Electrode Steam Humidifier

OPERATION MANUAL

Humax Series



Introduction

Develop by Naav Solutions Inc Company, this HUMAX series electrode steam humidifier is assembled at Enco Joint Stock Company (Vietnam). Product HUMAX provides sales support and technical globally through her technical service centre and distribution networks. Product HUMAX enjoys all of the intellectual property rights.

The product uses the world's most advanced design concepts and components, with excellent quality, price, high intelligence and durable, and is widely used in many countries in North America, China, South Asia, Middle East, Europe, covers many areas of customers, including manufacturing, agriculture, military, communications.

Please read the operation manual carefully before starting up the humidifier. This operating manual will provide you with a detailed installation, commissioning, operation and maintenance instructions. When you can not find the answer in this manual, please contact your supplier if you are experiencing specific technical problems, we will be happy to provide you with comprehensive technical services.

Safety Tips

Please read this operation manual before installation and operation. In case of failure to operate in accordance with this manual, improper use of equipment, or use of unauthorized parts, Naav Solutions is not responsible for any damage or lost, and warranty will be stopped then.

This Operation Manual should be kept together with the unit. The operation requires technical knowledge and operating experience.

This humidifier can use a steam distributing pipe to deliver steam into an AC duct or AHU unit or a steam blower to increase in-door room humidity. Other usage beyond above mentioned applications is not covered by the warranty of the product range.

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1. Installation

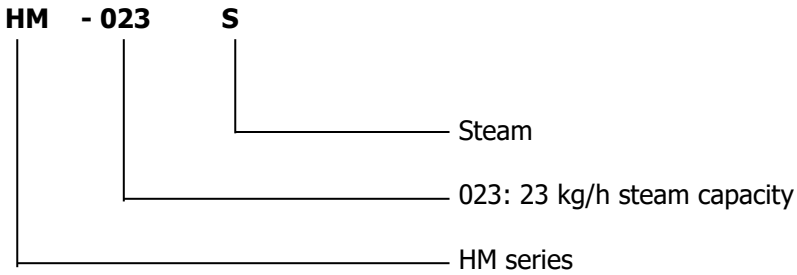
1.1 Appearance and Dimensions

The Humax series humidifier appearance and model description





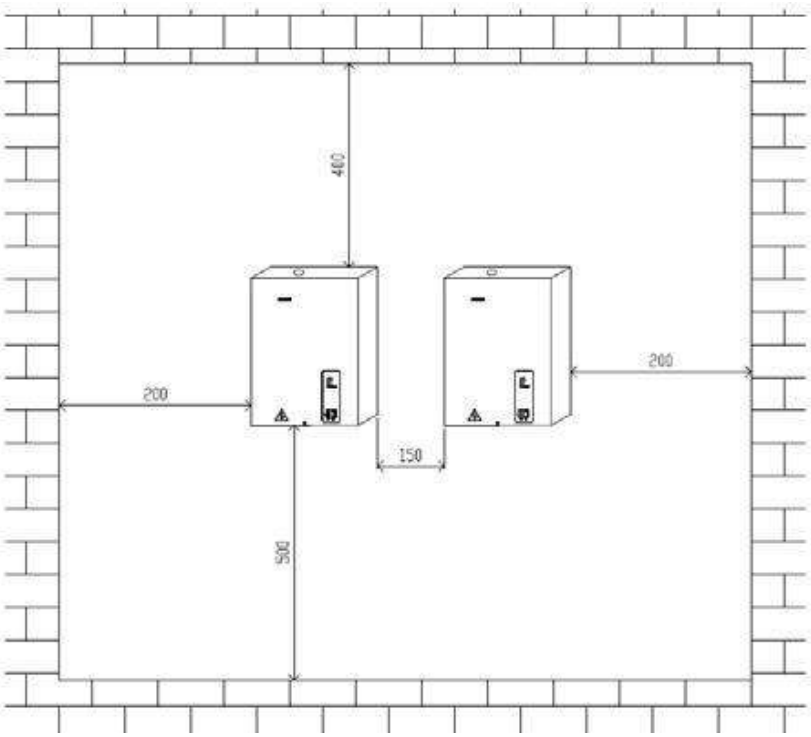
Humidifier Model Description



Size of HM series

Model	Steam capacity (Kg/h)	Voltage /phases	Power (kW)	Steam outlet diameter (Ømm)	Dimension, (H x W x D) (mm)	Net Weight (kg)	Running Weight (kg)
HM-4S	4	380/3	3	22 x 1	540 x 356 x 245	8.8	12.5
HM-8S	8	380/3	6	22 x 1	540 x 365 x 245	9.3	13.2
HM-15S	15	380/3	11.5	35 x 1	630 x 426 x 300	14.5	28.0
HM-23S	23	380/3	17.5	35 x 1	630 x 426 x 300	15.5	29.0
HM-32S	32	380/3	24.3	35 x 1	750 x 525 x 360	22.0	46.5
HM-45S	45	380/3	34.2	35 x 2	750 x 525 x 360	23.5	48.0
HM-65S	65	380/3	48.8	35 x 2	750 x 525 x 360	25.0	49.5
HM-90S	90	380/3	68.5	35 x 4	890 x 750 x 360	45.0	94.5
HM-130S	130	380/3	97.5	35 x 4	890 x 750 x 360	50.0	99.0

