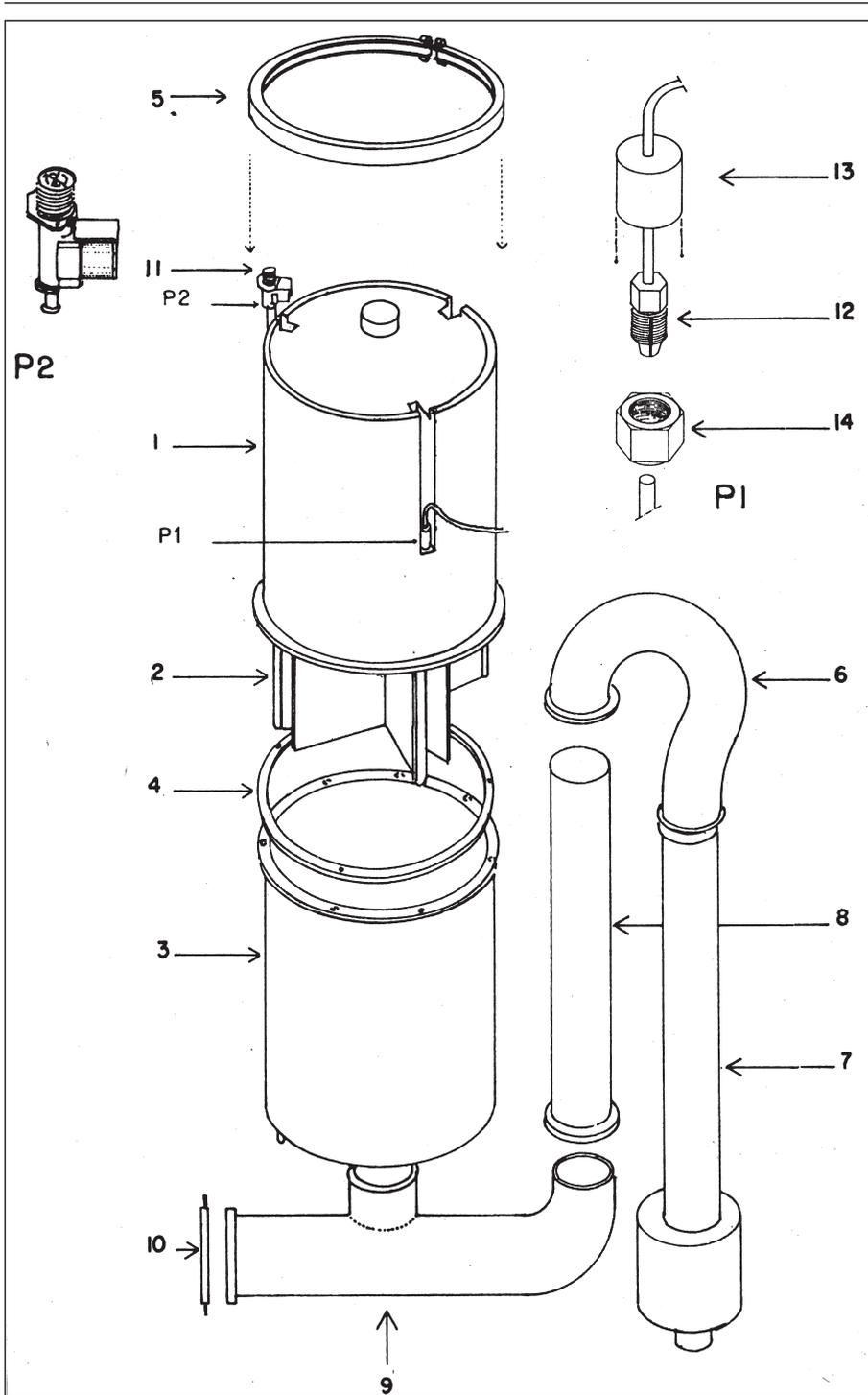


**“KT” STEAM HUMIDIFYER
OPERATOR’S MANUAL
USE AND SERVICE**

“KT” STEAM HUMIDIFYER

OPERATOR’S MANUAL

USE AND SERVICE



Air Steam Humidifier

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1.1 Installation dimensions

Humidifiers

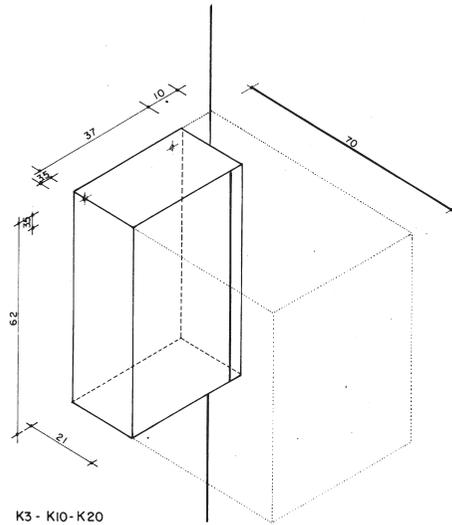
KT3 single phase

KT5 biphas

KT10 triphase

KT20 triphase

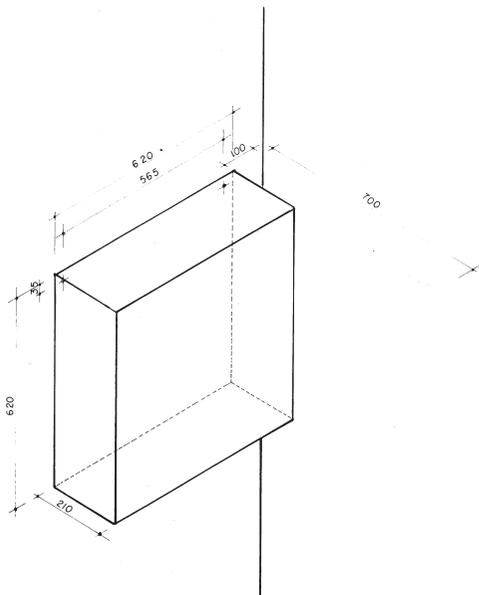
KT30 triphase



K3 - K10 - K20

KT40 triphase

KT60 triphase



9.1 Spare parts

- | | |
|--------------------------------|-----------------------------------------------------------------------------------------------------|
| 1.1 Boiler upper part | 1.1.M - single phase
1.1.T - triphase |
| 2.1 Stainless steel electrodes | 1.1.M - single phase
2.1.T1 - triphase K10
2.1.T2 - triphase K20/K40
2.1.T3 - triphase K60 |
| 3.1 Boiler lower part | |
| 4.1 Silicon rubber O-ring | |
| 5.1 Metal ring kit | |
| 6.1 Rubber curv for syphons | |
| 7.1 Syphon | |
| 8.1 Moplen pipe | |
| 9.1 Rubber manifold | |
| 10.1 Ispection plug | |
| 11.1 Infet water electrovalve | |
| 12.1 Complete power cable | |
| 13.1 Plastic protection | |
| 1.E Electronic card | |
| 2.E Power contactor | 2.E.3 single phase
2.E.10 - K10
2.E.20 - K20
2.E.40 - K40
2.E.60 - K60 |
| 3.E Trasformer | 3.E.3 - single phase
3.E.T - triphase
3.E.T5 - triphase K40/K60 |
| 4.E Power connecting cable | |
| 5.E Power fuses holder | 5.E.M - single phase
5.E.T - triphase |
| 6.E Earth plugging | |
| 7.E Trasformer fuses hobler | |

8.1 How Elsteam humidifier works

The humidifier washes the boiler and the idraulic system completely, removing all the limestone, to avoid air pollution coming from water which remained too long in the boiler.

At the same time, the electronic card tests the entire system: water drain, water feeder. It points out eventual troubles with lights.

If the water change procedure in the boiler is not correct within 5 minutes, the machine stops the attempt automatically, switches on the failure led but it starts the steam production regularly.

The water input for the production is normally enough to start a minimum production. Then, the humidifier feeds the water in small quantities between long intervals, untill the production reaches the hygrostat's demand.

The humidifier drains completely the idraulic system every 2 hours of full production, or in case of salt concentration in the boyler too high.

The water's drain uses patented double syphon system to avoid the use of electrovalves and unabling to remove big bit of limestone.

The boiler has also a simple but effective valve which allaws the steam passage to the output, but it stops the water and gives enough pressure at the boiler to eject big pieces of limestone.

