MISTRAL

Ultrasonic humidifiers
of small size and capacity

WARNING

Read and fully understand user manual before using this device.

Failure to follow these instructions can result in

Operating and maintenance manual

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IMPORTANT INFORMATION

Liability and residual risks

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

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

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

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

Disclaimer

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

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

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

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

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

Terms and Conditions of use

Permitted use

The device should only be used for humidification.
The device must be installed and used in accordance with the instructions provided and, in particular, hazardous live parts must not be accessible under normal conditions.

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

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

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

Prohibited use

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

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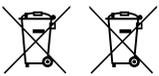
The device must be disposed of in accordance with local regulations regarding the collection of electrical and electronic appliances.

Consider the environment

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

IMPORTANT SAFETY INFORMATION

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

SYMBOLS

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

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

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

SAFETY MESSAGES

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

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

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

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

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

QUALIFIED PERSONNEL

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

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

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

⚠ ⚠ DANGER

RISK OF ELECTRIC SHOCK 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, and remove the power fuses before removing any covers or hatches, or before installing/uninstalling accessories, hardware, cables or wires.
- Always use a properly calibrated Voltmeter to make sure the system is powered off.
- 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 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 powering up the equipment, check all the wiring connections.

⚠ ⚠ DANGER

RISK OF ELECTRIC SHOCK AND FIRE

- Do not use the device with loads greater than those indicated in the technical data section.
- Do not exceed the temperature and humidity ranges indicated in the technical data section.
- Provide safety interlocks (isolators for all "undervoltage category 3" poles) 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".

⚠ ⚠ DANGER

RISK OF ELECTRIC SHOCK, EXPLOSION OR FIRE

- Install the humidifier away from electronic equipment.
- Do not install the humidifier above electronic equipment.

⚠ WARNING

MALFUNCTIONING OF THE EQUIPMENT

- Perform the wiring carefully, in compliance with electromagnetic compatibility and safety requirements.
- 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.").

⚠ WARNING

REGULATORY INCOMPATIBILITY

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

SAFETY INFORMATION RELATED TO HEALTH AND HYGIENE

HEALTH AND HYGIENE

The Mistral humidifier features:

- Automatic draining for inactivity;
- Periodic automatic cleaning;
- Plastic material on whose surface bacterial colonies do not proliferate.

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

⚠ ⚠ WARNING
BIOLOGICAL RISK
• In the event of inadequate use and/or poor maintenance it is possible that microorganisms (including the bacterium that causes Legionellosis) may proliferate and be transferred into the air treatment system or the surrounding environment.   • The humidifier must be used properly and be maintained and cleaned properly at prescribed intervals, as described in chapter **"11. MAINTENANCE" ON PAGE 73**.

1. INTRODUCTION

1.1 Description

The **Mistral** humidifier is the ELSTEAM solution for compact ultrasonic adiabatic humidification systems.

The **Mistral** humidifier generates humidity by breaking up the molecules of the water contained in the reservoir and producing mist through the energy transferred by ultrasonic ceramic transducers.

The water is atomised by oscillating the surface of the transducers in contact with the water using a high frequency signal which generates a column of water above the transducers. During the negative amplitude of the transducer (the surface of the transducer oscillates at high speed), water bubbles are produced that collide with each other during the positive amplitude phase, resulting in water mist that is introduced into the room by the air flow generated by the fan. The mist (humidity) is introduced into the room via a rigid tube.

1.2 Product overview
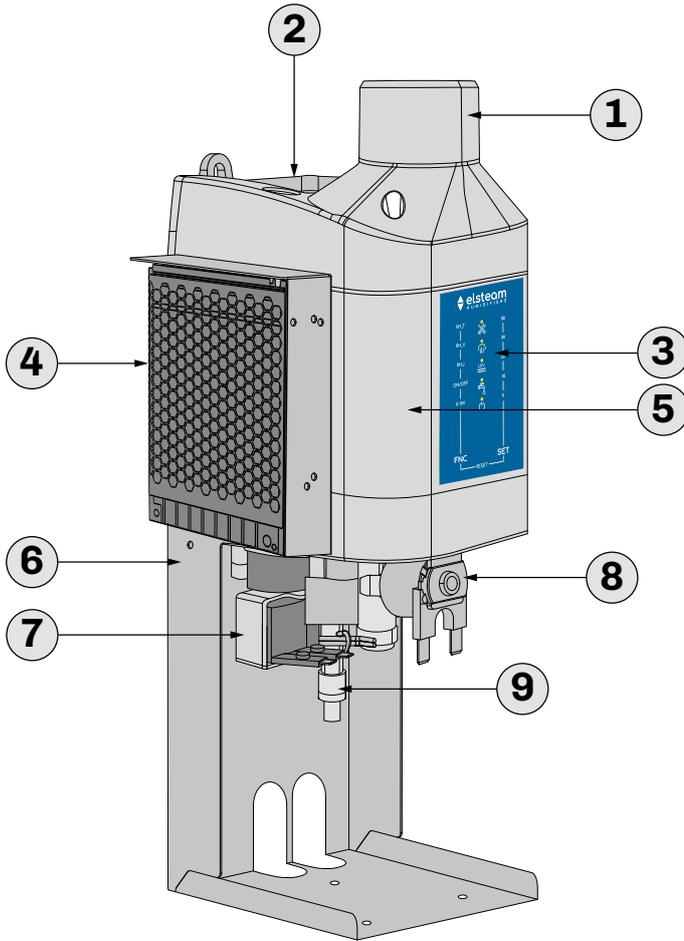
Reference	Description
1	Atomised water outlet
2	Suction fan
3	LED user interface
4	Switching power supply unit 230 Vac - 24 Vac/dc
5	Water reservoir
6	Box for mounting on a wall or on the base (optional)
7	Water outlet solenoid valve
8	Water inlet solenoid valve
9	Outlet manifold

Fig. 1. *Overview of **Mistral** humidifier with box*

1.3 Available models

Code	Description
EHUC001M2	Mistral - production capacity 1 kg/h

1.4 Applications

Mistral is mainly used in applications including:
- Storage rooms:
  - Display of fresh produce;
- Food stores;
- Cold rooms and units for temperature, humidity and maturation;
- Wine cellars;
- Air-conditioning with fan convectors.

1.5 Main features

- Adiabatic humidifier with low energy consumption;
- Constant and efficient production;
- Small footprint fits in small spaces (1 kg/h unit);
- Electronic control:
  - Via external signal ON/OFF, 0...10 V;
  - Incorporated via 4...20 mA, 0...10 V sensor or resistive;
- Water leakage protection system.

1.5.1 Electronic control features

- Proportional control of production of humidity:
  - High efficiency;
  - Rapid response to changes in requirements;
  - Precise production control.
- Protection against no inlet water;
- Automatic draining:
  - Removes scale build-up in the reservoir;
- Signals operating status via LED interface:
  - Continuous monitoring of the operating status;
  - Viewing alarms.

1.5.2 I/O specifications

- Analogue/digital input: configurable by **CFG** parameter;
- Digital input: manages enabling operation from an external signal;
- Digital output: manages an alarm or is a command for parallel configuration;
- RS-485 serial: serial link for communicating with remote user interface (see **"1.6 ACCESSORIES" ON PAGE 12**).

1.6 Accessories

The following accessories are available for the **Mistral** range of ultrasonic humidifiers:

P/n	Description
EHUK007	Mistral metal support bracket
EHUK008	Mistral metal box
EHUK009	Intake kit
EHUK011	Drain kit
UHFK02	Vertical distribution kit Ø50 mm Mistral
EHRO012	Reverse osmosis system 12 l/h
EVHTP520	Humidity and temperature sensor, proprietary signal
EVHP523	Humidity sensor with 4...20 mA output
0031000043	Inlet tube 8 mm (per metre)
EV3K61XLESRB	Remote user interface 74x32 mm, 4 touch keys, two-line LED display, 24 Vdc power supply
EHRO012	Reverse osmosis water treatment system, 12 l/h
EHRO020	Reverse osmosis water treatment system, 20 l/h

1.6.1 Reverse osmosis system (example)

The image is provided for illustrative purposes only and may differ from the product itself.
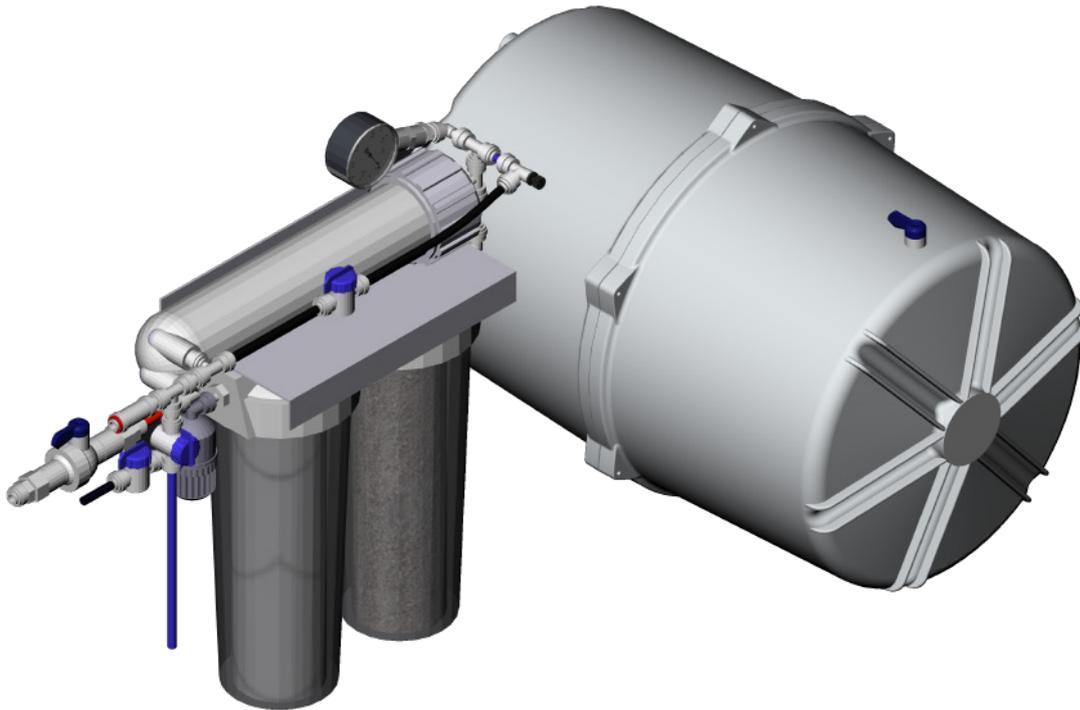
Fig. 2. *Reverse osmosis system (example)*

2. TECHNICAL DATA

2.1 Humidifier technical specifications

TYPE	MU	DESCRIPTION/VALUE
HUMIDITY PRODUCTION		
Production capacity:	kg/h	0.20...1.0
Connection outside diameter:	mm (in.)	50 (1.97)
Maximum air flow rate:	m³/h	50
Maximum pressure:	Pa	1...90
Mist distribution:	---	See accessory **UHFK02**
ELECTRICAL PROPERTIES		
Power supply:	V, Hz	85...264 Vac, 50/60 Hz
Power absorbed:	W	108 W
Current draw:	A	4.5 A
Auxiliary power supply:	V	24 Vdc
Hydraulic properties		
Supply water quality:	---	Reverse osmosis treated water or drinking water *SEE "5.2.1 WATER SPECIFICATIONS" ON PAGE 26*
Supply water conductivity:	µS/cm	• 0...100 (low maintenance) • 0...1250 (general operation)
Supply water hardness:	°f	• 0...5 (low maintenance) • 0...40 (general operation)
Supply water pressure:	MPa (bar)	0.02...1 (0.2...10)
Minimum supply flow rate	L/m	1
Supply water connection:	---	JG 8 mm
Drain water connection:	---	Ø10-12 mm
Supply water temperature:	°C/°F	1...40 °C (33.8...104 °F)
Drain water temperature:	°C/°F	1...60 °C (33.8...140 °F)
General specifications		
Ambient operating conditions:	°C/°F, %	1...50 °C (33.8...122 °F) 10 ... 90 % non-condensing
Transportation and storage conditions:	°C/°F, %	10...60 °C (50...140 °F) 10 ... 90 % non-condensing
Dimensions:	mm (in.)	*SEE "4.3 DIMENSIONS" ON PAGE 18*
Weight:	kg	~1.4
IP protection degree for the humidifier body (not including power supply unit):	---	IP30 (once plumbing is complete)
Regulation		
Control type:	---	Integrated
Control signal:	---	• ON/OFF • 0...10 V (or proportional) • 4...20 mA
Communication serial port		
Serial port:	---	1 RS-485 Modbus RTU serial port
COMPLIANCE		
CE certification:	---	√

2.1.1 I/O specifications

Type	Description
Analogue input:	1 configurable analogue input (**CFG** = 1...4 or **CFG** = 6...9)
Digital input:	1 digital input with a potential-free contact for enabling humidification 1 configurable digital input (**CFG** = 0 or **CFG** = 5)
Digital output:	1 non-isolated low-voltage relay output

Analogue input specifications

	Default	Resistive RH	Current 4...20 mA	Voltage 0...10 V	Digital input
IA1	Temperature alarm sensor	•	•	•	•

Range	---	-40...105 °C (-40...220 °F)	1% full scale	1% full scale	---
Solution	---	0.1 °C (1 °F)	0.1	0.1	---
Input impedance	---	10 kΩ	100 Ω	24 k Ω	---

Digital output specifications

	Default	Description	Load (at 30 Vdc)	Load type
Out1	Alarm or command for parallel operation	SPDT	1 A	Resistive

2.2 Power supply technical specifications

Type	Description
The product complies with the following harmonised standards:	IEC/EN 60335-1 and IEC/EN61558-1, EN61558-2-16
Device construction:	Incorporated electronic device
Overvoltage category:	III
Power supply input:	85...264 Vac, 50/60 Hz
Power supply output:	21.6...28.8 Vdc, 4.5 A maximum (Default: 28 Vdc)
Nominal output power:	108 W
Ambient operating conditions:	-30 ... 70 °C (-22 ... 158 °F) 20 ... 90 % RH non-condensing
Transportation and storage conditions:	-40 ... 85 °C (-40 ... 185 °F) 10 ... 95 % RH non-condensing
Maximum operating temperature in an enclosed space:	70 °C (158 °F) without forced ventilation

3. RECEIVING THE PRODUCT

⚠ CAUTION

IMPROPER HANDLING

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

NOTICE

UNEXPECTED EQUIPMENT OPERATION

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

3.1 Checking the packaging

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

3.1.1 Opening the packaging

- Take the package to the humidifier installation site;
- Open the cardboard packaging;
- Remove the humidifier from the die-cut separator.

3.1.2 Checking the packaging contents

The standard product package contains:

- **Mistral** ultrasonic humidifier;
- Instruction sheet for:
    - Mechanical assembly;
    - Electrical connections;
    - Start-up instructions;
- Switching power supply unit 85...264 Vac / 21.6...28.8 Vdc 108 W, and wiring.

4. MECHANICAL ASSEMBLY

4.1 Before you start

Read this manual carefully before installing the system.

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 programming of automated control 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.

⚠ WARNING
REGULATORY INCOMPATIBILITY
Make sure all the equipment used and the systems conform to all applicable local, regional and national regulations and standards.

4.2 Information concerning installation and the surrounding environment

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

⚠ ⚠ DANGER
RISK OF ELECTRIC SHOCK 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, and remove the power fuses before removing any covers or hatches, or before installing/uninstalling accessories, hardware, cables or wires.
• Always use a properly calibrated Voltmeter to make sure the system is powered off.
• 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 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 powering up the equipment, check all the wiring connections.

⚠ WARNING
MALFUNCTIONING OF THE EQUIPMENT
• Perform the wiring carefully, in compliance with electromagnetic compatibility and safety requirements.
• 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.).

4.3 Dimensions

4.3.1 Dimensions of Mistral
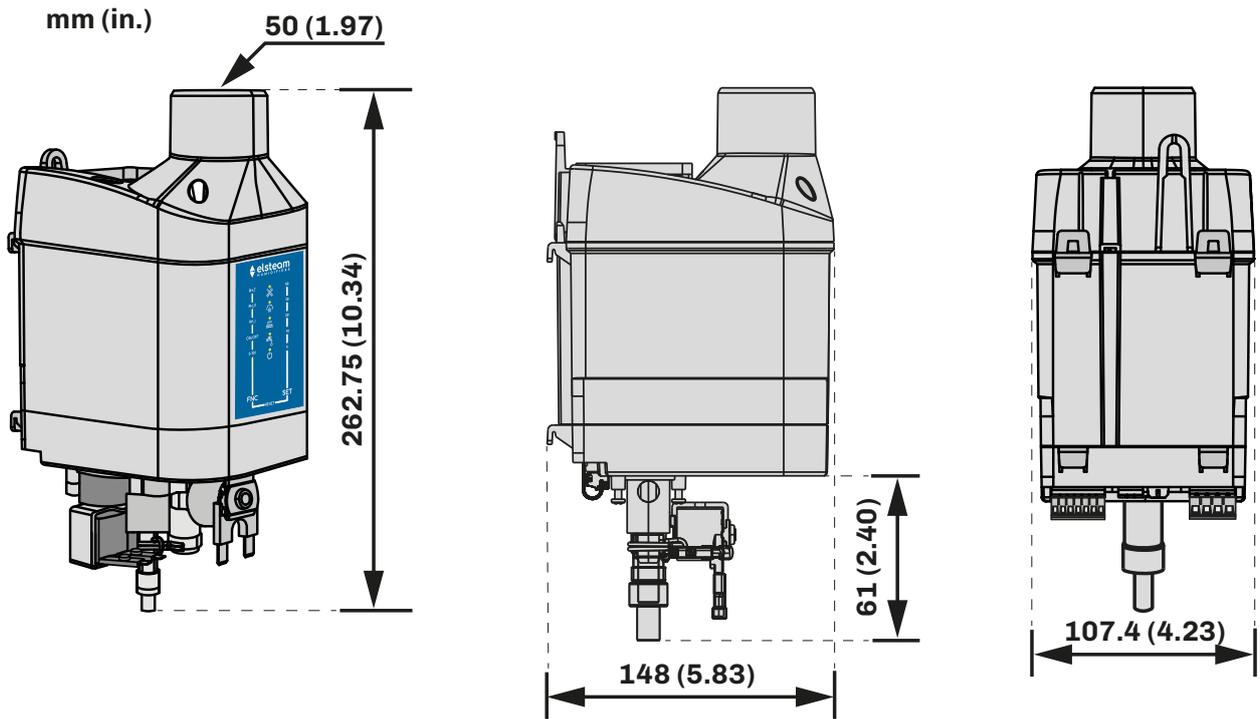
Fig. 3. *Dimensions of **Mistral***

4.3.2 Dimensions of Mistral with box
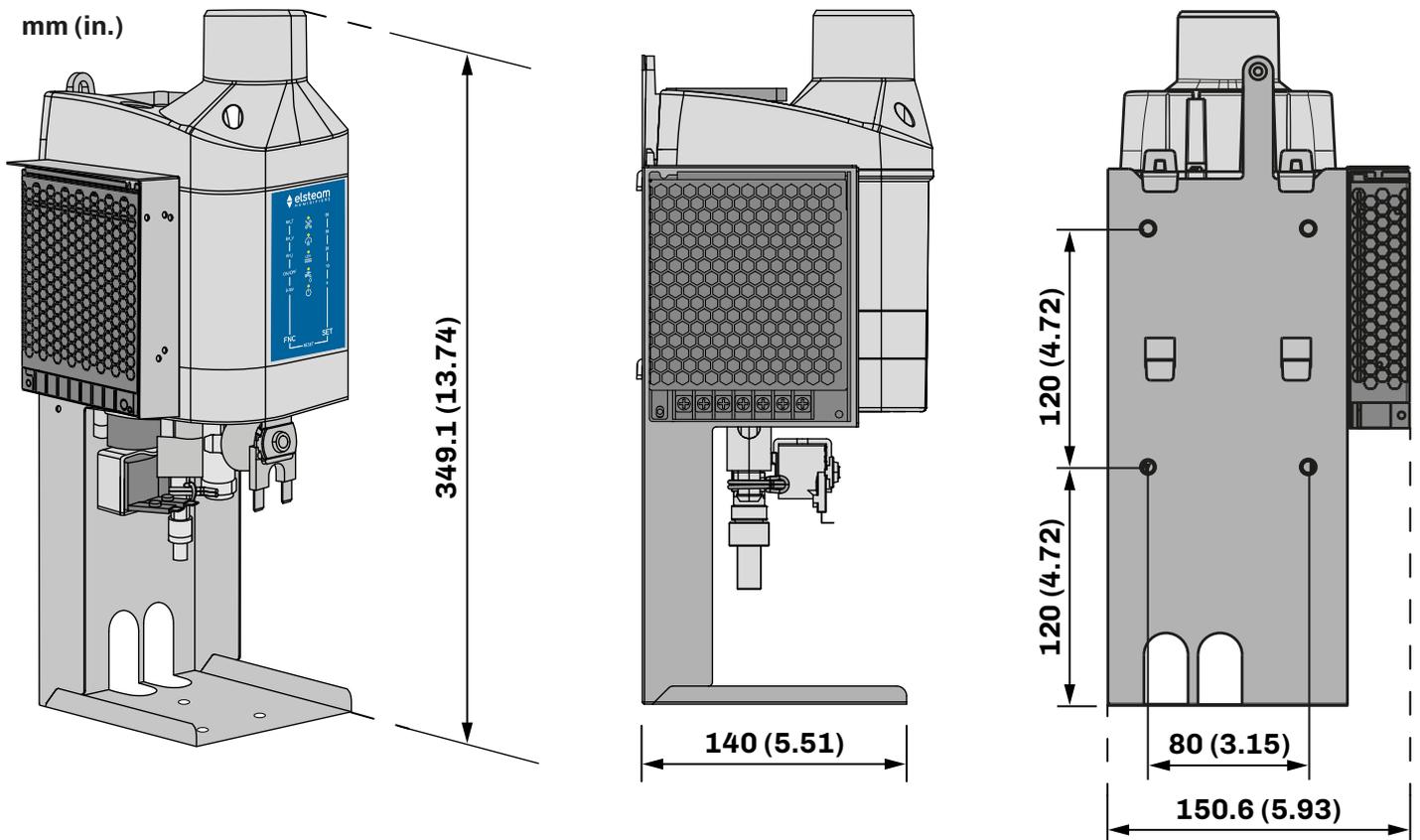
Fig. 4. *Dimensions of **Mistral** with box*

4.3.3 Dimensions of Mistral with support bracket

mm (in.)

171.5 (6.75)

105.4 (4.15)

10 (0.39)
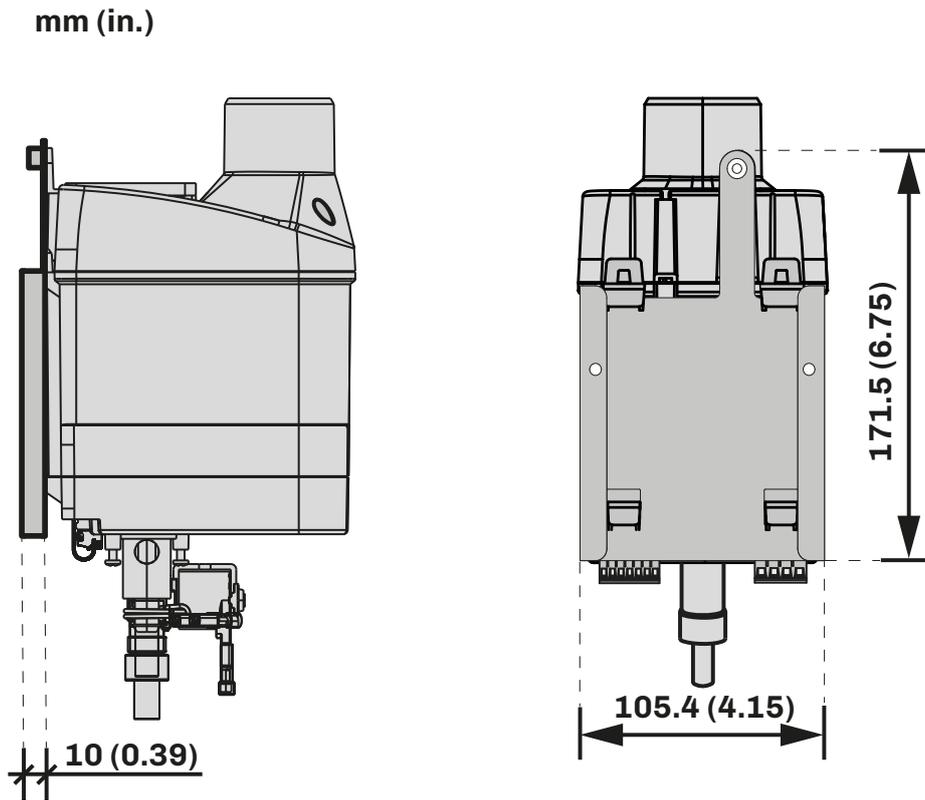
Fig. 5.   *Dimensions of **Mistral** with support bracket*

4.4 Minimum installation distances

When installing the **Mistral** humidifier in enclosed spaces, observe the minimum distance of 500 mm (19.68 in.) on each side, so as to guarantee adequate ventilation and aeration of the system.

⚠ 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.

4.4.1 Enclosed space

In the case of an installation in an enclosed space (e.g. fan convector or integration in a technical product) ensure that there is sufficient air circulation to avoid overheating and condensation.
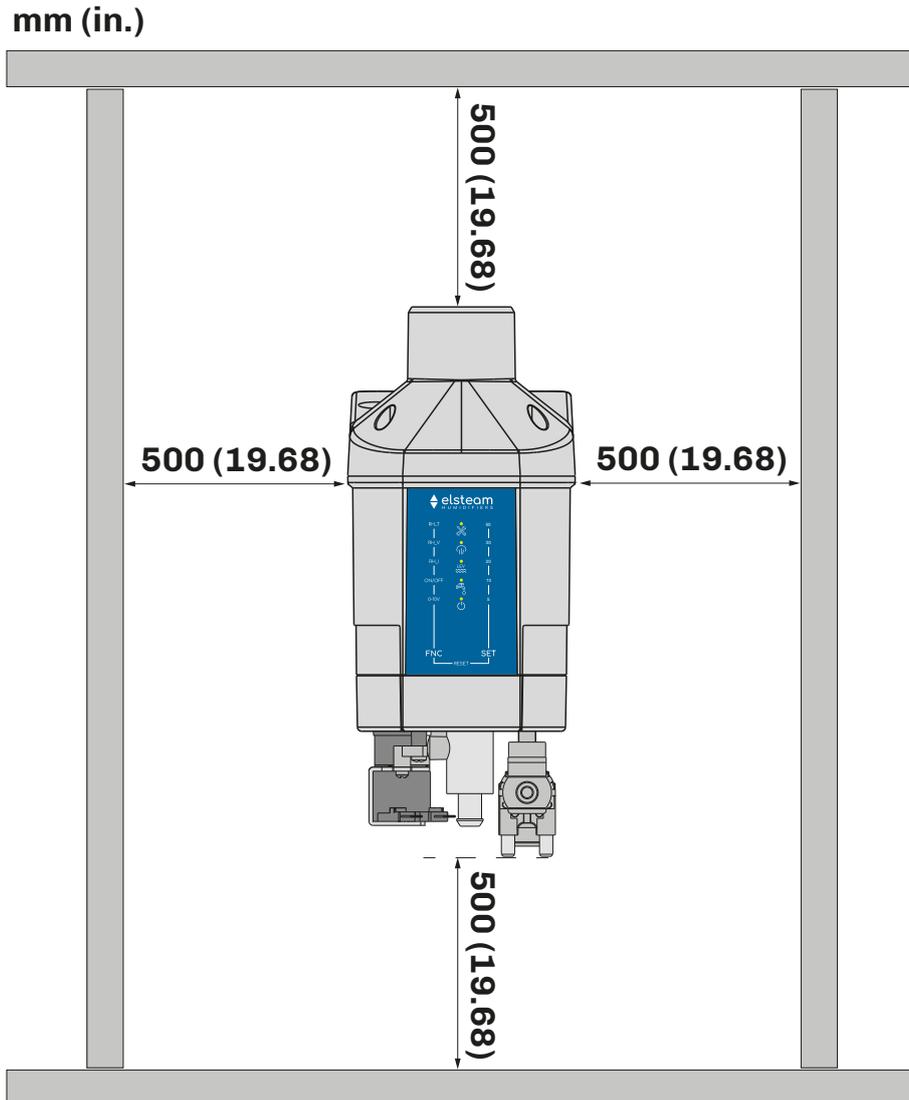
Fig. 6. *Minimum installation distances*

4.5 Support bracket

The **Mistral** humidifier can be installed on a wall with the aid of a support bracket supplied as an accessory (see *"1.6 ACCESSORIES" ON PAGE 12*).

4.5.1 Support bracket dimensions

The following illustration shows the dimensions of the optional support bracket to be used for wall mounting:
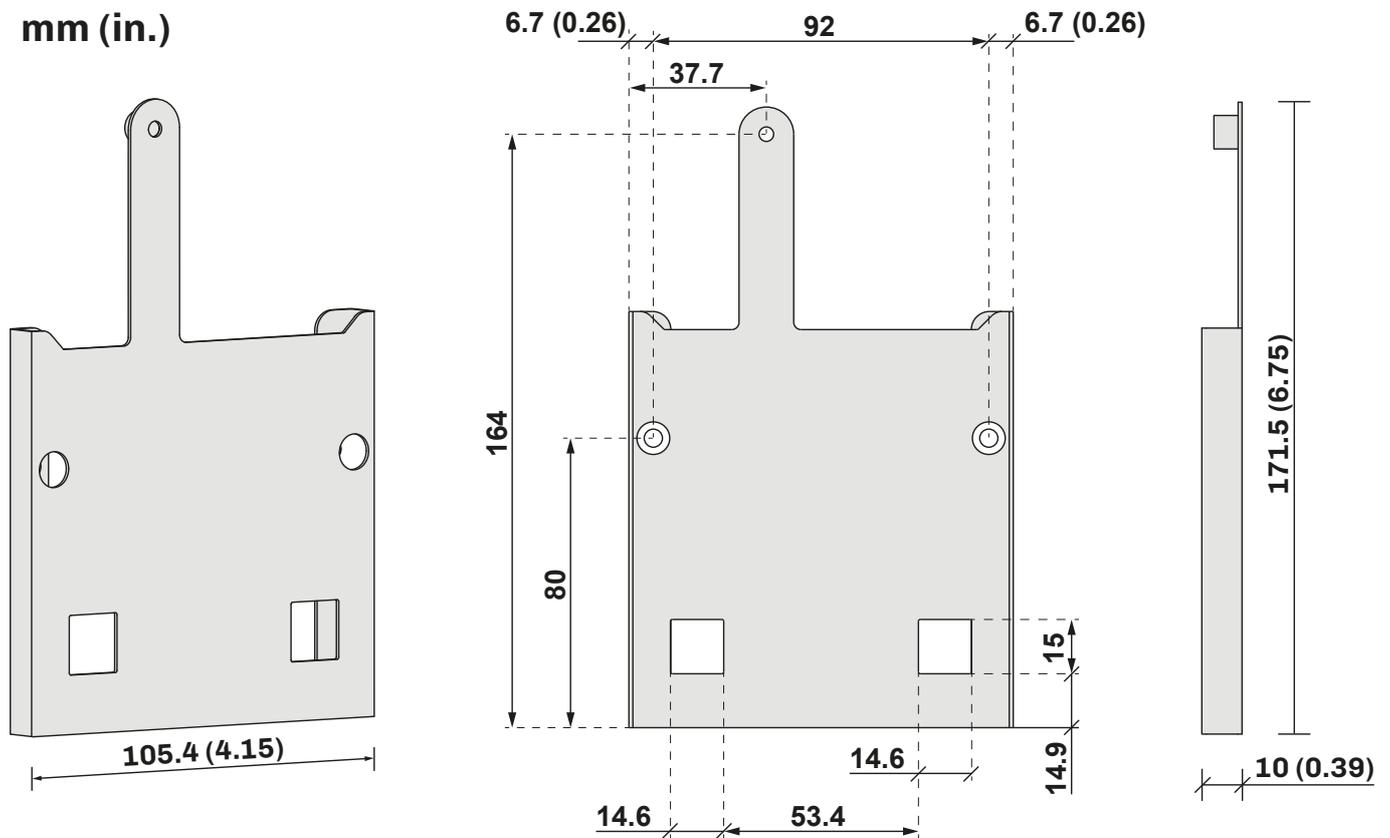
Fig. 7. *Support bracket dimensions*

4.5.2 Precautions for mounting with a support bracket

⚡ ⚠ DANGER
RISK OF ELECTRIC SHOCK, EXPLOSION OR FIRE
• Install the humidifier away from electronic equipment.
• Do not install the humidifier above electronic equipment.