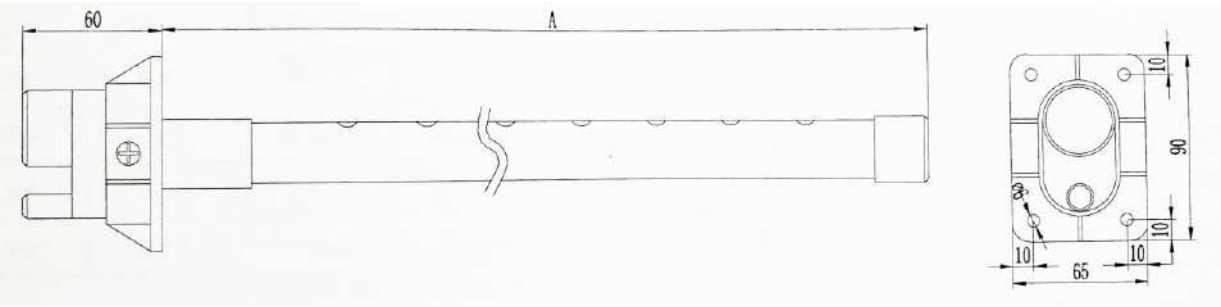
1.2. installation of humidifier (Min. distance between the unit and walls)



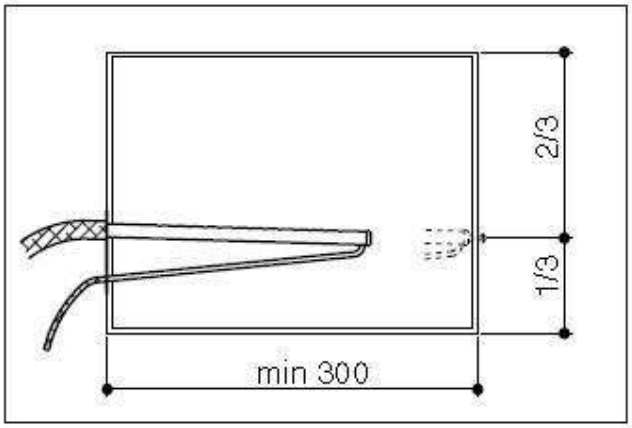
- All performances are to be carried out by qualified technician.
- Use the accompanying accessories to install unit. Pay attention to the safe distance requirements.
- Reserve sufficient space for repairing and maintenance jobs, and installation location should be easy for removal of unit.
- Recommendations: the distance between the humidifier and the steam distributor should be as short as possible. Steam hose length should be less than 2 meters, and never exceeds 3m. If the site requires longer distance, please contact the supplier.
- An open drainage funnel is used to ensure smooth drainage.
- A water filter is necessary in the water intake pipe.

1.3. Installation of the steam distributor

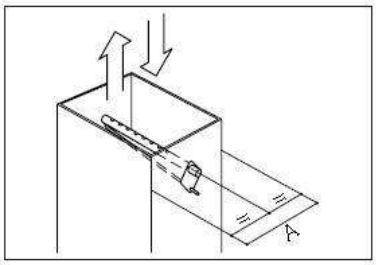
- A certain distance is needed for steam to spreads and be absorbs by air thoroughly. To reduce the condensing effect, steam distributor should keep an appropriate distance from surrounding objects, such as AC fan, air filter, etc.
- Steam nozzle is able to be mounted vertically or horizontally. The steam nozzles should be facing upward.
- Keeps the steam distributor at 2-3º angles to discharge the condensate drain water.
- The end of the long steam distributor (length greater than 900mm) should be fixed to the screws of M6.
- Dimensions of the steam distributor



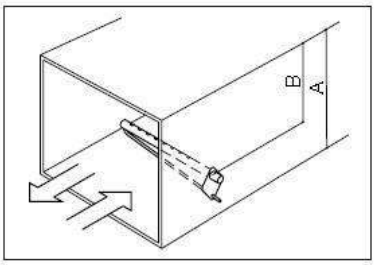
- Positioning the steam distributor



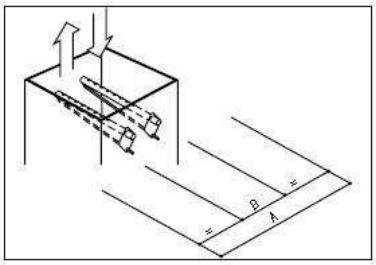
- Positioning of multi-steam-distributors