1.2 Humidifier positioning

The Elsteam humidifiers are equipped with a rubber water-pipe, a key to open the metallic case covers and a steam hose sleeve.

To open the humidifier, loose the screws on the bottom of the cover, lift and remove the cover.

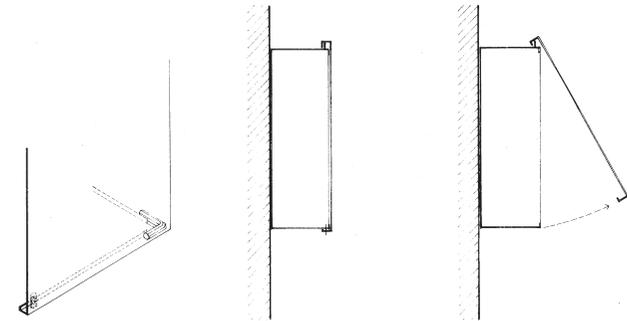
The cover must be connected to electrical ground.

All the units must be installed (walls, holding brackets, etc.) to work on vertical position.

The working weight of the units are as follow:

KT3 - KT5 - KT10 - KT20 - KT30: 40 kgs.

KT40 - KT60: 60 kgs.

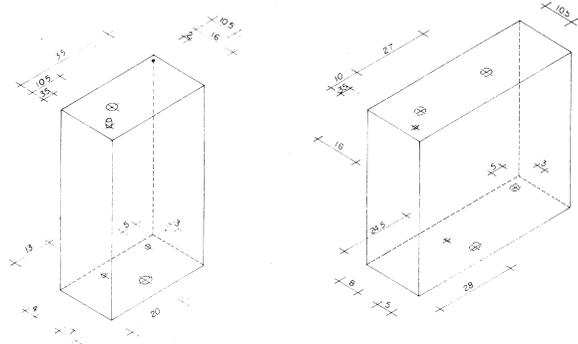


On the top of the humidifier we have

- steam output
- water feed valve of 3/4". In the valve the filter has to be cleaned in the regular maintenance; therefore the rubber supply pipe should be placed for easy inspections.
- hygrostate cables passing hole.

On the bottom of the humidifier we have

- water discharge piping
- power supply cables passing hole.



2.1 Water supply connections

Feed water must come to the humidifier from water mains through an intercept tap of a 1/2" minimum diameter. If more humidifiers are connected to the same mains, the pipe diameter has to be proportionally increased.

If the water quality is poor, add a secondary mechanical filter to the electrovalve one of the machine.

The filters must be regularly cleaned - mainly in, the first working period, and with new plumbing -. To avoid problems, use the Elsteam flexible piping, supplied with a 3/4" swivel connection already mounted.

WARNING: Do not feed demineralized water into humidifier!

Supply water need not be potable, but it should not contain physical particles such as sand, mud, algae, etc. which could interfere with the operation of the water supply valve. If the water supply system includes a softener composed by resins cartridges, the stainless steel electrodes in the boiler could be corroded in a short time (if this happens, the boiler will not be covered by the 2 years guarantee).

Water pressure must be kept between 2 and 7 bars. The machine works regularly with feed water having conductivity between, 800 and 8000 (ohm - cm), but it could also work using water with different characteristics, giving, however, less performances. With acid water, you should check for an unusual corrosion, of the electrodes.

If the feed piping is new, before connecting the humidifier electrovalve, drain the water for a few minutes, removing all the waste matter.

Intake water temperature must not exceed 50°C.

The electronic controls of the humidifier stop automatically income water in case of leakage inside the cabinet; however it will be usefull to inspect, every year, all the idraulic components to avoid any damage.

- electrovalve filter
- syphon not cracked or not well closed
- a big piece of limestone in the boiler or in the syphon
- remove the external draining pipes, empty the syphon 7 and test the humidifier. If the system works, the external draining pipe is not correct (too small or not vertical enough).

4. During the steam production, the water fills the syphon 7.

check:

- the steam production (if more than supposed, turn clockwise trimmer P3)
- the steam output: syphon sizes, etc.
- the draining plumbing: not opened, etc.

WARNING: AFTER ANY TROUBLES, EMPTY THE VERTICAL SYPHON 7 !!!

