



Humidification System

M 5482, M 5482-24 Operating Manual



Table of Contents

I. Important Safety Information.....	4
Informations Importantes d'inocuite	6
II. Description of Contents.....	8
Optional features and Accessories.....	9
III. Set-Up Guide	10
IV. Quick Start Guide	12
V. Functionality.....	15
Pinout.....	15
VI. Specifications	17
VII. Repair and Maintenance	18
Preventive Maintenance.....	18
VIII. Troubleshooting	20
IX. Warranty	22

Products described in this manual are designed and assembled in the U.S.A. by
Electro-Tech Systems, Inc.
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Perkasie, PA 18944



I. Important Safety Information



WARNING

This symbol accompanied by the word "WARNING" calls attention to an act or a condition which can lead to serious personal injury or death of operators and bystanders.



CAUTION

This symbol accompanied by the word "CAUTION" indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

The symbol without any warning text indicates potential damage to device when misused.



This symbol indicates the presence of hazardous AC or DC voltages constituting the risk of electric shock.



This symbol indicates a risk of fire due to improper handling or failure of device. For continued protection against risk of fire, when replacing fuses use only fuses of the specified type and current ratings.



This symbol indicates the danger of an electro-static discharge to which equipment may be sensitive. Observe all precautions for handling electrostatic sensitive devices.



These symbols indicate extreme temperature which can cause burns or frostbite. Avoid contact with surface. Failure to follow precautions may result in moderate to severe injury.

SAFETY INSTRUCTIONS

	<p>⚠ WARNING</p> <p>Read and fully understand operator's manual before using this machine.</p> <p>Failure to follow operating instructions could result in death or serious injury.</p>	
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The equipment described in this manual is designed and manufactured to operate within defined design limits. Any misuse may result in electric shock or fire. To prevent the equipment from being damaged, the following rules should be observed for installation, use and maintenance. **Read the following safety instructions before operating the instrument.**

OPERATION

CAUTION



DO NOT OPERATE WITH COVERS OR PANELS REMOVED. **Voltages inside the equipment consist of line operating at 24 VDC.**



DO NOT OPERATE WITH SUSPECTED EQUIPMENT FAILURES. If any odor or smoke becomes apparent turn off the equipment and unplug it immediately. Failure to do so may result in electrical shock, fire, or permanent damage to the equipment. Contact the factory for further instructions.



DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE. Operating the equipment in the presence of flammable gases or fumes **constitutes a definite safety hazard**. For equipment designed to operate in such environments the proper safety devices must be used such as dry air or inert gas purge, intrinsic safe barriers and/or explosion-proof enclosures.



USE DISTILLED OR DEIONIZED WATER SOURCE FOR HUMIDIFICATION. Build-up of contaminants on the transducer will cause stress to the transducer and electronics and resulting in premature failure and invalidate the warranty.



DO NOT USE IN ANY MANNER NOT SPECIFIED OR APPROVED BY THE MANUFACTURER. Unapproved use may result in damage to the equipment or present an electrical shock or fire hazard.

Informations Importantes d'inocuite



WARNING

Ce symbole accompagné du mot « AVERTISSEMENT » (WARNING) attire l'attention sur un acte ou une condition qui peut entraîner des blessures graves ou la mort des opérateurs et des passants.



CAUTION

Ce symbole accompagné du mot « ATTENTION » (CAUTION) indique une situation potentiellement dangereuse qui, si elle n'est pas évitée, pourra entraîner des blessures mineures ou modérées. Le symbole sans texte d'avertissement indique des dommages potentiels à l'appareil en cas d'utilisation abusive.



Ce symbole indique la présence d'une climatisation dangereuse ou d'un courant continu constituant le risque de choc électrique.



Ce symbole indique un risque d'incendie dû à une mauvaise manipulation ou à une défaillance de l'appareil. Pour une protection continue contre les risques d'incendie, lors du remplacement des fusibles, utilisez uniquement des fusibles du type et des valeurs nominales spécifiés.



Ce symbole indique le danger d'une décharge électrostatique à laquelle l'équipement peut être sensible. Observez toutes les précautions à prendre pour manipuler les appareils sensibles à l'électricité statique.