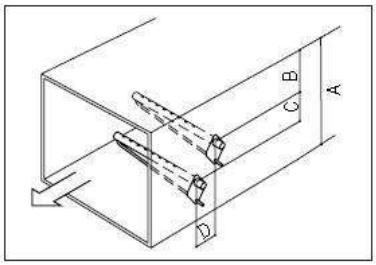
A = min. 200



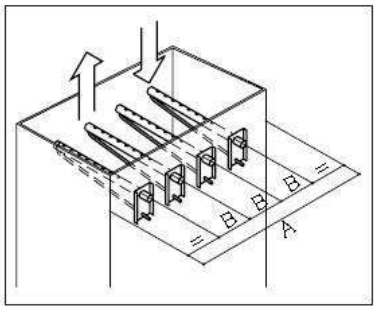
A = min. 250
B = min. 150



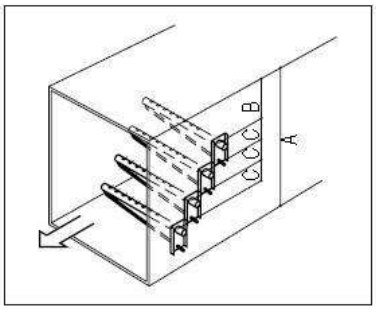
A > 300
B = 0.5 A



A > 350
B = min. 150
C = 0.3 A
D = min. 100



A > 500
B = min. 100



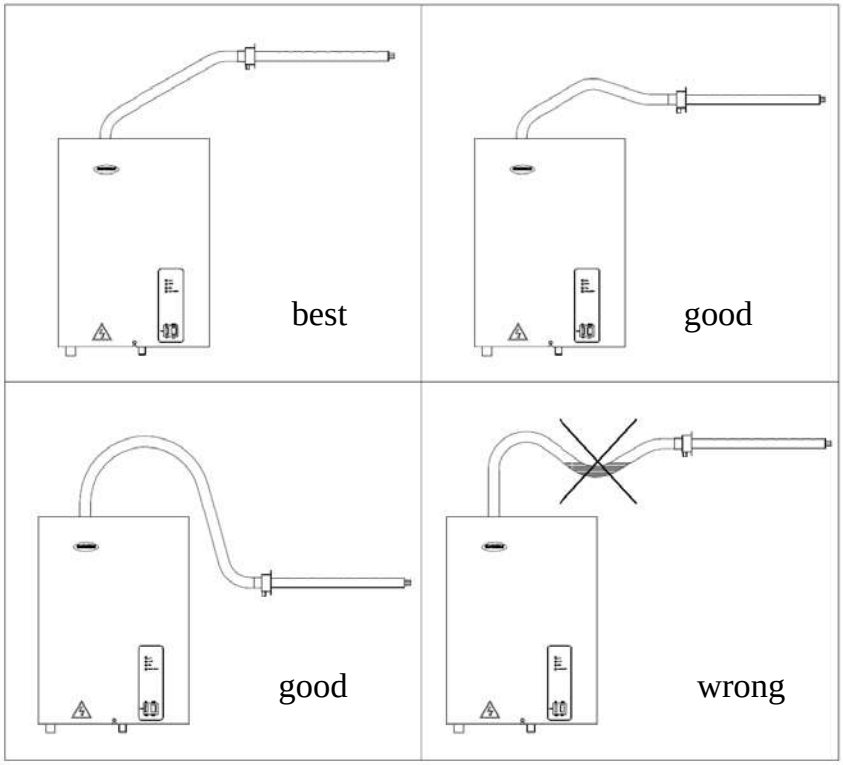
A > 500
B = min. 150
C = min. 0.15 A

1.4. installation of steam blower

- The steam blower can be installed on the top of the humidifier or on the wall separately.

1.5. Installation of Steam Hose

- Requirements for steam hose

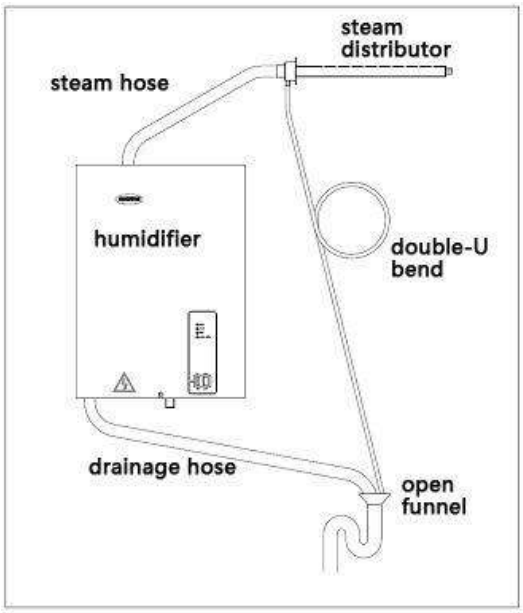


- The length of steam hose should be less than 3m.
- Try to use a complete hose, avoid using separated and connected hoses.
- The steam hose should be as short as possible, avoid dead corner or trap in the middle.
- Positioning the hose to maintain a large arc to avoid condensation of water remaining in the steam hose.
- Use hose clamps to connect and seal steam hoses and steam distributor tightly.
- Steam hose should endure high temperatures (minimum 120 ° C). All insulation material must be able to withstand high temperatures, too.
- If using brass the transport steam Note pipeline to avoid the formation of the small radius of the bend. Because the curved portion will cause a greater additional resistance. Meanwhile, the inner diameter of the brass to be equal to or greater than the inner diameter of the steam hose.
- · If the steam hose is too long, the corners too much, or duct, the air pressure is too high, the cylinder is easy to take the water, affecting the wetting effect. If it is necessary to use in this case, please contact the supplier.

1.6. Installation of condensing drain hose

- The condensing drain hose should be as vertical mounting, and directly discharged to the drainage funnel or drain pipe.
- The condensing hose must be positioned as a double-U backwater bend to make a water seal, which ensures no steam leaking.
- If the condensing water is directly discharged, the condensing hose should be installed separately and be kept straight. The other end of the hose requires an open drainage funnel. Do not plug in

water or connected in a closed pipeline to avoid poor drainage.



2. Water supply and drainage

2.1. The quality of water supplies

- Using tap water, the supply water conductivity should be between 125-1250 μS/cm.

2.2. inlet and outlet

- All installation work must be performed by trained professionals, customers have the responsibility to employ professional and technical personnel. Be sure to determine in advance whether the local power supply and water supply are consistent with the requirements of our products.
- The humidifier uses normal tap water. Deionized water is absolutely not allowed. If you want to use soft water, pure water or deionized water, please consult your supplier.
- Water inlet pipe should be equipped a water filter to avoid clogging water solenoid valve.
- When the water pressure is between 1-6bar (0.1-0.6MPa), the humidifier can be connected directly to the water supply line. If water pressure is greater than 6 bar (0.6MPa), install a pressure relief valve (set at 4-6 bar = 0.4 - 0.6MPa).
- Drain pipes should be able to endure 100 °C Generally, steel, brass or high temperature PPR pipe are allowed, do never use low temperature PVC drain pipe. Diameter of drainage pipe generally requires more than 50mm. The unit and drainage pipe should be connected with a more than 1 meter long insulating material hose to prevent electric current leakage.
- The end of drainage pie should lead to an open funnel, do not use a closed pipeline drainage. Drainage channels should be positioned at 5° angle to facilitate water flow.