7.1 Troubleshooting list

1. The humidifier is not working: light 1 "machine on" is off.

check:

- line fuses
- transformer fuse
- cover microswitch
- "on" push-button

test:

- transformer

2. The humidifier works: light 1 on, light 4 "washing cycle" is on, but the water electrovalve is not opened.

check:

- water supply line
- electrovalve filter
- water leakage at the bottom of the machine or between the electrodes on siphon n. 7

test:

- 12 Vdc on the electrovalve contact
- unscrew the coil of the electrovalve, open the electrovalve and clean the two small holes in the diaphragm.

3. During the washing cycle, the humidifier continues to introduce water without the light 4 switched off.

check:

- during the washing cycle the water fills completely the syphon for a few seconds.
- if it happens, check:
 - the cable between the electrodes and the electronic cards.
 - if it still, check:

2.2 Steam pipe connections

Elsteam humidifiers include a linear stainless steel steam distributor for efficient humidification of the units inside air and a plastic flange with rubber "o-ring". The steam distributor must be installed with the steam holes on the top and far from possible obstructions of the air ducts (curves, forks, changes in piping section size, fans, filters, grids, etc.).

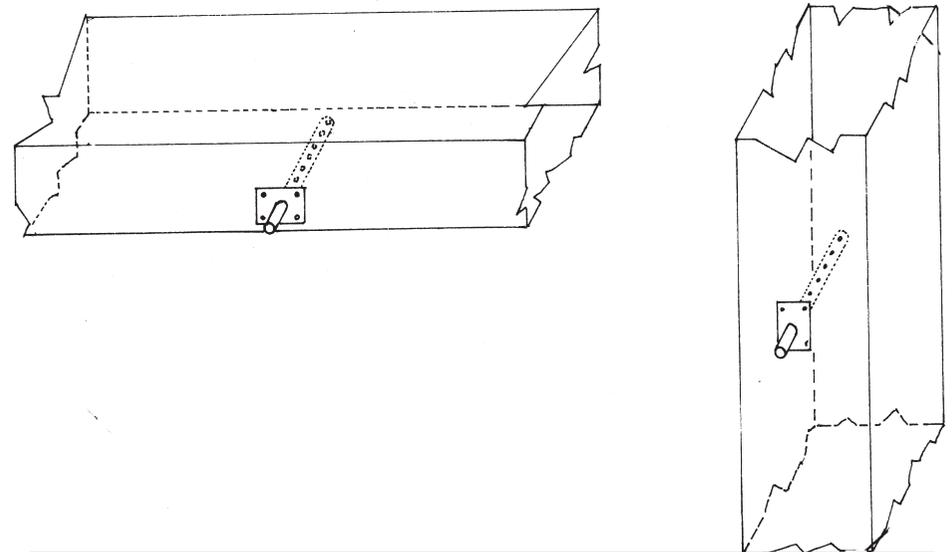
The distance between steam distributor and obstruction has to be kept more than 600 mm in the direction of air-flow.

Steam distributors should not be installed close to cooling batteries or humidity regulation probes and away from the external air input. Put the distributor in the lowest side of air duct: a minimum distance of 300 mm between the top of the steam output and the air duct ceiling must be observed to avoid condensation on the ceiling itself.

Install a condensation tank with an output pipe - 50 cm. away from the steam distributor - at the bottom of the air duct which is involved in the first steam injection, to avoid damaging of the air duct due to hygostat or air fan breakdowns.

To recover from steam recondensing in the distributor and in the steam pipes, the distributor itself must be installed above the steam output of the humidifier. The steam distributor in the air duct must be slightly tilted (2°); you could automatically obtain this result mounting the Elsteam flange with the little swelling (see draw) at the bottom.

Elsteam humidifiers are suitable for connection to air piping with a pressure of 100 m H₂O. If the dynamic air pressure is higher, the performance of the Elsteam machine decreases. When the pressure is more than 200 mm H₂O, the humidifier drains all the water, stops to produce steam and it goes on alarm mode.



Piping between the humidifier and the steam distributor must be installed to avoid condensation which leads to gurgling in the room or in the air duct with a loss of efficiency; if the condensate stops the steam pipe completely, the humidifier drains all the water from the steam cylinder and it starts working again.

