

KT Series

Immersed electrode humidifiers





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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 features 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 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 must be used for humidification only.

The device must be installed and used in accordance with the instructions provided and, in particular, hazardous live parts or high pressure water 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 according to local regulations governing the collection of electrical and electronic equipment.

Consider the environment



The company strives to respect the environment, taking account of customer requirements, technological innovations in terms of 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

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

SYMBOLS



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



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



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

SAFETY MESSAGES

DANGER

DANGER indicates a situation of imminent danger which, if not avoided, **will result in death or serious injury**.

WARNING

WARNING indicates a situation of imminent danger which, if not avoided, **may result in 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**.

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

QUALIFIED PERSONNEL

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

SAFETY INFORMATION RELATING TO THE PRODUCT

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

DANGER

RISK OF ELECTRIC SHOCK, EXPLOSION OR ELECTRIC ARC

- Only use electrically insulated measuring devices and equipment.
- Do not install the equipment while the power supply is connected.
- Switch off all equipment, including connected devices, before removing any covers or hatches and before installing or uninstalling any accessories, hardware, cables or wires.
- Use the required safety interlocks (disconnectors) of a suitable size between the power supply and the humidifier.
- Always use a correctly calibrated voltmeter to check the system is switched off.
- The maintenance, repair, installation and use of the equipment must only be entrusted to qualified personnel.
- Do not touch the unshielded components or the terminals while they are live.
- Do not open, disassemble, repair or modify the product.
- Do not expose the equipment to liquids or chemicals.
- Make sure the equipment is properly earthed.
- Before applying voltage to the equipment:
 - Make sure all protective elements, such as covers, hatches and grilles, are fitted and/or closed.
 - Check all wiring connections.

DANGER

RISK OF ELECTRIC SHOCK AND FIRE

- Do not use the device with loads greater than those indicated in the technical specifications.
- Do not exceed the temperature and humidity ranges indicated in the technical specifications.
- Use the required safety interlocks (disconnectors) of a suitable size between the power supply and the humidifier.
- Only use cables with a suitable cross-section as indicated in the section "Wiring best practices".

WARNING

MALFUNCTIONING OF THE EQUIPMENT

- Perform the wiring carefully, in compliance with electromagnetic compatibility and safety requirements.
- Carry out a full start-up test.
- Make sure the wiring is correct for the final application.
- Minimise the length of the connections as much as possible and 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 to terminals labelled "No connection "(N.C.)".

The humidifier produces steam at 100 °C (212 °F) and discharges water with a temperature of approximately 98 °C (208.4 °F).

WARNING

HOT STEAM

Do not touch the equipment when it is in operation.

WARNING

RISK OF BURNS

Before carrying out any work on the system, disconnect the humidifier and wait until it has cooled down (< 50 °C (122 °F)).

WARNING

REGULATORY NON-COMPLIANCE

Make sure all the equipment used and the designed systems comply with current local, regional and national regulations and standards.

1. INTRODUCTION

1.1 Description

The **KT** series is a range of immersed electrode humidifiers by ELSTEAM.

The humidifiers in the **KT** series generate humidity (steam) when a current is applied to two or more electrodes immersed in tap water, causing the water to boil.

The steam is controlled by modulating the intensity of the current transferred to the water by the immersed electrodes, so by indirectly controlling the boiling water.

Steam is introduced into the room through a special flexible hose and a steam distributor in stainless steel and engineering plastic (steam introduced into an AHU - air handling unit or an air conditioning duct) or a steam blower (steam introduced into room).

1.2 Applications

The **KT** series is mainly used when sterile steam is needed, such as in:

- Hospitals;
- Healthcare facilities;
- Commercial buildings (offices, factories, etc...) or;
- Wellness centres.

1.3 Main features

- Isothermal humidifier;
- Sterile steam (at a temperature of approx. 100 °C (212 °F));
- Automatic boiler cleaning;
- Automatic descaling of electrodes and boiler (**reusable**);
- Variable steam output (3...60 kg/h);
- Built-in electronic control using ON/OFF signal or 0...10 V (proportional);
- Protection against water escaping on the steam side (floating ball which stops water leaking into the steam supply pipe);
- Stainless steel drainage tank available on request.

1.3.1 Features of electronic control

- Proportional (logarithmic) control of steam production:
 - Highly efficient;
 - Quick response to changes in request;
 - Accurate control of steam production.
- Automatic electrode and boiling cleaning system (international patent):
 - Less maintenance required;
 - High performance;
 - Prolongs the life of the electrodes and boiler.
- Automatic boiler drainage:
 - Removes any limescale which collects in the manifold sleeve;
 - Prolongs the life of the boiler.
- LED signalling of operating status:
 - Operating status always under control;
 - Automatic fault analysis.

1.4 Accessories

The following accessories are available for the immersed electrode humidifiers in the **KT** series:

P/n	Description
EHSD040	Linear steam distributor, 400 mm (15.75 in.)
EHSD060	Linear steam distributor, 600 mm (23.62 in.)
EHSD080	Linear steam distributor, 800 mm (31.49 in.)
EHSD100	Linear steam distributor, 1000 mm (3.28 ft)
EHSD130	Linear steam distributor, 1300 mm (4.26 ft)
EHSD160	Linear steam distributor, 1600 mm (5.25 ft)
EHSD200	Linear steam distributor, 2000 mm (6.56 ft)
EHSDSP0	Linear steam distributor, length on request
EHSDY00	Y fitting, diameter 38 mm
EHSR0107	Steam blower for room
TV	Special pipe fitting that connects the humidifier and distributor
VI	Water drainage tank
EVHP523	Humidity probe 4-20 mA
EV3411M7	Universal controller with 1 outlet, power supply 230 Vac
EVTNPW30F200	NTC temperature probe, IP68
0031000048	Female 3/4"G flexible hose to feed water
1240000004	Alarm electronic board

2. TECHNICAL DATA

2.1 Technical specifications

Description	M.U.	KT3	KT10-230	KT20-230	KT5	KT10	KT20	KT30	KT40	KT60
Steam production										
Production capacity	kg/h	3	10	20	5	10	20	30	40	60
Maximum pressure	MPa (mmH ₂ O)	0.002 (200)								
Pipe connection external diameter	mm (in.)	40 (1.57)								
Steam distribution										
Number of linear distributors that can be connected	---	1	1	2	1	1	1	1	2	2
Number of steam blowers that can be connected	---	1	1	/	1	1	/	/	/	/
Electrical properties										
Power consumption	kW	2.25	7.5	15	3.75	7.5	15	22.5	30	45
Power supply	Vac, Hz	230 V, 50 Hz			400 V, 50 Hz					
Phases	Ph	1	3	3	2	3	3	3	3	3
Current per phase	A	10	19	38	9	11	22	32	43	65
Water properties										
Inlet water quality	---	See "5.2.1 CHARACTERISTICS OF WATER" ON PAGE 13								
Inlet water conductivity	μS*cm	70...1250								
Inlet water hardness	°f	5...50								
Inlet water pressure	MPa/bar	0.2...1/2...10								
Inlet water connection	---	3/4" GAS								
Water drain external dimensions	mm (in.)	42 (1.65)								
General characteristics										
Dimensions	mm (in.)	See "4.1 DIMENSIONS" ON PAGE 11								
Weight	kg	15	25	15						25
Hydraulic unit IP protection	---	20								
Regulation										
Type of controller	---	Built-in								
Command signal	---	Proportional (0-10 V) or ON-OFF								
Compliance										
CE certification	---	√								

3. DELIVERY OF PRODUCT

3.1 Checking the packaging

- Check the packaging is intact;
- Check the humidifier is intact upon delivery and immediately notify the carrier, in writing, of any damage that may be due to careless or improper transport (accept the goods subject to inspection).

3.1.1 Opening the packaging

- Move the packaging to where the humidifier is to be installed;
- Open the cardboard packaging and remove the protective polystyrene corners;
- Pull the humidifier out.

3.1.2 Checking the contents

The packaging contains:

- **KT** series humidifier;
- Operation and maintenance manual;
- Pipe fitting that feeds water from the mains to the humidifier's water load solenoid valve;
- Hex key to open the cabinet.

4. DIMENSIONS AND MECHANICAL ASSEMBLY

4.1 Dimensions

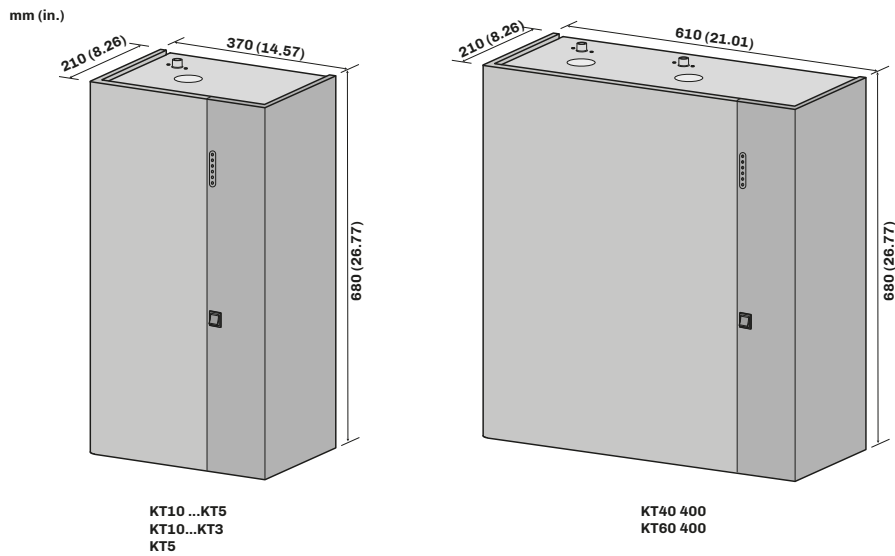


Fig. 1. Dimensions

4.2 Minimum installation distances

⚠ WARNING

MALFUNCTIONING OF THE EQUIPMENT

- The humidifier must be installed where the minimum distances from all nearby structures and equipment can be guaranteed, as shown in this manual.
- Install all the equipment in accordance with the technical specifications given in the respective documentation.