3. Power supply

3.1. Safety instructions

- All work must be carried out by qualified personnel only. Customers are responsible for verifying the technician's qualification.
- Be sure all circuit connections are secure, reliable and correct.

- Please note that the relevant provisions of the local power supply department.
- Use a current breaker, such as air switch, in the power supply line.
- Electrode steam humidifier requires reliable safety grounding.

Requirement for air switch / MCCB (A)

Heating Voltage	HM-4S	HM-8S	HM-15S	HM-23S	HM-32S	HM-45S	HM-65S	HM-90S	HM-130S
380V-3	10	16	30	45	60	80	100	150	200

Note: *Regardless of the cylinder has two-electrodes, three-electrodes or six-electrodes, or whether it is one or two cylinders, only one cable of a electrode is needed to go through the current transformer in the circuit board.*

3.2. Control voltage

- Voltage of control system is single-phase 200-230V / 50-60hz.
- When the humidifier is in cleaning or maintenance, the humidifier power must be shut down, including the control system.

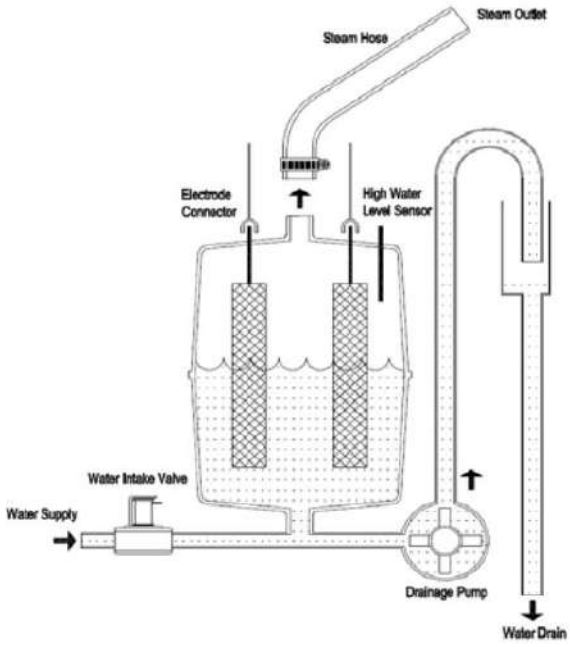
3.3. Heating voltage

The power supply and fuse specifications are decided with device model.
Wires must be securely connected to the terminal block. Check and tighten them every few months.

Humidifier Model	Terminal mm^2	Heating wire diameter mm^2	Controller wire diameter mm^2	Heating voltage V
HM-4S	4	2.5	0.75	380
HM-8S	4	2.5	0.75	380
HM-15S	6	4	0.75	380
HM-23S	10	2 x 4	0.75	380
HM-32S	10	2 x 4	0.75	380
HM-45S	16	2 x 6	0.75	380
HM-65S	16	2 x 6	0.75	380
HM-90S	35	4 x 6	0.75	380
HM-130S	35	4 x 6	0.75	380

3.4. Proportion control

- HUMAX humidifier circuit board has built-in proportional control function.
- Set up the blue DIP switchs and menu item 09 before use the unit.
- Accepts control signal of 0-10V, 0-1V, 0-5V, 1-5V, 0.5-4 .5V, 2-10V, 0-20mA or 4-20mA, etc.



4. Operation

4.1. How unit operates

- This electrode steam humidifier uses of tap water to generate steam. When there is water in the cylinder, the energized electrode is inserted in the water and generates current through the use of water conductivity, then the water is heated and boiled to output steam.
- The micro-processing controller controls to produce steam in the shortest time.
- The circuit board controls the water level automatically and precisely. For any change of settings, humidifier response rapidly and accurately.
- Humax humidifier uses drain pump. Unlike the traditional commonly used drain valve, the drain pump has larger inlet and outlet diameter which enables bigger scale to go through, be crushed into powder, and then drains out together with water. Thus, the lifetime of Humax cylinder is usually 2-3 times to the one who uses a drain valve.

4.2. The cylinder

- Regularly check the cylinder electrode connector to ensure reliable fastening.
- A cylinder which is cleaned 2-3 times must be replaced. We do not guarantee the normal and stable operation of the cylinder after cleaning.
- If the humidifier LED indicates replace cylinder, and meanwhile the left side of the circuit board green digital tube flash and shows 05 alarm, it means the lifetime of cylinder is reached and cylinder is needed to be replaced immediately.

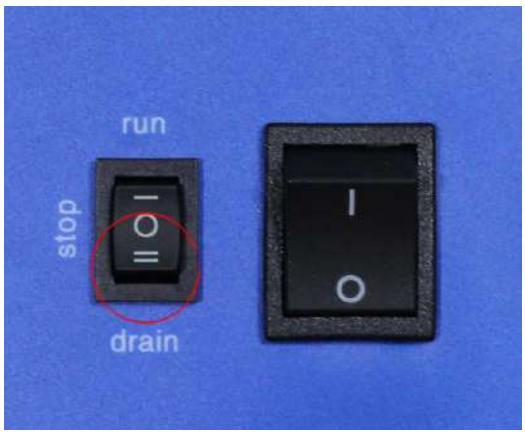
How to replace the cylinder

- Operation of the drainage function to empty the cylinder completely.
- How to start the drain pump. (See picture below.)

a) Press and hold "drain" key or put left side ship-type switch to "drain" position will start the drain pump.



