HUMIDIFIERS

Zephyr Series

Stand-alone immersed electrode humidifiers





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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 - 08/2023

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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

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

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

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

Terms and Conditions of use

Permitted use

The Zephyr 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 gualified 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

A A 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.

A A 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.

A A 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".

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).

HOT WATER VAPOUR

Do not touch the equipment while it is running.

A 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)).

A 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:

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1. INTRODUCTION

CHAPTER content

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1.1 Introduction to Zephyr

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

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

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

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

1.2 Available models

The Zephyr series consists of two models:

- **EHKT**: Immersed electrode humidifier with 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
ЕНКТОЗОТ4	EHKT immersed electrode humidifier, 30 kg/h, 400 Vac three-phase
EHKT040T4	EHKT immersed electrode humidifier, 40 kg/h, 400 Vac three-phase
ЕНКТО60Т4	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

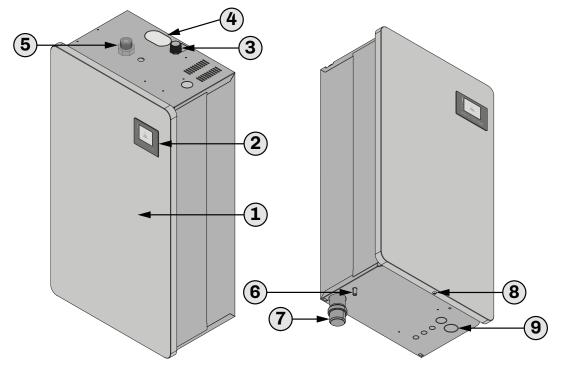


Fig. 1. External overview of the product

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

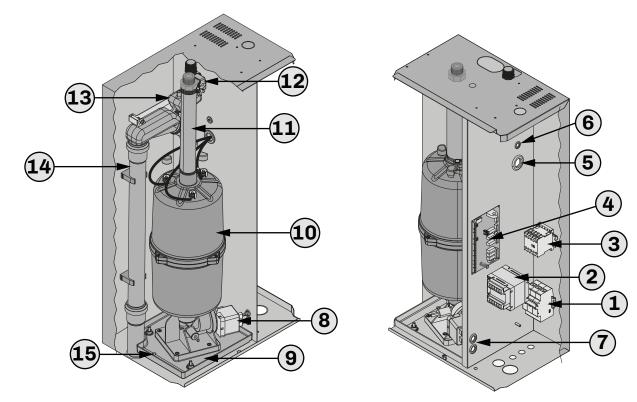


Fig. 2. Internal overview of the product

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

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.
EHSROREM	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	anable 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 595% r.H. and -1070 °C range.
EVHP523	420 mA humidity transducer with 595% r.H. range.
EVHTP523	Humidity and temperature transducer, 828 VDC power supply, 2 x 420 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	³ /4" 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					EHK hur	nidifier•				
distributor	EHK•3	EHK•5	EHK•10	EHK•15	EHK•20	EHK•30	EHK•40	EHK•60	EHKX80	EHKX100
EHSD040•	Х	X	X ^(*)							
EHSD060•	Х	Х	Х	X ^(**)	X ^(**)		X ^(**)			
EHSD080•	Х	X	X	х	X	X ^(***)	X ^(***)	X ^(#)	X ^(#)	X ^(#)
EHSD100•			X	X	X	X	Х	X2	X2	X ^(##)
EHSD130•			X	X	X	X	Х	X2	X2	X2
EHSD160•						x	Х	X2	X2	X2
EHSD200•						Х	Х	X2	X2	X2
EHSDY038	Can be	e used to do	uble the ste	am output a	and for smal	l steam emi	ssion ducts	with short s	steam distri	butors
EHSDC038	Х	X	X	X	X	X	X	X	X	X
EHSDW022										
EHSR015M2	Х	Х	Х	Х	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:

Subject	Page
Technical specifications	21

2.1 Technical specifications

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

- :		ЕНКТО•••• / ЕНКХО••••									
Description	MU	03M2	05M2	03T2	05T2	03T4	05T4	10T2	10T4		
Steam production											
Production capacity	kg/h	3	5	3	5	3	5	1	0		
Maximum pressure	Pa (mmH ₂ 0)				1650	(165)					
Connection outside diameter	mm (in.)				38 (2	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		
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 WA	TER SPECI	FICATION	S" ON PAG	E 50			
Supply water electrical conductivity	µS*cm			70125	0 (Standar	rd boiler 30	00700)				
Supply water hardness	°f			55	0 (Standar	d boiler 10	30)				
Supply water pressure	MPa/bar				0.021,	/0.210					
Supply water connection					M 3/4	4" GAS					
Water drain outer dimensions	mm (in.)				40 (1	1.57)					
General specifications											
Dimensions	mm (in.)		SEE '	'2.1 DIME	NSIONS AN	D WEIGH	S" ON PA	GE 41			
IP protection level of the water module		IP20									
Regulation											
Control type/Command signal		ON/OFF Proportional Probe									
Supervision/Configuration					RS-485	MODBUS sion Wi-Fi					

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

Description		EHKT0•••• / EHKX0••••							
Description	MU	15T2	15T4	20T2	20T4	30T4	40T4		
Steam production									
Production capacity	kg/h	15	15	20	20	30	40		
Maximum pressure	Pa (mmH ₂ 0)	1650	(165)		2000	(200)			
Connection outside diameter	mm (in.)			38 (1	.50)				
Steam distribution	· · ·								
Number of linear distributors that can be connected				1	L				
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, 400 V, 230 V, 400 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 SPECI	FICATIONS"	ON PAGE 50			
Supply water electrical conductivity	μS*cm		70	1250 (Standar	d boiler 300	.700)			
Supply water hardness	°f		5	50 (Standard	d boiler 103	0)			
Supply water pressure	MPa/bar			0.021/	/0.210				
Supply water connection				M 3/4	" GAS				
Water drain outer dimensions	mm (in.)	40 (1.57)							
General specifications									
Dimensions	mm (in.)		SEE "2.1 DII	MENSIONS AN	ID 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 N Supervis	MODBUS				

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.

Description	MU	EHK•060T4	EHKX080T4	EHKX100T4		
Steam production						
Production capacity	kg/h	60	80	100		
Maximum pressure	Pa (mmH ₂ O)		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 W	VATER SPECIFICATIONS"	ON PAGE 50		
Supply water electrical conductivity	µS*cm	701	250 (Standard boiler 300.	700)		
Supply water hardness	°f	5	50 (Standard boiler 103	30)		
Supply water pressure	MPa/bar		0.021/0.210			
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 DIM	IENSIONS 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:

Subject	Page
Zephyr operating principle	25

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 airconditioning duct), or via a ventilated steam distributor (steam emission into the room).

4. USER INTERFACE

Chapter content

This chapter contains the following information:

Subject	Page
EHKT humidifier user interface	27
EHKT user interface menu	28
EHKX humidifier user interface	32
EHKX user interface menu	33

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		
Ŷ	Steam request	In all other cases		
	Proportional operating mode	In all other cases		
Л	ON/OFF operating mode	In all other cases		
Ú	Humidifier OFF	Humidifier ON		
V	Voltage sensor operating mode	In all other cases		
	Current sensor operating mode	In all other cases		
R	Resistive sensor operating mode	In all other cases		
Α	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		
Ø	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		
\odot	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
	Scroll down through the valuesNavigate within the menu	Go to the maintenance and reset operating hours menu
\land	Scroll up through the valuesNavigate within the menu	Activate manual draining
≙ SET	Confirm the values on the displaySet/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**).

 ${\bf NOTE}:$ The ${\bf CV}$ and ${\bf 0/1}$ 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

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

 ${\bf NOTE}:$ The ${\bf CV}$ and ${\bf 0/1}$ contacts must be closed to produce humidity.

4.2.2 Changing the main sensor humidity setpoint

With $\mathbf{CFG} = \mathrm{HUM}$ or $\mathbf{CFG} = \mathrm{HUML}$ only.

To change the humidity setpoint:

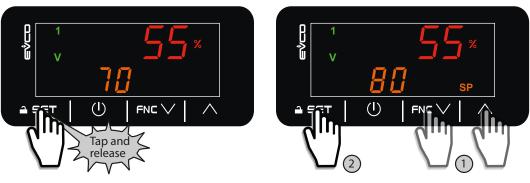


Fig. 10. Changing the humidity setpoint

4.2.3 Changing the temperature setpoint

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

To change the temperature setpoint:

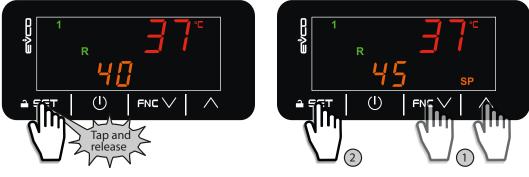


Fig. 11. Changing the temperature setpoint

4.2.4 Manual draining

To start manual draining:

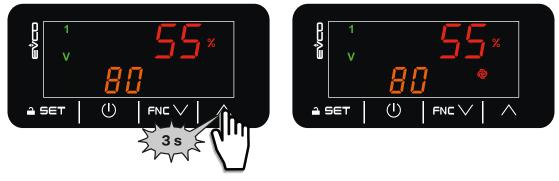


Fig. 12. Manual draining



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

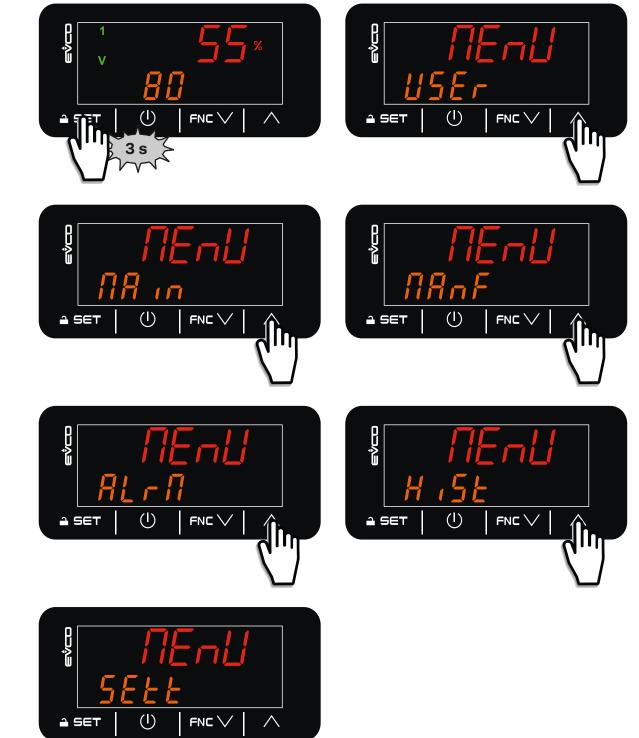


Fig. 13. Zephyr Menu - EV3K interface

Menu	Description
USEr	Access the user menu
NA	Access the maintenance technician menu
NAnF	RESERVED. NOT ACCESSIBLE TO THE PUBLIC.
AL-N	Currently accessing alarm control
H iSE	Access the alarm log
SEEE	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:

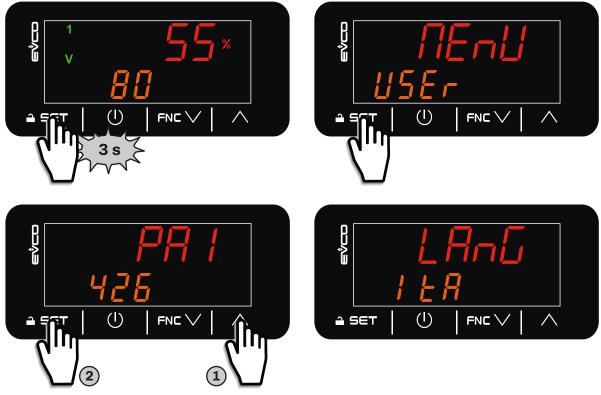


Fig. 14. User menu

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	Uumidity limit cotooint	Sets the humidity limit setpoint`. See "6.1 TABLE OF ADJUSTMENT PARAMETERS" ON PAGE 83
SP3		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	
Æ	Ventilated distributor ON	In all other cases	
$\overline{\mathbf{O}}$	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 Contactor OFF		Contactor OFF Steam generation finished	

4.3.2 Keys

Key	Tap and release to	Key	Tap and release to
	Access the menu	Û.⊙	Access the alarm log
≋⇒	Access the manual water draining start page	(\mathbf{l})	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.

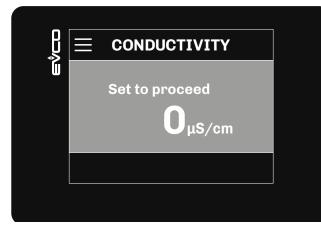


Fig. 16. First start-up - Setting the electrical conductivity



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)

0%
ಕೆ 26,8kg/h ″≝ 29,11 A
≝→ ¢≣ ¢⊙ ()

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)

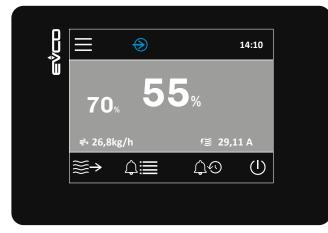


Fig. 20. Home screen with humidity sensor alone

Top line: Humidity measured by the room humidity sensor. **Bottom line (lh)**: Humidity setpoint.

Bottom line (rh): Limit sensor humidity setpoint (if CFG = HUML).

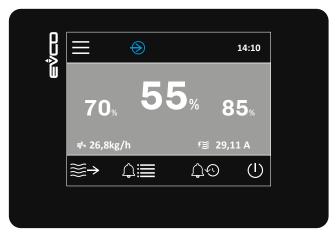


Fig. 21. Home screen with humidity sensor and limit sensor

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

With $\mathbf{CFG} = \mathrm{HUM}$ or $\mathbf{CFG} = \mathrm{HUML}$ only.

To change the humidity setpoint:

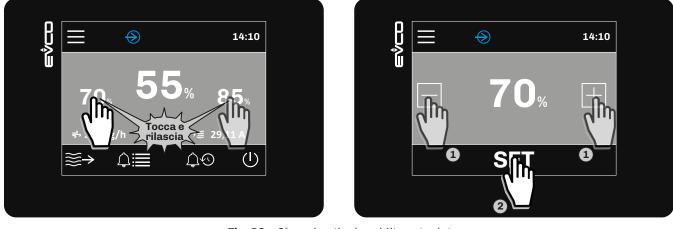


Fig. 22. Changing the humidity setpoint

4.4.3 Changing the temperature setpoint

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

To change the temperature setpoint:



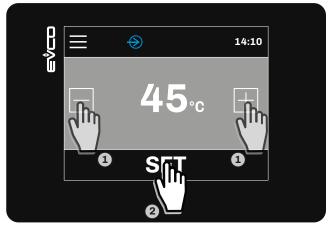


Fig. 23. Changing the temperature setpoint

4.4.4 Manual draining

To start manual draining:

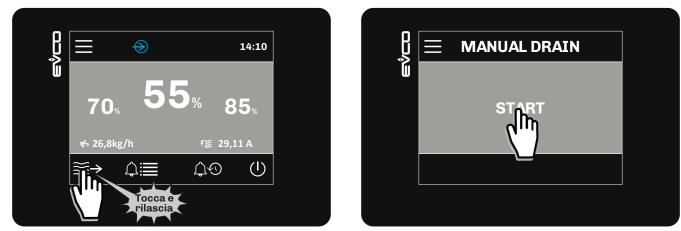
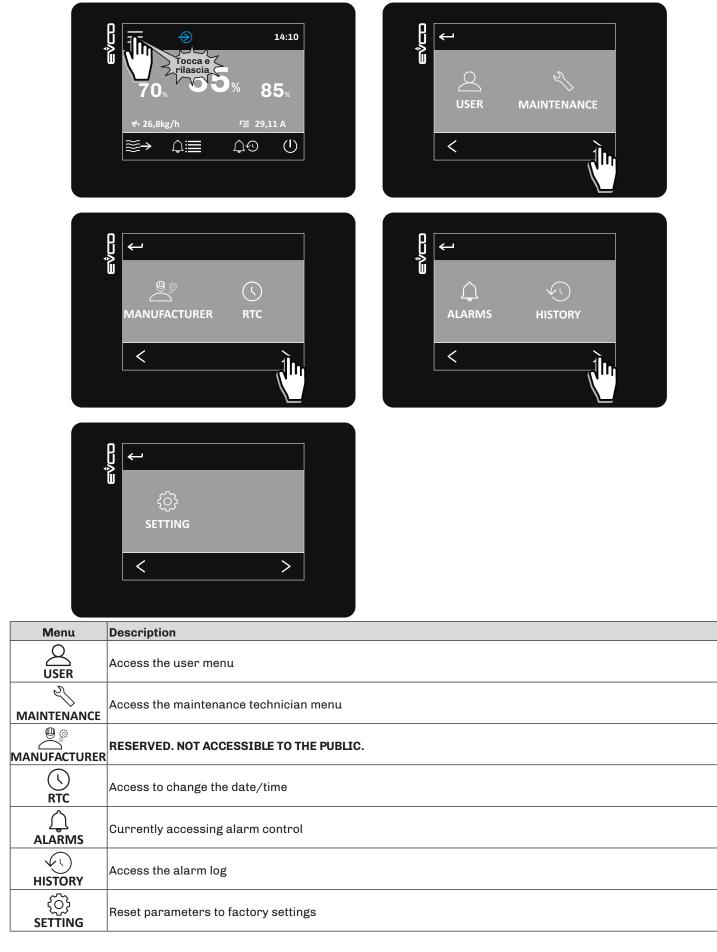


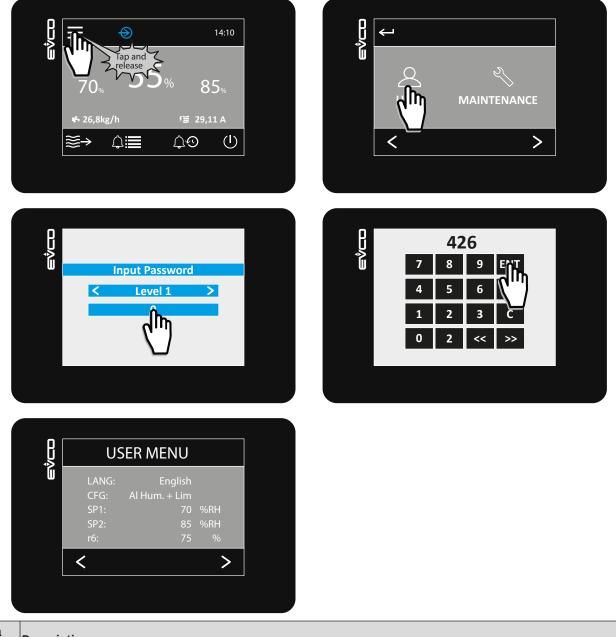
Fig. 24. Manual draining



4.4.6 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:

Subject	Page
Receiving the product	38
Dimensions and mechanical installation	40
Plumbing connections and installation	49
Electrical connections	64
Power-up and start-up	79
Configuration parameters	82
Modbus rtu functions and resources	86

1. RECEIVING THE PRODUCT

Chapter content

This chapter contains the following information:

Subject	Page
Before you start	39
Checking the packaging	39
Opening the packaging	39
Checking the packaging contents	39
Disposing of the packaging	39

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:

Subject	Page
Dimensions and weights	41
Minimum installation distances	44
Fitting single boiler models	45
Fitting double boiler models	47

2.1 Dimensions and weights

2.1.1 Models EHK•003 ... EHK•015

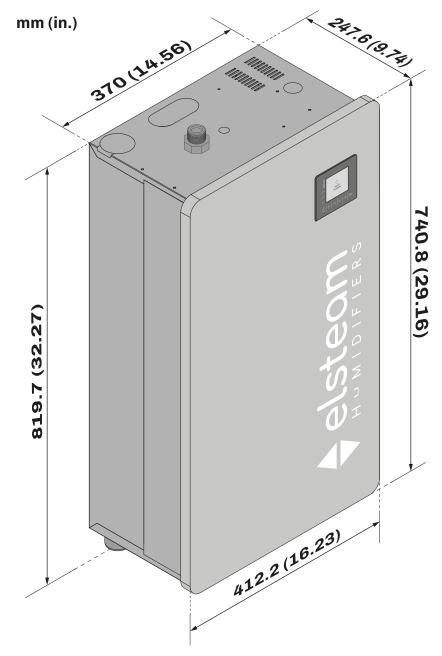


Fig. 25. Dimensions of models EHK•003 ... EHK•015

Weights	
Weight [kg(lb)]	
16.5 (36.37)	
16.5 (36.37)	
17.5 (38.58)	
17.5 (38.58)	
16.5 (36.37)	
16.5 (36.37)	
17.5 (38.58)	
17.5 (38.58)	

2.1.2 Models EHK • 020 ... EHK • 040

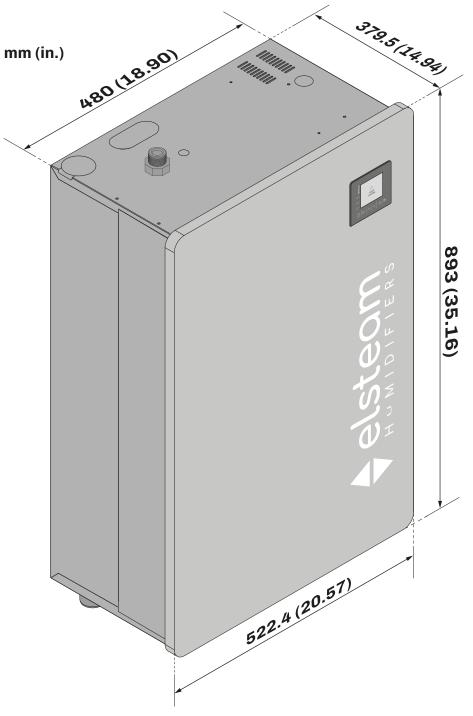
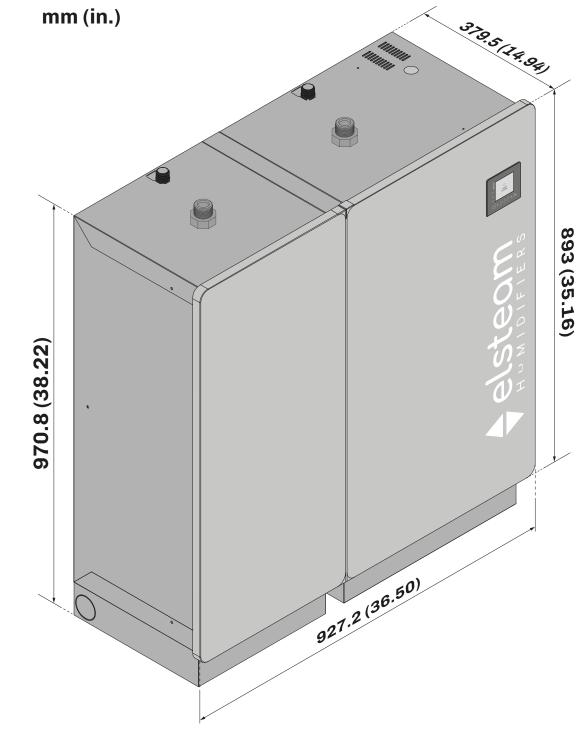


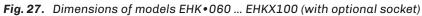
Fig. 26. Dimensions of models EHK • 020 ... EHK • 040

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)







Weights

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

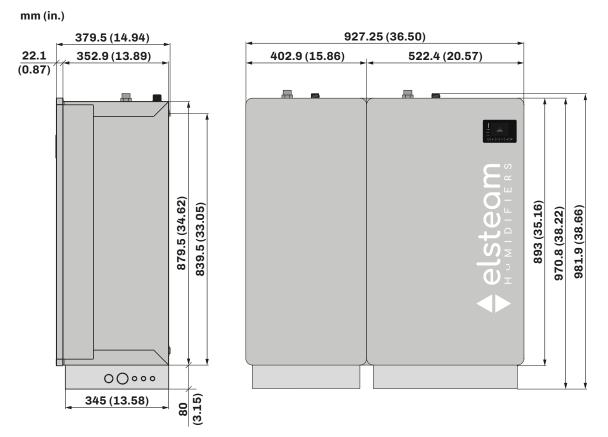


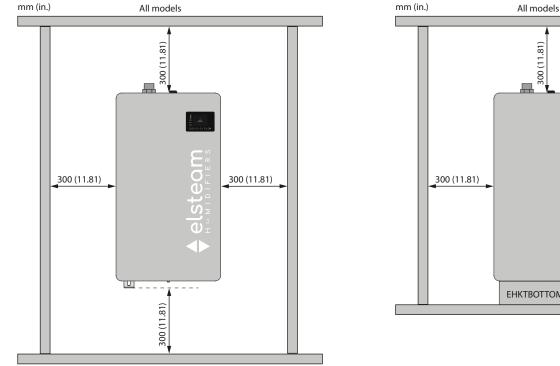
Fig. 28. Dimensions of double boiler models

2.2 Minimum installation distances

A 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.