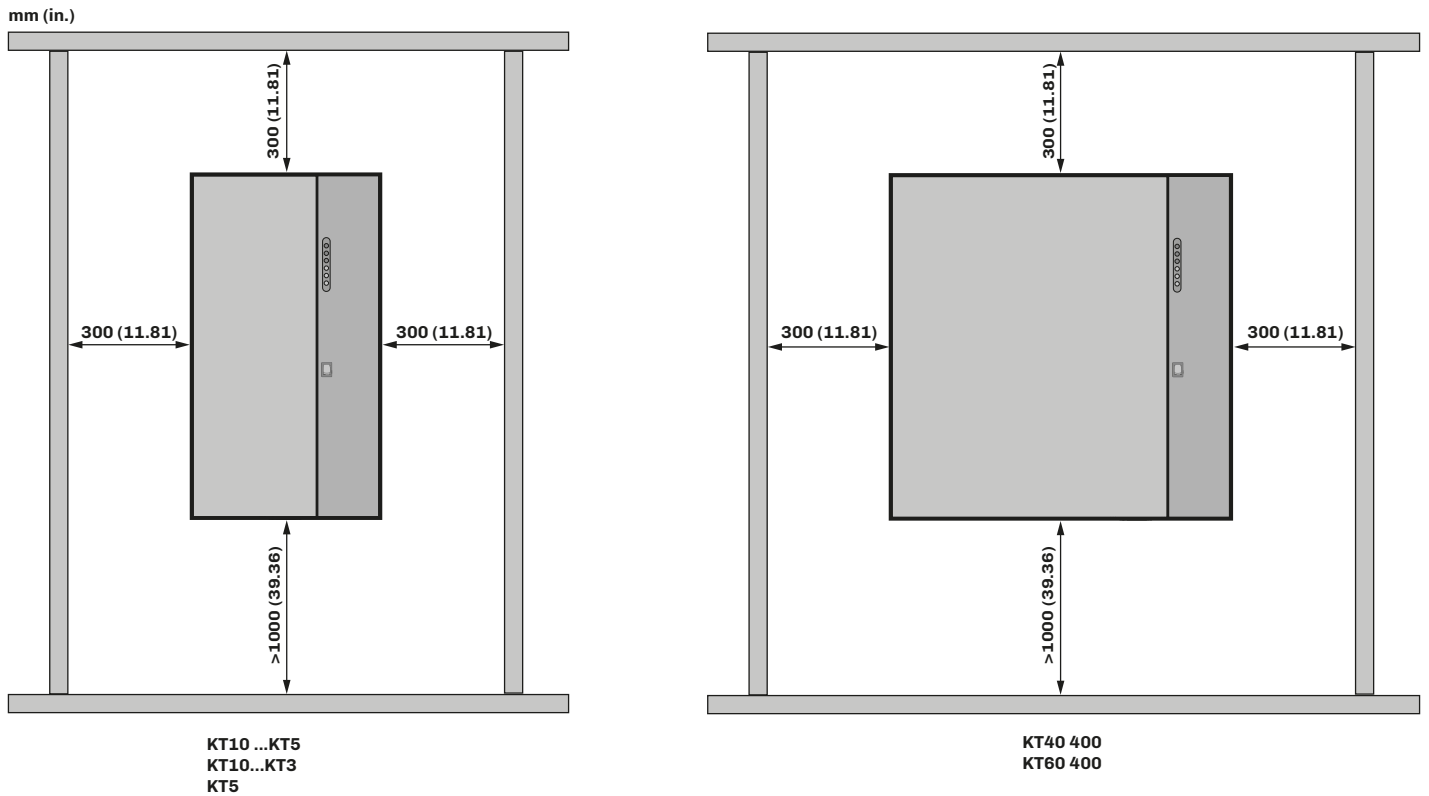


Fig. 2. Minimum installation distances

4.3 Installation

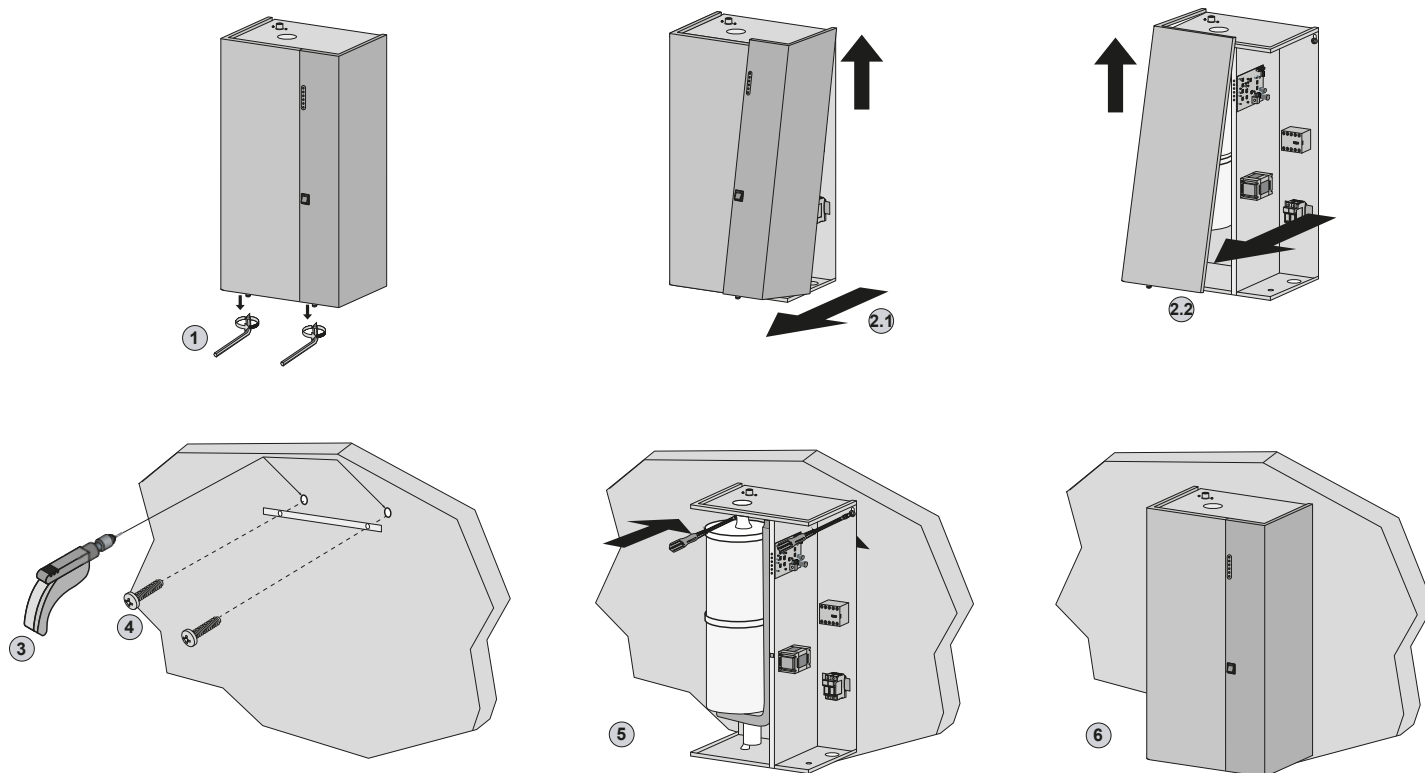


Fig. 3. Installation instructions

N.B.: Installation of models **KT40 / KT60** is the same as above.

4.3.1 Installation instructions

DANGER

RISK OF ELECTRIC SHOCK, EXPLOSION OR ELECTRIC ARC

Make sure the equipment is properly earthed.

NOTICE

IRREGULAR INSTALLATION

Use brackets with a minimum load-bearing capacity of 80 kg when installing the humidifier.

- Open the panels of the humidifier by removing the headless screws with the SW2.5 hex key;
- Remove the panels one at a time, pulling them towards you from the bottom and lifting them up;
- Remove the humidifier from the polystyrene;
- Hook the humidifier onto the brackets on the wall using the slots at the rear of the humidifier.

5. INSTALLATION

5.1 Humidifier parts

5.1.1 Top

- Steam outlet;
- Male 3/4" GAS connector for water supply.

5.1.2 Bottom

- Water outlet to connect to sewer system;
- Strain relief cable gland for power supply wiring;
- Strain relief cable gland for wiring of regulation board.

5.2 Water connections

You will need the following components to plumb in the humidifier:

- An intercept tap;
- A supplementary filter to the one already in the solenoid valve;
- A pressure reducer (if the pressure of the mains water exceeds 1 MPa (10 bar)).

N.B.: If a pressure reducer is used, make sure it is effective and does not cause a drastic reduction in pressure when the mains pressure is very low.

NOTICE

MALFUNCTIONING OF THE EQUIPMENT

- The feed water must have a minimum pressure of 0.2 MPa (2 bar).
- Connect the solenoid valve to the mains using the flexible hose supplied to reduce water hammers in the hose to the humidifier.
- During installation, be careful not to damage the plastic thread of the solenoid valve.
- When making the water connections, it must always be possible to access the mechanical filter in the water load solenoid valve for cleaning.

5.2.1 Characteristics of water

- Water pressure between 0.2...1 MPa (2...10 bar);
- Temperature between 1...50 °C (33.8...122 °F);
- Conductivity between 75...1250 µS/cm;
- Maximum water hardness between 5...50 °f.

N.B.: If water is harder or if there is more organic residue in it, the humidifier will still operate correctly but it must be serviced more regularly.

Dos

- Flush water into the drain for a couple of hours before making the final connection.
- Check the condition of the rubber coupling regularly to prevent problems and water leaking into the room.

Don'ts

- Soften the water. If the water hardness is above 50 °f or if it is such that the boiler requires regular maintenance, use demineralised water mixed with tap water in a percentage that ensures a minimum conductivity of 200 µS/cm and a hardness of at least 10 °f.

NOTICE

MALFUNCTIONING OF THE EQUIPMENT

- Do not use softened water.
- Once the humidifier has been installed, flush the pipes with the remaining water to prevent blocking the filter.
- Check all the parts of the humidifier are intact.
- If even one part of the humidifier is damaged, suspend installation.

5.3 Water discharge system

As this humidifier has an automatic boiler cleaning function, the water outlet must have a capacity of at least 10 litres in a few seconds (maximum 1 l/s).

NOTICE

MALFUNCTIONING OF THE EQUIPMENT

Size the outlet pipe to prevent obstructions or blockages during the automatic cleaning cycle.

5.3.1 Characteristics of fitting

- Minimum diameter 40 mm (1.57 in.);
- Maximum radius of curvature 300 mm (0.98 ft.);
- Minimum average slope of 45° with no siphons.

If these characteristics cannot be respected, a basin must be placed at the bottom of the humidifier to collect water and limescale (p/n VI) (contact ELSTEAM's sales office for more information).

Features of basin

- Drainage pipe with siphon to collect limescale.

NOTICE
MALFUNCTIONING OF THE EQUIPMENT
If the water is harder than 40 °f, the basin must be checked and cleaned at least twice a year.

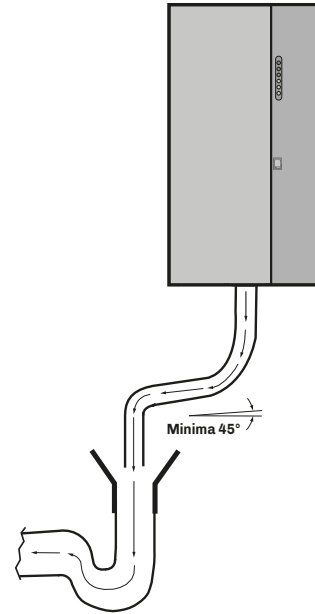


Fig. 4. Drainage pipe

If the water hardness is the same as indicated in the section "5.2.1 CHARACTERISTICS OF WATER" ON PAGE 13,, the basin can be cleaned once a year.

If the drainage system - or the basin - is made of an electrically conductive material, as a safety measure it must be connected to the earthing of the electrical system.

⚠ ⚠ DANGER
RISK OF ELECTRIC SHOCK
If the basin is made of an electrically conductive material, earth either the basin or the drainage system.

The outlet water can reach a temperature of 98 °C (208.4 °F) or higher.

⚠ WARNING
RISK OF BURNS
<ul style="list-style-type: none"> • Before draining water, make sure you are wearing all the necessary personal protective equipment (PPE). • Do not touch the equipment during draining.

5.4 Steam distribution in an AHU or duct

The humidifier must be connected to a stainless steel steam distributor with a fixing flange in engineering plastic in order to distribute steam in the ventilation system.

The steam distributor must be installed:

- Vertically;
- At least one metre from the top of the duct;
- At the bottom of the duct (so the steam can mix properly with the air);
- Higher than the humidifier outlet;
- As close as possible to the humidifier (to prevent reduced efficiency).

The section of the duct where the steam distributor is installed must be insulated, waterproof and have a drain at the bottom. The insulated pipe fitting between the humidifier and the distributor must not be fitted with siphons and must always slope down towards the humidifier to ensure the condensate runs freely in the machine.

⚠ WARNING
MATERIAL DETERIORATION
<ul style="list-style-type: none"> • The special steam piping must be fixed to the boiler and stainless steel ramp with stainless steel ties. • Only use material suitable for the intended use.

5.4.1 Permitted positioning of the distributor in the duct

Horizontal installation

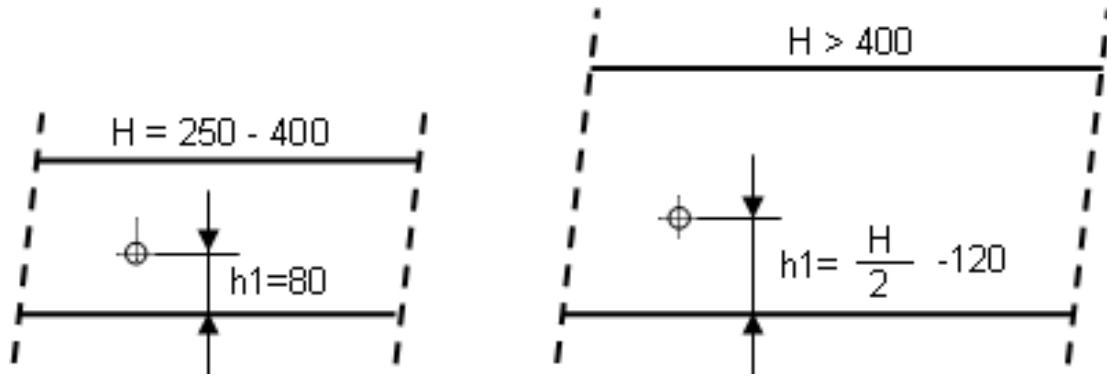


Fig. 5. Horizontal installation - 1 distributor

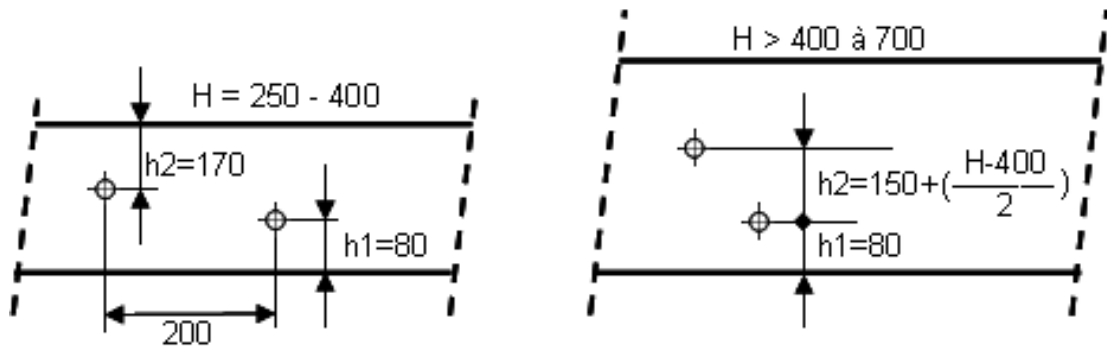


Fig. 6. Horizontal installation - 2 distributors

Vertical installation

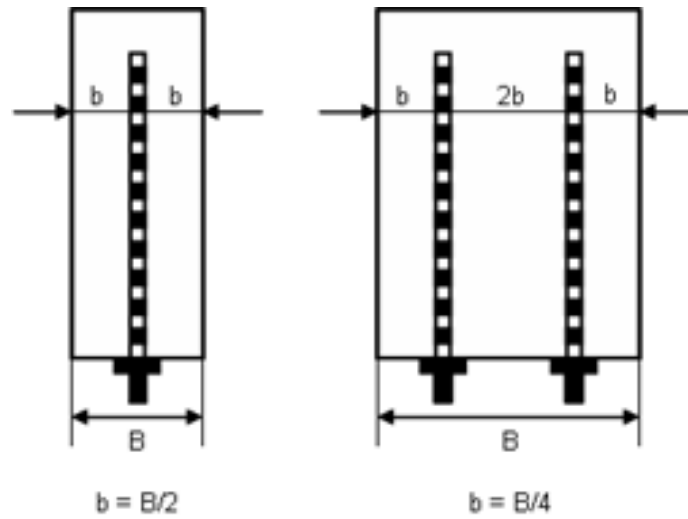
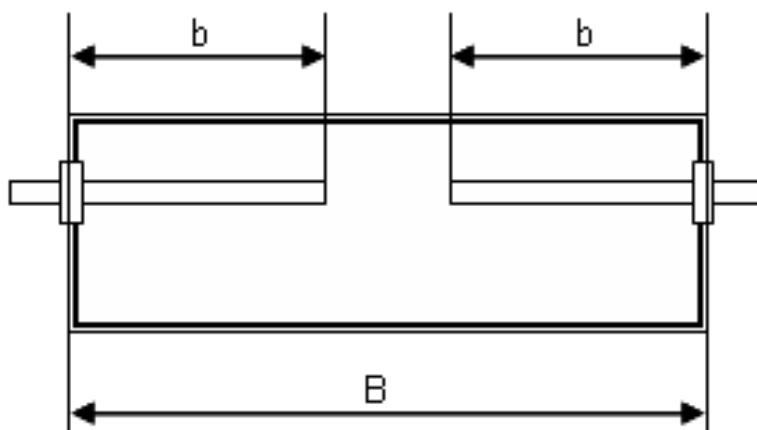