⚡ ⚠ DANGER
RISK OF ELECTRIC SHOCK
Make sure there is an effective earth connection.

4.6 Method of mounting with a support bracket

Mounting hooks
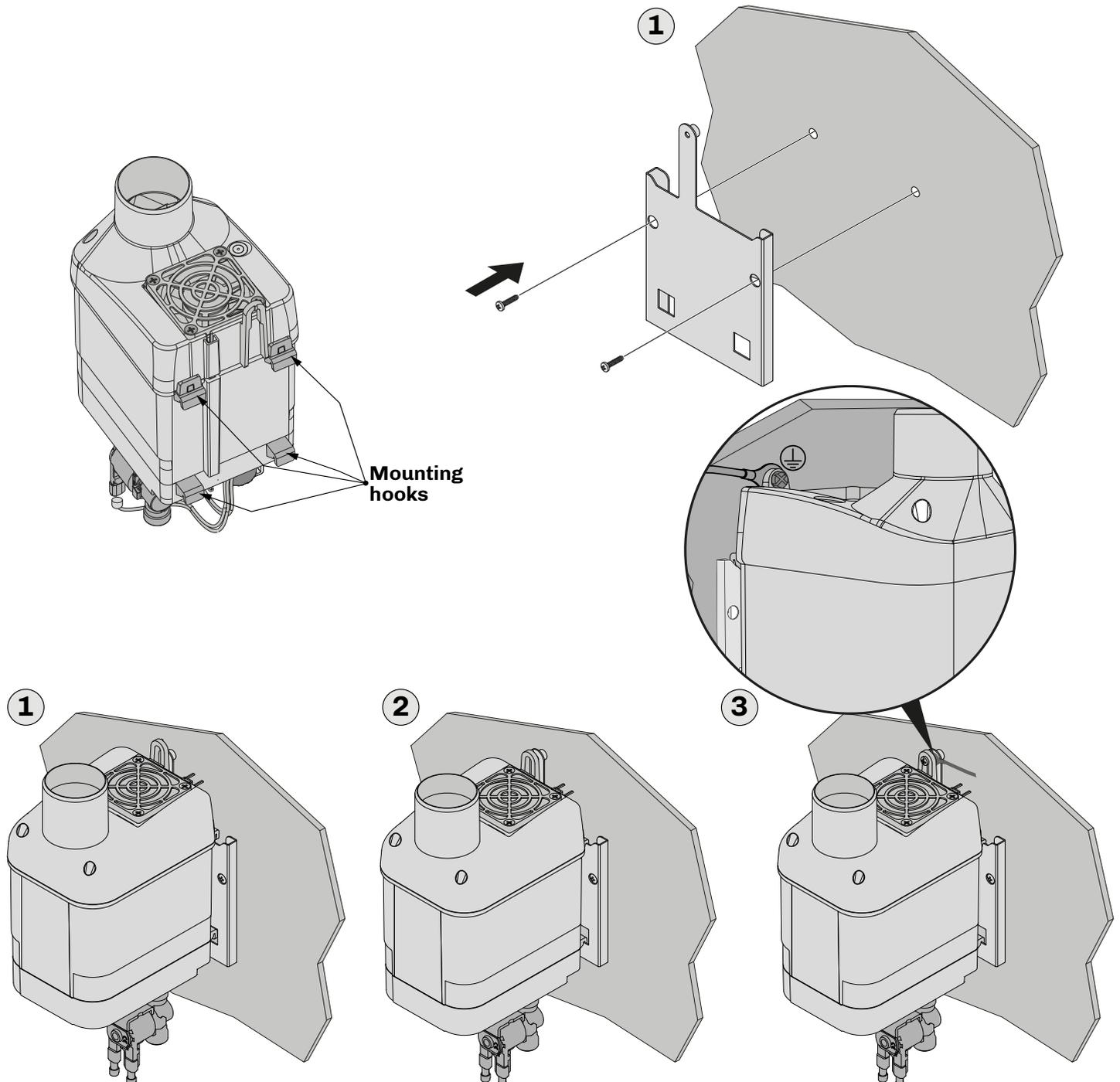
Fig. 8.   *Instructions for mounting with a support bracket*

Instructions
- Secure the support bracket to the wall following the instructions given in the picture *"FIG. 8. INSTRUCTIONS FOR MOUNTING WITH A SUPPORT BRACKET" ON PAGE 22* and the dimensions of the holes and bracket given in the subsection *"4.5.1 SUPPORT BRACKET DIMENSIONS" ON PAGE 21* (①);
- Attach the **Mistral** humidifier to the bracket, making sure it is secure (②);
- Make provision for an earthing connection via eyelet terminals between the support bracket and the humidifier;
- Secure the humidifier to the wall, where the support bracket is mounted, and the earthing connection using an **M4** flat-head screw, which is appropriate for the fixing wall (③).

4.7 Metal box

The **Mistral** humidifier can be installed on a wall or on a supporting base with the aid of the metal box supplied as an accessory (see **"1.6 ACCESSORIES" ON PAGE 12**).

4.7.1 Dimensions of metal box

The following illustration shows the dimensions of the optional metal box to be used for mounting on a wall or on a supporting base:

mm (in.)
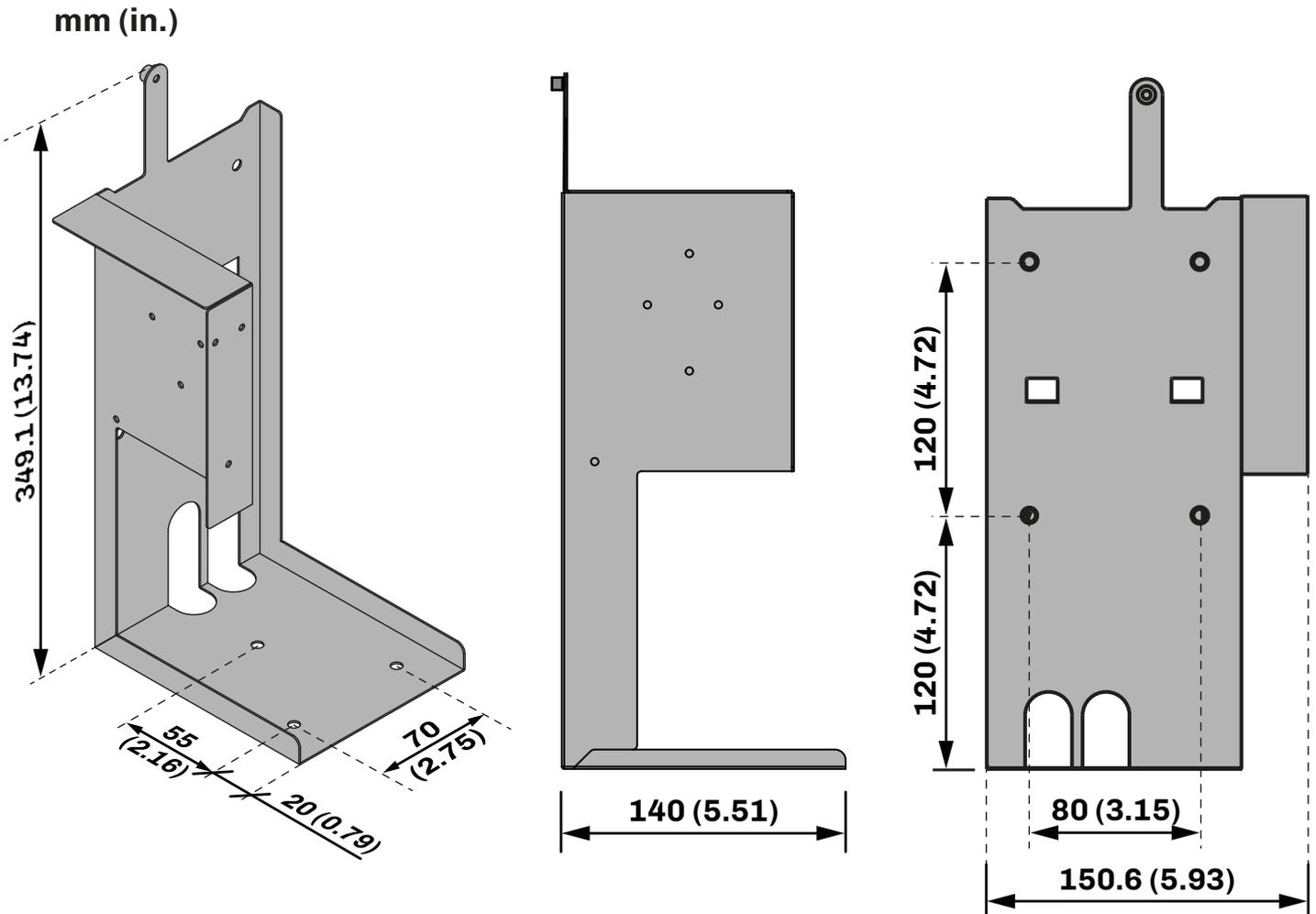
Fig. 9. *Dimensions of metal box*

4.7.2 Precautions for mounting with metal box

⚠ ⚠ DANGER
RISK OF ELECTRIC SHOCK, EXPLOSION OR FIRE
• Install the humidifier away from electronic equipment.
• Do not install the humidifier above electronic equipment.

⚠ ⚠ DANGER
RISK OF ELECTRIC SHOCK
Make sure there is an effective earth connection.

4.8 Method of mounting with box

The **Mistral** humidifier can be installed on a wall or on a supporting base with the aid of the box supplied as an accessory (see **"1.6 ACCESSORIES" ON PAGE 12**)

4.8.1 Installation on a wall

Mounting hooks
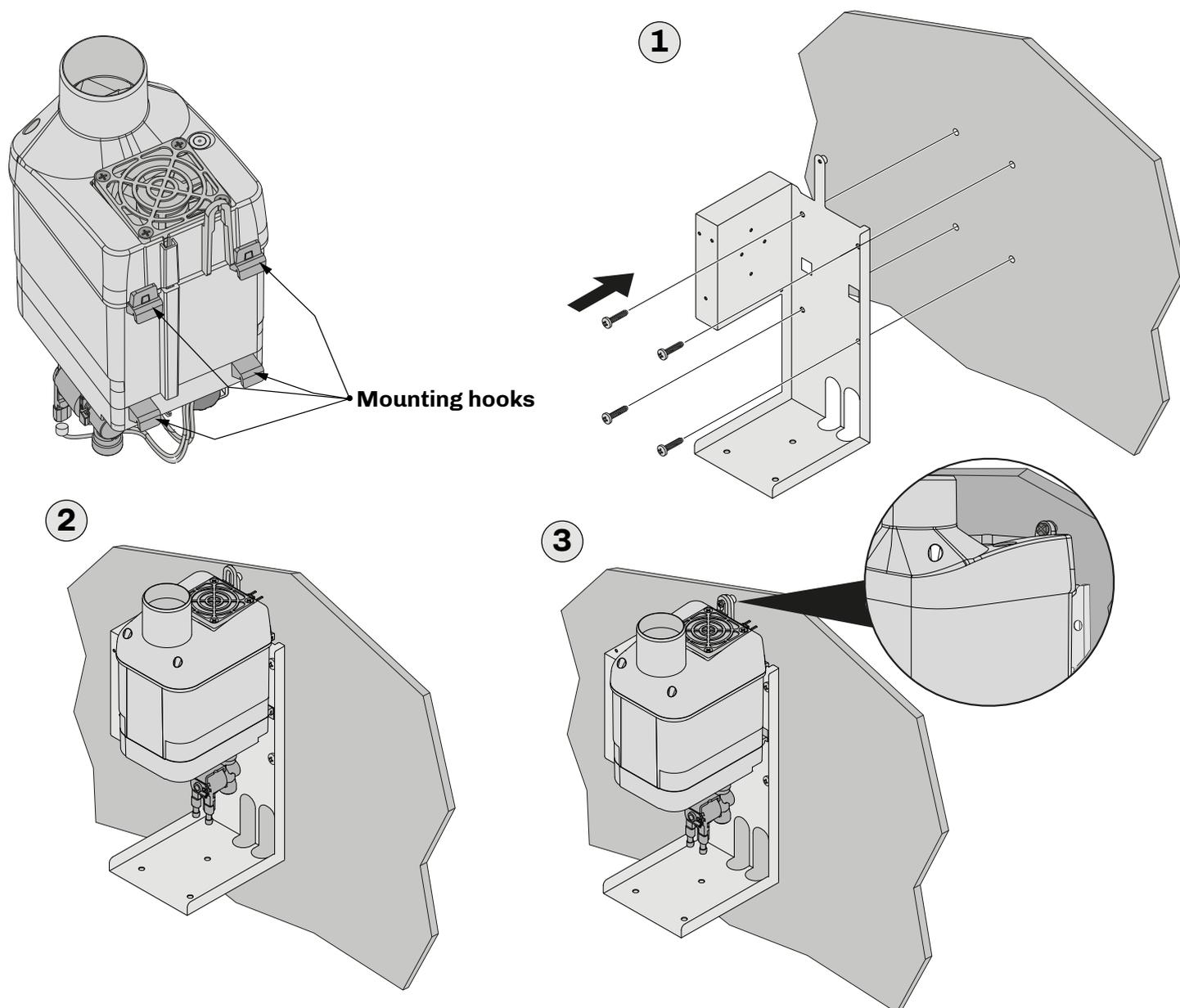
Fig. 10. Instructions for mounting the box on a wall

Instructions

- Secure the box to the wall following the instructions given in the picture **"FIG. 10. INSTRUCTIONS FOR MOUNTING THE BOX ON A WALL" ON PAGE 24** *and the dimensions of the holes and box given in the subsection* **"4.3.2 DIMENSIONS OF MISTRAL WITH BOX" ON PAGE 18** (**1**);
- Attach the **Mistral** humidifier to the box, making sure it is secure (**2**);
- Secure the humidifier to the wall where it is mounted using an M4 flat-head screw and a washer suitable for the fixing wall (**3**).

4.8.2 Installation on a supporting base
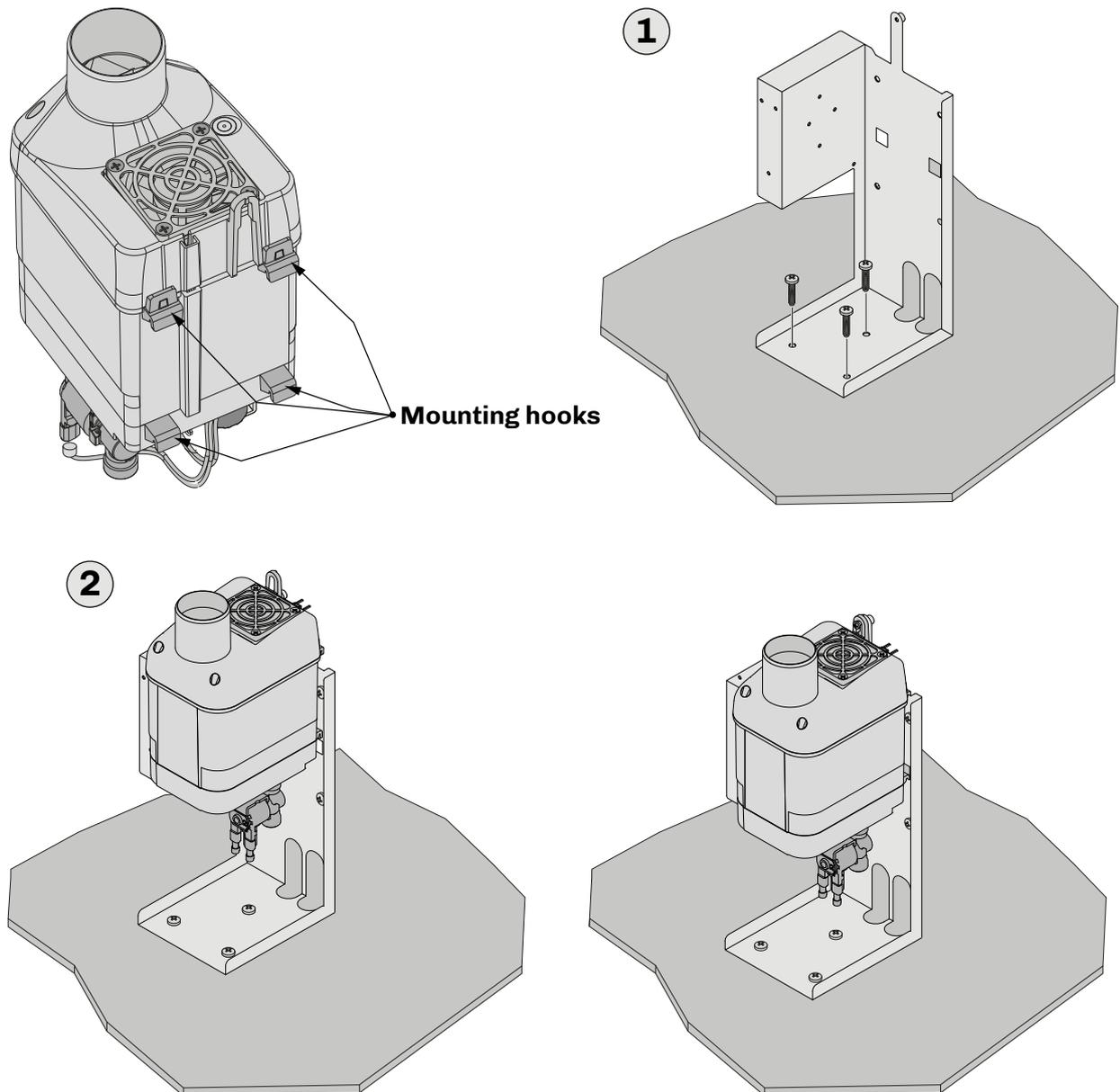
Fig. 11. *Instructions for mounting the box on a supporting base*

Instructions
- Secure the box to the base following the instructions given in the picture **"FIG. 11. INSTRUCTIONS FOR MOUNTING THE BOX ON A SUPPORTING BASE" ON PAGE 25** *and the dimensions of the holes and box given in the subsection* **"4.3.2 DIMENSIONS OF MISTRAL WITH BOX" ON PAGE 18** (①);
- Attach the **Mistral** humidifier to the box, making sure it is secure (②).

4.9 Installing the power supply unit

The power supply unit must be installed in an electrical cabinet that is fully protected from water and dust, and should only be accessible to qualified personnel equipped with a suitable tool.

5. INSTALLING THE PLUMBING

5.1 Humidifier composition

5.1.1 Top and front

The top and front of the **Mistral** humidifier consists of:
- Humidity outlet;
- Fair air intake;
- LED user interface.

5.1.2 Bottom

The bottom of the **Mistral** humidifier consists of
- Water outlet solenoid valve;
- Water inlet solenoid valve;
- Electrical connections.

5.2 Installing the plumbing

For proper hydraulic installation and optimal operation of the humidifier, make provision for:
- A shut-off tap;
- 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).

5.2.1 Water specifications

NOTICE
MALFUNCTIONING OF THE EQUIPMENT
• Only use inlet water supplied from a reverse osmosis treatment system, or drinking water fit for human consumption.
• No other type of water may be used in the Mistral humidifier.

Optimal operating characteristics
- Water pressure of 0.02...1 MPa (0.2...10 bar) with an assured minimum flow rate of 1 l/min;
- Inlet water temperature between 1...40 °C (33.8...104 °F) inclusive;
- Conductivity between 0...100 µS/cm inclusive;
- Maximum water hardness between 0...5 °f.

NOTE: using inlet water with the above characteristics supports reduced maintenance frequency.

General operating characteristics
- Water pressure of 0.02...1 MPa (0.2...10 bar) with an assured minimum flow rate of 1 l/min;
- Inlet water temperature between 1...40 °C (33.8...104 °F) inclusive;
- Conductivity between 0...1250 µS/cm inclusive;
- Maximum water hardness between 0...40 °f.

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

What should you do?
- Let the water flow through the drain for a few hours before making the final connection.
- Periodically check the state of repair of the JG connection of the inlet solenoid valve (see *"11.2 PERIODICALLY CHECKING THE STATUS OF THE HUMIDIFIER" ON PAGE 73*).

What should you NOT do?
- Do not use well water or water with a hardness greater than 40 °f;

NOTICE

MALFUNCTIONING OF THE EQUIPMENT
- Do not use well water.
- Once the humidifier has been installed, let the remaining water in the pipes flow out to prevent the inlet solenoid valve 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.

NOTE: in the case of particularly hard water, you can purchase the optional demineralisation KIT **EHRO012**.

5.3 Water drainage system

NOTICE

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

5.3.1 Connection specifications

- Minimum diameter 10...12 mm (0.39...0.47 in.);
- A minimum average slope of 45° and no siphons.
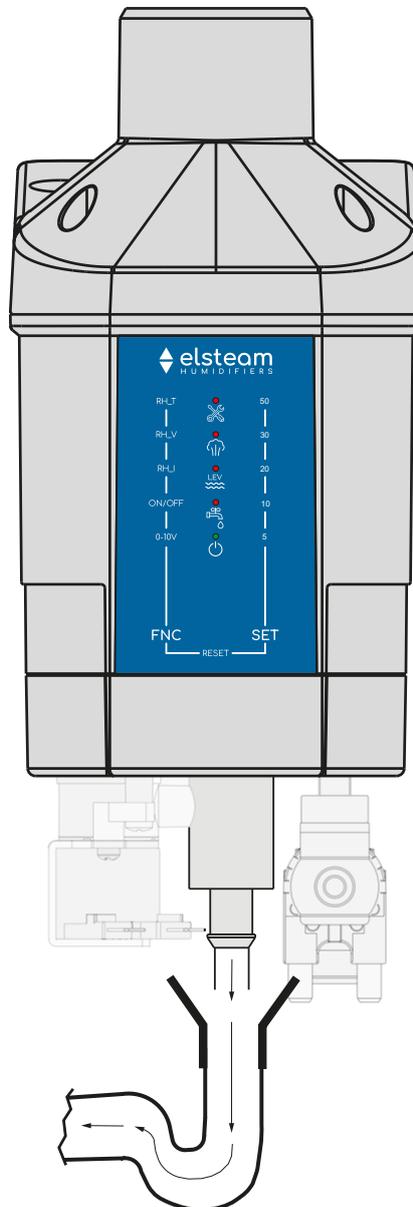
Fig. 12. *Outlet and drain pipe characteristics*

To eliminate any debris and/or residues/process substances, flush out the water supply lines.

NOTICE

MALFUNCTIONING OF THE EQUIPMENT
After installation, flush out the water supply line, directing the water directly into the outlet without introducing it into the humidifier.

5.3.2 Drain water

As the drain water is non-toxic and non-contaminated, it can be drained into the clean water collection system, as defined by local, regional and national regulations and standards in force.

5.4 Atomised water distribution

The atomised water can be distributed via:
- Vertical distribution kit;
- Conveyor.

5.4.1 Vertical distribution kit
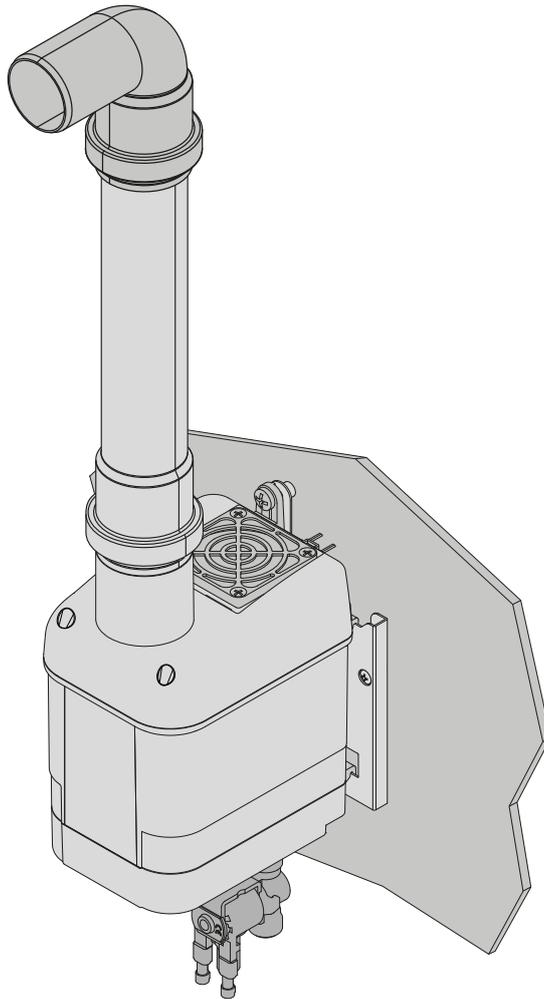
Fig. 13. *Vertical distribution kit*

5.4.2 Intake conveyor

With fan
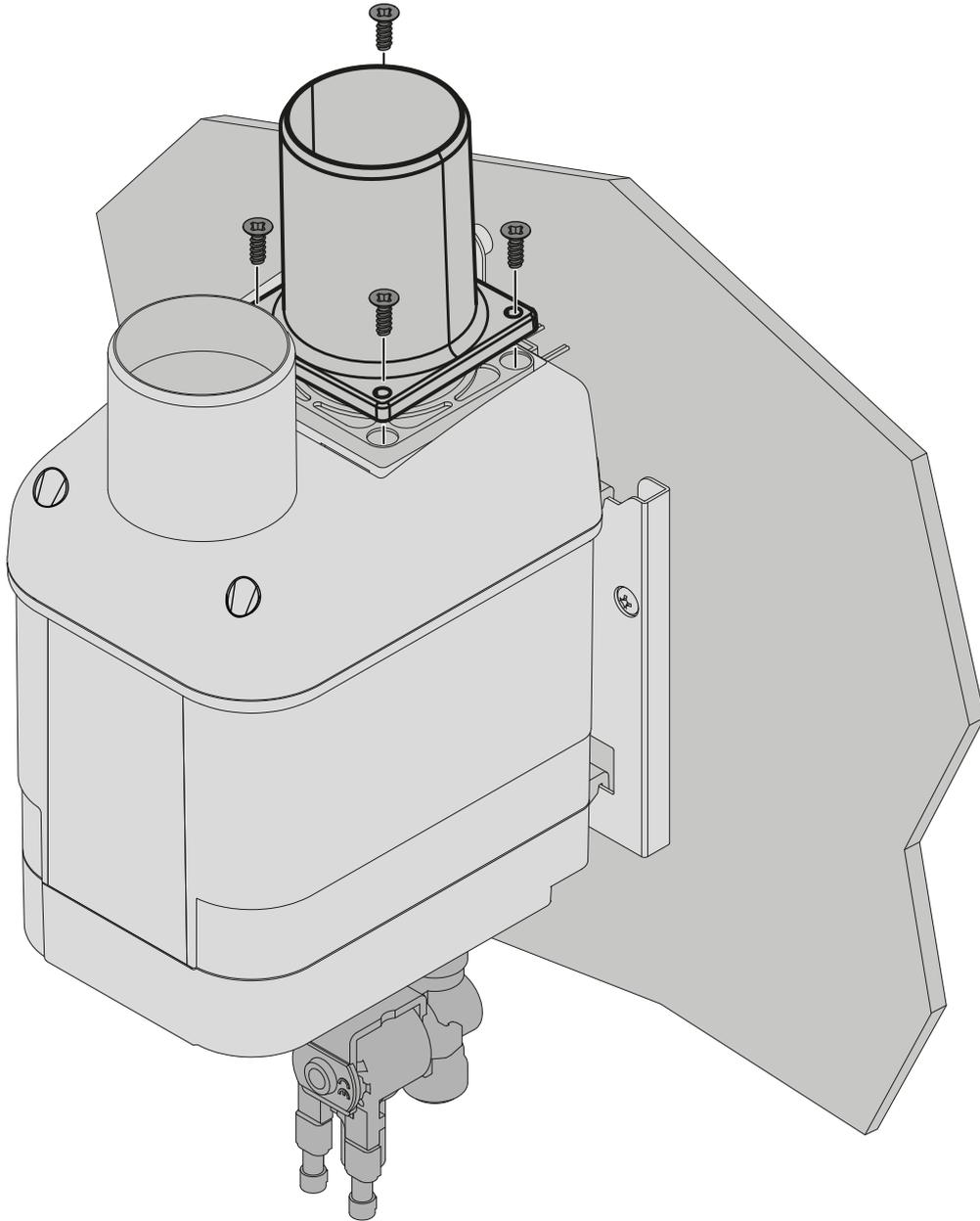
Fig. 14. *Conveyor with fan*

	Air flow rate for bypass
Intake conveyor with fan	10...60 m³/h
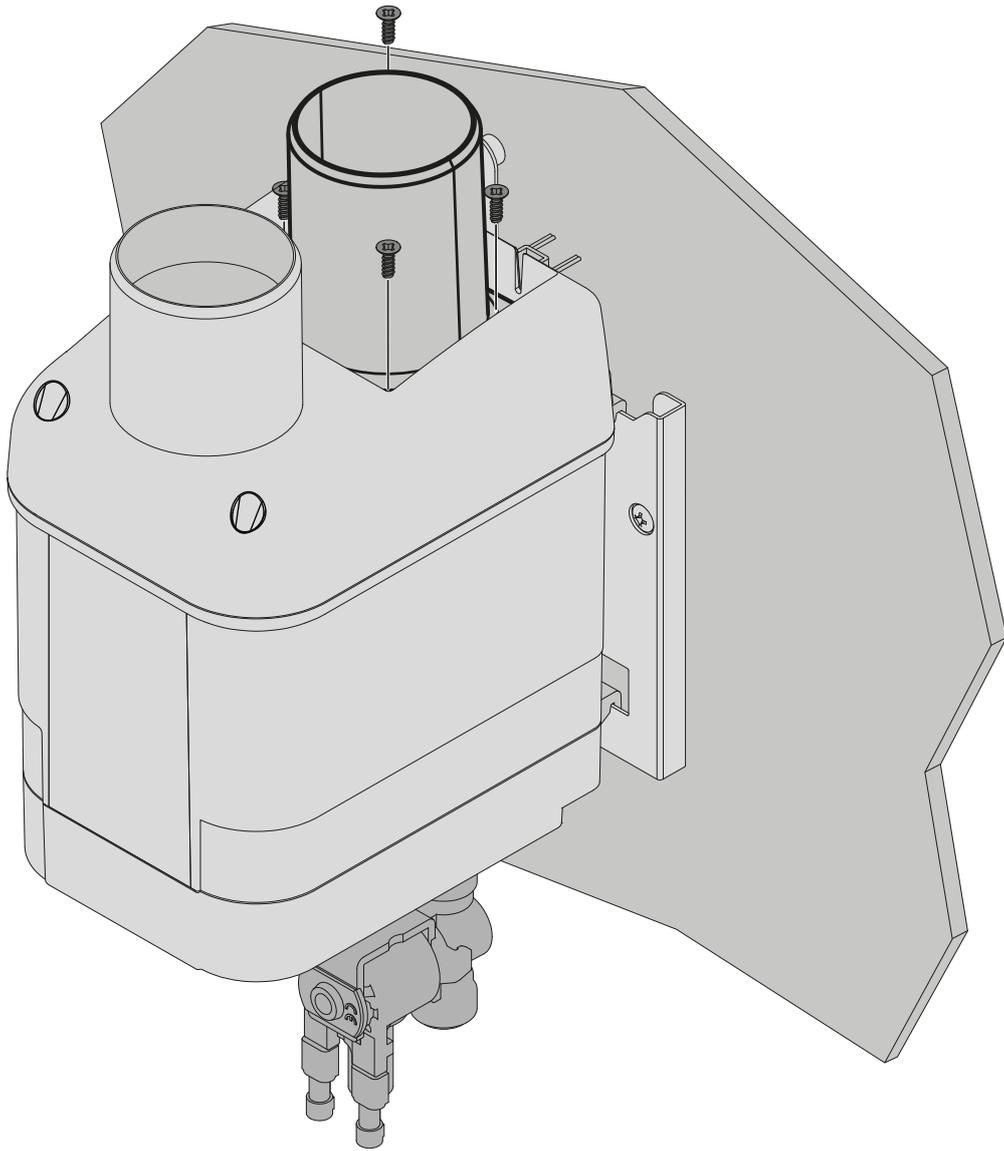
Without fan

Fig. 15. *Conveyor without fan*

5.4.3 Pipe installation example
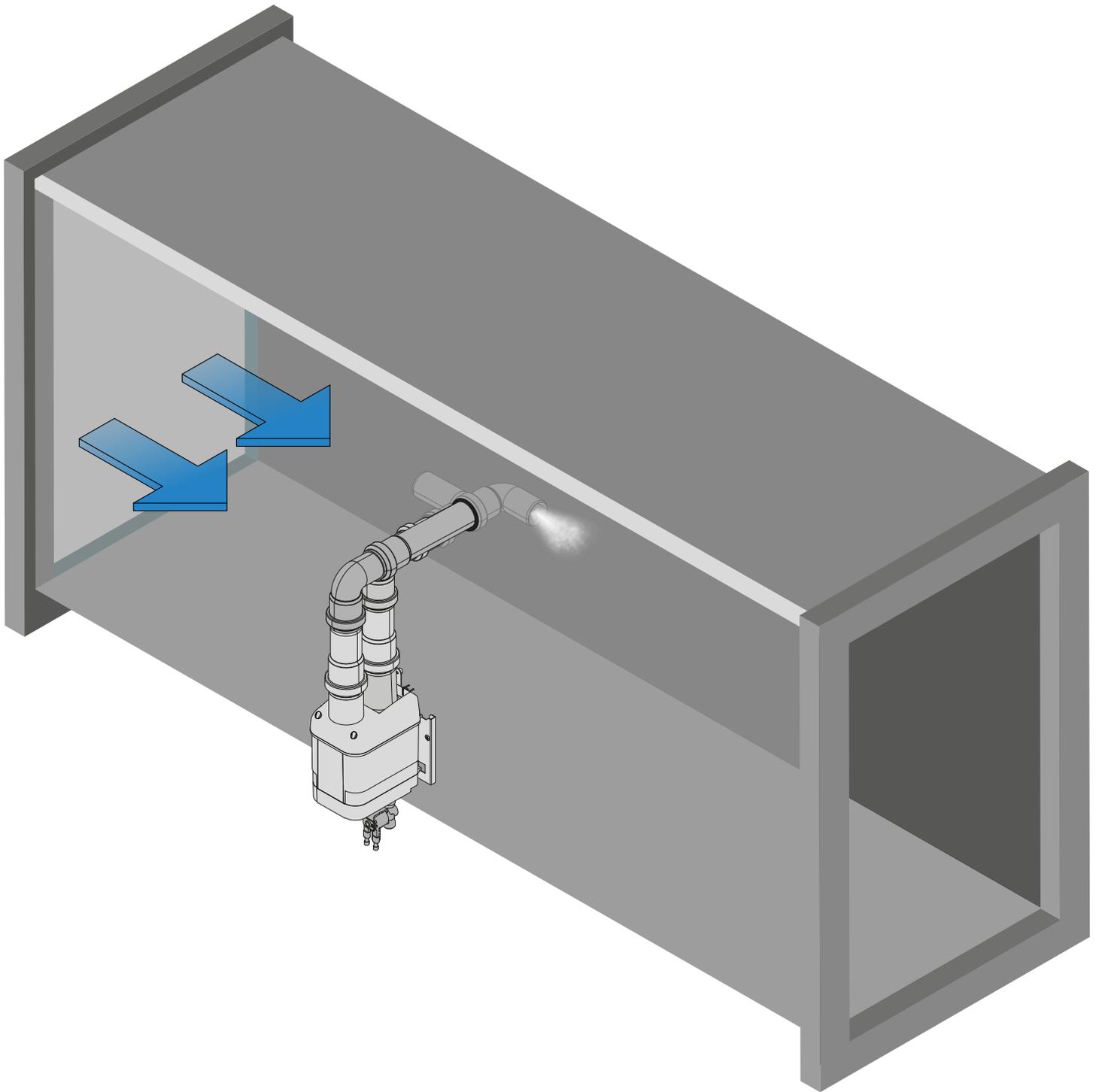
Fig. 16. *Pipe installation example*

6. ELECTRICAL CONNECTIONS

6.1 Before you start

Read this manual carefully before installing the equipment.