Ces symboles indiquent une température extrême qui peut causer des brûlures ou des engelures. Éviter le contact avec la surface. Le non-respect des précautions peut entraîner des blessures modérées à graves.

CONSIGNES DE SÉCURITÉ



Lisez et comprenez bien le manuel de l'utilisateur avant d'utiliser cette machine. Le non-respect des instructions d'utilisation peut entraîner la mort ou des blessures graves



L'équipement décrit dans ce manuel est conçu et fabriqué pour fonctionner dans les limites de conception définies. Toute mauvaise utilisation peut entraîner un choc électrique ou un incendie. Pour éviter que l'équipement ne soit endommagé, les règles suivantes doivent être respectées pour l'installation, l'utilisation et l'entretien. Lisez les consignes de sécurité suivantes avant d'utiliser l'instrument.

OPÉRATION

PRUDENCE



NE PAS UTILISER L'APPAREIL AVEC LES CAPOTS OU PANNEAUX RETIRÉS. Les tensions à l'intérieur de l'équipement comprennent une alimentation de ligne fonctionnant à 24 VCC.



NE PAS UTILISER L'APPAREIL EN CAS DE DÉFAILLANCE SUSPECTÉE. Si une odeur ou de la fumée apparaît, éteignez immédiatement l'équipement et débranchez-le. Le non-respect de cette consigne peut entraîner un choc électrique, un incendie ou des dommages permanents à l'équipement. Contactez le fabricant pour obtenir des instructions supplémentaires.



NE PAS UTILISER DANS UNE ATMOSPHÈRE EXPLOSIVE. L'utilisation de l'équipement en présence de gaz ou de fumées inflammables constitue un **danger certain pour la sécurité**. Pour les équipements conçus pour fonctionner dans de tels environnements, des dispositifs de sécurité appropriés doivent être utilisés, tels qu'une purge à l'air sec ou au gaz inerte, des barrières de sécurité intrinsèque et/ou des enceintes antidéflagrantes.



UTILISEZ UNE SOURCE D'EAU DISTILLÉE OU DÉSIONISÉE POUR L'HUMIDIFICATION. L'accumulation de contaminants sur le transducteur causera des contraintes au transducteur et à l'électronique et entraînera une défaillance prématurée et invalidera la garantie.



NE PAS UTILISER D'UNE MANIÈRE NON SPÉCIFIÉE OU APPROUVÉE PAR LE FABRICANT. Une utilisation non approuvée peut endommager l'équipement ou présenter un risque d'électrocution ou d'incendie.

II. Description of Contents



Item No.	Item	Qty.	Description
1	Ultrasonic Humidifier	1	The ultrasonic humidifier features a primary control base unit and top-mounted mist generation basin.
2	Power / Signal Cable Assembly	1	The M 5482 will include the appropriate cable assembly to connect to an M 5100 or M 5200 Series PID controller. The M 5482-24 will include the appropriate cable assembly to connect to the M 5300 Series EnviroPro PLC.
3	Water tank	1	One 5-gallon water tank is included as standard. Optionally, the humidification system can be connected directly to a DI water supply.
4	Water tank spout adapter	1	One adapter is included to neatly allow for 1/4" tubing to quickly connect and disconnect from the water tank.
5	1/4" OD polyethylene tubing	1	One 10-foot length of tubing is provided to connect the water tank to water supply inlet on the humidifier.
6	1" ID flexible PVC tubing	2	Two 1.5-foot lengths of tubing are provided to be used for connecting the mist out port and closed-loop to the humidification environment.

Optional features and Accessories

The Model 5482 and 5482-24 humidifiers may optionally be purchased with in-line particulate filtering for desired applications. The particulate filter serves to prevent contaminant build-up in the humidifier basin and increase unit lifespan. Filter specifications include 99.999+% Bacterial Filtration Efficiency (BFE), 99.999+% Viral Filtration Efficiency (VFE), and a flow resistance of 1.5cm/H₂O at 60 LPM.



The M 5482 and M 5482-24 humidifiers can be optionally purchased with increased output capacity. The model 5482-8595 high-capacity humidifier features dual outlet ports and hoses to rapidly humidify an environment or to sufficiently humidify a large volume of air.

III. Set-Up Guide

Part 1: Prepare water supply



Step 1 – Fill Water Tank

Remove cap with spigot attachment, and fill tank up to intended level, up to five gallons, with **de-ionized or distilled water only**.