Fig. 7. Vertical installation - 1-2 distributors

Horizontal installation - Wide duct

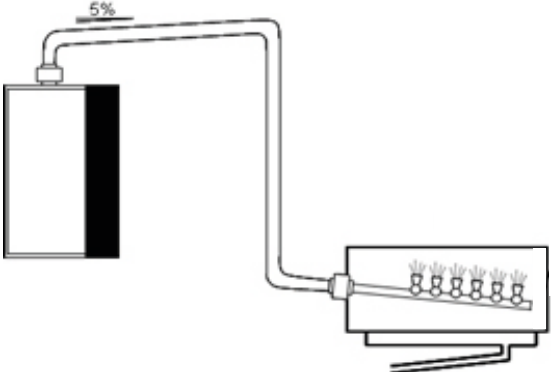
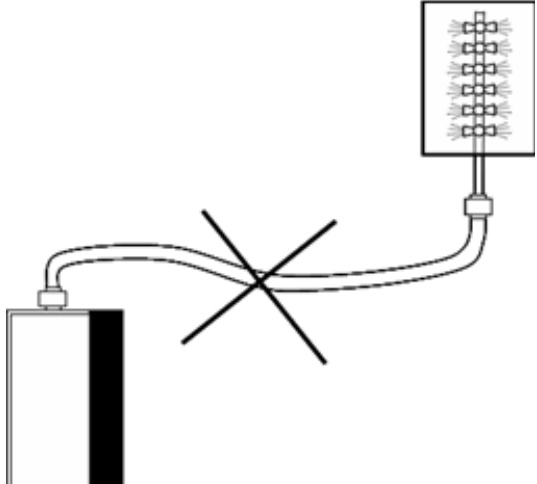


Ex. : $B = 2000\text{mm}$ $b = 600\text{mm}$

Fig. 8. Horizontal installation with wide duct - 2 distributors

5.4.2 Examples of distributor installation in the duct

Description	Example
<p>Installation example no. 1 Distributor is installed in a horizontal duct, positioned higher than the humidifier. Direction of air flow is not relevant.</p>	
<p>Installation example no. 2 Distributor is installed in a vertical duct. Direction of air flow is not relevant.</p>	
<p>Installation example no. 3 Distributor is installed vertically in a horizontal duct, positioned higher than the humidifier. Direction of air flow corresponds to the slope of the ramp.</p>	

Description	Example
<p>Installation example no. 4 Distributor is installed in a horizontal duct, positioned lower than the humidifier.</p>	
<p>Example of incorrect installation It is important to avoid condensation pockets in the supply pipe.</p>	

5.4.3 Distributing steam in the room

A steam blower p/n **ESR010700** must be installed if steam is to be distributed in the room without using ventilation ducts. For more information, visit www.elsteam.it.

The steam blower must be positioned horizontally, with the distribution holes aimed upwards, at least one metre from the ceiling and walls.

⚠ WARNING

RISK OF BURNS

The steam blower must be installed so it is accessible to qualified personnel only.

⚠ WARNING

HOT STEAM

Do not touch the equipment when it is in operation.

It must be positioned at least one metre from the ceiling (3.28 ft.).

Steam blower power supply

Steam blowers:

- **Single-phase 230 Vac models:** Powered directly by the fuse holder.
- **Three-phase models:** Powered directly by the 230 Vac mains voltage.

6. ELECTRICAL CONNECTIONS

6.1 Before starting

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 require experience in the design and installation of humidification systems. Only the user, system integrator or machine builder can be aware of all the conditions and factors present during the installation, configuration, operation and maintenance of the machine or process, and can therefore determine the associated automation equipment and the related safeties and interlocks which can be effectively and properly used. When selecting automation and control equipment and any other related equipment or software for a particular application, always consider all the applicable local, regional or national standards and/or regulations.

DANGER

RISK OF ELECTRIC SHOCK, EXPLOSION OR ELECTRIC ARC

- Only use electrically insulated measuring devices and equipment.
- Do not install the equipment while the power supply is connected.
- Switch off all equipment and remove the power fuses, including any connected devices, before removing any covers or hatches, or before installing or uninstalling accessories, hardware, cables or wires.
- Use the required safety interlocks (disconnectors) of a suitable size between the power supply and the humidifier.
- Always use a correctly calibrated voltmeter to check the system is switched off.
- The maintenance, repair, installation and use of the equipment must only be entrusted to qualified personnel.
- Do not touch the unshielded components or the terminals while they are live.
- Do not disassemble, repair or modify the product.
- Do not expose the equipment to liquids or chemicals.
- Make sure the equipment is properly earthed and if it is not, earth it.
- Before applying voltage to the equipment:
 - Make sure all protective elements, such as covers, hatches and grilles, are fitted and/or closed.
 - Check all wiring connections.

WARNING

REGULATORY NON-COMPLIANCE

Make sure all the equipment used and the designed systems comply with current local, regional and national regulations and standards.

6.2 Connection best practices

6.2.1 Wiring best practices

DANGER

RISK OF ELECTRIC SHOCK AND FIRE

- Do not use the device with loads greater than those indicated in the technical specifications.
- Do not exceed the temperature and humidity ranges indicated in the technical specifications.
- Use the required safety interlocks (disconnectors) 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 the correct diameter, suited to the voltage and current requirements.

DANGER

LOOSE WIRING CAN RESULT IN ELECTRIC SHOCK AND OVERHEATING

Tighten connections in compliance with the technical specifications for torque values.

WARNING

MALFUNCTIONING OF THE EQUIPMENT

- Perform the wiring carefully, in compliance with electromagnetic compatibility and safety requirements.
- Carry out a full start-up test.
- Make sure the wiring is correct for the final application.
- Minimise the length of the connections as much as possible and 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 to terminals labelled "No connection "(N.C.)".

⚠ WARNING

REGULATORY NON-COMPLIANCE

Make sure all the equipment used and the designed systems comply with current local, regional and national regulations and standards.

Suitable wiring for power supply

Pitch 17,8 mm (0.70 in.)

$\frac{\text{mm}}{\text{in.}}$ 7 0.28			
mm ²	2.5	2.5	2.5
AWG	13	13	13
No. of conductors	3		

		N•m	2,5
Ø 3.5 mm (0.14 in.)		lb-in	22.12

Fig. 9. Suitable wiring for power supply - **KT3**

Pitch 17,8 mm (0.70 in.)

$\frac{\text{mm}}{\text{in.}}$ 7 0.28			
mm ²	1.5	1.5	1.5
AWG	15	15	15
No. of conductors	4		

		N•m	2,5
Ø 3.5 mm (0.14 in.)		lb-in	22.12

Fig. 10. Suitable wiring for power supply - **KT5**

Pitch 17,8 mm (0.70 in.)

$\frac{\text{mm}}{\text{in.}}$ 7 0.28			
mm ²	2.5	2.5	2.5
AWG	13	13	13
No. of conductors	4		

		N•m	2,5
Ø 3.5 mm (0.14 in.)		lb-in	22.12

Fig. 11. Suitable wiring for power supply - **KT10 400 V**

Pitch 17,8 mm (0.70 in.)

$\frac{\text{mm}}{\text{in.}}$ 7 0.28			
mm ²	6	6	6
AWG	9	9	9
No. of conductors	4		

		N•m	2,5
Ø 3.5 mm (0.14 in.)		lb-in	22.12

Fig. 12. Suitable wiring for power supply - **KT10 230 V**

Pitch 17,8 mm (0.70 in.)

$\frac{\text{mm}}{\text{in.}}$ 7 0.28			
mm ²	16	16	16
AWG	5	5	5
No. of conductors	4		

		N•m	2,5
Ø 3.5 mm (0.14 in.)		lb-in	22.12

KT20 400

		N•m	3
Ø 3.5 mm (0.14 in.)		lb-in	26.55

Fig. 13. Suitable wiring for power supply - **KT20 400 V / KT20 230 V / KT30**

Pitch 17,8 mm (0.70 in.)

$\frac{\text{mm}}{\text{in.}}$ 7 0.28			
mm ²	25	25	25
AWG	7	7	7
No. of conductors	4		

		N•m	4
Ø 3.5 mm (0.14 in.)		lb-in	35.40

KT40

		N•m	4
Ø 3.5 mm (0.14 in.)		lb-in	35.40

Fig. 14. Suitable wiring for power supply - **KT40**

Pitch 17,8 mm (0.70 in.)

$\frac{\text{mm}}{\text{in.}}$ 7 0.28			
mm ²	35 + 25	35 + 25	35 + 25
AWG	2 + 3	2 + 3	2 + 3
No. of conductors	3 (35) + 1 (25)		

		N•m	4
Ø 3.5 mm (0.14 in.)		lb-in	35.40

Fig. 15. Suitable wiring for power supply - **KT60**

N.B.: For models **KT3 / KT5 / KT10 / KT10 230 / KT20** wiring is directly at the fuse holder, while for the other models it is directly at the disconnecter.

⚡ ⚠ DANGER

RISK OF ELECTRIC SHOCK

- Switch off all equipment, including any connected devices, before removing any covers or hatches, or before installing or uninstalling accessories, hardware, cables or wires.
- Always use a correctly calibrated voltmeter to check the system is switched off.

	KT3	KT5	KT10	KT10 230 V	KT20
Current	16	16	16	32	32
Type	Fast	Fast	Fast	Fast	Fast
Dimension	10x38	10x38	10x38	10x38	10x38

Fig. 16. Overload protection devices according to model

6.2.2 Replacing fuses - Fuse holder

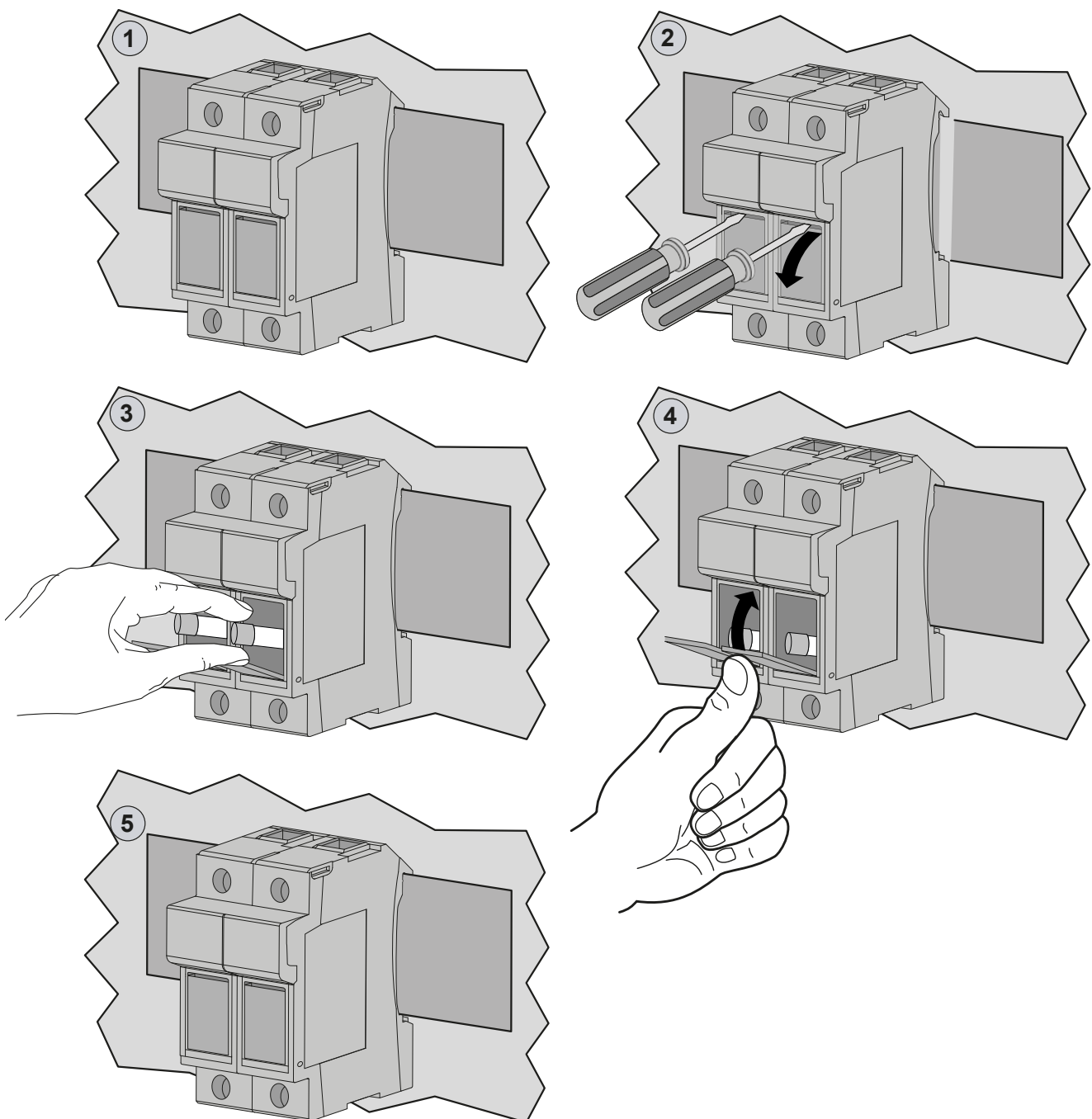


Fig. 17. Overload protection devices

N.B.: Only for models **KT3/KT5/KT10/KT10 230/KT20 400**.