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

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

⚠ ⚠ DANGER
RISK OF ELECTRIC SHOCK 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, and remove the power fuses before removing any covers or hatches, or before installing/uninstalling accessories, hardware, cables or wires.
• Always use a properly calibrated Voltmeter to make sure the system is powered off.
• 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 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 powering up the equipment, check all the wiring connections.

⚠ WARNING
MALFUNCTIONING OF THE EQUIPMENT
Only use the switching power supply unit supplied to power the humidifier.

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

6.2 Connection best practice

6.2.1 Wiring best practices

⚠ ⚠ DANGER
RISK OF ELECTRIC SHOCK AND FIRE
• Do not use the device with loads greater than those indicated in the technical data section.
• Do not exceed the temperature and humidity ranges indicated in the technical data section.
• Provide safety interlocks (isolators for all "undervoltage category 3" poles) 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 of a cross-section suited to the voltage and current requirements.

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

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

6.2.2 Wiring guidelines

When wiring the controllers, observe the following standards:
- The I/O and communication wiring must be kept separate from the power supply wiring. These two types of wiring must be routed in separate ducts.
- Make sure the operating environment and conditions fall within the specified values.
- Use wires with the correct diameter, suited to the voltage and current requirements.
- Use copper conductors (compulsory).
- Use shielded twisted pair cables for analogue/digital I/O connections.

Use correctly earthed shielded cables for all analogue inputs and for communication connections. If shielded cables are not used for these connections, electromagnetic interference may cause signal degradation.
Degraded signals can result in unpredictable operation of the controller or the modules and connected equipment.

⚠ WARNING
MALFUNCTIONING OF THE EQUIPMENT
• Perform the wiring carefully and in compliance with electromagnetic compatibility and safety requirements.
• 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.).

6.2.3 Guidelines for screw terminal blocks

Suitable wiring for the power supply

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

Step 5.08 mm (0.199 in.)

mm / in. 7 / 0.28									Ø 3.5 mm (0.14 in.) C	Nm	0.5...0.6
										lb-in.	4.42...5.31
mm²	1.5...2.5	1.5...2.5	1.5...2.5	1.5...2.5	2x0.75...1	2x0.75...1.5	2x0.75...1	2x0.75...1.5			
AWG	16...14	16...14	16...14	16...14	2x18...17	2x18...16	2x18...17	2x18...16			

Fig. 17. *Suitable wiring for the power supply*

Suitable wiring for I/O SELV

Step 3.5 mm (0.137 in.)

mm / in. 7 / 0.28									Ø 3.5 mm (0.14 in.) C	Nm	0.5...0.6
										lb-in.	4.42...5.31
mm²	0.14...1.5	0.14...1.5	0.25...1.5	0.25...0.5	2x0.08...0.5	2x0.08...0.5	2x0.25...0.34	2x0.5			
AWG	25...15	25...15	22...15	22...20	2x28...20	2x28...20	2x18...17	2x20			

Fig. 18. *Suitable wiring for I/O SELV*

6.2.4 Permitted cable lengths

NOTICE
MALFUNCTIONING OF THE EQUIPMENT
• When connecting the power supply, use cables that are no longer than 10 m (32.80 ft).
• When connecting the sensors, digital inputs and analogue inputs, use cables that are no longer than 10 m (32.80 ft).
• When connecting the RS-485 serial line, use cables that are no longer than 1000 m (3280 ft).
• When connecting the digital outputs, use cables that are no longer than 10 m (32.80 ft).

6.3 Wiring diagram
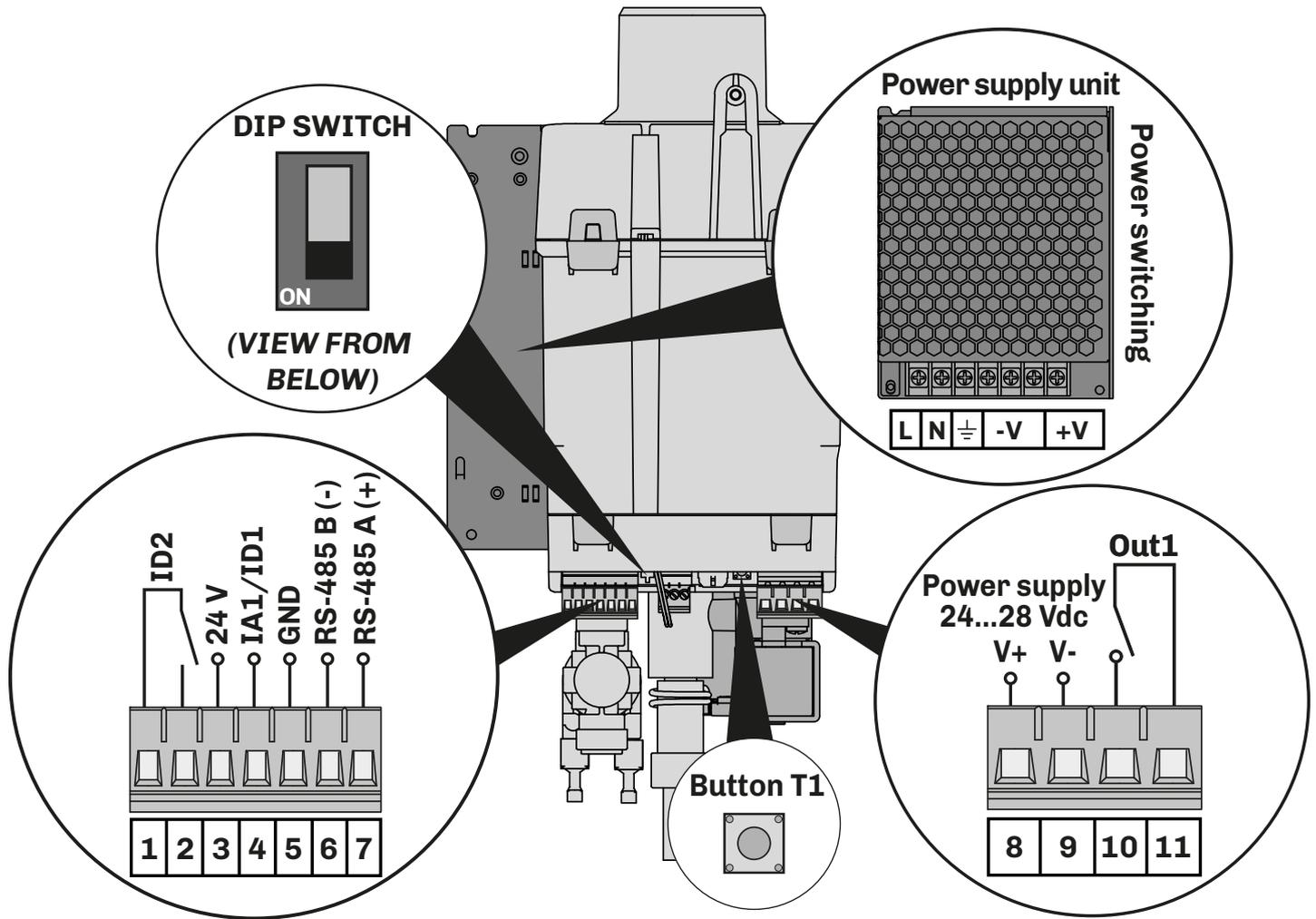
Fig. 19. *Mistral* humidifier connections

TERMINALS				
L	Power supply unit supply phase input	**4-5**	Multifunction input **IA1/ID1**	
N	Power supply unit supply neutral input	**6-7**	Serial communication input **RS-485**	
⏚	Power supply unit supply earth input	**8-9**	Power supply input (**28 Vdc**) from power supply unit	
-V	GND power supply unit output	**10-11**	Digital output **Out1**	
+V	+28 Vdc power supply unit output	**DIP Switch**	Activation of RS-485 serial line termination resistor (120 Ω)	
1-2	Digital input **ID2** (Ventilation consent)			
3	Auxiliary power supply **24 Vdc** (transducers)	**T1**	Reset button for partial Mist-maker operation hours	

⚠ WARNING

MALFUNCTIONING OF THE EQUIPMENT

Only use the switching power supply unit supplied to power the humidifier.

6.4 Configurations

Mistral can be configured in 11 different operating modes by setting the **CFG** parameter.

NOTE: in each mode of operation, **ID2** must be closed to allow Mistral to generate humidity.

6.4.1 Resistive humidity sensor connection

• Stand-alone configuration **CFG = 4**;
• Parallel configuration as master **CFG = 9**.

3 = Sensor power supply
4 = Signal input
5 = GND
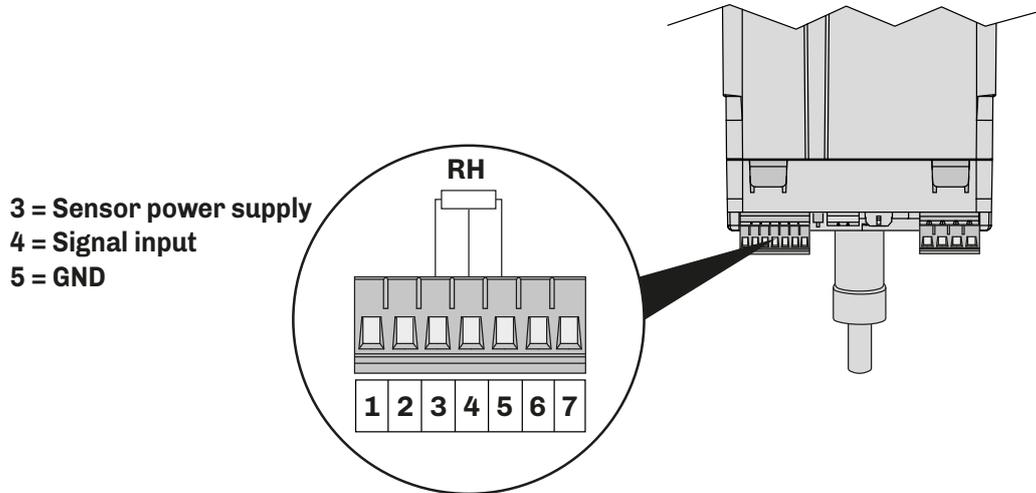
Fig. 20. *Resistive humidity sensor connection*

6.4.2 Humidity sensor connection 4...20 mA

• Stand-alone configuration **CFG = 2**;
• Parallel configuration as master **CFG = 7**.

3 = Sensor power supply
4 = Signal input
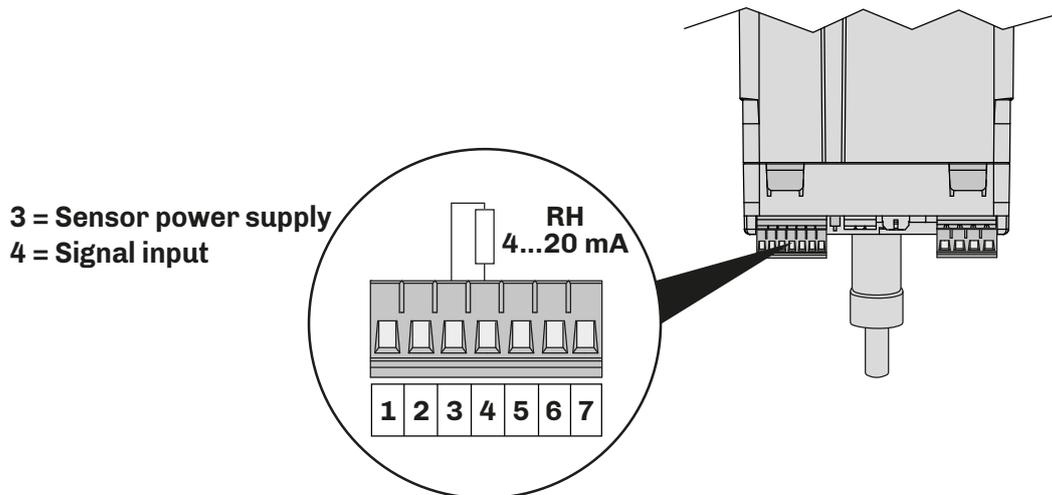
Fig. 21. *Humidity sensor connection 4...20 mA*

6.4.3 Humidity sensor connection 0...10 V

- Stand-alone configuration **CFG = 3**;
- Parallel configuration as master **CFG = 8**.

3 = Sensor power supply (if fitted)
4 = V+
5 = GND

RH 0...10 V

1 2 3 4 5 6 7
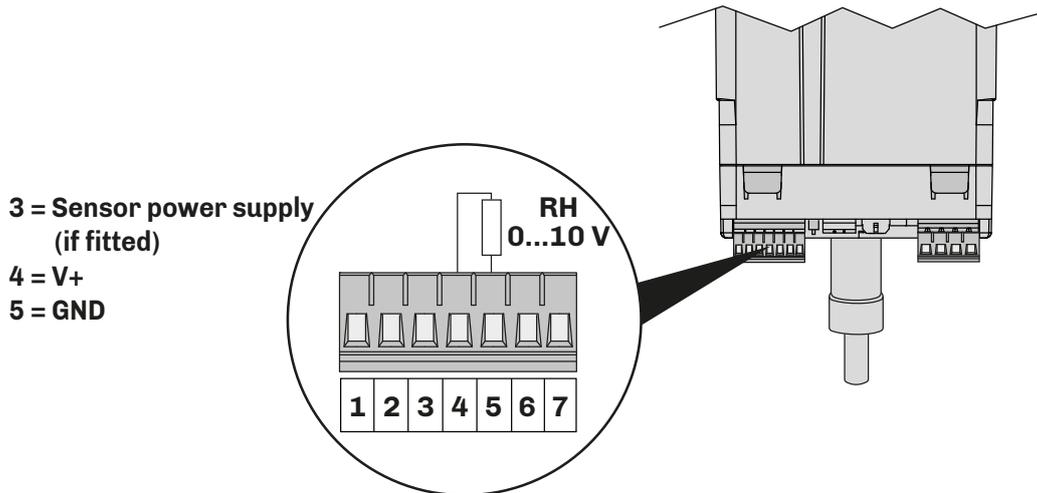
Fig. 22. *Humidity sensor connection 0...10 V*

6.4.4 External proportional humidistat connection with signal 0...10 V

- Stand-alone configuration **CFG = 1**;
- Parallel configuration as master **CFG = 6**.

4 = V+
5 = GND

0...10 V

1 2 3 4 5 6 7
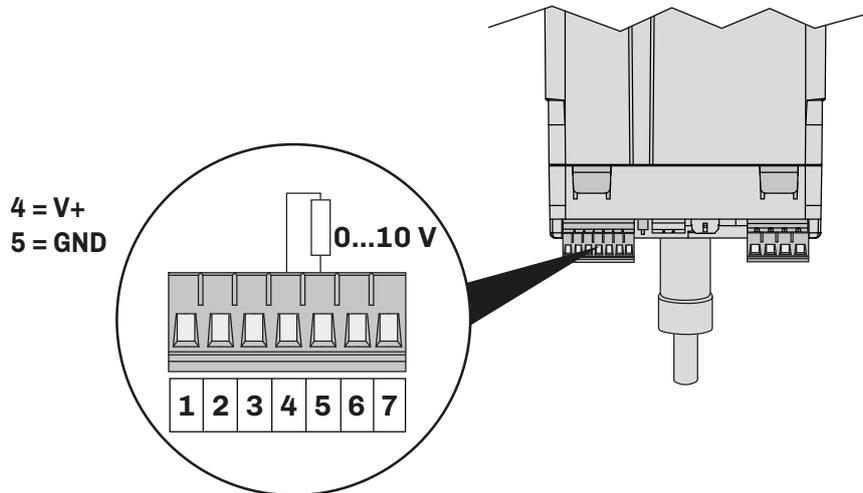
Fig. 23. *External proportional regulator connection with signal 0...10 V*

6.4.5 ON/OFF connection with humidistat or external contact

- Stand-alone configuration **CFG = 0**;
- Parallel configuration as master **CFG = 5**.

ON/OFF

1 2 3 4 5 6 7
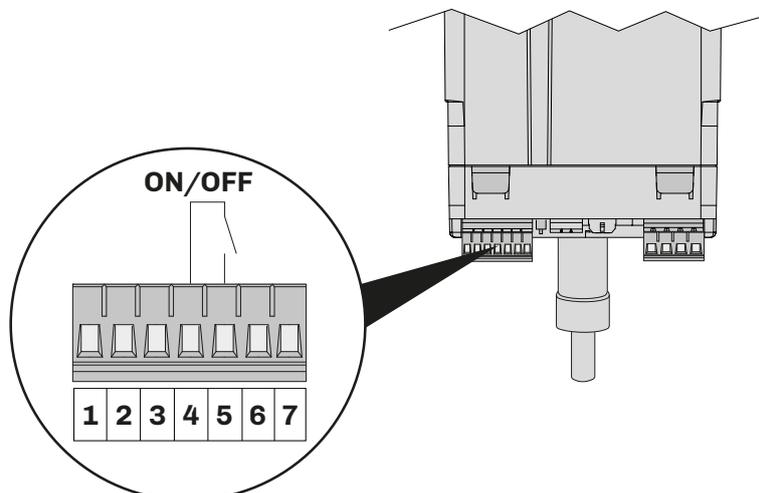
Fig. 24. *ON/OFF connection with humidistat or external contact*

7. USER INTERFACE

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

7.1 Mistral user interface
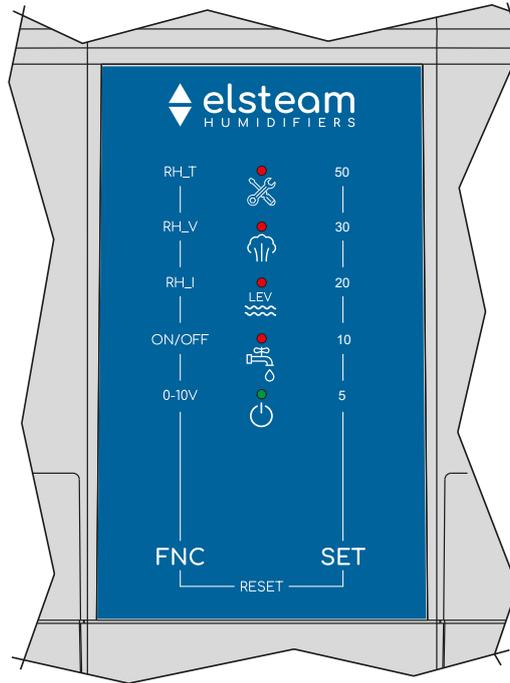
Fig. 25. *LED user interface*

7.1.1 LED

LED	Function	Description	
	Alarm LED	**Lit steadily:**	level sensor board alarm
		Blinking:	indicates an alarm according to the number of blinks (see **"15.1 ALARMS TABLE (LED INTERFACE)" ON PAGE 87**)
		OFF:	in all other cases
	High/low humidity LED	**Lit steadily:**	analogue input in alarm status
		Blinking:	**0.5 s ON / 0.5 s OFF**: high humidity alarm if **CFG** = 2, 3, 4, 7, 8, 9
			1 s ON / 1 s OFF: low humidity alarm if **CFG** = 2, 3, 4, 7, 8, 9
		OFF:	in all other cases
	Level sensor Alarm LED	**Lit steadily:**	level sensor alarm
		Blinking:	indicates a warning according to the number of blinks (see **"15.1 ALARMS TABLE (LED INTERFACE)" ON PAGE 87**)
		OFF:	in all other cases
	Water Alarm LED	**Lit steadily:**	filling procedure failed
		Blinking:	**3 s ON / 3 s OFF**: water below minimum level for activating mist-maker
			0.5 s ON / 0.5 s OFF: if, after draining, the sensors still detect water
		OFF:	in all other cases
	Power Supply LED	**Lit steadily:**	mist-maker ON and humidifier produces humidity
		Blinking:	**0.5 s ON / 0.5 s OFF**: humidity enable consent **ID2** not given
			1 s ON / 3 s OFF: Mistral produces no humidity
		OFF:	humidifier not powered

7.1.2 Keys

Keys	Tap and release to...	Tap and hold for at least 1 second to...	Tap and hold for at least 4 seconds to...
FNC	Change fan speed	During lamp test: enter the operating mode configuration menu	Start reservoir emptying
SET	---	Humidity setpoint setting	Change maximum humidity production

7.2 EV3K user interface

EV3K is available as an accessory completing the range of **Mistral** humidifiers (see *"1.6 ACCESSORIES" ON PAGE 12*).

Fig. 26. *EV3K user interface*

7.2.1 Icons

Icon	Lit steadily	OFF
1	Display shows the humidity sensor value on the top row	In all other cases
⊲≋	Humidity production in progress	No humidity production
∧	Proportional operating mode (**CFG** = 1 or **CFG** = 6)	In all other cases
⊓	ON/OFF operating mode (**CFG** = 0 or **CFG** = 5)	In all other cases
V	0...10 V sensor operating mode (**CFG** = 3 or **CFG** = 8)	In all other cases
I	4...20 mA sensor operating mode (**CFG** = 2 or **CFG** = 7)	In all other cases
R	Resistive sensor operating mode (**CFG** = 4 or **CFG** = 9)	In all other cases
°C	Display shows temperature in °C	In all other cases
%	Display shows humidity in %	In all other cases
⊙	Displayed value is operating hours (fan or mist-maker)	In all other cases
⚠	Alarm in progress	No alarm in progress
µS	Changing value of **P1** in progress	In all other cases
⚠	Warning in progress	No warning in progress
⟲	**ID2** closed (humidity consent present)	**ID2** open (humidity consent not provided)
SP	Changing humidity setpoint in progress	In all other cases

7.2.2 Touch keys

The touch key functions are described below:

Keys...	Tap and release to...	Tap and hold for at least 3 seconds to...
🔒 SET	• Confirm the values on the display • Set/change the humidity setpoint	Enter the parameters menu
⏻	Go back a level	---
FNC ∨	• Scroll down through the values • Navigate within the menu	• Access the maintenance menu • Reset operating hours
∧	• Scroll up through the values • Navigate within the menu	---

7.2.3 Main view

Depending on the chosen operating mode (**CFG**) the display has a different main view. The main screen displays according to the configured operating mode are shown below:

ON/OFF operating mode | CFG = 0 or CFG = 5

Fig. 27. *ON/OFF operation - **ID1** and **ID2** open*

Fig. 28. *ON/OFF operation - **ID1** and **ID2** closed*

Proportional operating mode | CFG = 1 or CFG = 6

Fig. 29. *Proportional operation - **ID1** and **ID2** open*

Fig. 30. *Proportional operation - **ID1** and **ID2** closed*

With **ID2** closed, the top row of the display shows the read value of the 0...10 V input signal, while the bottom row is off.

Operation with sensor | CFG = 2, 3, 4 or CFG = 7, 8, 9.
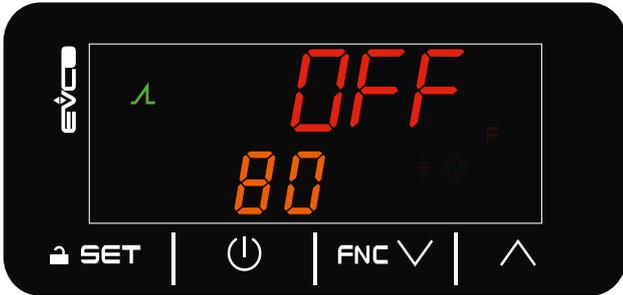
Fig. 31. *Proportional operation - **ID1** and **ID2** open*

Fig. 32. *Proportional operation - **ID1** and **ID2** closed*

With **ID2** closed, the top row of the display shows the value of the connected sensor, while the bottom row shows the setpoint value (**SP**).

In addition, depending on the type of sensor connected and therefore the operating mode with the chosen sensor, a corresponding icon will come on, as described in the subsection *"7.2.1 ICONS" ON PAGE 38*.

7.2.4 Setting and changing the setpoint

If CFG=0, 1, 5, 6, 10
Setpoint not configurable**.**

If CFG= 2, 3, 4, 7, 8, 9
In the main view, to change the setpoint, tap and release the 🔒 **SET** key. The value on the bottom row of the display will blink to indicate that you can make the change by scrolling with the **FNC** ∨ or ∧ keys. Tap the 🔒 **SET** key to confirm the desired value.

7.2.5 Maintenance menu

In the maintenance menu, you can view:

- The value read by the connected sensor;
- The value read by the on-board NTC sensor;
- The statuses of the digital inputs **ID1** and **ID2**;
- The fan speed;
- The operating hours of the mist-maker;
- The operating hours of the fan;
- The status of the outputs:
    - Mist-maker;
    - Fan;
    - Inlet solenoid valve;
    - Outlet solenoid valve;
    - Digital output **UD1**.
- Any alarms in progress.

7.2.6 Maintenance engineer parameters

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

Top row	Bottom row	Description
Pb1 sensor value	**Pb1**	If sensor Pb1 is connected, the value read by the sensor is displayed.
Pb2 sensor value	**Pb2**	If sensor Pb2 is connected, the value read by the sensor is displayed.
Status **ID1**	**di1**	If connected, the status of the digital input **ID1** is displayed. **CLo** = **ID1** closed; **OPn** = **ID1** open.
Status **ID2**	**di2**	If connected, the status of the digital input **ID2** is displayed. **CLo** = **ID2** closed; **OPn** = **ID2** open.
Value **F0**	**FAn**	The **F0** (fan speed) parameter configuration value is displayed.
Value **r6**	**PrM**	The **r6** (maximum steam production) parameter configuration value is displayed.
Mist-maker hours	**MH**	The operating hours of the mist-maker are displayed if ≤ 9999 h
Mist-maker hours	**MHH**	If the mist-maker operating hours are > 9999, the operating hours data is divided according to the following logic: (**MHH** x 1000)+**MHL**. *For example*: **MHH** = 1; **MHL** = 2956 ➡ (1 x 1000)+2956 = 12956 h
Mist-maker hours	**MHL**	If the mist-maker operating hours are > 9999, the operating hours data is divided according to the following logic: (**MHH** x 1000)+**MHL**. *For example*: **MHH** = 1; **MHL** = 2956 ➡ (1 x 1000)+2956 = 12956 h
0	**rMH**	Resets the mist-maker operating hours. Tap the 🔒 SET key, enter the password value 149 using the FNC ∨ or ∧ keys, tap 🔒 SET to confirm the reset. On the top row, "—" blinks for 3 seconds after which **0** is displayed indicating that the reset has been accomplished.
Fan hours	**FH**	The operating hours of the fan are displayed if ≤ 9999 h
Fan hours	**FHH**	If the fan operating hours are > 9999, the operating hours data is divided according to the following logic: (**MHH** x 1000)+**MHL**. *For example*: **MHH** = 1; **MHL** = 5894 ➡ (1 x 1000)+5894 = 15894 h
Fan hours	**FH L**	If the fan operating hours are > 9999, the operating hours data is divided according to the following logic: (**MHH** x 1000)+**MHL**. *For example*: **MHH** = 1; **MHL** = 5894 ➡ (1 x 1000)+5894 = 15894 h
0	**RFH**	Resets the fan operating hours. Tap the 🔒 SET key, enter the password value 149 using the FNC ∨ or ∧ keys, tap 🔒 SET to confirm the reset. On the top row, "—" blinks for 3 seconds after which **0** is displayed indicating that the reset has been accomplished.
Mist-maker output status	**OM**	The mist-maker output status is displayed. **OFF** = Mist-maker output OFF; **ON** = Mist-maker output ON.
Fan output status	**oF**	The fan output status is displayed. **OFF** = Fan output OFF; **ON** = Fan output ON.

Top row	Bottom row	Description
Inlet solenoid valve status	oi	The inlet solenoid valve status is displayed. **OFF** = Inlet solenoid valve output OFF; **ON** = Inlet solenoid valve output ON.
Outlet solenoid valve status	od	The outlet solenoid valve status is displayed. **OFF** = Outlet solenoid valve output OFF; **ON** = Outlet solenoid valve output ON.
Digital output status **UD1**	or	The **UD1** digital output status is displayed. **OFF** = **UD1** digital output OFF; **ON** = **UD1** digital output ON.