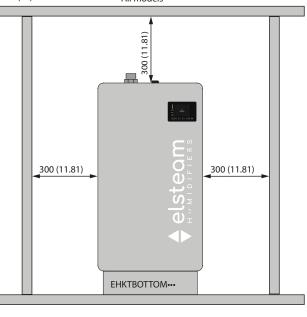


Fig. 29. Minimum installation distances

2.3 Fitting single boiler models

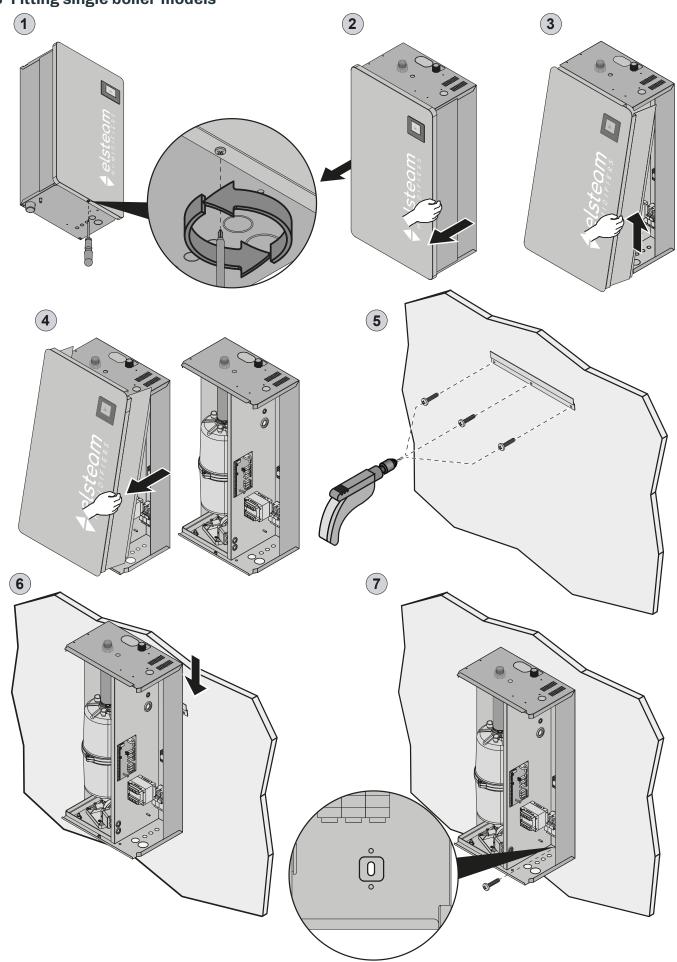


Fig. 30. Installation instructions

|45|Installer|

2.3.1 Installation instructions

A A 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.

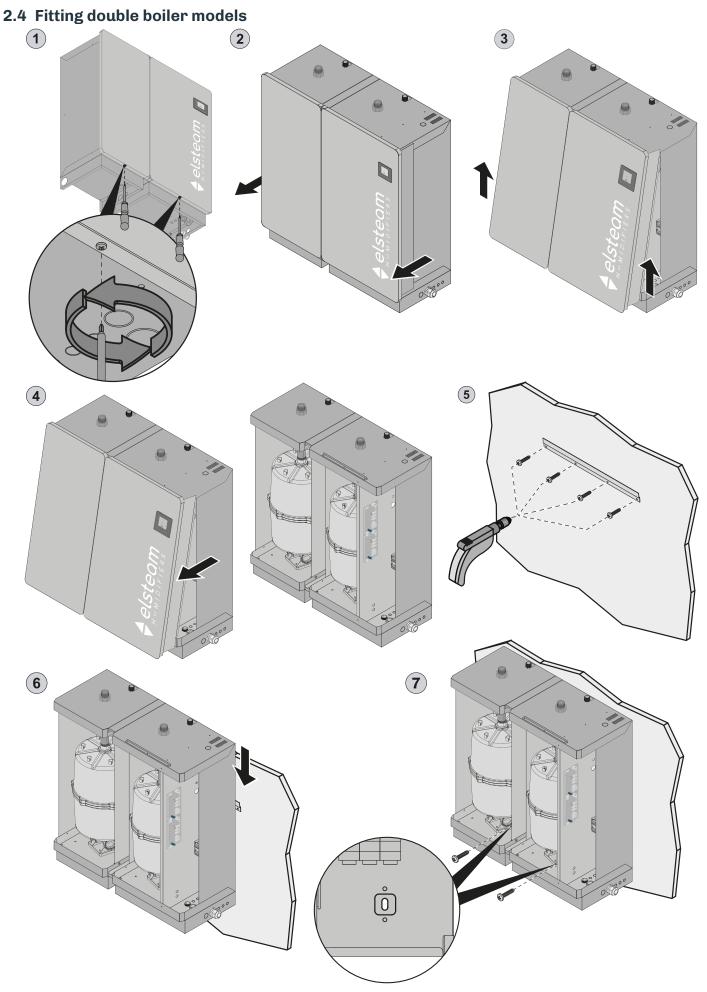


Fig. 31. Installation instructions

2.4.1 Installation instructions

A A 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:

Subject	Page
Humidifier composition	50
Plumbing installation	50
Water drainage system	51
Steam distribution in the AHU or duct	53
Steam distribution in the room	55
Installation overview	61

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 value 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	0.021 MPa (0.210 bar)
Water temperature	150 °C (33.8122 °F)
Electrical conductivity	751250 $\mu S/cm$ (at a temperature of 20 °C (68 °F))
Total hardness	550 °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	16 bar
Water temperature	7 20 °C (44.6 68 °F)
Electrical conductivity	300550 μS/cm
Total hardness	1025 °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.

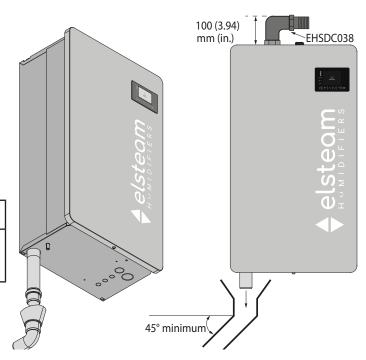


Fig. 32. Specifications of drain pipe for single boiler models

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).

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.

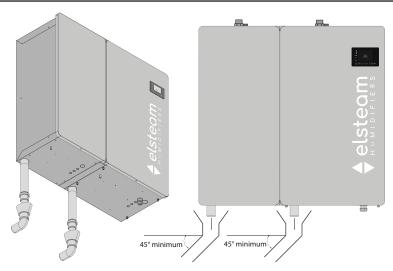


Fig. 33. Specifications of drain pipe for double boiler models - separate drains

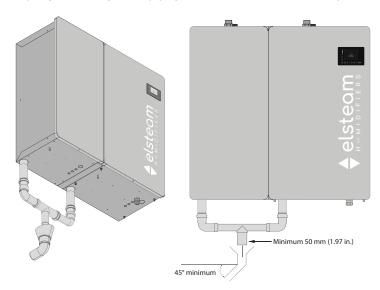


Fig. 34. Specifications of drain pipe for double boiler models - single drain

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.

A A 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).

A 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

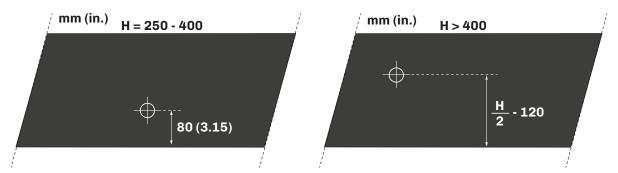






Fig. 36. Horizontal installation - 2 distributors

Vertical installation

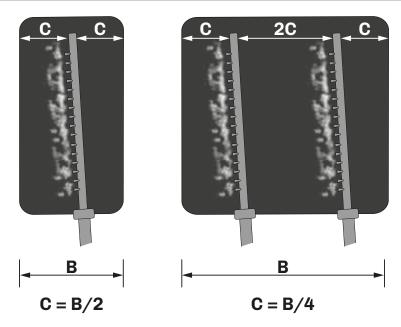


Fig. 37. Vertical installation - 1–2 distributors

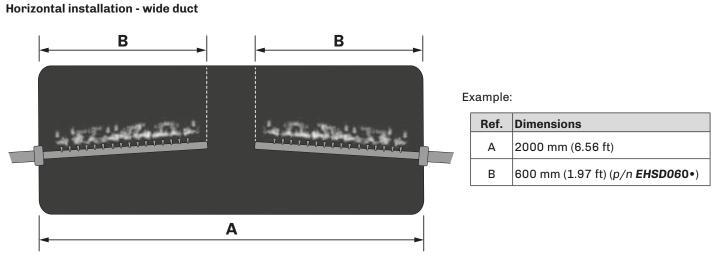


Fig. 38. Horizontal installation in a wide duct - 2 distributors

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.

RISK OF BURNS

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

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 <u>www.elsteam.it</u> under the Products/Zephyr section.



3.5.2 Remote ventilated steam distributor

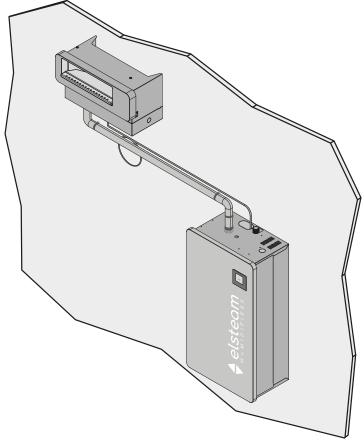


Fig. 39. Remote ventilated steam distribution

3.5.3 Ventilated steam distributor above the humidifier

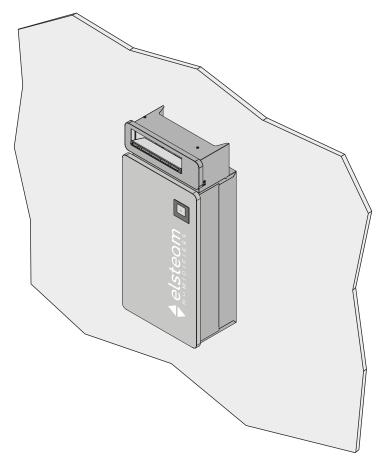


Fig. 40. Local ventilated steam distribution

3.5.4 Minimum distances to be observed with remote installation

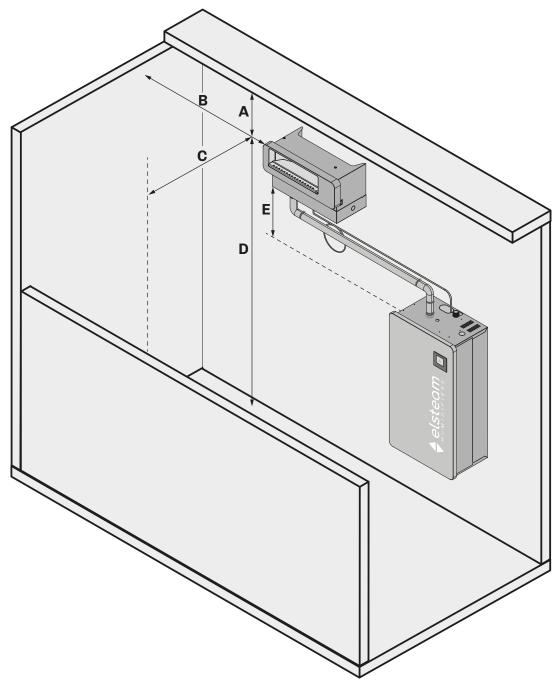


Fig. 41. Minimum distances with remote installation

Ref.	Dimensions
А	>1 m (3.3 ft.)
В	0.5 m (1.6 ft)
С	>3 m (9.8 ft.)
D	2.2 m (7.21ft.)
Е	≤4 m (13.1 ft.)

3.5.5 Minimum distances to be observed with installation above the humidifier

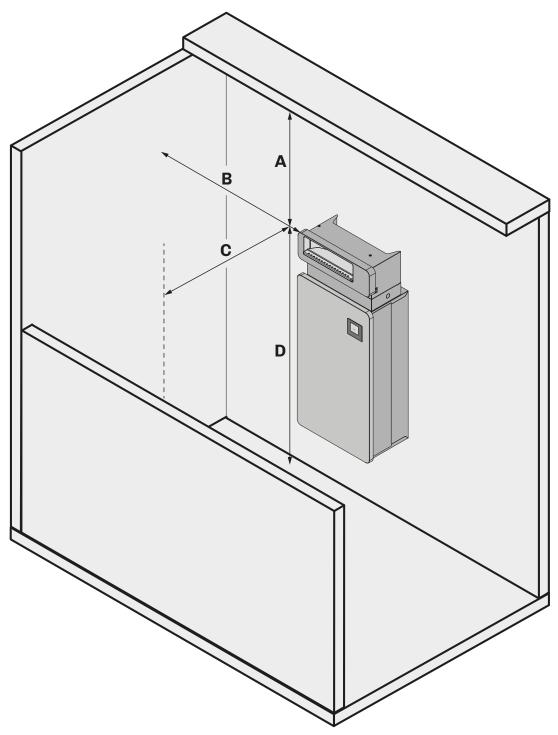


Fig. 42. Minimum distances with installation above the humidifier

Ref.	Dimensions
А	>1 m (3.3 ft.)
В	0.5 m (1.6 ft)
С	>5 m (16.40 ft.)
D	2.2 m (7.21ft.)

3.5.6 Steam distributor with nozzle (in wellness setting)

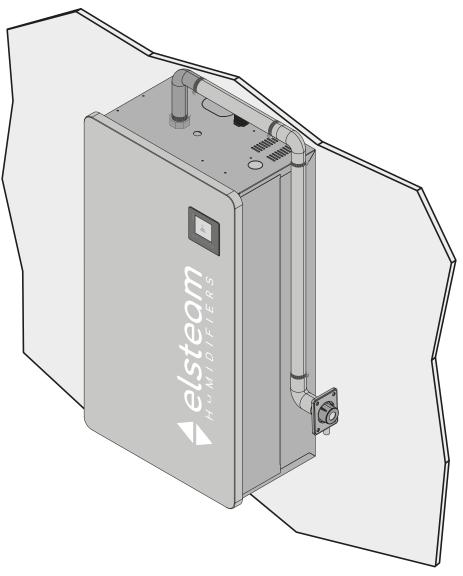


Fig. 43. Steam distributor with nozzle (in wellness setting)

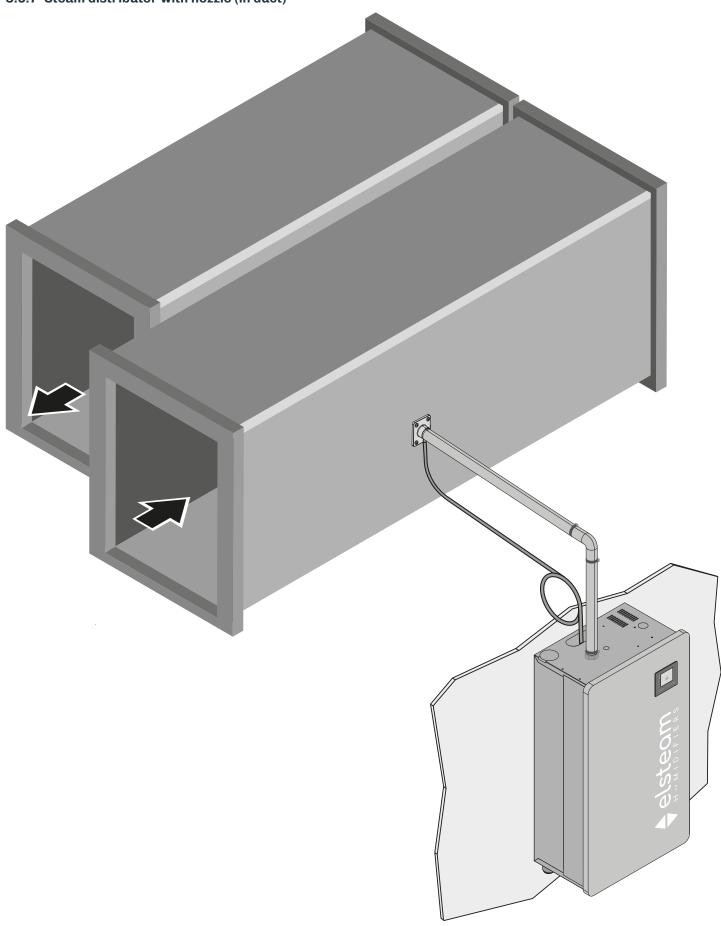


Fig. 44. Steam distributor with nozzle (in duct)

| 60 | Installer |

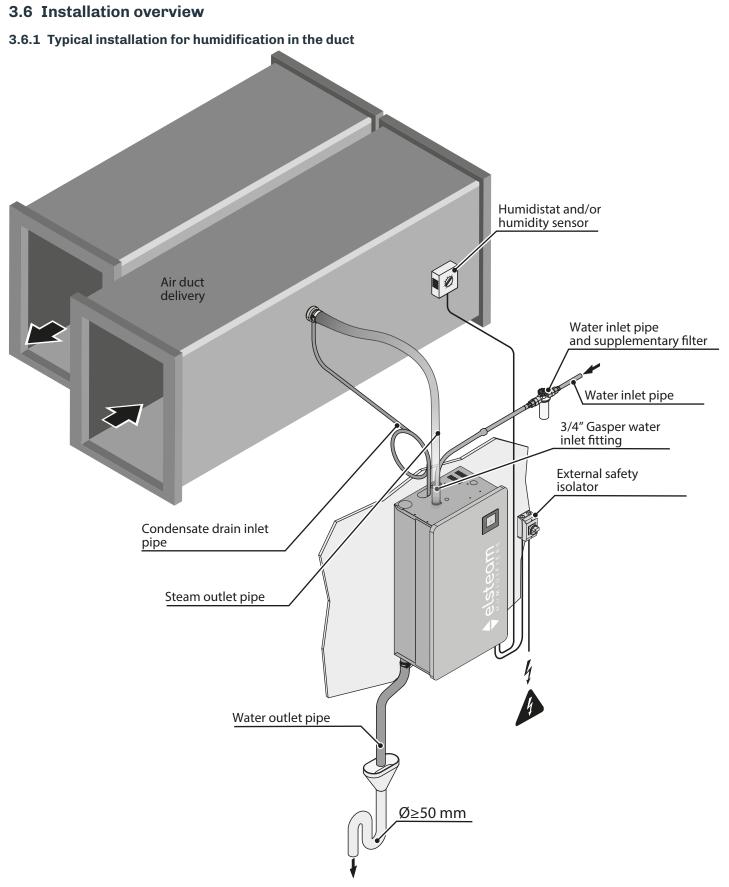
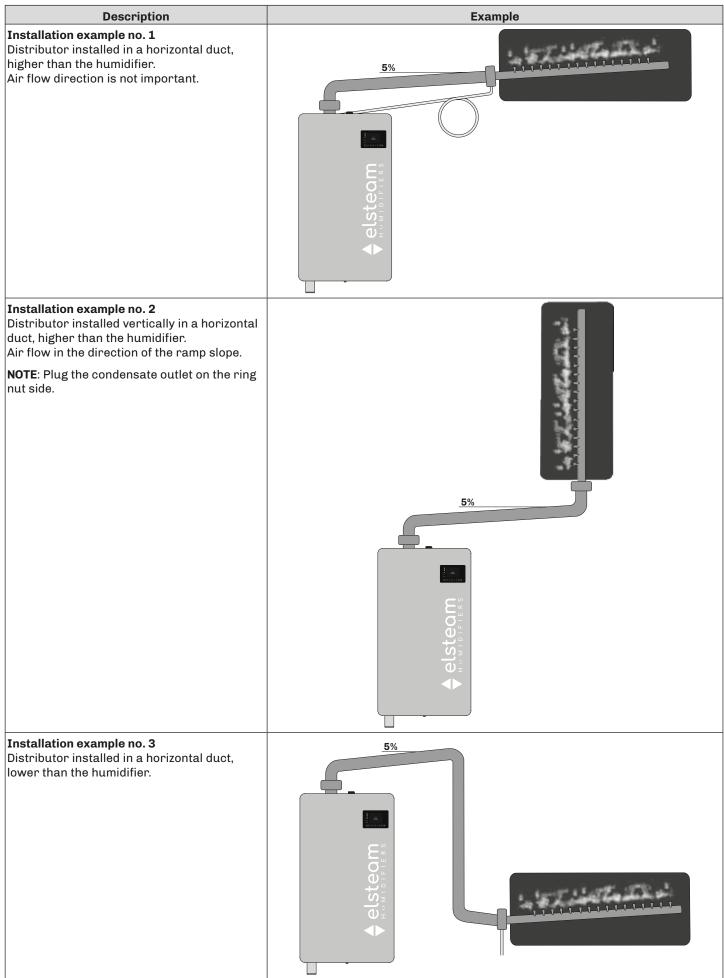
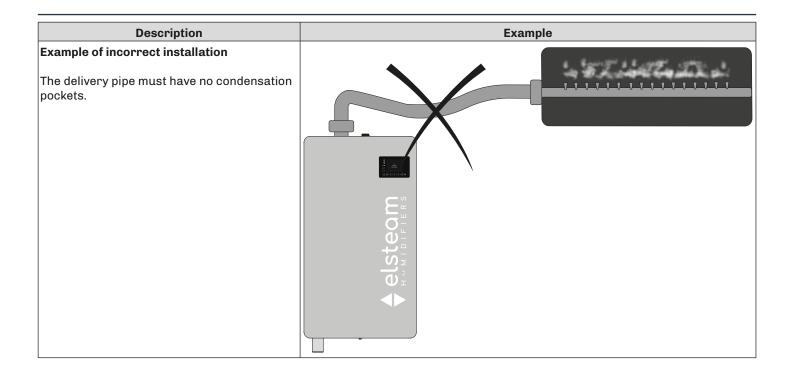