6.2.3 Replacing fuses - Control board

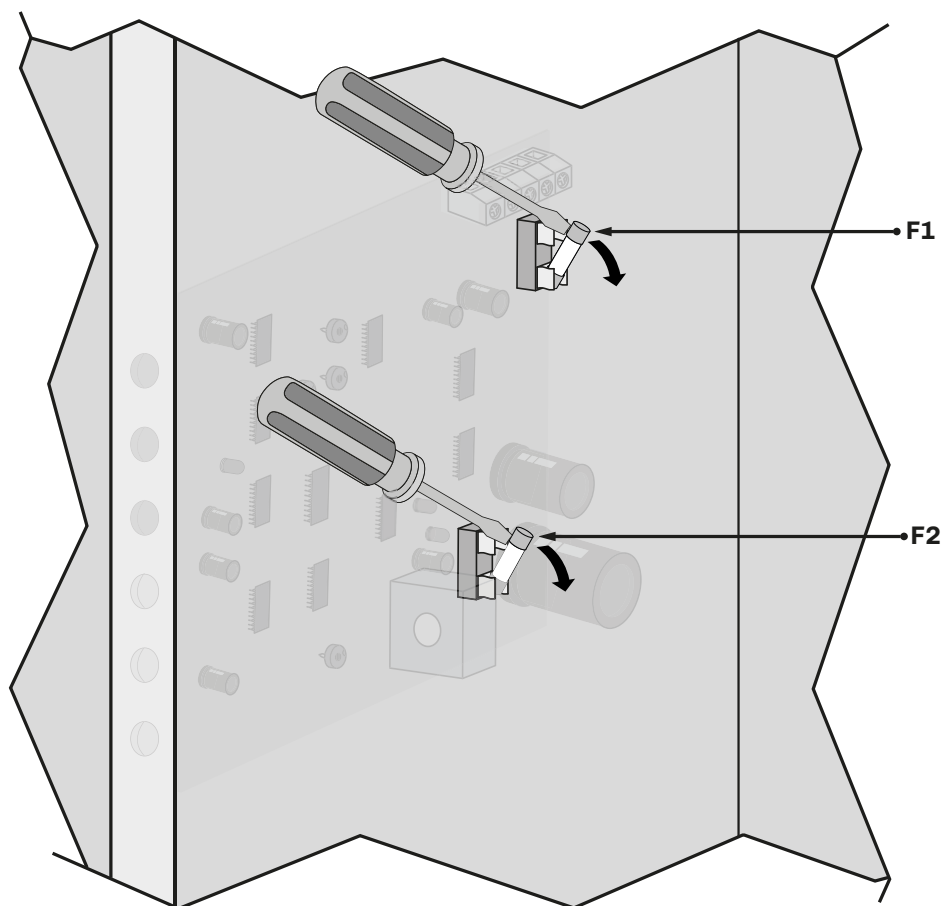


Fig. 18. Protection devices on the control board

Reference	Function	Description
F1	Terminal block M1	Protection against overload of auxiliary terminal block M1
F2	Transformer	Protection against overload of amperometric transformer

6.3 Wiring diagrams

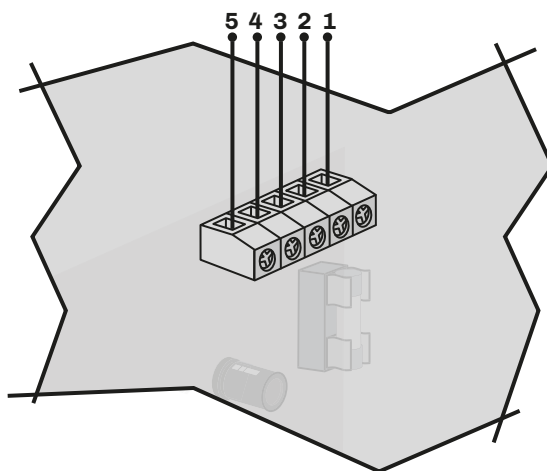


Fig. 19. Auxiliary terminal block M1

6.3.1 Connection with ON/OFF humidistat

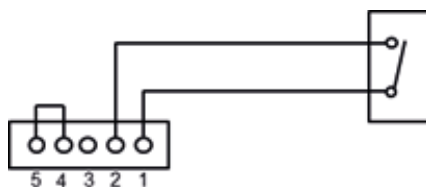


Fig. 20. Wiring diagram with ON/OFF humidistat

TERMINALS	
1	Connection with voltage-free contact
2	Connection with voltage-free contact
3	No connection (N.C.)
4-5	Short-circuiting

6.3.2 Connection with humidistat with voltage output, ON/OFF and proportional

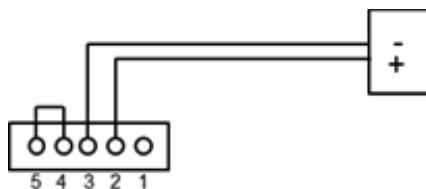


Fig. 21. Wiring diagram with humidistat with voltage output, ON/OFF and proportional

TERMINALS	
1	No connection (N.C.)
2	Connection with humidistat analogue output (+)
3	Connection with humidistat analogue output (-)
4-5	Short-circuiting

The humidifier has an analogue input 0...12 Vdc. Contact the ELSTEAM sales office for other configurations.

6.3.3 Connection with humidistat with resistive output

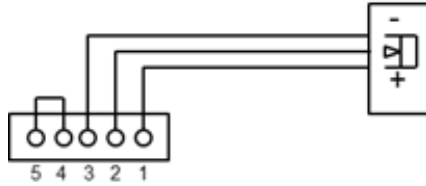


Fig. 22. Wiring diagram with humidistat with resistive output

TERMINALS	
1	Connection with humidistat resistive output (+)
2	Connection with humidistat resistive output cursor
3	Connection with humidistat resistive output (-)
4-5	Short-circuiting

The electrical resistance between terminal 2 (cursor) and terminal 1 (+) increases as the relative humidity of the room increases, while the resistance between terminal 3 (cursor) and terminal 3 (-) decreases.

6.3.4 Connection with humidistat which suspends humidification when ventilation is suspended

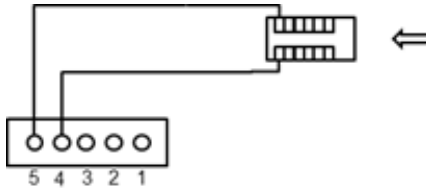


Fig. 23. Wiring diagram with humidistat which suspends humidification when ventilation is suspended

TERMINALS	
1	Depends on the type of connection (see section "6.3 WIRING DIAGRAMS" ON PAGE 22)
2	
3	
4	Connection with contactor AUX output
5	Connection with contactor AUX output

This connection should only be made with humidifiers in centralised and ducted ventilation systems. It interrupts steam production whenever air ventilation in the ducts ceases. If it were not interrupted, steam would build up in the ducts, causing irregular condensate and, as a result, water may leak out.

7. USER INTERFACE AND INITIALISATION

Check that the humidifier and all the installed parts are correctly connected before starting up, in compliance with regulations, criteria and all the applicable local, regional and national standards.

7.1 How the LEDs work

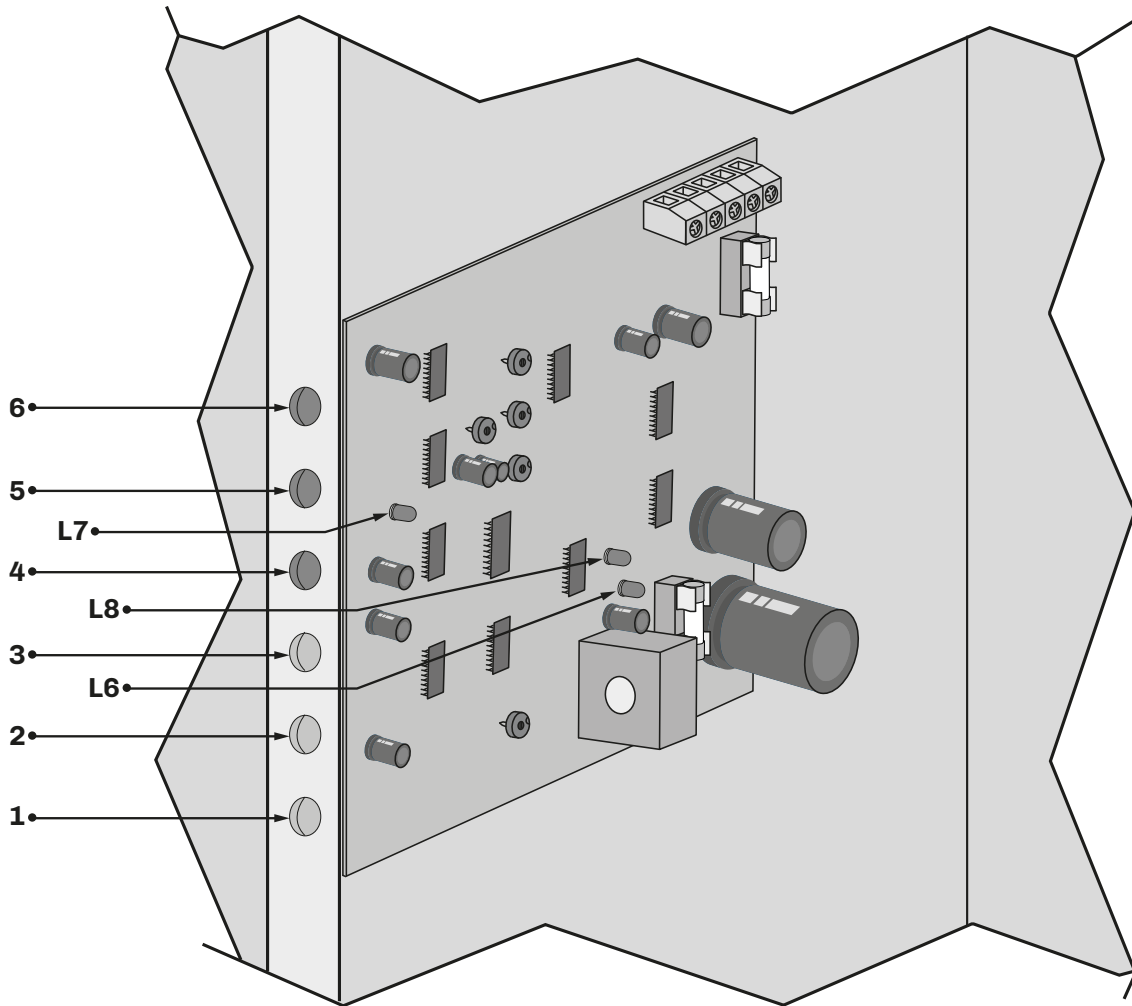


Fig. 24. LED interface

LED	Colour	Function	Description
1	Green	Power supply	When it is on, it indicates the device is switched on, that the terminals are receiving power and that the control circuit is operational.
2	Green	Request	The brightness of this LED is proportional to the humidistat request. The brighter it is, the more humidity the regulation circuit needs. This request can be modified by changing the potentiometer setting.
3	Green	Production	This LED lights up as soon as the device begins producing steam. Its brightness is proportional to the steam production. When the humidifier is working properly, the brightness of LEDs 2 and 3 should be the same.
4	Red	Change water	If this LED remains on for a long time, it indicates that the water has not been changed or has not been changed correctly. If this happens, consult section "Faults and malfunctions". The machine will continue to produce steam even if this LED is lit up.
5	Red	High production	The humidifier is producing more steam than requested. The alarm is reset manually by restarting the humidifier. This usually happens when the humidifier is unable to discharge the water. The humidifier needs to be serviced and the whole drainage circuit cleaned.
6	Red	Leakage	This means there is a water leakage inside the humidifier and that water has collected on the bottom of the cabinet. A probe prevents more water being fed into the system. Steam is produced normally until there is no more water in the cylinder.
L6	Red	Contactors	This comes on when the contactor is active. It goes off when the contactor is deactivated. If it stays on but the contactor is not activated (upon request): 1) Fuse F2 has blown; 2) The contactor coil is not working; 3) The voltage transformer is not working; 4) The electronic board is not working.

