Master/Slave machine rotation.	hours	10...500	150	M
P0	Type of sensor **S1** temperature of pre-heating + anti-freeze. **---** (0) = Disabled; **PTC** (1) = PTC; **NTC** (2) = NTC.	---	--- / PTC / NTC	---	M
P1	Electrical conductivity of the water.	µS/cm	0...1250	0	M

Par.	Description	MU	Range	Default	PW
P2	Type of regulator/sensor/probe **S2** (regulation input). **PTC** (0) = PTC probe; **1000** (1) = Pt1000 probe; **NTC** (2) = NTC probe; **0-10** (3) = Proportional input 0...10 V; **0-5** (4) = Proportional input 0...5 V; **0.20** (5) = Input 0...20 mA; **4.20** (6) = Input 4...20 mA; **E520** (7) = EVHTP520 proprietary probe.	---	PTC /1 000 / NTC / 0-10 / 0-5 / 0.20 / 4.20 / E520	0-10	M
P3	Minimum value **S2** (if **CFG** = HUM or **CFG** = HUML).	%rH	0...100	0	M
P4	Maximum value **S2** (if **CFG** = HUM or **CFG** = HUML).	%rH	0...100	100	M
P5	Sensor offset **S2** (if **CFG** = HUM or **CFG** = HUML).	%rH	-10...10	0	M
P6	**S1** sensor offset (temperature).	°C/°F	-10.0...10.0	0.0	M
P7	Type of sensor/probe **S3** (limit or mediating probe with input **P2** if temperature). Similar to **P2**.	---	PTC /1 000 / NTC / 0-10 / 0-5 / 0.20 / 4.20 / E520	0-10	M
P8	Minimum value **S3** (if **CFG** = HUML).	%rH	0...100	0	M
P9	Maximum value **S3** (if **CFG** = HUML).	%rH	0...100	100	M
P10	Sensor offset **S3** humidity (if **CFG** = HUML).	%rH	-10...10	0	M
P11	TA sensor K (1000 = current multiplier of 1.000).	---	0...2000	1000	M
P12	Ventilation presence (enables maintenance management based on utility operating hours). **No** = No ventilation; **Yes** = Ventilation present.	---	No/Yes	Yes	M
P13	Sensor offset **S2** temperature (if **CFG** = 1T or **CFG** = 2T).	°C/°F	-10.0...10.0	0.0	M
P14	Sensor offset **S3** temperature (if **CFG** = 1T or **CFG** = 2T).	°C/°F	-10.0...10.0	0.0	M
P20	Electrical conductivity of the water at 100°C (212 °F). **0** = 3000 µS/cm; **1** = 4000 µS/cm; **2** = 5000 µS/cm.	---	0...2	1	M
P21	Temperature unit of measure (changing value means that the temperature parameter limits will need to be reset manually). **0** = °C; **1** = °F.	---	0/1	0	M
P22	Steam production unit of measurement. **0** = kg/h; **1** = lb/h.	---	0/1	0	M
	REGULATION group				
r0	Humidity probe setpoint hysteresis.	%	0...20	2	M
r1	Minimum value for setting humidity setpoint.	%	0...**r2**	20	M
r2	Maximum value for setting humidity setpoint.	%	**r1**...100	95	M
r4	Humidity proportional band.	%	0...50	50	M
r5	Minimum production.	%	20...**r6**	20	M
r6	Maximum production.	%	**r5**...100	75	U
r10	Humidity limit probe setpoint hysteresis.	%	0...20	2	M
r11	Minimum value for setting humidity limit setpoint.	%	0...r12	20	M
r12	Maximum limit setpoint value.	%	**r11**...100	95	M
r20	Temperature proportional band.	°C/°F	0.1... 10.0	5.0	M
r21	Minimum value for setting temperature setpoint.	°C/°F	10.0...**r22**	20.0	M
r22	Maximum value for setting temperature setpoint.	°C/°F	**r21**...60.0	50.0	M
r23	Wellness temperature probe 1 weight.	%	0...100	50	M
r24	Wellness temperature probe 2 weight.	%	0...100	50	M
c0	Number of continuous days of inactivity after which the boiler is emptied. **0** = Function disabled.	days	0...10	2	M
c1	Number of continuous days of activity after which the boiler is emptied. **0** = Function disabled.	days	0...100	14	M
c3	Type of draining for dilution. **0** = Current-based; **1** = Time-based.	---	0/1	0	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

Par.	Description	MU	Range	Default	PW
c8	Preheating set-point for temperature hold. **0** = Disabled. (Not editable if temperature sensor **S1** is disabled).	°C/°F	0.0...90.0	0.0	M
c9	Anti-freezing enable (temperature fixed at 7 °C (44.6 °F)). **0** = Disabled; **1** = Enabled. (Not editable if temperature sensor **S1** is disabled).	---	0/1	0	M
c10	Maximum initial water filling time for water inlet check.	s	50...2000	1200	M
c11	Anti-foam process. **0** = Disabled; **1** = Enabled.	---	0/1	0	M
c14	Time to drain the boiler completely. **(*)** Default according to model, from: **3 kg/h** = 30 s; **5..15 kg/h** = 40 s; **20...100 kg/h** = 180 s.	s	0...240	**(*)**	M
c15	Hours of dual boiler machine rotation.	hours	10...500	150	M
c16	Low conductivity algorithm enable.	---	0/1	0	M
	MAINTENANCE/ALARMS group				
M5	Low humidity alarm threshold. The hysteresis is fixed at 2%. **0** = Disabled.	%	0...100	20	M
M6	High humidity alarm threshold. The hysteresis is fixed at 2%. **0** = Disabled.	%	0...100	95	M
M7	High/low humidity alarm delay. **0** = Disabled.	s	0...999	120	M
M8	Delay in alarm for no production	hours	1...100	48	M
M9	Maximum number of automatic attempts to rearm alarm **AL03** “No water” after which the alarm blocks manual rearming.	num	1...10	3	M
M10	Operating hours threshold for unit maintenance warning.	hx10	100....10000	4000	M
M11	Operating hours threshold for partial boiler maintenance warning.	hx10	100....2000	200	M
M12	Operating hours threshold for full boiler maintenance warning.	hx10	100....2000	1000	M
M13	Operating hours threshold for valve maintenance warning.	hx10	100....2000	1000	M
M14	Operating hours threshold for pump maintenance warning.	hx10	100....2000	1000	M
M15	Operating hours threshold for fan maintenance warning.	hx10	100....2000	1000	M
M20	High temperature alarm threshold. The hysteresis is fixed at 0.5 °C; **0** = Excluded.	°C/°F	0.0...80.0	50.0	M
M21	Maximum number of automatic attempts to rearm the high temperature alarm after which the alarm blocks manual rearming (attempts every hour)	num	1...10	3	M
	COMMUNICATION group				
LA1	Modbus communication protocol address.	num	1...247	247	M
Lb1	Modbus transmission speed (baud rate). **0** = 2400; **1** = 4800; **2** = 9600; **3** = 19200; **4** = 38400.	---	0...4	4	E
LP1	Modbus parity bit. **0** = None; **1** = Odd; **2** = Even.	---	0...2	2	E
LS1	Modbus stop bit. **0** = 1 stop bit; **1** = 2 stop bits.	---	0/1	0	E
	PASSWORD group				
PA1	First level password. **0** = No password	---	-99...999	0	U
PA2	Second level password.	---	-99...999	824	M

7. MODBUS RTU FUNCTIONS AND RESOURCES

Chapter content

This chapter contains the following information:

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.

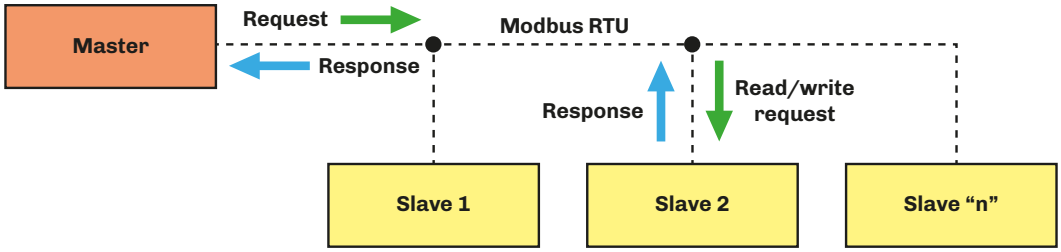


Fig. 70. *Diagram showing message exchange in a Modbus communication*

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. 71. FRAMING OF A MESSAGE USING MODBUS PROTOCOL" ON PAGE 87***) 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.

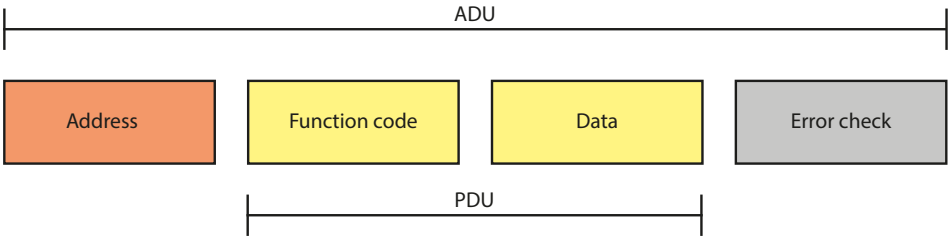


Fig. 71. *Framing of a message using Modbus protocol*

For further information relating to Modbus protocol, visit the official Modbus website: 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
03 (hex 0x03)	Resource reading command
06 (hex 0x06)	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
LA1	Modbus communication protocol address.	---	0...247	247
Lb1	Modbus transmission speed (baud rate). **0** = 2400; **1** = 4800; **2** = 9600; **3** = 19200; **4** = 38400.	---	0...4	4
LP1	Modbus parity bit. **0** = None; **1** = Odd; **2** = Even.	---	0...2	2
LS1	Modbus stop bit. **0** = 1 stop bit; **1** = 2 stop bits.	---	0/1	0

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

- RTU mode;
- Bit: 8 bit

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 64***.

In particular, take care to make the connections correctly, observing the instructions in section ***"4.4 ELECTRICAL CONNECTIONS" ON PAGE 70***

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:
  - **DWORD** = 32 bit
  - **DOUBLE** = 32 bit
  - **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
	SETPOINT group						
SP1	Humidity setpoint.	2001	R/W	SHORT	Y	%	**r1...r2**
SP2	Humidity limit setpoint.	2002	R/W	SHORT	Y	%	**r11...r12**
SP3	Temperature probe setpoint.	2086	R/W	SHORT	Y	°C/°F	**r21...r22**
	CONFIGURATION group						
CFG	Control input selection. **0-1** (0) = ON/OFF from digital input; **PROP** (1) = Proportional input; **HUM** (2) = Humidity sensor; **HUML** (3) = Humidity sensor + limit sensor; **1T** (4) = 1 temperature sensor; **2T** (5) = 2 temperature sensors.	2003	R/W	BYTES	---	---	0...5
duAL	Dual boiler humidifier operation. **0** = Parallel; **1** = Sequential.	2066	R/W	1 BIT	---	---	0/1
tyP	Type of boiler installed. **0** = Standard; **1** = Low electrical conductivity (**LC**); **2** = High electrical conductivity (**HC**).	2005	R/W	2 BIT	---	---	0...2
nTyp	Master/Slave operation. **0** = Disabled; **1** = Parallel; **2** = Rotation; **3** = Balancing.	2073	R/W	BYTES	---	---	0...3
nAdr	Networked master/slave module (only if enabled Master/Slave Operation **nTyp** ≠ 0). **1** = Master; **2** = Slave 1; **3** = Slave 2; **4** = Slave 3; **5** = Slave 4.	2070	R/W	BYTES	---	---	1...5
nPrE	Master/Slave machine pre-heating enabled. **0** = Disabled; **1** = Enabled.	2074	R/W	1BIT	---	---	0/1
ntot	Total number of Master/Slave machines.	2072	R/W	3 BIT	---	num	2...5
nbAc	Number of Master/Slave backup machines.	2071	R/W	2BIT	---	num	1...3
nHrs	Hours of Master/Slave machine rotation.	2075	R/W	BYTES	---	hours	10...500
P0	S1 sensor type (temperature). **---** (0) = Disabled; **PTC** (1) = PTC; **NTC** (2) = NTC.	2076	R/W	3 BIT	---	---	0...2
P1	Electrical conductivity of the water.	2006	R/W	WORD	---	µS/cm	0...1250
P2	**S2** sensor type (humidity 1 / proportional input). **PTC** (0) = PTC probe; **1000** (1) = Pt1000 probe; **NTC** (2) = NTC probe; **0-10** (3) = Proportional input 0...10 V; **0-5** (4) = Proportional input 0...5 V; **0.20** (5) = Input 0...20 mA; **4.20** (6) = Input 4...20 mA; **E520** (7) = EVHTP520 proprietary probe.	2007	R/W	BYTES	---	---	0...7
P3	Minimum value **S2** (if **CFG** = HUM or **CFG** = HUML).	2008	R/W	BYTES	---	%rH	0...100
P4	Maximum value **S2** (if **CFG** = HUM or **CFG** = HUML).	2009	R/W	BYTES	---	%rH	0...100
P5	Sensor offset **S2** (if **CFG** = HUM or **CFG** = HUML).	2010	R/W	BYTES	Y	%rH	-10...10
P6	**S1** sensor offset (temperature).	2011	R/W	SHORT	Y	°C/°F	-10.0...10.0
P7	**S3** sensor type (humidity 2 limit). Similar to **P2**.	2012	R/W	BYTES	---	---	0...7

Par.	Description	Val. Adr.	R/W	DATA SIZE	CPL	MU	Range
P8	Minimum value **S3** (if **CFG** = HUML).	2013	R/W	BYTES	---	%rH	0...100
P9	Maximum value **S3** (if **CFG** = HUML).	2014	R/W	BYTES	---	%rH	0...100
P10	Sensor offset **S3** (if **CFG** = HUML).	2015	R/W	SHORT	Y	%rH	-10...10
P12	Ventilation presence (enables maintenance management based on utility operating hours).	2077	R/W	1 BIT	---	---	0/1
P13	Sensor offset **S2** temperature (if **CFG** = 1T or **CFG** = 2T).	2078	R/W	SHORT	Y	°C/°F	-10.0...10.0
P14	Sensor offset **S3** temperature (if **CFG** = 1T or **CFG** = 2T).	2079	R/W	SHORT	Y	°C/°F	-10.0...10.0
P20	Electrical conductivity of the water at 100°C (212°F). **0** = 3000 µS/cm; **1** = 4000 µS/cm; **2** = 5000 µS/cm.	2016	R/W	3 BIT	---	---	0...2
P21	Temperature unit of measure (changing value means that the temperature parameter limits will need to be reset manually). **0** = °C; **1** = °F.	2017	R/W	1 BIT	---	---	0/1
P22	Steam production unit of measurement. **0** = kg/h; **1** = lb/h.	2080	R/W	1 BIT	---	---	0/1
	REGULATION group						
r0	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...100
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. **0** = Current-based; **1** = Time-based.	2030	R/W	1 BIT	---	---	0/1
c4	Draining duration for dilution (if **C3** = 1).	2031	R/W	WORD	---	s	0...9999
c5	Time between two dilution draining events (if **C3** = 1).	2032	R/W	WORD	---	min	30...999
c6	Draining value for dilution (if **C3** = 0).	2033	R/W	BYTES	---	%	20...80
c8	Preheating set-point for temperature hold. **0** = Disabled.	2034	R/W	BYTES	---	°C/°F	0.0...90.0
c9	Anti-freezing enable (temperature fixed at 7 °C (44.6 °F)). **0** = Disabled; **1** = Enabled. (Not editable if temperature sensor **S1** is disabled).	2035	R/W	1 BIT	---	---	0/1
c10	Maximum initial water filling time for water inlet check, depending on the model.	2036	R/W	WORD	---	s	50...2000
c11	Anti-foam process. **0** = Disabled; **1** = Enabled.	2037	R/W	1 BIT	---	---	0/1
c12	Time to detect foam after lowering the current by 30%.	2038	R/W	WORD	---	s	10...300
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	BYTES	---	s	0...240
c15	Hours of dual boiler machine rotation.	2065	R/W	WORD	---	hours	10...500
c16	Low conductivity algorithm enable.	1323	R/W	1 BIT	---	---	0/1
	MAINTENANCE/ALARMS group						
M5	Low humidity alarm threshold. The hysteresis is fixed at 2%. **0** = Disabled.	2041	R/W	BYTES	---	%	0...100
M6	High humidity alarm threshold. The hysteresis is fixed at 2%. **0** = Disabled.	2042	R/W	BYTES	---	%	0...100

Par.	Description	Val. Adr.	R/W	DATA SIZE	CPL	MU	Range
M7	High/low humidity alarm delay. **0** = Disabled.	2043	R/W	WORD	---	s	0...999
M8	Delay in alarm for no production.	2064	R/W	BYTES	---	h	1...100
M9	Maximum number of automatic attempts to rearm alarm **AL03** "No water" after which the alarm blocks manual rearming	2067	R/W	BYTES	---	num	1...10
M10	Operating hours threshold for unit maintenance warning.	2044 ... 2045	R/W	DWORD	---	hours x10	100....10000
M11	Operating hours threshold for partial boiler maintenance warning.	2046 ... 2047	R/W	DWORD	---	hours x10	100....2000
M12	Operating hours threshold for full boiler maintenance warning.	2048 ... 2049	R/W	DWORD	---	hours x10	100....2000
M13	Operating hours threshold for valve maintenance warning.	2050 ... 2051	R/W	DWORD	---	hours x10	100....2000
M14	Operating hours threshold for pump maintenance warning.	2052 ... 2053	R/W	DWORD	---	hours x10	100....2000
M15	Operating hours threshold for fan maintenance warning.	2054 ... 2055	R/W	DWORD	---	hours x10	100....2000
M20	High temperature alarm threshold. The hysteresis is fixed at 3 °C (6 °F); **0** = Excluded.	2068	R/W	BYTES	---	°C/°F	0.0...80.0
M21	Maximum number of automatic attempts to rearm the high temperature alarm after which the alarm blocks manual rearming (attempts every hour)	2069	R/W	BYTES	---	num	1...10
	COMMUNICATION group						
LA1	Modbus communication protocol address.	2056	R/W	BYTES	---	num	1...247
Lb1	Modbus transmission speed (baud rate). **0** = 2400; **1** = 4800; **2** = 9600; **3** = 19200; **4** = 38400.	2057	R/W	BYTES	---	---	0...4
LP1	Modbus parity bit. **0** = None; **1** = Odd; **2** = Even.	2058	R/W	BYTES	---	---	0...2
LS1	Modbus stop bit. **0** = 1 stop bit; **1** = 2 stop bits.	2059	R/W	1 BIT	---	---	0/1
	PASSWORD group						
PA1	First level password. **0** = No password.	2061	R/W	SHORT	Y	---	-99...999
PA2	Second level password.	2062	R/W	SHORT	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_ls	Level sensor input status.	260	---	R	1 BIT	---	---	0/1
DO1_EV1	Inlet solenoid valve output status.	385	---	R	1 BIT	---	---	0/1
DO2_DP1	Inlet pump output status.	386	---	R	1 BIT	---	---	0/1
DO3_G1	Steam generation output status.	387	---	R	1 BIT	---	---	0/1
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	SHORT	Y	°C/°F	-3276.8... 3276.7
AI_Humidity	Humidity sensor **S2** value.	517	---	R	SHORT	Y	%rH	-32768... 32767
AI_ Humidity_L	Humidity limit sensor **S3** value.	518	---	R	SHORT	Y	%rH	-32768... 32767
AI_Request	Proportional input **S2** value.	519	---	R	SHORT	Y	%	-32768... 32767
AI_Current	Current sensor **CT1** value.	520	---	R	SHORT	Y	A	-327.68... 327.67
PackedAlarm1	Status of warning **W01**.	769	0	R	1 BIT	---	---	0/1
PackedAlarm1	Status of alarm **AL01**.	769	1	R	1 BIT	---	---	0/1
PackedAlarm1	Status of warning **W02**.	769	2	R	1 BIT	---	---	0/1
PackedAlarm1	Status of alarm **AL02**.	769	3	R	1 BIT	---	---	0/1
PackedAlarm1	Status of alarm **AL03**.	769	4	R	1 BIT	---	---	0/1
PackedAlarm1	Status of warning **W04**.	769	5	R	1 BIT	---	---	0/1
PackedAlarm1	Status of warning **W05**.	769	6	R	1 BIT	---	---	0/1
PackedAlarm1	Status of warning **W06**.	769	7	R	1 BIT	---	---	0/1
PackedAlarm1	Status of alarm **AL07**.	769	8	R	1 BIT	---	---	0/1
PackedAlarm1	Status of warning **W08**.	769	9	R	1 BIT	---	---	0/1
PackedAlarm1	Status of alarm **AL08**.	769	10	R	1 BIT	---	---	0/1
PackedAlarm1	Status of alarm **AL09**.	769	11	R	1 BIT	---	---	0/1
PackedAlarm1	Status of alarm **AL10**.	769	12	R	1 BIT	---	---	0/1
PackedAlarm1	Status of alarm **AL11**.	769	13	R	1 BIT	---	---	0/1
PackedAlarm1	Status of warning **W12**.	769	14	R	1 BIT	---	---	0/1
PackedAlarm1	Status of warning **W13**.	769	15	R	1 BIT	---	---	0/1
PackedAlarm2	Status of alarm **AL14**.	770	0	R	1 BIT	---	---	0/1
PackedAlarm2	Status of alarm **AL15**.	770	1	R	1 BIT	---	---	0/1
PackedAlarm2	Status of alarm **AL16**.	770	2	R	1 BIT	---	---	0/1
PackedAlarm2	Status of alarm **AL17**.	770	3	R	1 BIT	---	---	0/1
PackedAlarm2	Status of alarm **AL18**.	770	4	R	1 BIT	---	---	0/1
PackedAlarm2	Status of alarm **AL19**.	770	5	R	1 BIT	---	---	0/1
PackedAlarm2	Status of alarm **AL20**.	770	6	R	1 BIT	---	---	0/1
PackedAlarm2	Status of alarm **AL21**.	770	7	R	1 BIT	---	---	0/1
PackedAlarm2	Status of alarm **AL22**.	770	8	R	1 BIT	---	---	0/1
PackedAlarm2	Status of alarm **AL23**.	770	9	R	1 BIT	---	---	0/1
PackedAlarm2	Status of alarm **AL24**.	770	10	R	1 BIT	---	---	0/1
PackedAlarm2	Status of alarm **AL25**.	770	11	R	1 BIT	---	---	0/1
PackedAlarm2	Status of alarm **AL26**.	770	12	R	1 BIT	---	---	0/1
PackedAlarm2	Status of alarm **AL27**.	770	13	R	1 BIT	---	---	0/1
PackedAlarm2	Status of alarm **AL28**.	770	14	R	1 BIT	---	---	0/1

Code	Description	Val. Adr.	Filter value	R/W	DATA SIZE	CPL	MU	Range
PackedAlarm2	Status of warning **W29**.	770	15	R	1 BIT	---	---	0/1
PackedAlarm3	Status of alarm **AL29**.	771	0	R	1 BIT	---	---	0/1
PackedAlarm3	Status of warning **W30**.	771	1	R	1 BIT	---	---	0/1
PackedAlarm3	Status of alarm **AL30**.	771	2	R	1 BIT	---	---	0/1
PackedAlarm3	Status of alarm **AL31**.	771	3	R	1 BIT	---	---	0/1
PackedAlarm3	Status of warning **W32**.	771	4	R	1 BIT	---	---	0/1
PackedAlarm3	Status of warning **W33**.	771	5	R	1 BIT	---	---	0/1
PackedAlarm3	Status of warning **W34**.	771	6	R	1 BIT	---	---	0/1
PackedAlarm3	Status of warning **W35**.	771	7	R	1 BIT	---	---	0/1
PackedAlarm3	Status of alarm **AL35**.	771	8	R	1 BIT	---	---	0/1
PackedAlarm3	Status of alarm **AL36**.	771	9	R	1 BIT	---	---	0/1
PackedAlarm3	Status of alarm **AL37**.	771	10	R	1 BIT	---	---	0/1
PackedAlarm3	Status of alarm **AL38**.	771	11	R	1 BIT	---	---	0/1
BMS_AL1	**AL01** manual reset.	773	---	R/W	1 BIT	---	---	0/1
BMS_AL3	**AL03** manual reset.	774	---	R/W	1 BIT	---	---	0/1
BMS_W04	**W04** manual reset.	775	---	R/W	1 BIT	---	---	0/1
BMS_AL22	**AL22** manual reset.	776	---	R/W	1 BIT	---	---	0/1
BMS_AL29_B2	**AL29** manual reset.	777	---	R/W	1 BIT	---	---	0/1
BMS_AL31_B2	**AL31** manual reset.	778	---	R/W	1 BIT	---	---	0/1
BMS_W32_B2	**W32** manual reset.	779	---	R/W	1 BIT	---	---	0/1
manWash	Manual draining command (OFF/ON).	1282	---	R/W	1 BIT	---	---	0/1
GeneralAlarm	General alarm status (OFF/ON).	1283	---	R/W	1 BIT	---	---	0/1
unitOn	Unit status (OFF/ON).	1284	---	R/W	1 BIT	---	---	0/1
---	Restore default parameters command	1285	---	R/W	1 BIT	---	---	0/1
HoursService	Hours of humidifier operation (LOW).(*)	1286	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
	Hours of humidifier operation (HIGH).(*)	1287	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
HoursBoilerP	Partial hours of boiler operation. (LOW).(*)	1288	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
	Partial hours of boiler operation. (HIGH).(*)	1289	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
HoursBoilerT	Total hours of boiler operation (hours x 10) (LOW).(*)	1290	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
	Total hours of boiler operation (hours x 10). (HIGH).(*)	1291	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
HoursEV1	Hours of water inlet solenoid valve operation (hours x 10) (LOW).(*)	1292	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
	Hours of water inlet solenoid valve operation (hours x 10) (HIGH).(*)	1293	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
HoursPump	Hours of outlet pump operation (hours x 10) (LOW).(*)	1294	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
	Hours of outlet pump operation (hours x 10). (HIGH).(*)	1295	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
HoursFan	Hours of fan operation (hours x 10) (LOW).(*)	1296	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
	Hours of fan operation (hours x 10). (HIGH).(*)	1297	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
curr100	Nominal current.	1298	---	R/W	WORD	---	A	0.00...655.35
tevap	Evaporation time.	1299	---	R/W	WORD	---	s	0.0 ... 6553.5
actProd	Actual steam production.	1303	---	R/W	SHORT	Y	kg/h	-3276.8 ... 3276.7
limH	Humidity limit sensor status (ON/OFF).	1304	---	R/W	1 BIT	---	---	0/1

Code	Description	Val. Adr.	Filter value	R/W	DATA SIZE	CPL	MU	Range
HoursAct	Hours of continuous activity. (LOW).(*)	1316	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
	Hours of continuous activity. (HIGH).(*)	1317	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
HoursNotAct	Hours of continuous inactivity. (LOW).(*)	1318	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
	Hours of continuous inactivity. (HIGH).(*)	1319	---	R/W	DWORD	---	h x 10	0.0 ... 429496729.5
MBS_SwEn	On/Off command from BMS.	1922	---	R/W	1 BIT	---	---	0/1

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

MAINTENANCE SECTION

Section content

This section contains the following information:

1. MAINTENANCE USER INTERFACE

Chapter content

This chapter contains the following information:

1.1 EHKT user interface

1.1.1 Maintenance menu

To access the maintenance menu:

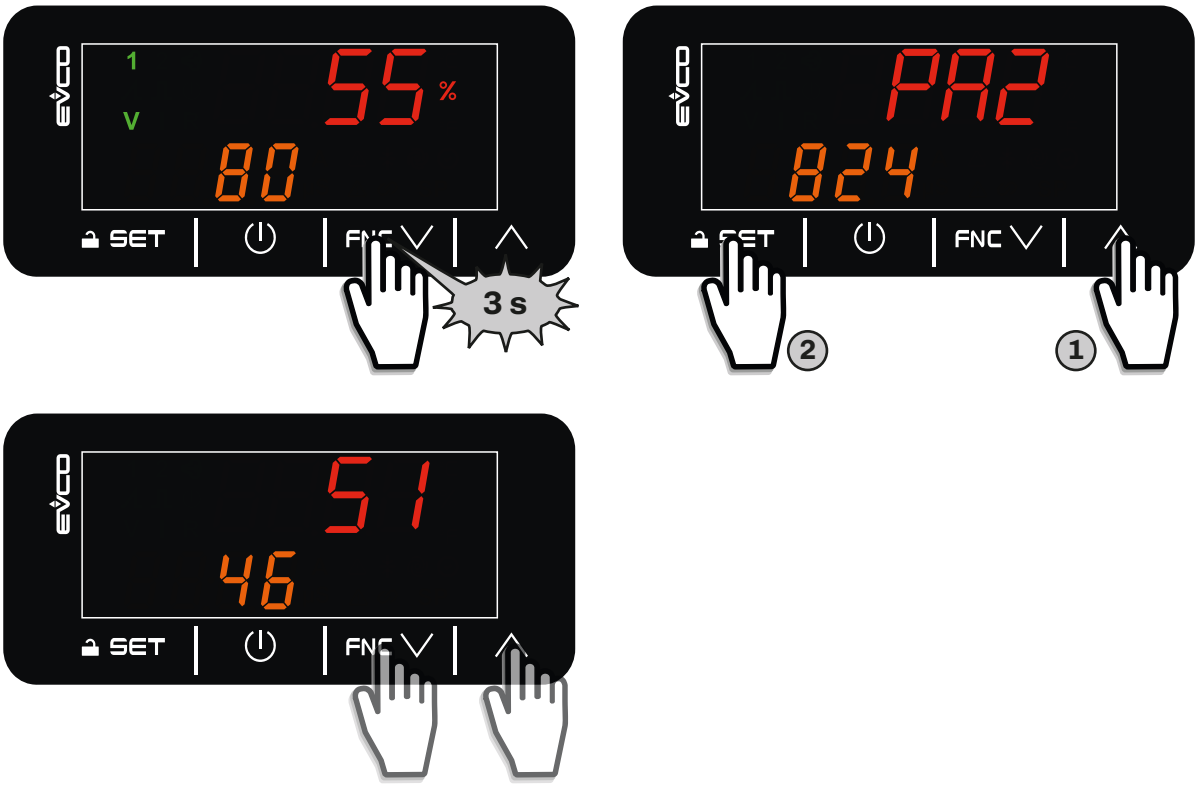


Fig. 72. *Maintenance menu*

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

Top line	Bottom line	Description
SP1	Setpoint **SP1** value	Displays the value of setpoint **SP1**.
SP2	Setpoint **SP2** value	Displays the value of setpoint **SP2**.
CFG	Set operating mode	Sets the operating mode See ***"6.1 TABLE OF ADJUSTMENT PARAMETERS" ON PAGE 83***
c0...c11	Parameter value	See ***"6.1 TABLE OF ADJUSTMENT PARAMETERS" ON PAGE 83***
S1	Sensor S1 value	Displays the value read by sensor S1 if it is connected.
S2	Sensor S2 value	Displays the value read by sensor S2 if it is connected.
S3	Sensor S3 value	Displays the value read by sensor S3 if it is connected.
tA	Sensor tA value	Displays the value read by sensor CT1 if it is connected.
CU	**CV** input status.	Displays the status of the **CV** digital input (fan enable) if it is connected. **OFF** = **CV** input closed; **On** = **CV** input open.
OI	**0/1** input status	Displays the status of the **0/1** digital input (remote ON/OFF) if it is connected. **OFF** = **0/1** input closed; **On** = **0/1** input open.
SO	**S0** input status	Displays the status of the **S0** digital input (remote humidistat enable) if it is connected. **OFF** = **S0** input closed; **On** = **S0** input open.
LS	**LS1** input status	Displays the status of the **LS1** digital input (level sensor) if it is connected. **OFF** = **LS1** input closed; **On** = **LS1** input open.
oEU	Inlet solenoid valve output status	Displays the status of the inlet solenoid valve. **OFF** = Inlet solenoid valve output OFF; **ON** = Inlet solenoid valve output ON.
oP	Outlet pump status	Displays the status of the outlet pump. **OFF** = Outlet pump output OFF; **ON** = Outlet pump output ON.

Top line	Bottom line	Description
oS	Steam generation contactor status	Displays the status of the steam generator contactor. **OFF** = Steam generator electrode output OFF; **ON** = Steam generator electrode output ON.
od	Dehumidification enable output status	Displays the status of the dehumidification enable output. **OFF** = Dehumidification enable output OFF; **ON** = Dehumidification enable output ON.
oF	Fan output status	Displays the status of the fan digital output. **OFF** = Fan output OFF; **ON** = Fan output ON.
oAL	General alarm output status	Displays the status of the general alarm output. **OFF** = General alarm output OFF; **ON** = 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 SET key, enter password **PA2** using the FNC ∨ or ∧ keys, and tap SET to confirm.
MAnu	Output forcing page	Enters the output forcing page. To access the page: Double tap the SET key, enter password **PA2** using the FNC ∨ or ∧ keys, and tap SET to confirm.

1.1.2 Displaying/resetting the operating hours

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

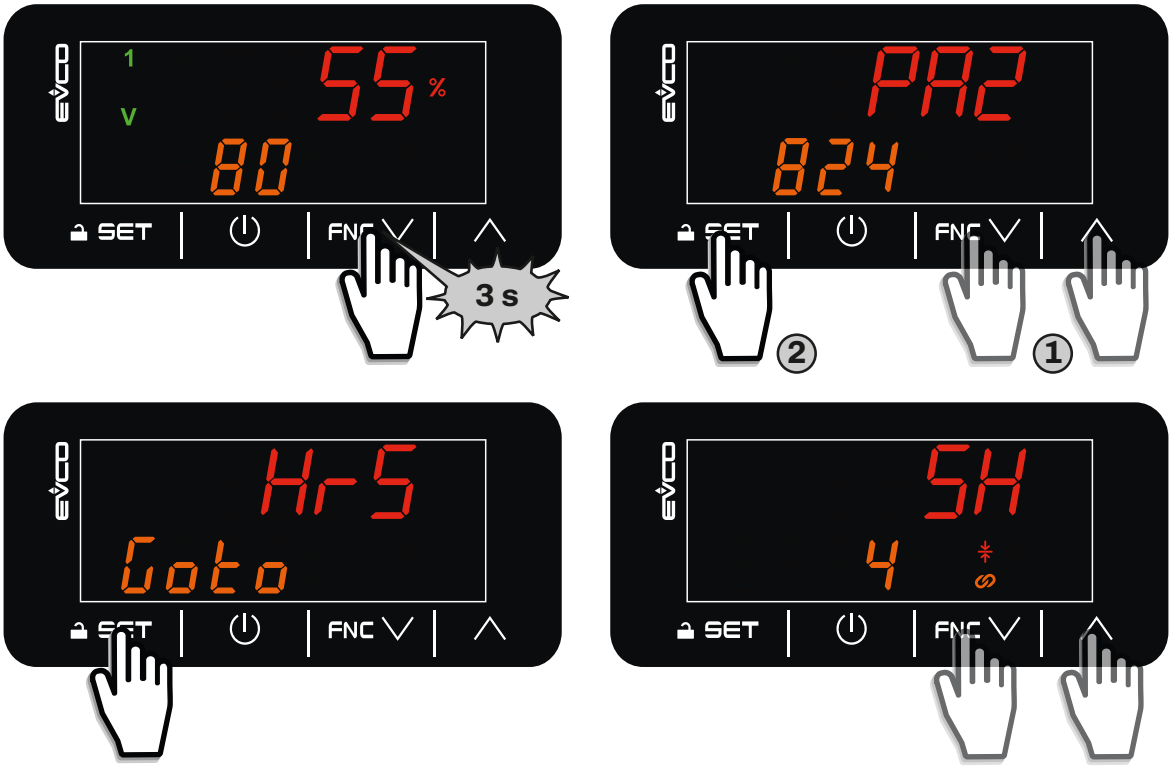


Fig. 73. *Displaying the operating hours*

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:

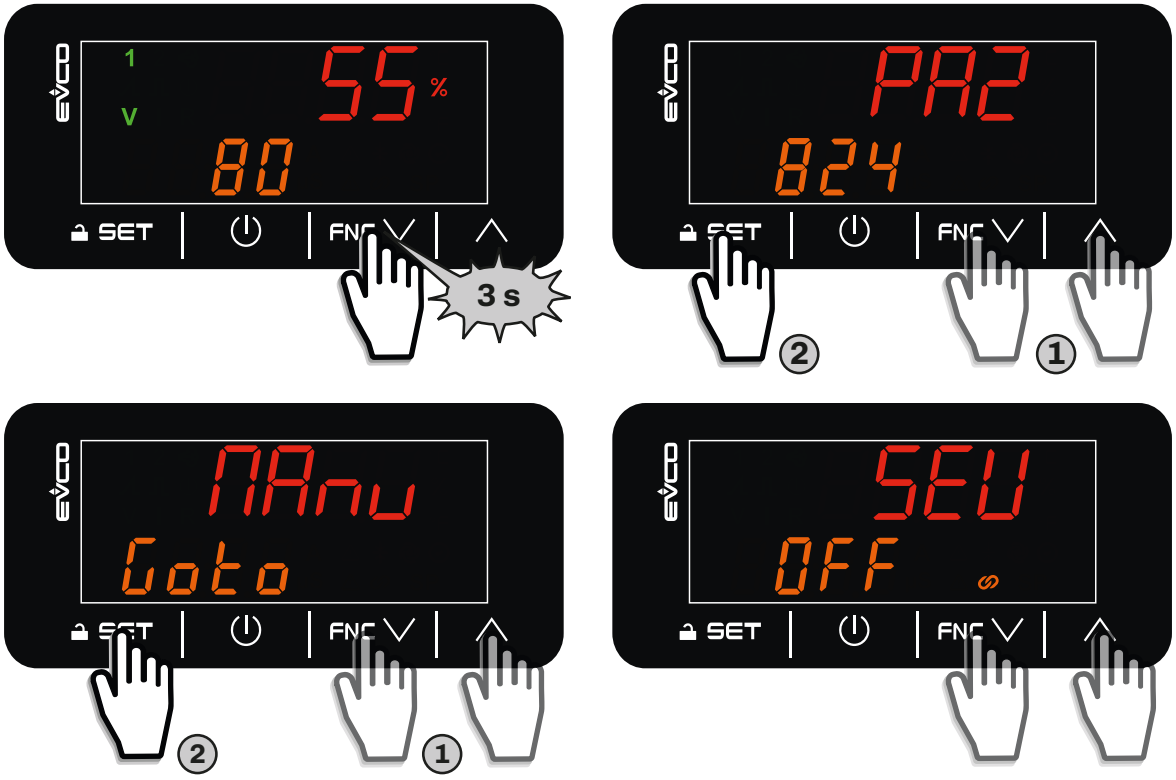


Fig. 74. *Output functional test*

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. **OFF** = Inlet solenoid valve output forced OFF; **ON** = Inlet solenoid valve output forced ON.
SP	Outlet pump output status	Forces the outlet pump output on/off. **OFF** = Outlet pump output forced OFF; **ON** = Outlet pump output forced ON.
SS	Steam generation contactor status	Forces the steam generation contactor on/off. **OFF** = Steam generator electrode output forced OFF; **ON** = Steam generator electrode output forced ON.
Sd	Dehumidification enable output status	Forces the dehumidifier enable output on/off. **OFF** = Dehumidification enable output forced OFF; **ON** = Dehumidification enable output forced ON.
SF	Fan output status	Forces the fan output on/off. **OFF** = Fan output forced OFF; **ON** = Fan output forced ON.
SAL	General alarm output status	Forces the general alarm output on/off. **OFF** = General alarm output forced OFF; **ON** = General alarm output forced ON.

1.2 EHKX user interface

1.2.1 Maintenance menu

To access the maintenance menu:

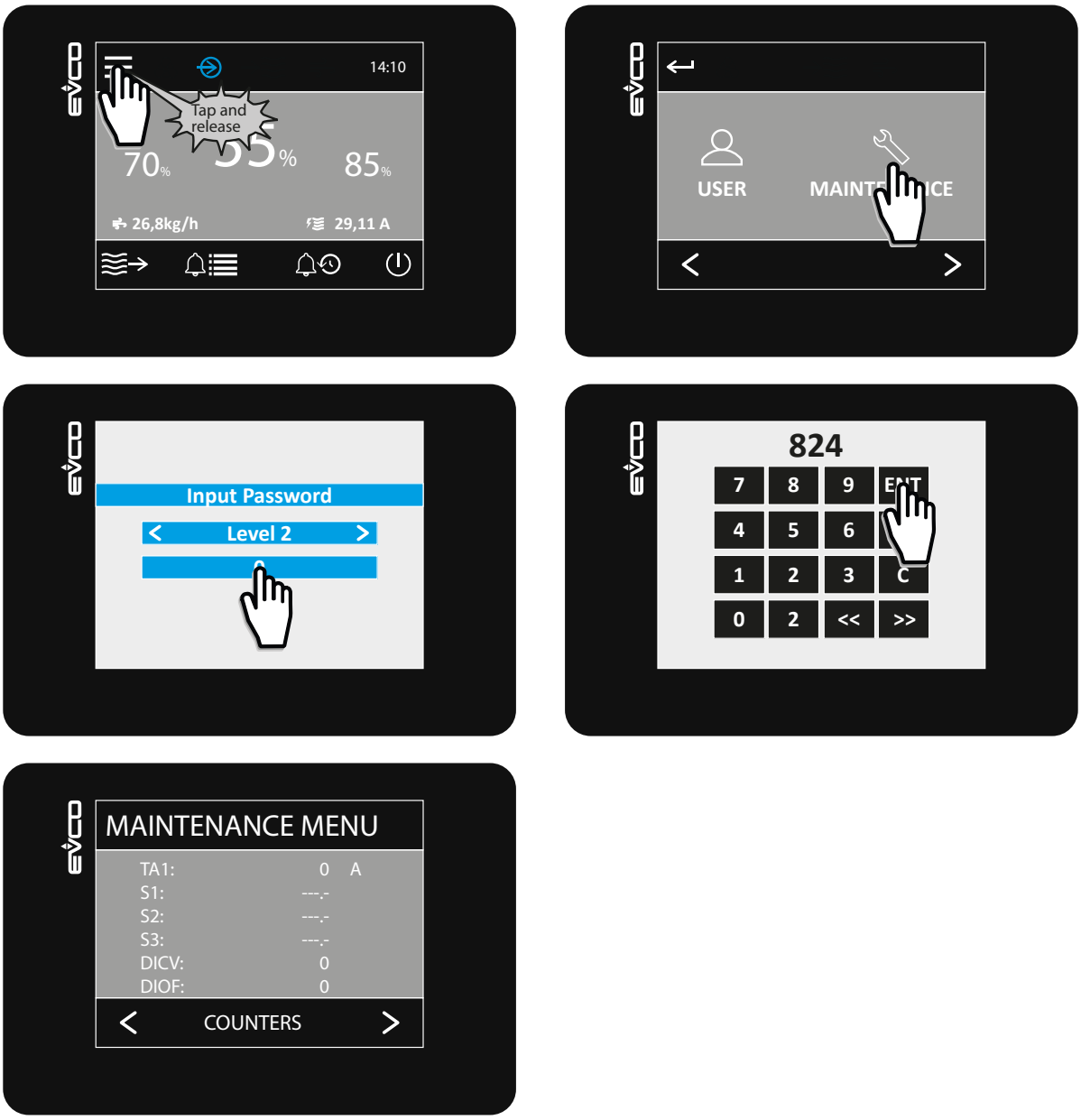


Fig. 75. *Maintenance menu*

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

Menu option	Description
CFG	Sets the operating mode. See ***"6.1 TABLE OF ADJUSTMENT PARAMETERS" ON PAGE 83***
c0...c11	See ***"6.1 TABLE OF ADJUSTMENT PARAMETERS" ON PAGE 83***
r0...r12	See ***"6.1 TABLE OF ADJUSTMENT PARAMETERS" ON PAGE 83***
TA1	Displays the value read by sensor CT1 if it is connected.
S1	Displays the value read by sensor S1 if it is connected.
S2	Displays the value read by sensor S2 if it is connected.
S3	Displays the value read by sensor S3 if it is connected.
DICV	Displays the status of the **CV** digital input (fan enable) if it is connected. **OFF** = **CV** input closed; **On** = **CV** input open.

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

1.2.2 Displaying/resetting the operating hours

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

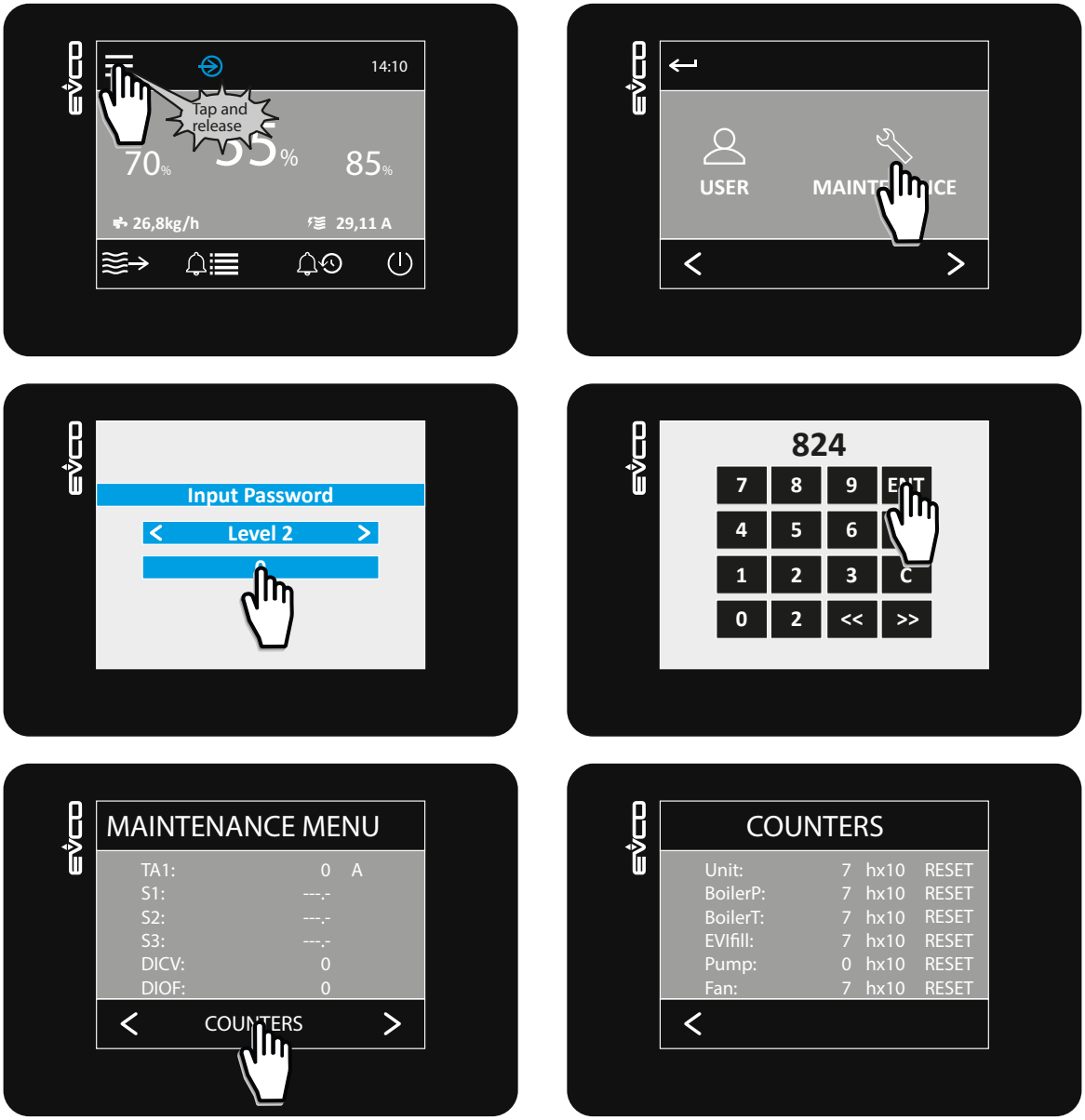


Fig. 76. *Displaying the operating hours*

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

Menu option	Description
Unit	Displays the hours of humidifier operation.
BoilerP	Displays the partial hours of boiler operation.
BoilerT	Displays the total hours of boiler operation.
EVIfill	Displays the hours of outlet solenoid valve operation.
Pump	Displays the hours of outlet pump operation.
Fan	Displays the 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:

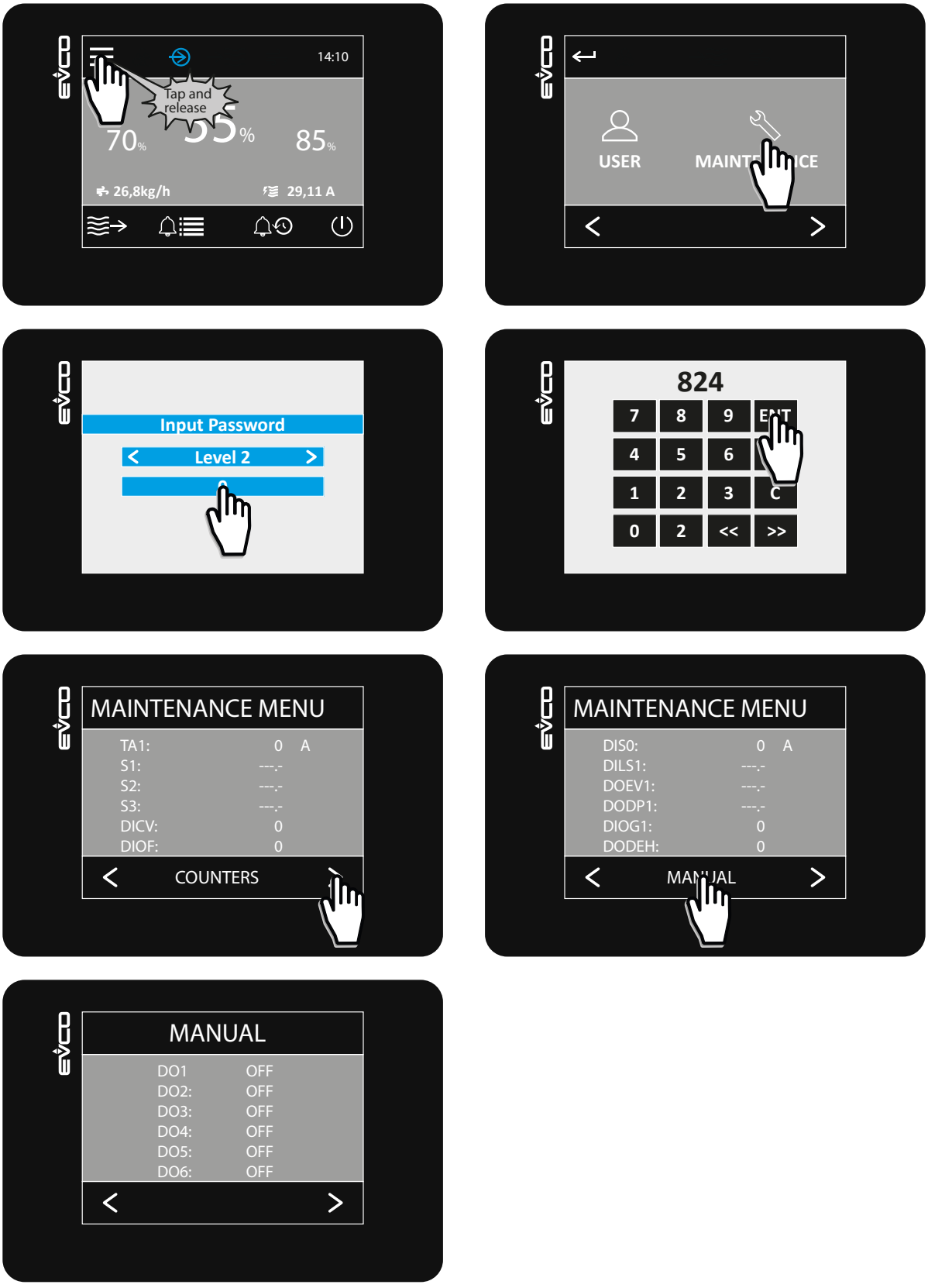


Fig. 77. *Displaying the operating hours*

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

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

2. DIMENSIONS AND MECHANICAL INSTALLATION

Chapter content

This chapter contains the following information:

2.1 Dimensions and weights

2.1.1 Models EHK•003 ... EHK•015

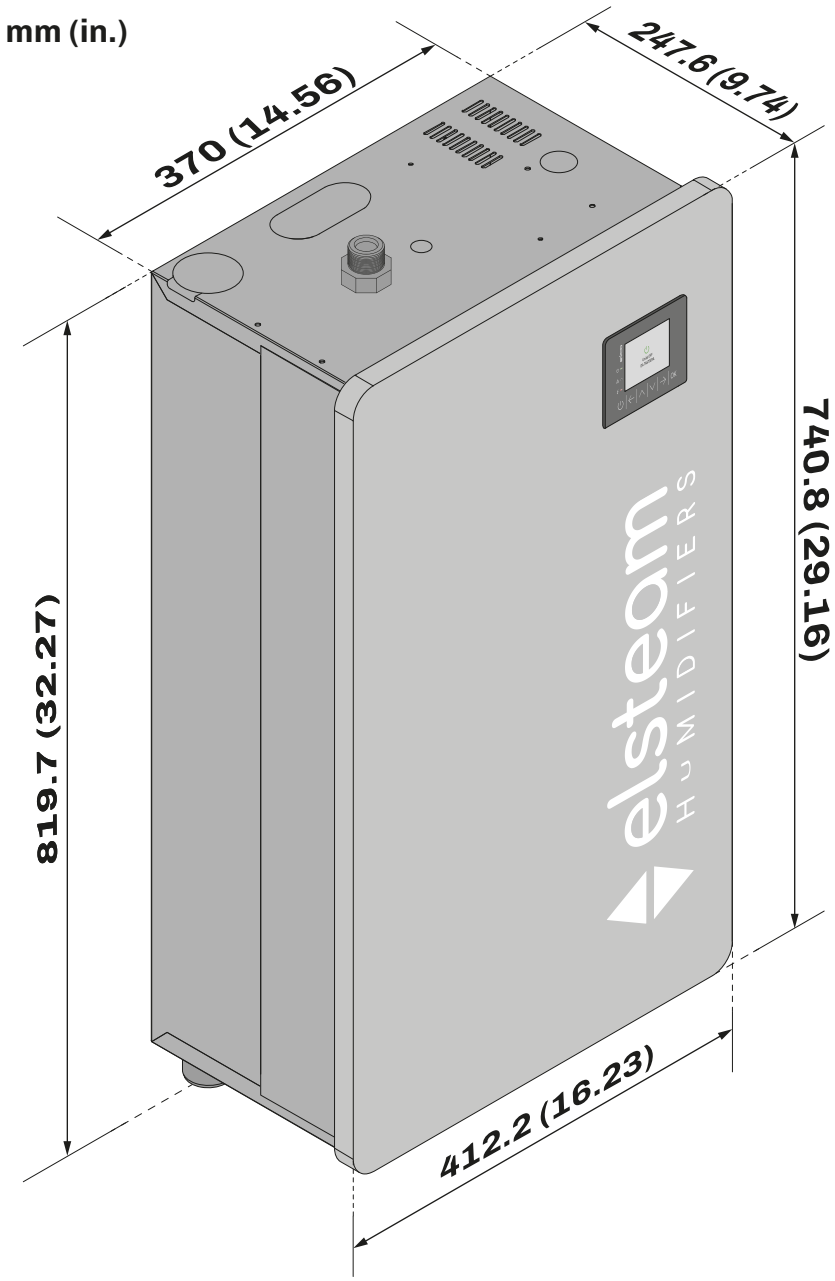


Fig. 78. *Dimensions of models EHK•003 ... EHK•015*

Weights

Model	Weight [kg(lb)]
EHKT003	16.5 (36.37)
EHKT005	16.5 (36.37)
EHKT010	17.5 (38.58)
EHKT015	17.5 (38.58)
EHKX003	16.5 (36.37)
EHKX005	16.5 (36.37)
EHKX010	17.5 (38.58)
EHKX015	17.5 (38.58)