Fig. 45. Typical installation for humidification in the duct

3.6.2 Examples of distributor installation in the duct



924EHKTE4.01 - **Zephyr** series humidifiers



4. ELECTRICAL CONNECTIONS

Chapter content

This chapter contains the following information:

Subject	Page
Before you start	65
Best connection practices	65
Suitable power supply protection devices	67
Electrical connections	70
Configurations	72
Power supply and earth wiring connection	75
Cable glands and cable routing	76
Serial line connections	78

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.

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

A A 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.

A A DANGER

LOOSE WIRING CAUSES ELECTRIC SHOCKS AND OVERHEATING

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

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.).

A 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 7 in. 0.28				Ø 3.5 mm (0.14 in.)	() c 🔊	N•m <i>Ib-in.</i>	2.5 22.12
mm ²	16	16	16				
AWG	8	8	8				
no. of conductors		2					

3.5 mm (0.14 in.)

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

Step 26.5 mm (1.04 in.)

<u>mm</u> 7 <i>in.</i> 0.28 ↓ ↓				Ø 3.5
mm ²	35	25	25	
AWG	8	6	6	
no. of conductors		3		

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

∫ C ∰)____

N•m 3

Ib-in. 26.55

N•m 2.5

Applicable to models ... EHK•015T2

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

jc∰)____

Step 17.8 mm (0.70 in.)

mm 7 <i>0.28</i>				Ø 3.5 mm (<i>0.14 in.</i>)
mm ²	16	16	16	
AWG	8	8	8	
no. of conductors		2		

Ib-in.	22.12	Applicable to models
	-	ЕНК•020Т4

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

Step 26.5 mm (1.04 in.)

mm 7 in. 0.28				Ø 3.5 mm (0.14 in.)	N•m 3 <i>Ib-in.</i> 26.55	
mm ²	35	25	25			EHK•020T2 / EHK•030T4 / EHK•040T4
AWG	8	6	6			
no. of conductors		3				

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

Step 35.5 mm (1.40 in.)

mm 7 in. 0.28				Ø 3.5 mm (0.14 in.)	Applicable to models
mm ²	50	35	35		EHK•060T4 / EHKX080T4 / EHKX100T4
AWG	1	2	2		
no. of conductors		4			

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			
EHKT003T2	EHKX003T2	3G2.5			
EHKT003T4	EHKX003T4	3G2.5			
EHKT005M2	EHKX005M2	2G10			
EHKT005T2	EHKX005T2	3G4			17.8 (0.70)
EHKT005T4	EHKX005T4	3G2.5			
EHKT010T2	EHKX010T2	3G10			
EHKT010T4	EHKX010T4	3G4			
EHKT015T4	EHKX015T4	3G6	15 m (49.2 ft.)		
EHKT015T2	EHKX015T2	3G16			20 = (1, 0, 4)
EHKT020T2	EHKX020T2	3G16			26.5 (1.04)
EHKT020T4	EHKX020T4	3G10			17.8 (0.70)
EHKT030T4	EHKX030T4	3G16			00 E (1 0/l)
EHKT040T4	EHKX040T4	3G16			26.5 (1.04)
EHKT060T4	EHKX060T4	3G25			
	EHKX080T4	3G35			35.5 (1.40)
	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∙ 005M2	EHK∙ 005T2						ЕНК∙ 020Т4		EHK∙ 030T4	EHK∙ 040T4	EHK∙ 060T4		EHKX 100T4
Corrente	16	10	10	32	16	10	16	32	32	50	32	50 10		100	12	25	
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)

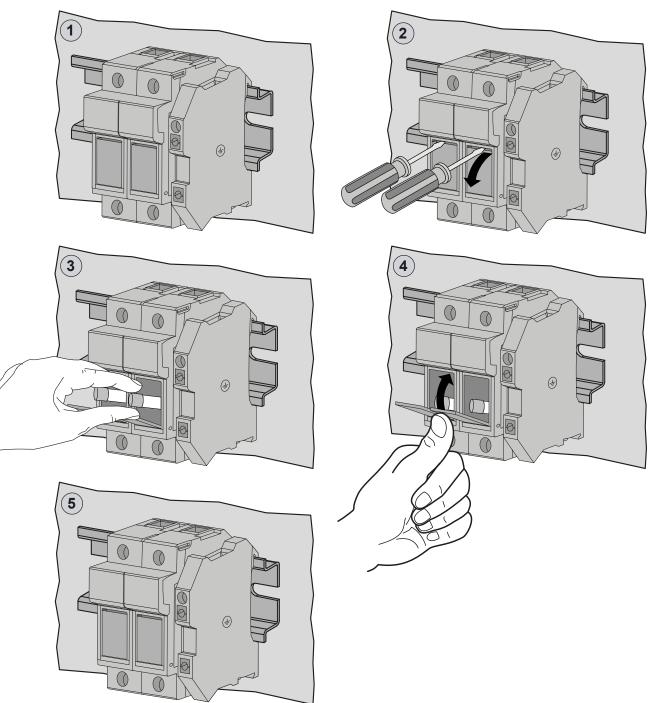


Fig. 52. Overload protection device

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

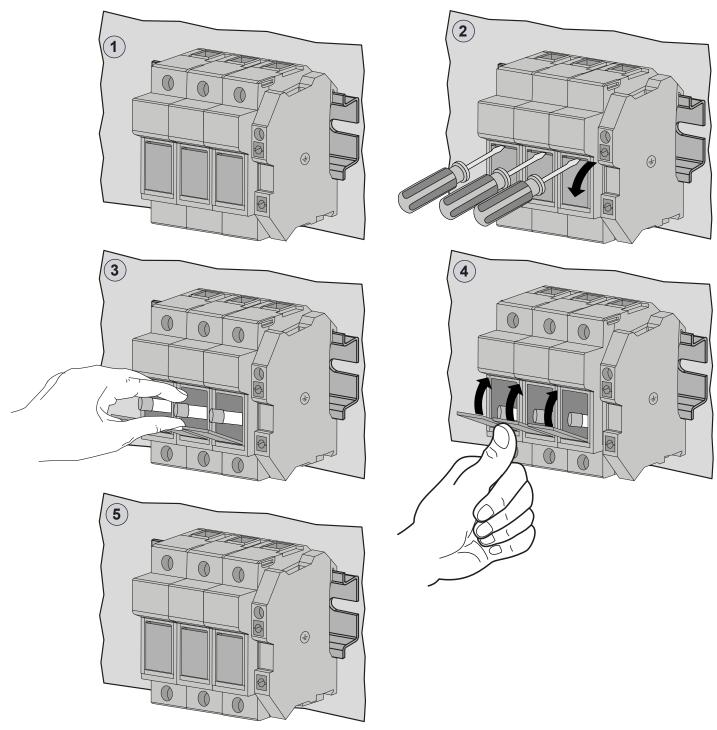


Fig. 53. Overload protection device

4.3.3 Changing fuses - Control board

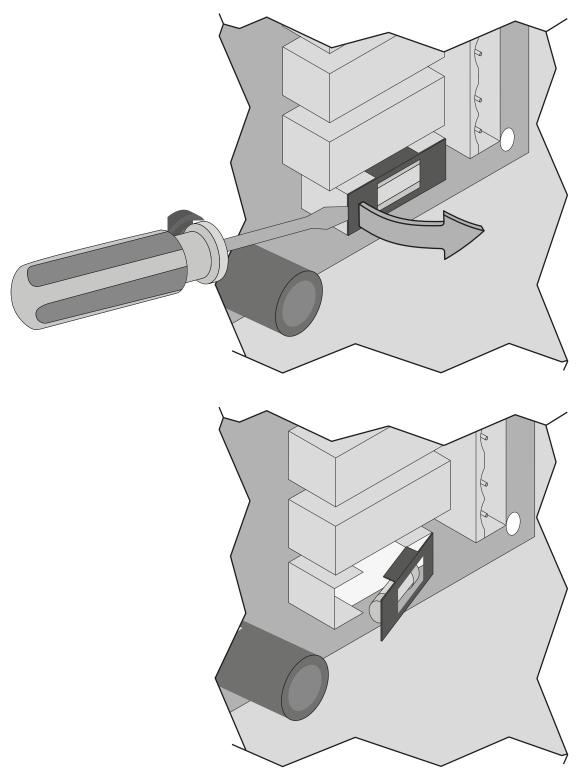


Fig. 54. Protection devices on the control board

Description

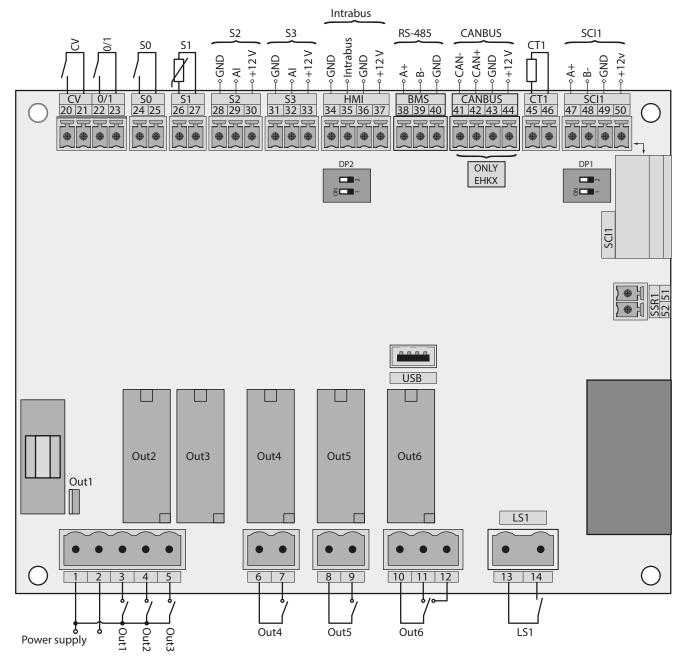
Overload protection devices for the control board power supply.

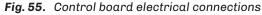
Control board overload protection devices

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

4.4 Electrical connections

4.4.1 Control board





TERMI	NALS		
1-2	24 Vac power supply	26-27	S1 analogue input: temperature (anti-freezing and hold)
1-3	Digital output: water outlet solenoid valve	2830	S2 analogue input: humidity sensor
1-4	Digital output: water outlet pump	3133	S3 analogue input: humidity limit sensor
1-5	Digital output: contactor (steam generation)	3436	Serial line connection: HMI Intrabus
6-7	Digital output: dehumidification enable	3840	Serial line connection: RS-485 modbus for BMS slave
8-9	Digital output: ventilated distributor control	4144	Serial line connection: CANBUS (EHKX only)
1012	Digital output: alarm	45-46	Analogue connection: external current sensor CT1 (TA)
13-14	Hazardous voltage digital input: level sensor LS1	4750	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

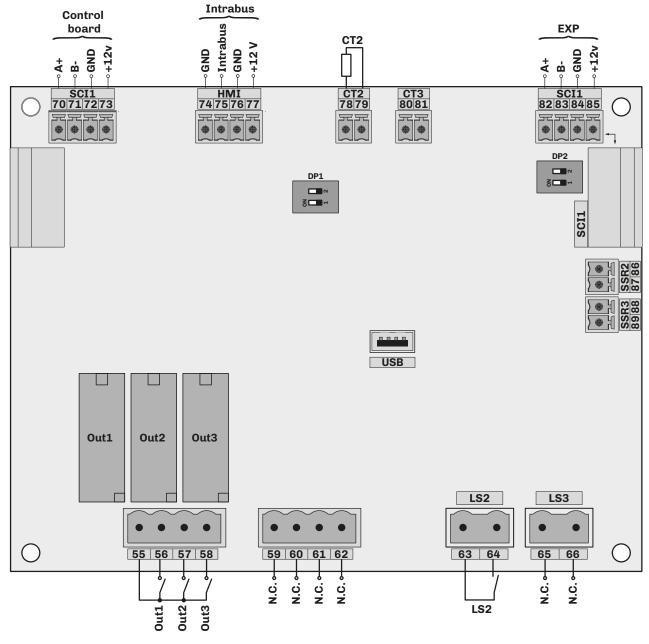


Fig. 56. Expansion electrical connections

TERMIN	TERMINALS									
		80-81	0-81 Reserved							
55-56	Digital output: boiler 2 water outlet solenoid valve	8285	Con	nect	ion to expansion board SCI1					
			Mod	lbus	communication address of expansion board					
55-57	Digital output: boiler 2 water outlet pump		1	2	Address offset relative to LA1					
55-58	Digital output: electrodes (steam generation)		OFF	OFF	LA1 + 0					
63-64	Hazardous voltage digital input: level sensor LS2	DP1	OFF	ON	LA1 + 1					
7073	Connection to control board SCI1		ON	OFF	LA1 + 2					
7477	Serial line input: HMI Intrabus		ON	ON	LA1 + 3					
78-79	Analogue input: external current sensor CT2 (TA) for boiler 2	DP2	DP2Activate 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)

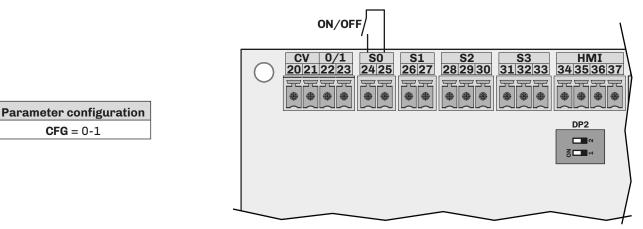


Fig. 57. ON/OFF connection with humidistat or external contact (CFG = 0-1)

4.5.2 External proportional humidistat connection (CFG = PROP)

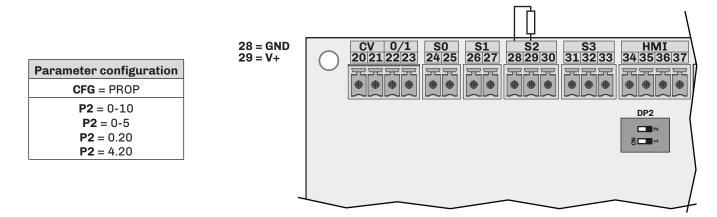


Fig. 58. External proportional humidistat connection (CFG = PROP)

4.5.3 Humidity sensor connection (CFG = HUM)

		вн 🗍	
	S2 input 29 = Sensor signal input 30 = Sensor power supply	CV 0/1 S0 S1 S2 S3 HMI 20212223 24/25 26/27 28/29/30 31/32/33 34/35/36/3	37
Parameter configuration			
CFG = HUM			1
P2 = 0-10		DP2	
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)

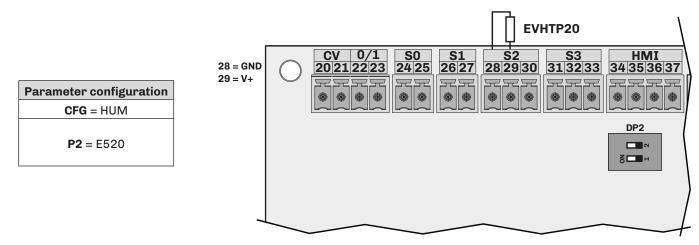


Fig. 60. Humidity sensor connection EVHTP520 (CFG = HUM)

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

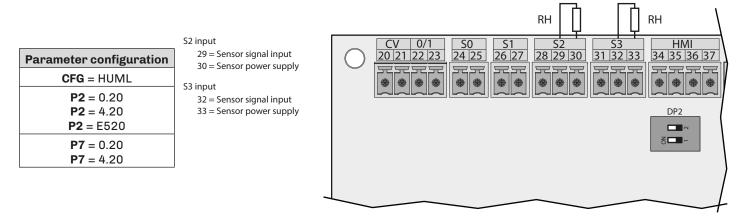


Fig. 61. Connection for humidity sensor and limit sensor (CFG = HUML)

4.5.6 Temperature sensor connection (CFG = 1T)

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

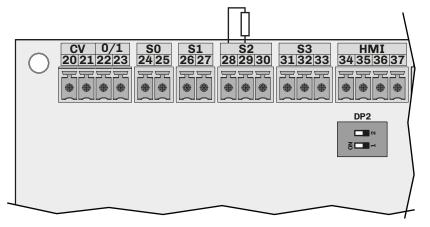


Fig. 62. Temperature sensor connection (CFG = 1T)

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

Parameter configuration CFG = 2T	CV 2021	0/1 S0 2223 2425	<u>S1</u>	S2	S 3	HMI
		<u>22,23</u> 24,23			31 32 33 32 32 33	34 35 36 37
P2 = PTC P2 = 1000 P2 = NTC						DP2
P7 = PTC P7 = 1000 P7 = NTC						No Contraction of the second s

n n

1

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

4.5.8 Humidity sensor connection $0...5\,V\,/\,0...10\,V$

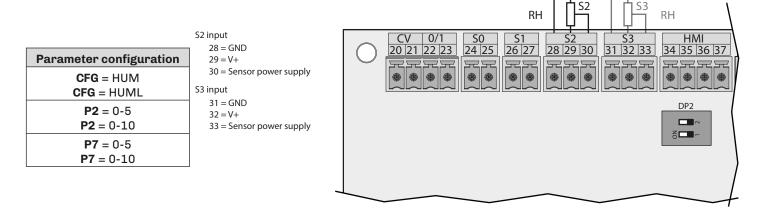


Fig. 64. Humidity sensor connection 0...5 V

4.6 Power supply and earth wiring connection

4.6.1 Single-phase models

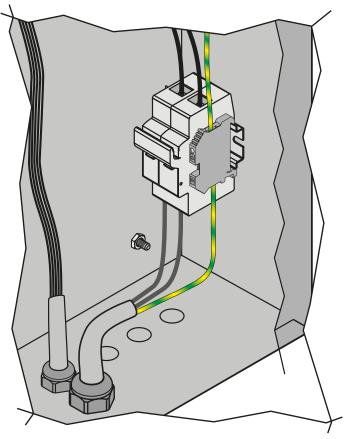


Fig. 65. Power supply connections - single-phase models

4.6.2 Three-phase models

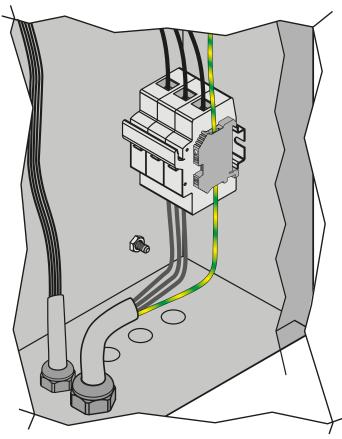
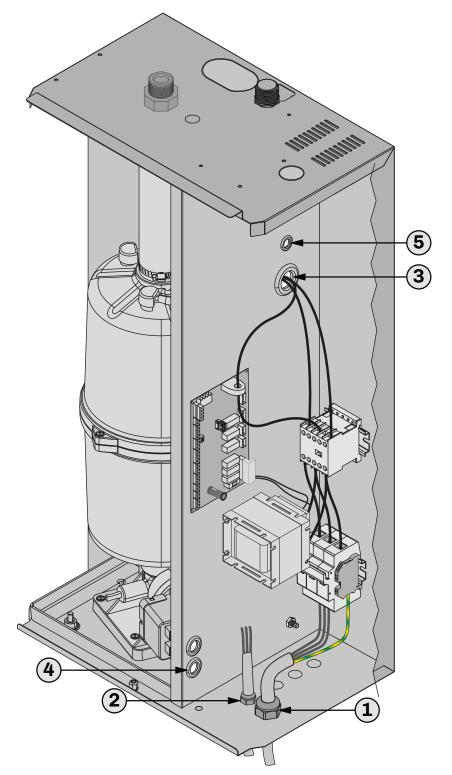