LED	Colour	Function	Description
L7	Red	Solenoid valve	<p>ON when the solenoid valve is active. If it stays ON when the solenoid valve is OFF:</p> <ol style="list-style-type: none"> 1) The solenoid valve is not working; 2) The solenoid valve filter or the external filter is blocked; 3) There is no mains water; 4) The electronic board is not working.
L8	Red	Feed water	<p>This LED comes on when the water is first fed into the system after being discharged. It goes off as soon as the absorbed intensity is around 1 A. If it stays on and no water is fed into the system and no steam is produced (despite a request being made), check the contactor.</p>

7.2 Switching on and starting up

DANGER

RISK OF ELECTRIC SHOCK, EXPLOSION OR ELECTRIC ARC

- Do not install the equipment while the power supply is connected.
- Switch off all equipment and remove the power fuses, including any connected devices, before removing any covers or hatches, or before installing or uninstalling accessories, hardware, cables or wires.
- Always use a correctly calibrated voltmeter to check the system is switched off.
- Do not touch the unshielded components or the terminals while they are live.
- Make sure the equipment is properly earthed and if it is not, earth it.
- Before applying voltage to the equipment:
 - Make sure all protective elements, such as covers, hatches and grilles, are fitted and/or closed.
 - Check all wiring connections.

NOTICE

MALFUNCTIONING OF THE EQUIPMENT

- Check the water supply has been correctly connected.
- Check there are no siphons in the drainage duct.
- Check the ties on the steam outlet have been correctly tightened.
- Check there are no condensation pockets or obstructions in the steam supply pipe.

To start up the humidifier (with the humidistat connected):

- Check the feeding and discharging systems and the steam supply pipe (see "**5.2 WATER CONNECTIONS" ON PAGE 13**, "**5.3 WATER DISCHARGE SYSTEM" ON PAGE 13** and "**5.4 STEAM DISTRIBUTION IN AN AHU OR DUCT" ON PAGE 14**);
- **For models with fuses:** Insert the power fuses - **For models with a disconnecter:** Activate the internal disconnecter;
- Connect the humidistat according to the operating mode (see "**6.3 WIRING DIAGRAMS" ON PAGE 22**);
- Check there is a voltage-free contact or a short circuit ("bridge") between terminals 4-5 of terminal block M1, see "**6.3 WIRING DIAGRAMS" ON PAGE 22**;
- Close the panels of the humidifier;
- Activate the disconnecter installed on the outside of the humidifier and open the water;
- Press the ON/OFF key on the front of the humidifier to start it up;
- Set the humidity request setpoint to 100%, LEDs 1 and 2 will come on;
- The humidifier will start a water feed cycle (LED 4 will come on when feeding) and a discharge cycle (LED 6 will come on when discharging);
- When it is fully discharged (LED 6 will go off), set the humidity request setpoint as required;
- Upon receiving the humidity request, the humidifier begins feeding water into the boiler until it reaches the minimum level that guarantees rapid steam production.
- The humidifier regularly discharges all the water and refills again, performing a washing cycle to ensure optimal operating conditions.

8. OPERATION

8.1 Regulating and calibrating the potentiometers

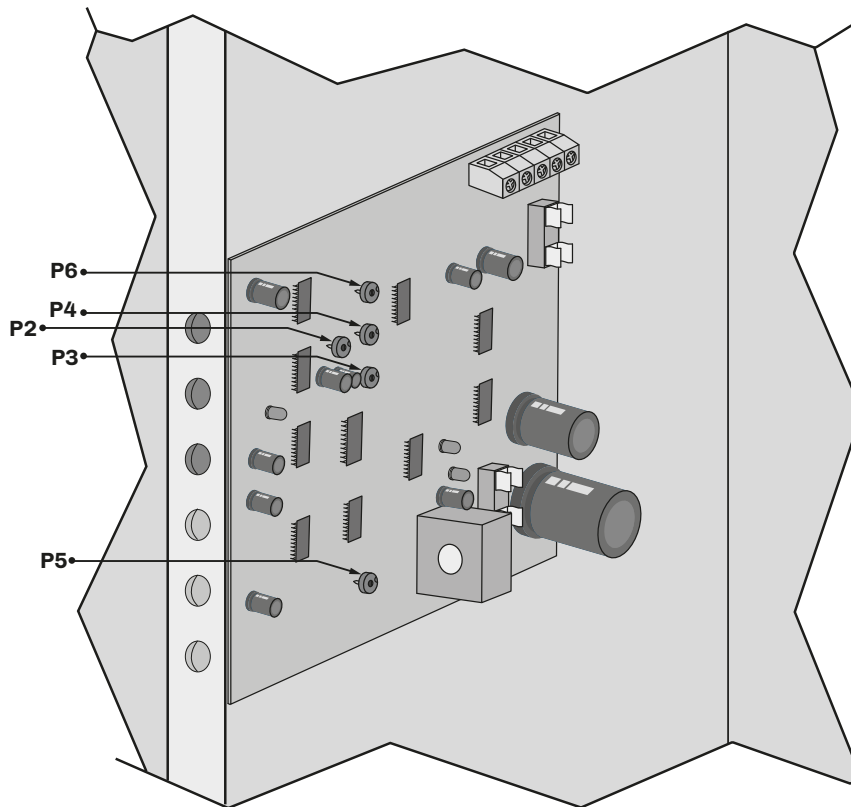


Fig. 25. Position of potentiometers

Potentiometer...	Description
P2	Controls the sensitivity of the humidifier to humidistat requests. Potentiometer P2 reduces the output of the connected humidistat: when turned anticlockwise, it takes the request to zero, when turned completely clockwise, it introduces the humidistat request in full. Potentiometers P2 and P4 adapt the signal when the voltage is not 0.1...6 V, so it is compatible with the humidifier.
P3	Reserved.
P4	Potentiometer P4 increases the humidistat request, taking it to a maximum of 6 V. To calibrate potentiometers P2 and P4 , see " 7.2 SWITCHING ON AND STARTING UP " ON PAGE 25.
P5	Determines the duration of the intervals for feeding water into the humidifier. When turned clockwise, it feeds water less frequently so less steam is produced.
P6 (If fitted)	Potentiometer P6 controls a signal if its voltage is different from the humidifier input. For example with a signal of 7...10 V: <ul style="list-style-type: none"> • When the machine is operating, set the humidistat at the maximum humidity request; • Regulate potentiometers P2 and P4 to obtain the required steam production; • Set the humidistat to no request; • Turn potentiometer P6 until the humidifier power contactor is de-energized.

N.B.: The potentiometers are calibrated in the factory. Please contact ELSTEAM customer service for custom calibration. This can only be done by personnel authorised by ELSTEAM. ELSTEAM shall not be liable for any effects caused by non-authorized personnel tampering with the potentiometers.

NOTICE

MALFUNCTIONING OF THE EQUIPMENT

The equipment must be used and calibrated only by qualified personnel authorised by ELSTEAM.

8.2 Manual water discharge

If the humidifier must be switched off for long periods of time, the following steps must be taken:

- Switch off the humidifier by pressing the ON/OFF key on the front panel;
- Switch it back on by pressing the ON/OFF key;
- The humidifier will start loading water (LED 4 Red on);
- Wait until LED 4 Red goes off and LED 6 Red comes on;
- The boiler will begin the discharging procedure (emptying it of water);
- Switch the humidifier off before it has discharged all the water.

9. MAINTENANCE

DANGER

RISK OF ELECTRIC SHOCK, EXPLOSION OR ELECTRIC ARC

- Before carrying out any work on the humidifier, including any kind of maintenance, it must be disconnected from the power supply.
- The maintenance, repair, installation and use of the equipment must be carried out by qualified personnel only.

WARNING

RISK OF BURNS

Before carrying out any work on the system, disconnect the humidifier and wait until it has cooled down (< 50 °C (122 °F)).

9.1 Introduction

The humidifiers in the **KT series** are designed to operate with the "**5.2.1 CHARACTERISTICS OF WATER**" ON PAGE 13.

If they are different or if the water becomes increasingly hard, approaching the maximum value of 50 °f, the humidifier will require more regular maintenance.

The boiler supplied should be serviced and cleaned every season in the following conditions:

Water conductivity	Water hardness
200...600 µS/cm	10...30 °f

It is impossible to say precisely how often maintenance should be carried out, as it depends to a large extent on the composition of the water used, which can differ even when the characteristics (conductivity and hardness) are the same.

If the humidifiers in the **KT series** are used with water with more extreme characteristics such as, for instance:

Water conductivity	Water hardness
700...1250 µS/cm	35...50 °f

and more frequent maintenance is required (in extreme cases even every week), a special boiler (p/n **BKTHC**) (optional) can be installed which is designed and built to work in critical water conditions.

Using the special boiler will reduce the frequency of maintenance and cleaning which, again, cannot be calculated purely by the conductivity and hardness of the water.

NOTICE

MALFUNCTIONING OF THE EQUIPMENT

The humidifier must only be used with water with the characteristics given in this manual.

If the boiler needs frequent maintenance, check the quality of the input water.

The boiler must be replaced immediately when:

- The outlet water is very dark (reddish/black) and corrosion is beginning to appear on the electrodes (*) due to overly aggressive concentrated water;
- The humidifier frequently discharges all the water (several times an hour); the humidifiers in the **KT series** normally replace the water in the boiler in relation to the amount of steam produced.
N.B.: A high concentration of salt in the boiler water can lead to high electric conductivity which can trigger different high current alarms and, as a result, frequent discharges.
- The boiler has reached 5 seasons or 24 months of continuous operation with maintenance performed as indicated;
- Large quantities of limescale build up. This causes an alteration in the colour and surface of the outside of the boiler due to overheating because the deposits grow so much they attach to the sides of the boiler;
N.B.: It is quite normal for there to be limescale, even in large amounts, inside the boiler as it is collected from the water. The boiler must therefore be serviced and cleaned regularly in order to ensure correct operation.

NOTICE

MALFUNCTIONING OF THE EQUIPMENT

All boiler maintenance must be carried out following the instructions in the Maintenance chapter of this manual.

(*): The electrodes are made of AISI316 steel and the parts in engineering plastic are self-extinguishing.

- Water starts leaking from the boiler because it is broken or cracked.
N.B.: The water inside the boiler is electrically charged so water leaking from the boiler is dangerous.

 **DANGER**

RISK OF ELECTRIC SHOCK, EXPLOSION OR ELECTRIC ARC

- Before carrying out any work on the humidifier, including any kind of maintenance, it must be disconnected from the power supply.
- If water begins leaking from the boiler, disconnect the humidifier immediately from the mains.

- If anything unusual or irregular happens which is not described in this manual, service the boiler and/or replace it. Contact ELSTEAM Customer Service for advice and instructions;

 **DANGER**

RISK OF ELECTRIC SHOCK, EXPLOSION OR ELECTRIC ARC

If anything unusual or irregular happens, disconnect the humidifier immediately from the mains.

- After extended operation and/or due to the water used, limescale can build up inside the boiler, bringing the electrodes closer together or to the walls of the boiler. They can potentially become electrical conductors which, when there is no water in the boiler, can cause the temperature to rise (and the surface of the boiler to become black) and the boiler wall to melt (with electrically charged water leaking out);

 **DANGER**

RISK OF ELECTRIC SHOCK, EXPLOSION OR ELECTRIC ARC

If water begins leaking from the boiler, disconnect the humidifier immediately from the mains.

Checking the condition of the humidifier

Carry out the following controls as shown:

When...	What to do...
When starting up	Check there are no leaks after one hour of continuous operation.
When changing parts	Check there are no leaks after one hour of continuous operation.
Every 3 days	<ul style="list-style-type: none"> • Check the humidifier is operating correctly (according to the indications given in this manual); • Check there are no leaks in the hydraulic system; • Check everything appears to be working properly.
Every 30 days	<ul style="list-style-type: none"> • Check there are no obstructions when discharging water; • Check the water drains correctly; • Remove any limescale in the drain.
Every 60 days	<ul style="list-style-type: none"> • Check the build-up of limescale inside the boiler is not excessive; • Wash the inside of the boiler with 20% acetic acid, cleaning the electrodes and the surface of the boiler. • If necessary, replace the electrodes and seals.
Every 2 years (*)	Replace the boiler.
Every 5 years (**)	Replace the boiler.

(*) **N.B.:** If the humidifier is used continuously.

(**) **N.B.:** If the humidifier is used seasonally.

9.2 Periodical cleaning of the product and parts

- Discharge water from the humidifier (see "**8.2 MANUAL WATER DISCHARGE" ON PAGE 26**);
- Turn off the power from the machine using the external disconnecter;
- Open the panels of the humidifier as described "**4.3 INSTALLATION" ON PAGE 12**;
- Unscrew the tie that blocks the inspection cap;
- Remove the plug and clean the humidifier of any limescale;
- Put the inspection cap and the tie back in place.
- Unscrew the two screws on the top of the humidifier and disconnect the solenoid valve that feeds the water.

9.3 Cleaning the boiler

- Discharge water from the humidifier (see **"8.2 MANUAL WATER DISCHARGE" ON PAGE 26**);
- Turn off the power from the machine using the external disconnecter;
- Open the panels of the humidifier as described **"4.3 INSTALLATION" ON PAGE 12**;
- Disconnect the electrode cables from the contactor;
 - Take care not to damage the amperometric transformer (AT) on the electronic board;
- Disconnect the steam supply pipe at the top of the boiler;
- Disconnect the sleeve connector at the bottom of the boiler;
- Unscrew the two screws on the top of the humidifier and disconnect the solenoid valve that feeds the water.
- Lift the boiler up slightly until it comes off its supports at the bottom and pull it straight out of the cabinet;
- Place the boiler in a bucket with a solution of citric acid or acetic acid overnight (the boiler must be completely filled with the solution);
- Remount the boiler.

9.4 Cleaning the optional stainless steel drain tank (accessory)

- Disconnect the basin from the drain;
- Remove the basin from the bottom of the humidifier;
- Remove any built-up limescale and clean the basin under running water;
- Place the basin back in its original position and reconnect to the drain.