2.1.2 Models EHK•020 ... EHK•040

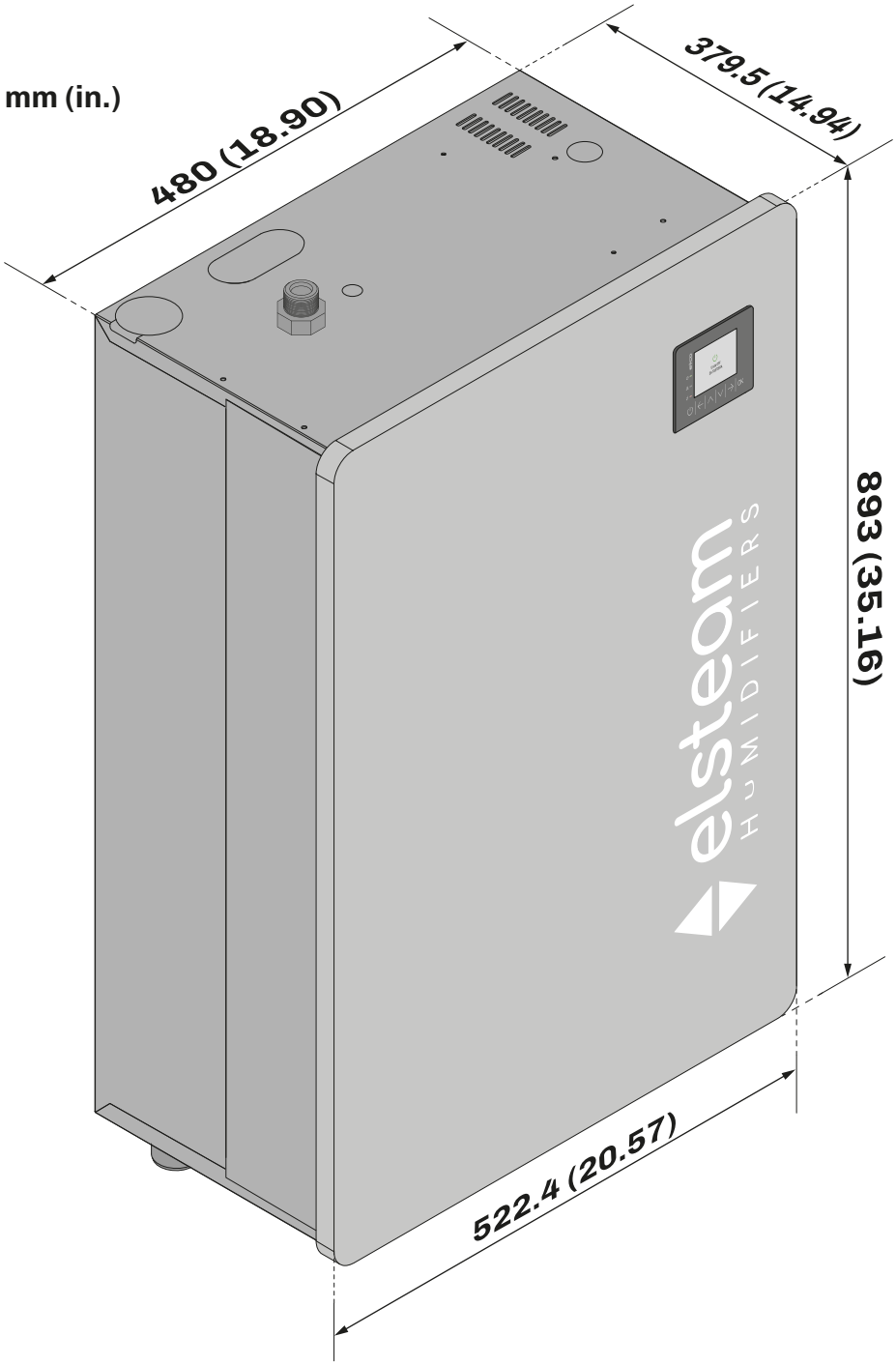


Fig. 79. *Dimensions of models EHK•020 ... EHK•040*

Weights

Model	Weight [kg(lb)]
EHKT020	28.5 (62.83)
EHKT030	28.5 (62.83)
EHKT040	28.5 (62.83)
EHKX020	28.5 (62.83)
EHKX030	28.5 (62.83)
EHKX040	28.5 (62.83)

2.1.3 Models EHK•060 ... EHKX100

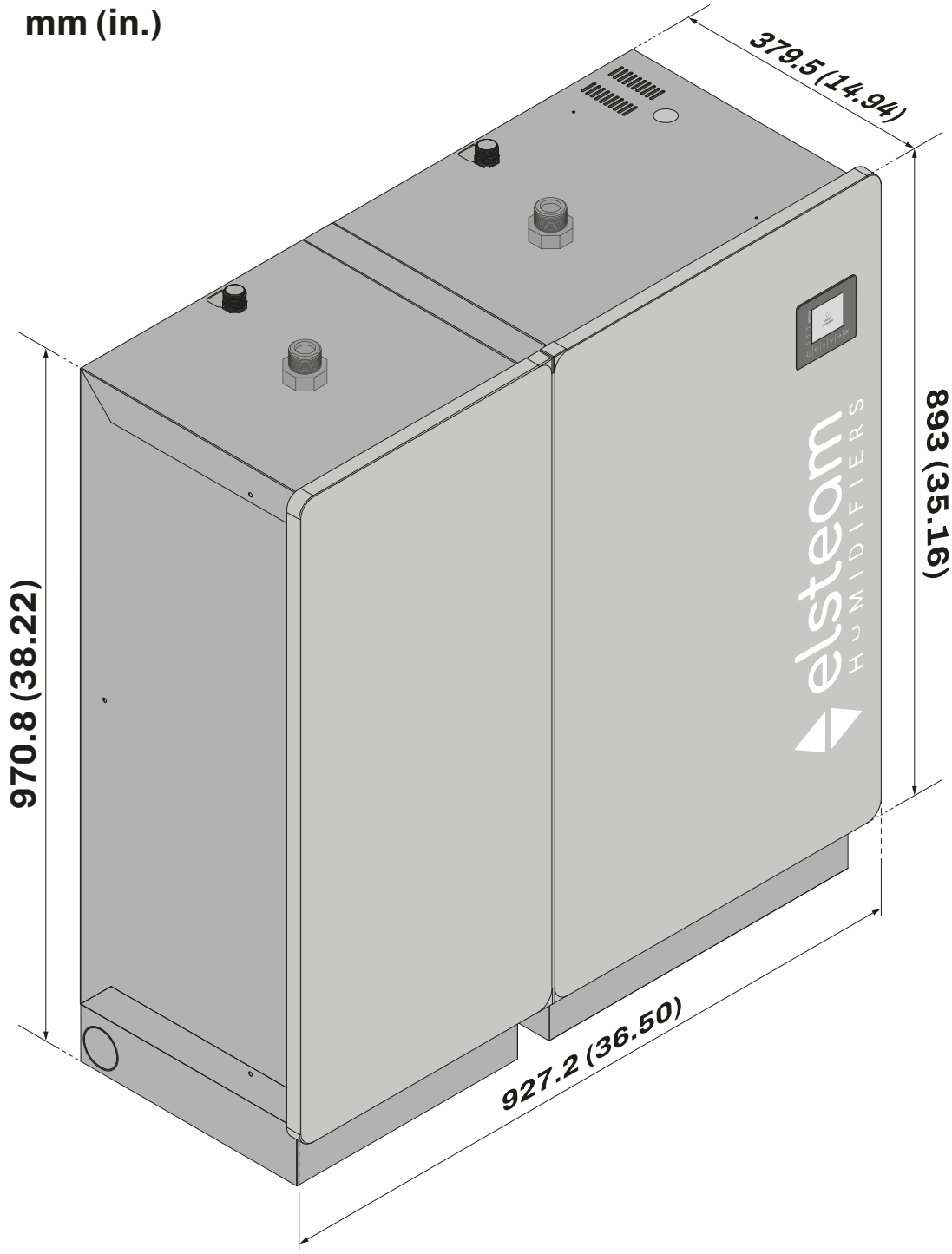


Fig. 80. *Dimensions of models EHK•060 ... EHKX100 (with optional socket)*

Weights

Model	Weight [kg(lb)]
EHKT060	42 (92.59)
EHKX060	42 (92.59)
EHKX080	42 (92.59)
EHKX100	42 (92.59)

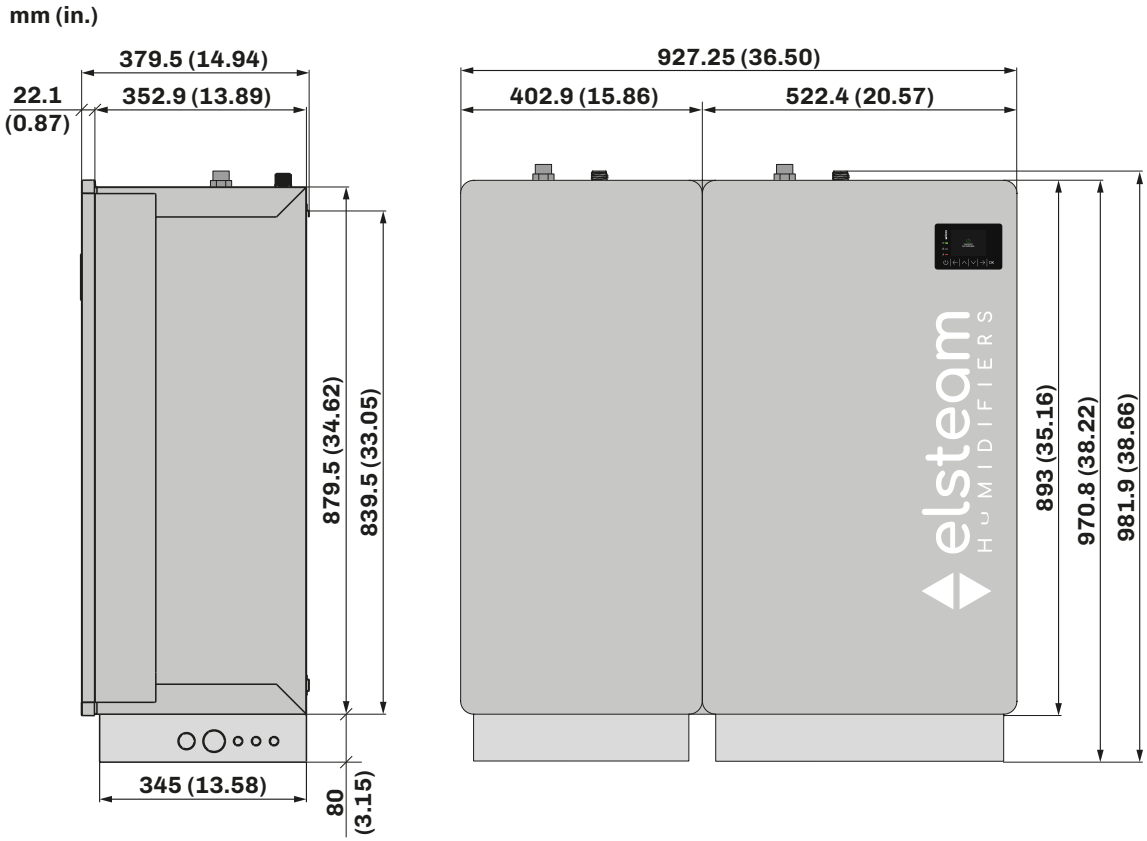


Fig. 81. *Dimensions of double boiler models*

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.

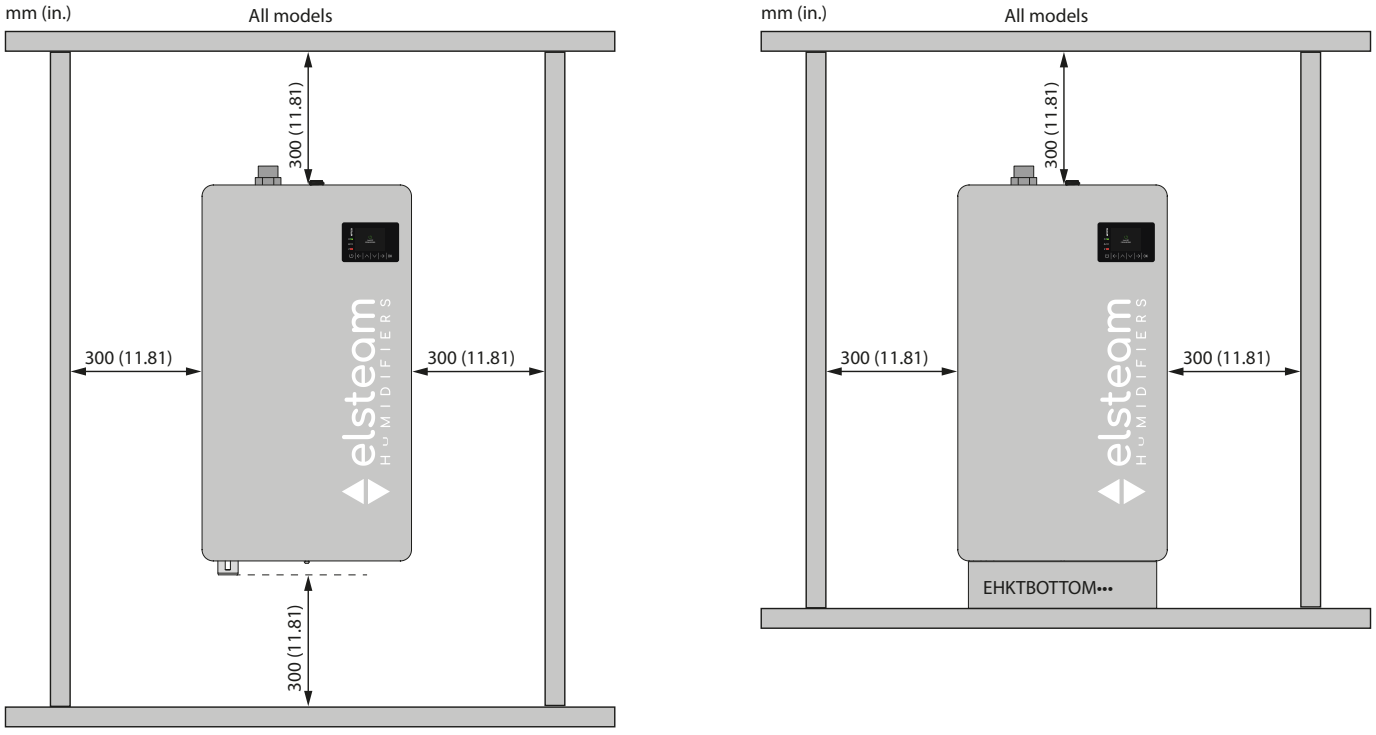


Fig. 82. *Minimum installation distances*

2.3 Fitting single boiler models

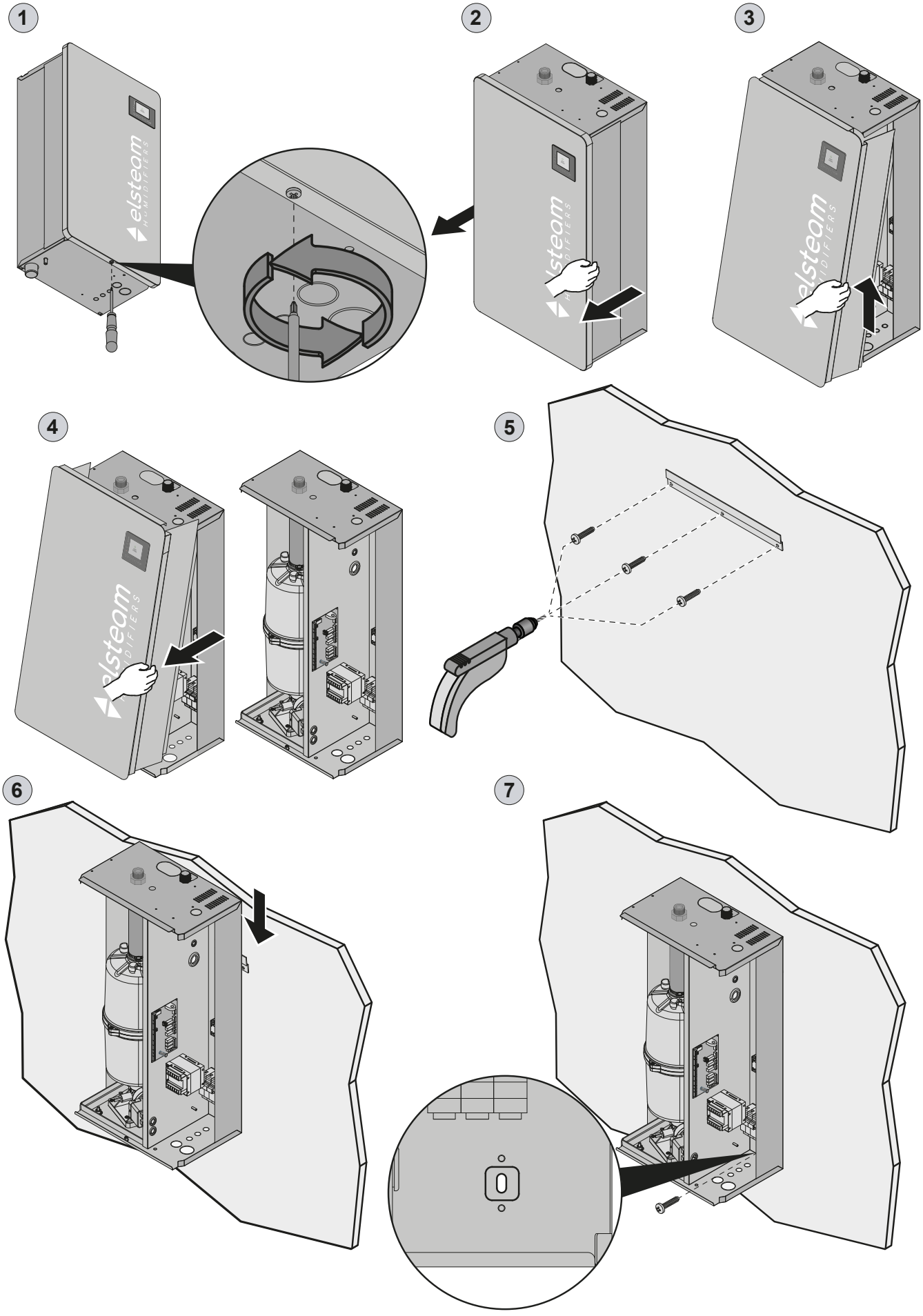


Fig. 83. *Installation instructions*

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 PH2 pan head Phillips 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.

2.4 Fitting double boiler models

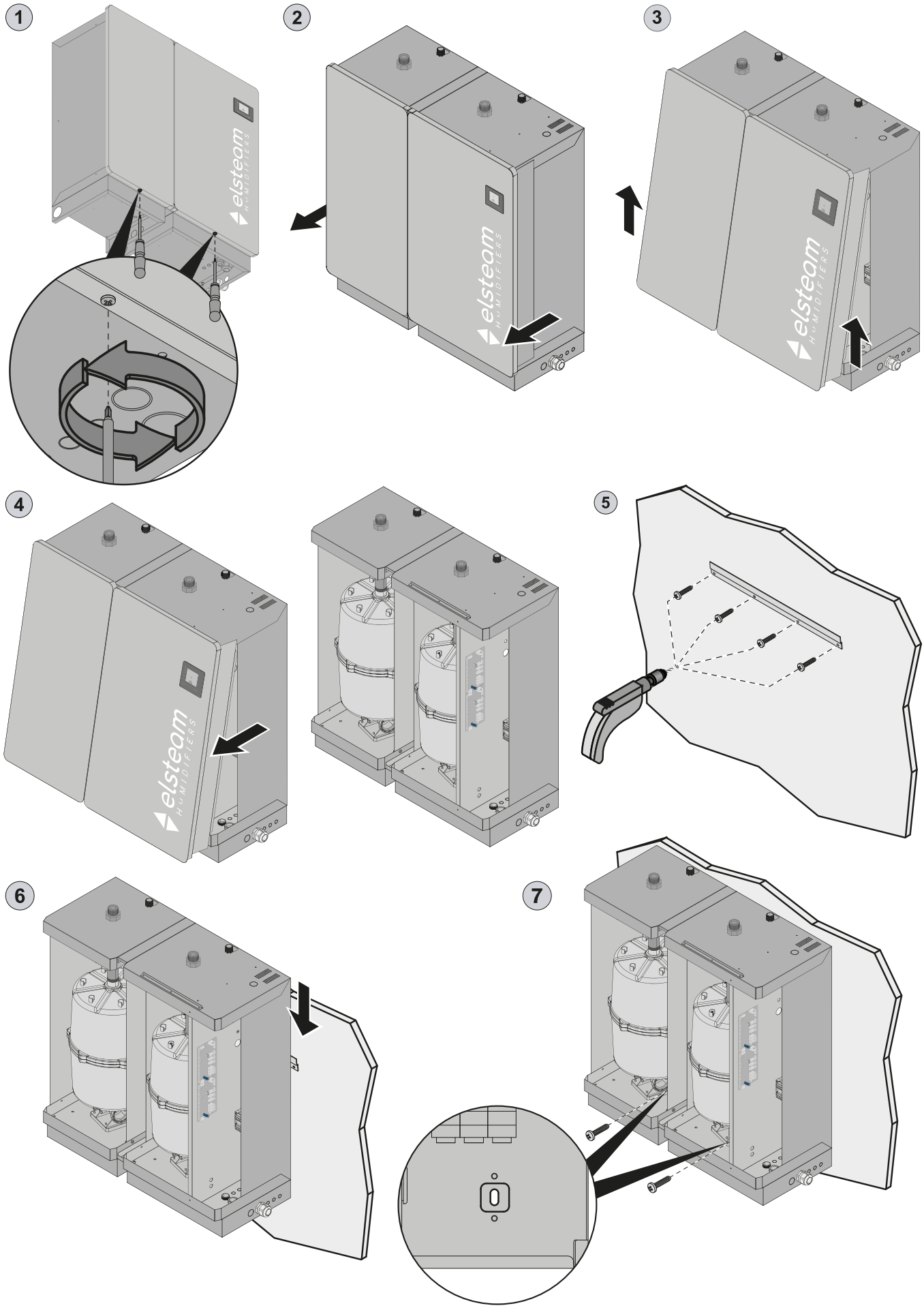


Fig. 84. *Installation instructions*

2.4.1 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 PH2 pan head Phillips screw to open the walls of the humidifier;
- Remove the front walls by pulling them towards you from the bottom and lifting;
- 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 the security screws.

3. ELECTRICAL CONNECTIONS

Chapter content

This chapter contains the following information:

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

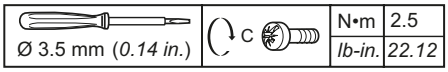
REGULATORY INCOMPATIBILITY

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.)

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

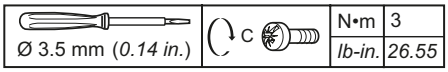


Applicable to models ...
EHK•003M2 / EHK•003T2 / EHK•003T4/ EHK•005M2 / EHK•005T2 / EHK•005T4 / EHK•010T4 / EHK•010T2 / EHK•015T4

Fig. 85. *Maximum power supply wiring -* ***See the table for the models***

Step 26.5 mm (1.04 in.)

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

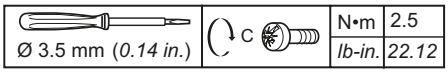


Applicable to models ...
EHK•015T2

Fig. 86. *Maximum power supply wiring -* ***EHK•015T2***

Step 17.8 mm (0.70 in.)

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

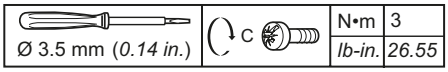


Applicable to models ...
EHK•020T4

Fig. 87. *Maximum power supply wiring -* ***EHK• 020T4***

Step 26.5 mm (1.04 in.)

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

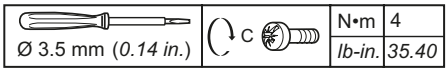


Applicable to models ...
EHK•020T2 / EHK•030T4 / EHK•040T4

Fig. 88. *Maximum power supply wiring -* ***EHK•020T2 / EHK•030T4 / EHK•040T4***

Step 35.5 mm (1.40 in.)