Piping must use the gravity force to drain the recondensed steam towards the boiler:

- avoid use of pipe size less than 40 mm inside diameter
- avoid sharp bends - curve diameter must not be less than 300 mm
- avoid to siphon the pipe, leading to condensation points
- obtain - if possible - an uniform minimum gradient (10%) towards the humidifier, to bring recondensed steam back towards the boiler
- use steam tubing and fittings suitable for temperature up to 120° C at atmosphere pressure and thermally insulated
- the piping has to be supported by brackets mounted every 50 cm or contained in plastic shaft.

Elsteam humidifiers don't need a separate condensation discharge tube.

If the humidifier steam output position is above the steam distributor in the air duct, 2 solutions are suitable:

1. If the air duct can be drained from the bottom, install the steam distributor in the air duct with the nozzles down and open the end of the steam distributor removing the plastic plug: the condensed steam goes in the drain of the air duct.
2. If it's difficult to drain the water from the air duct, install the steam distributor with the nozzles at the top and drain the condensed steam from the lowest side of the steam distributor through a small siphon soldered at the bottom of the distributor itself. (see draw).

6.1 Start up

Verify:

- the installation of the humidifier is solid and vertical
- the earth terminal of the metallic parts is correctly connected
- the water supply is cleaned, and at a right pressure
- the drain plumbing is well sized and not siphoned

Disconnect the hygrometer, connect the screws 1 & 2 of the humidifier electronic card to simulate the hygrometer "on", and connect the screw 4 & 5 to simulate the airflow "on".

Switch on the power supply and the cover microswitch: the light 1 and 2 should be on. The light 4 lights up and the water starts to fill the boiler washing the hydraulic system completely. If the washing is correct, the light 6 turns on for a few seconds - the water fills completely the siphon (7) - and the light 4 switches off. At this time, the light 6 switches off and the water starts to fill the boiler for the steam production. The electrovalve stops when the production is at its minimum (0.5 A), then the electrovalve opens for few seconds and with long intervals. The light 3 starts lighting and the intensity is directly proportional to the production.

Switch-off the humidifier, disconnect the screws 1 & 2 of the electronic card and connect the hygrometer: verify the correct work of the hygrometer. Disconnect the screws 4 & 5, connect the airflow interlock and verify; if the air duct fan stops, the humidifier stops the production.

5.1 Electronic adjustments

All the adjustments described in the following paragraph are carried out using the trimmers shown in the schedule. The humidifiers are already calibrated in the factory during the burn-in of the machine. These explanations of electronic adjustments are meant only for maintenance following failures or after electronic spare parts replacements.

P2 and P4 allow the use of humidistats with output characteristics different from those established, as standard, for the humidifiers.

The standard input signal from humidistat to Elsteam humidifiers is 0 V (with no humidity demand) 10 V (with requested of full humidifier capacity).

If the humidistat gives different output, up to 20 Vdc (pulsed or dc), the humidifier works without problems, However, if you need better performance, you could adjust P2 or P4 trimmer.

If the humidifier output is more than 10 Vdc, turn the trimmer P4 counterclockwise, proportionally to the difference between the actual output and 10 Vdc.

If the humidifier output is less than 10 Vdc, turn the trimmer P4 totally clockwise, and the trimmer P2 clockwise proportionally to the difference between the actual output of the hygostat and 10 Vdc.

To resume the procedure; turn clockwise the trimmers to increase the output of the hygostat, or, turn the trimmers counterclockwise to decrease the output of the hygostat. In particular, P2 increases the output, P4 decreases the output.

P3:

This trimmer converts the steam production in a voltage to be compared with the demand of the hygostat.

It's calibrated in the factory. Do not touch!!

P5:

This trimmer adjusts the timing between the water supplies.

The water enters in the boiler in small quantity between large time intervals to allow the electronic card to control the water quality, ...

P6:

This trimmer is important only when the hygostat output is not usual. Few kind of humidistats don't give "0 Volt" when they are meant to stop the steam production (humidistat asks humidification when the output is between 3 and 10 V, and dehumidification when the output is between 0 and 3 V).

In this case, set the humidistat to the minimum (20% UR) and turn the trimmer P6 clockwise until the humidifier stops steam production and then set the humidistat to the maximum (90%) verifying that the humidifier lights the led no. 2.