7.2.7 Accessing the parameters menu

User parameters
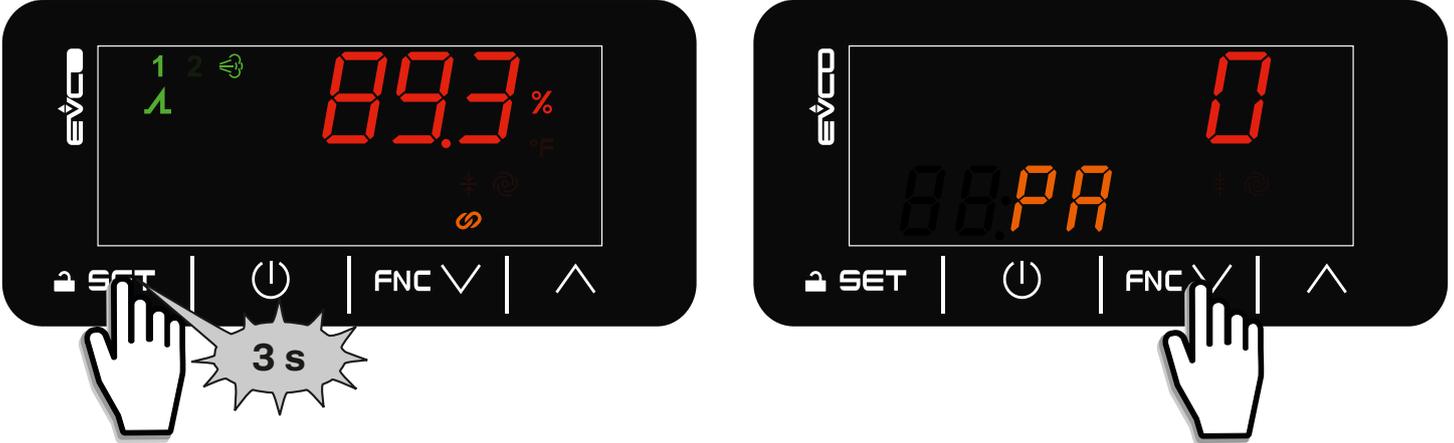
Fig. 33. *Accessing the user parameters menu*

Maintenance engineer parameters
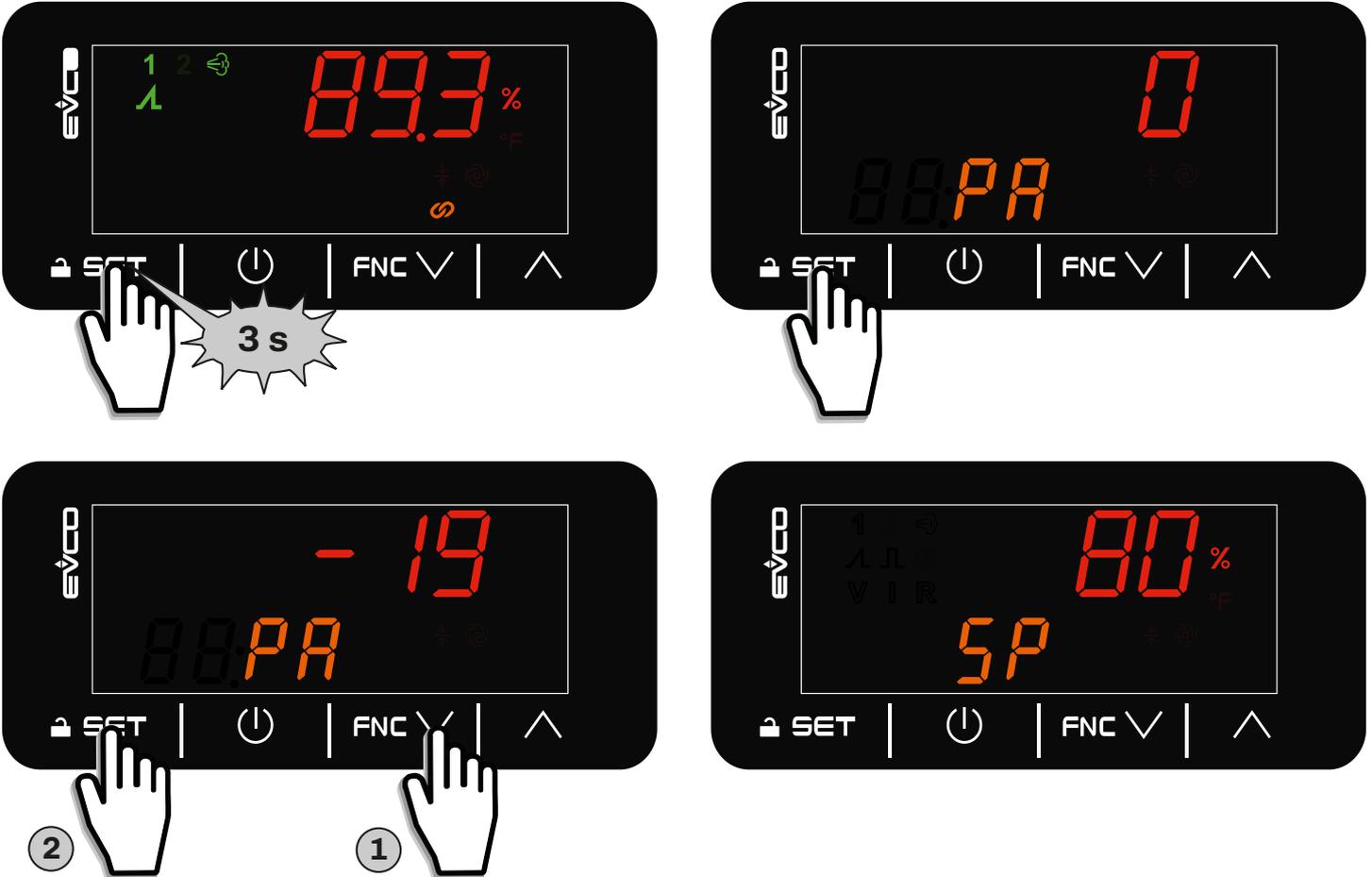
Fig. 34. *Accessing the maintenance engineer parameters menu*

7.2.8 Changing fan speed
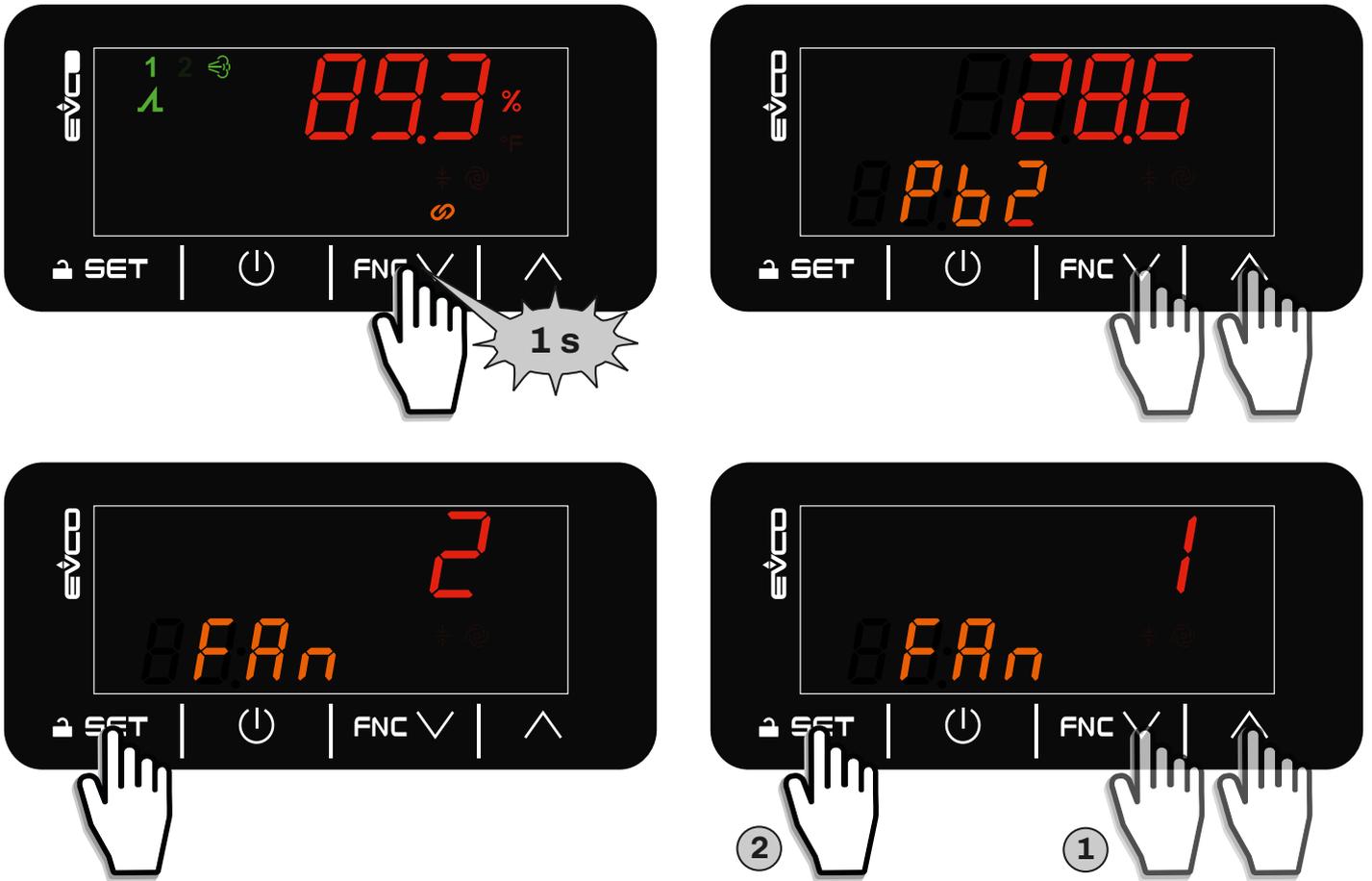
Fig. 35. *Changing fan speed*

7.2.9 Maximum humidity production configuration
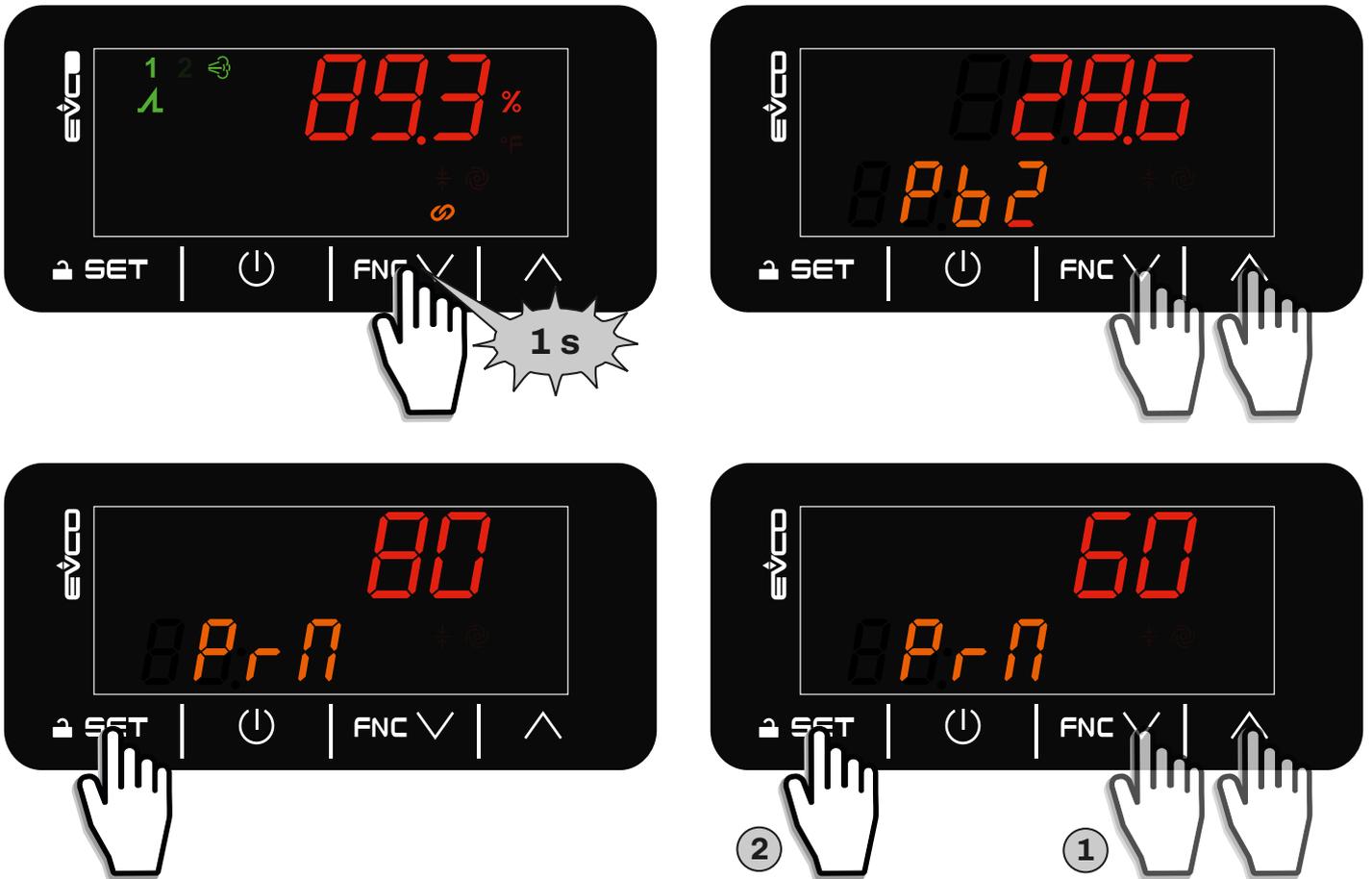
Fig. 36. *Maximum humidity production configuration*

8. POWER-UP AND START-UP

8.1 Before you start

⚠ ⚠ DANGER
RISK OF ELECTRIC SHOCK, EXPLOSION OR FIRE
• Install the humidifier away from electronic equipment.
• Do not install the humidifier above electronic equipment.

⚠ ⚠ DANGER
RISK OF ELECTRIC SHOCK OR ELECTRIC ARC
• Do not install the equipment while the power supply is connected.
• Cut off the power supply to all equipment, including any connected devices, and remove the power fuses before removing any covers or hatches, or before installing/uninstalling accessories, hardware, cables or wires.
• Always use a properly calibrated Voltmeter to make sure the system is powered off.
• Do not touch the unshielded components or the terminals while they are live.
• Make sure there is an effective earth connection; if there is not, earth the equipment.
• Before powering up the equipment, check all the wiring connections.

⚠ WARNING
MALFUNCTIONING OF THE EQUIPMENT
• Perform the wiring carefully, in compliance with electromagnetic compatibility and safety requirements.
• 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.").

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 humidity outlet closure clamps are properly tightened.
• Make sure there are no pockets of condensate or throttling in the mist (humidity) delivery channel.
• Make sure that the water quality and flow meets the technical requirements specified in the chapter *"5.2 INSTALLING THE PLUMBING" ON PAGE 26*

8.2 Start-up instructions

NOTICE
MALFUNCTIONING OF THE EQUIPMENT
The configuration and self-test phase lasts approximately 5 minutes from the moment the humidifier is switched on, after which the humidifier is ready to generate humidity.

To start up the humidifier follow the instructions given in the table below.

Instructions	References
1. Perform the humidifier wiring according to the required configuration	*"6.3 WIRING DIAGRAM" ON PAGE 34*
2. Activate the isolator outside the humidifier and open the water supply source	*"6. ELECTRICAL CONNECTIONS" ON PAGE 32*
3. Open the water inlet shutoff cock upstream of the humidifier	*"5.2 INSTALLING THE PLUMBING" ON PAGE 26*
4. When powering on, the humidifier starts a configuration and self-test phase (*). This phase consists of the following automatic operations: • Power on • Water drain cycle (draining off any residues) • Water fill cycle and configuration and self-test levels • Water drain cycle to complete configuration • Start of production	*"9. OPERATION" ON PAGE 46*
5. Set the **CFG** parameter depending on the required operating mode	• *"9.2 OPERATING MODE CONFIGURATION" ON PAGE 46* • *"13.1 TABLE OF MISTRAL ADJUSTMENT PARAMETERS" ON PAGE 78*
6. Configure the machine parameters according to the characteristics of the water and usage of the humidifier	*"13.1 TABLE OF MISTRAL ADJUSTMENT PARAMETERS" ON PAGE 78*
7. Set the humidity setpoint to 100%	*"9.4 HUMIDITY SETPOINT CONFIGURATION" ON PAGE 49*
8. Check for humidity production	*"9.7 HUMIDITY ADJUSTMENT" ON PAGE 52*
9. Set the humidity setpoint to the desired value	*"7.2.4 SETTING AND CHANGING THE SETPOINT" ON PAGE 39*
10. The humidifier periodically (parameter **C1**) fully drains the water and replaces it cyclically while performing the washing procedure, in order to maintain efficient humidifier operating conditions	*"9.1 DRAINING WATER / WASHING RESERVOIR" ON PAGE 46*

(*****) Mistral may discharge water in this phase.

Each time the instrument is connected to the power supply and then switched on, the configuration and self-test phase starts.
The configuration and self-test phase lasts **approximately 5 minutes**, after which the humidifier is ready to generate humidity.
If the configuration phase fails, it is repeated an additional two times, increasing the maximum time to 15 minutes. If the configuration fails at the third attempt, the humidifier signals **Water alarm**.

8.3 Instructions for seasonal or long-term shut-down

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;
- Clean the humidifier following the instructions provided in the chapter *"11. MAINTENANCE" ON PAGE 73*.

If the machine is suddenly loses power, for example in the event of a mains powercut or an inhibiting alarm which has forced the user to switch off the humidifier:

- Manually drain the product using the manual drainage launch procedure (*);
- Clean the humidifier following the instructions provided in the chapter *"11. MAINTENANCE" ON PAGE 73* within 72 hours of the moment it was switched off.

(*****) If the drainage procedure cannot be carried out via the user interface, manually empty the water from the reservoir.

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

⚠ ⚠ WARNING
BIOLOGICAL RISK
• In the event of inadequate use and/or poor maintenance it is possible that microorganisms (including the bacterium that causes Legionellosis) may proliferate and be transferred into the air treatment system or the surrounding environment. • The humidifier must be used properly and be maintained and cleaned properly at prescribed intervals, as described in chapter *"11. MAINTENANCE" ON PAGE 73*.

8.4 Checks to be carried out each time the humidifier is switched on

Each time the humidifier is turned on, perform the following checks:

- Make sure the reservoir is properly clean as described in the chapter **"11. MAINTENANCE" ON PAGE 73** (carry out cleaning if necessary, using 20% citric acid and suitable biocides);
- Check that the mist delivery is consistent with the demand for humidity;
- Make sure there are no hydraulic leaks;
- Make sure that there are no alarms in progress (see **"15. DIAGNOSTICS" ON PAGE 87**).

9. OPERATION

9.1 Draining water / washing reservoir

The water reservoir is emptied in the following cases:

- When powering up;
- After an idle time determined by parameter **C0** (if **C0** ≠ 0);
- After an active time determined by parameter **C1** (if **C1** ≠ 0);
- In the case of the first high temperature alarm event (parameters **A1** and **A2**);
- In the case of maintenance, manual emptying is initiated by pressing and holding the `FNC` key for at least 4 seconds.

In the case of emptying the reservoir due to inactivity, the **Mistral** humidifier will run the fan for a time **F5** to dry the reservoir. If there is a demand for humidity, the humidifier will fill the reservoir.

At the end of each emptying phase, the drain valve is kept open for another 2 seconds.

NOTE: water drainage can be set to a frequency greater than 72 hours using only demineralised water.

9.2 Operating mode configuration

When powering up, while the LEDs are blinking, press the `FNC` key for at least 1 second to enter the analogue input configuration menu.

Press the `FNC` key again until the desired operating mode configuration is selected and press the `SET` key to confirm your choice.

Par.	Description	MU	Range
CFG	Operating mode. **0** = Stand-alone, ON/OFF operation, alarm relay; **1** = Stand-alone, proportional operation, alarm relay; **2** = Stand-alone, operation with 4...20 mA sensor, alarm relay; **3** = Stand-alone, operation with 0...10 V sensor, alarm relay; **4** = Stand-alone, operation with resistive humidity sensor, alarm relay; **5** = Master, ON/OFF operation; **6** = Master, proportional operation; **7** = Master, operation with 4...20 mA sensor; **8** = Master, operation with 0...10 V sensor; **9** = Master, operation with resistive humidity sensor; **10** = Slave.	---	0...10

Depending on the LED(s) on, one operating mode is chosen.
In the table on the next page, you can find the relation between **LED ON - OPERATING MODE**.

Relation between LED BLINKING - OPERATING MODE.

Mode	RH_T (tools)	RH_V (steam)	RH_I (LEV)	ON/OFF (tap)	0-10V (power)
Mode 0 (CFG = 0)	—	—	—	red	—
Mode 1 (CFG = 1)	—	—	—	—	green blinking
Mode 2 (CFG = 2)	—	—	red blinking	—	—
Mode 3 (CFG = 3)	—	red blinking	—	—	—
Mode 4 (CFG = 4)	red blinking	—	—	—	—
Mode 5 (CFG = 5)	—	—	—	red blinking	green blinking
Mode 6 (CFG = 6)	red blinking	—	red blinking	—	green blinking
Mode 7 (CFG = 7)	—	—	red blinking	—	green blinking
Mode 8 (CFG = 8)	—	red blinking	—	—	green blinking

Scale markings on each panel: 50 / 30 / 20 / 10 / 5

Mode 9 (CFG = 9)	Mode 10 (CFG = 10)

9.3 Fan speed configuration

To configure the fan speed, during normal operating mode, press `FNC` until the LEDs 🔧 and 💧 light up (release the key before the two lit LEDs cause manual drainage to begin).

Each time the `FNC` key is pressed, the value of parameter **F0** increments by 1.

Wait 5 seconds after last pressing the `FNC` key to exit the procedure and save the new value.

The **F0** parameter values corresponding to the lit LED are:

	LEV	🚰	⏻
F0 = 0 (OFF)	---	---	---
F0 = 1 (15%)	---	---	ON
F0 = 2 (30%)	---	ON	---
F0 = 3 (60%)	ON	---	---
F0 = 4 (80%)	---	ON	ON

--- = LED off.
ON = LED lit.

NOTE: the 🔧 and 💧 LEDs remain steadily lit during fan configuration.

9.4 Humidity setpoint configuration

Procedure available with **CFG** = 2,3,4,7,8,9.

During normal operation, to set the setpoint press the SET key.

During the phase of configuring the humidity setpoint **SP**, a LED corresponding to a set percentage value will light up. The humidity setpoint can vary within the range of values set by parameters **r1** and **r2**.

Each time the SET key is pressed, the humidity value is increased by 5%.

Wait 5 seconds after last pressing the SET key to exit the procedure and save the new value.

The humidity percentage values corresponding to the lit LEDs are:

LED	🔴 🔧	🔴 💨	🔴 LEV	🔴 🚰	🟢 ⏻
Humidity value	50%	30%	20%	10%	5%

9.4.1 Examples of humidity setpoint configuration

Example 25% Humidity Setpoint:
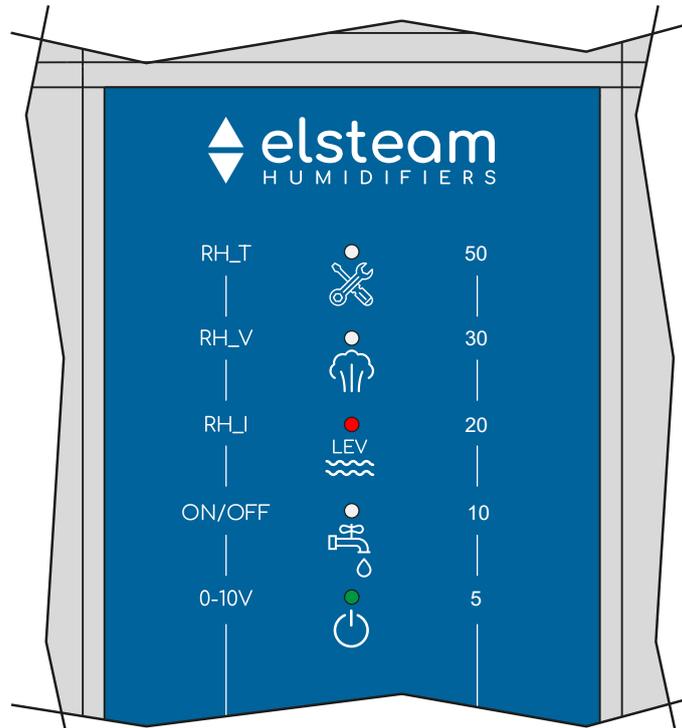
*Fig. 37. Example of humidity setpoint configuration at **25%***

LED	⚪ 🔧	⚪ 💨	🔴 LEV	⚪ 🚰	🟢 ⏻
LED ON/OFF	OFF	OFF	ON	OFF	ON
Humidity value	---	---	20%	---	5%

Example 50% Humidity Setpoint:
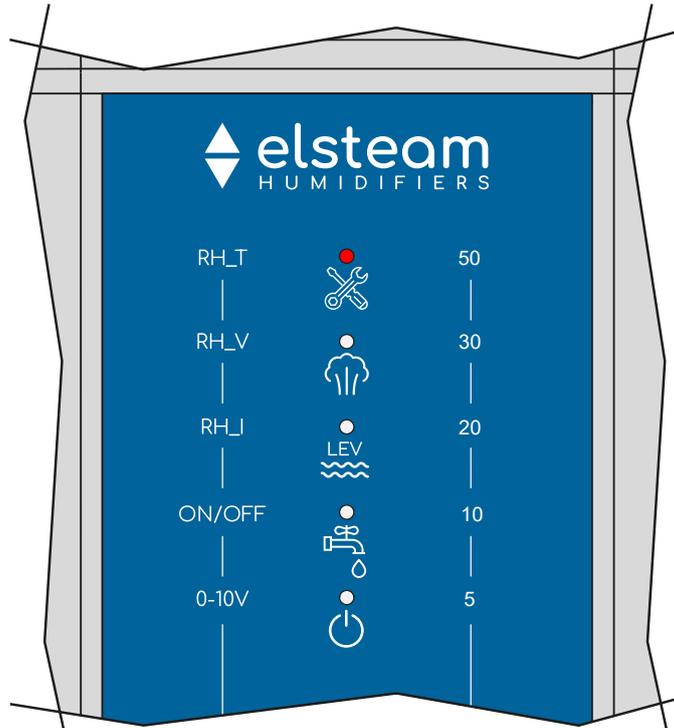
Fig. 38. *Example of humidity setpoint configuration at* **50%**

LED					
LED ON/OFF	ON	OFF	OFF	OFF	OFF
Humidity value	50%	---	---	---	---

Example 75% Humidity Setpoint:
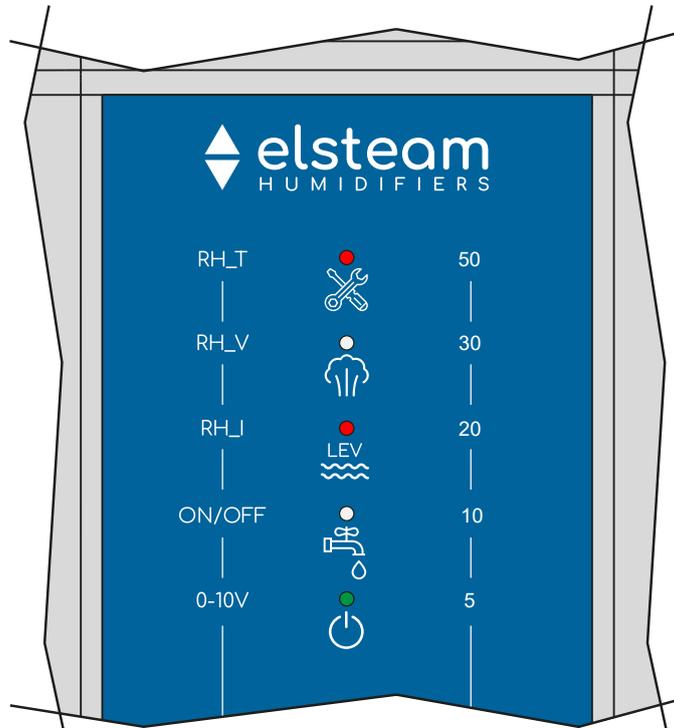
Fig. 39. *Example of humidity setpoint configuration at* **75%**

LED					
LED ON/OFF	ON	OFF	ON	OFF	ON
Humidity value	50%	---	20%	---	5%

Example 100% Humidity Setpoint:
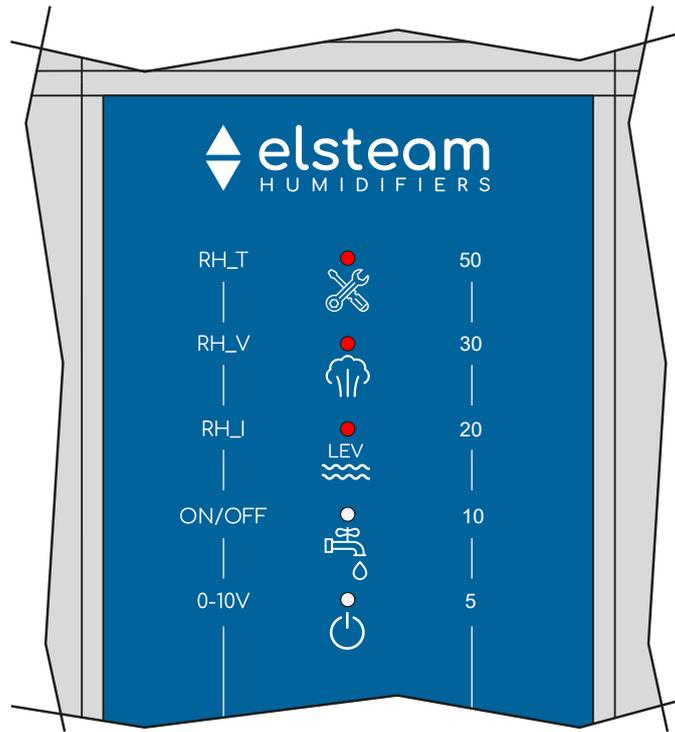
*Fig. 40. Example of humidity setpoint configuration at **100%***

LED					
LED ON/OFF	ON	ON	ON	OFF	OFF
Humidity value	50%	30%	20%	---	---

9.5 Maximum steam production configuration

During normal operation, to configure the maximum steam production press the SET key for longer than 4 seconds.

Each time the SET key is pressed, the value of the maximum steam production is increased by 5%.

Wait 6 seconds after last pressing the SET key to exit the procedure and save the new value.

The humidity percentage values corresponding to the lit LEDs are:

LED					
Humidity value	50%	30%	20%	10%	5%

Example maximum production value at 50%:

LED					
Humidity value	50%	30%	20%	10%	5%

9.6 Temperature sensor

A sensor is installed on the board to measure the temperature of the water in the reservoir during normal operation.

The internal temperature sensor is used by the humidifier for any temperature alarms (see **"15.1 ALARMS TABLE (LED INTERFACE)" ON PAGE 87**).

If **A1** = 0, the high temperature alarm is disabled.

If **A1** > 0, **Mistral** generates the alarm when the temperature detected by the internal sensor exceeds threshold **A1** for a time **A2**. In this situation the humidifier empties the reservoir and fills it again.

If after emptying, the alarm occurs again within a time **A3**, a high temperature alarm is signalled.

If, instead, after a time **A3**, no alarm is generated, the previous event is cleared.

If **A3** = 0, no emptying is carried out and the alarm is generated immediately.

9.7 Humidity adjustment

9.7.1 ON/OFF regulator

Humidity adjustment in ON/OFF mode is made by setting:
- **CFG** = 0 or **CFG** = 5.

The outlet starts to produce humidity (at parameter value **r6**) when both digital inputs are closed.

If the digital input **ID2** is open (consent not provided), the ⏻ LED will blink with a period of 0.5 s ON - 0.5 s OFF.