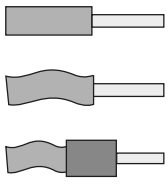
mm / in. 7 / 0.28			
mm²	50	35	35
AWG	1	2	2
no. of conductors	4		



Applicable to models ...
EHK•060T4 / EHKX080T4 / EHKX100T4

Fig. 89. *Maximum power supply wiring -* ***EHK•060T4 / EHKX080T4 / EHKX100T4***

Suitable wiring for the power supply

P/n EHKT	P/n EHKX	Wiring size	Maximum length	Permissible wiring type	Pitch [mm(in.)]
EHKT003M2	**EHKX003M2**	2G4	15 m (49.2 ft.)		17.8 (0.70)
EHKT003T2	**EHKX003T2**	3G2.5			
EHKT003T4	**EHKX003T4**	3G2.5			
EHKT005M2	**EHKX005M2**	2G10			
EHKT005T2	**EHKX005T2**	3G4			
EHKT005T4	**EHKX005T4**	3G2.5			
EHKT010T2	**EHKX010T2**	3G10			
EHKT010T4	**EHKX010T4**	3G4			
EHKT015T4	**EHKX015T4**	3G6			
EHKT015T2	**EHKX015T2**	3G16			26.5 (1.04)
EHKT020T2	**EHKX020T2**	3G16			
EHKT020T4	**EHKX020T4**	3G10			17.8 (0.70)
EHKT030T4	**EHKX030T4**	3G16			26.5 (1.04)
EHKT040T4	**EHKX040T4**	3G16			
EHKT060T4	**EHKX060T4**	3G25			35.5 (1.40)
	EHKX080T4	3G35			
	EHKX0100T4	3G50			

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*
Corrente	16	10	10	32	16	10	16	32	32	50	32	50			100	125	
Tipologia	Rapido			Rapido			Rapido			Rapido	Rapido	Rapido			Rapido		
Dimensione	10x38			10x38			10x38			14x51	10x38	14x51			22x58		

Fig. 90. *Overload protection devices according to model*

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

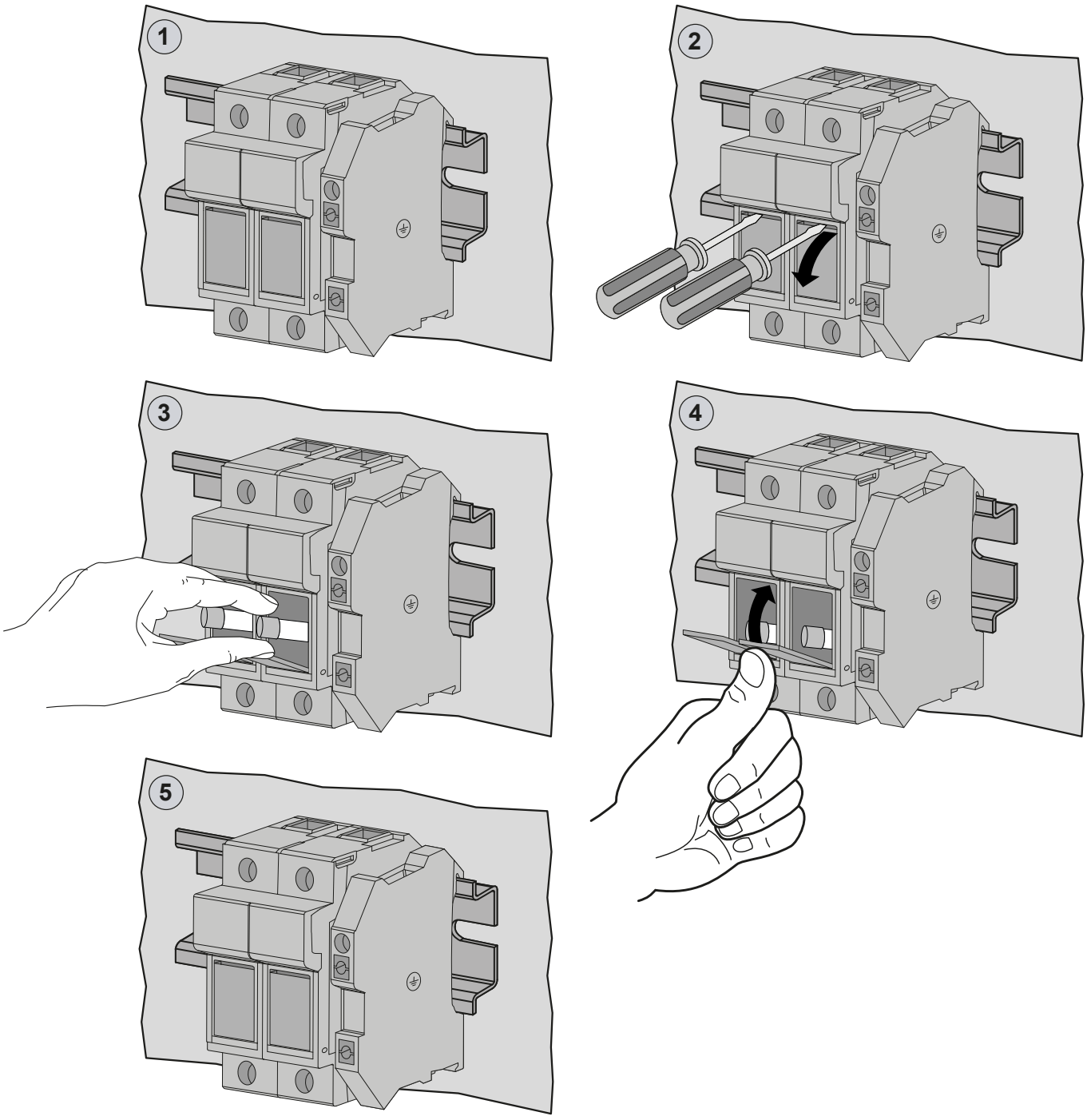


Fig. 91. *Overload protection device*

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

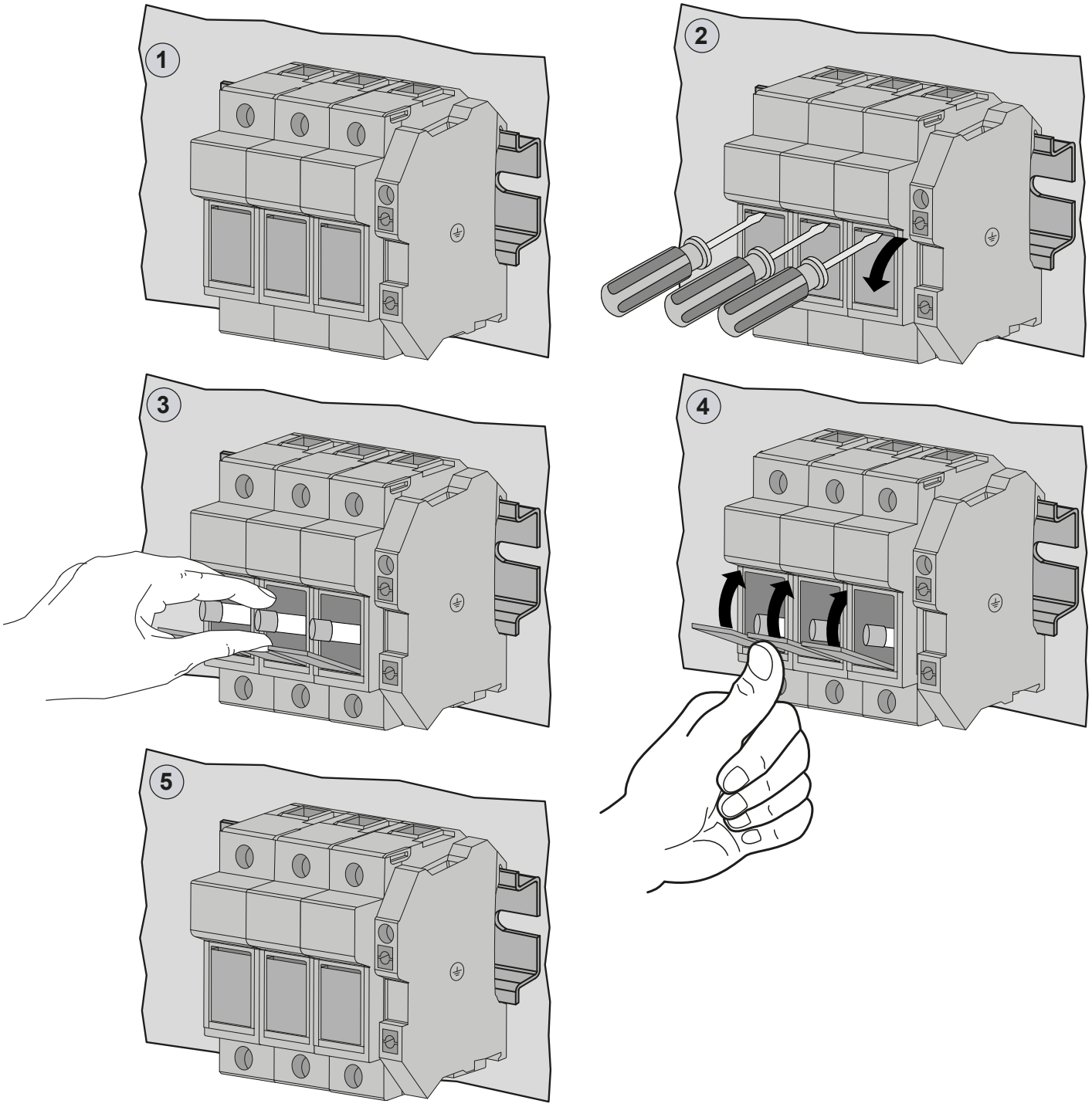


Fig. 92. *Overload protection device*

3.3.3 Changing fuses - Control board

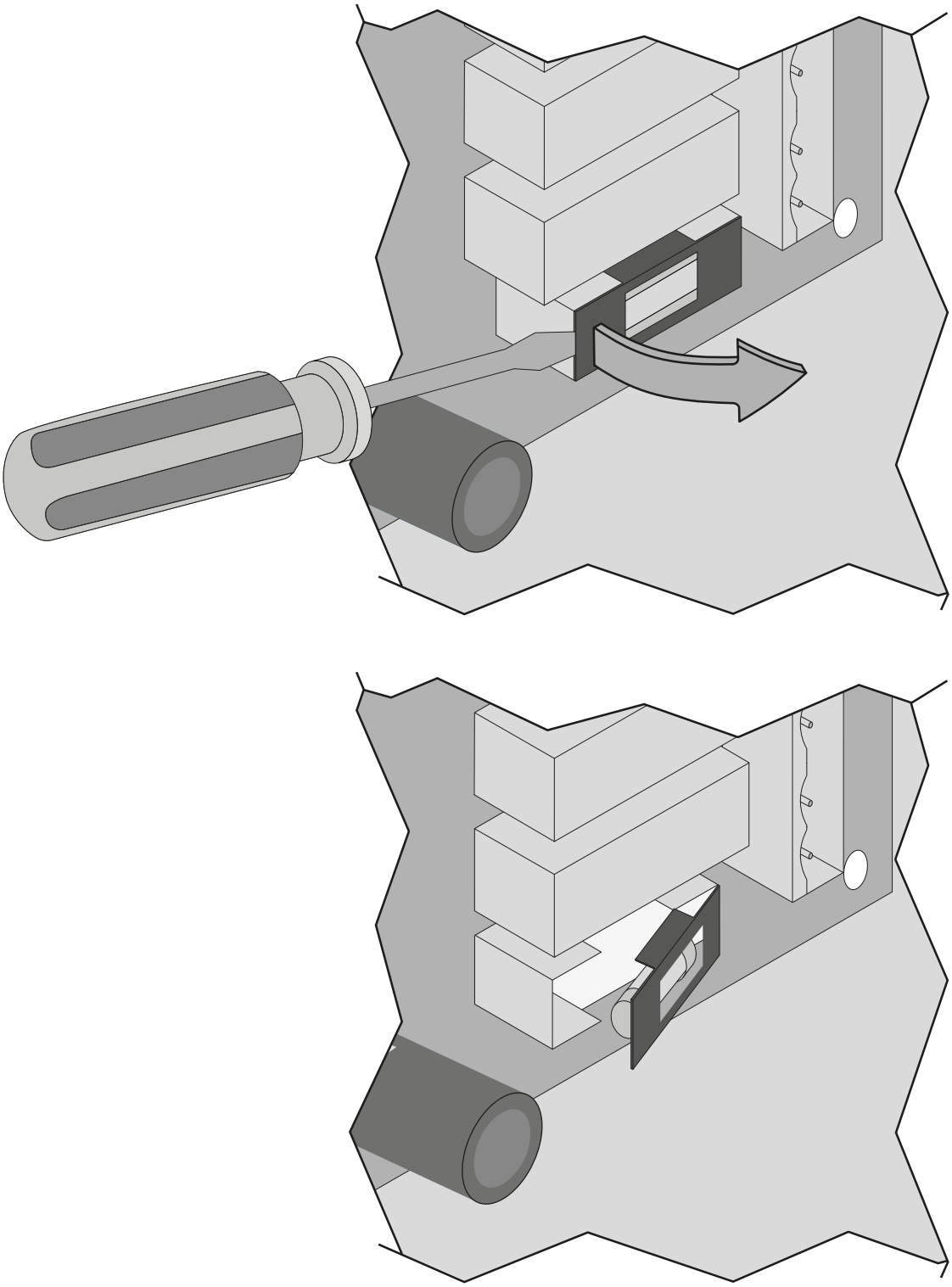
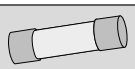


Fig. 93. *Protection devices on the control board*

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

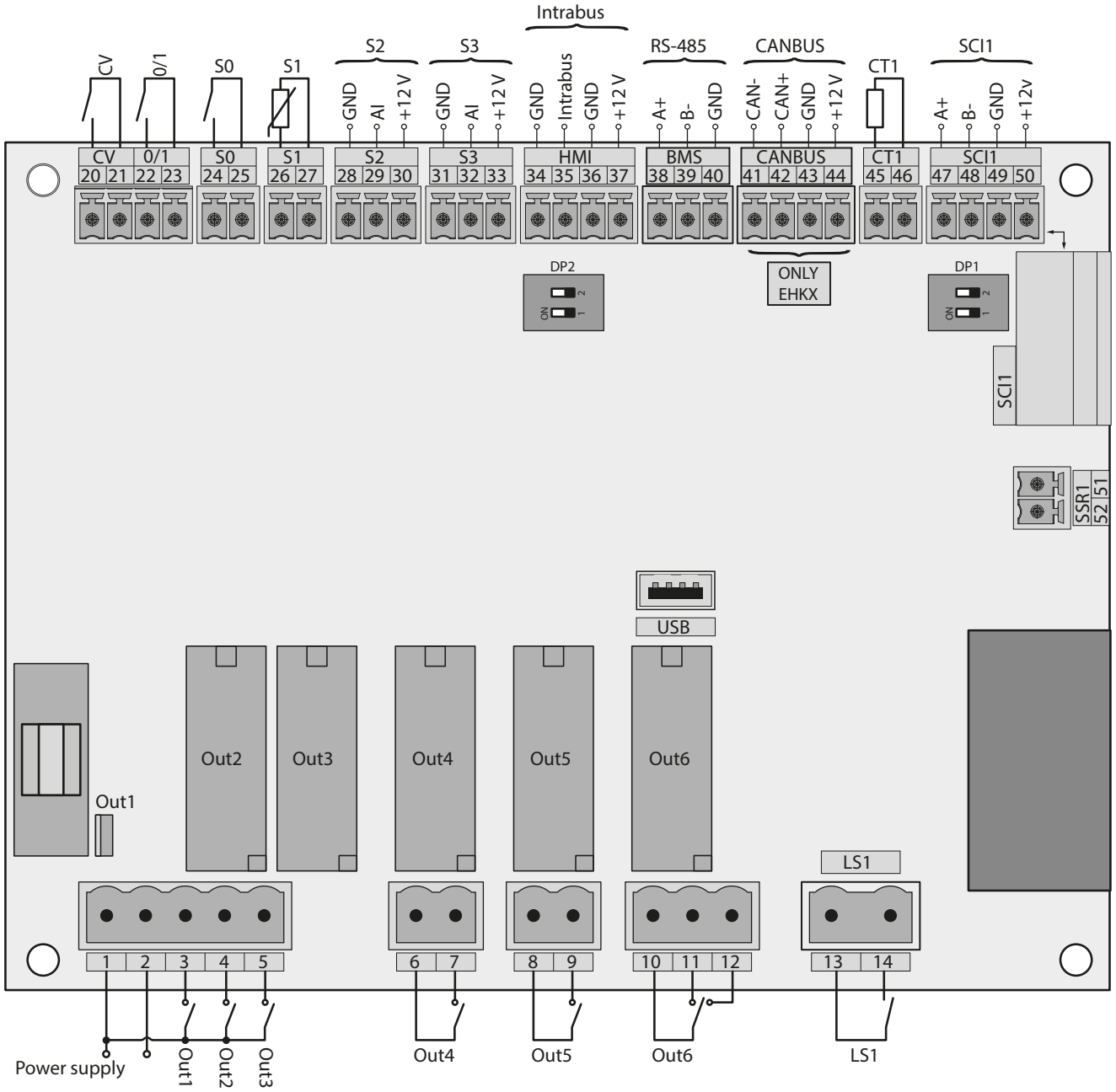


Fig. 94. *Control board electrical connections*

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

3.4.2 Expansion

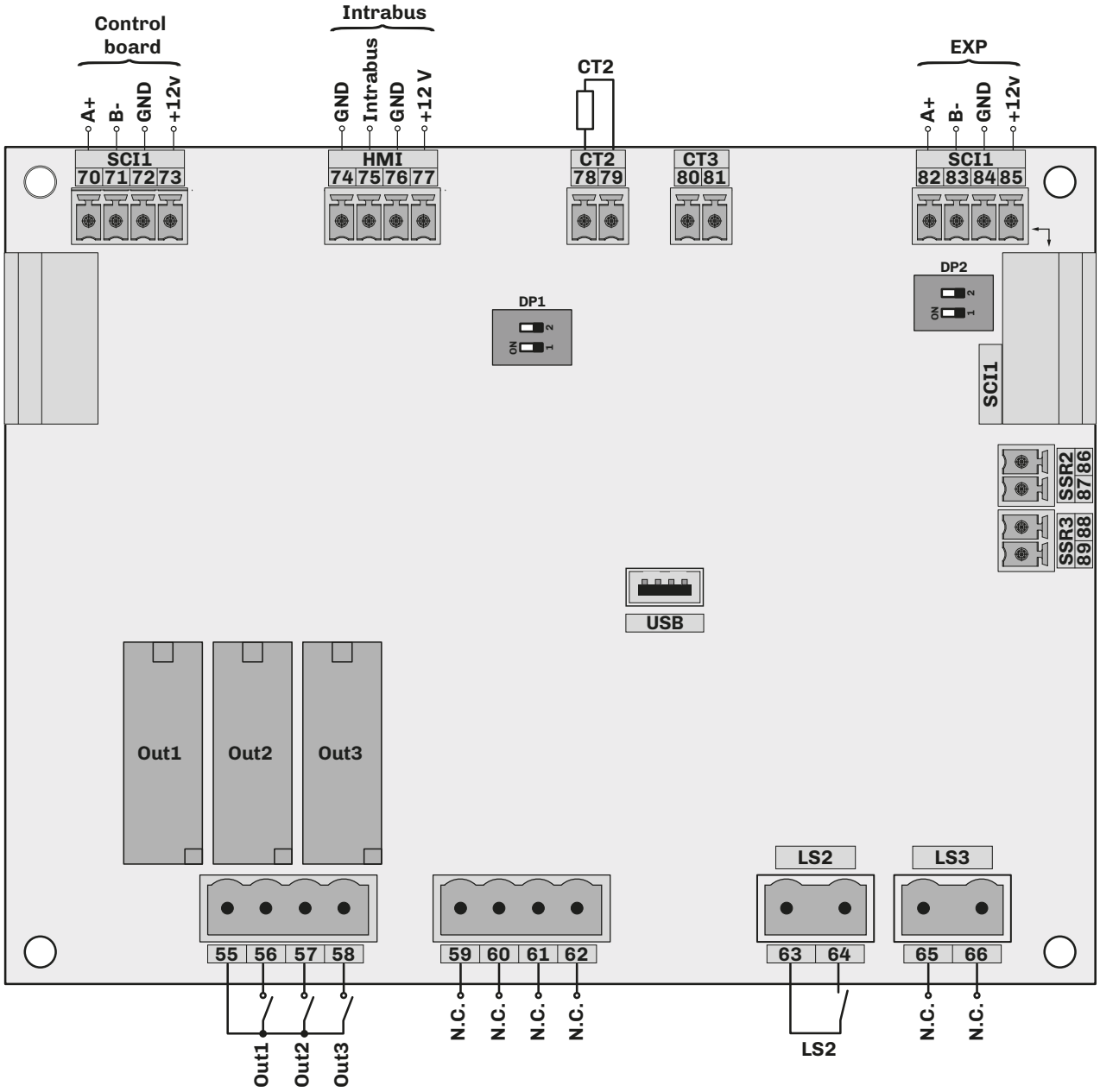


Fig. 95. *Expansion electrical connections*

TERMINALS					
55-56	Digital output: boiler 2 water outlet solenoid valve	**80-81**	Reserved		
55-57	Digital output: boiler 2 water outlet pump	**82...85**	Connection to expansion board **SCI1**		
55-58	Digital output: electrodes (steam generation)	**DP1**	Modbus communication address of expansion board		
63-64	Hazardous voltage digital input: level sensor **LS2**		**1**	**2**	Address offset relative to **LA1**
70...73	Connection to control board **SCI1**		OFF	OFF	**LA1 + 0**
74...77	Serial line input: HMI Intrabus		OFF	ON	**LA1 + 1**
78-79	Analogue input: external current sensor **CT2** (TA) for boiler 2		ON	OFF	**LA1 + 2**
			ON	ON	**LA1 + 3**
		DP2	Activate termination resistor on **SCI1 RS-485** serial line. **1** = SCI1 RS-485 serial termination; **2** = Reserved		

3.5 Configurations

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

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

Parameter configuration
CFG = 0-1

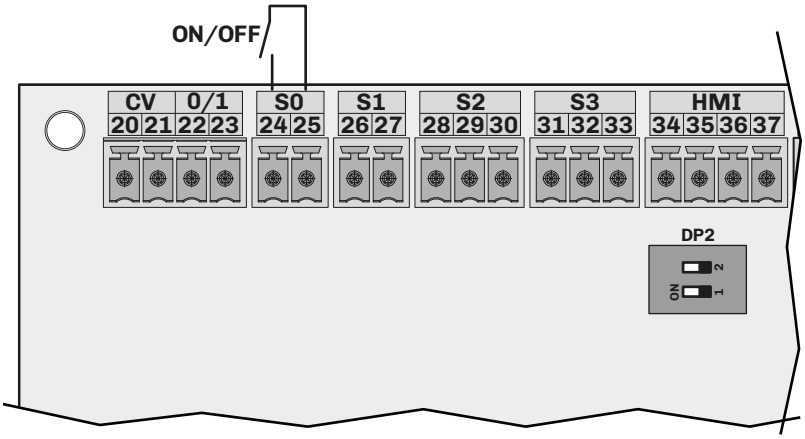


Fig. 96. *ON/OFF connection with humidistat or external contact (**CFG** = 0-1)*

3.5.2 External proportional humidistat connection (CFG = PROP)

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

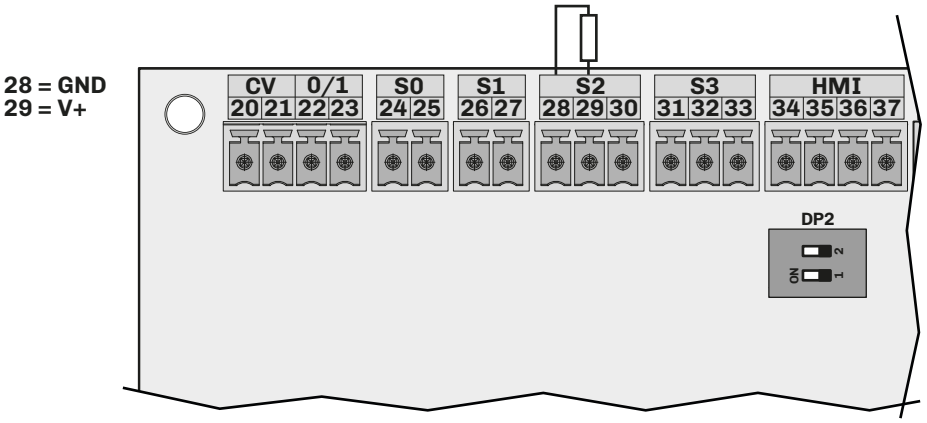


Fig. 97. *External proportional humidistat connection (**CFG** = PROP)*

3.5.3 Humidity sensor connection (CFG = HUM)

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

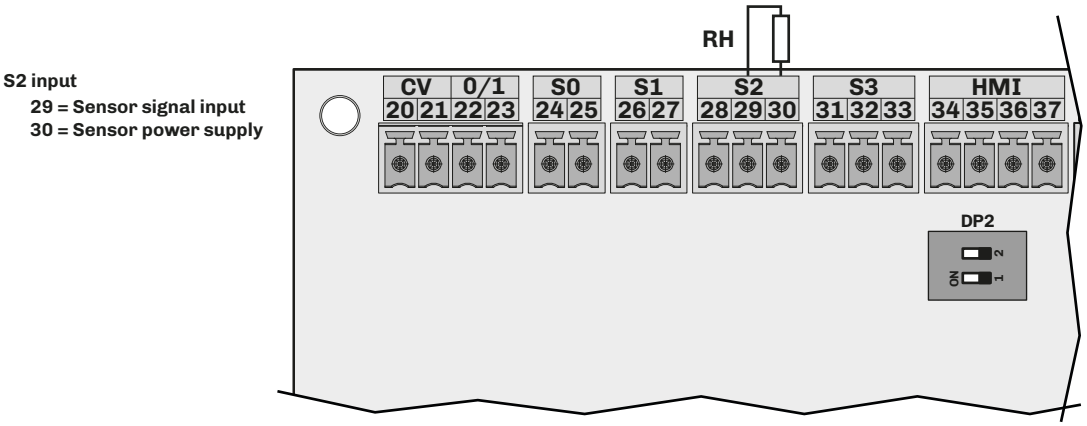


Fig. 98. *Humidity sensor connection (**CFG** = HUM)*

3.5.4 Humidity sensor connection EVHTP520 (CFG = HUM)

Parameter configuration
CFG = HUM
P2 = E520

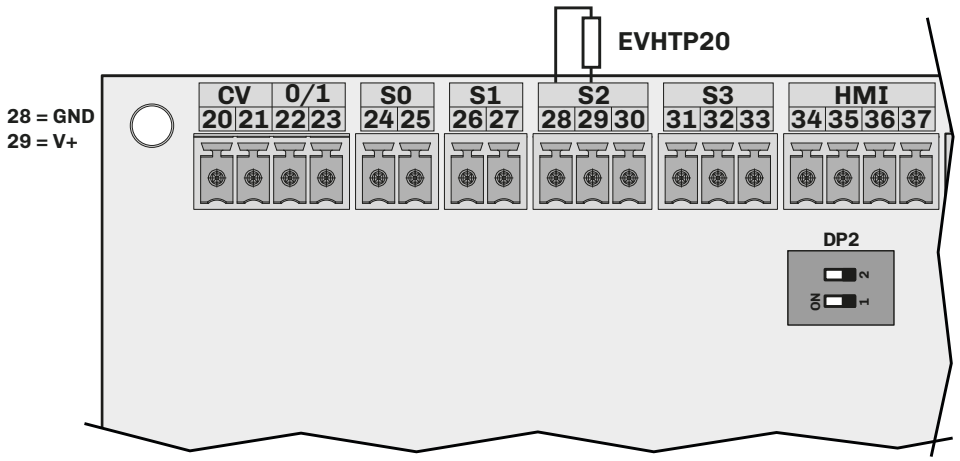


Fig. 99. *Humidity sensor connection EVHTP520 (**CFG** = HUM)*

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

Parameter configuration
CFG = HUML
P2 = 0.20 **P2** = 4.20 **P2** = E520
P7 = 0.20 **P7** = 4.20

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

S3 input
32 = Sensor signal input
33 = Sensor power supply

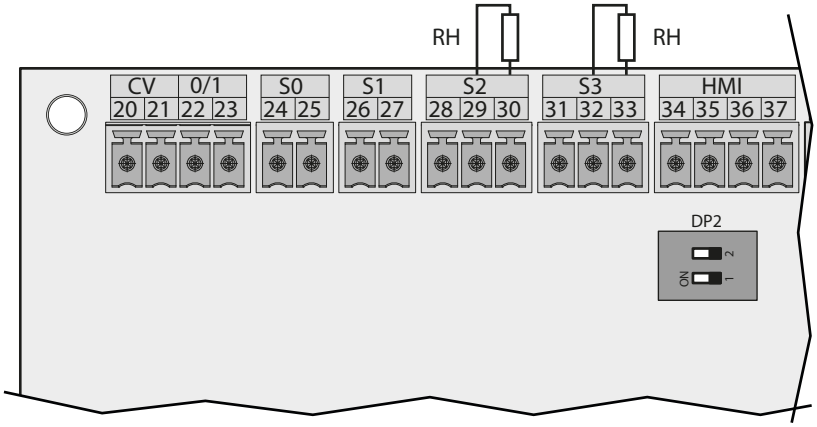


Fig. 100. *Connection for humidity sensor and limit sensor (**CFG** = HUML)*

3.5.6 Temperature sensor connection (CFG = 1T)

Parameter configuration
CFG = 1T
P2 = PTC **P2** = 1000 **P2** = NTC

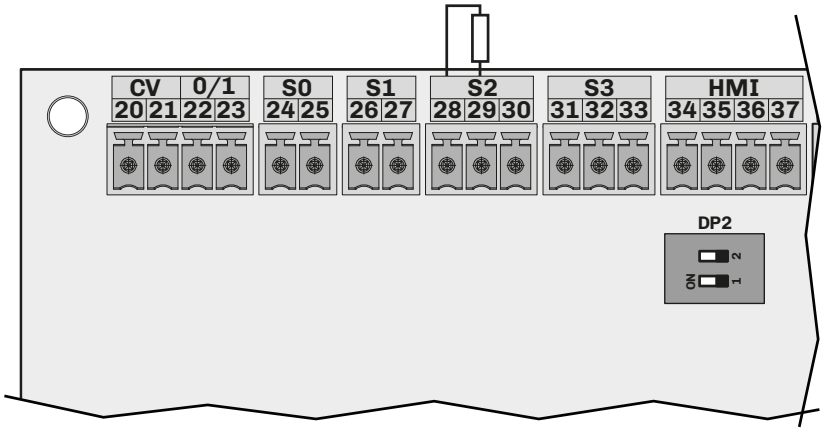


Fig. 101. *Temperature sensor connection (**CFG** = 1T)*

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

Parameter configuration
CFG = 2T
P2 = PTC **P2** = 1000 **P2** = NTC
P7 = PTC **P7** = 1000 **P7** = NTC