Fig. 66. Power supply connections - three-phase models

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

| 76 | Installer |

4.7.2 Double boiler models

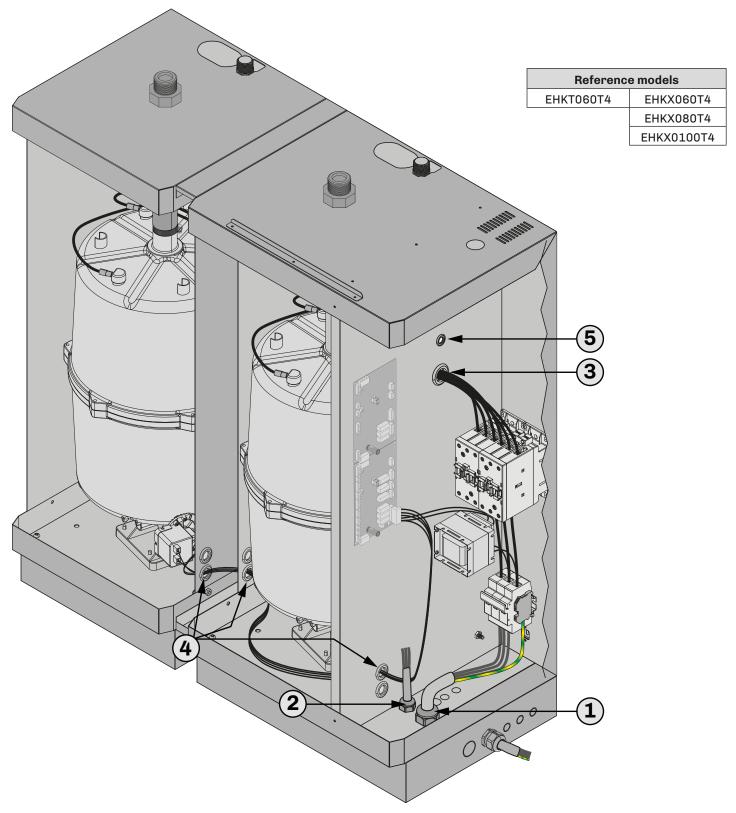


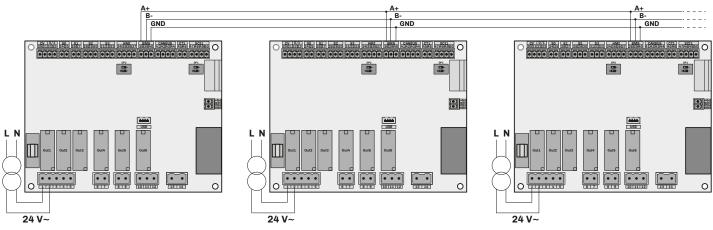
Fig. 68. Cable glands and cable routing

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

|77|Installer|

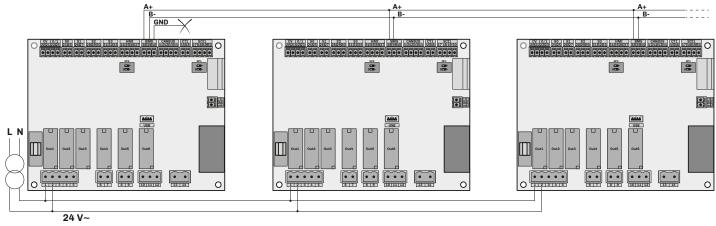
4.8 Serial line connections

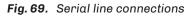
The device power supply inputs are not isolated. Use separate isolated power supplies if the RS-485 network GND connection or the CAN expansion bus is connected to multiple devices. Alternatively, do not connect the RS-485 or CAN GND signal if the equipment is connected to a single power supply. Take 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





5. POWER-UP AND START-UP

Chapter content

This chapter contains the following information:

Subject	Page
First start-up instructions	80
Seasonal or long-term shut-down instructions	80
Start-up after a seasonal or long-term shut-down	81

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.

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:

Subject	Page
Table of adjustment parameters	83

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.	%	r1r2	70.0	U		
SP2	Humidity limit setpoint.	%	r11r12	85.0	U		
SP3	Wellness temperature setpoint.	°C/°F	r21r22	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	М		
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).		02	0	М		
пТур	Master/Slave operation. 0 = Disabled; 1 = Parallel; 2 = Rotation; 3 = Balancing.		03	0	М		
nAdr	Networked master/slave module (only if enabled Master/Slave Operation $nTyp \neq 0$). 1 = Master;		15	1	М		
nPrE	Master/Slave machine pre-heating enabled. 0 = Disabled; 1 = Enabled.	0/1		0	м		
ntot	Total number of Master/Slave machines.	num	25	2	М		
nbAc	Number of Master/Slave backup machines (only for nTyP = 2 and/or nTyP = 3).	num	13	1	м		
nHrs	Hours of Master/Slave machine rotation.	hours	10500	150	М		
PO	Type of sensor S1 temperature of pre-heating + anti-freeze. (0) = Disabled; PTC (1) = PTC; NTC (2) = NTC.		/ PTC / NTC		м		
P1	Electrical conductivity of the water.	µS/cm	01250	0	М		

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 010 V; 0-5 (4) = Proportional input 05 V; 0.20 (5) = Input 020 mA; 4.20 (6) = Input 420 mA; E520 (7) = EVHTP520 proprietary probe.		PTC /1 000 / NTC / 0-10 / 0-5 / 0.20 / 4.20 / E520	0-10	м
P3	Minimum value S2 (if CFG = HUM or CFG = HUML).	%rH	0100	0	м
P4	Maximum value S2 (if CFG = HUM or CFG = HUML).	%rH	0100	100	M
P5	Sensor offset S2 (if CFG = HUM or CFG = HUML).	%rH	-1010	0	M
P6	S1 sensor offset (temperature).	°C/°F	-10.010.0	0.0	М
Р7	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	м
P8	Minimum value S3 (if CFG = HUML).	%rH	0100	0	М
P9	Maximum value S3 (if CFG = HUML).	%rH	0100	100	М
P10	Sensor offset S3 humidity (if CFG = HUML).	%rH	-1010	0	М
P11	TA sensor K (1000 = current multiplier of 1.000).		02000	1000	М
P12	Ventilation presence (enables maintenance management based on utility operating hours). No = No ventilation; Yes = Ventilation present.		No/Yes	Yes	М
P13	Sensor offset S2 temperature (if CFG = 1T or CFG = 2T).	°C/°F	-10.010.0	0.0	М
P14	Sensor offset S3 temperature (if CFG = 1T or CFG = 2T).	°C/°F	°C/°F -10.010.0		М
P20	$\begin{array}{c c} \text{lectrical conductivity of the water at 100°C (212 °F).} \\ \text{lectrical conductivity of the water at 100°C (212 °F).} \\ \text{lectrical conductivity of the water at 100°C (212 °F).} \\ \text{lectrical conductivity of the water at 100°C (212 °F).} \\ \text{lectrical conductivity of the water at 100°C (212 °F).} \\ \text{lectrical conductivity of the water at 100°C (212 °F).} \\ \text{lectrical conductivity of the water at 100°C (212 °F).} \\ \text{lectrical conductivity of the water at 100°C (212 °F).} \\ \text{lectrical conductivity of the water at 100°C (212 °F).} \\ \text{lectrical conductivity of the water at 100°C (212 °F).} \\ \text{lectrical conductivity of the water at 100°C (212 °F).} \\ \text{lectrical conductivity of the water at 100°C (212 °F).} \\ \text{lectrical conductivity of the water at 100°C (212 °F).} \\ \text{lectrical conductivity of the water at 100°C (212 °F).} \\ \text{lectrical conductivity of the water at 100°C (212 °F).} \\ \text{lectrical conductivity of the water at 100°C (212 °F).} \\ \text{lectrical conductivity of the water at 100°C (212 °F).} \\ \text{lectrical conductivity of the water at 100°C (212 °F).} \\ \text{lectrical conductivity of the water at 100°C (212 °F).} \\ \text{lectrical conductivity of the water at 100°C (212 °F).} \\ \text{lectrical conductivity of the water at 100°C (212 °F).} \\ \text{lectrical conductivity of the water at 100°C (212 °F).} \\ \text{lectrical conductivity of the water at 100°C (212 °F).} \\ \text{lectrical conductivity of the water at 100°C (212 °F).} \\ \text{lectrical conductivity of the water at 100°C (212 °F).} \\ \text{lectrical conductivity of the water at 100°C (212 °F).} \\ \text{lectrical conductivity of the water at 100°C (212 °F).} \\ \text{lectrical conductivity of the water at 100°C (212 °F).} \\ \text{lectrical conductivity of the water at 100°C (212 °F).} \\ \text{lectrical conductivity of the water at 100°C (212 °F).} \\ \text{lectrical conductivity of the water at 100°C (212 °F).} \\ \text{lectrical conductivity of the water at 100°C (212 °F).} \\ \text{lectrical conductivity of the water at 100°C (212 °F).} \\ \text{lectrical conductivity of the water at 10°C (212 °F).} $		02	1	м
P21	Temperature unit of measure (changing value means that the temperature parameter limits will need to be reset manually). $0 = ^{\circ}C$; $1 = ^{\circ}F$.			0	м
P22	2 Steam production unit of measurement. 0 = kg/h; 1 = lb/h.		0/1	0	М
	REGULATION group		1		
r0	Humidity probe setpoint hysteresis.	%	020	2	Μ
r1	Minimum value for setting humidity setpoint.	%	0 r2	20	М
r2	Maximum value for setting humidity setpoint.	%	r1 100	95	М
r4	Humidity proportional band.	%	050	50	M
r5	Minimum production.	%	20 r6	20	M
r6	Maximum production.	%	r5 100	75	U
r10	Humidity limit probe setpoint hysteresis.	%	020	2	M
r11	Minimum value for setting humidity limit setpoint.	%	0r12	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	r2160.0	50.0	M
r23	Wellness temperature probe 1 weight	%	0100	50	M
r24 c0	Wellness temperature probe 2 weight. Number of continuous days of inactivity after which the boiler is emptied. 0 = Function disabled.	% days	0100	50 2	M M
c1	Number of continuous days of activity after which the boiler is emptied. 0 = Function disabled.	days	0100	14	м
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	09999	5	M
0-7				M	
c5	11 me between two dilution draining events (if $c_3 = 1$)	m	30 999	ทบ	1 101

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	0.090.0	0.0	м
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	м
c10	Maximum initial water filling time for water inlet check.	s	502000	1200	М
c11	Anti-foam process. 0 = Disabled; 1 = Enabled.		0/1	0	м
c1 4	Time to drain the boiler completely. (*) Default according to model, from: 3 kg/h = 30 s; 515 kg/h = 40 s; 20100 kg/h = 180 s.	s	0240	(*)	м
c15	Hours of dual boiler machine rotation.	hours	10500	150	М
c16	Low conductivity algorithm enable.		0/1	0	М
	MAINTENANCE/ALARMS group	1	1	r	
M 5	Low humidity alarm threshold. The hysteresis is fixed at 2%. 0 = Disabled.	%	0100	20	М
M 6	High humidity alarm threshold. The hysteresis is fixed at 2%. 0 = Disabled.	%	0100	95	М
M7	High/low humidity alarm delay. 0 = Disabled.	S	0999	120	М
M 8	Delay in alarm for no production	hours	1100	48	М
M 9	Maximum number of automatic attempts to rearm alarm AL03 "No water" after which the alarm blocks manual rearming.		110	3	м
M10	Operating hours threshold for unit maintenance warning.	hx10	10010000	4000	М
M11	Operating hours threshold for partial boiler maintenance warning.		1002000	200	М
M12	Operating hours threshold for full boiler maintenance warning.	hx10	1002000	1000	М
M13	Operating hours threshold for valve maintenance warning.	hx10	1002000	1000	М
M1 4	Operating hours threshold for pump maintenance warning.	hx10	1002000	1000	М
M15	Operating hours threshold for fan maintenance warning.	hx10	1002000	1000	М
M20	High temperature alarm threshold. The hysteresis is fixed at 0.5 °C; 0 = Excluded.	°C/°F	0.080.0	50.0	М
M21	Maximum number of automatic attempts to rearm the high temperature alarm after which the alarm blocks manual rearming (attempts every hour)	num	110	3	м
	COMMUNICATION group	1	1		
LA1	Modbus communication protocol address.	num	1247	247	М
Lb1	Modbus transmission speed (baud rate). 0 = 2400; 1 = 4800;		04	4	Е
LP1	Modbus parity bit.		02	2	E
LS1	Modbus stop bit. 0 = 1 stop bit; 1 = 2 stop bits.		0/1	0	Е
	PASSWORD group			·	
PA1	First level password. 0 = No password		-99999	0	U
PA2	Second level password.		-99999	824	м

7. MODBUS RTU FUNCTIONS AND RESOURCES

Chapter content

This chapter contains the following information:

Subject	Page
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Modbus message structure	87
Modbus functions and registers	87
Address configuration	88
Connections	88
Modbus table content	88
Zephyr modbus addresses	89

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.

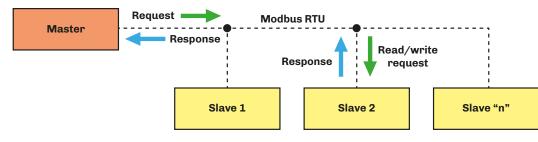


Fig. 70. Diagram showing message exchange in a Modbus communication

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.

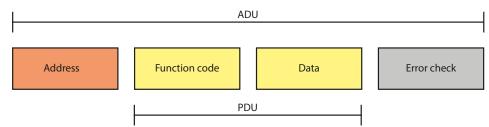


Fig. 71. Framing of a message using Modbus protocol

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

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
data must not be exchanged over the communication bus, to allow the connected instruments to recognise	the master has established dialogue; this is a value between 1247. The address 0 is reserved for the broadcast message sent	function to execute or which has been executed	data sent by the master or sent back by the slave as a response to a question	check whether any errors are present during communication,	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.		0247	247
Lb1	Modbus transmission speed (baud rate). 0 = 2400; 1 = 4800; 2 = 9600; 3 = 19200; 4 = 38400.		04	4
LP1	Modbus parity bit. 0 = None; 1 = Odd; 2 = Even.		02	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	1					
SP1	Humidity setpoint.	2001	R/W	SHORT	Y	%	r1r2
SP2	Humidity limit setpoint.	2002	R/W	SHORT	Y	%	r11r12
SP3	Temperature probe setpoint.	2086	R/W	SHORT	Υ	°C/°F	r21r22
	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			05
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			02
пТур	Master/Slave operation. 0 = Disabled; 1 = Parallel; 2 = Rotation; 3 = Balancing.	2073	R/W	BYTES			03
nAdr	Networked master/slave module (only if enabled Master/ Slave Operation $nTyp \neq 0$). 1 = Master; 2 = Slave 1; 3 = Slave 2; 4 = Slave 3; 5 = Slave 4.	2070	R/W	BYTES			15
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	25
nbAc	Number of Master/Slave backup machines.	2071	R/W	2BIT		num	13
nHrs	Hours of Master/Slave machine rotation.	2075	R/W	BYTES		hours	10500
PO	S1 sensor type (temperature). (0) = Disabled; PTC (1) = PTC; NTC (2) = NTC.	2076	R/W	3 BIT			02
P1	Electrical conductivity of the water.	2006	R/W	WORD		µS/cm	01250
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 010 V; 0-5 (4) = Proportional input 05 V; 0.20 (5) = Input 020 mA; 4.20 (6) = Input 420 mA; E520 (7) = EVHTP520 proprietary probe. 	2007	R/W	BYTES			07
P3	Minimum value S2 (if CFG = HUM or CFG = HUML).	2008	R/W	BYTES		%rH	0100
P4	Maximum value S2 (if CFG = HUM or CFG = HUML).	2009	R/W	BYTES		%rH	0100
P5	Sensor offset S2 (if CFG = HUM or CFG = HUML).	2010	R/W	BYTES	Y	%rH	-1010
P6	S1 sensor offset (temperature).	2011	R/W	SHORT	Y	°C/°F	-10.010.0
P7	S3 sensor type (humidity 2 limit). Similar to P2 .	2012	R/W	BYTES			07

Par.	Description	Val. Adr.	R/W	DATA SIZE	CPL	MU	Range
P8	Minimum value S3 (if CFG = HUML).	2013	R/W	BYTES		%rH	0100
P9	Maximum value S3 (if CFG = HUML).		R/W	BYTES		%rH	0100
P10	Sensor offset S3 (if CFG = HUML).	2015	R/W	SHORT	Y	%rH	-1010
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	-10.010.0
P14	Sensor offset S3 temperature (if CFG = 1T or CFG = 2T).	2079	R/W	SHORT	Y	°C/°F	-10.010.0
P20	Electrical conductivity of the water at 100°C (212°F). $0 = 3000 \ \mu\text{S/cm};$ $1 = 4000 \ \mu\text{S/cm};$ $2 = 5000 \ \mu\text{S/cm}.$	2016	R/W	3 BIT			02
P21	Temperature unit of measure (changing value means that the temperature parameter limits will need to be reset manually). $0 = ^{\circ}\mathbf{C}; 1 = ^{\circ}\mathbf{F}.$	2017	R/W	1 BIT			0/1
P22	Steam production unit of measurement. $0 = \text{kg/h}; 1 = \text{lb/h}.$	2080	R/W	1 BIT			0/1
	REGULATION group						
r0	Sensor 1 setpoint hysteresis.	2018	R/W	BYTES		%	020
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		%	050
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		%	020
r11	Minimum limit setpoint value.	2025	R/W	BYTES		%	0r12
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	010
c1	Number of continuous days of activity after which the boiler is emptied. 0 = Function disabled.	2028	R/W	BYTES		days	0100
c2	Number of cleaning cycles (filling+draining) following emptying due to activity or inactivity.	2029	R/W	BYTES		num	010
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	099999
c5	Time between two dilution draining events (if C3 = 1).	2032	R/W	WORD		min	30999
c6	Draining value for dilution (if C3 = 0).	2033	R/W	BYTES		%	2080
c8	Preheating set-point for temperature hold. 0 = Disabled.	2034	R/W	BYTES		°C/°F	0.090.0
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	502000
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	10300
c13	Enable water filling with steam generation active.	2039	R/W	1 BIT			0/1
c1 4	Time to drain the boiler completely.	2040	R/W	BYTES		s	0240
c15	Hours of dual boiler machine rotation.	2065	R/W	WORD		hours	10500
c16	Low conductivity algorithm enable.	1323	R/W	1 BIT			0/1
	MAINTENANCE/ALARMS group	1 1		1			
M5	Low humidity alarm threshold. The hysteresis is fixed at 2%. 0 = Disabled.	2041	R/W	BYTES		%	0100
M 6	High humidity alarm threshold. The hysteresis is fixed at 2%. 0 = Disabled.	2042	R/W	BYTES		%	0100

Par.	Description	Val. Adr.	R/W	DATA SIZE	CPL	MU	Range
M7	High/low humidity alarm delay. 0 = Disabled.	2043	R/W	WORD		s	0999
M 8	Delay in alarm for no production.	2064	R/W	BYTES		h	1100
M9	Maximum number of automatic attempts to rearm alarm AL03 "No water" after which the alarm blocks manual rearming	2067	R/W	BYTES		num	110
M10	Operating hours threshold for unit maintenance warning.	2044 2045	R/W	DWORD		hours x10	10010000
M11	Operating hours threshold for partial boiler maintenance warning.	2046 2047	R/W	DWORD		hours x10	1002000
M12	Operating hours threshold for full boiler maintenance warning.	2048 2049	R/W	DWORD		hours x10	1002000
M13	Operating hours threshold for valve maintenance warning.	2050 2051	R/W	DWORD		hours x10	1002000
M1 4	Operating hours threshold for pump maintenance warning.	2052 2053	R/W	DWORD		hours x10	1002000
M15	Operating hours threshold for fan maintenance warning.	2054 2055	R/W	DWORD		hours x10	1002000
M20	High temperature alarm threshold. The hysteresis is fixed at 3 °C (6 °F); 0 = Excluded.	2068	R/W	BYTES		°C/°F	0.080.0
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	110
	COMMUNICATION group						
LA1	Modbus communication protocol address.	2056	R/W	BYTES		num	1247
Lb1	Modbus transmission speed (baud rate). 0 = 2400; 1 = 4800; 2 = 9600; 3 = 19200; 4 = 38400.	2057	R/W	BYTES			04
LP1	Modbus parity bit. 0 = None; 1 = Odd; 2 = Even.	2058	R/W	BYTES			02
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		-99999
PA2	Second level password.	2062	R/W	SHORT	Y		-99999