Use of tap water will cause build-up of contaminants and cause stress to the mist-generating elements, which may result in premature failure.

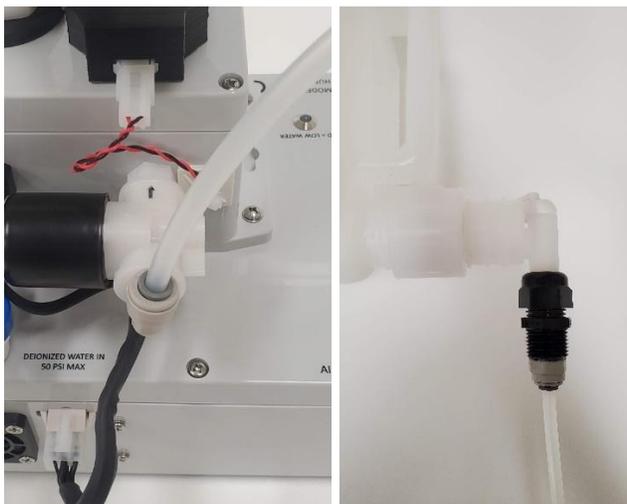


Step 2 – Install Dispensing Cap

Hand-tighten dispensing cap onto water tank. **Caution:** DO NOT use any tools, over-tightening the cap will damage the gasket and cause water leakage.

Ensure the water tank tap lever is pointed right in the “OFF” position, as depicted.

Loosen the small white cap to allow water to flow freely.



Step 3 – Install Water Feeding Tube

Place water tank above humidifier.

Insert 1/4” OD tubing firmly into the “**DEIONIZED WATER IN**” port on the humidifier. Test the connection by gently tugging on the tubing.

Optionally, utilize a water line in place of the water tank. **Caution:** Water line pressure cannot exceed 50 psi.

Part 2: Prepare Unit for Operation



Step 1 – Check Drain Valve position

Ensure the drain valve is set to the “OFF” position with the tap lever turned 90° from the drain valve inlet and outlet.

Ensure humidifier is placed on a level surface with no more than 5° tilt.



Step 2 – Turn on Water Valve

Ensure feeding tube is fully inserted.

Switch the water tank tap lever to the “ON” position (to the left) for water to flow freely.

Loosen the small white cap to allow water to flow freely.

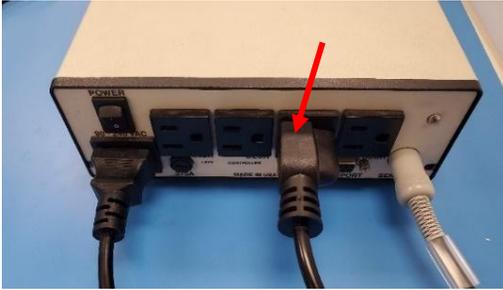


Step 3 – Identify 4-Pin Power Cable

The M 5482 includes an external power supply that is subsequently plugged into an M 5100 or M 5200 Series PID controller.

The M 5482-24 includes a 4-Pin Power Cable that directly connects to an M 5300 Series EnviroPro PLC for power.

IV. Quick Start Guide



Step 3A – Connect to Controller (M 5100 and M 5200 Series)

Connect the M 5482 humidifier power supply to a controller in the appropriate operating system outlet, labeled “HUMIDITY”.

The M 5482 can now be controlled to produce mist and raise humidity using the M 5100/M5200 Series PID controller.



Step 3B – Connect to Controller (M 5300 Series EnviroPro PLC)

Connect the 4-pin cable to the controller connectors labeled “HUMIDIFY”.

The M 5482-24 can now be controlled to produce mist and raise humidity using the M 5300 Series PLC.