Press and hold "DRAIN" key
to start drain pump

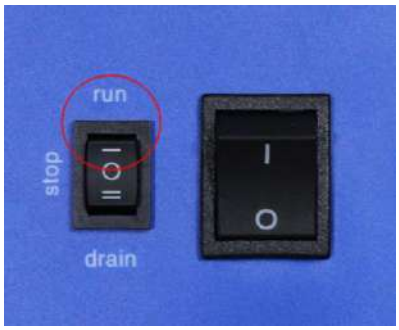


Put left ship-type switch to "drain" position
to start drain pump

b) Drain water completely before moving the cylinder.
c) Cut off the power supply, disconnect the cylinder electrode plugs and high water level sensor plug;
d) Push the cylinder upward hardly, turn it if necessary.
e) Pull out the drain filter in the bottom of the cylinder.
f) Clean the cylinder and the filter with clean water.
g) When cleaning is finished, put back the cylinder with the reverse procedures. Re-connect electrode plugs and high-water plug.
h) Tighten hose clamps which were removed before cleaning.
i) Resume the power supply.

4.3. Operates humidifier

When steam hoses, water pipes, drain pipes and cables are properly connected, you can operate the controller power supply rocker switch to "I" position. Press the left switch to "run', the humidifier is ready to start. When humidistat calls for on, (when the H1-H2 terminals are closed), the humidifier begin to fully automatic operation. Meanwhile, the LED of "on/off' lights in green, which indicates that the humidifier is in running.



4.4. Circuit board and control panel

The HUMAX series humidifier internal control board

A) When cabinet door opens, the circuit board is in the right chamber.

B) Information displayer of circuit board

1) 2 digital nixie tube groups. Left one displays items, and right one displays value.

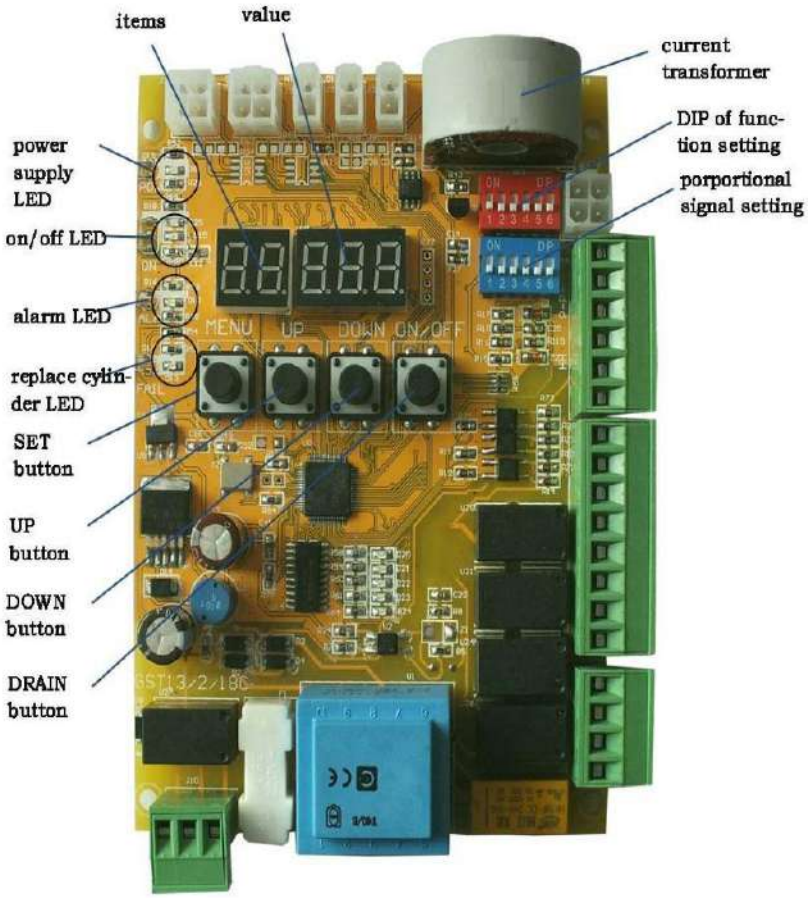
2) 4 LEDs.

power – power supply

On/off – unit run or stop

alarm – failure occurs

Changer cylinder – the cylinder is needed to be replaced



C) Front panel displayer

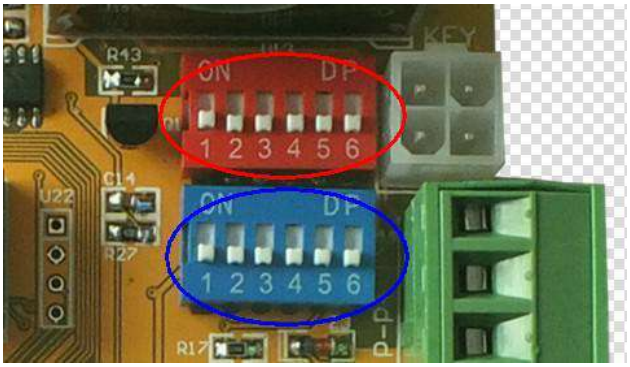




1) 3 LEDs: power, on/off, alarm/high water.
2) Two rocker switch.
   - The right rocker switch is used to control the circuit board powered.
   - The left rocker switch
     RUN: humidifier starts
     STOP: humidifier stops
     DRAIN: drain pump starts.

D) There are two groups of six DIP switches on the top right of the circuit board.
The red DIP switch is used for function setting;
The blue DIP switch is used to select the type of the input proportional signal.

4.5. DIP switch groups' definetion



Setting to top is ON, setting to bottom is OFF.