9.5 Replacing the boiler

- Discharge water from the humidifier (see **"8.2 MANUAL WATER DISCHARGE" ON PAGE 26**);
- Turn off the power from the machine using the external disconnecter;
- Open the panels of the humidifier as described **"4.3 INSTALLATION" ON PAGE 12**;
- Unscrew the tie that blocks the inspection cap;
- Remove the plug and clean the humidifier of any limescale;
- Put the inspection cap and the tie back in place.
- Unscrew the two screws on the top of the humidifier and disconnect the solenoid valve that feeds the water;
- Lift the boiler up slightly until it comes off its supports at the bottom and pull it straight out of the cabinet;
- Insert the new boiler as described **"9.6 INSTALLING THE BOILER" ON PAGE 29**;
- Depending on the model of KT humidifier installed, make sure the cable connections from the boiler are tightened properly (see **"6. ELECTRICAL CONNECTIONS" ON PAGE 18**);
- Make sure the cable that goes from the boiler to the contactor goes through the transformer AT.

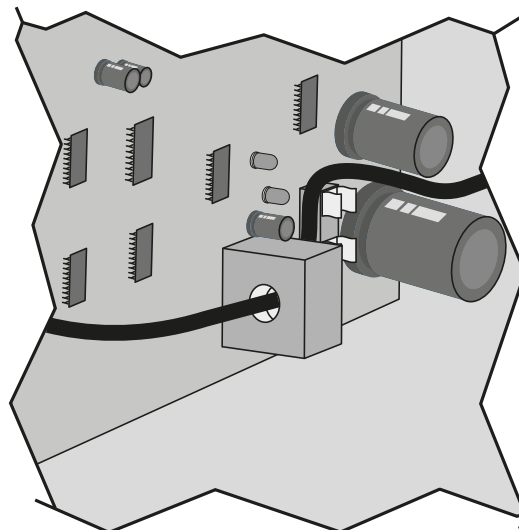


Fig. 26. Passing the cable through the AT

9.6 Installing the boiler

- Place the boiler on its supports;
- Connect the solenoid valve to feed the water and screw the two screws on the top of the humidifier tight;
- Insert the inspection cap and tighten the tie;
- Insert the panels of the humidifier as described **"4.3 INSTALLATION" ON PAGE 12**

10. SPARE PARTS

10.1 Hydraulics

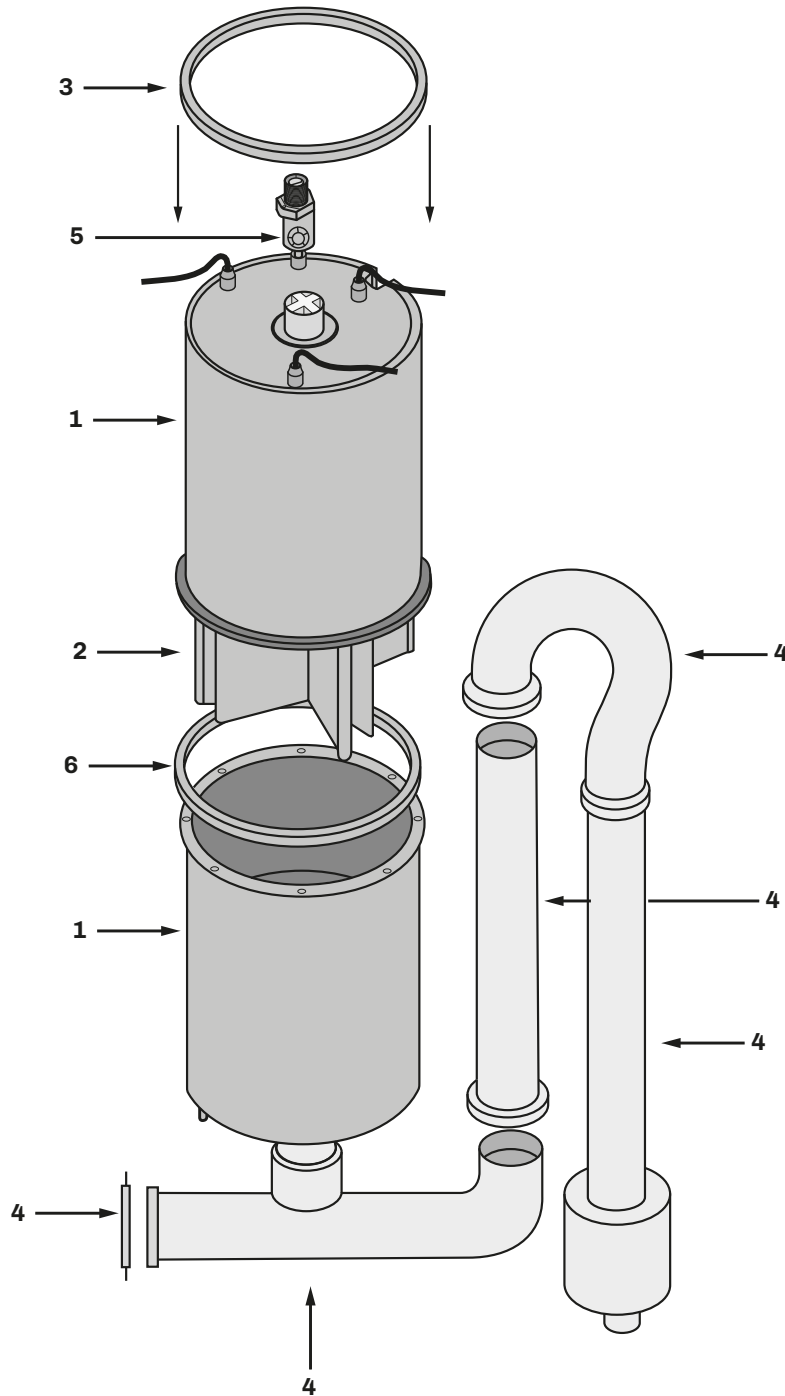
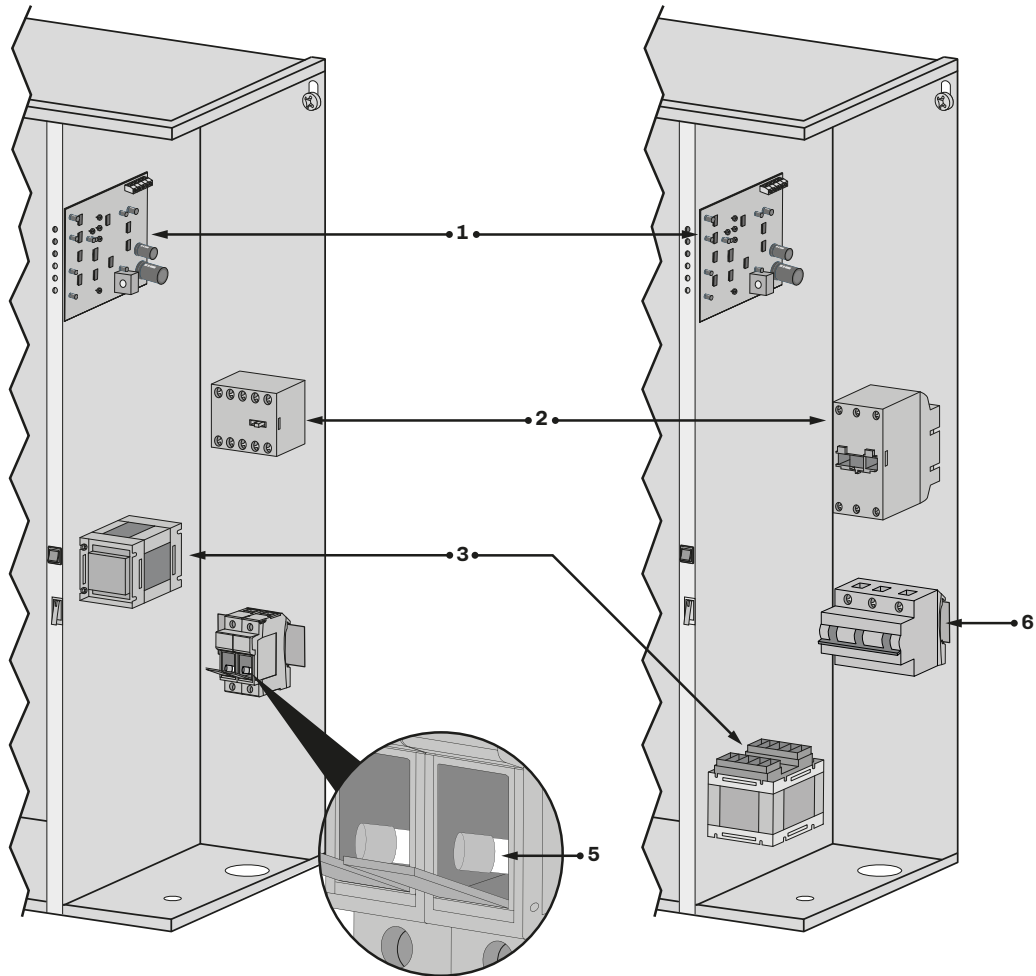


Fig. 27. Spare parts KT series - Hydraulics

Ref.	P/n	Description	Ref.	P/n	Description
1	BKT3	Boiler for KT3 and KT5	5	KTOK03	Solenoid valve kit to feed water
	BKT10	Boiler for KT10	6	BKTK05	Seal kit
	BKT20	Boiler for KT20 and KT40		KTOK05	Brown cable kit for KT20 and KT40
	BKT30	Boiler for KT30 and KT60		KTOK06	Grey/blue cable kit for KT3, KT5 and KT10
	BKTHC	Special boiler for highly conductive water		KTOK07	Black cable kit for KT30 and KT60
2	BKTK01	Two electrodes for KT3 and KT5			
	BKTK02	Three electrodes for models KT10			
	BKTK03	Three electrodes for models KT20 and KT40			
	BKTK04	Three electrodes for models KT30 and KT60			
	BKTK06	Three high conductivity electrodes			
3	KTOK08	Ring and electrode cover kit			
4	KTOK01	Siphon kit for models with one boiler			
	KTOK02	Siphon kit for models with two boilers			

10.2 Electrics



**KT3 / KT10 / KT10 230 /
KT20 / KT5**

**KT20 230 / KT30 / KT40 /
KT 60**

Fig. 28. Spare parts KT series - Electrics

Ref.	P/n	Description
1	KT0K12	Control board
2	0209310001	Contactor for models KT3/KT5/KT10
	0209310002	Contactor for models KT20
	0209310003	Contactor for models KT30/KT40
	0209310004	Contactor for models KT60
3	0101010020	230 Vac transformer for models KT3 230
	0101014020	400 Vac transformer for models KT5/KT10 400/KT20 400/KT30/KT40/KT60
4	0150120001	Fuse holder for models KT3
	0150130001	Fuse holder for models KT5/KT10 400/KT20/KT10 230
5	KT0K10	Fuse kit for models KT3/KT5/KT10
	KT0K11	Fuse kit for KT20
6	0153411020	Disconnecter for models KT3 (*)
	0153421020	Disconnecter for models KT5 (*)
	0153431001	Disconnecter for models KT20 (*)
	0153431003	Disconnecter for models KT30
	0153431004	Disconnecter for models KT40/KT20 230
	0153431005	Disconnecter for models KT60

(*) = For models manufactured up to wk50/2020 (see label with details).

11. WHAT TO DO IF...

1. When the humidifier is switched on, signal 1 "machine on" does not come on.
 - Check the power supply terminals are receiving power;
 - Check the power fuses are in the right position;
 - Check fuse F of the transformer primary is installed correctly;
 - Check the cover of the humidifier electrics is well secured and keeping the "cover closed" micro switch energised;
 - Check the "machine on" switch is pressed down.
2. When the humidifier is switched on, the water supply solenoid valve does not feed water.
 - Check the power supply circuit is open;
 - Check the filter is not blocked;
 - Check the solenoid valve is correctly powered with 12 Vdc;
 - After closing the tap which feeds the water and disconnecting the humidifier from the mains, open the solenoid valve by unscrewing the three screws. Remove all the components, clean the two small holes (approx. 1/2 mm in diameter) on the rubber membrane. Remount the solenoid valve carefully;
 - If this happens after the boiler has been replaced, check inside the boiler that the hole through which the water is fed has been made.
3. When the water has been changed, the machine continues to feed water and signal 4 "water change" stays on. This takes a couple of minutes. The machine then stops feeding water and begins producing steam normally, even though signal 4 remains on. This means that the water has not been changed properly.
 - Check there are no problems with water feeding: filters blocked, incomplete water opening, etc...;
 - Check the siphon drain is not blocked: disconnect the power, open the plug (10) and remove any obstructions.
4. During operation, the humidifier may signal it is overproducing (signal 5 on) and a water change starts up.
 - Check potentiometer P5 is in the right position and turn it clockwise;
 - Reduce the humidistat request by turning potentiometer P2 anticlockwise.
5. During operation, the humidifier feeds water into the vertical siphon hose (7).
 - Reduce the humidistat request (P2) and manually empty the vertical hose.