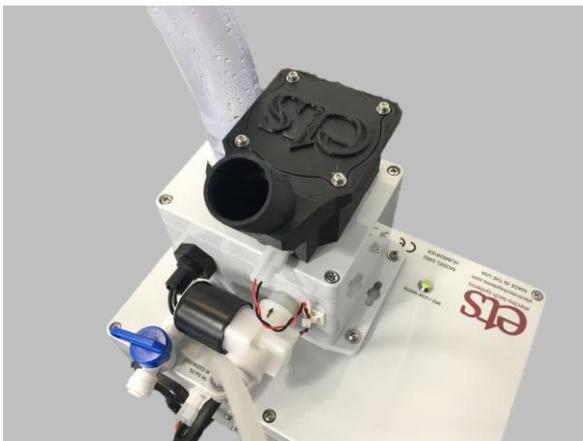


Step 4a – Closed-Loop Humidification

Connect the two 1.5-foot sections of 1” ID tubing to the humidifier. Connect one tube to the white humidity outlet barb. Connect the other tube to the black air inlet barb.

Connect the other ends of the tubing to the environmental chambers input and output barbs.

The unit will recirculate and humidify a controlled volume of air within a sealed environment.



Step 4b – Optional Open-Loop Configuration

The humidifier can optionally be run in an open-loop configuration, if desired.

Utilize one 1.5-foot section of 1” ID tubing and connect from the white humidity outlet barb to the intended environmental conditioning location.

The unit will pull external air to provide humidity to an environment.



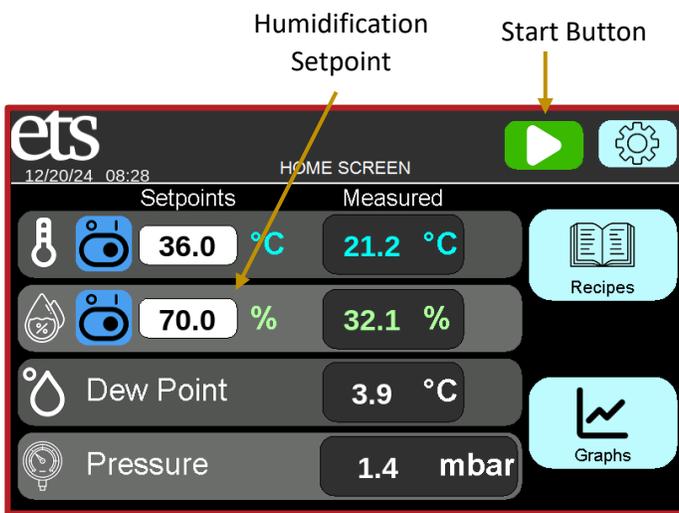
Step 5A – Humidity Setpoint (M 5100 / M 5200 Series PID controllers)

Install a relative humidity sensor within an environmental chamber and plug into the rear sensor socket of a M 5100 / M 5200 Series controller. With the sensor properly installed, on the rear of the controller switch the back panel power switch to on.

Create a set point by holding down the “*” star key on the controller and using the “▲” increase / “▼” decrease buttons to enter the desired humidity.

Switch the front panel “HUMIDIFY” switch to ON. The controller will request humidification as needed.

Consult the Operating Manual for the 5000 Series Controller for more details.



Step 5B – Humidity Setpoint (M 5300 Series EnviroPro PLC)

Tap the white entry field next to the humidity icon to enter the desired humidity setpoint.

Tap the green “play” button in the upper right side to start the system. If the setpoint humidity is higher than the current humidity, the humidifier should turn on within 10 seconds.

Consult the M 5300 Operating Manual for more details.



Step 6 – Wait for Basin to Fill

The humidifier requires its internal basin to be full before producing mist. Once the controller powers the humidifier, it will start drawing water into the basin. While the humidifier is filling, the LED turns red. This process should take between 1 to 2 minutes.

Note: Base Unit **must** be placed on a level surface with no more than 5° tilt.



Step 7 – Mist Generation

After the water reaches an acceptable level, the LED will turn **green** to indicate system has enough water to produce mist.