Red six DIP switch group's definition

No.	ON	OFF
1	Proportional signal operation	Switch signal operation
2	The contactor is closed when drain	The contactor is disconnected when drain
3	Using drain pump	Using drain valve
4	Imperial unit	Metric unit
5	Water filling valve opens when drain	Water filling valve closes when drain
6	-	-

Blue six DIP switch group's definition

Note: - The menu of 09 options should be set accordingly, other wise error occurs.
- Default set is 0-10V signal.

When the humidifier is in proportional control , it must be ensured that the H1 and H2 terminals of the circuit board or wiring terminals are in a conductive state. A separate switch-type humidistat can be connected between H1 and H2, or shorted with a wire. When the connection between H1 and H2 is on, the humidifier detects the proportional signal of the P+ and P- terminals, and outputs the appropriate humidification amount according to the percentage of the proportional signal.

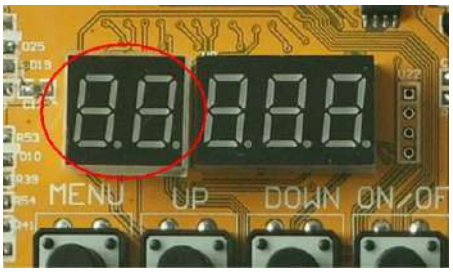
Signal type	1	2	3	4	5	6
0-10V	OFF	ON	OFF	OFF	OFF	OFF
0-1V	OFF	ON	OFF	OFF	OFF	OFF
0-5V	OFF	ON	OFF	OFF	OFF	OFF
1-5V	OFF	ON	OFF	OFF	OFF	OFF
0.5-4.5V	OFF	ON	OFF	OFF	OFF	OFF
2-10V	OFF	ON	OFF	OFF	OFF	OFF
0-20mA	OFF	OFF	ON	OFF	ON	OFF
4-20mA	OFF	OFF	ON	OFF	ON	OFF
0-135Ω	OFF	OFF	OFF	ON	OFF	ON

4.6. LED

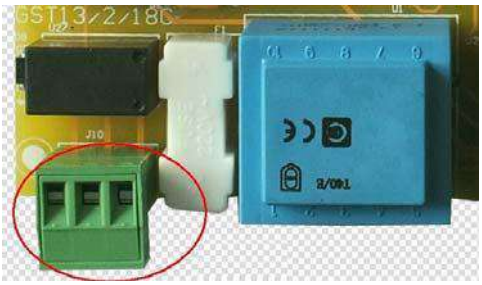
LED	color	description
POWER	Red	LED red lights - power supplied
ON/OFF	Red/green	Green lights – unit on and steam is producing
		Red flash – unit on and water is in filling
		Green flash – unit is in draining.
ALARM	red	Red lights – alarm occurs
		Red flash – water reaches high level (No. 03 alarm)
		Unit auto-reset when alarm eliminates

4.7. Alarm

When alarm occurs, the alarm code number displays at the left nixie tube and alarm LED lights.



Meanwhile, the alarm signal alarm terminals in the bottom left of the circuit board output on/off signal.



Alarm Number	Meaning	Description
01	No steam output	Unit runs 10 minutes and no steam output. Unit keeps running 5 hours before stop.

02 92	No water	Water filling valve opens 30 minutes later, still not running current. Generally caused by water filling valve failure.
03	Water level reaches high level sensor	Usually caused by the cylinder failure or low water conductivity.
04	Large electric current	Heating current exceeds 1.4 times of rated current.
05	Cylinder needs replacement	Unit doesn't reached the rated steam production after 5 hours. Unit keeps running at the low capacity mode. Usually caused by the cylinder failure.
06	Illegal cylinder	Unit senses illegal cylinder, cylinder needs replacement. Unit stops.
07	Input password 5 times, unit locks	When operates the menu, input wrong password 5 time, unit locks. Contact supplier for service.
08	Unit overtime	Unit run time exceeds preset limit. Contact supplier for service.
09	Wrong proportional setting	Check the nixie tube setting and menu 09 setting.
10	Bad drainage	Drainage pipe blocked, unit stops. Clean drainage pipe.
11	High drain water temperature	Check the drainage water.
12	Bad grounding	Check the grounding.
13	Water conductivity is out of range	Alarm conductivity water supply is out of range. Water supply conductivity requires between 125-1250μm/cm, the humidifier, the humidifier continues to run.

4.8. Menu settings

The circuit board has four keys - SET , UP , DOWN and DRAIN.

Key	Meaning	Function
Set	Menu	Press and hold the key for 3 seconds, enter the menu settings. Press SET each time to enter the next menu option.
Up	up	Increase value during menu setting mode. Press and hold this key will increase value quickly. Press up key to open water filling valve manually during service mode.
Down	down	Decrease value during menu setting mode. Press and hold this key will decrease value quickly. Press down key to show run status respectively.
Drain	drain	Press and hold DRAIN key to start the drain pump(valve), release it to stop draining.

Menu settings:

- Press and hold the SET key for 3 seconds will enter the menu settings.
- The left side of the nixie tube displays menu code. For example, when it displays 01, 01 menu can be modified then.
- Parameters can be modified using the UP and DWON keys. When press SET to enter the next option, the modified parameter value is stored. Press and hold UP or DOWN, the value increase or decrease quickly. Or every time you press the key, digital change a digit.
- If no operation within 20 seconds, or press and hold SET key for 3 seconds, it will automatically exit the menu.

- The alarm LED lights during the menu setting mode.