If consent is given, but the humidifier is not producing any humidity, the ⏻ LED will blink with a period of 1 s ON - 3 s OFF:

The following diagram explains the operating logic:
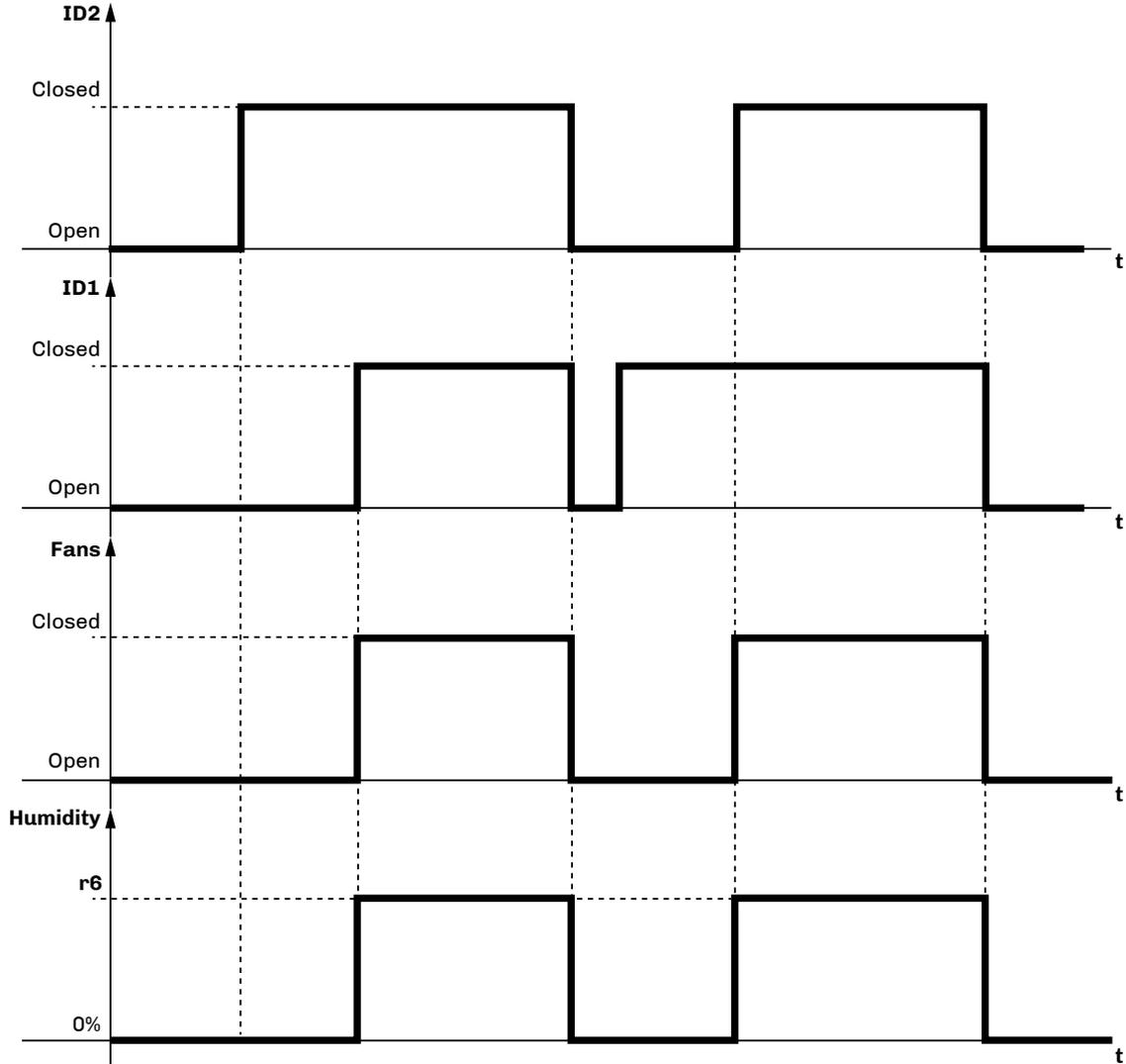
Fig. 41. *Humidity adjustment - ON-OFF*

9.7.2 External proportional regulator with 0...10 V input

The humidity adjustment in proportional mode with 0...10 V input is done by setting:

- **CFG** = 1 or **CFG** = 6.

The outlet starts producing humidity in proportion to the input signal.

If the digital input **ID2** is open (consent not provided), the [power icon] LED will blink with a period of 0.5 s ON - 0.5 s OFF.

If consent is given, but the humidifier is not producing any humidity, the [power icon] LED will blink with a period of 1 s ON - 3 s OFF:

The following diagram explains the operating logic:

INPUT SIGNAL GRAPH

OUTPUT GRAPH IN RELATION TO INPUT

Fig. 42. *External proportional regulator with 0...10 input*

In order to produce humidity, **Mistral** must receive consent from the ventilation, so digital input **ID2** must be closed.

The proportional humidity function has a PWM type modulation which provides for a cycle time between two consecutive activations of the humidity production output (parameter **r3**).
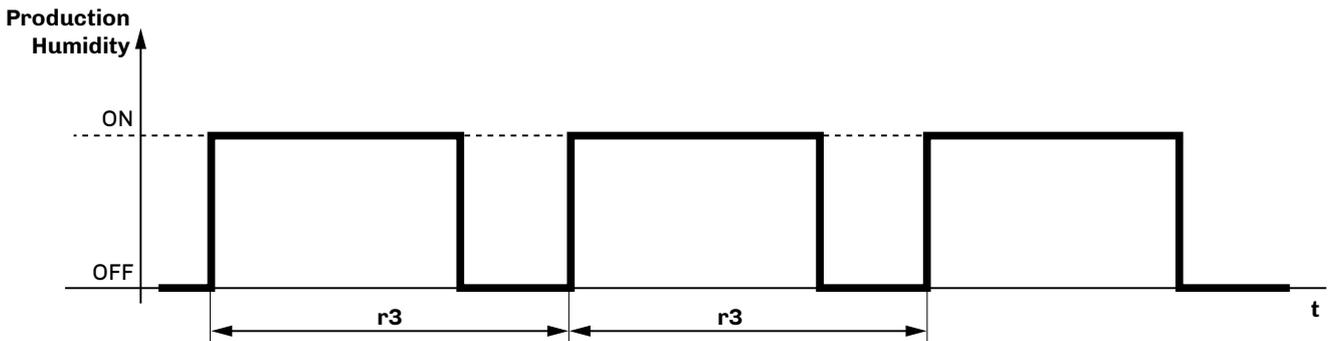
Fig. 43. *External proportional regulator with 0...10 input - Consecutive activation delay*

9.7.3 Regulator with humidity sensor

Humidity adjustment via a humidity sensor is made by setting:
- **CFG** = 2; **CFG** = 3; **CFG** =4 or
- **CFG** = 7; **CFG** = 8; **CFG** = 9.

The outlet produces humidity with the following logic:
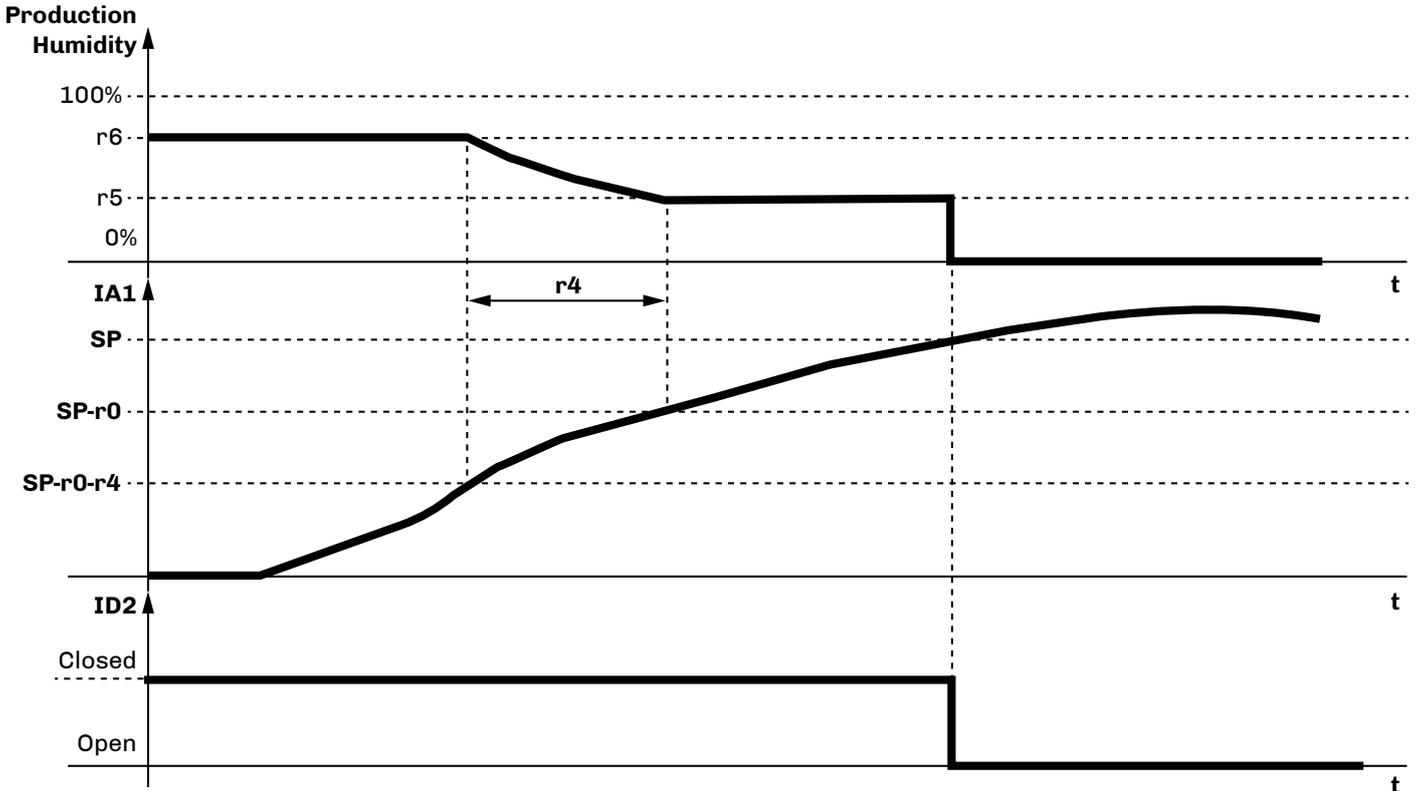
Fig. 44. *Adjustment with humidity sensor*

- If the sensor reading is less than **SP-r0-r4**, then the humidity production is at its maximum;
- If the sensor reading is between **SP-r0-r4** and **SP-r0**, then the production is proportional between **r5** and **r6**;
- If the sensor reading is between **SP-r0** and **SP** then there is little or no production;
- **Mistral** does not produce humidity under any other conditions;
- **Mistral** does not produce any humidity with the sensor in error.

9.8 Recording hours of operation

The **Mistral** humidifier, among its functions, includes recording the operating hours, to monitor and alert you when to perform routine maintenance. Some of the recordings made include:
- Partial hours of mist-maker operation;
- Partial hours of fan operation.

The operating hours are stored in the internal memory.

This is referred to as partial hours, as the recorded operating hours can be reset to zero.

To view/reset the partial operating hours, you need to connect the remote user interface (see *“1.6 ACCESSORIES” ON PAGE 12*).

9.8.1 Mist-maker operating hours: partial number

If the mist-maker operating hours > **A10**, the **Mistral** humidifier will generate a warning. If **A10** = 0, no warning is generated.

The data is considered partial because it can be reset by pressing and holding key **T1** for at least 4 seconds.

To view and reset the partial operating hours of the fan see *“7.2.5 MAINTENANCE MENU” ON PAGE 40.*

9.8.2 Fan operating hours: partial number

If the fan operating hours > **A13**, the **Mistral** humidifier will generate a warning. If **A13** = 0, no warning is generated.

The data is considered partial because it can be reset by pressing and holding key **T1** for at least 4 seconds.

To view and reset the partial operating hours of the fan see *“7.2.5 MAINTENANCE MENU” ON PAGE 40.*

9.9 Parallel operation

Up to 5 humidifiers can be connected in parallel.

By configuring and setting the first humidifier only (MASTER), the others (SLAVES) will follow the operation of the first humidifier by replicating it precisely (parametrizations are not replicated if they are changed on the MASTER).

To activate this operating mode, you need to:
- Set one humidifier as Master, by setting **CFG** = 5...9;
- Set all the other humidifiers as Slave, by setting **CFG** = 10 on each humidifier;
- Connect the analogue input **IA1** on the Master humidifier;
- Connect the digital output **Out1** of each humidifier to the digital input **ID2** of the next humidifier.
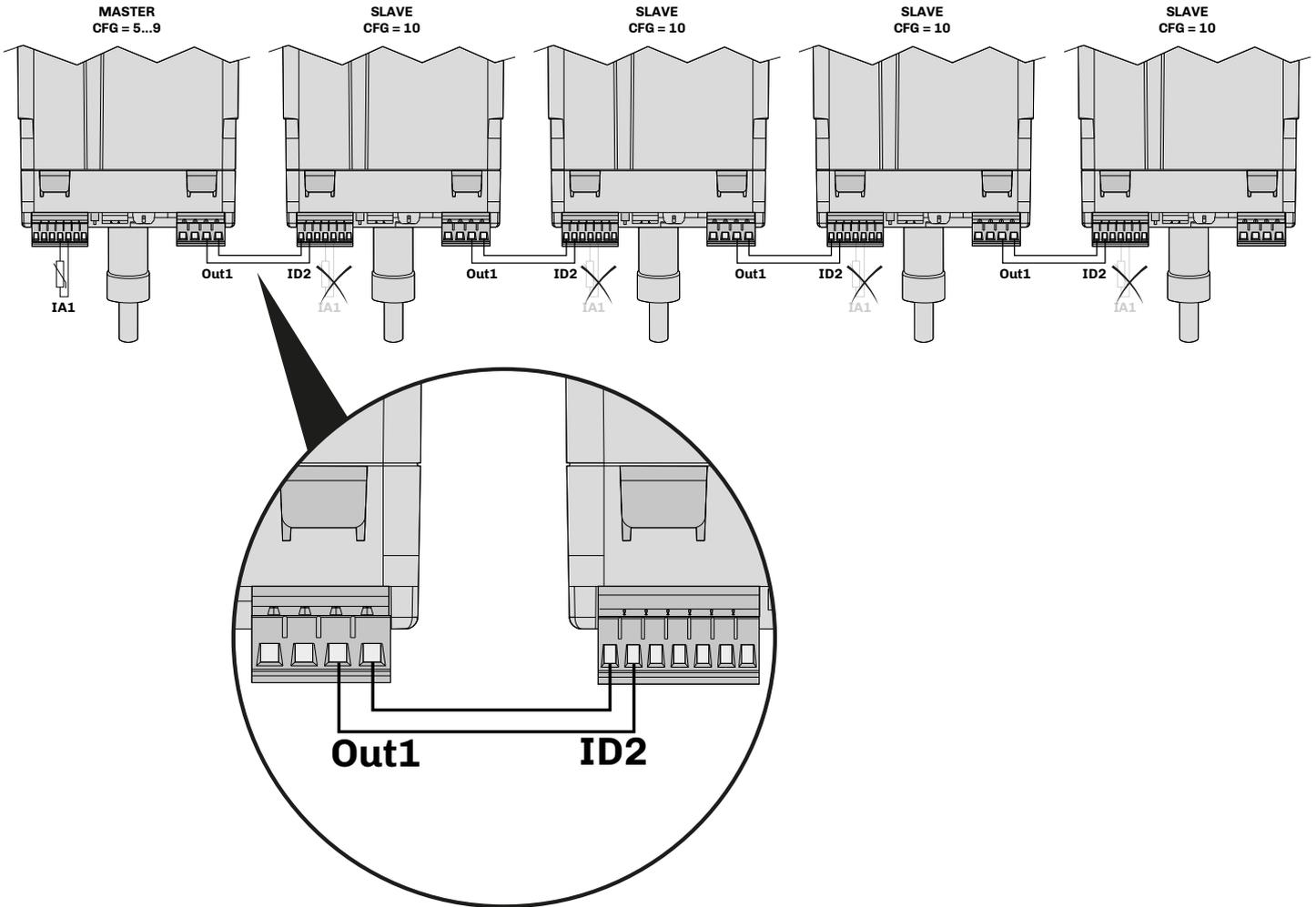
Fig. 45. *Parallel operation*

NOTE: in this operating mode, the digital output is used to propagate the operating signal.
NOTE: for humidifiers set to SLAVE, do not connect input **IA1**.

10. MASTER/SLAVE CONFIGURATION

10.1 Introduction

The Master/Slave configuration allows the user to increase the system's production capacity or to control the entire system remotely.

The cutting-edge **EPJC** user interface allows the connection of several humidifiers in an RS-485 network in order to enable different operating modes and allow maintenance on individual humidifiers without interrupting operation of the entire humidification system.

The configuration parameters for the master/slave RS-485 network are listed on the **EPJC** user interface and are as follows:

Par.	Description	MU	Range
E0	Number of humidifiers connected.	---	1...4
E1	Operating mode. **1** = Independent; **2** = Parallel; **3** = Rotation; **4** = Balancing.	---	1...4
E2	Rotation time.	hours	1...24
BLE	Enable EVconnect/EPoCA. **0** = Spare; **1** = Forced for EVconnect/EPoCA; **2...99** = EPoCA local network address.	---	0...99
PA1	User level EPoCA password.	---	-99...999
PA2	Administrator level EPoCA password.	---	-99...999
LA1	COM1 address (RS-485 Slave).	---	1...247
LB1	COM1 Baud rate (RS-485 Slave). **0** = 2400; **1** = 4800; **2** = 9600; **3** = 19200; **4** = 38400.	---	0...4
LP1	COM1 parity (RS-485 Slave). **0** = None; **1** = Odd; **2** = Even.	---	0...2

If a Mistral loses connection with the **EPJC**, after 15 seconds it will begin running in the mode set via **CFG** (parameter on Mistral).

10.2 Operating modes

The **EPJC** user interface can be used to configure parameter **E1** and set different operating modes for the **Mistral** master/slave RS-485 network.

The configuration parameters for the operating modes are:

Par.	Description	MU	Range
E0	Number of humidifiers connected in master/slave configuration.	---	1...4
E1	Humidifier operating mode in master/slave configuration. **1** = Independent; **2** = Parallel; **3** = Rotation; **4** = Balancing.	---	1...4
E2	Rotation time in master/slave configuration.	hours	1...120

10.2.1 Master/Slave | Independent Mistral operation

Each **Mistral** humidifier operates with its own parameters, **EPJC** is a display unit only.

If the master humidifier loses connection, the other instruments remain in slave mode with zero power.

10.2.2 Master/Slave | Parallel Mistral operation

Once the master humidifier has been set, it sets the demand for humidity for the slave humidifiers, making them all work simultaneously at the same request value.

Parallel operation means that the humidification capacity can be increased.

10.2.3 Master/Slave | Rotational Mistral operation

Once the master humidifier has been set, it sets the demand for humidity for the slave humidifiers, making each one work at the same request value.

Each Mistral produces an output based on the demand for humidity for a time period **E2**; once this time has elapsed, the next Mistral in the network begins to produce an output at the same requested value.

If, for example, the rotation time **E2** = 1 h and the connected Mistrals have addresses of 1, 2 and 4: Mistral 1 will produce an output in the first hour, then 2, then 4 and then 1, 2, 4 again cyclically.

Rotational operation makes it possible to normalise all operating hours for the various humidifiers in the network.

10.2.4 Master/Slave | Balancing Mistral operation

Once the master humidifier has been set, it sets the demand for humidity made to the slave humidifiers, making each one work at the same request value.

Each Mistral remains on based on how active its mist-maker has been, before passing control to the next Mistral. Rotation takes place according to the principle described in the subsection **"10.2.3 MASTER/SLAVE | ROTATIONAL MISTRAL OPERATION" ON PAGE 57**.

The rotation time is adjusted in line with the maximum output of the humidifier in production mode (parameter **r6** on Mistral).

If, for example, there are three instruments and a rotation time **E2** = 1 h, the role change takes place effectively when each instrument has produced a humidity value equal to r6.

- **Mistral 1** always works at 50% and **r6** = 100% -> rotation time = 2 h
- **Mistral 2** always works at 100% and **r6** = 100% -> rotation time = 1 h

Rotation takes place in a circular fashion, with the first device being the master: for example, if devices 1, 2, 4 are connected in the network and device 2 is the master, the order will be 2-4-1-2-4-etc.

Balancing operation makes it possible to normalise humidity production for the various humidifiers in the network.

10.2.5 Master/Slave | Mistral in maintenance

This mode cannot be selected via menu as the humidifiers not subject to maintenance must remain active to keep the humidification system running.

To switch to maintenance mode, see **"10.6.2 HUMIDIFIER MAINTENANCE" ON PAGE 66**.

10.3 EPJC user interface

10.3.1 Humidifier grid view

Depending on the chosen operating mode (**E1**) the display has a different main view. The main screen displays according to the configured operating mode are shown below:

Independent Mistral operating mode | E1 = 1
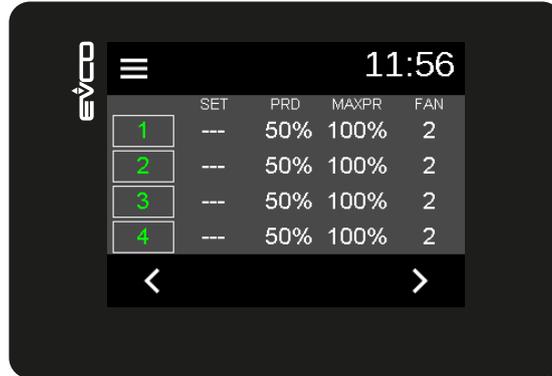
Fig. 46. Independent Mistral operating mode | E1 = 1

The grid view screen for humidifiers in independent **Mistral** mode (**E1** = 1) shows the following information:

	SET	PRD	MAXPR	FAN
Mistral 1				Fan speed
Mistral 2	• Setpoint (if regulation takes place with sensor)	Current production	Maximum production (**r6**)	**0** = Fan off; **1** = Speed at **15%**; **2** = Speed at **30%**;
Mistral 3	• **--** in all other cases			**3** = Speed at **60%**;
Mistral 4				**4** = Speed at **80%**.

In all other cases

Fig. 47. Grid view in all other cases

In other cases the *humidifier grid view* screen shows the following information:

Screen 1

	RH %	ID2	ID1	STATUS
Mistral 1				• **M** if master
Mistral 2	• Sensor value (if present)	ON/OFF consent input status	• ON/OFF input status (if present)	• **R** if active in rotation
Mistral 3	• **--** in all other cases		• **--** in all other cases	• **S** if in maintenance
Mistral 4				• **--** in all other cases

Screen 2

	SET	PRD	MAXPR	FAN
Mistral 1				Fan speed
Mistral 2	• Setpoint (if regulation takes place with sensor)	Current production	Maximum production (**r6**)	**0** = Fan off; **1** = Speed at **15%**; **2** = Speed at **30%**;
Mistral 3	• **--** in all other cases			**3** = Speed at **60%**;
Mistral 4				**4** = Speed at **80%**.

10.3.2 Viewing the screen for a single Mistral

Fig. 48. *Viewing the screen for a single Mistral*

10.3.3 Setting and changing the setpoint
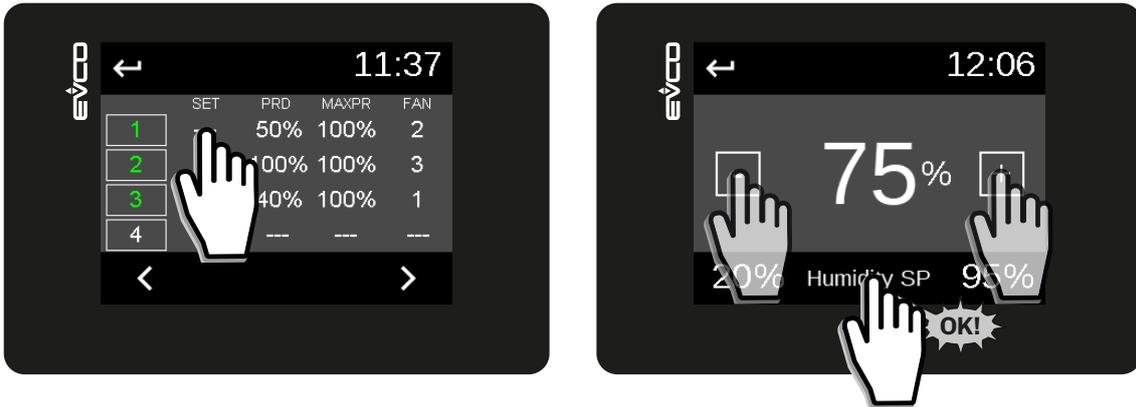
Fig. 49. *Changing the setpoint*

10.3.4 Changing the maximum humidity production
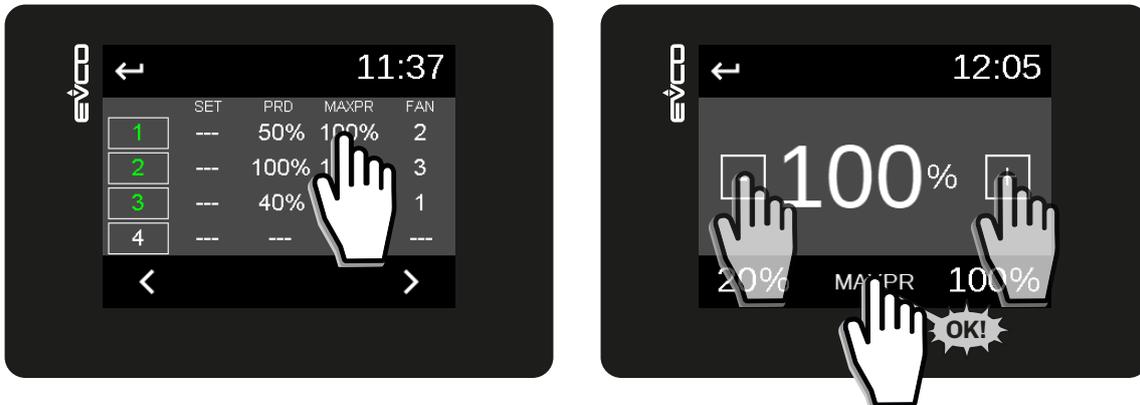
Fig. 50. *Changing the maximum humidity production*

10.3.5 Changing fan speed
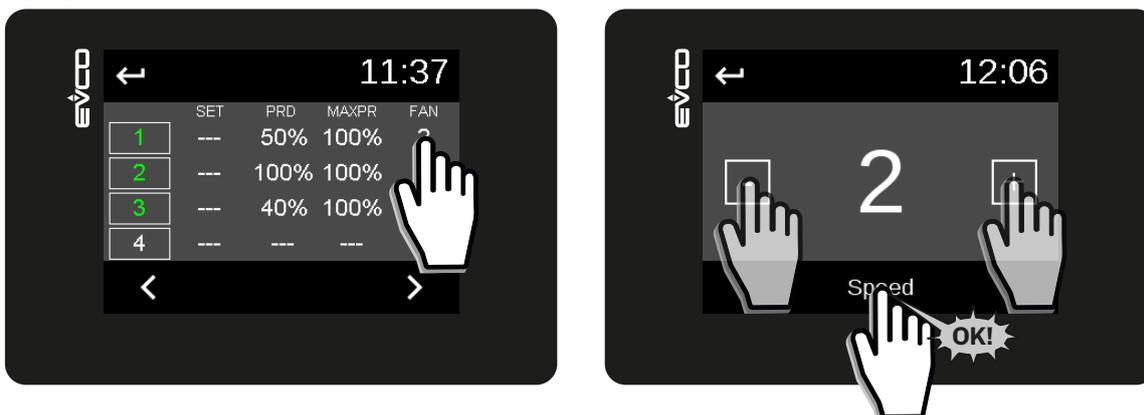
Fig. 51. *Changing fan speed*

10.4 EPJC general menu

Menu access with E1 = 1   **Menu access with E1 ≠ 1**
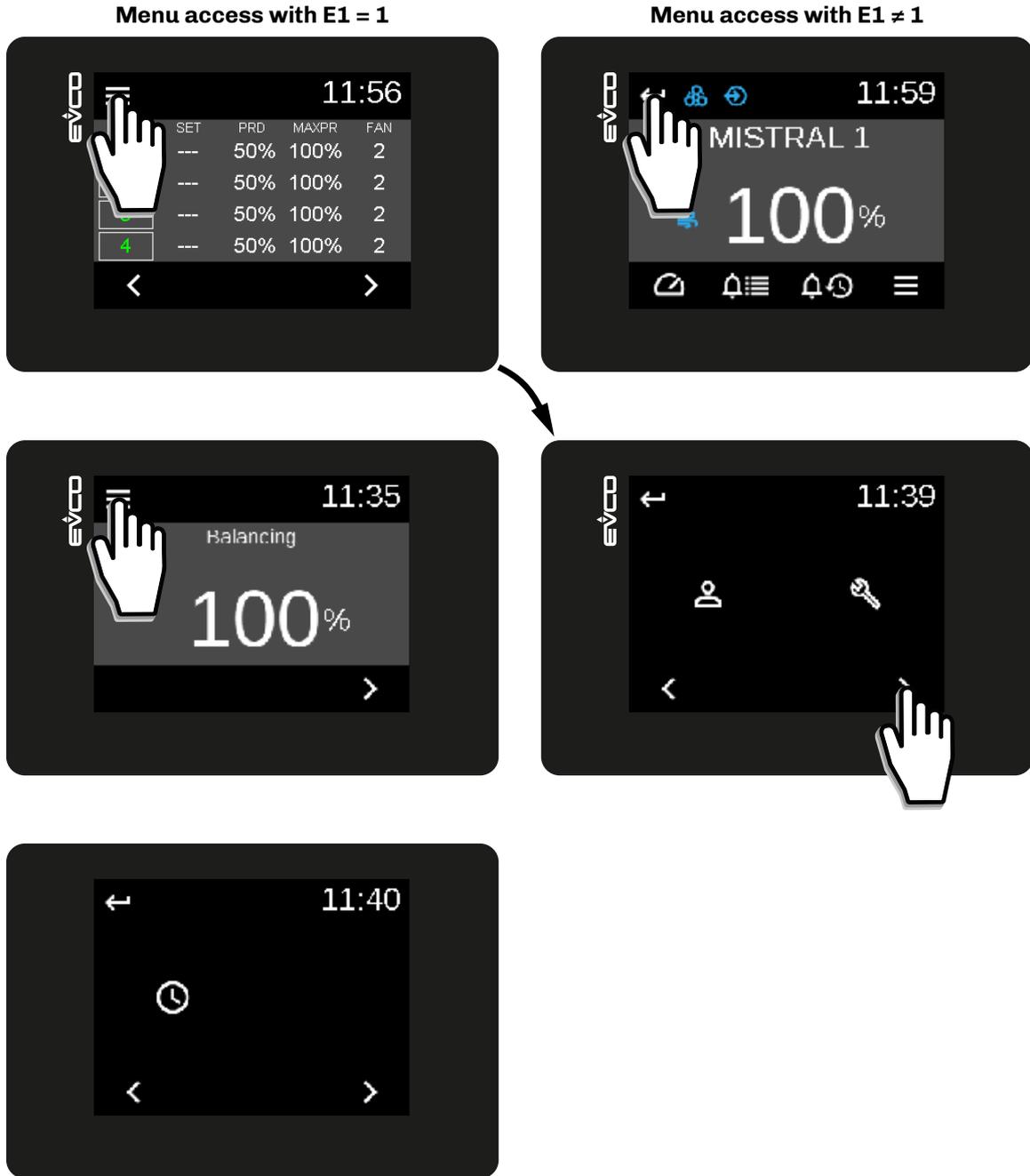
Fig. 52. Accessing the general menu

Menu	Description
👤	Access the user menu
🔧	Access the maintenance technician menu
🕐	Access to change the date/time