12. WIRING DIAGRAMS

12.1 Models KT3

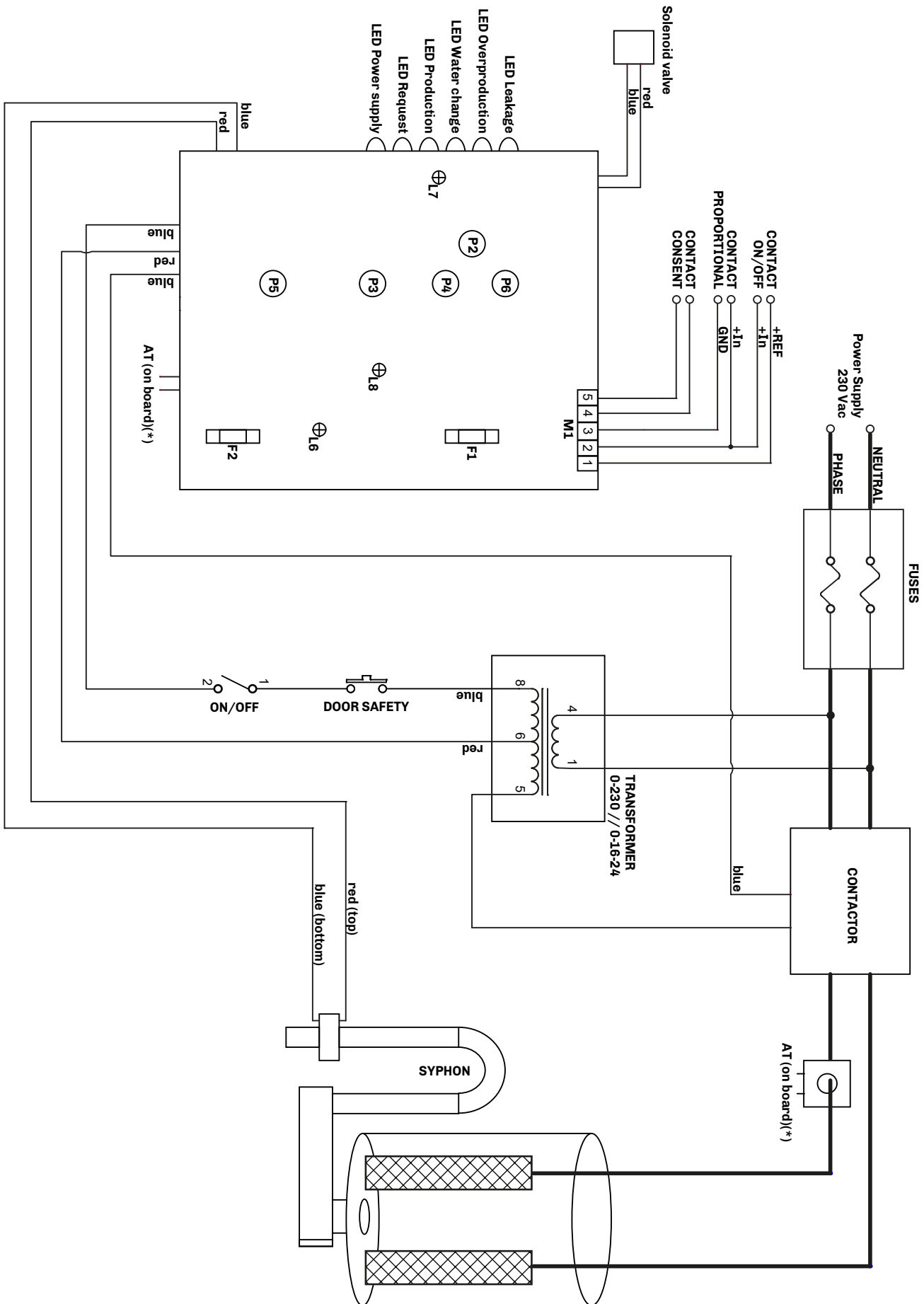


Fig. 29. Wiring diagram models KT3

12.2 Models KT5-400

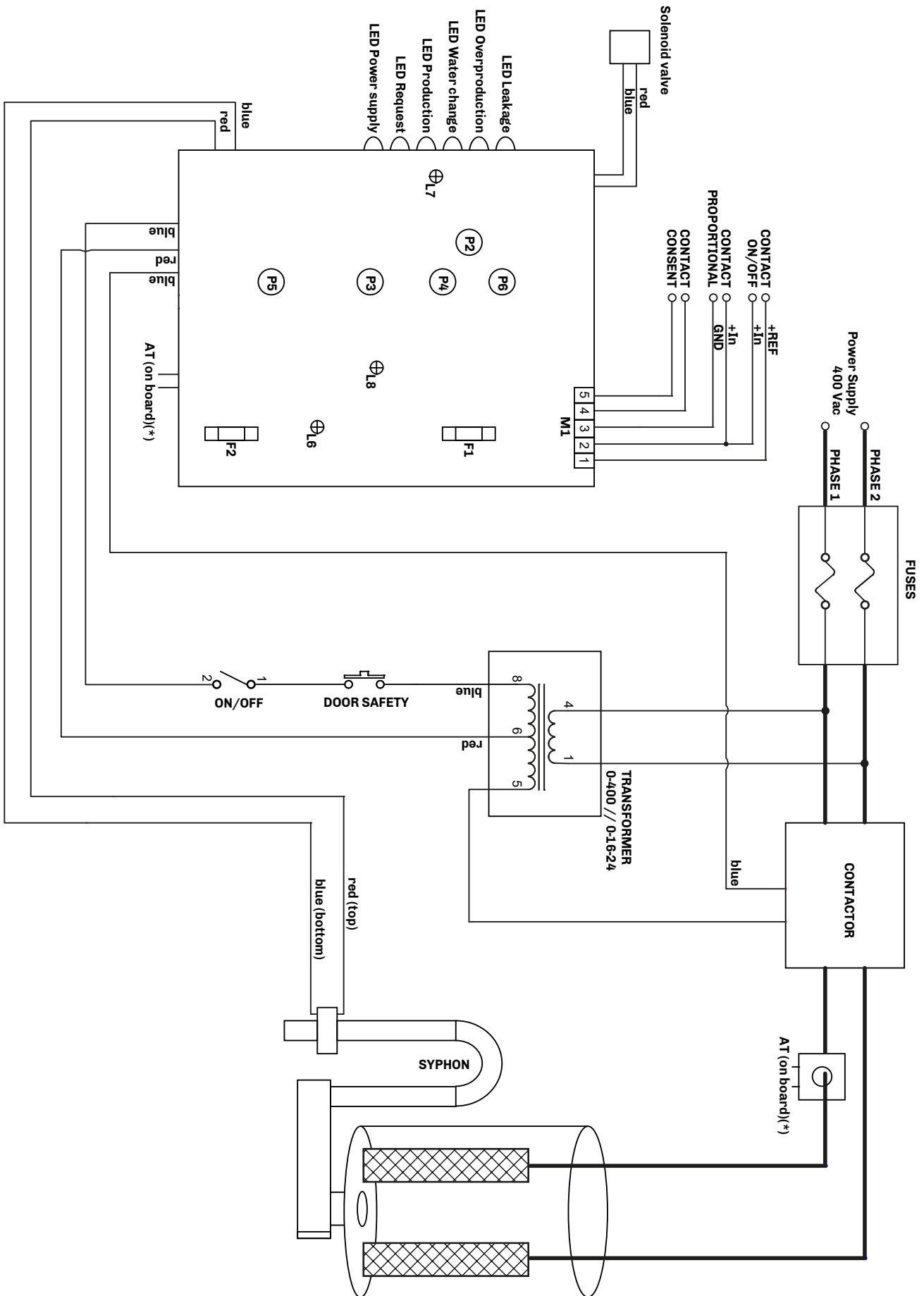


Fig. 30. Wiring diagram models KT5-400

12.3 Models KT10-230

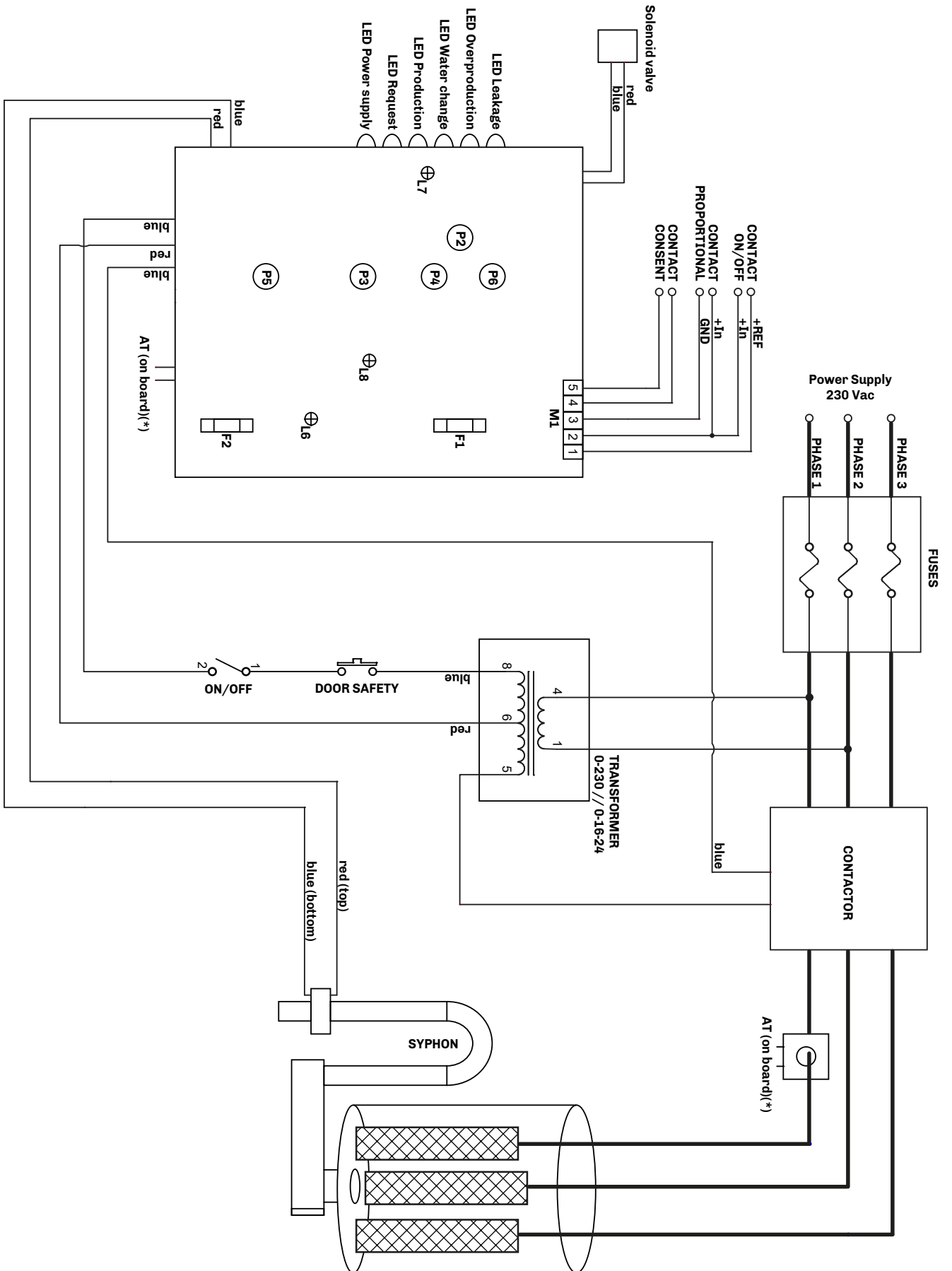


Fig. 31. Wiring diagram models KT10-230

12.4 Models KT10-400 / KT20-400

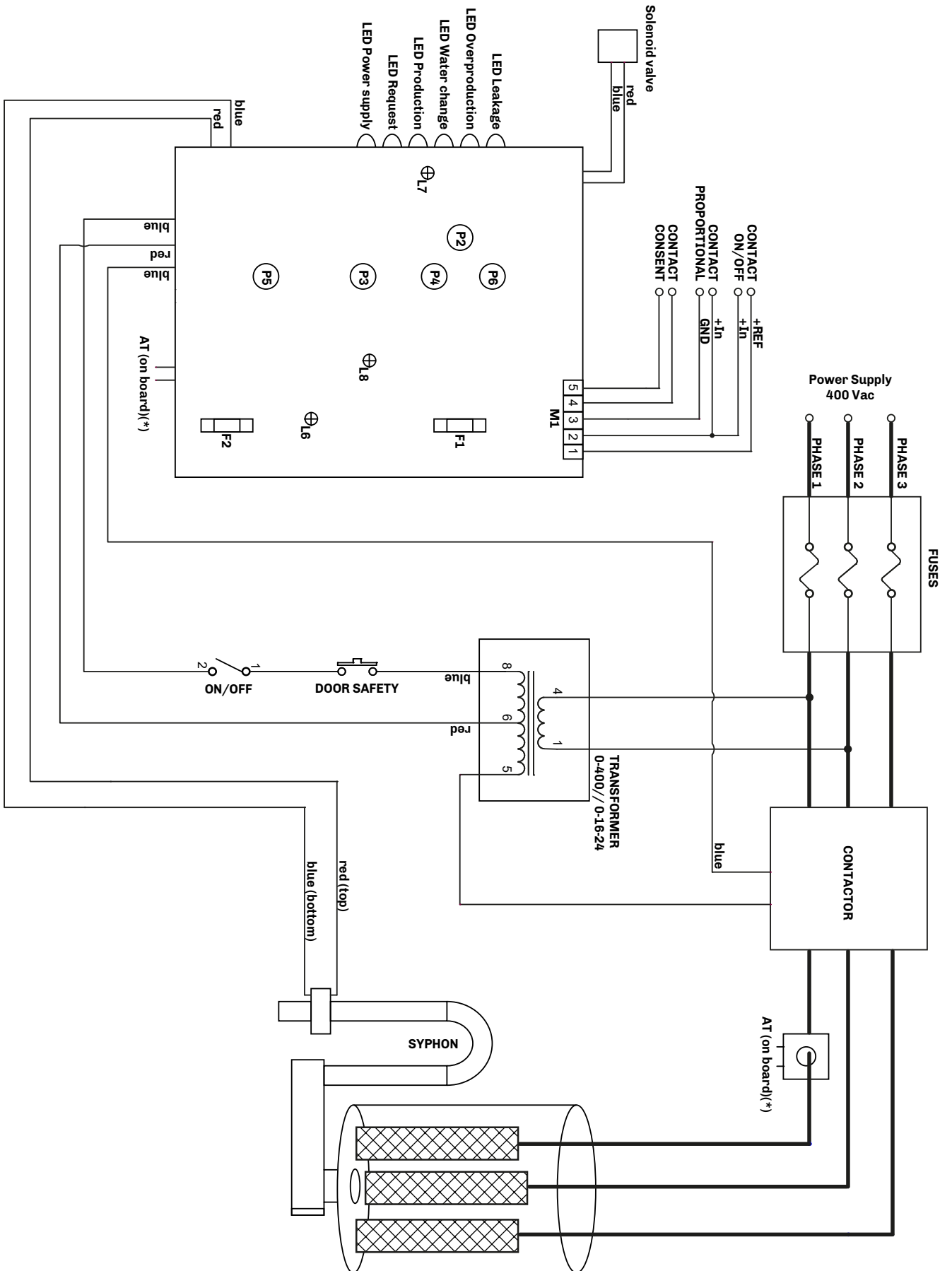


Fig. 32. Wiring diagram models KT10-400 / KT20-400

12.5 Models KT20-230

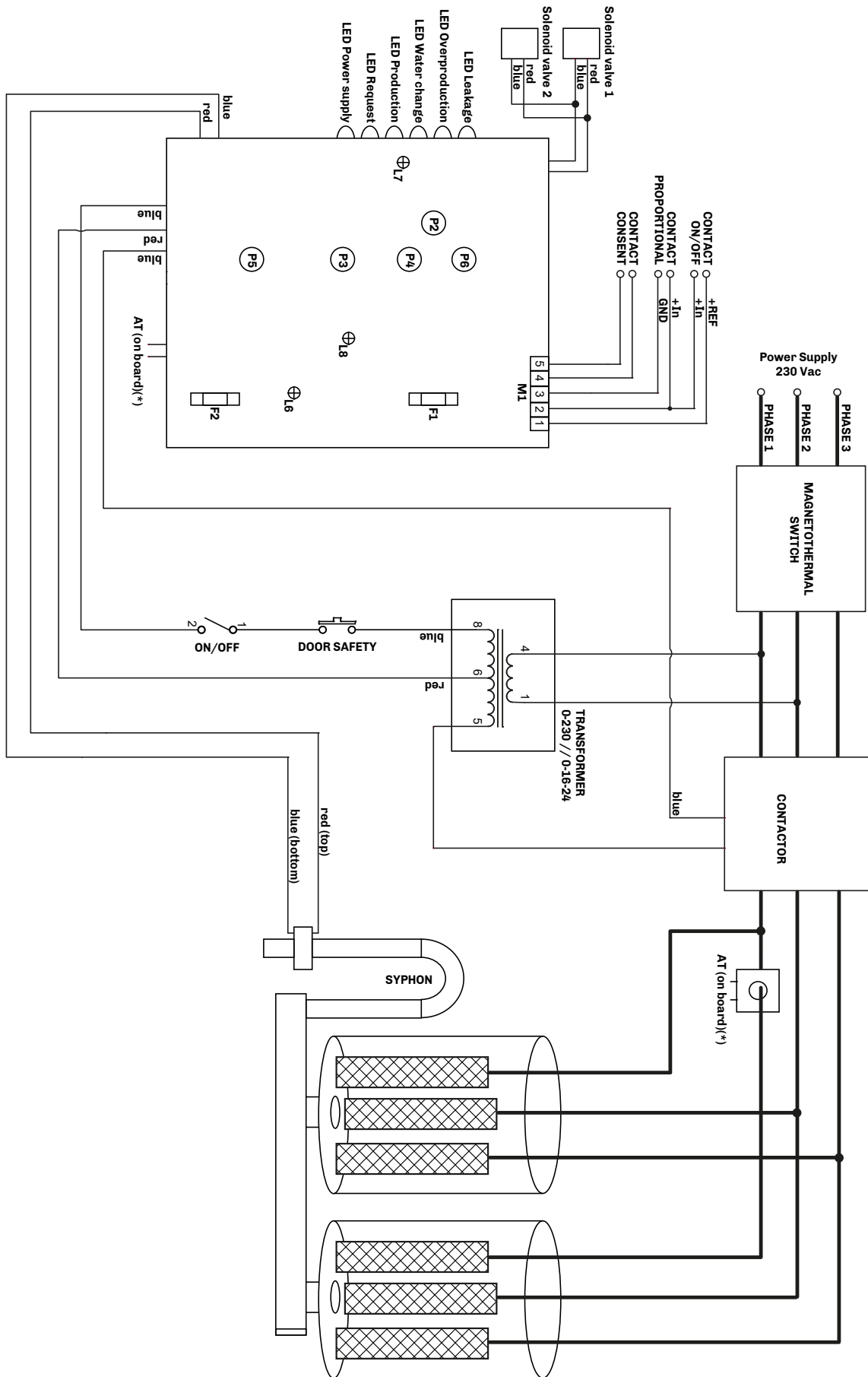