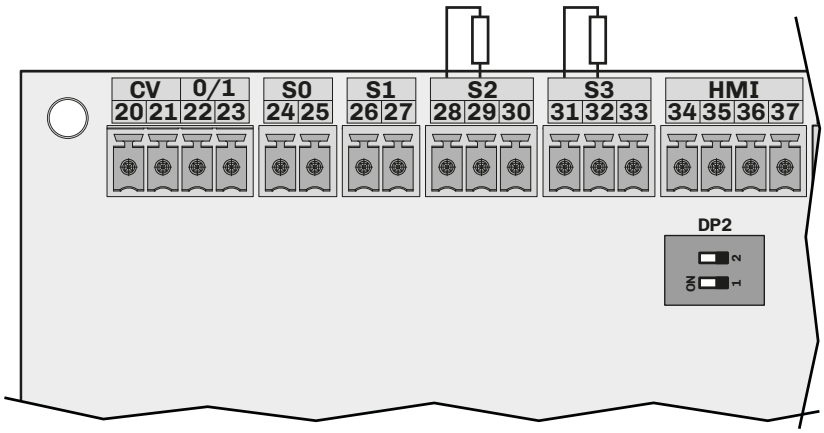


Fig. 102. *Temperature sensor connection (**CFG** = 2T)*

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

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

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

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

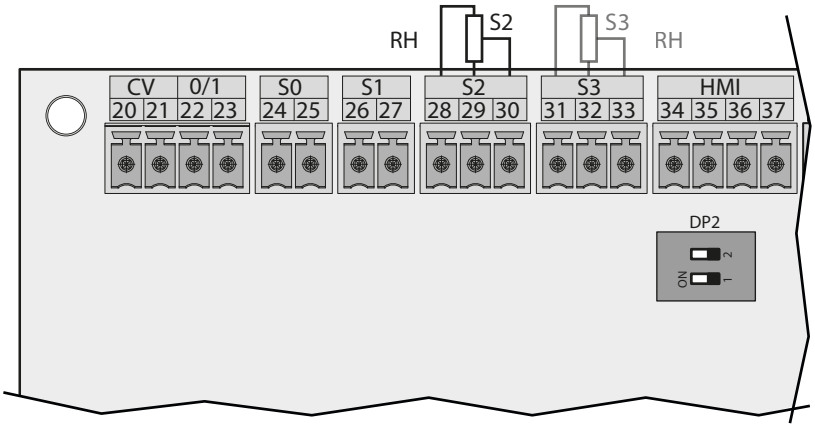


Fig. 103. *Humidity sensor connection 0...5 V*

3.6 Power supply and earth wiring connection

3.6.1 Single-phase models

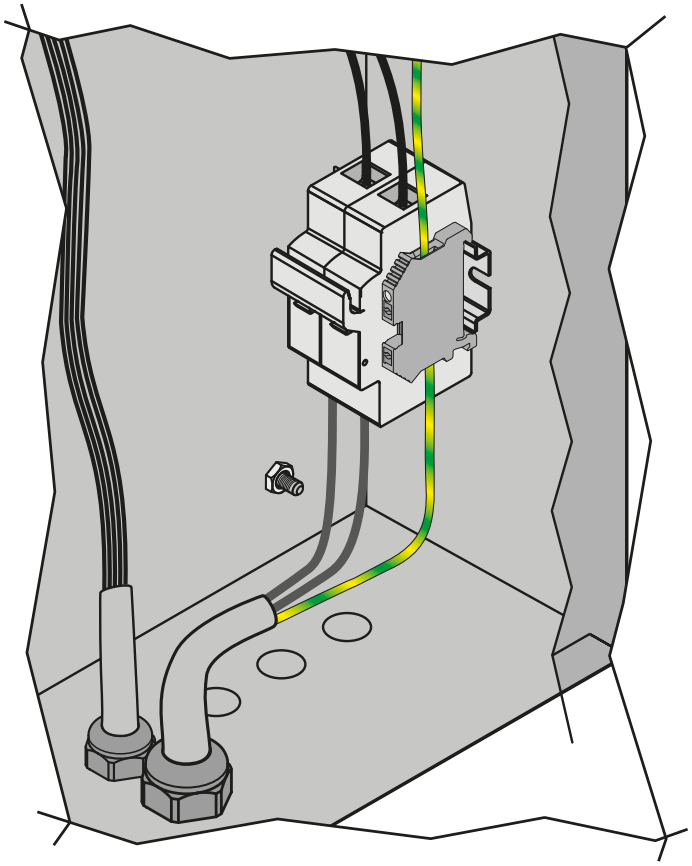


Fig. 104. *Power supply connections - single-phase models*

3.6.2 Three-phase models

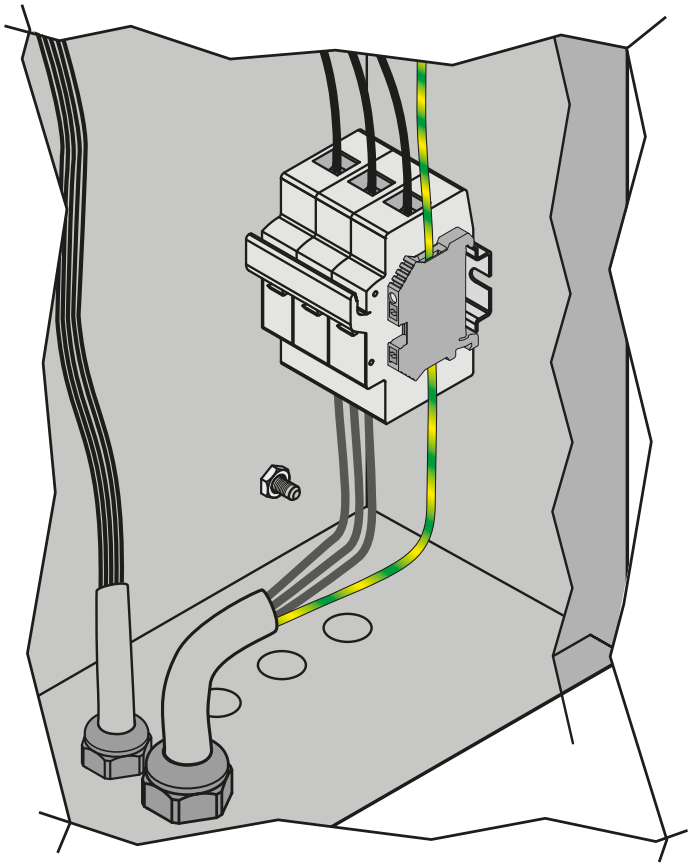
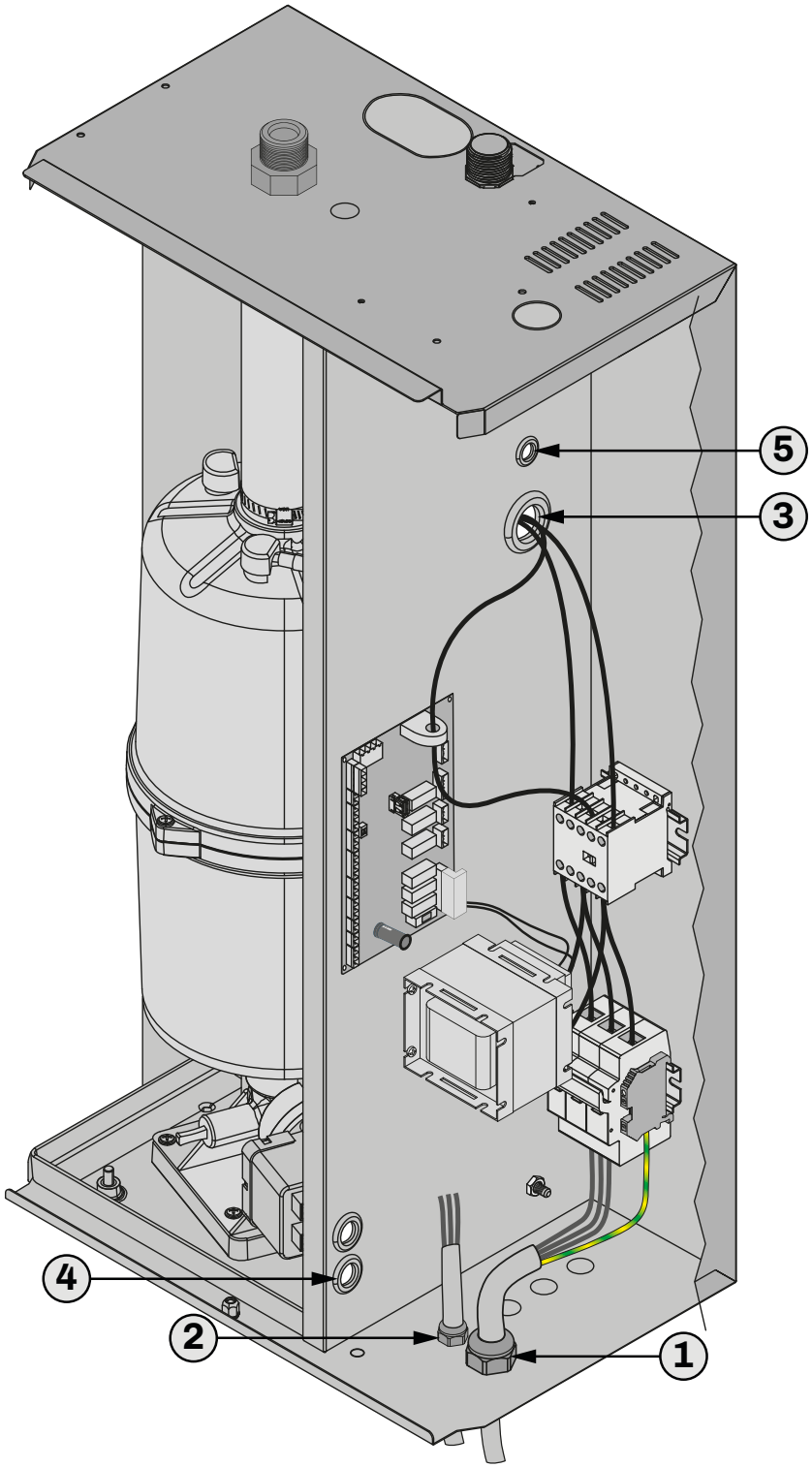


Fig. 105. *Power supply connections - three-phase models*

3.7 Cable glands and cable routing

3.7.1 Single boiler models



Reference models	
EHKT003M2	EHKX003M2
EHKT003T2	EHKX003T2
EHKT003T4	EHKX003T4
EHKT005M2	EHKX005M2
EHKT005T2	EHKX005T2
EHKT005T4	EHKX005T4
EHKT010T2	EHKX010T2
EHKT010T4	EHKX010T4
EHKT015T2	EHKX015T2
EHKT015T4	EHKX015T4
EHKT020T2	EHKX020T2
EHKT020T4	EHKX020T4
EHKT030T4	EHKX030T4
EHKT040T4	EHKX040T4

Fig. 106. *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

3.7.2 Double boiler models

Reference models	
EHKT060T4	EHKX060T4
	EHKX080T4
	EHKX0100T4

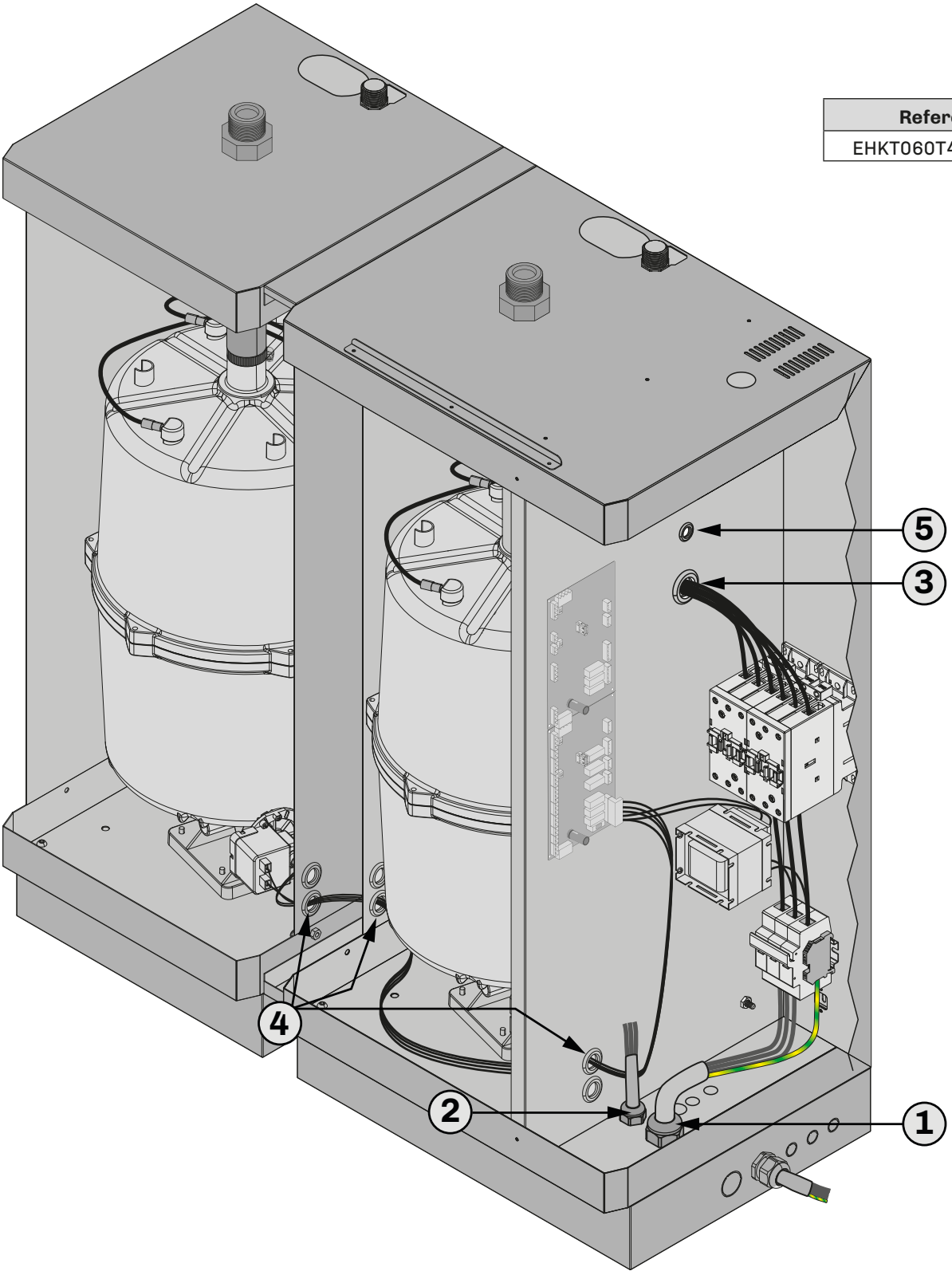


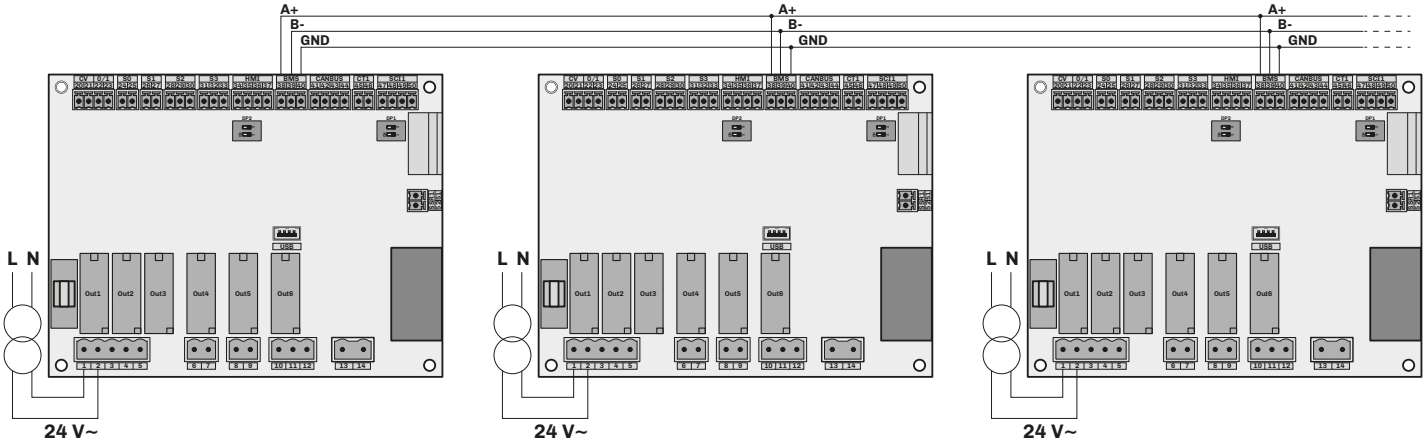
Fig. 107. *Cable glands and cable routing*

Ref.	Description
①	Pull-resistant cable glands 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

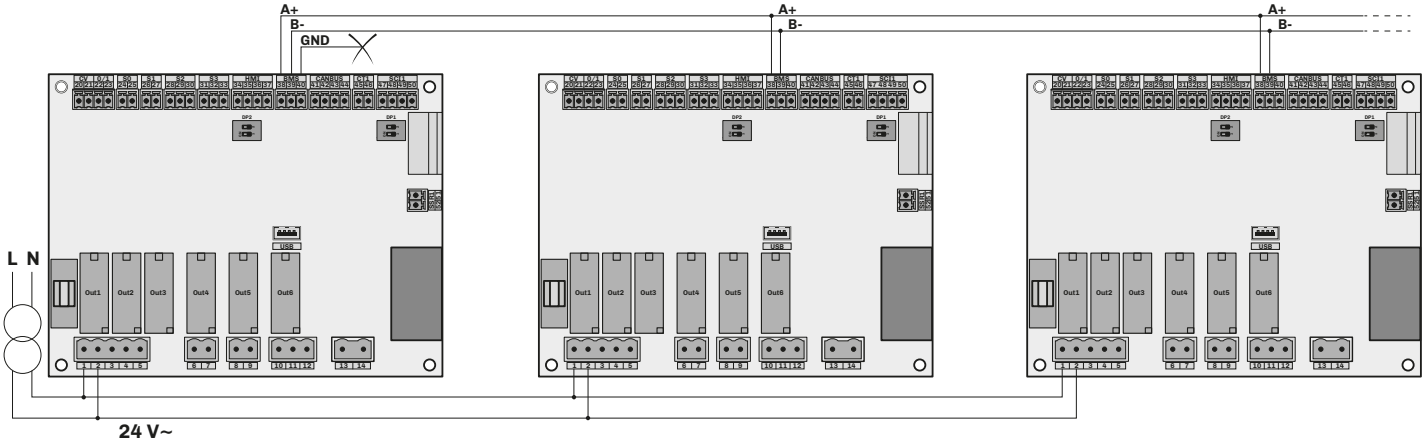


Fig. 108. *Serial line connections*

4. OPERATION

Chapter content

This chapter contains the following information:

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 6 ways, depending on how the **CFG** parameter is set:

- ON-OFF regulation (**CFG** = 0-1);
- Proportional regulation (**CFG** = PROP);
- Regulation with the humidity sensor (**CFG** = HUM);
- Regulation with the humidity sensor and limit sensor (**CFG** = HUML);
- Regulation with a temperature probe (wellness applications) (**CFG** = 1T);
- Regulation with two temperature probes (wellness applications) (**CFG** = "T)

4.2.1 ON-OFF regulation | CFG = 0-1

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

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

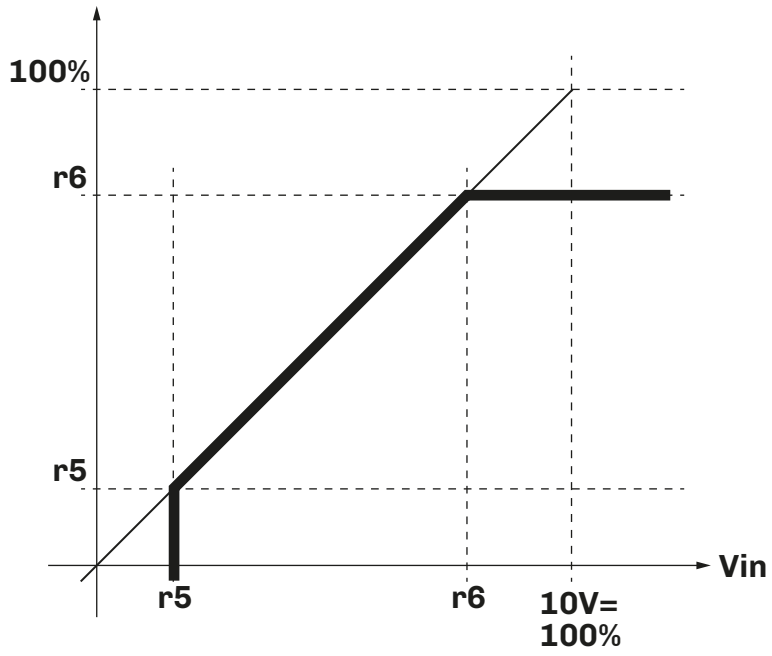
When the **S0**digital input is closed, **Zephyr** generates humidity according to the maximum value set in parameter **r6**.

4.2.2 Proportional regulation | CFG = PROP

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

- **CFG** = PROP;
- Set the minimum humidity production **r5**;
- Set the maximum humidity production **r6**;
- Enable digital input closed (**CV**);
- Remote ON/OFF digital input (**0/1**).

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



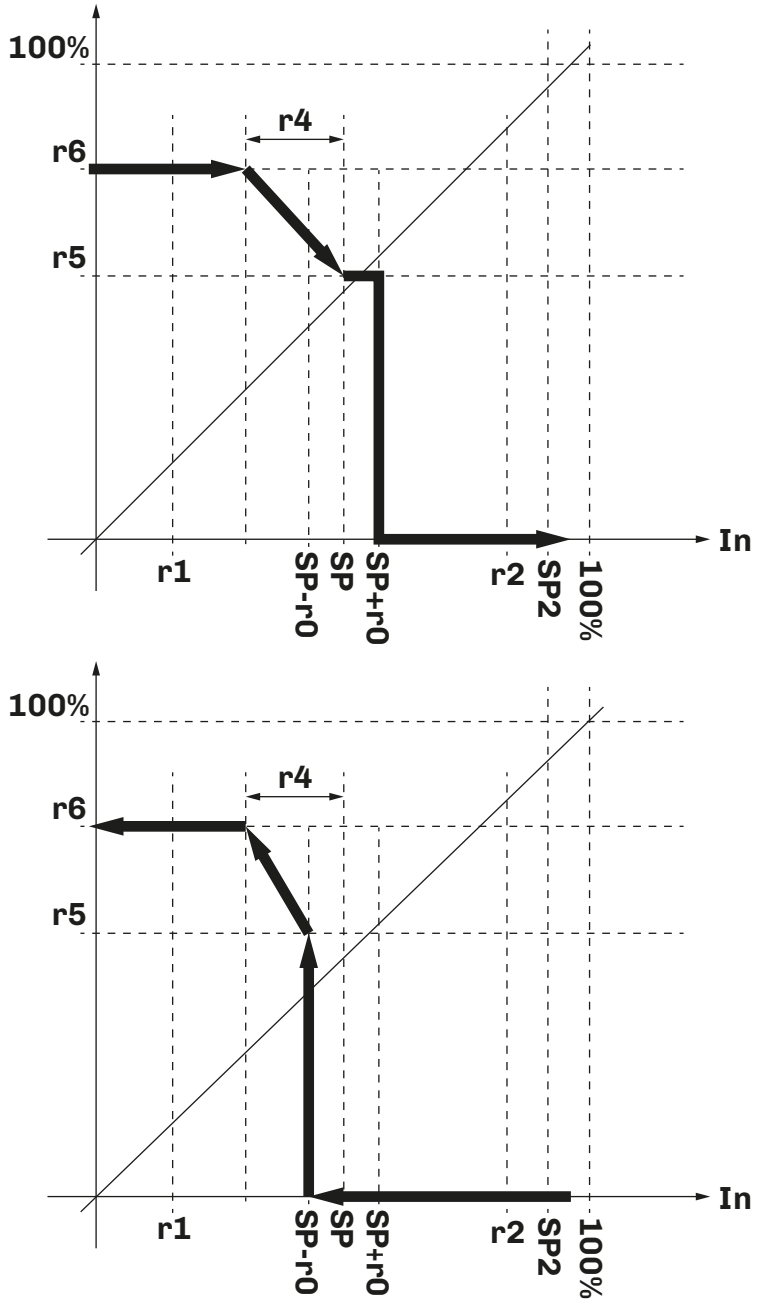
KEY	
Line	**Description**
——	V_{in}
▬	Production

Fig. 109. *How proportional regulation works | **CFG** = PROP*

4.2.3 Regulation with the humidity sensor | CFG = HUM

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

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



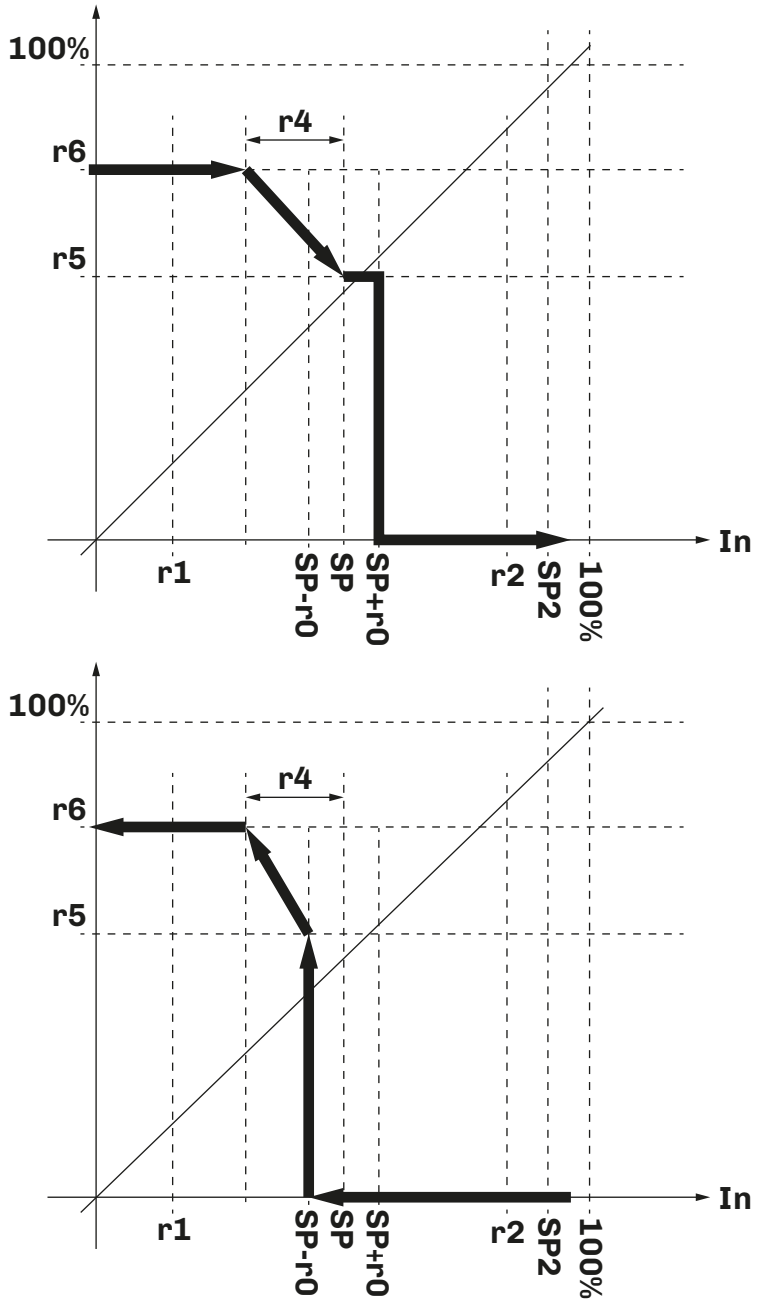
KEY	
Line	**Description**
——	V_{in}
▬	Production

Fig. 110. *How regulation with the humidity sensor works | **CFG** = HUM*

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

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

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



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

Fig. 111. *How regulation with the humidity sensor + limit sensor works | **CFG** = HUML*

The humidity production behaves in the same way as for regulation with the humidity sensor (**CFG** = HUM), 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**.