10.5 EPJC user menu
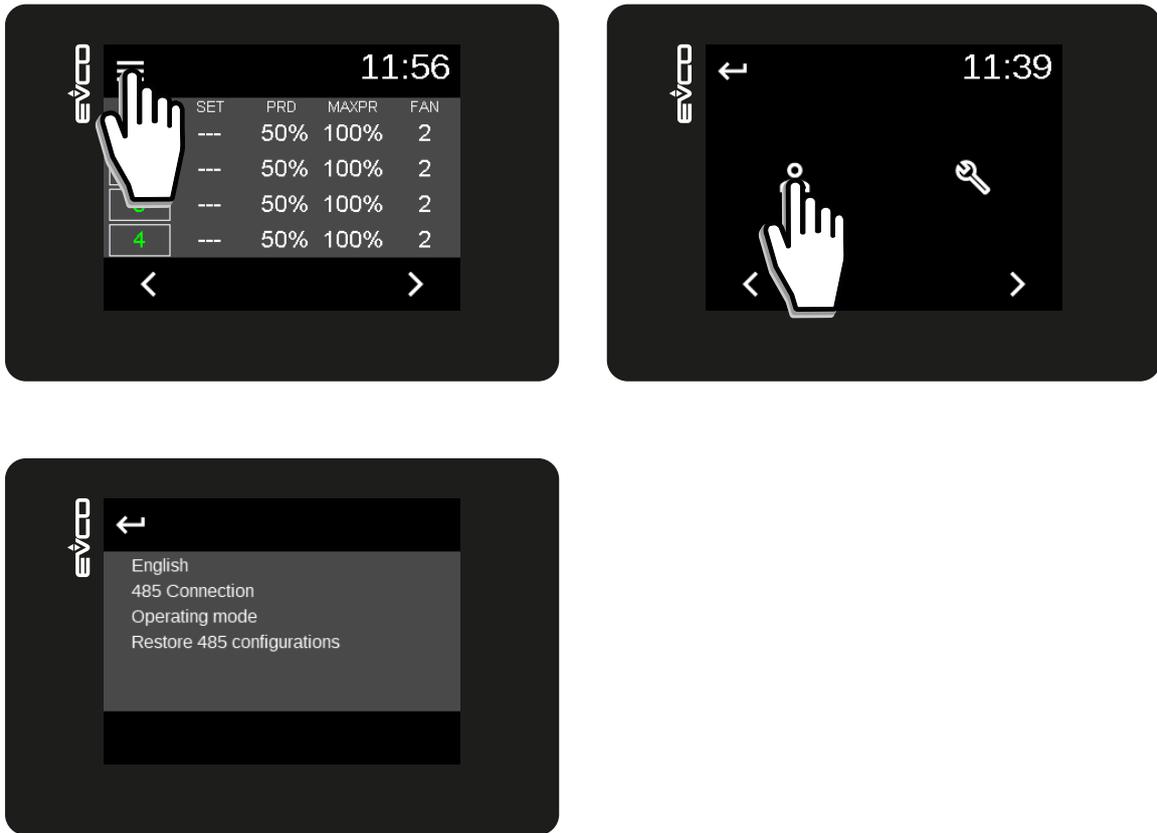
Fig. 53. EPJC user menu

Menu option	Description
Language	Used to set the menu language (English set in the example)
485 Connection	Used to view the Mistrals connected in master/slave RS-485
Operating mode	Used to view and set the master/slave network operating mode
Restore 485 configurations	Used to disconnect all humidifiers connected in the master/slave network

10.5.1 Humidifier connection

Mistral 1 connected, all others disconnected

All Mistrals connected
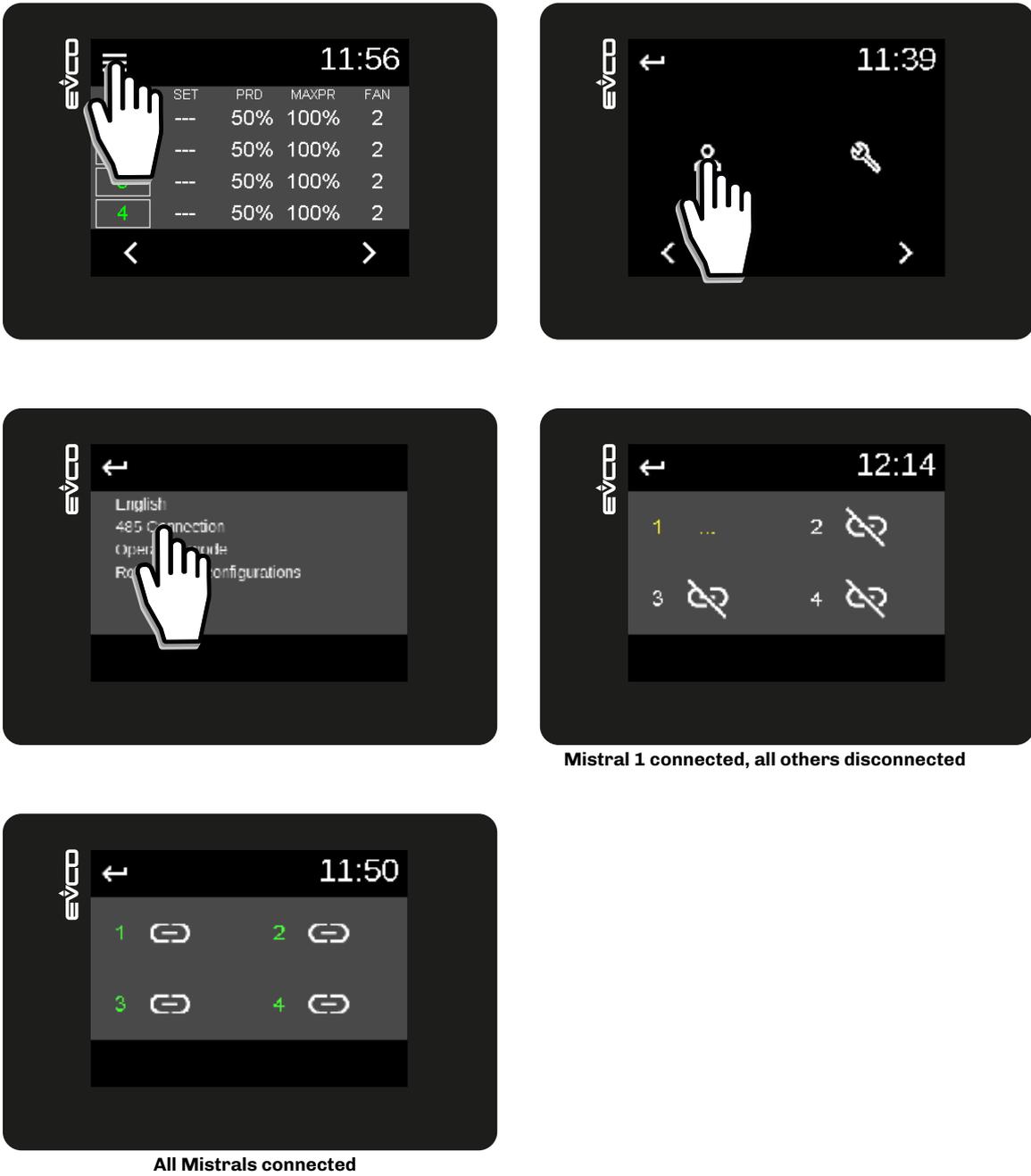
Fig. 54. *Humidifier connection*

To carry out connection (for example, connect a Mistral in position 1):

- Connect the Mistral to the RS-485 network and power it up;
- From the EPJC, access the screen *Humidifier connection*;
- Press the 🔗 icon (reference position 1) to perform the connection;
- The screen showing connected humidifiers appears.

Key

	Icon	Number colour
Mistral connecting	● ● ●	Number in yellow
Mistral connected	🔗	Number in green
Mistral disconnected	🔗	Number in white

10.5.2 Setting master/slave operating mode
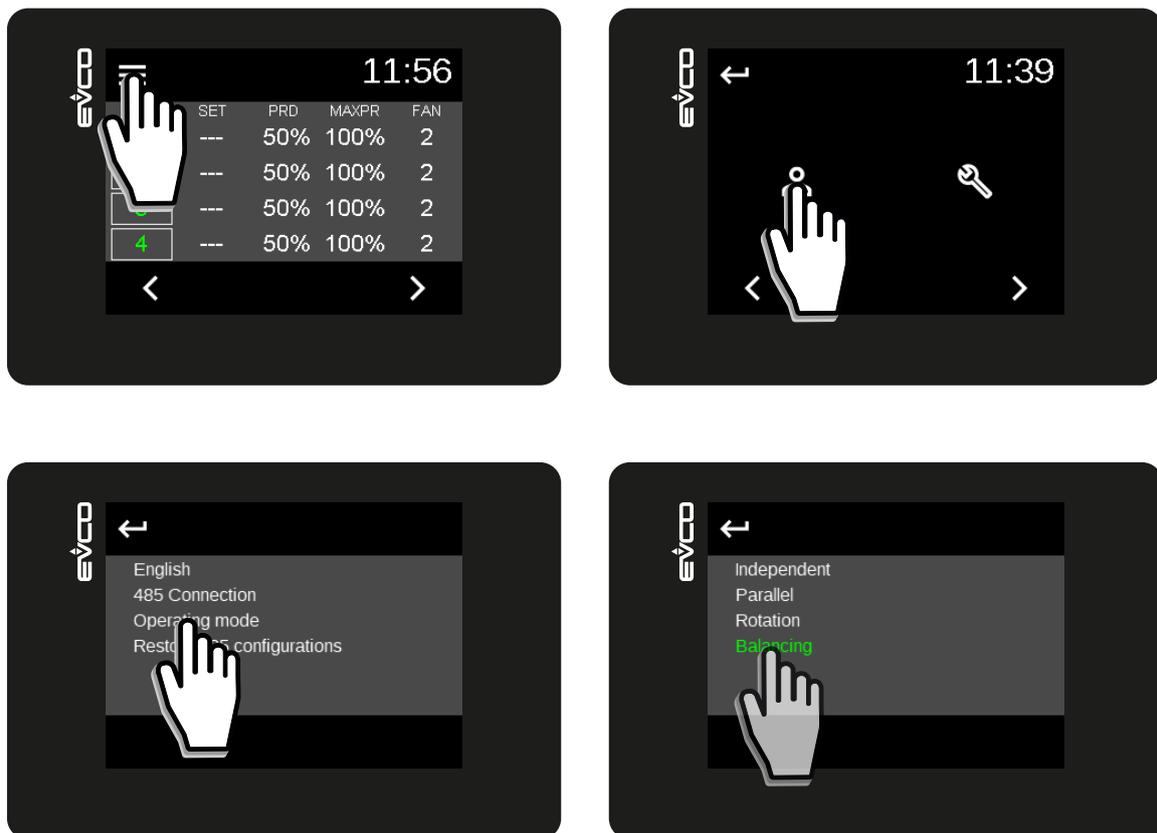
Fig. 55.   *Setting master/slave operating mode*

Key

Selected	Destination
Independent	Humidifier grid screen
Parallel	Master humidifier selection screen
Rotation	
Balancing	

10.5.3 Selecting the master humidifier
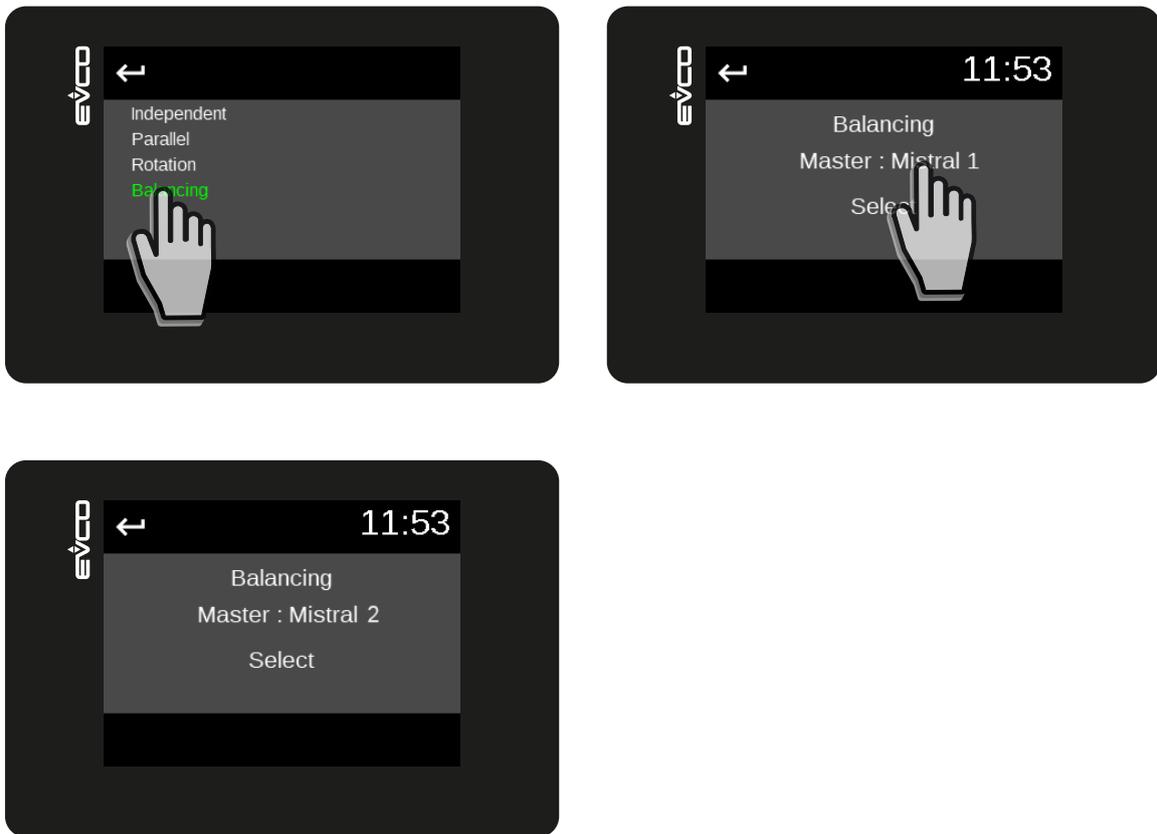
Fig. 56.   *Selecting the master humidifier*

10.6 EPJC maintenance menu
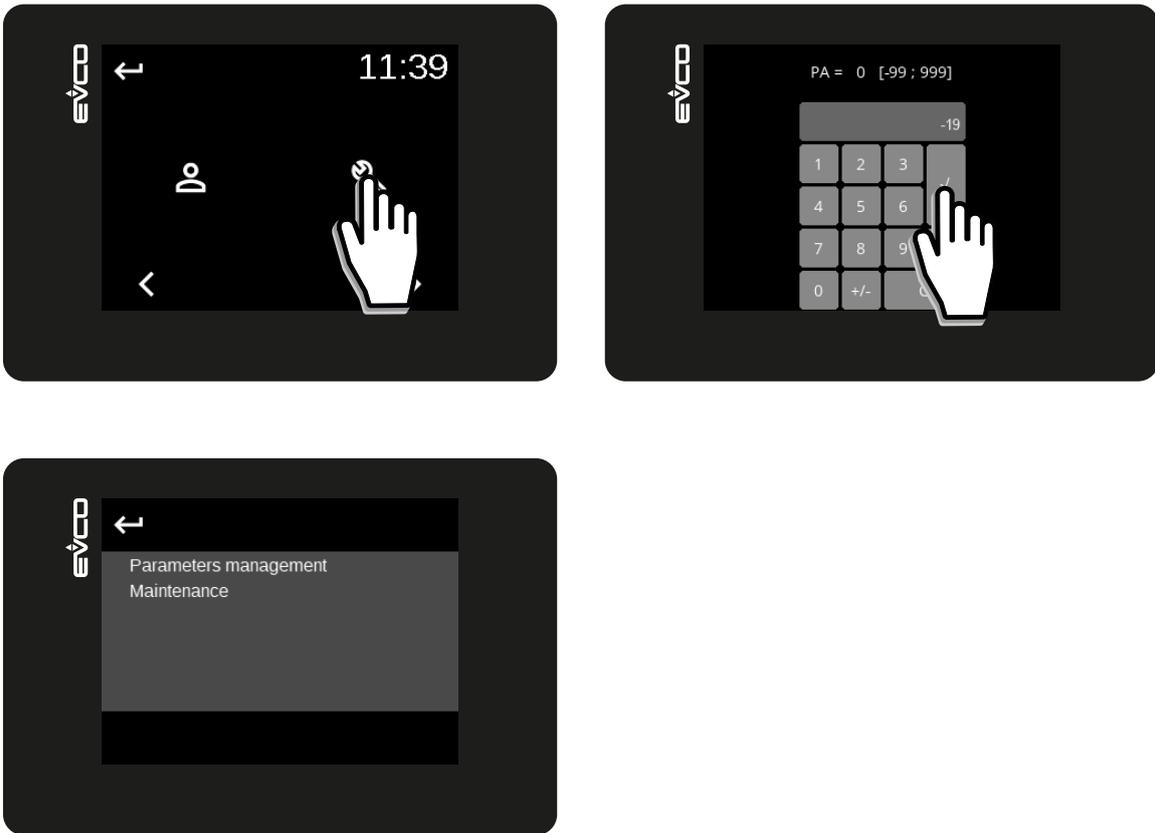
Fig. 57. *Maintenance menu*

Menu option	Description
Parameters management	Used to access the list of parameters
Maintenance	Used to select the humidifier on which maintenance is to be carried out

10.6.1 Changing the parameters
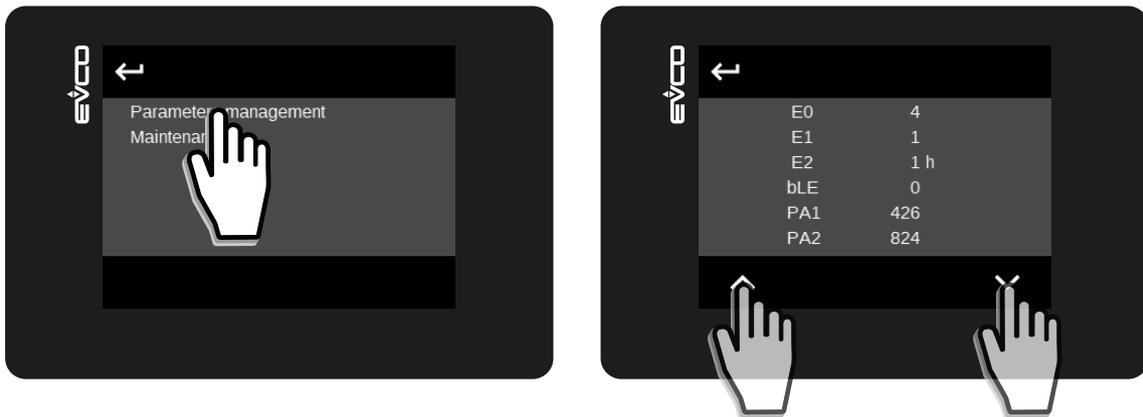
Fig. 58. *Changing the parameters*

10.6.2 Humidifier maintenance
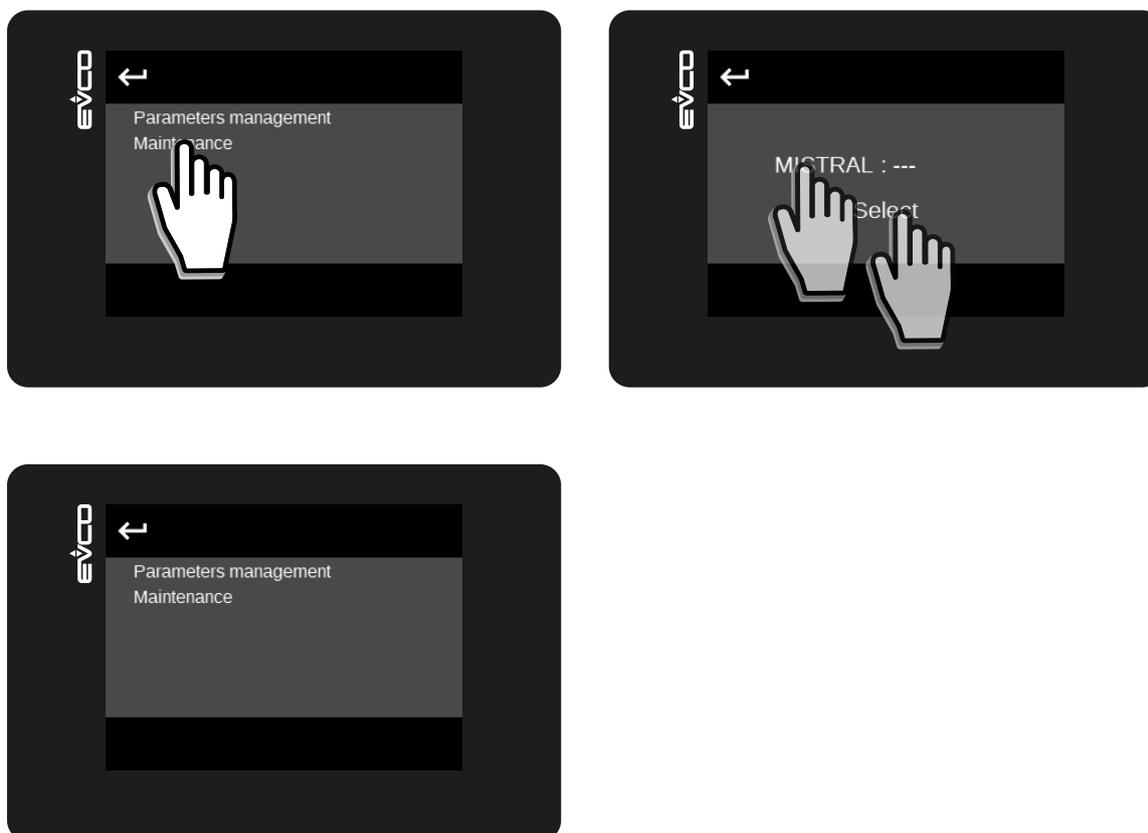
Fig. 59. *Humidifier maintenance*

- Select the humidifier on which maintenance is to be carried out;
- Press **Select**;
- The selected humidifier is set in maintenance mode.

10.7 Changing the date and time
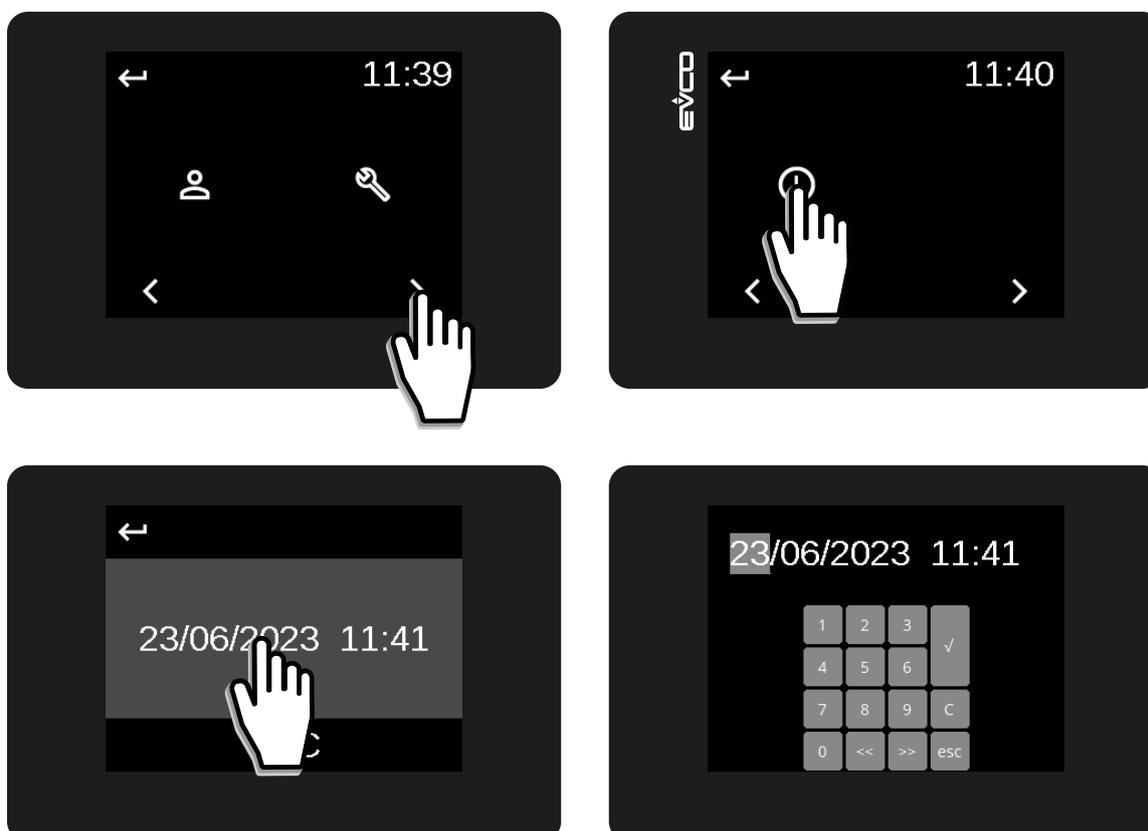
Fig. 60. *Changing the date and time*

10.8 Single Mistral screen
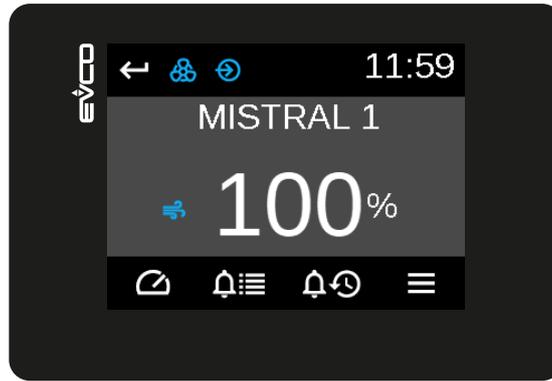
Fig. 61.   *Single Mistral screen*

Icons

Icon	Lit steadily	OFF
(fan icon)	Distribution in the room ON	In all other cases
(arrow-in-circle icon)	SW consent input (ID2) closed	SW consent input (ID2) open
(inlet valve icon)	Inlet solenoid valve ON Water filling in progress	Inlet solenoid valve OFF Water filling finished
(outlet valve icon)	Outlet solenoid valve ON Water draining in progress	Outlet solenoid valve OFF Water draining finished
(humidity icon)	Light blue icon: humidity generation in progress	White icon: humidity generation finished

10.8.1 Mistral in alarm mode

Single Mistral view   **Humidifier grid view**
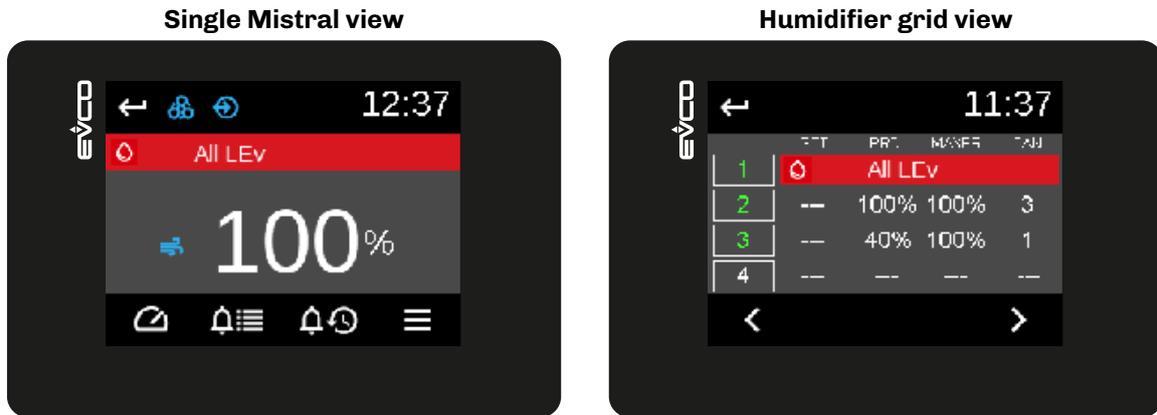
Fig. 62.   *Mistral in alarm mode*

10.8.2 Operating hours

Partial hours view

Total hours view
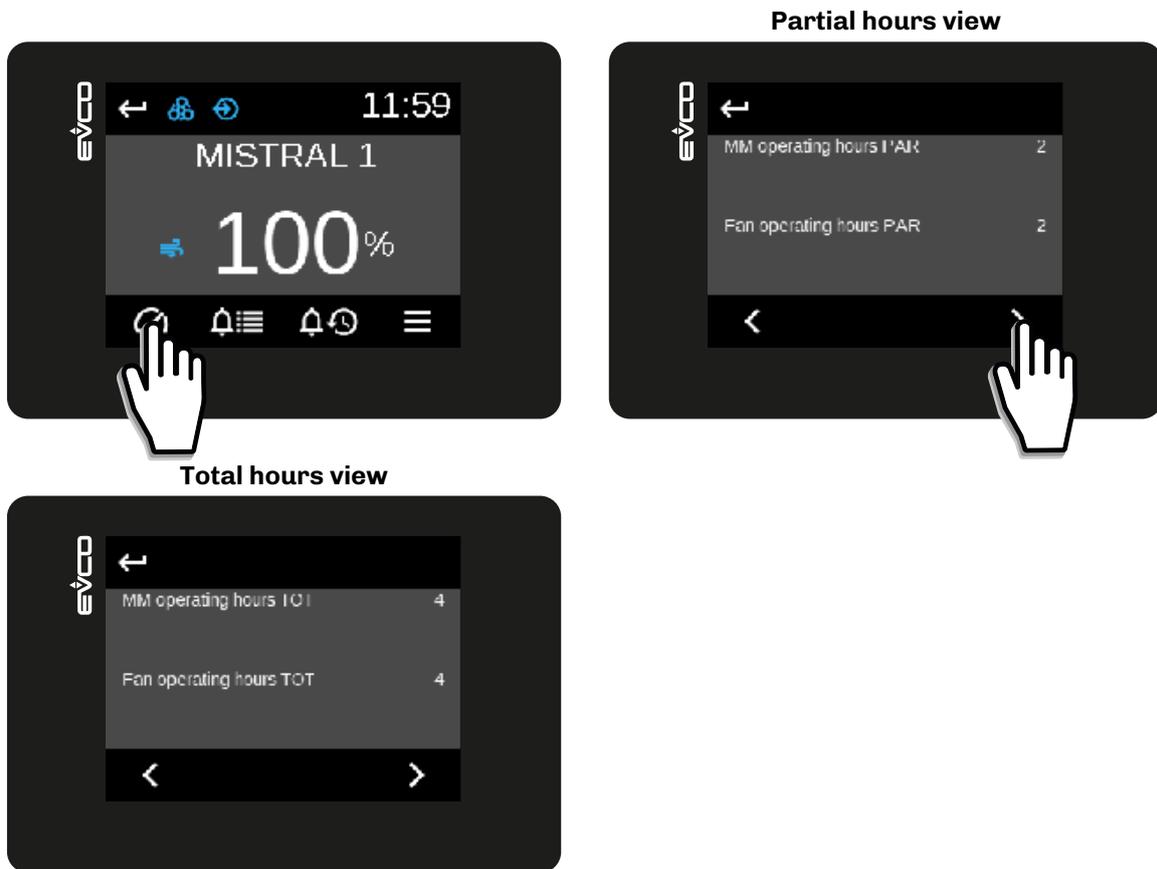
Fig. 63. *Displaying operating hours*

10.8.3 List of alarms in progress
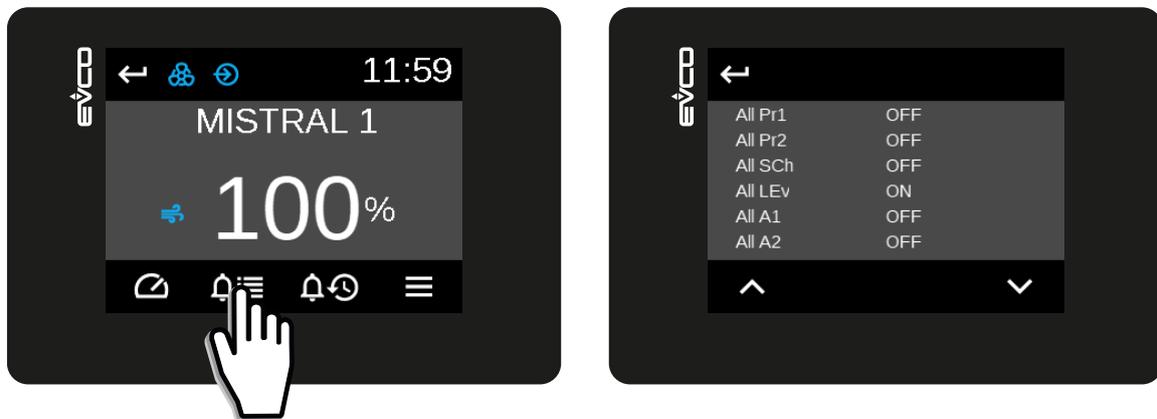
Fig. 64. *List of alarms in progress*

10.8.4 Alarm history
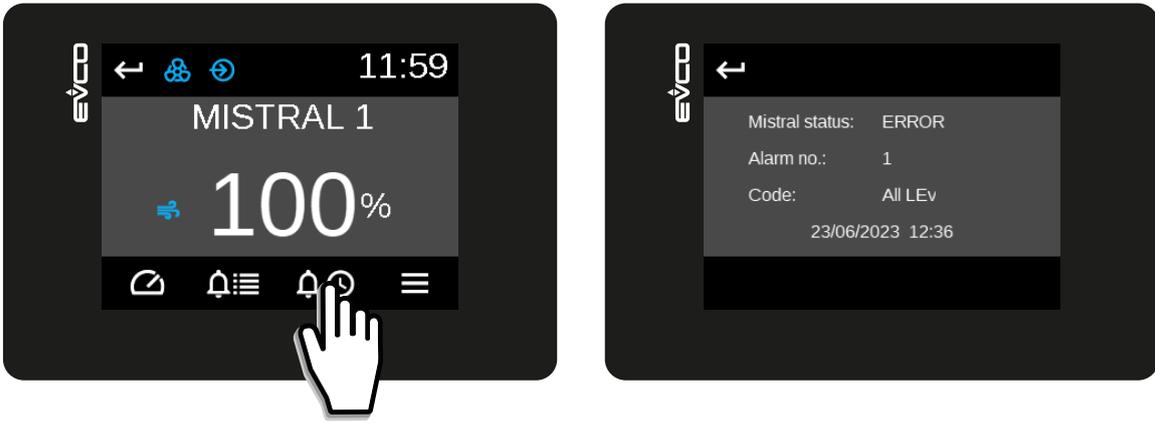
Fig. 65. *Alarm history*

10.9 Single Mistral menu
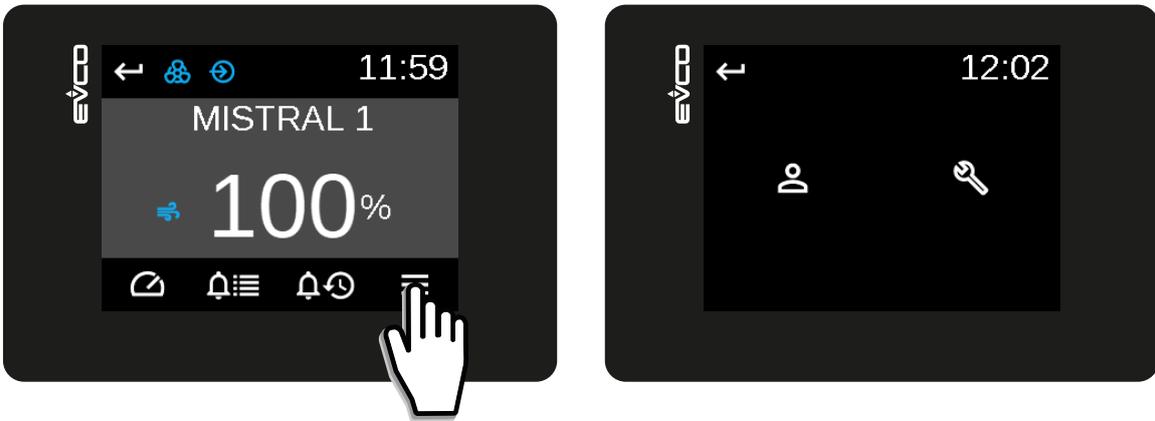
Fig. 66. *Menu for a single Mistral*

Menu	Description
👤	Access the user menu
🔧	Access the maintenance technician menu

10.10 Single Mistral user menu

Fig. 67. *User menu for a single Mistral*

The user menu on each Mistral connected to the master/slave network can be used to change the user parameters for the selected Mistral.