Menu	Meaning	Description	Default value
01	Set rated steam capacity	Unit: kg/h， Range: 0-200	3.0
02	Set the auto flush interval t1	Unit: minute Range: 0-300	30
03	Set auto flush duration t2	Unit: second Range: 0-300	5
04	Current value calibration	Range: 20-200	125
05	The duration of the drainage valve opens when unit shutdown 72 hours later and is needed to fully emptying the cylinder.	Unit: second	180
06	Execute timing cleaning when stop	1: yes 0: no	0
07	Interval of timing cleaning when stop	Unit: minute	180
08	Duration of drain pump opens when stop	Unit: second	180
09	Type of proportional signal (be accordingly to blue DIP setting)	1：0-10V 2：0-1V 3：0-5V 4：1-5V 5：0.5-4.5V 6：2-10V 7：0-20mA 8：4-20mA 9：0-135Ω	1（0-10V）
10	Software version, read only	1-999	
11	Set the water filling time when the machine is shut down for cleaning	Unit: second Range: 1 - 999	10
12	Set shutdown cleaning times	Unit: number of times Range: 1 - 10	2

4.9. Running state patrol

Press DOWN key to check running status circularly when unit runs.

Code	Description	Unit
00	Steam output	Kg/h（lb/h）
01 *	Electric current of current transformer	A
02	Proportional control signal %	%

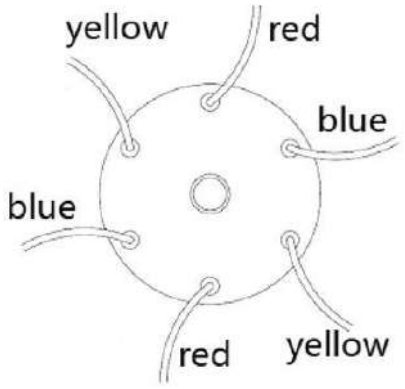
* Displays the measured current value of the transformer, not the phase current.

5. Repair and maintenance

5.1. Cleaning and replacement of the cylinder

- Before cleaning and replacement, cut off all power supply and the circuit connection.
- Cylinder lifetime varies according to work time and water quality. If unit uses high conductivity of the water, the electrodes are easy to scale and resulting in insufficient steam production.
- When 05-alarm appears, the cylinder's running situation is not ideal, but it still can use a few days. Please replace the cylinder with a new one as soon as possible.

Note: For the six-electrode cylinder, the connectors require to be plugged in the proper position.



5.2. Cylinder drainage filters

- The bottom of the cylinder is fitted with a removable drain filter.
- The filter should be removed, cleaned and re-installed back when the cylinder is been cleaned.

5.3. moving circuit board

- moving before the board, be sure to shut all power of the humidifier.
- the circuit board onboard current transformer, used to measure the heating current value.
- The operation panel can be adjusted set rated humidification current, the amount of humidification, cleaning frequency, cleaning duration and other parameters.

5.4. Humidifier stops

- For long time shutdown, please disconnect the power supply.
- Put the left switch to STOP position for short-time shutdown.
- Fro seasonal shut down, please make sure to completely empty the cylinder.

5.5. Routine maintenance

- Regular maintenance helps to prolong the unit lifetime. All maintenance work must be carried out by professionals, and customers are responsible to employ qualified technical personnel. Before performing maintenance work, be sure to cut off all power supply.

5.6. Maintenance procedures

- Regular maintenance items,
  - View and clean the cylinder. If the cylinder is accumulated with mineral, please take off the filter, which is at the bottom of the cylinder, clean it with water. If electrodes are fouled, the cylinder should be replaced soon.
  - Check steam hose, condensing pipe, clamps and water pipes.
  - Check and cleaning the water filling valve and drainage valve (pump).
  - Check drainage funnel.

6. Insufficient steam production

There are many possibilities that may cause the insufficient steam production.

- Unit doesn't recognize a new replaced cylinder, unit stops.
- The room humidity reaches the goal and unit stops.
- The safety protection devices, such as high humidity protection action etc, cause the stop.
- When the humidifier is in the proportion control mode, the unit stops when there is a disconnection between H1/H2 or the input proportional signal is lower than 20%.
- The electrode connectors are not plugged in properly, so the electrodes are not energized.
- Failure of water inlet.
- Accumulation of mineral in cylinder causes the insufficient steam production.
- A wrong unit, which has small steam capacity, is applied.
- The power contactor is not closed.
- The steam hoses is clogged.

7. Spares

For details, please consult your supplier.