4.2.5 Regulation with a temperature probe | CFG = 1T

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

- **CFG** = 1T;
- Set parameter **P0** according to the sensor type to be used
- Set the minimum humidity production **r5**;
- Set the maximum humidity production **r6**;
- Enable digital input closed (**CV**);
- Remote ON/OFF digital input (**0/1**).

Principle of operation

The humidity requirement is managed with a proportional temperature adjustment between SP3 and the proportional band r20, according to the following logic:

- Temperature ≥ **SP3**: 0% humidity required;
- Temperature ≤ **SP3** - **r20**: humidity requirement at **r6**;
- **SP3** < Temperature < **r20**: proportionally linearized humidity required (minimum production **r5**).

4.2.6 Regulation with two temperature probes | CFG = 2T

To use **Zephyr** with regulation with two temperature sensors, the following conditions must be met:

- **CFG** = 2T;
- Set parameter **P0** according to the sensor type to be used
- Set the minimum humidity production **r5**;
- Set the maximum humidity production **r6**;
- Set parameter **r23**;
- Set parameter **r24**;
- Enable digital input closed (**CV**);
- Remote ON/OFF digital input (**0/1**).

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

NOTE: Optional feature for **EHKT** models.

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

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

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
c6	Draining value for dilution (if **C3** = 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
c4	Draining duration for dilution (if **C3** = 1).	s	0...9999
c5	Time between two dilution draining events (if **C3** = 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 **AL08** is generated and the humidifier is forced OFF until maintenance is carried out (see ***"8.1 TABLE OF ZEPHYR ALARMS" ON PAGE 151***).

4.6 Completely draining the boiler

Zephyr requires completely draining the boiler in the following cases:

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

The configuration parameters for the cleaning cycles are:

Par.	Description	MU	Range	Default
c0	Number of continuous days of inactivity after which the boiler is emptied. **0** = Function disabled.	days	0...10	2
c1	Number of continuous days of activity after which the boiler is emptied. **0** = Function disabled.	days	0...100	14

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

If the level sensor is reached again within time **c12**, there is foam in the boiler. **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.

When there is foam, **Zephyr** displays code **W05** (see ***"8.1 TABLE OF ZEPHYR ALARMS" ON PAGE 151***).

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
A10	Operating hours threshold for unit maintenance warning.	hx10	100....1000
A11	Operating hours threshold for partial boiler maintenance warning.	hx10	100....1000
A12	Operating hours threshold for full boiler maintenance warning.	hx10	100....1000
A13	Operating hours threshold for valve maintenance warning.	hx10	100....1000
A14	Operating hours threshold for pump maintenance warning.	hx10	100....1000
A15	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. MASTER/SLAVE OPERATION

Chapter content

This chapter contains the following information:

5.1 Introduction

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

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

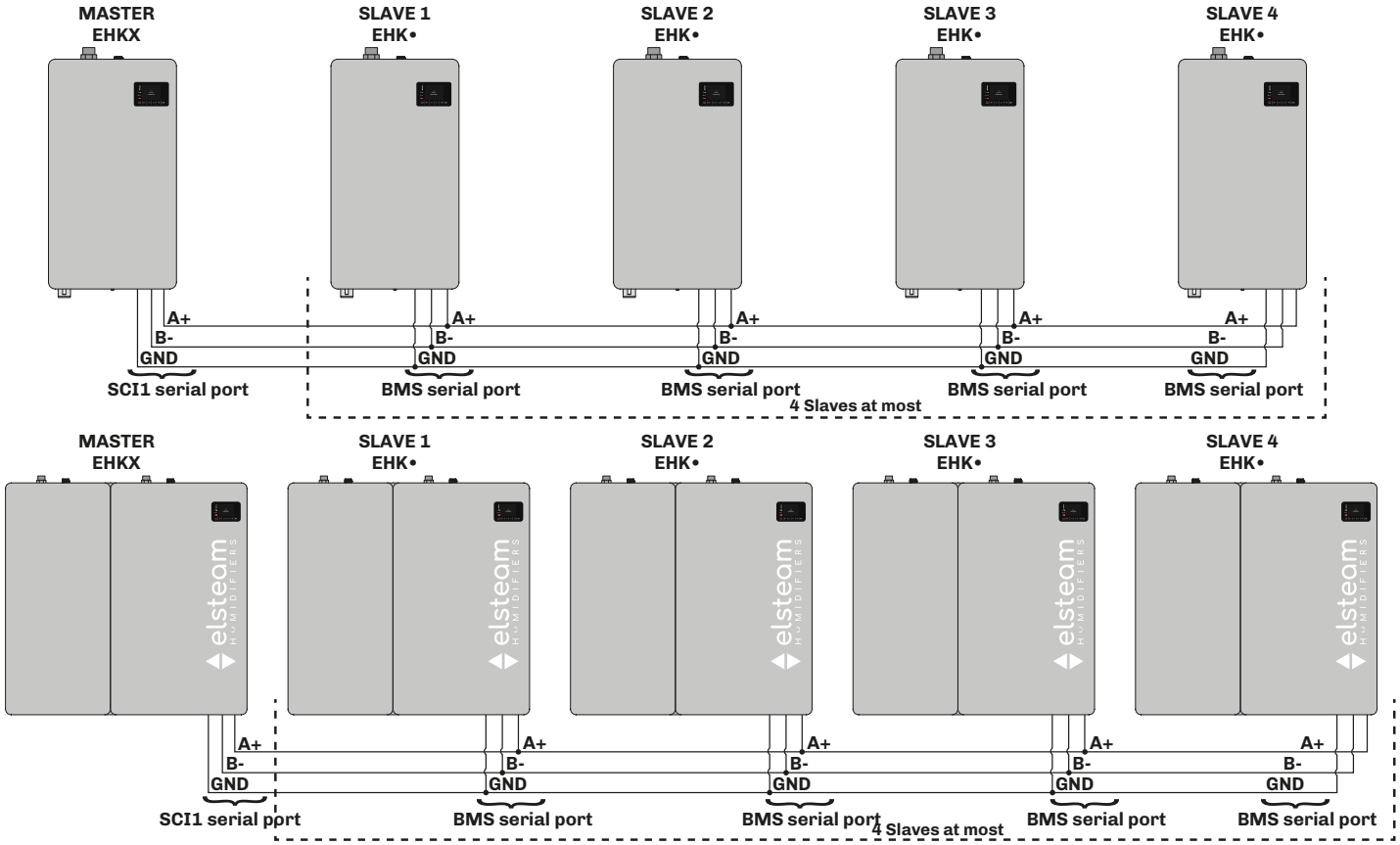


Fig. 112. *External overview of the product*

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

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

5.2 Operation in Parallel | nTyp = 1

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

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

Actual result: All 4 humidifiers produce at 60%.

5.3 Operation in Rotation | nTyp = 2

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

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

Actual result: The Master humidifier enables only 3 humidifiers to operate at any one time, giving priority to machines with fewer operating hours and alternating with the backup humidifiers according to the time **nHrs**.

In the case of:

- Key off,
- Alarms inhibiting its operation;
- Maintenance of running machines l

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

5.4 Operation in Balancing | nTyp = 3

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

Example
Hours of humidifier operation: 2 hours at 50%

Actual result: Normalized hours of operation: 1 hour.

5.5 Protection management

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

6. MAINTENANCE

Chapter content

This chapter contains the following information:

6.1 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).

6.2 Product overview

6.2.1 External view of the product

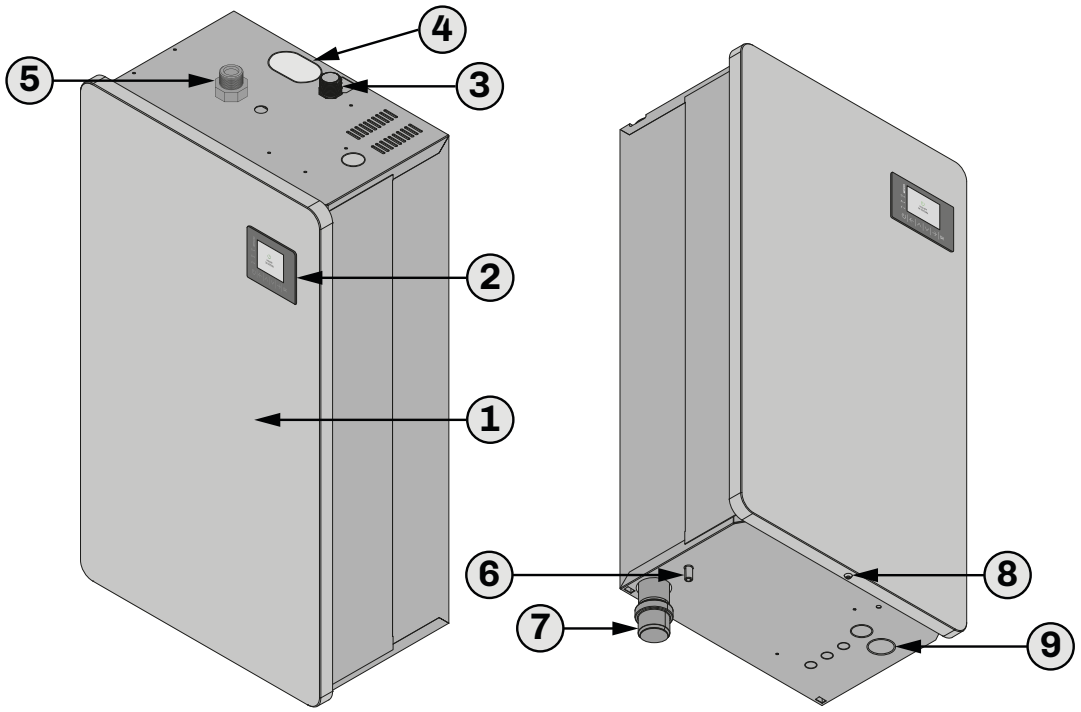


Fig. 113. *External overview of the product*

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

6.3 Checking the status of the humidifier

Perform the following scheduled checks on the humidifier:

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

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

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

6.4 Boiler maintenance

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

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

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

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

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

that lead to an increase in maintenance frequency (even weekly in extreme cases), a special range of boilers designed and developed to operate with hard water can be used (see ***"1.6 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 continuous operation with maintenance carried out in accordance with best practices or in any case at most 20000 hours;
- There are large amounts of limescale that lead to colour and surface variations on the outer walls of the boiler due to overheating caused by limescale bridging between the electrical phases;
  NOTE: Limescale inside the boiler is normal, even in large amounts, as the boiler collects the limescale present in the water; therefore performing maintenance/cleaning on it is essential for correct operation.

NOTICE

MALFUNCTIONING OF THE EQUIPMENT

Only carry out boiler maintenance in accordance with the instructions provided in the Maintenance chapter of this manual.

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

⚠ ⚠ DANGER

RISK OF ELECTRIC SHOCK OR ELECTRIC ARC

- Any procedure on the humidifier, including maintenance of any type, must only be carried out while the power supply is disconnected.
- In the event of water leakage, disconnect the humidifier power supply immediately.

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

⚠ ⚠ DANGER

RISK OF ELECTRIC SHOCK, EXPLOSION OR ELECTRIC ARC

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

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

⚠ ⚠ DANGER

RISK OF ELECTRIC SHOCK OR ELECTRIC ARC

In the event of water leakage, disconnect the humidifier power supply immediately.

6.5 Cleaning the boiler

- Drain the humidifier manually (for **EHKT** see: ***"4.2.4 MANUAL DRAINING" ON PAGE 29***;
  for **EHKX** see: ***"4.4.4 MANUAL DRAINING" ON PAGE 34***);
- Disconnect the machine power supply using the external isolator;
- Open the humidifier walls as described in chapter ***"2. DIMENSIONS AND MECHANICAL INSTALLATION" ON PAGE 105***;
- 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 a citric acid solution for a few hours and then repeat the previous step;
- Wash the whole boiler in running water to flush away any material removed by hand;
- Carefully refit the central seal in position and close the boiler with the screws in the coupling area;
- Reassemble the boiler by following the removal procedure in reverse.
- Check that the electrodes are securely fastened to the boiler and make good electrical connections by securing the cable lugs in such a way that the wiring harness cannot become loose during normal humidifier operation.

⚠ ⚠ DANGER

LOOSE WIRING CAUSES ELECTRIC SHOCKS AND OVERHEATING

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

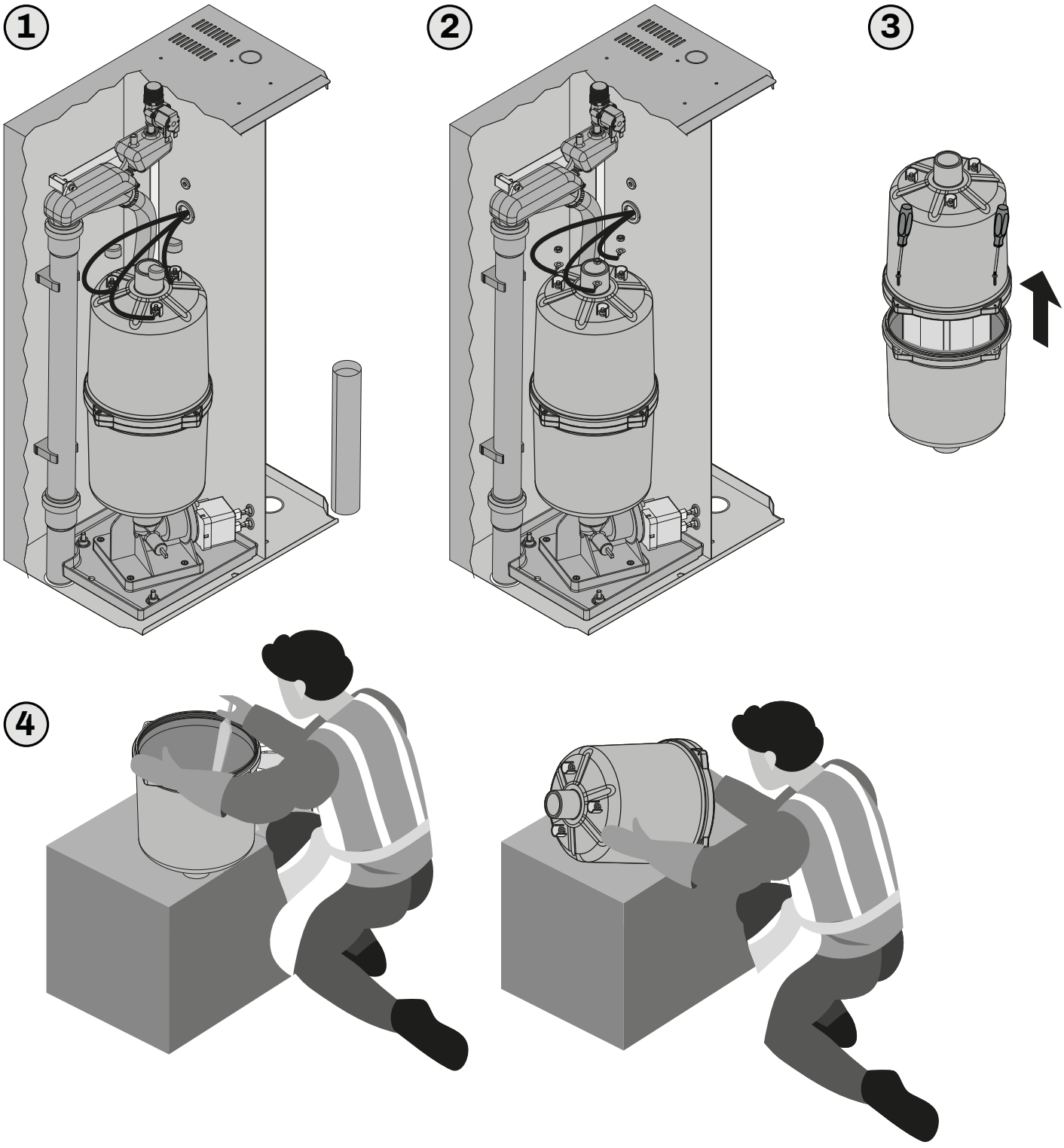


Fig. 114. *Cleaning the boiler*

6.6 Replacing the boiler

- Drain the humidifier manually (for **EHKT** see: ***"4.2.4 MANUAL DRAINING" ON PAGE 29***; for **EHKX** see: ***"4.4.4 MANUAL DRAINING" ON PAGE 34***);
- Disconnect the machine power supply using the external isolator;
- Open the humidifier walls as described in chapter ***"2. DIMENSIONS AND MECHANICAL INSTALLATION" ON PAGE 105***;
- 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 ***"6.7 FITTING THE BOILER" ON PAGE 144***;
- Depending on the **Zephyr** humidifier you have, make sure that the cable connections are tightened properly (see ***"3. ELECTRICAL CONNECTIONS" ON PAGE 114***);
- 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.

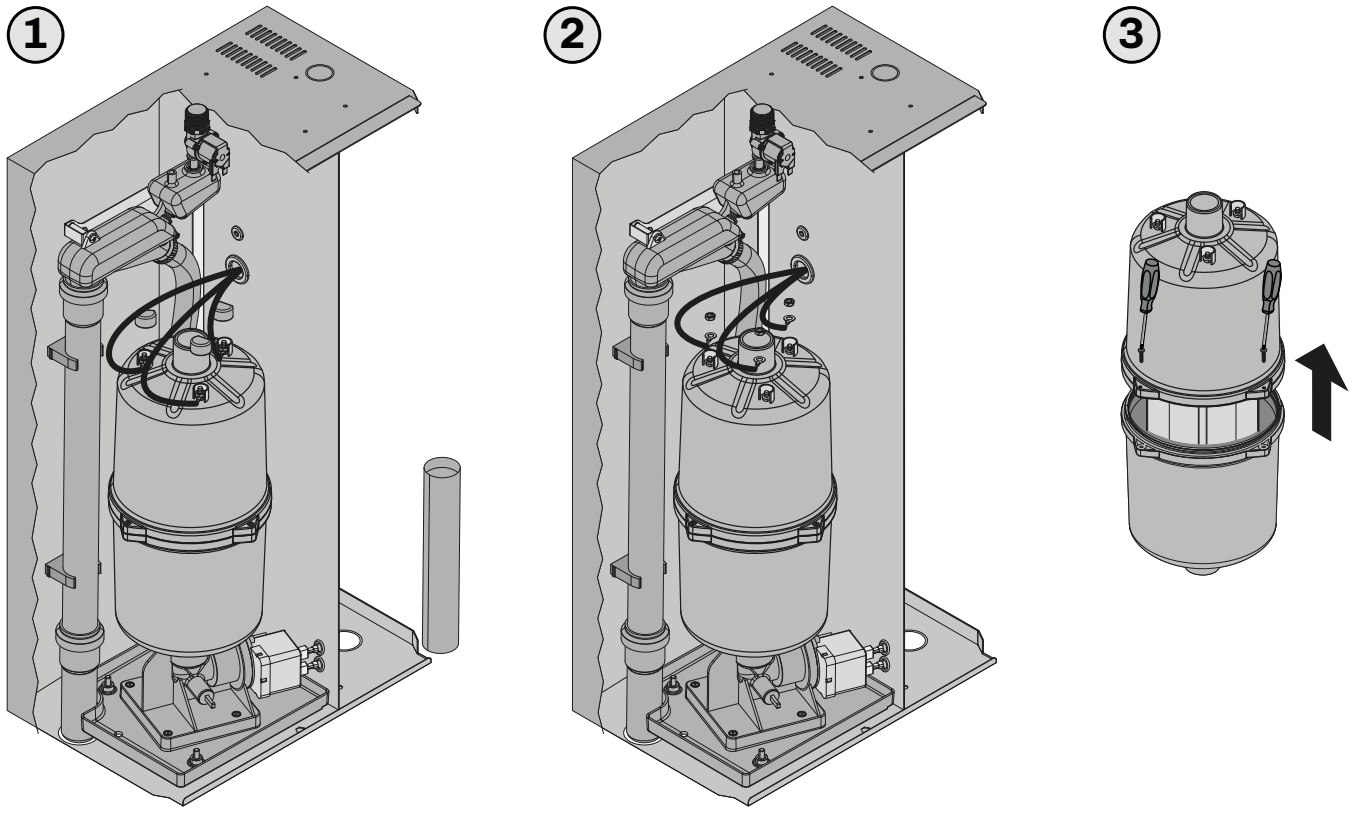


Fig. 115. *Replacing the boiler*

6.7 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 wall as described in chapter ***"2. DIMENSIONS AND MECHANICAL INSTALLATION" ON PAGE 105***
- 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.

6.8 Cleaning/replacing the electrodes

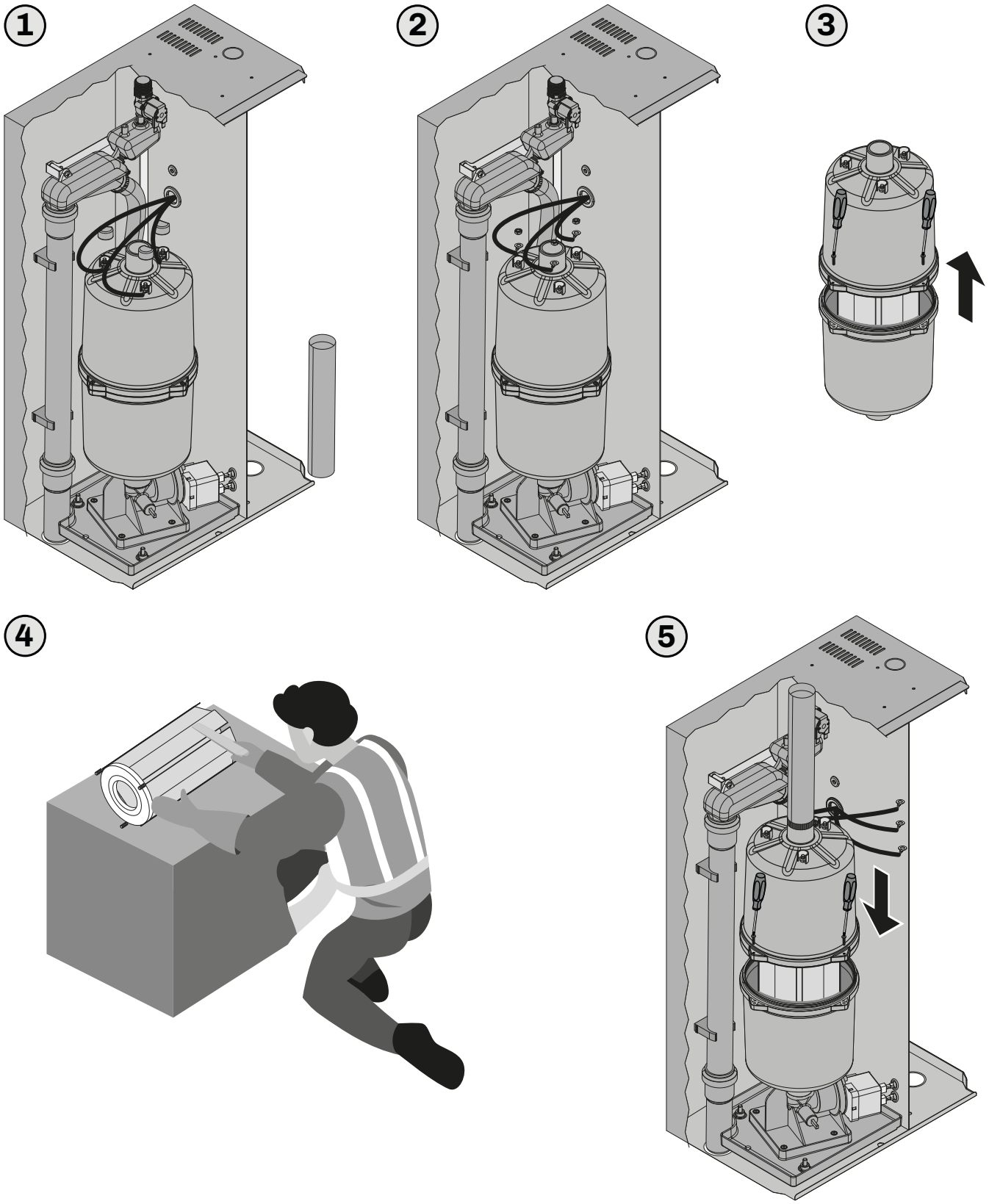


Fig. 116. *Cleaning/replacing the electrodes*

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

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

7. SPARE PARTS

Chapter content

This chapter contains the following information:

7.1 Plumbing spare parts

7.1.1 Table of plumbing spare part codes

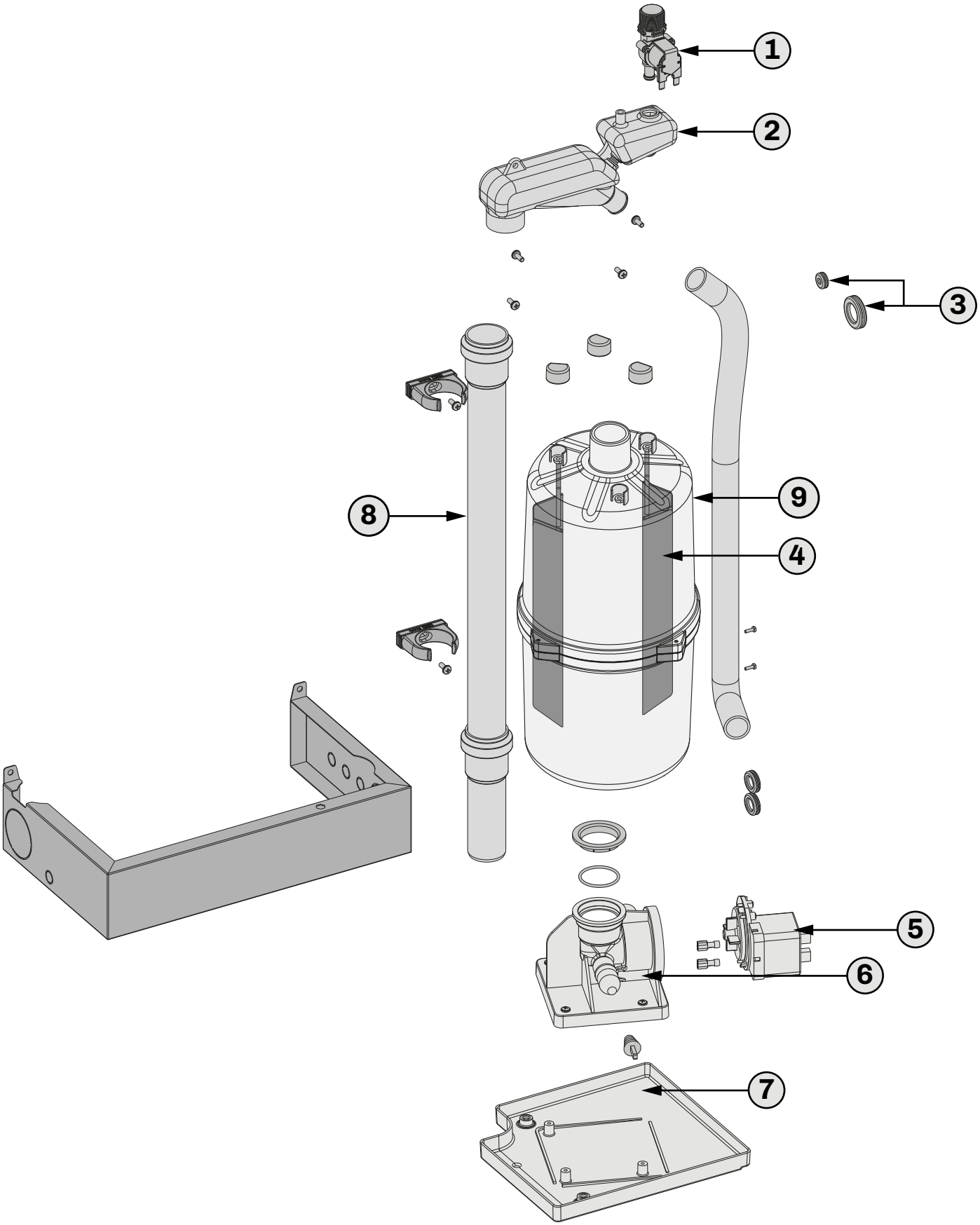


Fig. 117. EHKT/EHKX series spare parts - Plumbing Part

Ref.	P/n	Description
①	**EHKT0K01**	Inlet solenoid valve EHK•10...EHK•15
	EHKT0K02	Inlet solenoid valve EHK•20...EHK•100
	EHKT0K03	Inlet solenoid valve EHK•03...EHK•05
②	**EHKT0K07**	Filling tank
③	**EHKT0K09**	XS-S-M boiler seal kit
	EHKT0K10	L boiler seal kit
④	**EHKT0K21**	Set of two electrodes, boiler **EHBK005M00S**
	EHKT0K22	Set of two electrodes, boiler **EHBK005MHCS**
	EHKT0K23	Set of two electrodes, boiler **EHBK005MLCS**
	EHKT0K24	Set of three electrodes, boiler **EHBK005T00S**
	EHKT0K25	Set of three electrodes, boiler **EHBK005THCS**
	EHKT0K26	Set of three electrodes, boiler **EHBK005TLCS**
	EHKT0K27	Set of three electrodes, boiler **EHBK005T00S**
	EHKT0K28	Set of three electrodes, boiler **EHBK005THCS**
	EHKT0K29	Set of three electrodes, boiler **EHBK005TLCS**
	EHKT0K30	Set of three electrodes, boiler **EHBK015T00M**
	EHKT0K31	Set of three electrodes, boiler **EHBK015THCM**
	EHKT0K32	Set of three electrodes, boiler **EHBK015TLCM**
	EHKT0K33	Set of three electrodes, boiler **EHBK040T00L**
	EHKT0K34	Set of three electrodes, boiler **EHBK040THCL**
	EHKT0K35	Set of three electrodes, boiler **EHBK040TLCL**
	EHKT0K36	Set of three electrodes, boiler **EHBK050T00L**
	EHKT0K37	Set of three electrodes, boiler **EHBK050THCL**
	EHKT0K38	Set of three electrodes, boiler **EHBK050TLCL**