10.11 Single Mistral maintenance menu
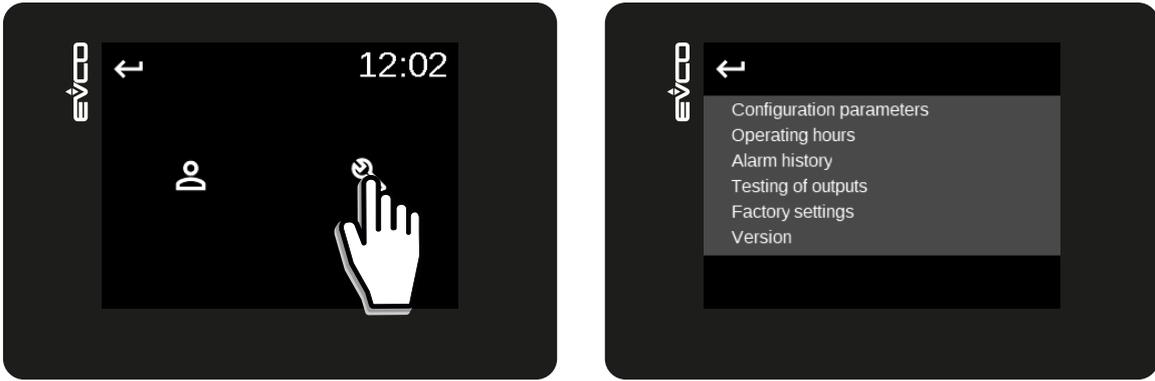
Fig. 68. *Maintenance menu for a single Mistral*

Menu option	Description
Configuration parameters	Used to access the list of maintenance engineer parameters
Operating hours	Used to view and reset the operating hours
Alarm history	Used to reset the alarm history
Testing of outputs	Used to access the output functional test screen, where the outputs can be forced on or off
Factory settings	Used to restore the EPJC factory settings
Version	Used to view the fw version

10.11.1 Maintenance engineer parameters
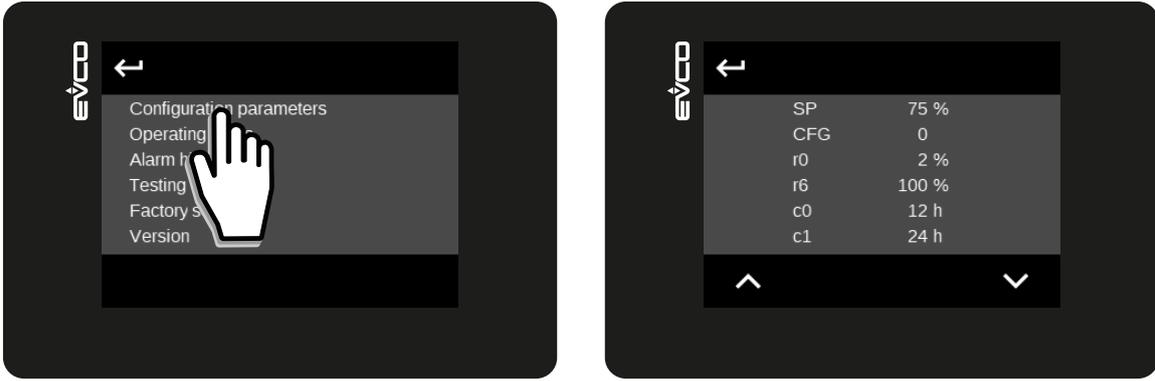
Fig. 69.   *Maintenance engineer parameters*

10.11.2 Displaying/resetting the operating hours
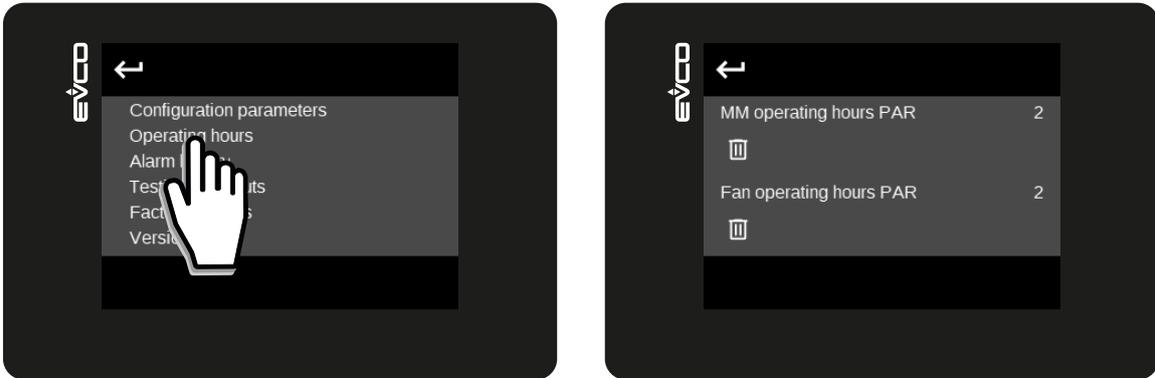
Fig. 70.   *Resetting the operating hours*

To reset the operating hours as desired, press the 🗑 icon.

10.11.3 Resetting the alarm history
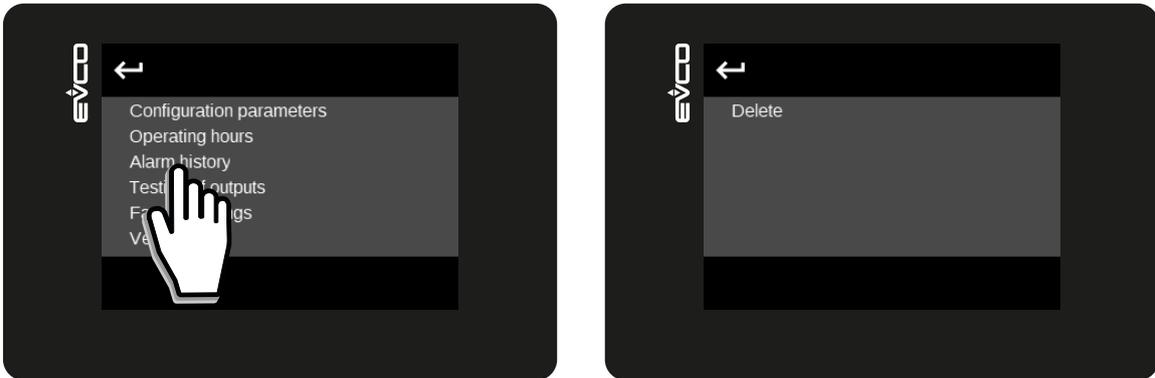
Fig. 71.   *Resetting the alarm history*

To reset the alarm history, press **Delete.**

10.11.4 Testing of outputs
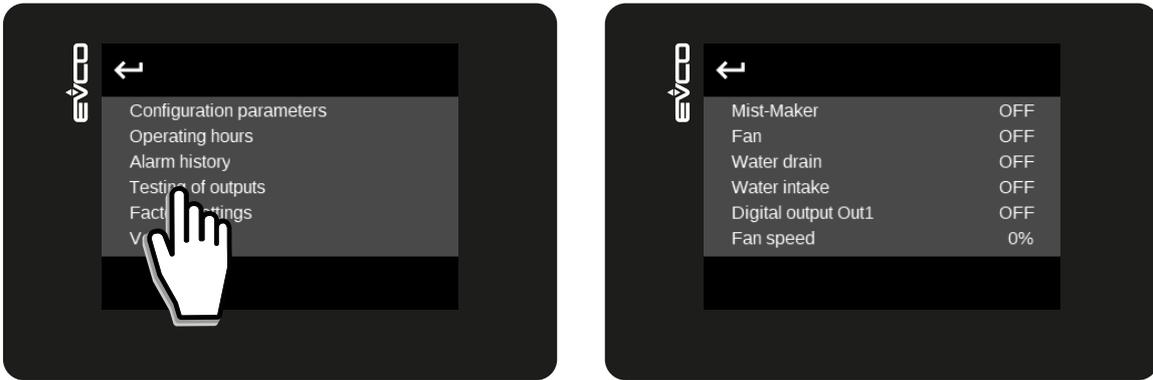
Fig. 72. *Testing of outputs*

10.11.5 Restoring factory settings
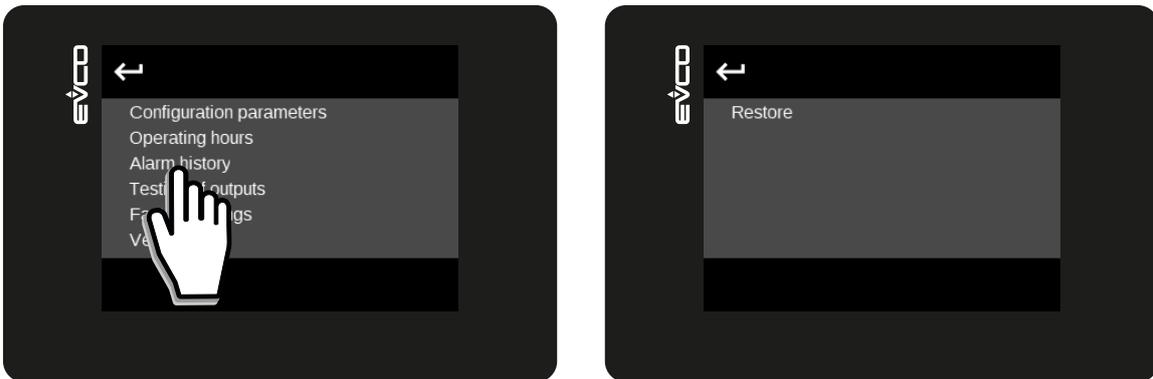
Fig. 73. *Restoring factory settings*

10.12 Lost connection

If a Mistral in the master/slave network loses connection with that network, after 15 seconds it will begin running in the mode set via the **CFG** parameter on the humidifier.

10.13 Master/Slave connection procedure

All Mistrals must be disconnected and switched off.

1. Switch on Mistral 1 and connect it, via RS-485, to the EPJcolor;
2. Perform connection between EPJcolor and Mistral 1 (see *"10.5.1 HUMIDIFIER CONNECTION" ON PAGE 62*;
3. Switch on Mistral 2 and connect it, via RS-485, to the EPJcolor;
4. Perform connection between EPJcolor and Mistral 2 (see *"10.5.1 HUMIDIFIER CONNECTION" ON PAGE 62*;
5. Switch on Mistral 3 and connect it, via RS-485, to the EPJcolor;
6. Perform connection between EPJcolor and Mistral 3 (see *"10.5.1 HUMIDIFIER CONNECTION" ON PAGE 62*;
7. Switch on Mistral 4 and connect it, via RS-485, to the EPJcolor;
8. Perform connection between EPJcolor and Mistral 4 (see *"10.5.1 HUMIDIFIER CONNECTION" ON PAGE 62*;
9. Connect all Mistrals via RS-485.

11. MAINTENANCE

⚠ ⚠ **DANGER**
RISK OF ELECTRIC SHOCK OR ELECTRIC ARC
• The maintenance, repair, installation and use of the equipment must only be entrusted to qualified personnel. • Any procedure on the humidifier, including routine or extraordinary maintenance, must only be carried out while the power supply is disconnected.

11.1 Introduction

The **Mistral** humidifier is designed for operation with the water specifications described in subsection **"5.2.1 WATER SPECIFICATIONS" ON PAGE 26.**

Using water with different specifications and/or with a hardness level approaching the limit of 40 °f causes maintenance to be required more frequently. The reservoir requires frequent maintenance and seasonal cleaning in the following conditions:

Water conductivity	Water hardness
0...100 µS/cm	0...5 °f

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

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

NOTICE
MALFUNCTIONING OF THE EQUIPMENT
• Only use the humidifier with the water specifications indicated in this manual. • Only carry out humidifier maintenance in accordance with the instructions provided in section **"11. MAINTENANCE" ON PAGE 73**.

  • Leaks may occur due to breakages, cracks and fissures.

⚠ ⚠ **DANGER**
RISK OF ELECTRIC SHOCK OR ELECTRIC ARC
• Any procedure on the humidifier, including routine or extraordinary maintenance, must only be carried out while the power supply is disconnected. • In the event of water leakage, disconnect the humidifier electric power supply immediately by means of the external isolator.

  • If any adverse event not described in this documentation arises, carry out maintenance and/or replace the humidifier. Contact ELSTEAM customer service for guidelines and instructions.

⚠ ⚠ **DANGER**
RISK OF ELECTRIC SHOCK OR ELECTRIC ARC
If an adverse event occurs, disconnect the humidifier power supply immediately.

11.2 Periodically 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	Renew the seals and 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; • Thoroughly remove limescale and biofilm residues from the reservoir and drain (wash the inside of the reservoir with 20% citric acid and appropriate biocides, and clean the limescale off the surface).
Seasonally	• Check the tightness of the seals and replace them if necessary.

The Mistral humidifier features:
- Automatic draining for inactivity;
- Periodic automatic cleaning;
- Plastic material on whose surface bacterial colonies do not proliferate.

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

⚠ WARNING
BIOLOGICAL RISK
• In the event of inadequate use and/or poor maintenance it is possible that microorganisms (including the bacterium that causes Legionellosis) may proliferate and be transferred into the air treatment system or the surrounding environment.
• The humidifier must be used properly and be maintained and cleaned properly at prescribed intervals, as described in chapter **"11. MAINTENANCE" ON PAGE 73**.

11.3 Cleaning the Reservoir

Cleaning and maintenance of the reservoir must be done every 30 days when using non-demineralised drinking water to ensure optimal operation of the humidifier. With demineralised water the cleaning frequency is seasonal. This procedure is useful to prevent the water drain from clogging.

Below are the cleaning instructions:
- Drain the humidifier (see **"9.1 DRAINING WATER / WASHING RESERVOIR" ON PAGE 46**);
- Disconnect the machine power supply using the external isolator;
- Unscrew the screws at the top of the humidifier;
- Clean the following thoroughly using the products indicated in the section **"11.4 GUIDELINES FOR CLEANING AND DETERGENTS" ON PAGE 75** and removing limescale from the surface:
  - The reservoir;
  - The mist-maker;
  - The grooves around seals and couplings.
- Rinse the inside of the tank thoroughly;
- Check the cover seal is intact;
- Install the cover by screwing the screws into the upper face.
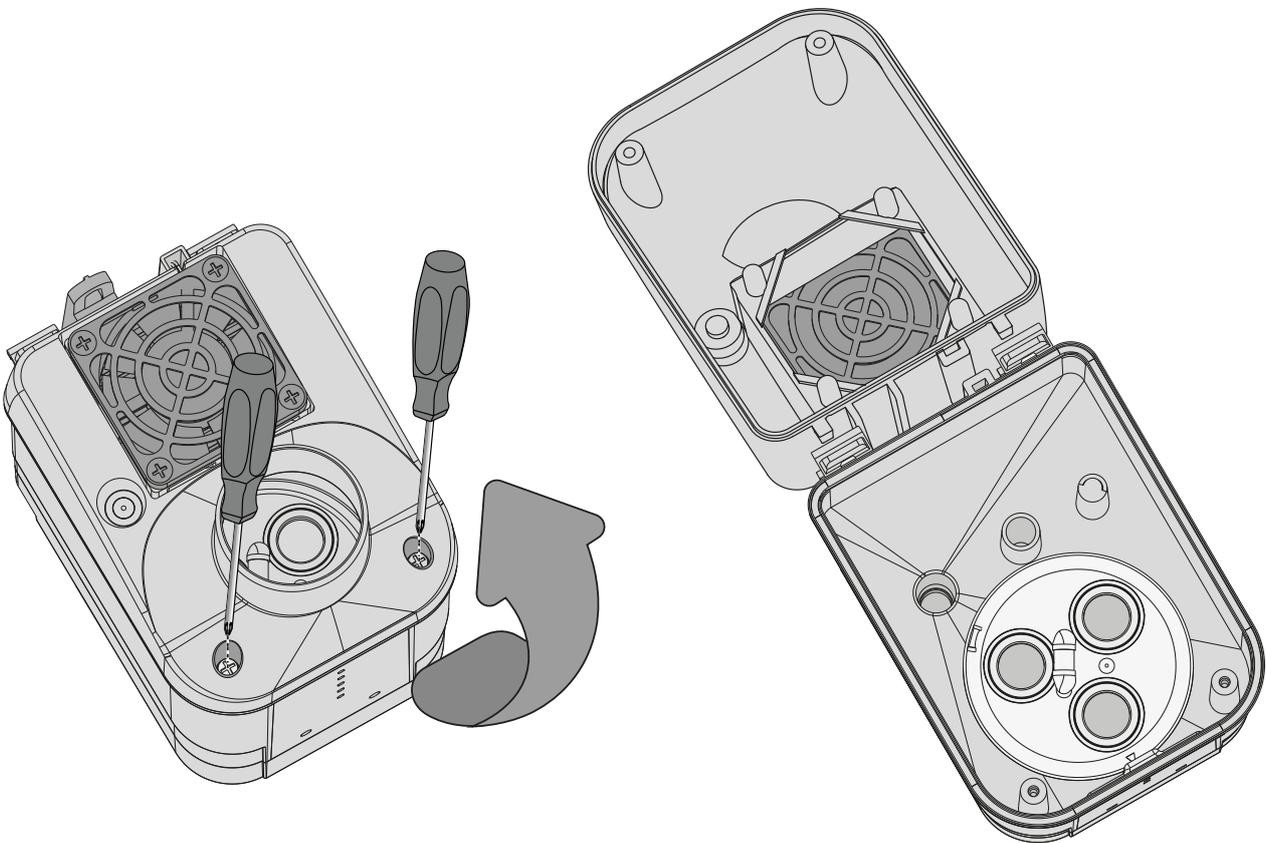
Fig. 74. *Opening the **Mistral** cover to clean the reservoir*

For the full list of permitted products that can be used for cleaning, see **"11.4 GUIDELINES FOR CLEANING AND DETERGENTS" ON PAGE 75**.

11.4 Guidelines for cleaning and detergents

When cleaning **Mistral** humidifier components, only use the products and detergents indicated in this operating and maintenance manual.

All application methods and safety instructions provided by the manufacturer relating to the detergents used must be observed.

More specifically: observe the information relating to personal safety, environmental safeguarding and usage restrictions.

⚠ ⚠ DANGER
RISK OF INHALING TOXIC RESIDUES
When cleaning the humidifier, do not use detergents that leave behind toxic residues. During subsequent operation, these may be released into the ambient air and put people's health at risk. In any case, the components should be rinsed thoroughly with demineralised water after cleaning.

⚠ CAUTION
UNFORESEEN USE
When cleaning, do not use any solvents, aromatic or halegonated hydrocarbons or other aggressive substances as they may damage the appliance components or human health.

11.4.1 Permitted products and detergents

When cleaning the Mistral humidifier and all its components, only use the following products or detergents:

Products/Detergents	Description
	20 % citric acid
	Biocides authorised in compliance with EU Regulation 528/2012
	Medical-surgical detergents and/or disinfectants. Medical-surgical detergents must be authorised by the Ministry of Health in accordance with Italian Presidential Decree 392 dated 6th October 1998 and the Act dated 5th February 1999; furthermore, the product must possess an official label including its registration number.
	Scraper

The active substances contained in biocides, i.e. the substances performing a toxic action on the desired strains, may damage other organisms which constitute, in some cases, essential elements of ecosystems.

⚠ WARNING
POLLUTION OF THE ENVIRONMENT AND THE ECOSYSTEM
Do not discard the products used for cleaning in the environment.

11.5 Replacing mist-maker ceramic discs

The illustration gives instructions on how to properly replace the ceramic discs of the mist-maker.
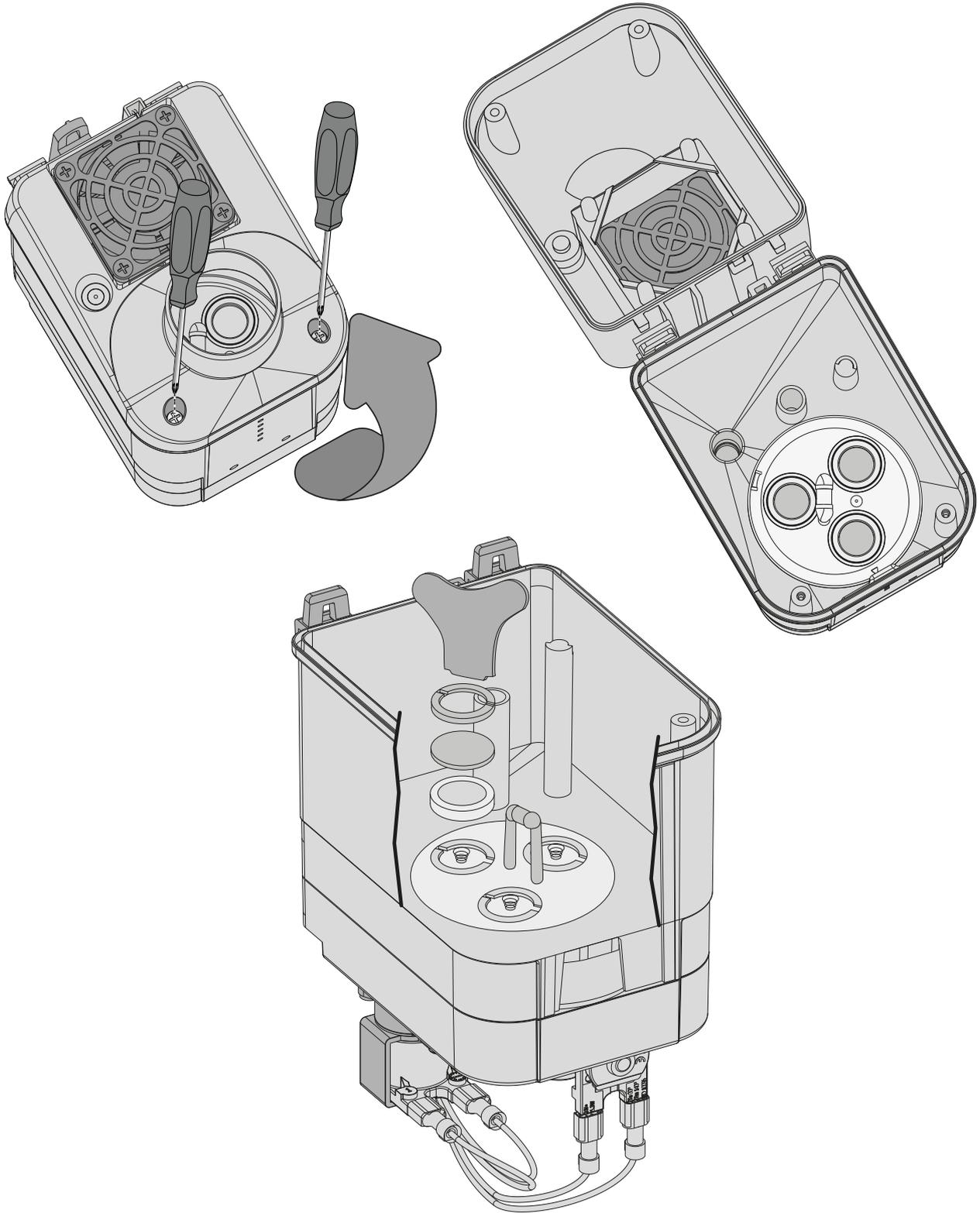
Fig. 75. *Replacing mist-maker ceramic discs*

NOTICE

FAN NOT WORKING

When removing the cover, be careful not to damage the fan power cables located at the back of the humidifier.

12. SPARE PARTS
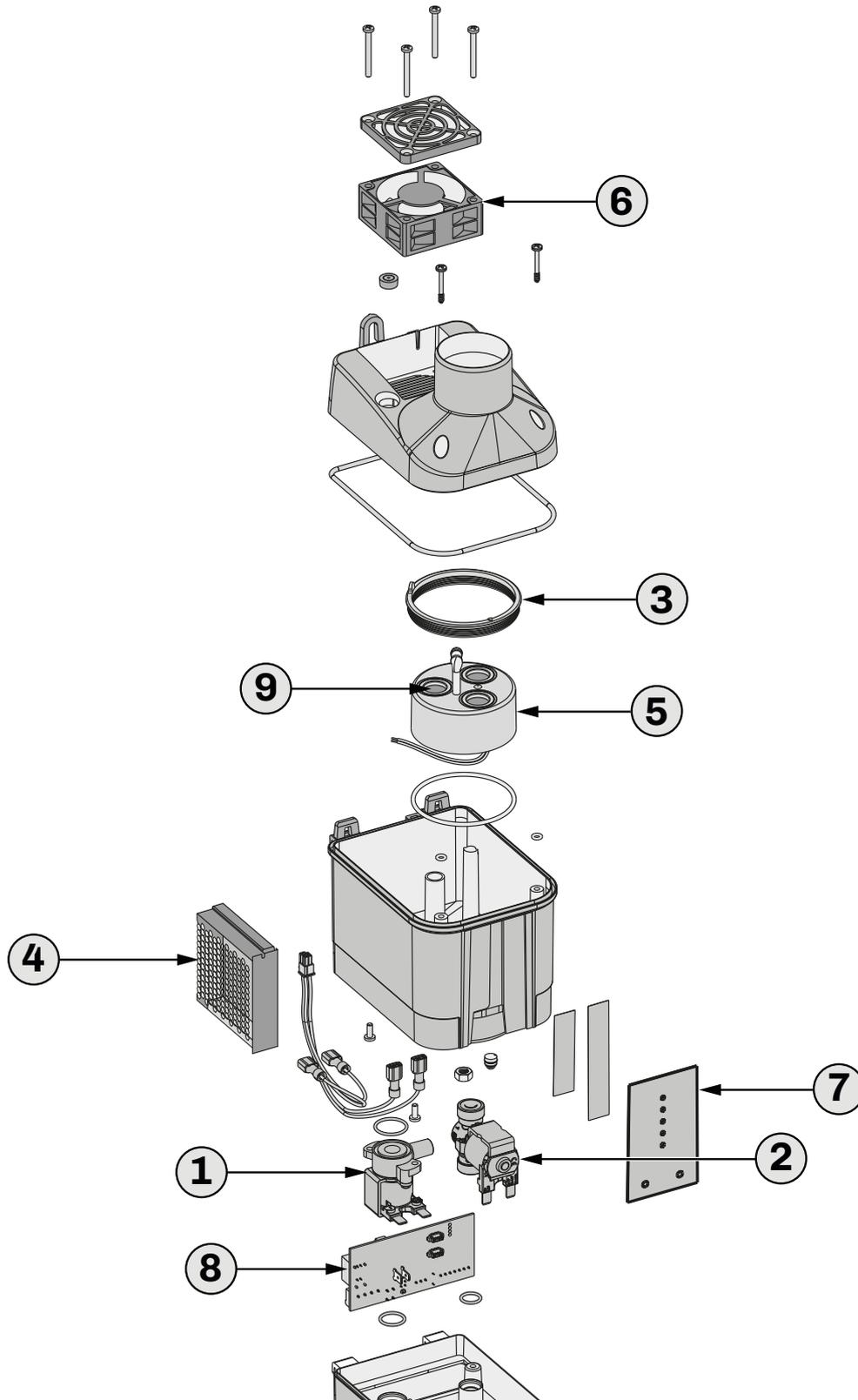
*Fig. 76. **Mistral Humidifier** spare parts*

Ref.	P/n	Description		Ref.	P/n	Description
①	**EHUK001**	**EHUC** water drain valve kit		⑥	**EHUK012**	24 Vdc low speed fan + technopolymer grid
②	**EHUK002**	**EHUC** water inlet valve kit		⑦	**EHUK020**	Level regulator and user interface
③	**EHUK003**	**EHUC** seal kit		⑧	**EHUK021**	**EHUC** controller
④	**EHUK004**	**EHUC** switching power supply unit		⑨	**1220000001**	DK ceramic transducer set (9 pc blister pack)
⑤	**EUHK005**	**EHUC** mist-maker				

13. ADJUSTMENT PARAMETERS

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:
- **Default**: indicates the pre-set factory configuration;
- **PW**: indicates the access level for the parameter:
  - **U** = User parameters;
  - **M** = Maintenance parameters.