8. Options

- Water inlet filter
- Humidity Controller
- Steam blower

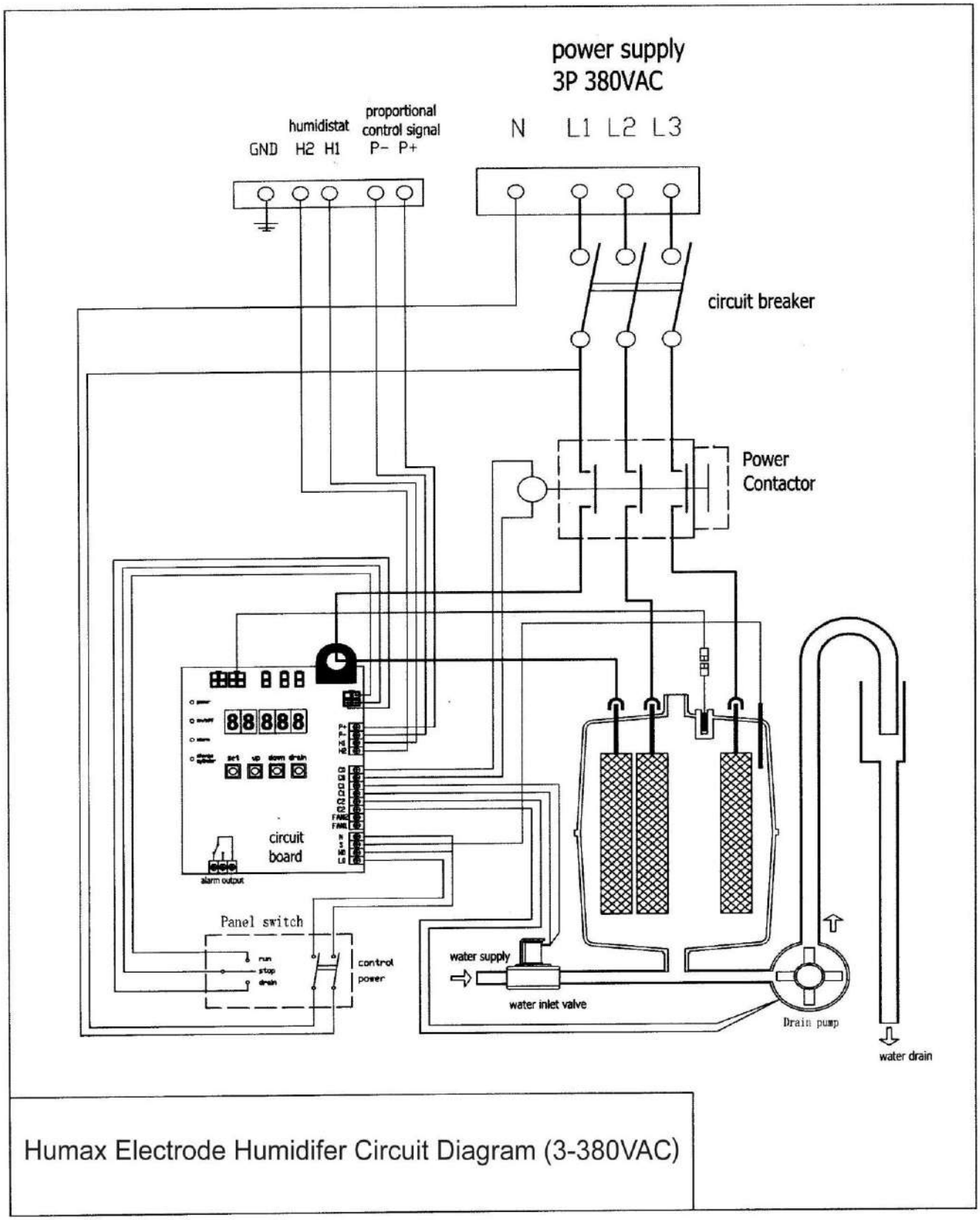
9. Simple troubleshooting and troubleshooting

Phenomenon	Reason	Troubleshooting and troubleshooting
02 Alarm	Too much dirt in the barrel	As a result, the water replenishment path is bloked, and the humidification bucket needs to be cleaned. If necessary, apply to the supplier for replacement of consummables.
	Water source and pipeline failure	Check water supply and humidifier piping, restore wayer supply, call for technical support if necessary
	Circuit failure	Consult your humidifier supplier for technical support
03 Alarm	Too much dirt in the barrel	As a result, the effective water level is too low, and the humidification barrel needs to be cleaned. If necessary, apply to the supplier for replacement of consumables.
04 Alarm	Exellent water quality	Appropriately shorten the self-cleaning execution cycle of the humidifier, and request technical support from supplier if necessary
	Too much dirt in the barrel	Check the condition of the humidifier, remove limescale, and request technical support from supplier if necessary
	Humidifying barrel aging	Check the condition of the humidifier and request technical support from supplier if necessary
	Circuit failure	Consult your humidifier supplier for technical support
05 Alarm	Water too soft	Reduce the humidifier amount of the equtpment until it can operate normaly, and appropriately extend the self-cleaning execution period.
	The humidification barrel is aging and the electrode wear is serious	As a result, the normal water level cannot reach the corresponding humidification current. It is necessary to check the humidification baeel and apply to the supplier for replacement of consumables if necessary
06 Alarm	Illegal barrel	Please use the high-quality barrel provided by the manufacturer. Ilegal barrel will cause the humidifier to fail to operate

10. Technical parameters

Model		HM-4S	HM-8S	HM-15S	HM-23S	HM-32S	HM-45S	HM-65S	HM-90S	HM-130S
Steam capacity	Kg/h	4	8	15	23	32	45	65	90	130
Power supply	V/ph	380V/3ph								
Current	A	4.4	8.8	16.5	25.3	35.2	49.5	71.5	99.0	143.0
Power	kW	3	6	11.5	17.5	24.3	34.2	48.8	68.5	97.5
Controller power		Single phase, 208~230V, 50/60Hz								
No. of cylinder		01							02	
Cylinder model		C4	C8	C15	C23	C32	C45	C65	2 X C45	2 X C65
Size (mm)	Width	356	356	426	426	525	525	525	890	525
	Thick.	245	245	300	300	360	360	360	360	360
	Height	540	540	630	630	750	750	750	750	750
Net weight	Kg	8.8	9.3	14.5	15.5	22.0	23.5	25.0	45.0	50.0
Run weight	Kg	12.5	13.2	28.0	29.0	46.5	48.0	49.5	94.5	99.0
Diameter of steam outlet	mm	22		35						
Diameter of water inlet		3/4’ External thread								
Diameter of water outlet	mm	30								

(2023 series)



Humax Electrode Humidifer Circuit Diagram (3-380VAC)

Note: when analog quantity is used for control, terminals H1 and H2 shall be short circuited

Humax Humidifier Never Dry!