Ref.	P/n	Description
⑤	**EHKT0K04**	Electric outlet pump
⑥	**EHKT0K05**	Inlet/outlet manifold
⑦	**EHKT0K08**	Bottom tray
⑧	**EHKT0K06**	Outlet circuit kit
⑨	**EHBK005M00M**	Standard cleanable boiler, 3–5 kg/h single-phase models
	EHBK005MLCM	Cleanable boiler, 3–5 kg/h single-phase models, low conductivity
	EHBK005MHCM	Cleanable boiler, 3–5 kg/h single-phase models, high conductivity
	EHBK005T00M	Standard cleanable boiler, 3–5 kg/h three-phase models
	EHBK005TLCM	Cleanable boiler, 3–5 kg/h three-phase models, low conductivity
	EHBK005THCM	Cleanable boiler, 3–5 kg/h three-phase models, high conductivity
	EHBK015T00M	Standard cleanable boiler, 10–15 kg/h three-phase models
	EHBK015TLCM	Cleanable boiler, 10–15 kg/h three-phase models, low conductivity
	EHBK015THCM	Cleanable boiler, 10–15 kg/h three-phase models, high conductivity
	EHBK040T00L	Standard cleanable boiler, 20–30–40 kg/h three-phase models
	EHBK040TLCL	Cleanable boiler, 20–30–40 kg/h three-phase models, low conductivity
	EHBK040THCL	Cleanable boiler, 20–30–40 kg/h three-phase models, high conductivity
	EHBK050T00L	Standard cleanable boiler, 50 kg/h three-phase models
	EHBK050TLCL	Cleanable boiler, 50 kg/h three-phase models, low conductivity
	EHBK050THCL	Cleanable boiler, 50 kg/h three-phase models, high conductivity

7.2 Electrical spare parts

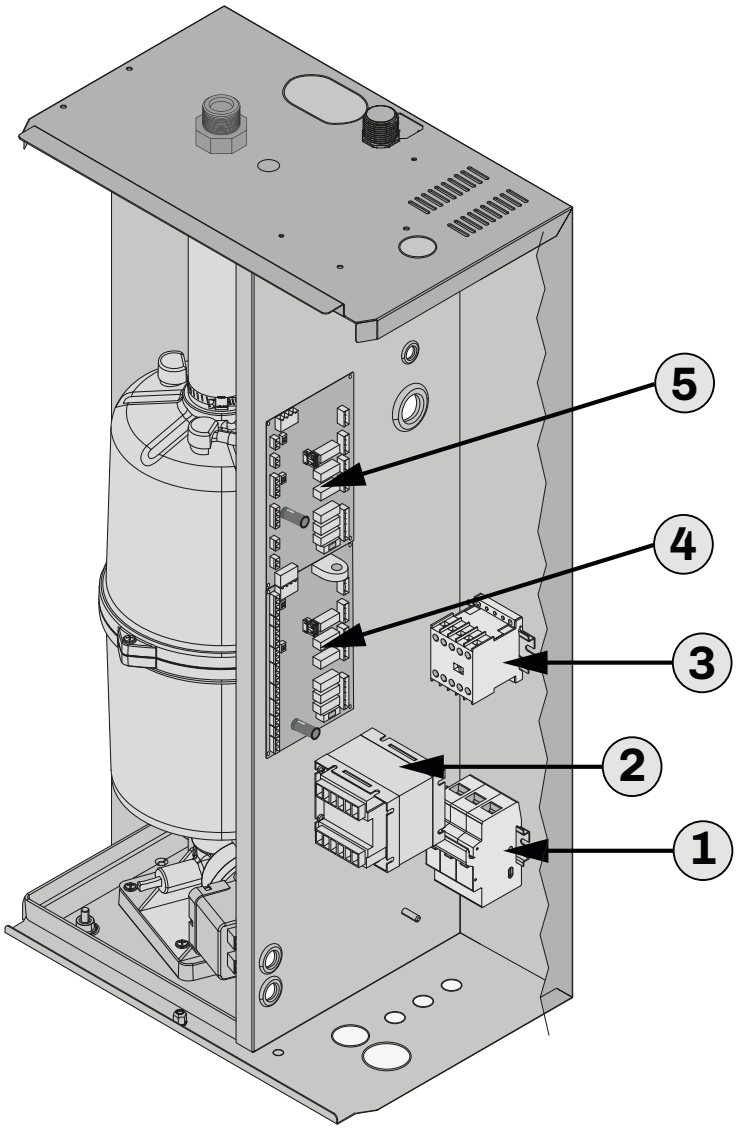


Fig. 118. EHKT/EHKX series spare parts - Electrical Part

7.2.1 Table of electrical spare part codes

Ref.	P/n	Description
①	**EHKT0K71**	Fuse holder base, 2P 10x38 gG
	EHKT0K72	Fuse holder base, 3P 10x38 gG
	EHKT0K73	Fuse holder base, 3P 14x51 gG
	EHKT0K74	Fuse holder base, 3P 22x58 gG
②	**0101010020**	Transformer, 230/24 V
	0101014020	Transformer, 400/24 V
③	**0153411020**	Contactor, 230/400 Vac 24 Vac 20 A
	0153431001	Contactor, 230/400 Vac 24 Vac 25 A
	0153431003	Contactor, 230/400 Vac 24 Vac 45 A
	0153431004	Contactor, 230/400 Vac 24 Vac 56–60 A
	0153431005	Contactor, 400 Vac 24 Vac 70 A
④	**EHKT0K90**	**EHKT** electronic control
	EHKX0K90	**EHKX** electronic control
⑤	**EHKX0K91**	Expansion electronic control for **EHKX060** / **EHKX080** / **EHKX100**

Ref.	P/n	Description
---	**EHKT0K51**	Boiler cable kit, MxxS 230 Vac single-phase
	EHKT0K52	Boiler cable kit, TxxS 400 Vac three-phase
	EHKT0K53	Boiler cable kit, TxxS 230 Vac three-phase
	EHKT0K54	Boiler cable KIT, TxxM 230 Vac three-phase
	EHKT0K55	Boiler cable KIT, TxxM 400 Vac three-phase
	EHKT0K56	Boiler cable kit, TxxL 230 Vac three-phase
	EHKT0K57	Boiler cable kit, TxxL 400 Vac three-phase
---	**EHKT0K75FUSE**	Fuse kit, 10pcs 10x38 gG 10 A
	EHKT0K76FUSE	Fuse kit, 10pcs 10x38 gG 16 A
	EHKT0K77FUSE	Fuse kit, 10pcs 10x38 gG 32 A
	EHKT0K78FUSE	Fuse kit, 10pcs 14x51 gG 50 A
	EHKT0K79FUSE	Fuse kit, 10pcs 22x58 gG 100 A
	EHKT0K80FUSE	Fuse kit, 10pcs 22x58 gG 125 A

8. DIAGNOSTICS

Chapter content

This chapter contains the following information:

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

8.1 Table of Zephyr alarms

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

Code	Description	Cause	Effects	Solution
AL08	Alarm: boiler service life	Hours of boiler operation > **M12**	• Fixed alarm icon • Showing **AL08** • Alarm relay ON • Humidifier OFF • Recording **AL08** in the log	Replace the boiler
AL09	Alarm: solenoid valve maintenance	Hours of solenoid valve operation > **M13**	• Fixed alarm icon • **AL09** displayed • No effect on regulation • **AL09** recorded in the log	• Clean the water inlet filter • Check for leaks • Replace the inlet solenoid valve if necessary • Reset the counter
AL10	Alarm: pump maintenance	Hours of pump operation > **M14**	• Fixed alarm icon • **AL10** displayed • No effect on regulation • **AL10** recorded in the log	• Clean the pump and the inlet and outlet manifold • Clean the inlet/outlet circuit • Check for leaks • Replace the outlet pump if necessary • Reset the counter
AL11	Alarm: fan maintenance	Hours of fan operation > **M15**	• Fixed alarm icon • **AL11** displayed • No effect on regulation • **AL11** recorded in the log	• Clean the fans and grilles • Remove residues and dust incrustations • Replace any fans that are not working • Reset the counter
W12	Warning: low humidity	Humidity production < **M5** for a time > **M7**	• Fixed alarm icon • Showing **W12** • Alarm relay ON • Recording **W12** in the log	• If it occurs together with other alarms, check accordingly • If the humidifier is underdimensioned, contact the system designer • Check **R6** and set it > 70%
W13	Warning: high humidity	Humidity production > **M6** for a time > **M7**	• Fixed alarm icon • Showing **W13** • Alarm relay ON • Recording **W13** in the log	• If it occurs together with other alarms, check accordingly • If the humidifier is overdimensioned, contact the system designer • Check **R6** and set it < 70%
AL14	Alarm: temperature sensor **S1**	• Probe not working • Probe not connected properly • Incorrect probe type	• Fixed alarm icon • **AL14** displayed • Humidifier OFF • **AL14** recorded in the log	• Check the sensor type • Check the sensor wiring • Change the sensor type • Check for electrical noise
AL15	Alarm: humidity sensor **S2**	• Sensor not working • Sensor not connected correctly • Control board not working	• Fixed alarm icon • **AL15** displayed • Alarm relay ON • Humidifier OFF • **AL15** recorded in the log	• Check the sensor type (**P2**) • Check the sensor wiring • Change the sensor type • Check for electrical noise
AL16	Alarm: humidity limit sensor **S3**		• Fixed alarm icon • **AL16** displayed • Alarm relay ON • Humidifier OFF • **AL16** recorded in the log	• Check the sensor type (**P7**) • Check the sensor wiring • Change the sensor type • Check for electrical noise
AL17	Alarm: proportional request from regulator		• Fixed alarm icon • **AL17** displayed • Alarm relay ON • Humidifier OFF • **AL17** recorded in the log	• Check the regulator wiring • Check the regulator type
AL18	Alarm: current sensor **CT**		• Fixed alarm icon • **AL18** displayed • Alarm relay ON • Humidifier OFF • **AL18** recorded in the log	• Check for water leaks • Check the electrical phase wiring on the boiler and contactor • Check that the TA is working • If the control board or current sensor are not working, replace the control board

Code	Description	Cause	Effects	Solution
AL19	Alarm: temperature sensor 1	• Probe not working • Probe not connected properly • Incorrect probe type	• Fixed alarm icon • **AL19** displayed • Alarm relay ON • Humidifier OFF • **AL19** recorded in the log	• Check the sensor type • Check the sensor wiring • Change the sensor type • Check for electrical noise
AL20	Alarm: temperature sensor 2		• Fixed alarm icon • **AL20** displayed • Alarm relay ON • Humidifier OFF • **AL20** recorded in the log	
AL21	Alarm: boiler 2 current sensor	• Phase via sensor disconnected • Control board not working • Current sensor not working • Inlet solenoid valve not working • Possible water leakage	• Fixed alarm icon • **AL21** displayed • Alarm relay ON • Humidifier OFF • **AL21** recorded in the log	• Check for water leaks • Check the electrical phase wiring on the boiler and contactor • Check that TA 2 is working • If the control board or current sensor are not working, replace the control board
AL22	Alarm: high temperature in wellness room	Wellness room temperature > **M20**	• Fixed alarm icon • **AL22** displayed • Alarm relay ON • Humidifier OFF • **AL22** recorded in the log	• Wait until room temperature < **M20** - 3 °C • Check and eliminate the cause of wellness room temperature > **M20**
AL23	Alarm: expansion board second boiler offline	No communication between control board and expansion device	• **AL23** displayed • Alarm relay ON • All regulators for the second boiler are switched off • **AL23** recorded in the log	• Restore communication between control board and expansion device • Automatic reset
AL24	Alarm master offline (only on slave)	No communication between slave humidifier and master humidifier when **nTyP** ≠ 0	• Showing **AL24** • Alarm relay ON • All regulators related to the Master humidifier are switched off (slaves operate as stand-alone) • Recording **AL24** in the log	• Restore communication between slave humidifier and master humidifier • Automatic reset
AL25	Alarm: slave 1 offline or alarmed (only on master)	• No communication between master humidifier and slave 1 humidifier when **nTyP** ≠ 0 • Slave 1 alarmed with regulation block	• Showing **AL25** • Alarm relay ON • Slave 1 OFF, other humidifiers operate normally • Recording **AL25** in the log	• Restore communication between master humidifier and slave 1 humidifier • Automatic reset
AL26	Alarm: slave 2 offline or alarmed (only on master)	• No communication between master humidifier and slave 2 humidifier when **nTyP** ≠ 0 • Slave 2 alarmed with regulation block	• Showing **AL26** • Alarm relay ON • Slave 2 OFF, other humidifiers operate normally • Recording **AL26** in the log	• Restore communication between master humidifier and slave 2 humidifier • Automatic reset
AL27	Alarm: slave 3 offline or alarmed (only on master)	• No communication between master humidifier and slave 3 humidifier when **nTyP** ≠ 0 • Slave 3 alarmed with regulation block	• Showing **AL27** • Alarm relay ON • Slave 3 OFF, other humidifiers operate normally • Recording **AL27** in the log	• Restore communication between master humidifier and slave 3 humidifier • Automatic reset
AL28	Alarm: slave 4 offline or alarmed (only on master)	• No communication between master humidifier and slave 4 humidifier when **nTyP** ≠ 0 • Slave 3 alarmed with regulation block	• Showing **AL28** • Alarm relay ON • Slave 4 OFF, other humidifiers operate normally • Recording **AL28** in the log	• Restore communication between master humidifier and slave 4 humidifier • Automatic reset
W29	Warning: +30% overcurrent boiler 2	• Overcurrent between the electrodes • Electrodes not working or shorted • Current sensor not working • Control board not working • Boiler compromised • High electrical conductivity • Use softened water	• Fixed alarm icon • Showing **W29** • Partial draining • Recording **W29** in the log	• Carry out maintenance • Replace boiler 2 • Check that boiler 2 outlet pump is working • Check that the TA is working (if external) • Check the water properties
AL29	Alarm: +50% overcurrent boiler 2		• Fixed alarm icon • Showing **AL29** • Humidifier OFF • Recording **AL29** in the log	

Code	Description	Cause	Effects	Solution
W30	Warning: no boiler 2 production	• Foam in boiler 2 • Water inlet flow rate too low • Boiler 2 failing • Water pipes or filter clogged • Backpressure at the steam outlet is greater than rated value • Very low electrical conductivity • No production for a long time	• Fixed alarm icon • Showing **W30** • No effect on regulation • Recording **W30** in the log	• Check the water mains flow rate • Check that boiler 2 solenoid valve is working • Carry out maintenance on boiler 2 solenoid valve • Replace the solenoid valve • Check for foam • Check the backpressure in the steam outlet duct
AL30	Alarm: no boiler 2 production		• Fixed alarm icon • Showing **AL30** • Alarm relay ON • Humidifier OFF if **AL30** > 100 h • Recorded **AL30** in the log	
AL31	Alarm: no boiler 2 water	• Water fill time > **c10** • Inlet filter clogged • Solenoid valve not working • Water pressure too low • Water inlet circuit leaking	• Fixed alarm icon • Showing **AL31** • Humidifier inhibited for 15 minutes • Recording **AL31** in the log	• Check the water mains flow rate • Check that boiler 2 solenoid valve is working • Carry out maintenance on boiler 2 solenoid valve • Replace the solenoid valve • Check and clean the internal pipes and inlet/outlet manifold • Cleaning boiler 2 • Replace boiler 2 (if there is significant limescale residue)
W32	Warning: insufficient draining boiler 2	• Insufficient water drained • Water inlet/outlet clogged	• Fixed alarm icon • Showing **W32** • Alarm relay ON • Recording **W32** in the log	• Cleaning boiler 2 • Replace the boiler (if there is significant limescale residue) • Clean the pump, outlet manifold and outlet circuit • Replace the outlet pump if it is not working
W33	Warning: boiler 2 foam	The water in boiler 2 reaches the maximum level sensor	• Fixed alarm icon • Showing **W33** • Anti-foam washing activated • Recording **W33** in the log	• Automatic reset • If it persists over time, disconnect the humidifier water connections and let the water drain, then wash and clean the boiler • Check if the filling water is softened
W34	Warning: suspected high electrical conductivity boiler 2	• High current • Low filling frequency	• Fixed alarm icon • Showing **W34** • Automatic washing activated • Recording **W34** in the log	• Carry out maintenance • Check the inlet water properties
W35	Warning: boiler 2 maintenance	Hours of boiler 2 operation > **M11**	• Fixed alarm icon • Showing **W35** • Alarm relay ON • Recording **W35** in the log	Clean the boiler
AL35	Alarm: boiler 2 service life	Hours of boiler 2 operation > **M12**	• Fixed alarm icon • Showing **AL35** • Alarm relay ON • Humidifier OFF • Recording **AL35** in the log	Replace boiler 2
AL36	Alarm: boiler 2 solenoid valve maintenance	Hours of solenoid valve 2 operation > **M13**	• Fixed alarm icon • Showing **AL36** • No effect on regulation • Recording **AL36** in the log	• Clean the water inlet filter • Check for leaks • Replace the inlet solenoid valve if necessary • Reset the counter
AL37	Alarm: boiler 2 pump maintenance	Hours of pump operation > **M14**	• Fixed alarm icon • Showing **AL37** • No effect on regulation • Recording **AL37** in the log	• Clean the pump and the inlet and outlet manifold • Clean the inlet/outlet circuit • Check for leaks • Replace the outlet pump if necessary • Reset the counter

Code	Description	Cause	Effects	Solution
AL38	Alarm: boiler 2 fan maintenance	Hours of fan operation > **M15**	• Fixed alarm icon • Showing **AL38** • No effect on regulation • Recording **AL38** in the log	• Clean the fans and grilles • Remove residues and dust incrustations • Replace any fans that are not working • Reset the counter

9. WIRING DIAGRAMS

Chapter content

This chapter contains the following information:

9.1 Wiring diagram EHKT003M2 / EHKT005M2

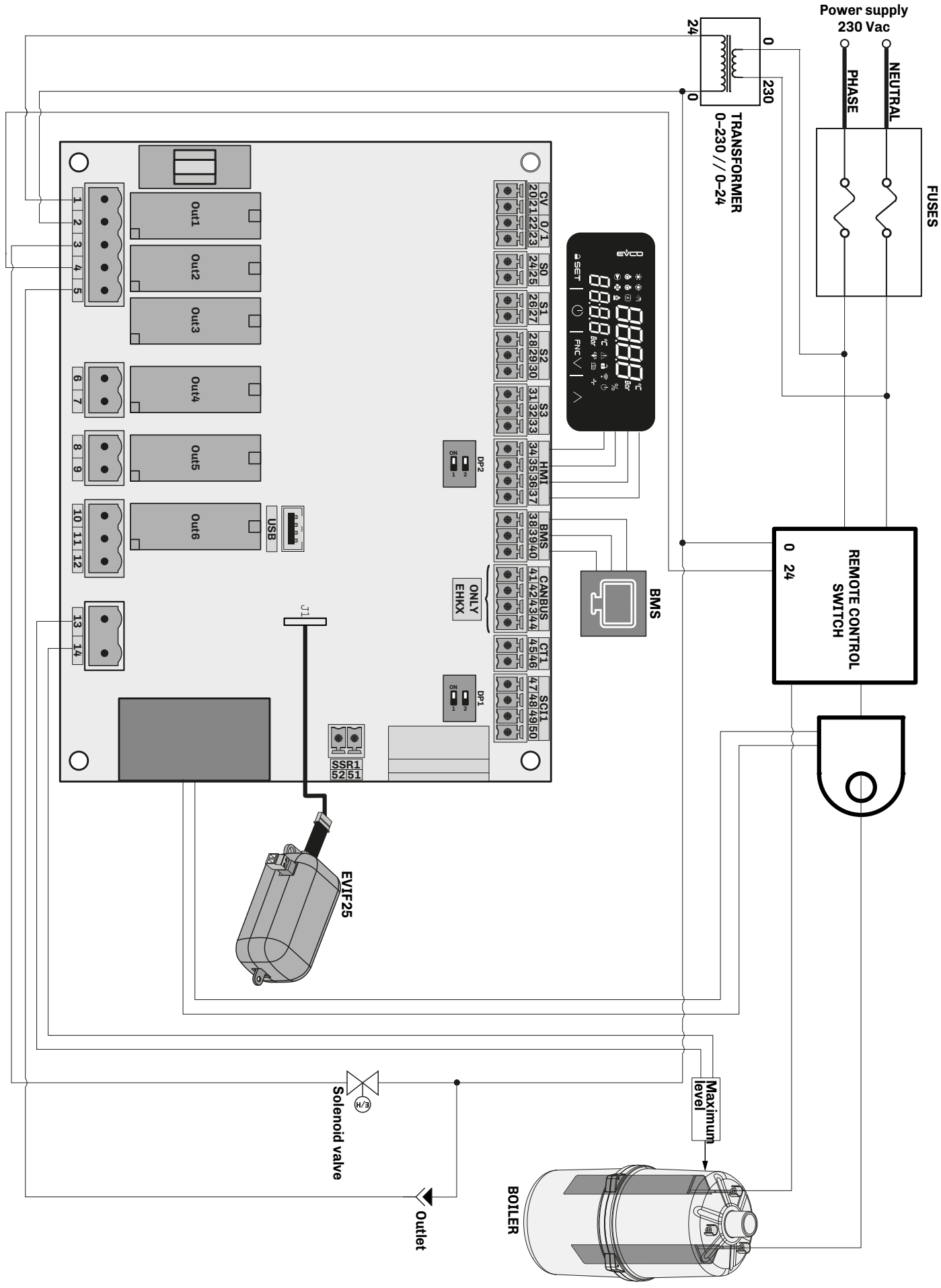


Fig. 119. *Wiring diagram models EHKT003M2 / EHKT005M2*

9.2 Wiring diagram EHKT003T2 / EHKT005T2 / EHKT010T2 / EHKT015T2 / EHKT020T2

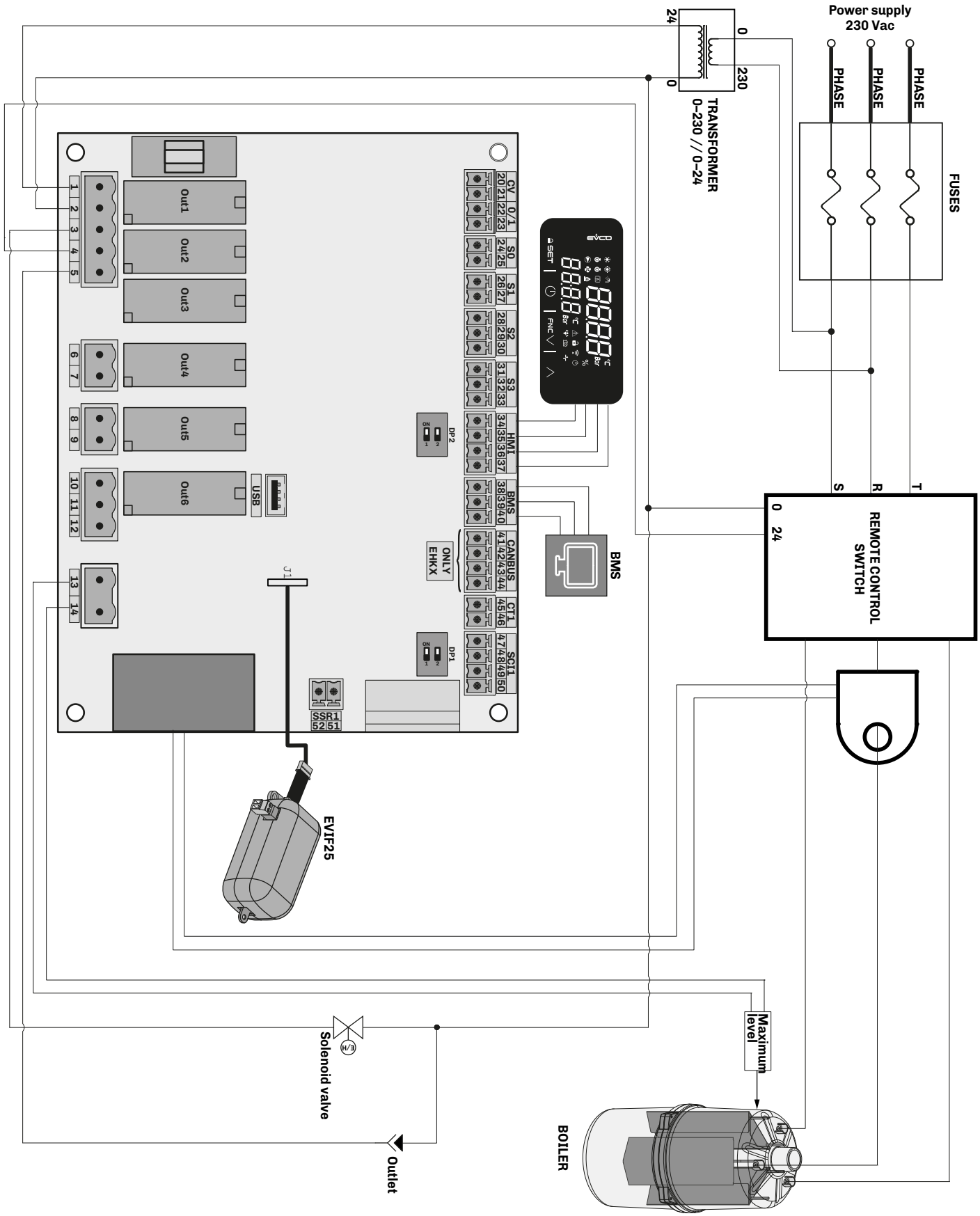


Fig. 120. *Wiring diagram models EHKT003T2 / EHKT005T2 / EHKT010T2 / EHKT015T2 / EHKT020T2*