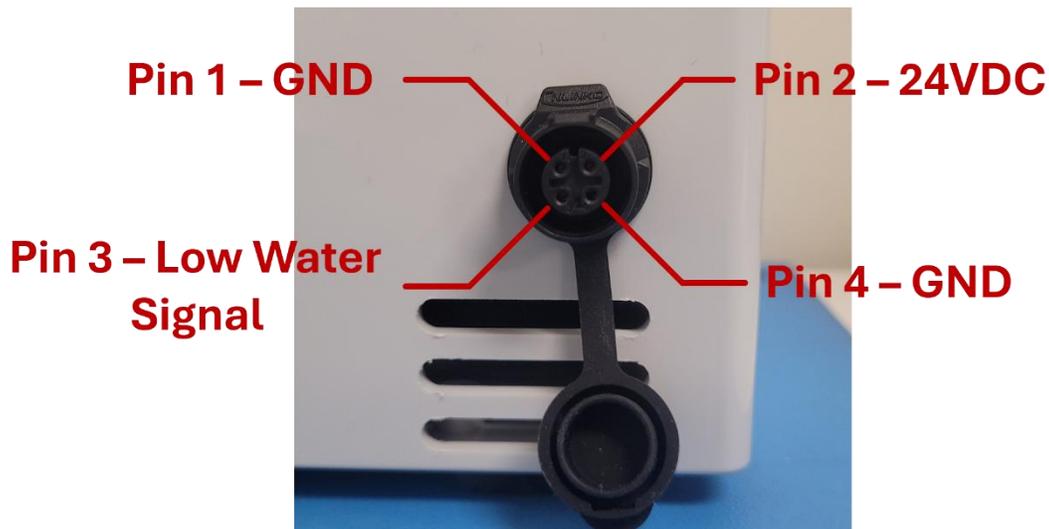
You should begin to see mist flowing out of the humidifier.

V. Functionality

1. The ETS Model 5482 Ultrasonic Humidification System requires a single-phase AC power supply. It works with voltages from 100VAC to 240VAC.
 - a. The ETS Model 5482-24 Ultrasonic Humidification System requires a 24V DC signal. See the below pinout for more details.
2. The LED is a bi-color LED. It will turn **red** when de-ionized or distilled water falls below the acceptable level in the basin. It will turn **green** when the water is at an acceptable level.
3. While the bi-color LED is **red**, the water solenoid is open to let de-ionized or distilled water fill the basin to an acceptable level.

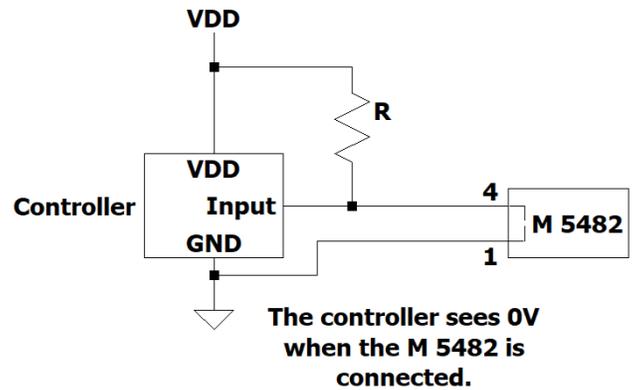
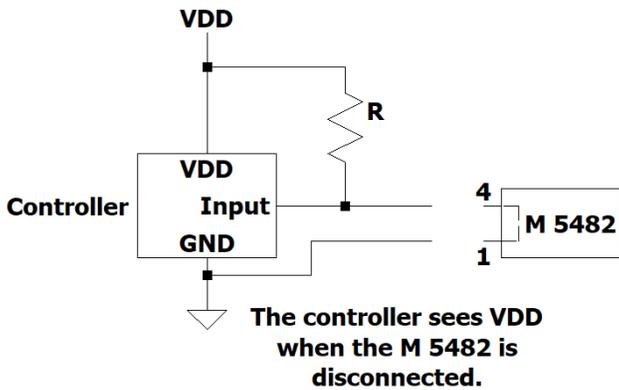
CAUTION: IF RED LED IS STAYS ON FOR MORE THAN 3 MINUTES, UNPLUG THE AC LINE CORD AND RE-FILL WATER TANK BEFORE RE-STARTING THE BASE UNIT.

Pinout



Pin Number	Pin Name	Pin Type	Description
1	GND	Power	Ground pin.
2	24V	Power	Power supply voltage input. The M 5482 and M 5482-24 require 24VDC on this pin to produce mist.
3	Low Water Signal	Output	When the humidifier basin does not have enough water, this pin will output a high signal (24V) and the solenoid will open, allowing water to flow into the basin. When the basin has sufficient water, this pin will output a low signal (0V) and the solenoid will close. When this pin is high, there is no mist production.