WARNING: FOR ALL OTHER HYGROSTAT, leave the trimmer P6 fully counterclockwise!!!

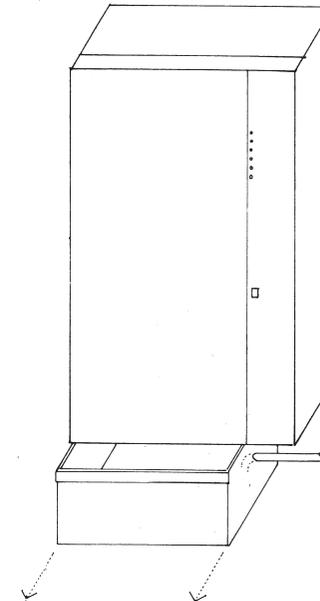
2.3 Plumbing connections - Drain connection

The drain system must be capable of handling ten liters discharge in few seconds, without opposing counterpressure to the humidifier drain.

The Elsteam humidifier is able to remove the limestone concentrated in the boiler only if the external drain plumbing is totally free:

- pipe internal diameter not less than 40 mm
- pipe must be vertical, without sharp bends
- the drain of the humidifier must be separate from any other drain. The boiler is directly connected to the drain system through a syphon: if the drain creates a vacuum depression, it sucks the water from the humidifier, with an efficiency loss or a lack of production.

In any case, Elsteam suggests to install a collecting vessel, preferably opened to the atmosphere, of, at least, 10 liters. If the drain system is made of material which conducts electricity, it should be earthed.

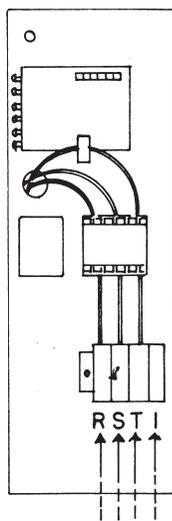
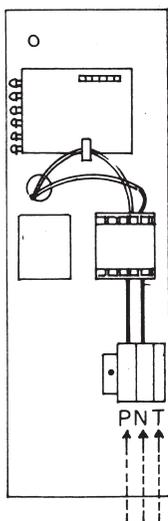


3.1 Power supply connections - Wiring

Elsteam humidifiers are equipped with line-fuses and they must be removed in case of electrical maintenance.

WARNING: Before switching on the humidifier, connect all metallic parts of the system to earth!!!

Mod.			Fuses
KT3 monofase	220V	2 x 6 mmq	2 x 20 A
KT5 bifase	380V	2 x 6 mmq	3 x 20 A
KT10 trifase	380V	3 x 6 mmq	3 x 20 A
KT20 trifase	380V	3 x 10 mmq	3 x 32 A
KT30 trifase	380V	3 x 10 mmq	3 x 32 A
KT40 trifase	380V	3 x 16 mmq	3 x 50 A
KT60 trifase	360V	3 x 25 mmq	3 x 63 A
KT10 trifase	220V	3 x 10 mmq	3 x 32 A
KT20 trifase	220V	3 x 16 mmq	3 x 50 A



Indicator light 6: red "water's leak"

If on, it indicates a leak of water in the machine. In this case, the humidifier stops the production and it lights the alarm 6 avoiding possible damages in the room.

During the normal functioning of the machine:

With no demand of hygrostat:

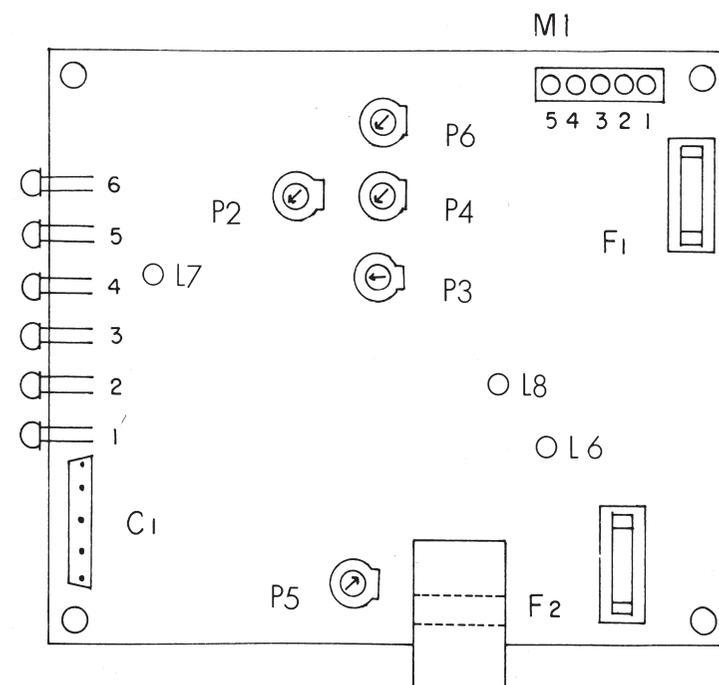
- light 1 on.