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
D03_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	А	-327.68 327.67
	Status of warning W01 .	769	0	R	1 BIT			0/1
	Status of alarm AL01 .	769	1	R	1 BIT			0/1
	Status of warning W02 .	769	2	R	1 BIT			0/1
	Status of alarm AL02 .	769	3	R	1 BIT			0/1
	Status of alarm AL03 .	769	4	R	1 BIT			0/1
	Status of warning W04 .	769	5	R	1 BIT			0/1
	Status of warning W05 .	769	6	R	1 BIT			0/1
	Status of warning W06 .	769	7	R	1 BIT			0/1
	Status of alarm AL07 .	769	8	R	1 BIT			0/1
	Status of warning W08 .	769	9	R	1 BIT			0/1
	Status of alarm AL08 .	769	10	R	1 BIT			0/1
	Status of alarm AL09 .	769	11	R	1 BIT			0/1
	Status of alarm AL10 .	769	12	R	1 BIT			0/1
	Status of alarm AL11 .	769	13	R	1 BIT			0/1
	Status of warning W12 .	769	14	R	1 BIT			0/1
	Status of warning W13 .	769	15	R	1 BIT			0/1
	Status of alarm AL14.	770	0	R	1 BIT			0/1
	Status of alarm AL15.	770	1	R	1 BIT			0/1
	Status of alarm AL16.	770	2	R	1 BIT			0/1
	Status of alarm AL17.	770	3	R	1 BIT			0/1
	Status of alarm AL18.	770	4	R	1 BIT			0/1
	Status of alarm AL19.	770	5	R	1 BIT			0/1
	Status of alarm AL20.	770	6	R	1 BIT			0/1
	Status of alarm AL21.	770	7	R	1 BIT			0/1
	Status of alarm AL22.	770	8	R	1 BIT			0/1
	Status of alarm AL23.	770	9	R	1 BIT			0/1
	Status of alarm AL24.	770	10	R	1 BIT			0/1
	Status of alarm AL25.	770	11	R	1 BIT			0/1
	Status of alarm AL26 .	770	12	R	1 BIT			0/1
	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
	AL22 manual reset.	776		Ŕ/W	1 BIT			0/1
	AL29 manual reset.	777		, R/W	1 BIT			0/1
	AL31 manual reset.	778		, R/W	1 BIT			0/1
	W32 manual reset.	779		, R/W	1 BIT			0/1
manWash	Manual draining command (OFF/ON).	1282		R/W	1 BIT			0/1
-	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
	Hours of humidifier operation (LOW).(*)	1286			DWORD		h x 10	0.0
HoursService	Hours of humidifier operation (HIGH).(*)	1287		R/W	DWORD		h x 10	0.0 429496729.5
HoursBoilerP	Partial hours of boiler operation. (LOW).(*)	1288		R/W	DWORD		h x 10	0.0 429496729.5
	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	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			DWORD		h x 10	0.0 429496729.5
curr100	Nominal current.	1298		R/W	WORD		A	0.00655.35
tevap	Evaporation time.	1299		R/W	WORD		s	0.0 6553.5
actProd	Actual steam production.	1303		-	SHORT	Y	kg/h	-3276.8 3276.7
limH	Humidity limit sensor status (ON/OFF).	1304		R/W	1 BIT			0/1

Code	Description V		Filter value	R/W	DATA SIZE	CPL	MU	Range
llauna 6 at	Hours of continuous activity. (LOW).(*)	1316		R/W	DWORD		h x 10	0.0 429496729.5
HoursAct	Hours of continuous activity. (HIGH).(*)	1317		R/W	DWORD		h x 10	0.0 429496729.5
	Hours of continuous inactivity. (LOW).(*)	1318		R/W	DWORD		h x 10	0.0 429496729.5
HoursNotAct	Hours of continuous inactivity. (HIGH).(*)	1319		R/W	DWORD		h x 10	0.0 429496729.5
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:

Subject	Page
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Dimensions and mechanical installation	105
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1. MAINTENANCE USER INTERFACE

Chapter content

This chapter contains the following information:

Subject	Page
EHKT user interface	97
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1.1 EHKT user interface

1.1.1 Maintenance menu

To access the maintenance menu:

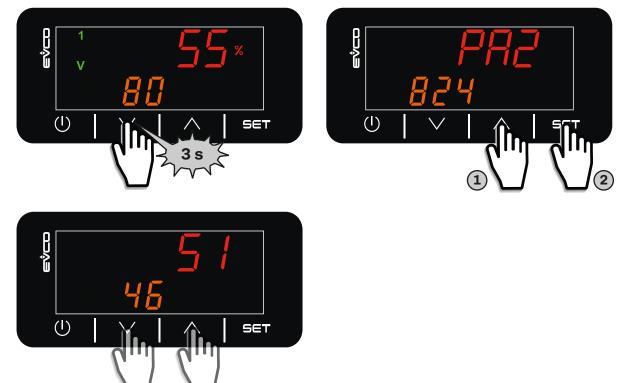


Fig. 72. Maintenance menu

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
c0c11	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.
ОІ	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 2 SET key, enter password PA2 using the FNC \checkmark or \land keys, and tap 2 SET to confirm.
MAnu	Output forcing page	Enters the output forcing page. To access the page: Double tap the Δ SET key, enter password PA2 using the FNC \checkmark or \land keys, and tap Δ SET to confirm.

1.1.2 Displaying/resetting the operating hours

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

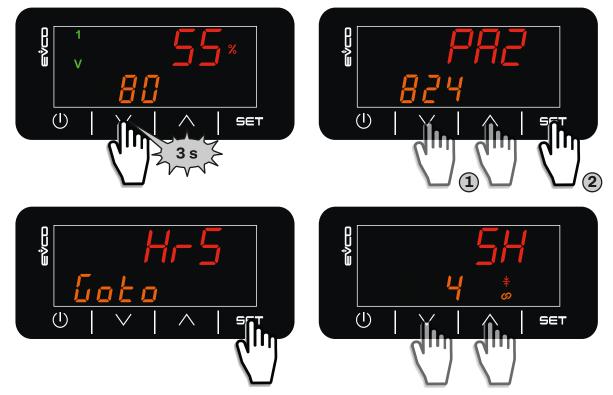


Fig. 73. Displaying the operating hours

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:

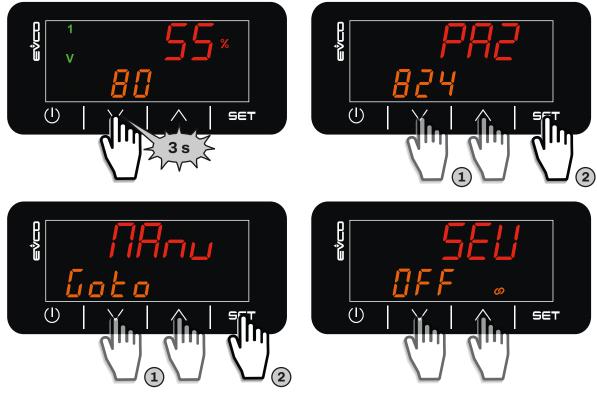


Fig. 74. Output functional test

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	
c0c11	See "6.1 TABLE OF ADJUSTMENT PARAMETERS" ON PAGE 83	
r0r12	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.

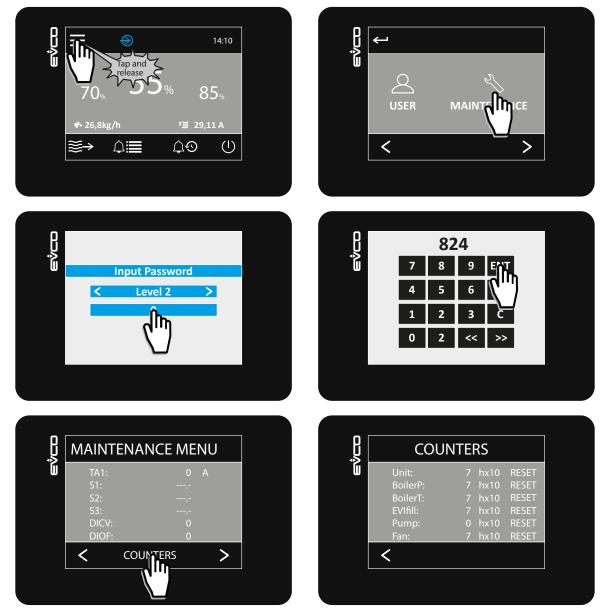


Fig. 76. Displaying the operating hours

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:

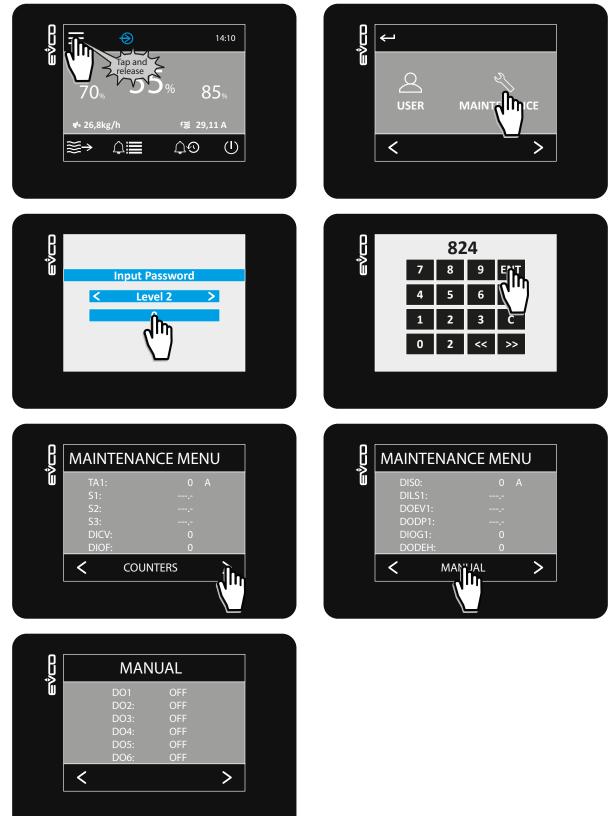


Fig. 77. Displaying the operating hours

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

Menu option	Description
D01	Forces the inlet solenoid valve output on/off. OFF = Inlet solenoid valve output forced OFF; ON = Inlet solenoid valve output forced ON.
D02	Forces the outlet pump output on/off. OFF = Outlet pump output forced OFF; ON = Outlet pump output forced ON.
D03	Forces the steam generator electrode output on/off. OFF = Steam generator electrode output forced OFF; ON = Steam generator electrode output forced ON.
D04	Forces the dehumidifier enable output on/off. OFF = Dehumidification enable output forced OFF; ON = Dehumidification enable output forced ON.
D05	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:

Subject	Page
Dimensions and weights	106
Minimum installation distances	109
Fitting single boiler models	110
Fitting double boiler models	112

2.1 Dimensions and weights

2.1.1 Models EHK•003 ... EHK•015

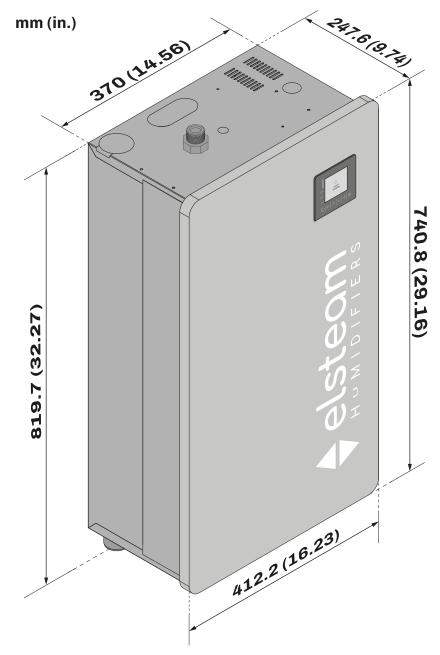


Fig. 78. Dimensions of models EHK•003 ... EHK•015

Weights		
Weight [kg(lb)]		
16.5 (36.37)		
16.5 (36.37)		
17.5 (38.58)		
17.5 (38.58)		
16.5 (36.37)		
16.5 (36.37)		
17.5 (38.58)		
17.5 (38.58)		

2.1.2 Models EHK • 020 ... EHK • 040

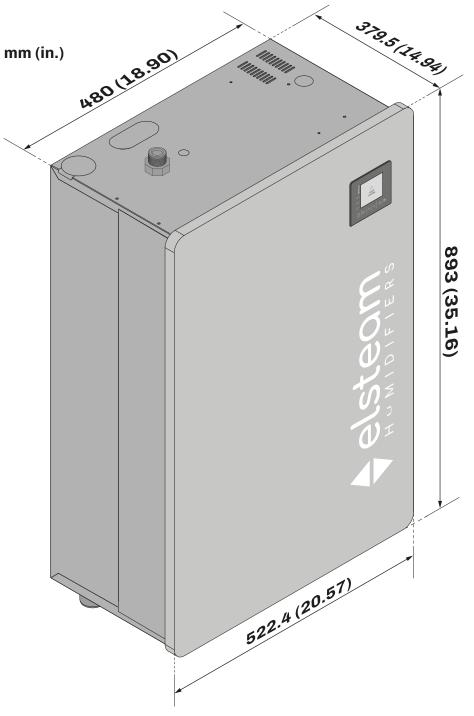
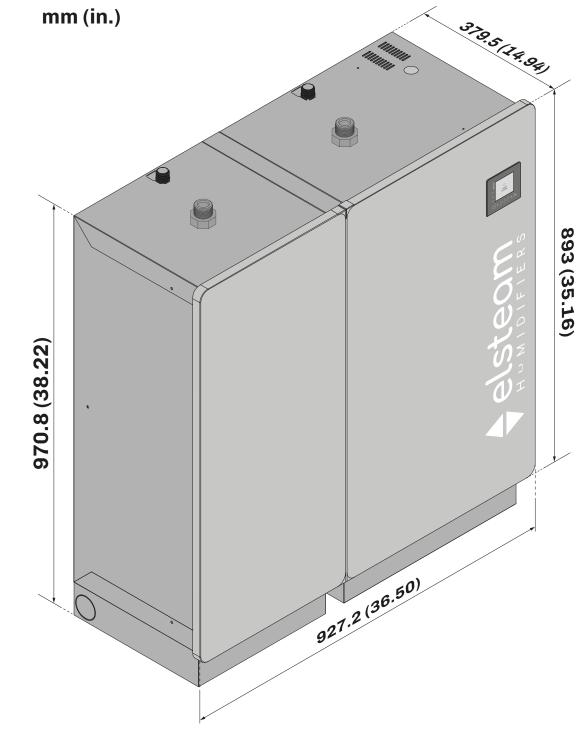
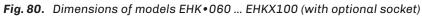


Fig. 79. Dimensions of models EHK • 020 ... EHK • 040

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







Weights

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

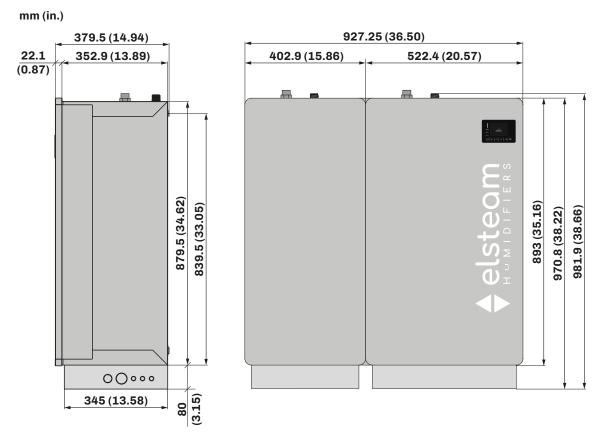


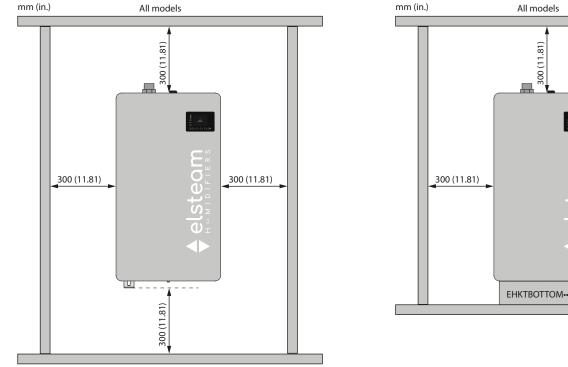
Fig. 81. Dimensions of double boiler models

2.2 Minimum installation distances

A 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.



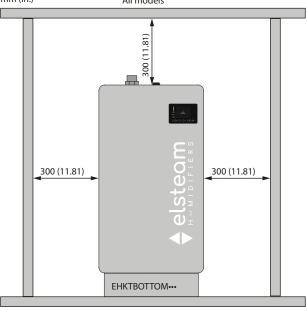


Fig. 82. Minimum installation distances

2.3 Fitting single boiler models

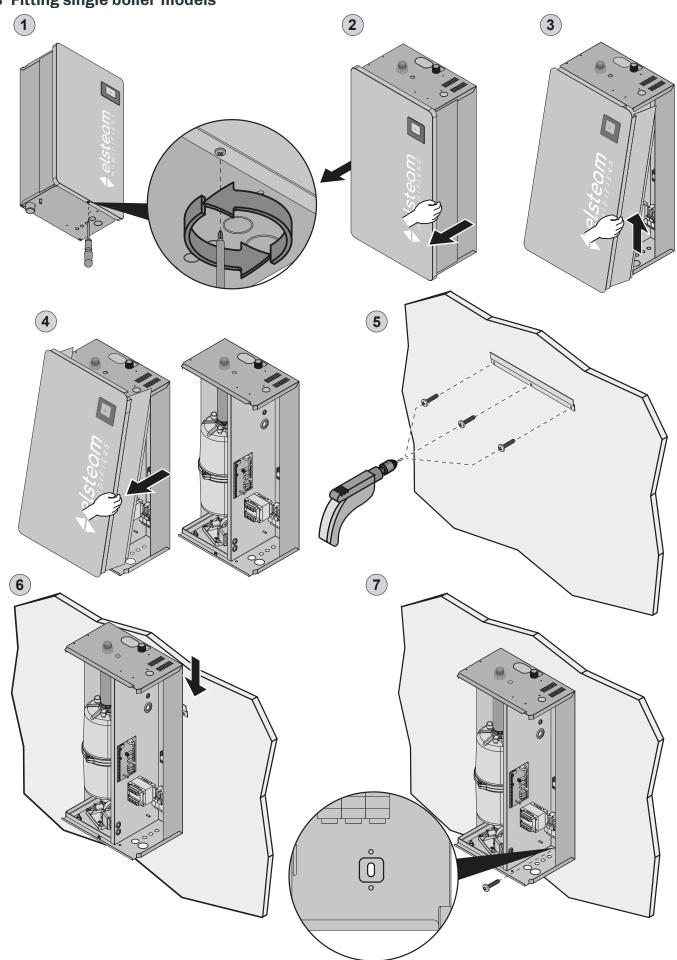


Fig. 83. Installation instructions

2.3.1 Installation instructions

A A 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.

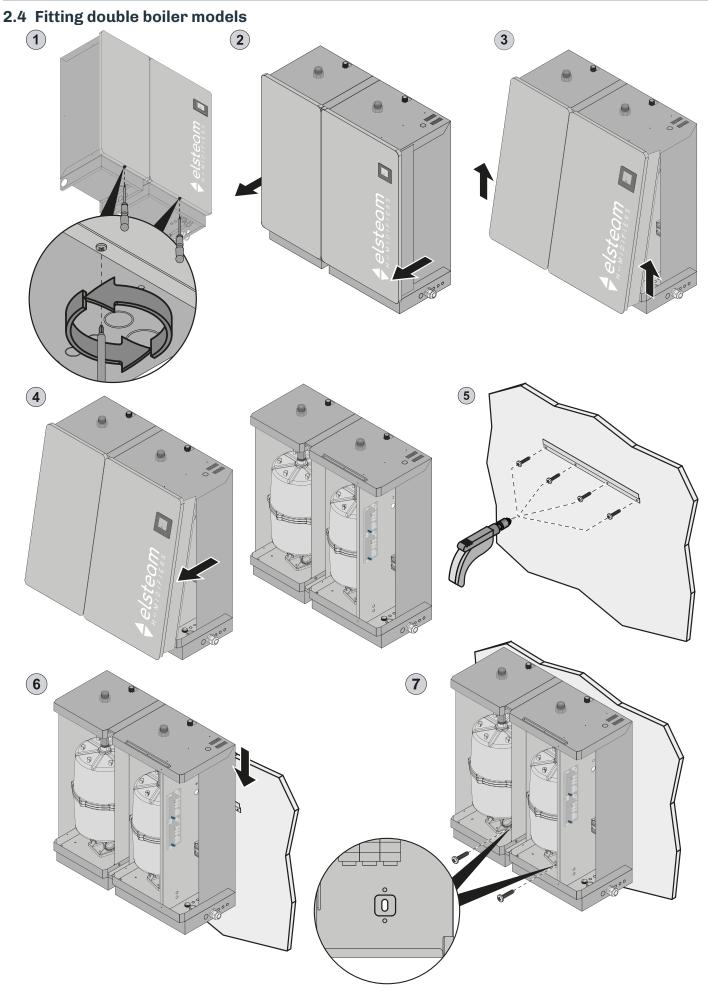


Fig. 84. Installation instructions

2.4.1 Installation instructions

A A 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:

Subject	Page
Before you start	115
Best connection practices	115
Suitable power supply protection devices	117
Electrical connections	120
Configurations	122
Power supply and earth wiring connection	125
Cable glands and cable routing	126
Serial line connections	128

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.

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

A A 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.

A A DANGER

LOOSE WIRING CAUSES ELECTRIC SHOCKS AND OVERHEATING

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

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.).