9.3 Wiring diagram EHKT003T4 / EHKT005T4 / EHKT010T4 / EHKT015T4

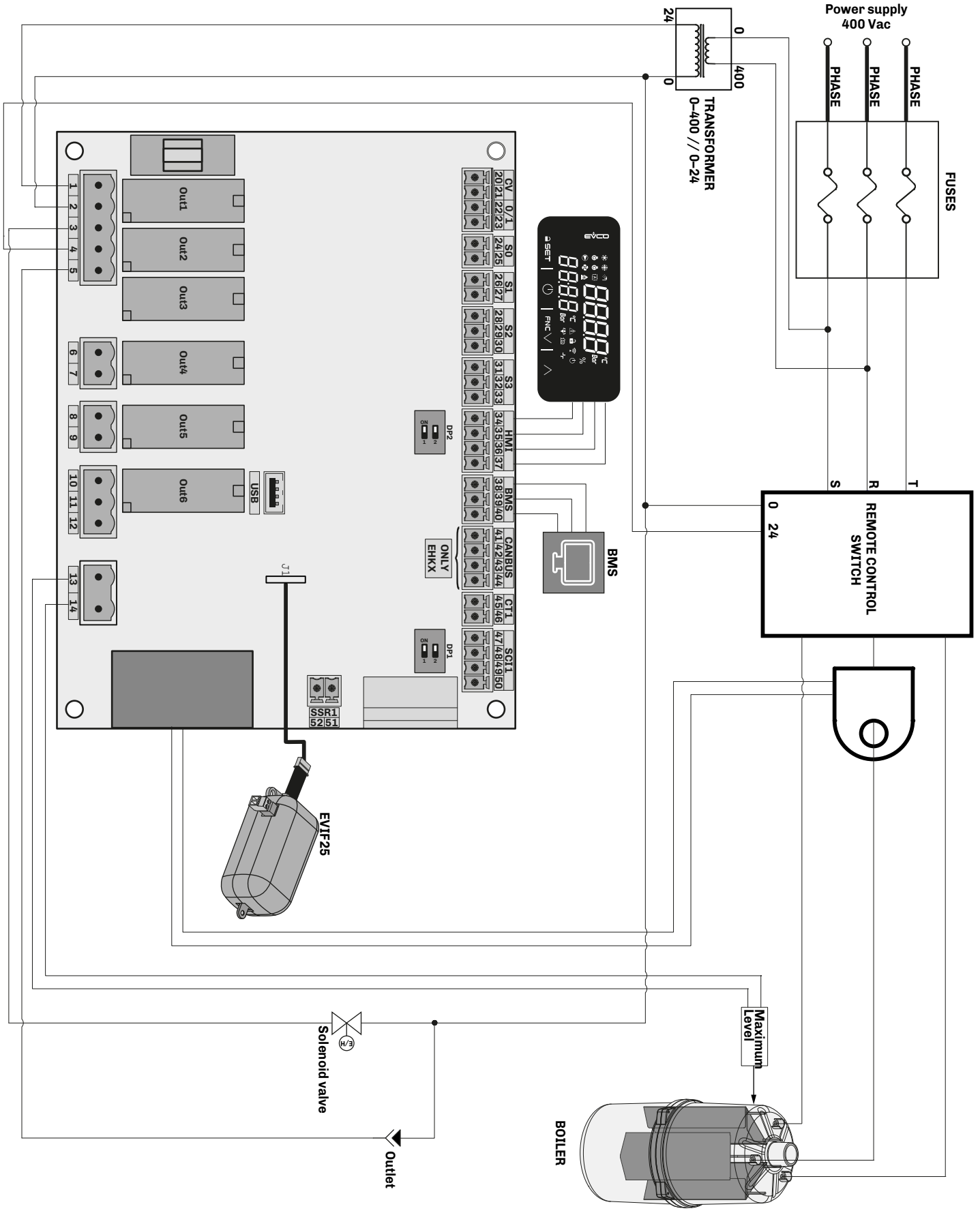


Fig. 121. *Wiring diagram models EHKT003T4 / EHKT005T4 / EHKT010T4 / EHKT015T4*

9.4 Wiring diagram EHKT020T4 / EHKT030T4 / EHKT040T4

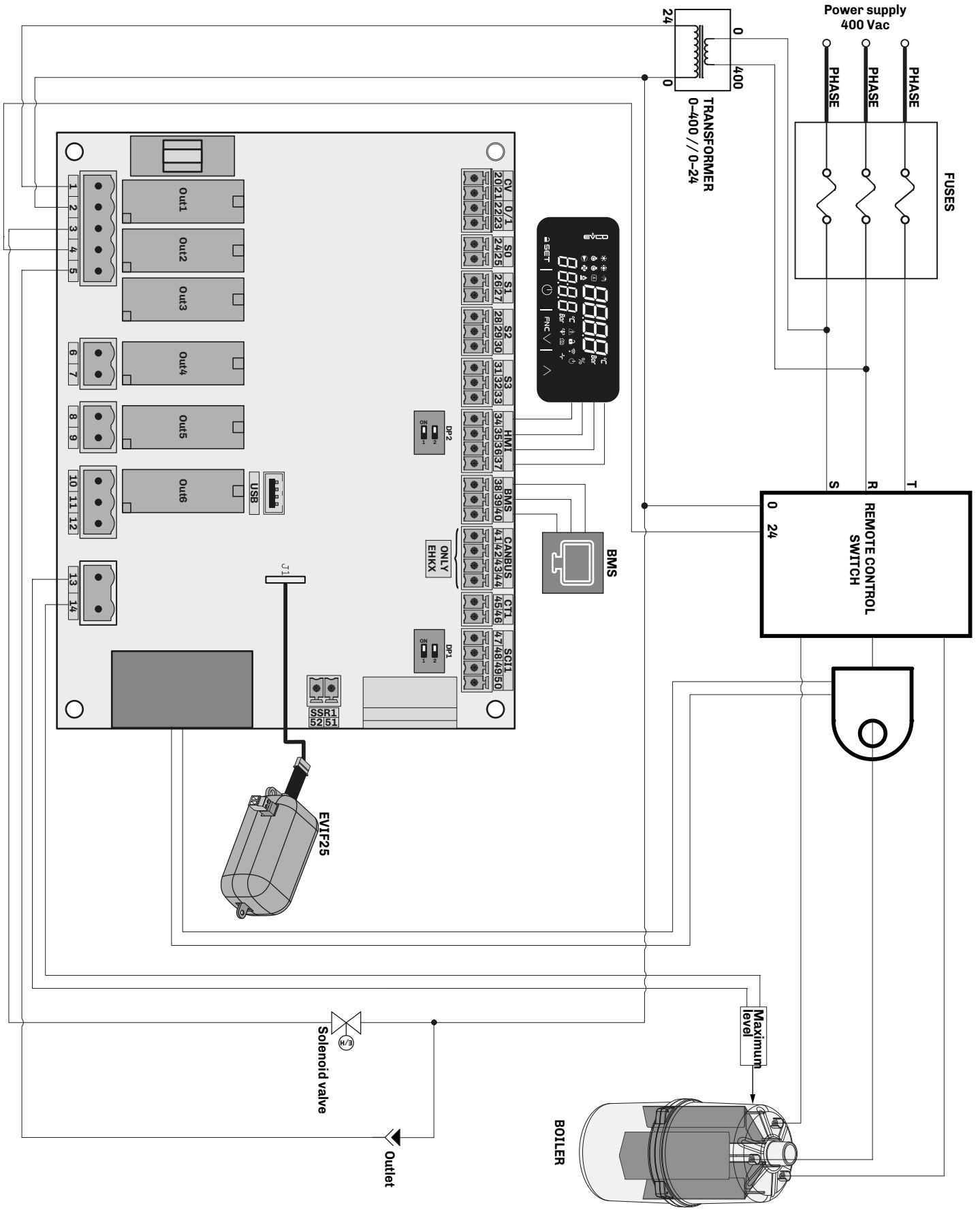


Fig. 122. *Wiring diagram models EHKT020T4 / EHKT030T4 / EHKT040T4*

9.5 Wiring diagram EHKT060T4

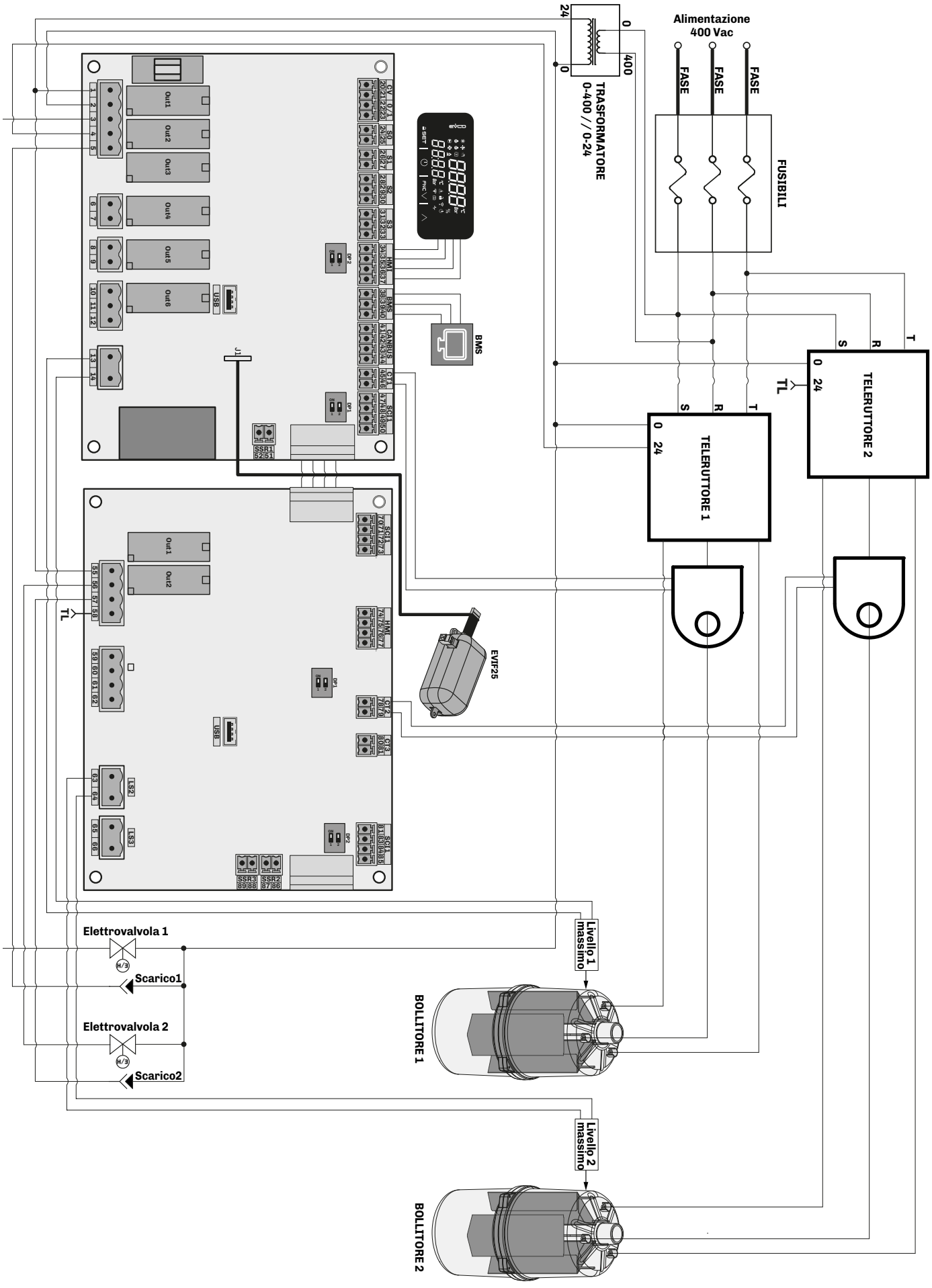


Fig. 123. *Wiring diagram models EHKT060T4*

9.6 Wiring diagram EHKX003M2 / EHKX005M2

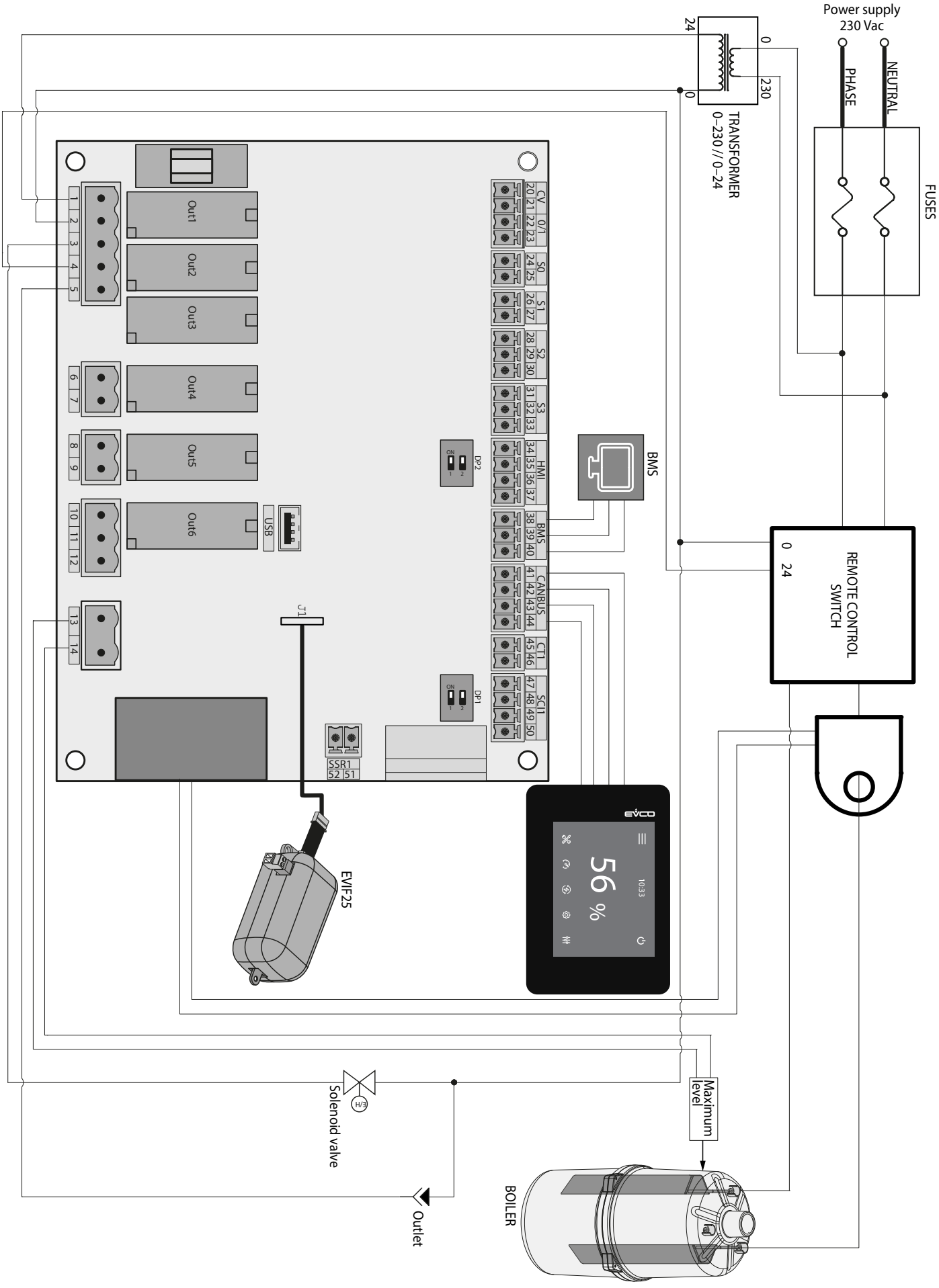


Fig. 124. *Wiring diagram models EHKX003M2 / EHKX005M2*

9.7 Wiring diagram EHKX003T2 / EHKX005T2 / EHKX010T2 / EHKX015T2

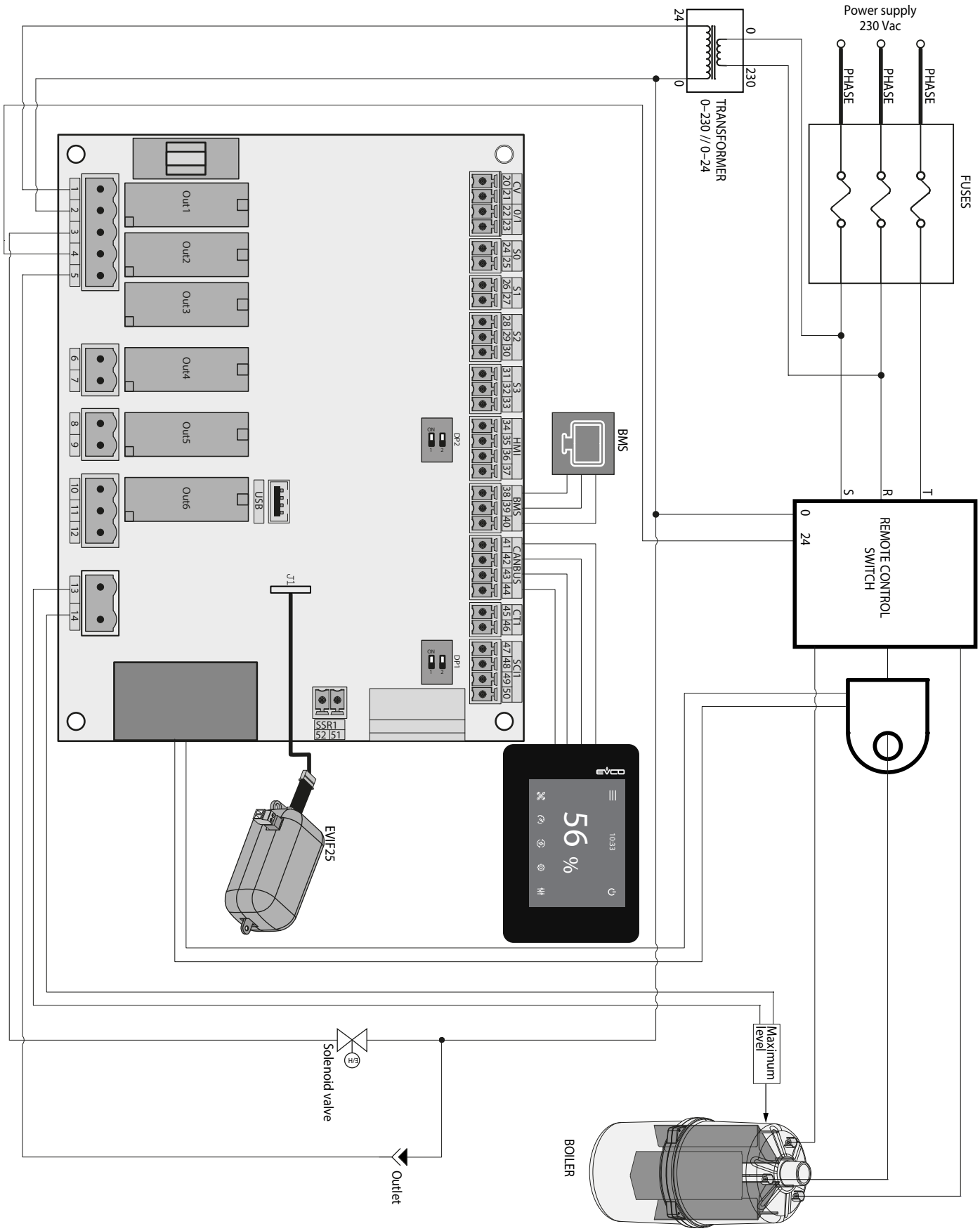


Fig. 125. *Wiring diagram models EHKX003T2 / EHKX005T2 / EHKX010T2 / EHKX015T2*

9.8 Wiring diagram EHKX003T4 / EHKX005T4 / EHKX010T4 / EHKX015T4 / EHKX020T4 / EHKX030T4 / EHKX040T4

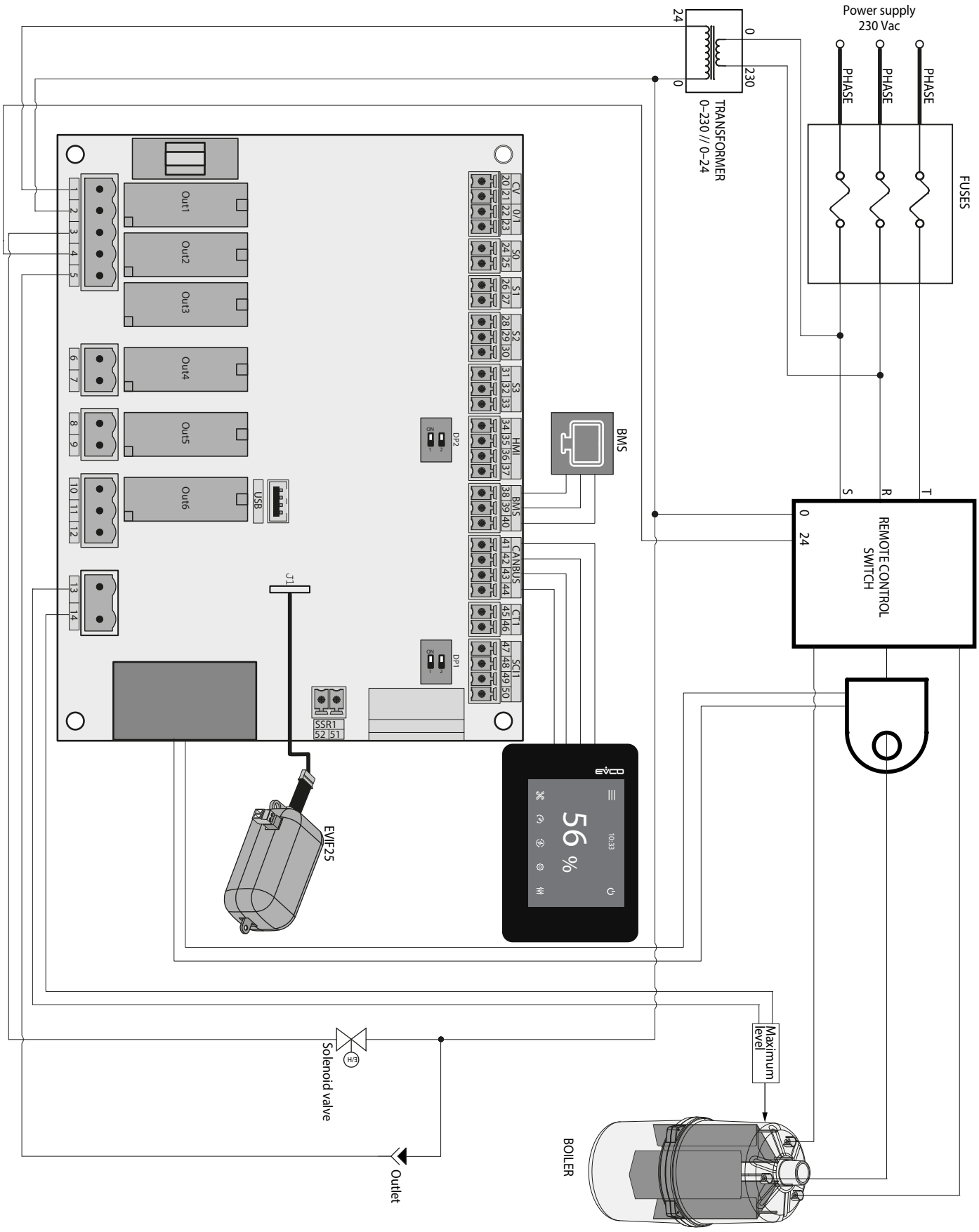


Fig. 126. *Wiring diagram models EHKX003T4 / EHKX005T4 / EHKX010T4 / EHKX015T4 / EHKX020T4 / EHKX030T4 / EHKX040T4*

9.9 Wiring diagram EHKX060T4 / EHKX080T4 / EHKX0100T4

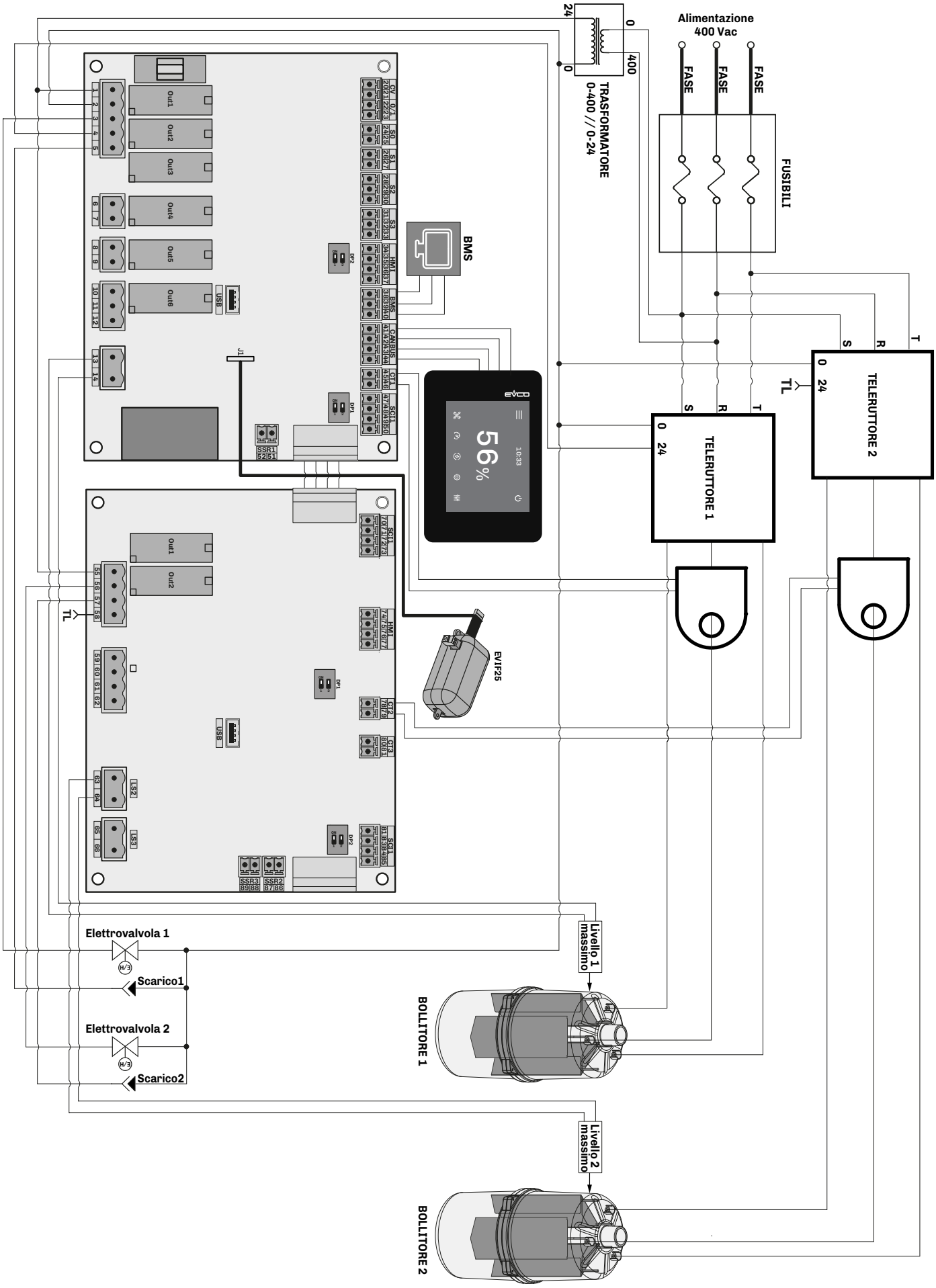


Fig. 127. *Wiring diagram models EHKX060T4 / EHKX080T4 / EHKX0100T4*

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