With demand of hygrostat:

- light 1 on

- light 2 on, proportionally to the hygrostat demand.

- light 3 on, proportionally to the humidifier production.



4.1 Panel Controls

Elsteam humidifiers are provided with a control front panel containing light indicators which normally signal the unit's correct functioning and also allows, in case of failure the possibility to determine the principal causes in the machine itself and/or related to the connected system.

A complete understanding of the various possible light signals allows, in most cases, to quickly determine the cause of any malfunction reducing maintenance time and costs.

For unknown alarms, please contact Elsteam.

Indicator light 1: green "machine on"

When on, it indicates the controls are supplied. When it turns off, this indicates the loss of a power supply phase or a malfunction of the power supply internal to the humidifier (see 7.1 Troubleshooting list).

Indicator light 2: green "humidistat's demand"

If on, the humidistat is calling for humidity.

It gets more or less luminous proportionally to the humidity demand of the hygrometer.

Indicator light 3: green "steam production"

If on, the humidifier produces steam. The light intensity is directly proportional to the steam production.

Indicator light 4: red "Washing cycle"

If on, it indicates either the water within the humidifier is being flushed, or a regular cleaning of the electrodes has been performed or, also, because of an excessive concentration of salt and calcium in the water.

If this indicator light remains on for a long period of time (more than 5 minutes) and, at the same time, vapor is not generated even with the humidistat calling for it, the light indicates a malfunction in a flushing cycle or other anomaly in the system itself.

After the problem has been solved, it's necessary to turn the system off and on again to start-up the production.

Indicator light 5: red "steam production too high"

If on, it indicates the humidifier, although measuring a steam production higher than normal, is not able to wash the boiler and start up the production again.

In this case, the machine stops working and it lights the alarm 5.

3.2 Control circuit connections

Elsteam humidifiers are foreseen to operate in conjunction with practically all kinds of humidistat and to satisfy the major requirements of the installer without the use of any other optionals.

3.2.1 Hygrostats

Both humidistats, on-off and modulating type, can be utilized. The proportional type allows all the possibilities of the humidifier to be taken completely advantage, obtaining excellent control of the ambient relative humidity without fluctuations from the desired level. The precision and stability of the humidity depends on two major parameters:

- precision of the hygrometer used
- inertia of the humidification system

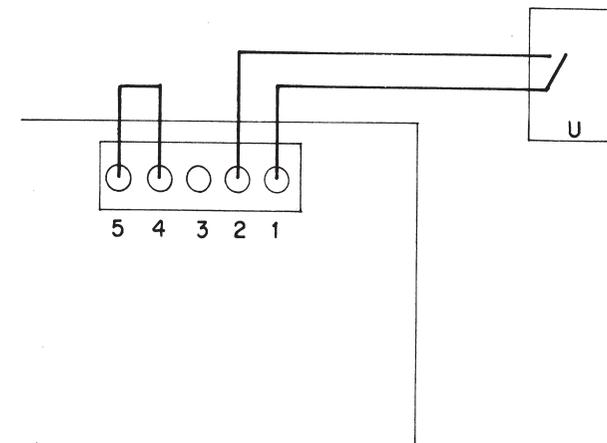
This system inertia is inversely proportional to the capacity of the humidifier which is related to the needs of the ambient itself. If the humidifier maximum output is not too low, but it is sized correctly, the precision of the setpoint depends only from the humidistat.

Elsteam humidifier can be connected directly with:

Hygrometer on-off

This kind of hygrometer has a simple output contact which switches on when the hygrometer demands humidity.

Wiring connections should be as shown in fig.