A 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 7 <i>0.28</i>				Ø 3.5 mm (0.14 in.)	() c Dim	N•m <i>Ib-in.</i>	2.5 22.12
ſ	mm²	16	16	16				
	AWG	8	8	8				
ſ	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

Step 26.5 mm (1.04 in.)

mm 7 0.28				Ø 3.5 mm (0.14 in.)
mm²	35	25	25	
AWG	8	6	6	
no. of conductors		3		

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

N•m 3

Ib-in. 26.55

Applicable to models ... EHK+015T2

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

jc∰)____

∫c∰)____

Step 17.8 mm (0.70 in.)

mm 7 0.28				Ø 3.5 mm (0.14 in.)
mm²	16	16	16	
AWG	8	8	8	
no. of conductors		2		

N•m	2.5	
lb-in.	22.12	Applicable to models
		ЕНК•020Т4

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

Step 26.5 mm (1.04 in.)

mm 7 in. 0.28				Ø 3.5 mm (0.14 in.)	N•m 3 <i>Ib-in.</i> 26.55	Applicable to models
mm ²	35	25	25			EHK•020T2 / EHK•030T4 / EHK•040T4
AWG	8	6	6			
no. of conductors		3				

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

Step 35.5 mm (1.40 in.)

mm 7 in. 0.28				Ø 3.5 mm (0.14 in.)	Applicable to models
mm ²	50	35	35		EHK•060T4 / EHKX080T4 / EHKX100T4
AWG	1	2	2		
no. of conductors		4			

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			
EHKT003T2	EHKX003T2	3G2.5			
EHKT003T4	EHKX003T4	3G2.5			
EHKT005M2	EHKX005M2	2G10			
EHKT005T2	EHKX005T2	3G4			17.8 (0.70)
EHKT005T4	EHKX005T4	3G2.5			
EHKT010T2	EHKX010T2	3G10			
EHKT010T4	EHKX010T4	3G4			
EHKT015T4	EHKX015T4	3G6	15 m (49.2 ft.)		
EHKT015T2	EHKX015T2	3G16			20 = (1, 0, 4)
EHKT020T2	EHKX020T2	3G16			26.5 (1.04)
EHKT020T4	EHKX020T4	3G10			17.8 (0.70)
EHKT030T4	EHKX030T4	3G16			20 = (1, 0, 4)
EHKT040T4	EHKX040T4	3G16			26.5 (1.04)
EHKT060T4	EHKX060T4	3G25			
	EHKX080T4	3G35			35.5 (1.40)
	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∙ 005M2								EHK∙ 030T4	EHK∙ 040T4		EHKX 080T4	EHKX 100T4
Corrente	16	10	10	32	16	10	16	32	32	50	32	50		100	12	25
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)

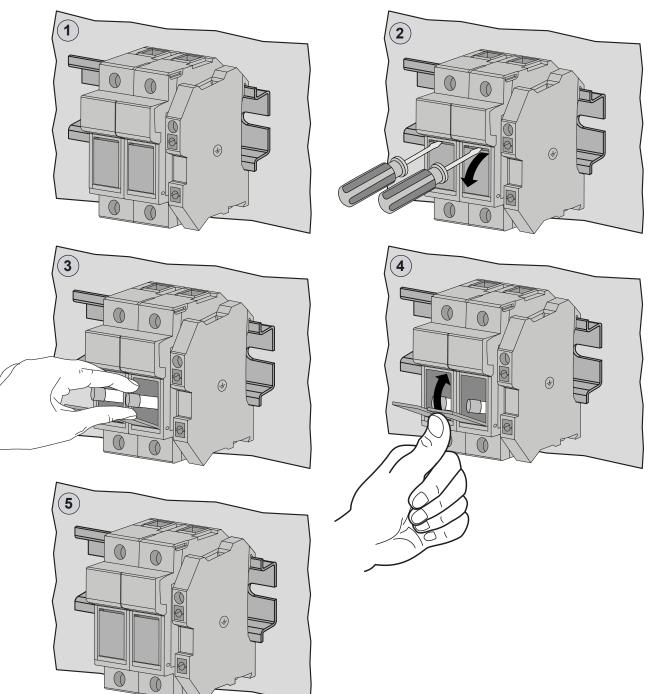


Fig. 91. Overload protection device

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

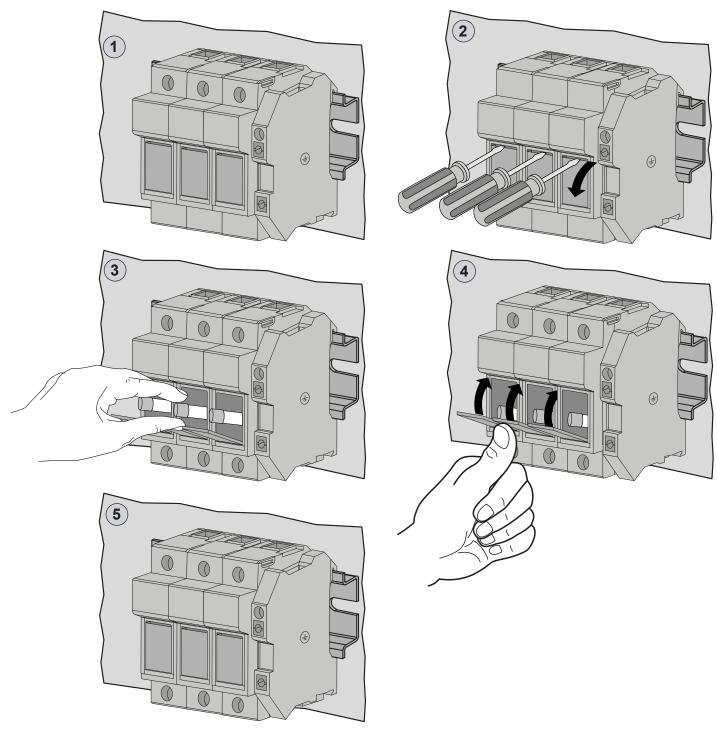


Fig. 92. Overload protection device

3.3.3 Changing fuses - Control board

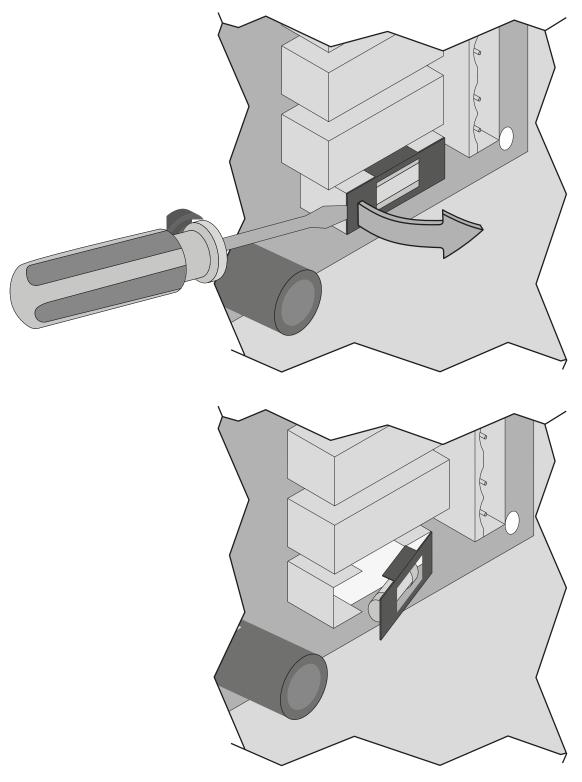


Fig. 93. Protection devices on the control board

Description

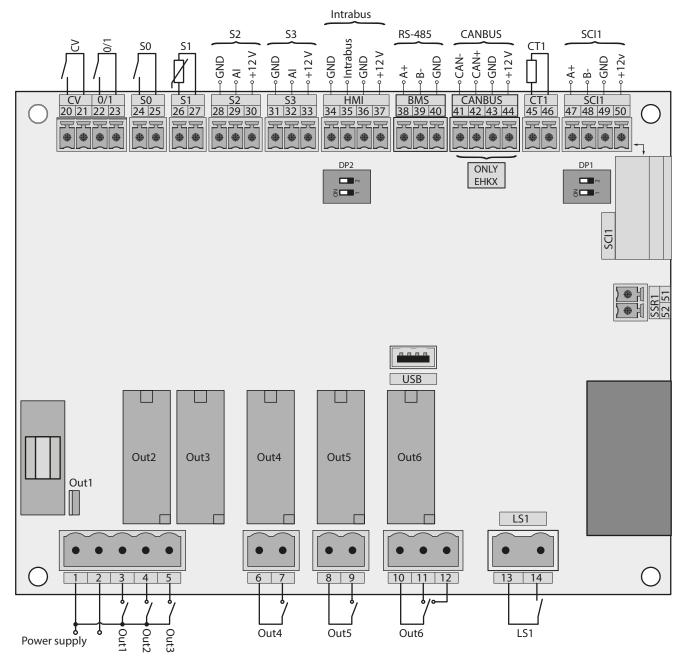
Overload protection devices for the control board power supply.

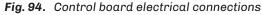
Control board overload protection devices

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

3.4 Electrical connections

3.4.1 Control board





TERMI	NALS		
1-2	24 Vac power supply	26-27	S1 analogue input: temperature (anti-freezing and hold)
1-3	Digital output: water outlet solenoid valve	2830	S2 analogue input: humidity sensor
1-4	Digital output: water outlet pump	3133	S3 analogue input: humidity limit sensor
1-5	Digital output: contactor (steam generation)	3436	Serial line connection: HMI Intrabus
6-7	Digital output: dehumidification enable	3840	Serial line connection: RS-485 modbus for BMS slave
8-9	Digital output: ventilated distributor control	4144	Serial line connection: CANBUS (EHKX only)
1012	Digital output: alarm	45-46	Analogue connection: external current sensor CT1 (TA)
13-14	Hazardous voltage digital input: level sensor LS1	4750	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

924EHKTE4.01 - Zephyr series humidifiers

3.4.2 Expansion

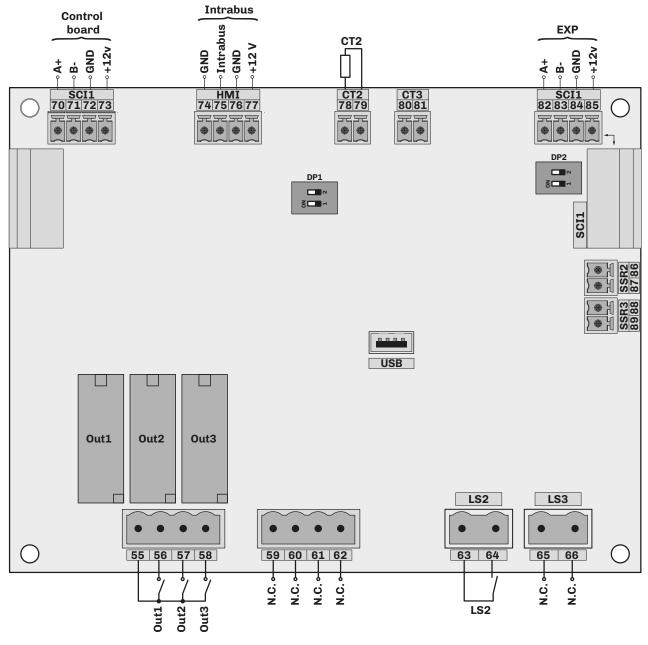


Fig. 95. Expansion electrical connections

TERMIN	TERMINALS									
		80-81	80-81 Reserved							
55-56	Digital output: boiler 2 water outlet solenoid valve	8285	3285 Connection to expansion board SCI1							
			Mod	lbus	communication address of expansion board					
55-57	Digital output: boiler 2 water outlet pump		1	2	Address offset relative to LA1					
55-58	Digital output: electrodes (steam generation)		OFF	OFF	LA1 + 0					
63-64	Hazardous voltage digital input: level sensor LS2	DP1	OFF	ON	LA1 + 1					
7073	Connection to control board SCI1		ON	OFF	LA1 + 2					
7477	Serial line input: HMI Intrabus		ON	ON	LA1 + 3					
78-79	Analogue input: external current sensor CT2 (TA) for boiler 2	DP2			termination resistor on SCI1 RS-485 serial line. 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)

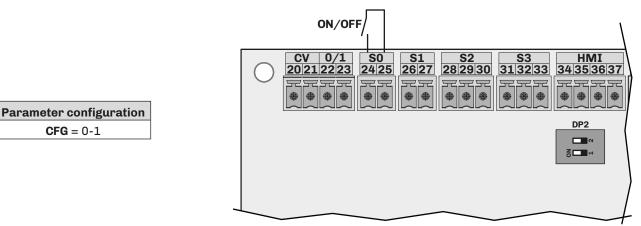


Fig. 96. ON/OFF connection with humidistat or external contact (CFG = 0-1)

3.5.2 External proportional humidistat connection (CFG = PROP)

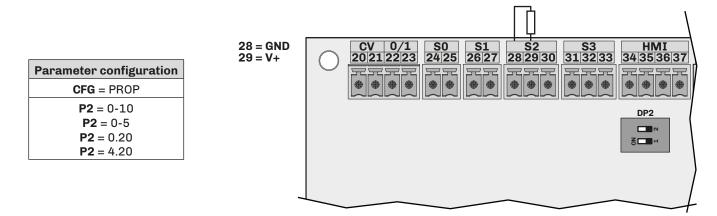


Fig. 97. External proportional humidistat connection (CFG = PROP)

3.5.3 Humidity sensor connection (CFG = HUM)

						RH []		\
Parameter configuration CFG = HUM	S2 input 29 = Sensor signal input 30 = Sensor power supply	0	CV 0/1 20212223	S0 2425	S1 2627	\$2 282930	S3 31 32 33	HMI 34353637
P2 = 0-10 P2 = 0-5 P2 = 0.20 P2 = 4.20								DP2
	_							

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

3.5.4 Humidity sensor connection EVHTP520 (CFG = HUM)

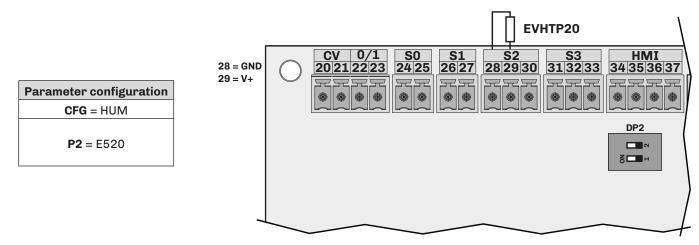


Fig. 99. Humidity sensor connection EVHTP520 (CFG = HUM)

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

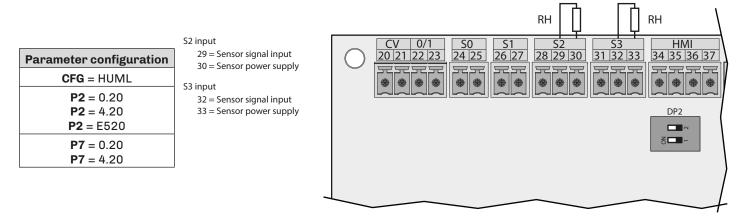


Fig. 100. Connection for humidity sensor and limit sensor (CFG = HUML)

3.5.6 Temperature sensor connection (CFG = 1T)

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

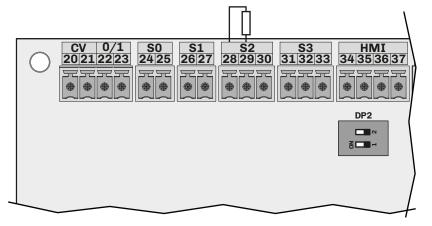


Fig. 101. Temperature sensor connection (CFG = 1T)

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

CFG = 2T P2 = PTC P2 = 1000 P2 = NTC P7 = PTC 0 <td< th=""><th></th><th></th><th></th><th></th><th> Ų</th><th><u> </u></th><th></th></td<>					Ų	<u> </u>	
P2 = PTC P2 = 1000 P2 = NTC P7 = PTC The set of the s	Parameter configuration		S0 24 25	<u>S1</u> 26 27		S3 31 32 33	HMI 34 35 36 37
P2 = 1000 DP2 P2 = NTC Image: Second secon	CFG = 2T						
P2 = NTC ■ P7 = PTC 3	P2 = PTC						
P7 = PTC 3⊡ →							DP2
	P2 = NTC						×
P7 – 1000	P7 = PTC						8□■ =
	P7 = 1000						
P7 = NTC	P7 = NTC						

n n

1

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

3.5.8 Humidity sensor connection $0...5\,V\,/\,0...10\,V$

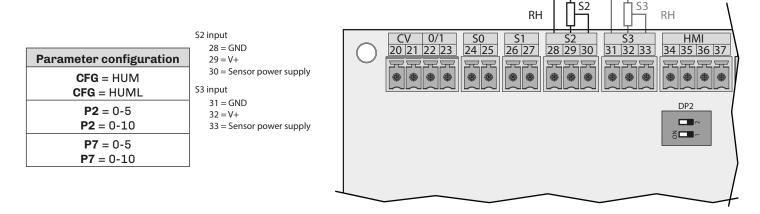


Fig. 103. Humidity sensor connection 0...5 V

3.6 Power supply and earth wiring connection

3.6.1 Single-phase models

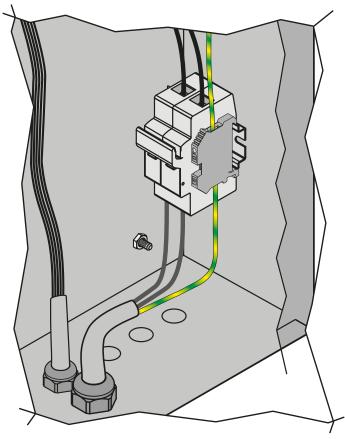


Fig. 104. Power supply connections - single-phase models

3.6.2 Three-phase models

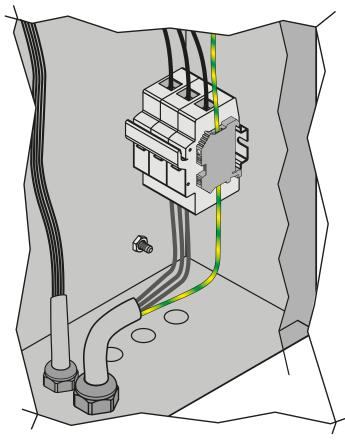
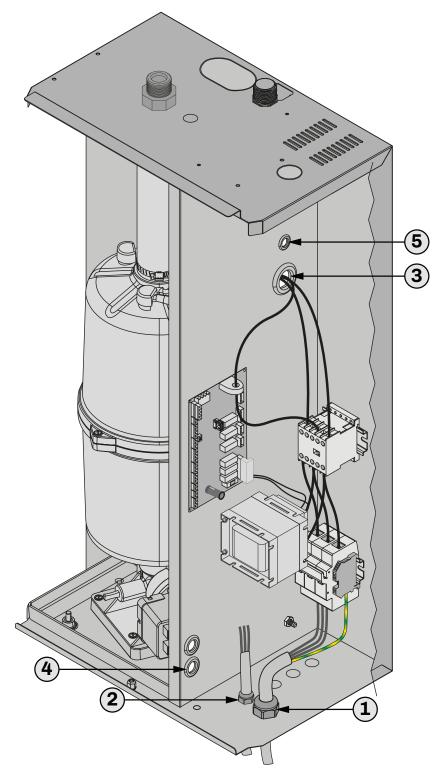


Fig. 105. Power supply connections - three-phase models

3.7 Cable glands and cable routing

3.7.1 Single boiler models



Referenc	e 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

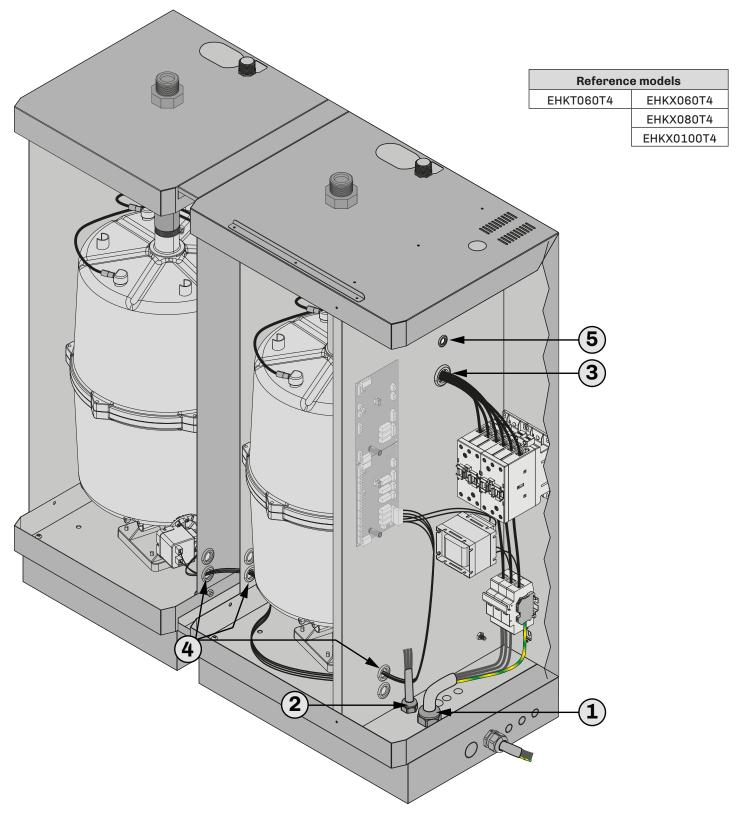


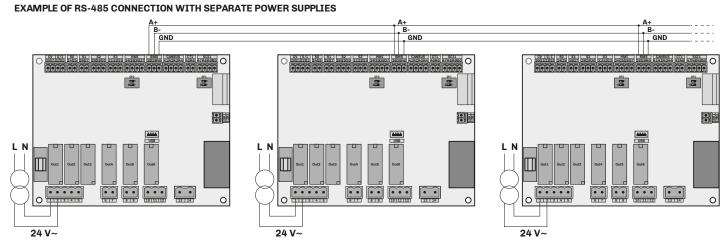
Fig. 107. Cable glands and cable routing

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

| 127 | Maintenance |

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 COMMON POWER SUPPLY AND GND SIGNAL NOT CONNECTED

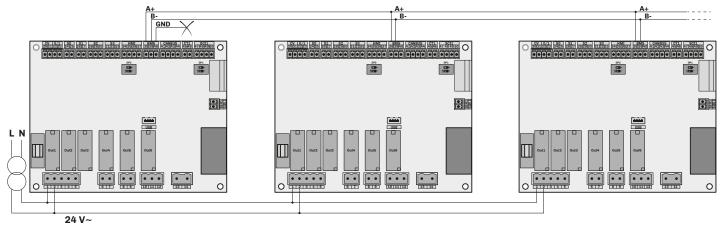


Fig. 108. Serial line connections

4. OPERATION

Chapter content

This chapter contains the following information:

Subject	Page
Zephyr operating principle	130
Humidity regulation	130
Preheating and anti-freeze (EHKX only)	133
Boiler water dilution	133
Boiler draining	134
Completely draining the boiler	134
Level sensor	134
Foam management	134
Operating hours	135
Overproduction	135

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).