Fig. 33. Wiring diagram models KT20-230

12.6 Models KT30-400

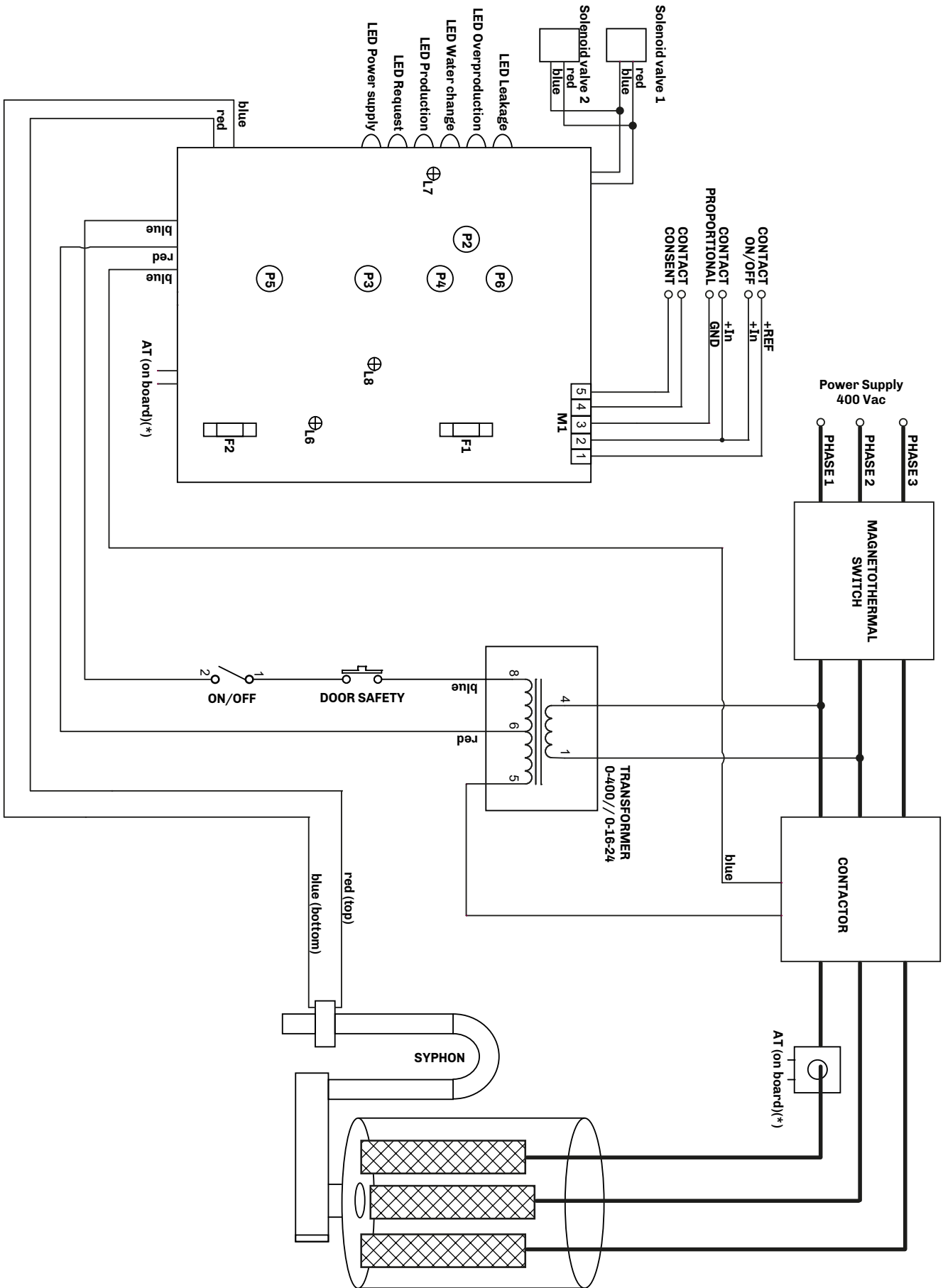


Fig. 34. Wiring diagram models KT30-400

12.7 Models KT40-400 / KT60-400

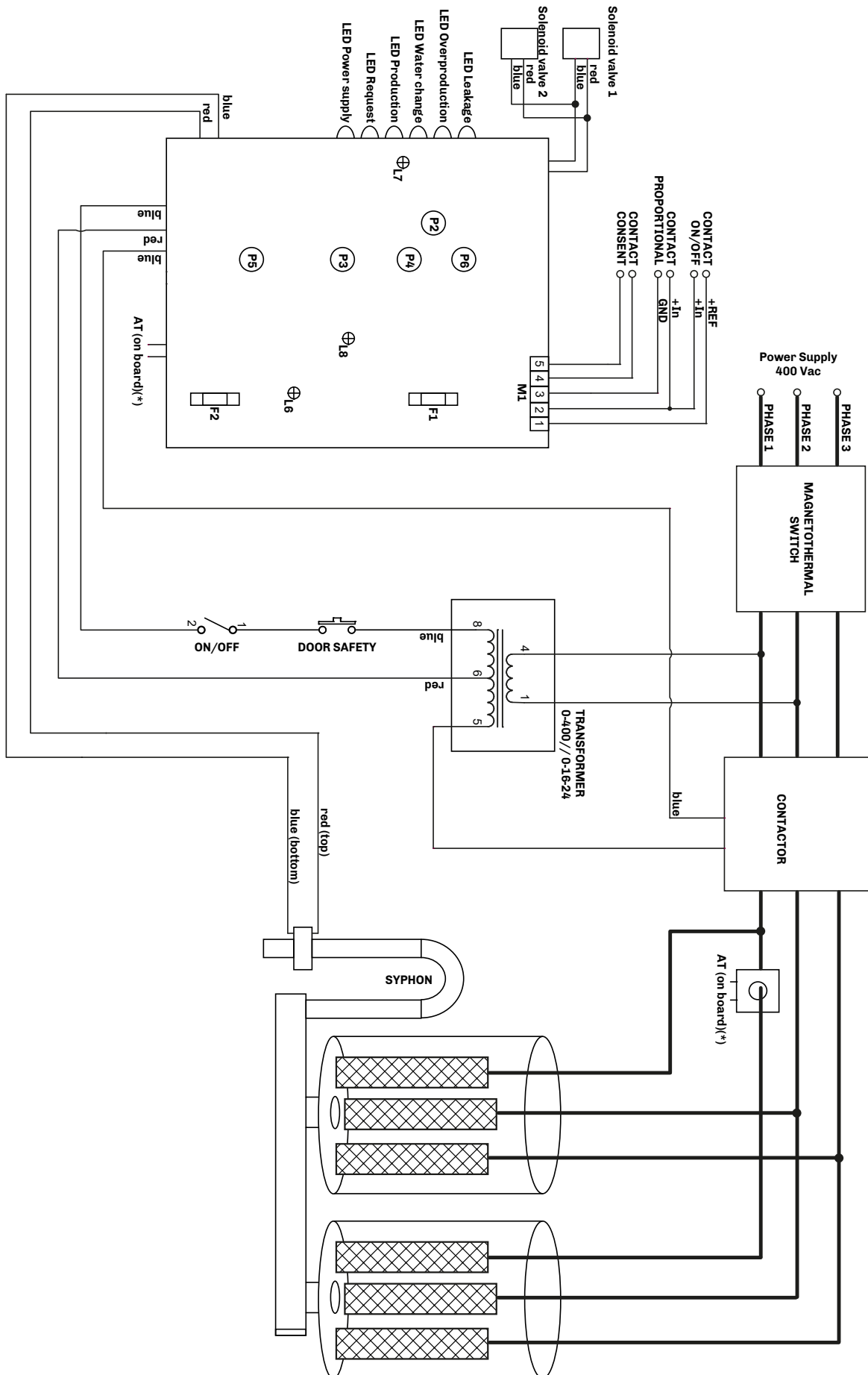


Fig. 35. Wiring diagram models KT40-400 / KT60-400

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MADE IN ITALY

ELSTEAM S.r.l.

Via Enrico Fermi 496, 21042,
Caronno Pertusella (VA) ITALY

Telephone: +39 02 9659890

Fax: +39 02 96457007

Email: info@elsteam.it

Web: www.elsteam.com