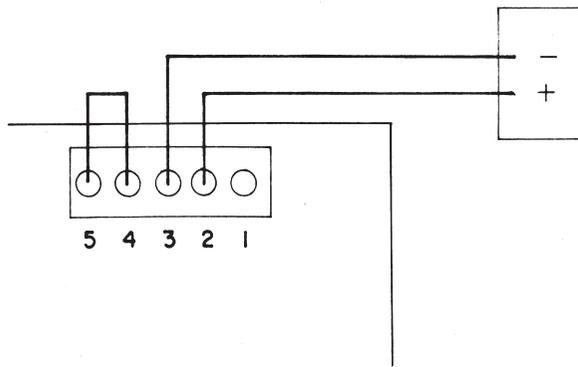
At the screw 1 the 12 Vdc voltage - compared with the 0 Volt of screw 3 - is protected by the fuse F1 - (100 mA).

When the hygrostat demands humidity, the 12 Vdc are supplied to the electronic card. The contact 3 of the electronic card is unscrew.

Humidistats with continuous or pulsing energized output - on-off or proportionals -

When the system demands humidity, the humidistat gives an output voltage. In this case, connect the humidistat to the humidifier electronic card, following fig.

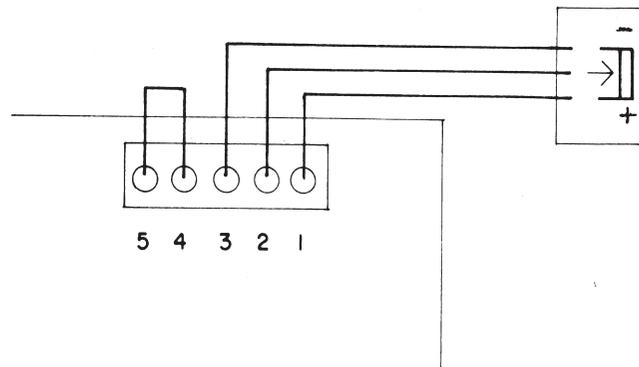
If the humidifier output is more than 20 V, reduce the card input, using P4 (see 5.1 Electronic adjustments)



Humidistats with resistive outputs

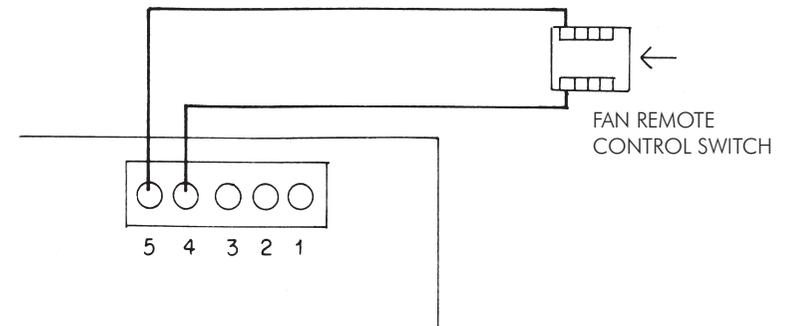
The humidistat gives a variable resistance related to the humidity.

In this case the connection between humidifier and hygrostat are made with a three conductor cable. The minimum resistance which should be seen at the input of the humidifier, is 50 ohms. Wiring connections should be as shown in fig.



3.3.1 Airflow interlock

If the humidifier will be installed in a central system, an interlock should be used between the central fan and the humidifier to stop its operation in case of duct ceases airflow.



The ideal control is composed by two serial contacts - both closed when there is airflow -; the first, an auxiliary contact of the fan, relays the second, a mechanical type, which opens when there is an insufficient airflow.

3.4.1 Room distribution unit

To distribute directly the steam in the room, without using the air duct, use the stainless steel Elsteam room distribution unit.

Observe all the instruction regarding the steam distribution from the air duct.

The room distribution unit must be installed in the way the steam jet doesn't come in contact with people, electrical equipments, ceiling, surfaces or lamps.

Avoid to install the steam distributor over machines or material which can be damaged in case of lack of condensed steam or in case of other failures.

The outlet nozzles should be installed at an height between 180 cm from ground level and 50 cm from the ceiling.

The steam jet should not reach any object before the steam is completely reabsorbed (2 metres).