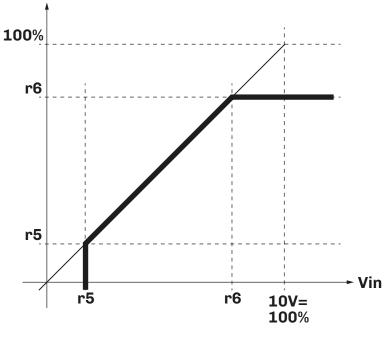
When the **SO**digital input is closed, **Zephyr** generates humidity according to the maximum value set in parameter r6.

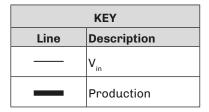
4.2.2 Proportional regulation | CFG = PROP

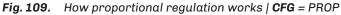
To use **Zephyr** with proportional regulation, the following conditions must be met:

- **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**:



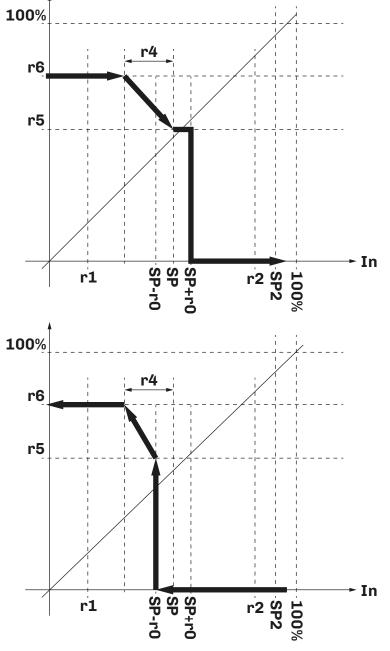




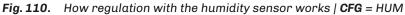
4.2.3 Regulation with the humidity sensor | CFG = HUM

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**).



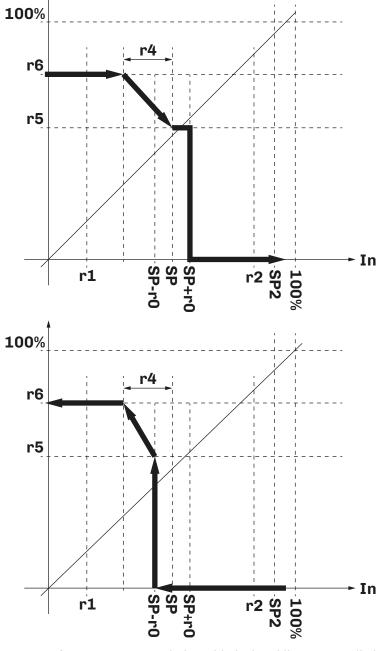
	KEY
Line	Description
	V _{in}
	Production

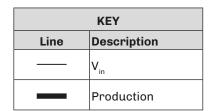


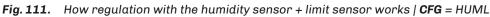
4.2.4 Regulation with the humidity sensor + limit sensor | CFG = HUML

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**).







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 **PO** 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 PO 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:

F	Par.	Description	MU	Range
	c8	Preheating set-point for temperature hold. 0 = Disabled.	°C/°F	0.090.0
	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).	%	2080

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	09999
с5	Time between two dilution draining events (if $C3 = 1$).	min	30999

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:

Pa	ar.	Description	MU	Range	Default
С	:0	Number of continuous days of inactivity after which the boiler is emptied. 0 = Function disabled.	days	010	2
C	:1	Number of continuous days of activity after which the boiler is emptied. 0 = Function disabled.	days	0100	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	0 Operating hours threshold for unit maintenance warning.		1001000
A11	Operating hours threshold for partial boiler maintenance warning.	hx10	1001000
A12	Operating hours threshold for full boiler maintenance warning.	hx10	1001000
A13	Operating hours threshold for valve maintenance warning.	hx10	1001000
A14	Operating hours threshold for pump maintenance warning.	hx10	1001000
A15	Operating hours threshold for fan maintenance warning.	hx10	1001000

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:

Subject	Page	
Introduction	137	
Operation in Parallel nTyp = 1	138	
Operation in Rotation nTyp = 2	138	
Operation in Balancing nTyp = 3	138	
Protection management	138	

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).

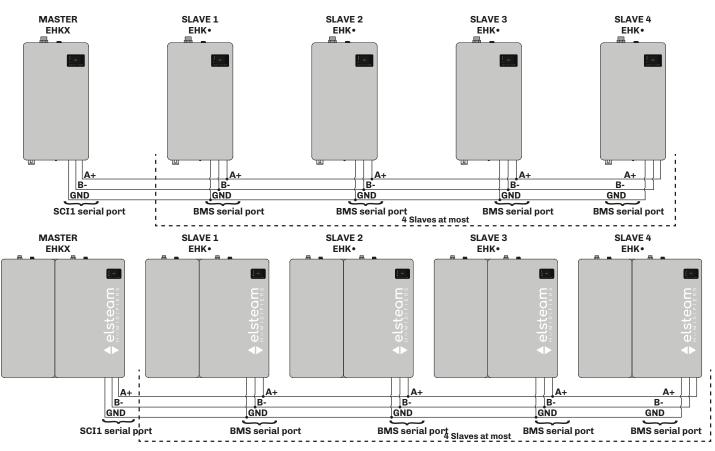


Fig. 112. External overview of the product

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.		03
nAdr	Networked master/slave module (only if enabled Master/Slave Operation $nTyp \neq 0$). 1 = Master; 2 = Slave 1; 3 = Slave 2; 4 = Slave 3; 5 = Slave 4.		15
nPrE	Master/Slave machine pre-heating enabled. 0 = Disabled; 1 = Enabled.		0/1
ntot	Total number of Master/Slave machines.	num	25
nbAc	Number of Master/Slave backup machines (only for nTyP = 2 and/or nTyP = 3).	num	13
nHrs	Hours of Master/Slave machine rotation.	hours	10500

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 I

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:

Subject	Page
Introduction to Zephyr	140
Product overview	140
Checking the status of the humidifier	141
Boiler maintenance	141
Cleaning the boiler	142
Replacing the boiler	144
Fitting the boiler	144
Cleaning/replacing the electrodes	145
Cleaning the optional stainless steel drain tray (EHVI accessory)	145

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

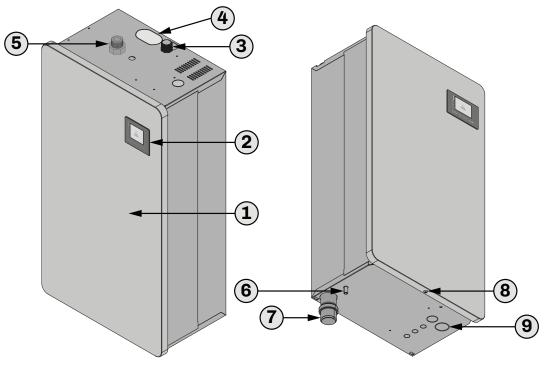


Fig. 113. External overview of the product

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
75600 μS/cm	530 °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
7001250 μS/cm	3550 °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;

A A 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);

A 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.

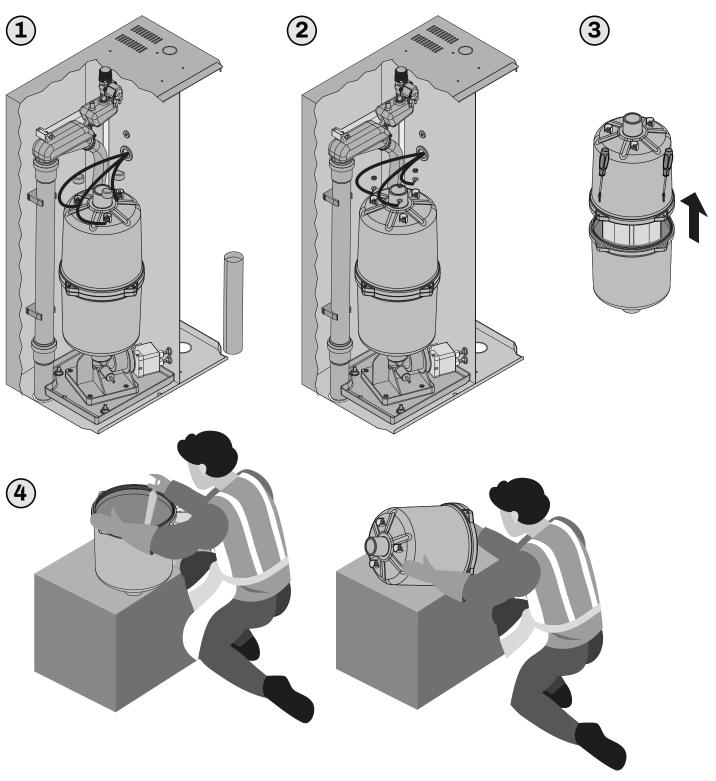


Fig. 114. Cleaning the boiler

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.

A A DANGER

LOOSE WIRING CAUSES ELECTRIC SHOCKS AND OVERHEATING

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

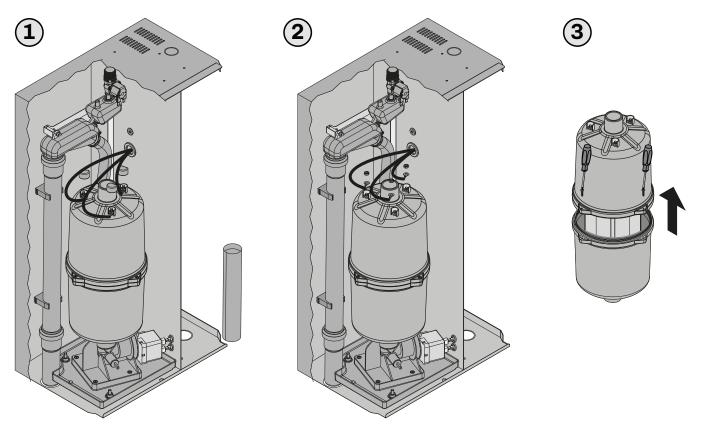


Fig. 115. Replacing the boiler

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.

A A 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

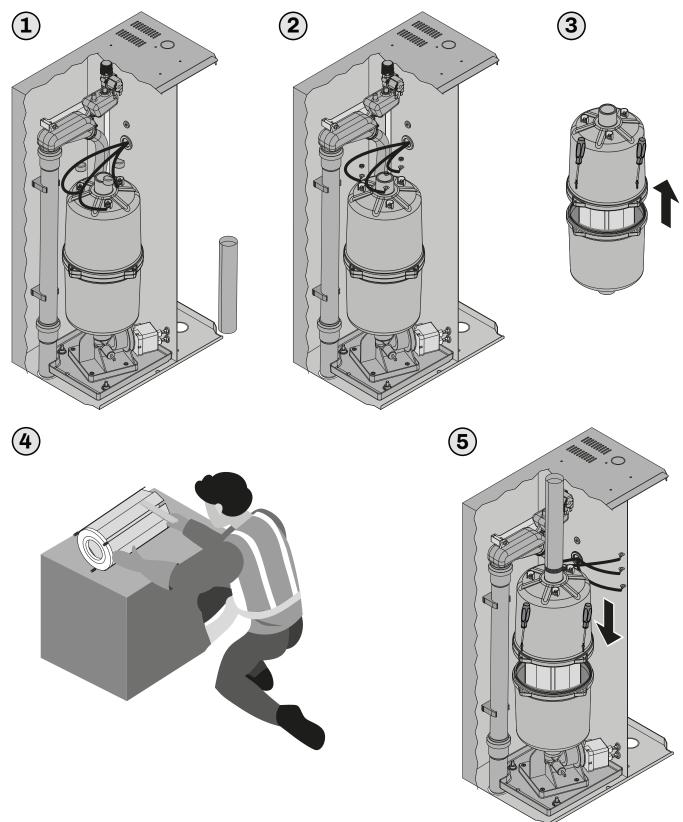


Fig. 116. Cleaning/replacing the electrodes

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:

Subject	Page
Plumbing spare parts	147
Electrical spare parts	149

7.1 Plumbing spare parts

7.1.1 Table of plumbing spare part codes

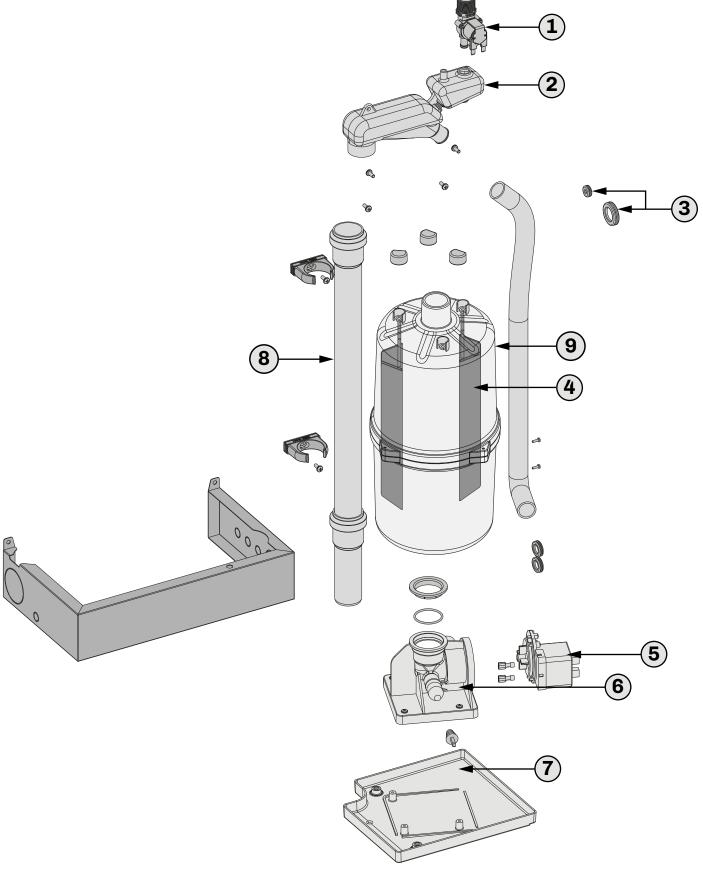


Fig. 117. EHKT/EHKX series spare parts - Plumbing Part

| 147 | Maintenance |

Ref.	P/n	Description	Ref.	P/n	Description
	EHKTOK01	Inlet solenoid valve EHK•10EHK•15	5	ЕНКТОКО4	Electric outlet pump
	EHKT0K02	Inlet solenoid valve EHK•20EHK•100	6	EHKT0K05	Inlet/outlet manifold
	ЕНКТОКОЗ	Inlet solenoid valve EHK+03EHK+05	7	ЕНКТОКО8	Bottom tray
2	ЕНКТОКО7	Filling tank	8	EHKTOKO6	Outlet circuit kit
	ЕНКТОКО9	XS-S-M boiler seal kit		EHBK005M00M	Standard cleanable boiler, 3–5 kg/h single- phase models
3	EHKTOK10	L boiler seal kit		EHBK005MLCM	Cleanable boiler, 3–5 kg/h single-phase models, low conductivity
	EHKT0K21	Set of two electrodes, boiler EHBK005M00S		ЕНВКО05МНСМ	Cleanable boiler, 3–5 kg/h single-phase models, high conductivity
	EHKT0K22	Set of two electrodes, boiler EHBK005MHCS		ЕНВК005Т00М	Standard cleanable boiler, 3–5 kg/h three- phase models
	EHKT0K23	Set of two electrodes, boiler EHBK005MLCS		EHBK005TLCM	Cleanable boiler, 3–5 kg/h three-phase models, low conductivity
	ЕНКТОК24	Set of three electrodes, boiler EHBK005T00S		ЕНВК005ТНСМ	Cleanable boiler, 3–5 kg/h three-phase models, high conductivity
	EHKT0K25	Set of three electrodes, boiler EHBK005THCS		EHBK015T00M	Standard cleanable boiler, 10–15 kg/h three- phase models
	ЕНКТОК26	Set of three electrodes, boiler EHBK005TLCS	9	EHBK015TLCM	Cleanable boiler, 10–15 kg/h three-phase models, low conductivity
	ЕНКТОК27	Set of three electrodes, boiler EHBK005T00S		EHBK015THCM	Cleanable boiler, 10–15 kg/h three-phase models, high conductivity
	ЕНКТОК28	Set of three electrodes, boiler EHBK005THCS		EHBK040T00L	Standard cleanable boiler, 20–30–40 kg/h three-phase models
	ЕНКТОК29	Set of three electrodes, boiler EHBK005TLCS		EHBK040TLCL	Cleanable boiler, 20–30–40 kg/h three-phase models, low conductivity
4	ЕНКТОКЗО	Set of three electrodes, boiler EHBK015T00M		EHBK040THCL	Cleanable boiler, 20–30–40 kg/h three-phase models, high conductivity
	EHKT0K31	Set of three electrodes, boiler EHBK015THCM		EHBK050T00L	Standard cleanable boiler, 50 kg/h three- phase models
	ЕНКТОК32	Set of three electrodes, boiler EHBK015TLCM		EHBK050TLCL	Cleanable boiler, 50 kg/h three-phase models, low conductivity
	ЕНКТОКЗЗ	Set of three electrodes, boiler EHBK040T00L		EHBK050THCL	Cleanable boiler, 50 kg/h three-phase models, high conductivity
	ЕНКТОК34	Set of three electrodes, boiler EHBK040THCL		1	
	ЕНКТОК35	Set of three electrodes, boiler EHBK040TLCL	1		
	ЕНКТОК36	Set of three electrodes, boiler EHBK050T00L	1		
	ЕНКТОК37	Set of three electrodes, boiler EHBK050THCL	1		
	EHKTOK38	Set of three electrodes, boiler EHBK050TLCL			

7.2 Electrical spare parts

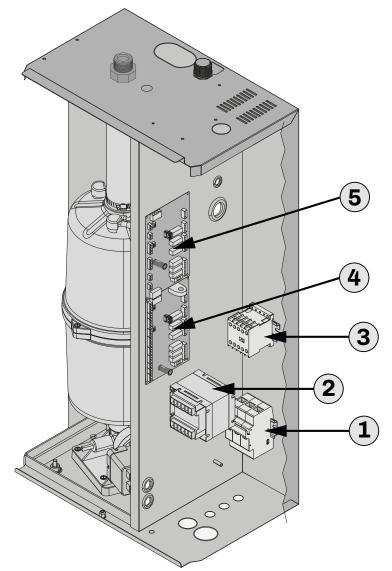


Fig. 118. EHKT/EHKX series spare parts - Electrical Part

7.2.1 Table of electrical spare part codes

Ref.	P/n	Description	Ref.	P/n	Description
	EHKTOK71	Fuse holder base, 2P 10x38 gG		EHKT0K51	Boiler cable kit, MxxS 230 Vac single-phase
	EHKTOK72	Fuse holder base, 3P 10x38 gG		EHKT0K52	Boiler cable kit, TxxS 400 Vac three-phase
	EHKTOK73	Fuse holder base, 3P 14x51 gG		EHKT0K53	Boiler cable kit, TxxS 230 Vac three-phase
	EHKT0K74	Fuse holder base, 3P 22x58 gG		EHKT0K54	Boiler cable KIT, TxxM 230 Vac three-phase
2	0101010020	Transformer, 230/24 V		EHKT0K55	Boiler cable KIT, TxxM 400 Vac three-phase
	0101014020	Transformer, 400/24 V		EHKT0K56	Boiler cable kit, TxxL 230 Vac three-phase
	0153411020	Contactor, 230/400 Vac 24 Vac 20 A		EHKT0K57	Boiler cable kit, TxxL 400 Vac three-phase
	0153431001	Contactor, 230/400 Vac 24 Vac 25 A		EHKT0K75FUSE	Fuse kit, 10pcs 10x38 gG 10 A
3	0153431003	Contactor, 230/400 Vac 24 Vac 45 A	·	EHKTOK76FUSE	Fuse kit, 10pcs 10x38 gG 16 A
	0153431004	Contactor, 230/400 Vac 24 Vac 56–60 A		EHKT0K77FUSE	Fuse kit, 10pcs 10x38 gG 32 A
	0153431005	Contactor, 400 Vac 24 Vac 70 A		EHKT0K78FUSE	Fuse kit, 10pcs 14x51 gG 50 A
	EHKT0K90	EHKT electronic control		EHKT0K79FUSE	Fuse kit, 10pcs 22x58 gG 100 A
4	EHKX0K90	EHKX electronic control		EHKTOK80FUSE	Fuse kit, 10pcs 22x58 gG 125 A
5	EHKX0K91	Expansion electronic control for EHKX060 / EHKX080 / EHKX100			

8. DIAGNOSTICS

Chapter content

This chapter contains the following information:

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Table of Zephyr alarms	151

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

8.1 Table of Zephyr alarms

Code	Description	Cause	Effects	Solution
W01 AL01	Warning: +30% overcurrent Alarm: +50% 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 Fixed alarm icon AL01 displayed Humidifier OFF AL01 recorded in the log 	 Carry out maintenance Replace the boiler Check that the outlet pump is working Check that the TA is working (if external) Check the water properties
W02 AL02	Warning: no production Alarm: no	 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 	 Fixed alarm icon Showing W02 No effect on regulation Recording W02 in the log Fixed alarm icon Showing AL02 Alarm relay ON 	 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
AL03	production No water alarm	 Very low electrical conductivity No production for a long time Water fill time > c10 Inlet filter clogged Solenoid valve not working Water pressure too low Water inlet circuit leaking 	 Humidifier OFF if AL02 > 100 h Recorded AL02 in the log Fixed alarm icon AL03 displayed Humidifier inhibited for 15 minutes AL03 recorded in the log 	 Check the backpressure in the steam outlet duct 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)
W 04	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 currentLow 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		 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	 Sensor not working Sensor not connected correctly Control board not working 	 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 AL20	Alarm: temperature sensor 1 Alarm: temperature sensor 2	 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 Fixed alarm icon AL20 displayed Alarm relay ON Humidifier OFF AL20 recorded in the log 	 Check the sensor type Check the sensor wiring Change the sensor type Check for electrical noise
AL21	Alarm: 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 	 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
AL29	Alarm: +50% overcurrent boiler 2	 Current sensor not working Control board not working Boiler compromised High electrical conductivity Use softened water 	 Fixed alarm icon Showing AL29 Humidifier OFF Recording AL29 in the log 	 Check that the TA is working (if external) Check the water properties

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 	 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
AL30	Alarm: no boiler 2 production	 Water pipes of 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 AL30 Alarm relay ON Humidifier OFF if AL30 > 100 h Recorded AL30 in the log 	 boiler 2 solenoid valve Replace the solenoid valve Check for foam Check the backpressure in the steam outlet duct
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
W 34	Warning: suspected high electrical conductivity boiler 2	High currentLow 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 iconShowing AL38	 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

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9.1 Wiring diagram EHKT003M2 / EHKT005M2

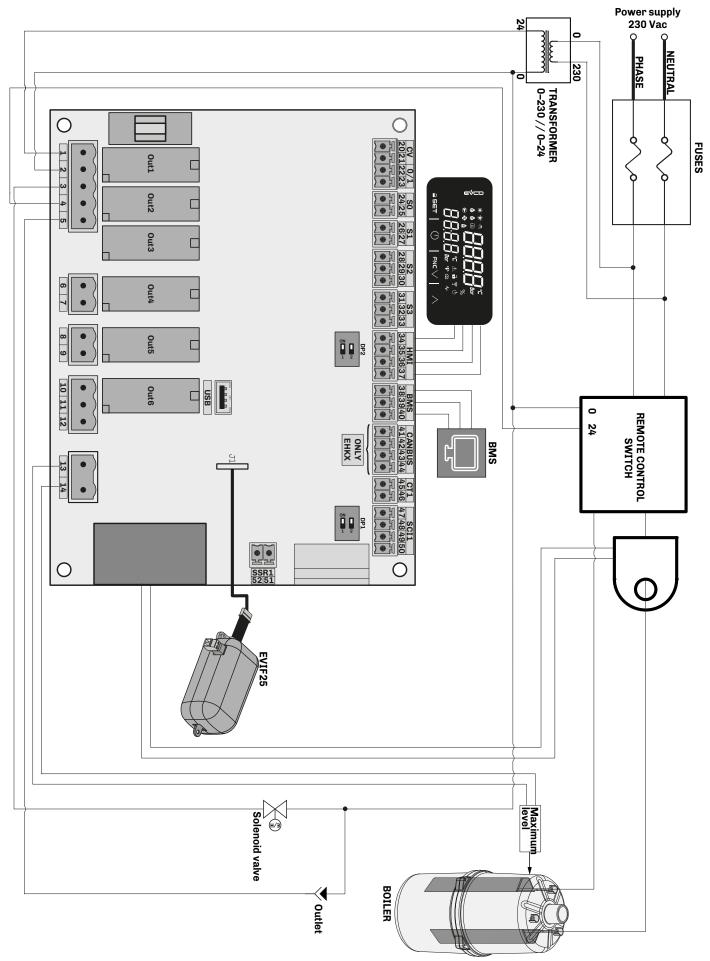


Fig. 119. Wiring diagram models EHKT003M2 / EHKT005M2

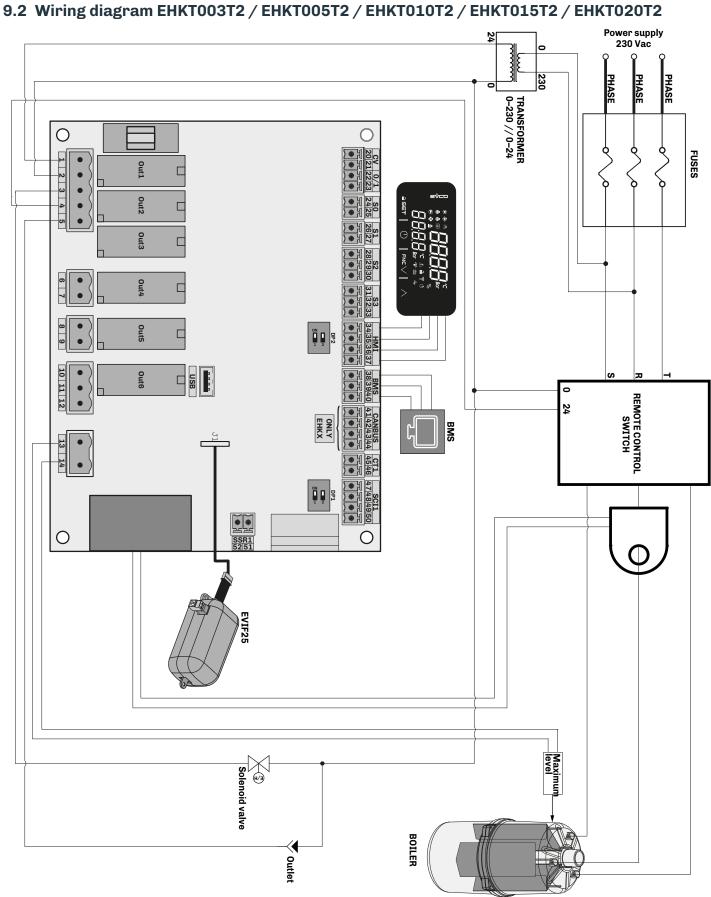
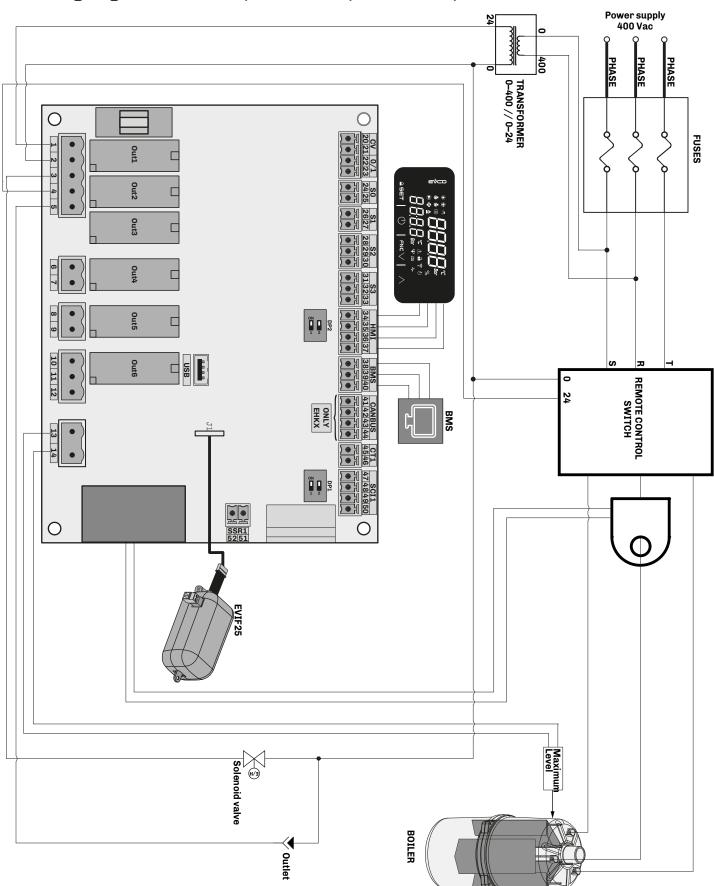


Fig. 120. Wiring diagram models EHKT003T2 / EHKT005T2 / EHKT010T2 / EHKT015T2 / EHKT020T2



9.3 Wiring diagram EHKT003T4 / EHKT005T4 / EHKT010T4 / EHKT015T4

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

9.4 Wiring diagram EHKT020T4 / EHKT030T4 / EHKT040T4

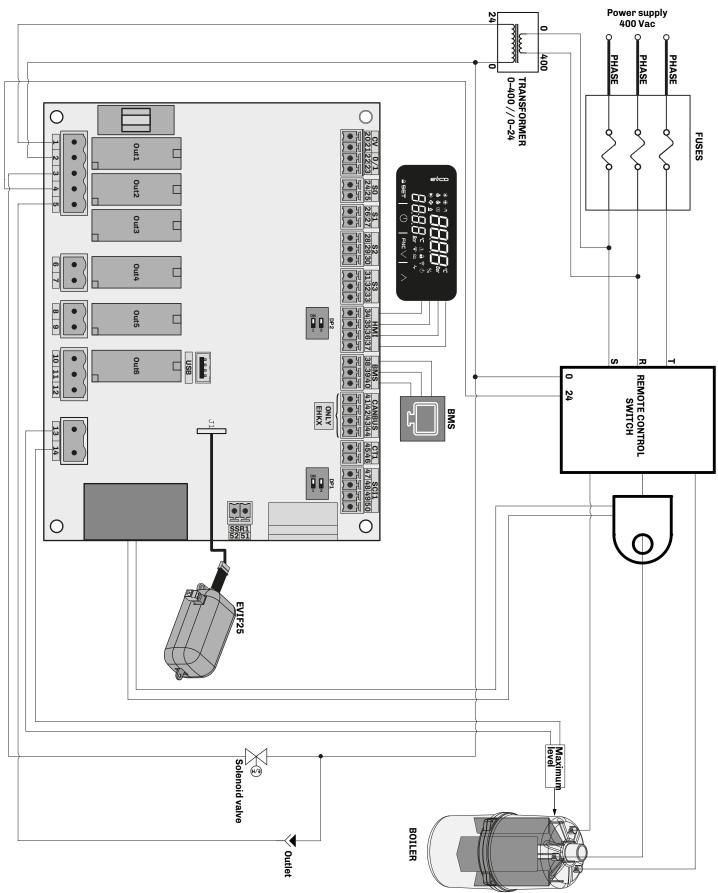


Fig. 122. Wiring diagram models EHKT020T4 / EHKT030T4 / EHKT040T4

9.5 Wiring diagram EHKT060T4

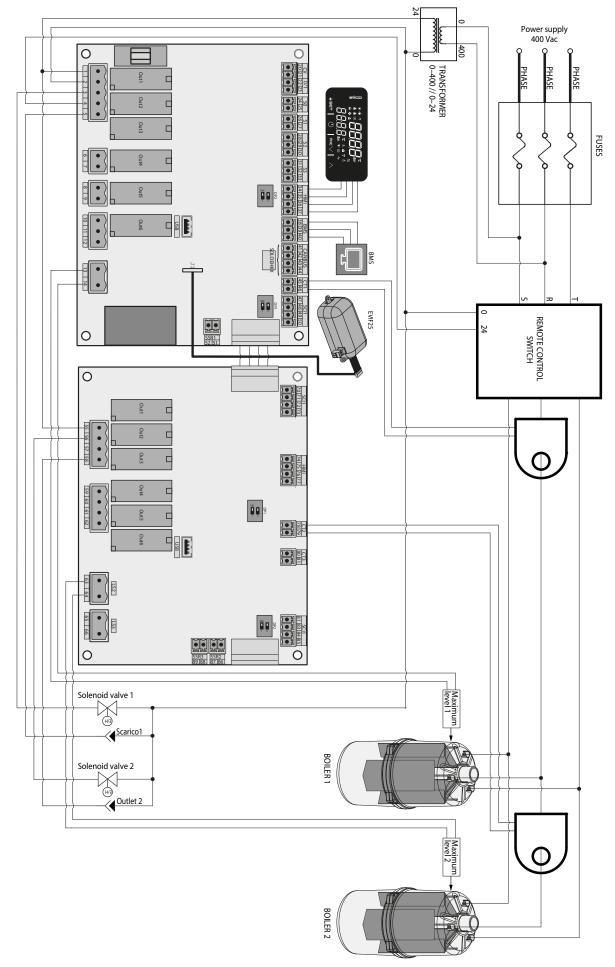


Fig. 123. Wiring diagram models EHKT060T4

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9.6 Wiring diagram EHKX003M2 / EHKX005M2

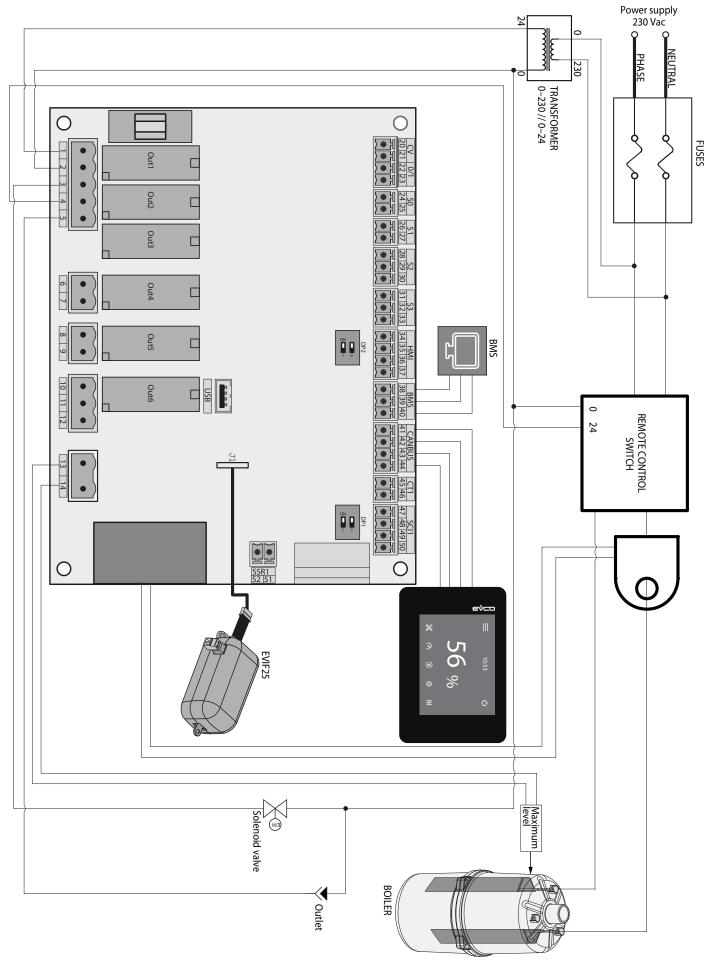
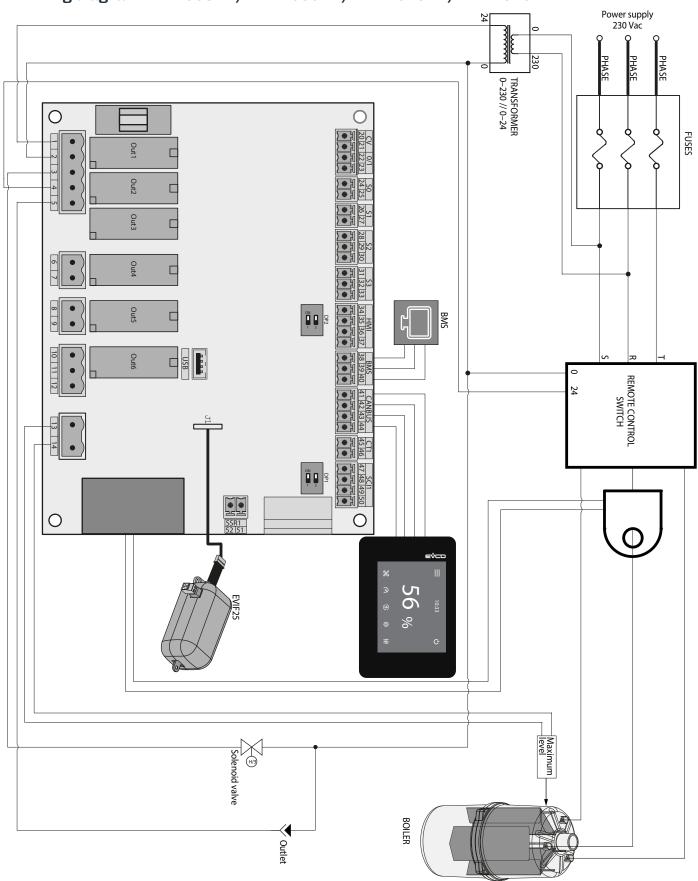


Fig. 124. Wiring diagram models EHKX003M2 / EHKX005M2

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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

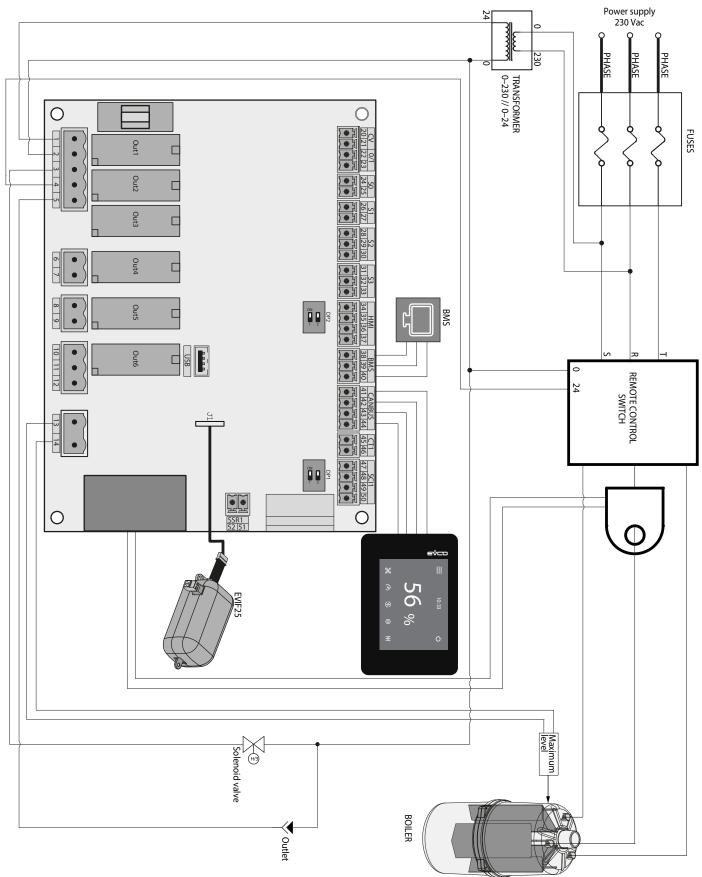
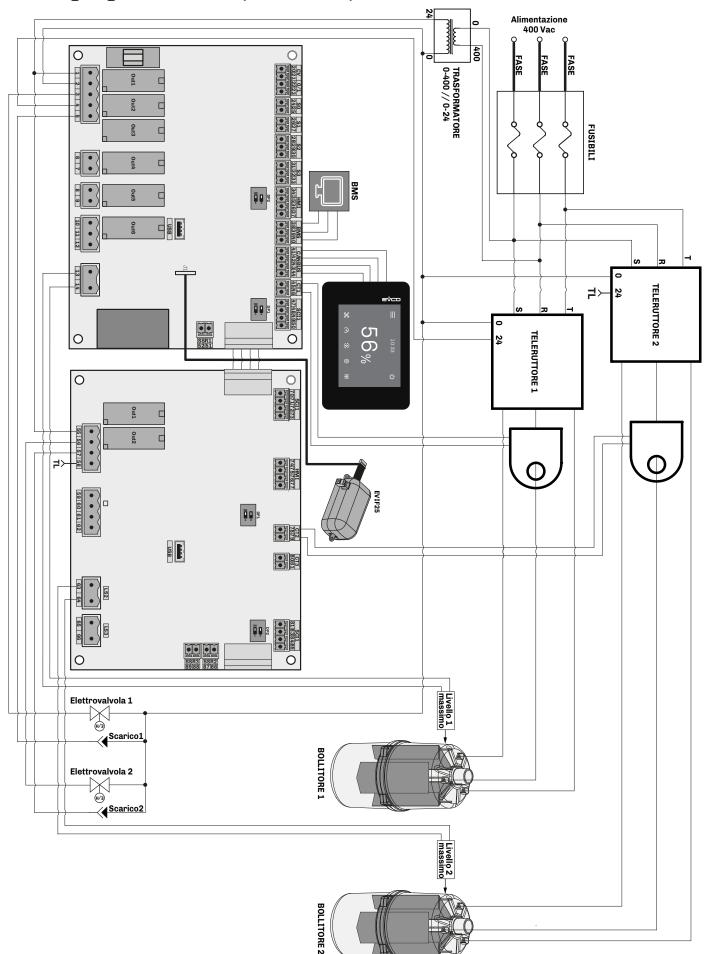


Fig. 126. Wiring diagram models EHKX003T4 / EHKX005T4 / EHKX010T4 / EHKX015T4 / EHKX020T4 / EHKX030T4 / EHKX040T4



9.9 Wiring diagram EHKX060T4 / EHKX080T4 / EHKX0100T4

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

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