13.1 Table of Mistral adjustment parameters

Par.	Description	MU	Range	PW	Default
	SETPOINT group				
SP	Humidity setpoint.	%	**r1...r2**	U	70
	CONFIGURATIONS Group				
CFG	Operating mode. **0** = Stand-alone, ON/OFF operation, alarm relay; **1** = Stand-alone, proportional operation, alarm relay; **2** = Stand-alone, operation with 4...20 mA sensor, alarm relay; **3** = Stand-alone, operation with 0...10 V sensor, alarm relay; **4** = Stand-alone, operation with resistive humidity sensor, alarm relay; **5** = Master, ON/OFF operation; **6** = Master, proportional operation; **7** = Master, operation with 4...20 mA sensor; **8** = Master, operation with 0...10 V sensor; **9** = Master, operation with resistive humidity sensor; **10** = Slave.	---	0...10	U	0
	ANALOGUE INPUTS group				
P1	Water conductivity.	µS*cm	70...1250	M	500
b4	Initial charge time.	s	0...999	M	130
	MAIN REGULATOR group				
r0	Hysteresis. With **CFG** = 2, 3, 4, 7, 8, 9.	%	2...20	U	5
r1	Minimum humidity setpoint value. With **CFG** = 2, 3, 4, 7, 8, 9.	%	0...**r2**	M	20
r2	Maximum humidity setpoint value. With **CFG** = 2, 3, 4, 7, 8, 9.	%	**r1**...100	M	95
r3	Cycle time between two consecutive humidity production activations. With **CFG** ≠ 10.	s	1...240	M	20
r4	Proportional band. With **CFG** = 2, 3, 4, 7, 8, 9.	%	0...50	M	50
r5	Minimum humidity production. With **CFG** ≠ 10.	%	0....**r6**	M	20
r6	Maximum humidity production. With **CFG** ≠ 10.	%	**r5**...100	U	100
	SANITARY SAFETY group				
c0	Number of continuous idle hours causing the water reservoir to empty. **0** = Function disabled.	h	0...250	U	12
c1	Number of operating hours causing the water reservoir to empty. **0** = Function disabled.	h	0...250	U	24
	FANS group				
F0	Fan speed. **0** = Fan off; **1** = Speed at **15%**; **2** = Speed at **30%**; **3** = Speed at **60%**; **4** = Speed at **80%**.	---	0...4	U	3
F5	Fan off delay from switching mist-maker off (with **CFG** = 10).	s	0...240	M	20
F6	Fan operation time after emptying due to inactivity.	s	0...999	M	300

Par.	Description	MU	Range	PW	Default
	TEMPERATURE ALARMS group				
A5	Low humidity alarm threshold only if **CFG** = 2, 3, 4, 7, 8, 9. Fixed hysteresis = 2%.	---	0...100	M	20
A6	High humidity alarm threshold only if **CFG** = 2, 3, 4, 7, 8, 9. Fixed hysteresis = 2%.	---	0...100	M	95
A7	High low humidity alarm delay only if **CFG** = 2, 3, 4, 7, 8, 9.	s	0...999	M	120
A10	Number of operating hours of the mist-maker for reporting partial hours if the water conductivity **P1** is between 70...449 µS*cm. The count can be reset to zero by pressing and holding key **T1** on the control board for at least 4 s. 0 = Function excluded.	1000h	0...99	M	90
A11	Number of operating hours of the mist-maker for reporting partial hours if the water conductivity **P1** is between 450...849 µS*cm. The count can be reset to zero by pressing and holding key **T1** on the control board for at least 4 s. 0 = Function excluded.	1000h	0...99	M	50
A12	Number of operating hours of the mist-maker for reporting partial hours if the water conductivity **P1** is between 850...1250 µS*cm. The count can be reset to zero by pressing and holding key **T1** on the control board for at least 4 s. 0 = Function excluded.	1000h	0...99	M	20
A13	Number of fan operating hours to signal partial operating hours. The count can be reset to zero by pressing and holding for at least 4 s.	1000h	0...99	M	60
	DIGITAL INPUTS group				
i0	**ID2** port digital input polarity. **0** = Normally closed; **1** = Normally open.	---	0/1	M	0
	PASSWORD group				
PAS	Parameter access password.	num	-99...999	M	-19
	EVLINK DATALOGGING group				
bLE	Serial port configuration for EVconnect/EPoCA connectivity. **0** = Spare; **1** = Forced for EVconnect or EPoCA; **2...99** = EPoCA local network address.	---	0...99	M	1
rE0	Data logger sampling interval.	min	0...240	M	60
rE1	Enable data logging for data logger. **0** = No; **1** = Yes. Logged data: • Humidity sensor (if fitted); • Temperature sensor (level board); • Mist-maker output status; • Fan output status; • EEVC output status; • EEVS output status.	---	0/1	M	0
	MODBUS SERIAL CONFIGURATION group				
LA1	COM1 serial line modbus protocol controller address.	num	1...247	M	20
LB1	COM1 serial line modbus transmission speed (baud rate). **0** = 2400 baud; **1** = 4800 baud; **2** = 9600 baud; **3** = 19200 baud; **4** = 38400 baud.	---	0...4	M	2
LP1	COM1 serial line Modbus serial parity. **0** = No Parity; **1** = Odd; **2** = Even.	---	0...2	M	2

13.2 EPJC configuration parameters table (master/slave)

Par.	Description	MU	Range	PW	Default
	MASTER/SLAVE CONFIGURATION group				
E0	Number of humidifiers connected.	---	1...4	M	4
E1	Operating mode. **1** = Independent; **2** = Parallel; **3** = Rotation; **4** = Balancing.	---	1...4	M	1
E2	Rotation time.	hours	1...24	M	1
	MODBUS SERIAL CONFIGURATION group				
BLE	Enable EVconnect/EPoCA. **0** = Spare; **1** = Forced for EVconnect/EPoCA; **2...99** = EPoCA local network address.	---	0...99	M	0
PA1	User level EPoCA password.	---	-99...999	M	426
PA2	Administrator level EPoCA password.	---	-99...999	M	824
LA1	COM1 address (RS-485 Slave).	---	1...247	M	247
LB1	COM1 Baud rate (RS-485 Slave). **0** = 2400; **1** = 4800; **2** = 9600; **3** = 19200; **4** = 38400.	---	0...4	M	3
LP1	COM1 parity (RS-485 Slave). **0** = None; **1** = Odd; **2** = Even.	---	0...2	M	2

14. MODBUS RTU FUNCTIONS AND RESOURCES

14.1 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.
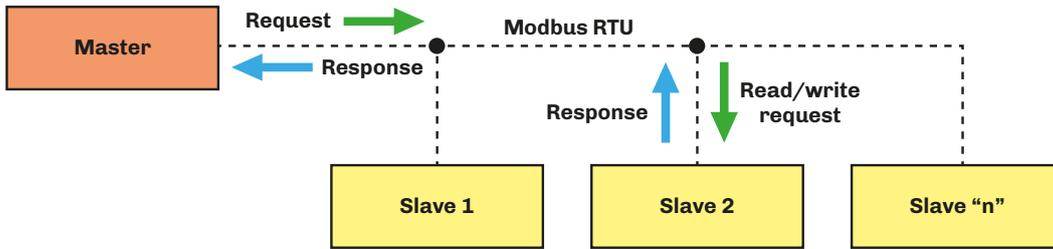
Fig. 77.   *Diagram showing message exchange in a Modbus communication*

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. 78. FRAMING OF A MESSAGE USING MODBUS PROTOCOL" ON PAGE 81***) to specific buses and networks.

Devices such as PLCs (Programmable Logic Controller), HMIs (Human Machine Interface), control panels, drivers, motion controllers, I/O devices, etc. can use Modbus to begin a remote procedure, and the protocol is often used to connect a supervising computer with a Remote Terminal Unit in a supervision, control and data acquisition (SCADA) system.
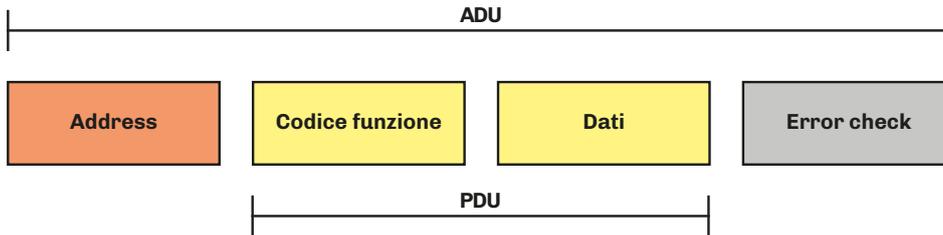
Fig. 78.   *Framing of a message using Modbus protocol*

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

14.2 Modbus message structure

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

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

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

14.3 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.

14.3.1 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

14.4 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 address of a device within a Modbus message is set by the **MODBUS Address** parameter.

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 protocol controller address.	---	1...247	20
LB1	COM1 serial line modbus transmission speed (baud rate). **0** = 2400 baud; **1** = 4800 baud; **2** = 9600 baud; **3** = 19200 baud; **4** = 38400 baud.	---	0...4	4
LP1	COM1 serial line Modbus serial parity. **0** = No Parity; **1** = Odd; **2** = Even.	---	0...2	2

The RS-485 RTU serial line has the following characteristics (which cannot be changed):
- RTU mode;
- Bit: 8 bit;
- Stop bit: 1 bit.

14.5 Connections

For the entire system to work properly, including the RS-485 RTU serial line, observe the instructions provided in chapter **"6. ELECTRICAL CONNECTIONS" ON PAGE 32**.

In particular, make sure the connections are performed correctly, observing the instructions in section **"6.3 WIRING DIAGRAM" ON PAGE 34**.

14.6 Modbus tables content

Table content description
The table below contains the information required to access the resources properly and directly.
There are two tables:
- Modbus address table, which contains all the configuration parameters for the device and the corresponding Modbus addresses;
- Modbus resource table, which contains all the status (I/O) and alarm resources in the device memory.

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

14.7 Mistral modbus addresses

14.7.1 Modbus address table

Par.	Description	Val. Adr.	R/W	DATA SIZE	CPL	MU	Range
	SETPOINT group						
SP	Humidity setpoint.	1539	R/W	WORD	---	%	r1...r2
	CONFIGURATIONS Group						
CFG	Operating mode.	1540	R/W	BYTES	---	---	0...10
	ANALOGUE INPUTS group						
P1	Water conductivity.	1541	R/W	WORD	---	µS*cm	70...1250
b4	Initial charge time.	1626	R/W	WORD	---	s	0...999
	MAIN REGULATOR group						
r0	Hysteresis. With **CFG** = 2, 3, 4, 7, 8, 9.	1545	R/W	WORD	---	%	2...20
r1	Minimum humidity setpoint value. With **CFG** = 2, 3, 4, 7, 8, 9.	1546	R/W	WORD	---	%	0...**r2**
r2	Maximum humidity setpoint value. With **CFG** = 2, 3, 4, 7, 8, 9.	1547	R/W	WORD	---	%	**r1**...100
r3	Minimum delay time between two consecutive humidity production activations. With **CFG** ≠ 10.	1548	R/W	WORD	---	s	1...240
r4	Proportional band. With **CFG** = 2, 3, 4, 7, 8, 9.	1549	R/W	BYTES	---	%	0...50
r5	Minimum humidity production. With **CFG** ≠ 10.	1550	R/W	WORD	---	%	0....**r6**
r6	Maximum humidity production. With **CFG** ≠ 10.	1551	R/W	WORD	---	%	**r5**...100
	REGULATOR PROTECTION group						
c0	Number of continuous idle hours causing the water reservoir to empty.	1556	R/W	BYTES	---	h	0...250
c1	Number of operating hours causing the water reservoir to empty.	1557	R/W	BYTES	---	h	0...250
	FANS group						
F0	Fan speed.	1559	R/W	3 BIT	---	---	0...4
F5	Fan off delay from switching mist-maker off (with **CFG** = 10).	1563	R/W	BYTES	---	s	0...240
F6	Fan operation time after emptying due to inactivity.	1564	R/W	WORD	---	s	0...999
	ALARMS group						
A5	Low humidity alarm threshold only if **CFG** = 2, 3, 4, 7, 8, 9.	1568	R/W	BYTES	---	---	0...100
A6	High humidity alarm threshold only if **CFG** = 2, 3, 4, 7, 8, 9.	1569	R/W	BYTES	---	---	0...100
A7	High low humidity alarm delay only if **CFG** = 2, 3, 4, 7, 8, 9.	1570	R/W	WORD	---	s	0...999
A10	Number of operating hours of the mist-maker for reporting partial hours if the water conductivity P1 is between 70...449 µS*cm.	1571	R/W	BYTES	---	1000h	0...99
A11	Number of operating hours of the mist-maker for reporting partial hours if the water conductivity P1 is between 450...849 µS*cm.	1572	R/W	BYTES	---	1000h	0...99
A12	Number of operating hours of the mist-maker for reporting partial hours if the water conductivity P1 is between 850...1250 µS*cm.	1573	R/W	BYTES	---	1000h	0...99
A13	Number of fan operating hours to signal partial operating hours.	1574	R/W	BYTES	---	1000h	0...99
	DIGITAL INPUTS group						
i0	**ID2** port digital input polarity.	1607	R/W	1 BIT	---	---	0/1
	PASSWORD group						
PAS	Parameter access password.	1609	R/W	SHORT	Y	num	-99...999
	EVLINK DATALOGGING group						
bLE	Serial port configuration for EVconnect/EPoCA connectivity.	1612	R/W	WORD	---	---	0...99
rE0	Datalogger sampling interval.	1613	R/W	BYTES	---	min	0...240
rE1	Enable data logging for datalogger.	1614	R/W	1 BIT	---	---	0/1
	MODBUS SERIAL CONFIGURATION group						
LA1	COM1 serial line modbus protocol controller address.	1615	R/W	BYTES	---	num	1...247
LB1	COM1 serial line modbus transmission speed (baud rate).	1616	R/W	3 BIT	---	---	0...4
LP1	COM1 serial line Modbus serial parity.	1617	R/W	2 BIT	---	---	0...2

14.7.2 Modbus resource table

Code	Description	Val. Adr.	Filter value	R/W	DATA SIZE	CPL	MU	Range
STATES Group								
PROBE VAL	Analogue control input.	1362	---	R	SHORT	Y	%	-99.9...99.9
FANS	Fan current value.	517	---	R	SHORT	Y	mA	-99.9...99.9
EEVC	Inlet SV current value.	518	---	R	SHORT	Y	mA	-99.9...99.9
MM	Mist-maker current value.	519	---	R	SHORT	Y	mA	-999...999
EEVS	Outlet SV current value.	520	---	R	SHORT	Y	mA	-99.9...99.9
T MMH	Mist-maker partial time (H).	882	---	R	WORD	---	---	0...999
T MML	Mist-maker partial time (L).	883	---	R	WORD	---	---	0...999
T FANH	Fan (H) partial time.	890	---	R	WORD	---	---	0...999
T FANL	Fan (L) partial time.	891	---	R	WORD	---	---	0...999
FW ID	Firmware identifier.	65289	---	R	WORD	---	---	0...65535
FW REV	FW version (bit0-7=REV; bit8-15=VAR).	65290	---	R	SHORT	---	---	$00...$FFFF
FW PROGR	FW progressive No.	65291	---	R	WORD	---	---	0...65535
DIGITAL INPUTS group								
HW EN	HW enable consent. **0**= Off; **1** = On.	1361	0	R	1 BIT	---	---	0/1
ON/OFF	Inlet ON/OFF status. **0**= Off; **1** = On.	1361	2	R	1 BIT	---	---	0/1
i0	**ID2** port digital input polarity. **0** = Normally closed; **1** = Normally open.	1607	---	R/W	1 BIT	---	---	0/1
DIGITAL OUTPUTS group								
EEVC	Inlet SV output status. **0**= Off; **1** = On.	1361	8	R	1 BIT	---	---	0/1
EEVS	Outlet SV output status. **0**= Off; **1** = On.	1361	9	R	1 BIT	---	---	0/1
FAN	Fan output status. **0**= Off; **1** = On.	1361	10	R	1 BIT	---	---	0/1
MM	Mist-maker output status. **0**= Off; **1** = On.	1361	11	R	1 BIT	---	---	0/1
ALARM	Alarm output status. **0**= Off; **1** = On.	1361	12	R	1 BIT	---	---	0/1
REGULATOR group								
SW EN	SW enable consent. **0**= Off; **1** = On.	1126	---	R/W	1 BIT	---	---	0/1
ALARMS group								
AL PROBE	Probe alarm. **0**= Off; **1** = On.	1364	8	R	1 BIT	---	---	0/1
AL TEMP LB	Level board temperature alarm. **0**= Off; **1** = On.	1364	2	R	1 BIT	---	---	0/1
AL COM LB	Level board communication alarm. **0**= Off; **1** = On.	1364	3	R	1 BIT	---	---	0/1
AL TIME MM	Mist-maker operating hours alarm. **0**= Off; **1** = On.	1366	8	R	1 BIT	---	---	0/1
AL TIME FAN	Fan operating time alarm. **0**= Off; **1** = On.	1366	9	R	1 BIT	---	---	0/1
AL LOW RH	Low humidity alarm. **0**= Off; **1** = On.	1366	10	R	1 BIT	---	---	0/1
AL HIGH RH	High humidity alarm. **0**= Off; **1** = On.	1366	11	R	1 BIT	---	---	0/1
AL LEVEL	Level not reached alarm. **0**= Off; **1** = On.	1366	15	R	1 BIT	---	---	0/1
WAR IMIN EEVC	Inlet SV minimum current warning. **0**= Off; **1** = On.	1365	0	R	1 BIT	---	---	0/1
WAR IMAX EEVC	Inlet SV maximum current warning. **0**= Off; **1** = On.	1365	1	R	1 BIT	---	---	0/1
WAR IMIN EEVS	Outlet SV minimum current warning. **0**= Off; **1** = On.	1365	2	R	1 BIT	---	---	0/1
WAR IMAX EEVS	Outlet SV maximum current warning. **0**= Off; **1** = On.	1365	3	R	1 BIT	---	---	0/1
WAR IMIN MM	Mist-maker minimum current warning. **0**= Off; **1** = On.	1365	4	R	1 BIT	CPL	---	0/1
WAR IMAX MM	Mist-maker maximum current warning. **0**= Off; **1** = On.	1365	5	R	1 BIT	---	---	0/1

Code	Description	Val. Adr.	Filter value	R/W	DATA SIZE	CPL	MU	Range
WAR IMIN FAN	Fan SV minimum current warning. **0**= Off; **1** = On.	1365	6	R	1 BIT	---	---	0/1
WAR IMAX FAN	Fan SV maximum current warning. **0**= Off; **1** = On.	1365	7	R	1 BIT	---	---	0/1
AL IMIN EEVC	Inlet SV minimum current alarm. **0**= Off; **1** = On.	1365	8	R	1 BIT	---	---	0/1
AL IMAX EEVC	Inlet SV maximum current alarm. **0**= Off; **1** = On.	1365	9	R	1 BIT	---	---	0/1
AL IMIN EEVS	Outlet SV minimum current alarm. **0**= Off; **1** = On.	1365	10	R	1 BIT	---	---	0/1
AL IMAX EEVS	Outlet SV maximum current alarm. **0**= Off; **1** = On.	1365	11	R	1 BIT	---	---	0/1
AL IMIN MM	Mist-maker minimum current alarm. **0**= Off; **1** = On.	1365	12	R	1 BIT	---	---	0/1
AL IMAX MM	Mist-maker maximum current alarm. **0**= Off; **1** = On.	1365	13	R	1 BIT	---	---	0/1
AL IMIN FAN	Fan SV minimum current alarm. **0**= Off; **1** = On.	1365	14	R	1 BIT	---	---	0/1
AL IMAX FAN	Fan SV maximum current alarm. **0**= Off; **1** = On.	1365	15	R	1 BIT	---	---	0/1

14.8 EPJC modbus addresses (master/slave)

14.8.1 Modbus address table

Par.	Description	Val. Adr.	R/W	DATA SIZE	CPL	MU	Range
	Group						
E0	Number of humidifiers connected.	1357	R/W	BYTES	---	---	1…4
E1	Operating mode. **1** = Independent; **2** = Parallel; **3** = Rotation; **4** = Balancing.	1358	R/W	BYTES	---	---	1…4
E2	Rotation time.	1359	R/W	BYTES	---	hours	1…24
	MODBUS SERIAL CONFIGURATION group						
LA1	COM1 address (RS-485 Slave).	1545	R/W	BYTES	---	---	1…247
LB1	COM1 Baud rate (RS-485 Slave). **0** = 2400; **1** = 4800; **2** = 9600; **3** = 19200; **4** = 38400.	1546	R/W	3 BIT	---	---	0…4
LP1	COM1 parity (RS-485 Slave). **0** = None; **1** = Odd; **2** = Even.	1547	R/W	2 BIT	---	---	0…2
	DATA LOGGING group						
BLE	Enable EVconnect/EPoCA. **0** = Spare; **1** = Forced for EVconnect/EPoCA; **2…99** = EPoCA local network address.	1540	R/W	BYTES	---	---	0…99
PA1	User level EPoCA password.	1541	R/W	SHORT	Y	---	-99…999
PA2	Administrator level EPoCA password.	1542	R/W	SHORT	Y	---	-99…999

15. DIAGNOSTICS

The table below lists alarms with corresponding solutions.
Warnings are made via LED lighting up (see **"15.1 ALARMS TABLE (LED INTERFACE)" ON PAGE 87**).
NOTE: the last blink of each alarm is followed by 5 s OFF.

15.1 Alarms table (LED interface)

15.1.1 Warnings

LED	Lamp No.	Description	Cause	Effects	Solution
LEV	1	Mist-maker current warning	Absorption warning thresholds exceeded in normal operation	• No effect on regulation • LED blinks	• Schedule maintenance and/or component replacement • Contact ELSTEAM technical support
	2	Fan current warning	Absorption warning thresholds exceeded in normal operation		
	3	Inlet solenoid valve current warning	Absorption warning thresholds exceeded in normal operation		
	4	Outlet solenoid valve current warning	Absorption warning thresholds exceeded in normal operation		

15.1.2 Alarms

LED	Lamp No.	Description	Cause	Effects	Solution
	1	Mist-maker current alarm	Absorption alarm thresholds exceeded in normal operation	• Mist-maker OFF • If **CFG** = 0...4 then **Out1** is activated • LED blinks 0.5 s ON / 5 s OFF	• Replace mist-maker • Contact ELSTEAM technical support
	2	Fan current alarm	Absorption alarm thresholds exceeded in normal operation	• Regulation OFF • If **CFG** = 0...4 then **Out1** is activated • LED blinks 0.5 s ON / 5 s OFF	• Replace fan • Contact ELSTEAM technical support
	3	Inlet solenoid valve current alarm	Absorption alarm thresholds exceeded in normal operation	• Inlet solenoid valve OFF • If **CFG** = 0...4 then **Out1** is activated • LED blinks 0.5 s ON / 5 s OFF	• Replace inlet solenoid valve • Contact ELSTEAM technical support
	4	Outlet solenoid valve current alarm	Absorption alarm thresholds exceeded in normal operation	• Outlet solenoid valve OFF • If **CFG** = 0...4 then **Out1** is activated • LED blinks 0.5 s ON / 5 s OFF	• Replace outlet solenoid valve • Contact ELSTEAM technical support
	5	Level board high temperature alarm	• Level board high temperature • Impurities in the water in the reservoir	• Regulation OFF • If **CFG** = 0...4 then **Out1** is activated • LED blinks 0.5 s ON / 5 s OFF	• Check the characteristics of the water • Clean the reservoir • Switch the humidifier off and on again
	6	Mist-maker operating hours alarm	• If **P1** = 70...449 µS*cm, operating hours > **A10** • If **P1** = 450...849 µS*cm, operating hours > **A11** • If **P1** = 850...1250 µS*cm, operating hours > **A12**	• No effect on regulation • If **CFG** = 0...4 then **Out1** is activated • LED blinks 0.5 s ON / 5 s OFF	Carry out maintenance (see **"11. MAINTENANCE" ON PAGE 73**)
	7	Fan operating hours alarm	Operating hours > **A13**	• No effect on regulation • If **CFG** = 0...4 then **Out1** is activated • LED blinks 0.5 s ON / 5 s OFF	Carry out maintenance (see **"11. MAINTENANCE" ON PAGE 73**)

15.1.3 High or low humidity alarm

Only if **CFG** = 2, 3, 4, 7, 8, 9.

LED	Description	Cause	Effects	Solution
	High humidity alarm	• RH sensor > **A6** for a time **A7** • RH sensor not working or not connected	• LED blinks 0.5 s ON / 0.5 s OFF • Mist-maker and fan OFF until automatic reset • If **CFG** = 0...4, alarm output ON	RH sensor < **A6** - 2 % reactivation is automatic
	Low humidity alarm	• RH sensor < **A5** for a time **A7** • RH sensor not working or not connected	• LED blinks 1 s ON / 1 s OFF • Mist-maker and fan OFF until automatic reset • If **CFG** = 0...4, alarm output ON	RH sensor > **A5** + 2 % reactivation is automatic

15.1.4 Level sensor alarm

LED	Description	Cause	Effects	Solution
	Level sensor alarm	Level board not working	• Regulation OFF • LED blinks 0.5 s ON / 0.5 s OFF • If **CFG** = 0...4, alarm output ON	Contact ELSTEAM technical support
	Level sensor self-test alarm			Check for correct water pressure. If the alarm reoccurs at reset, replace the control board

15.1.5 Water alarm

LED	Description	Cause	Effects	Solution
	Minimum water level alarm	• Level board not working • Minimum water level not reached • Water present after draining	*Level board not working:* • mist-maker and fan OFF • LED on steady • If **CFG** = 0...4, alarm output ON *Minimum water level not reached:* • mist-maker OFF • LED blinks 3 s ON/3 s OFF • If **CFG** = 0...4, alarm output ON *Water present after draining:* • mist-maker and fan OFF • LED blinks 0.5 s ON/ 0.5 s OFF • If **CFG** = 0...4, alarm output ON	Contact ELSTEAM technical support

15.2 Alarms table (EV3K interface)

The table below lists alarms with corresponding solutions.
The upper line of the display shows **Err** (if alarm in progress) or **UUor** (if warning in progress).

NOTE: LED user interface

Code	Type	Description	Cause	Effects	Solution
Pr1	Err	Adjustment sensor error	• Probe not working • Probe not connected properly • Incorrect probe type	• Showing code **Pr1** • Alarm LED ⚠ lit steadily • ON alarm output • If **CFG** = 0...4, alarm output ON	• Check the sensor type • Check the sensor wiring • Change the sensor type • Automatic reset
Pr2	Err	NTC on-board sensor error	• NTC on-board sensor not working • Level board not working	• Showing code **Pr2** • Alarm LED ⚠ lit steadily • Regulation OFF • If **CFG** = 0...4, alarm output ON	• Replace level board • Contact ELSTEAM technical support • Automatic reset

Code	Type	Description	Cause	Effects	Solution
A1	UUor	Inlet solenoid valve minimum current alarm	Absorption thresholds exceeded in normal operation	• Showing code **A1** • Indicator LED ⚠ lit steadily	• Replace inlet solenoid valve • Contact ELSTEAM technical support
	Err			• Showing code **A1** • Alarm LED ⚠ lit steadily • Regulation OFF • If **CFG** = 0...4, alarm output ON	
A2	UUor	Inlet solenoid valve maximum current alarm	Absorption thresholds exceeded in normal operation	• Showing code **A2** • Indicator LED ⚠ lit steadily	
	Err			• Showing code **A2** • Alarm LED ⚠ lit steadily • Regulation OFF • If **CFG** = 0...4, alarm output ON	
A3	UUor	Outlet solenoid valve minimum current alarm	Absorption thresholds exceeded in normal operation	• Showing code **A3** • Indicator LED ⚠ lit steadily	• Replace outlet solenoid valve • Contact ELSTEAM technical support
	Err			• Showing code **A3** • Alarm LED ⚠ lit steadily • Regulation OFF • If **CFG** = 0...4, alarm output ON	
A4	UUor	Outlet solenoid valve maximum current alarm	Absorption thresholds exceeded in normal operation	• Showing code **A4** • Indicator LED ⚠ lit steadily	
	Err			• Showing code **A4** • Alarm LED ⚠ lit steadily • Regulation OFF • If **CFG** = 0...4, alarm output ON	
A5	UUor	Mist-maker minimum current alarm	Absorption thresholds exceeded in normal operation	• Showing code **A5** • Indicator LED ⚠ lit steadily	• Replace mist-maker • Contact ELSTEAM technical support
	Err			• Showing code **A5** • Alarm LED ⚠ lit steadily • Regulation OFF • If **CFG** = 0...4, alarm output ON	
A6	UUor	Mist-maker maximum current alarm	Absorption thresholds exceeded in normal operation	• Showing code **A6** • Indicator LED ⚠ lit steadily	
	Err			• Showing code **A6** • Alarm LED ⚠ lit steadily • Regulation OFF • If **CFG** = 0...4, alarm output ON	
A7	UUor	Fan minimum current alarm	Absorption thresholds exceeded in normal operation	• Showing code **A7** • Indicator LED ⚠ lit steadily	• Automatic reset • Contact ELSTEAM technical support
	Err			• Showing code **A7** • Alarm LED ⚠ lit steadily • Regulation OFF • If **CFG** = 0...4, alarm output ON	
A8	UUor	Fan maximum current alarm	Absorption thresholds exceeded in normal operation	• Showing code **A8** • Indicator LED ⚠ lit steadily	
	Err			• Showing code **A8** • Alarm LED ⚠ lit steadily • Regulation OFF • If **CFG** = 0...4, alarm output ON	
A9	UUor	Mist-maker operating hours alarm	• If **P1** = 70...449 µS*cm, operating hours > **A10** • If **P1** = 450...849 µS*cm, operating hours > **A11** • If **P1** = 850...1250 µS*cm, operating hours > **A12**	• Showing code **A9** • Indicator LED ⚠ lit steadily • No effect on regulation	Carry out maintenance (see *"11. MAINTENANCE" ON PAGE 73*)
A10	UUor	Fan operating hours alarm	Fan operating hours > **A13**	• Showing code **A10** • Indicator LED ⚠ lit steadily • No effect on regulation	Carry out maintenance (see *"11. MAINTENANCE" ON PAGE 73*)
A11	Err	Low humidity alarm	RH sensor humidity < **A5** for a time period **A7**	• Showing code **A11** • Alarm LED ⚠ lit steadily • Mist-maker and fan OFF until automatic reset • If **CFG** = 0...4, alarm output ON	Reactivation is automatic if RH sensor > **A5** + 2 %

Code	Type	Description	Cause	Effects	Solution
A12	Err	High humidity alarm	RH sensor humidity > **A6** for a time period **A7**	• Showing code **A12** • Alarm LED ⚠ lit steadily • Mist-maker and fan OFF until automatic reset • If **CFG** = 0...4, alarm output ON	Reactivation is automatic if RH sensor < **A6** - 2 %
A13	Err	Level board high temperature alarm	• Level board high temperature • Impurities in the water in the reservoir	• Showing code **A13** • Alarm LED ⚠ lit steadily • Regulation OFF • If **CFG** = 0...4, alarm output ON	• Check the characteristics of the water • Clean the reservoir • Switch the humidifier off and on again
SCh	Err	**Mistral** communication alarm	**Mistral** no communication	• Showing code **SCh** • Alarm LED ⚠ lit steadily • Regulation OFF until automatic reset • If **CFG** = 0...4, alarm output ON	• Automatic reset • Contact ELSTEAM technical support
ERRc	Err	**EV3K** and **Mistral** communication alarm	No communication between **EV3K** interface and **Mistral**	• Showing code **ERRc** • Alarm LED ⚠ lit steadily • Regulation OFF until automatic reset • If **CFG** = 0...4, alarm output ON	• Restore communication between EV3K and Mistral • Automatic reset
LEu	Err	Minimum water level alarm	Water level < **r9**	• Showing code **LEu** • Alarm LED ⚠ lit steadily • Mist-maker and fan OFF until automatic reset • If **CFG** = 0...4, alarm output ON	• Wait for the water level to reach the minimum required level for production • Automatic reset

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