4	GND Feedback	Output	This pin is internally connected to the ground pin (Pin 1), so no voltage should be driven to this pin. This pin can be used to detect that the humidifier is connected to the controller. This pin will be at 0V when the device is connected and floating if it is disconnected. See the image below for an example schematic to detect the humidifier.
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Example detection circuit using a pull-up resistor.

VI. Specifications

PERFORMANCE:

Humidification Rate: >125 mL/hour

Droplet Size: 5 microns

MECHANICAL

External Dimensions: 9.5" W x 7.0" D x 10.0" H

Material: Polycarbonate Construction

Weight: 4 lbs.

HARDWARE PORTS:

Two ¼ Inch Quick Connect

Two 1 Inch Hose Barbs

ELECTRICAL

Voltage: 100VAC to 240VAC, 50 to 60 Hz (M 5482 only)

Voltage: 24VDC (M 5482-24 only)

Current: 1 Amp maximum

COMPATIBILITY

ETS Model 5100 or 5200 Series Controllers (M 5482 only)

ETS Model 5300 EnviroPro PLC (M 5482-24 only)

VII. Repair and Maintenance

To return equipment to ETS for repair it is first necessary to obtain a RMA number, please call 215-887-2196 or email service@ets2.com

Preventive Maintenance

The humidification system utilizes a pair of ultrasonic transducers that has an estimated lifespan of at least 3000 hours of run time after which it may need to be replaced. The ultrasonic transducer is not user replaceable. Please contact ETS for assistance with repair/replacement. To maximize the life of the transducer, use an appropriate water supply (deionized water or distilled water) and perform regular preventive maintenance after **every 500 hours** of operational use.

Any time the humidifier is not being used for more than a week, drain the water completely out of the basin.

Accessory filters have limited lifespan. It is recommended to replace the filter regularly to avoid degradation in humidification capability or contamination (e.g. mold). In closed-loop, high-humidity conditions, filters may become oversaturated with moisture and resist the flow of air. It is recommended to replace over-saturated filters. Filter lifespan is highly variable based on each specific application, however, to maximize the humidification capability of the Model 5482 it is recommended to replace the in-line filter **monthly**.

Preventive Maintenance



Step 1 – Power OFF and Drain the Basin

Unplug the humidifier from the controller.

Place the unit above a small container at the end of the drain valve to collect drained water.

Turn the drain valve to ON position with the tap lever turned parallel to the shutoff valve inlet and outlet and wait until draining is complete.



Step 2 – Flush out the Basin

Empty the small drain container. Reconnect the humidifier to the controller. Set the humidity setpoint to 100%. *(Note: for the M 5482 only, you may plug the AC connector into a wall outlet instead to avoid setting the humidity to 100%).*

Turn the 5-gallon water tank valve to the “ON” position to let fresh deionized water from the tank flush out contaminants in the basin through the drain valve for at least 2 minutes. No mist will be produced at this time.



Step 3 – Return System to Operation

Turn the drain valve to the “OFF” position with the shutoff valve tap lever turned 90° from the valve inlet and outlet.

Refer to **Section IV. Quick Start Guide** to return the humidifier back into standard operation.

VIII. Troubleshooting

Troubleshooting Guide		
Problem	Possible Causes	Corrective Actions
Power LED does not light up	Unit is not receiving power	Plug Humidifier unit into controller. Check that the controller is turned on. For the M 5482, ensure the "HUMIDIFY" switch is in the "ON" position. For the M 5482-24, ensure that humidity control is enabled on the M 5300. Check that the humidification set point is above the current humidity.
	Electrical issue resulting in LED not lighting.	Contact ETS for troubleshooting and repair.
Red "LOW WATER" light stays on	Water basin is empty	Check if water tank valve is turned to the "ON" position. Check if basin drain valve is turned to "closed" position. Check if water tank has at least 1 gallon of water. Ensure that water tank is located above basin to allow gravity feed of water. Ensure that small white cap on water tank is loose to allow air flow.
Power LED is Green , but diminished mist is being generated.	The ultrasonic elements are contaminated.	Conduct Preventative Maintenance. Ensure distilled or deionized water is utilized to minimize contamination and avoid premature failure of the system.
	One of the ultrasonic elements is at the end of the rated life (3000 hours of operation)	Contact ETS for servicing unit and replacing of ultrasonic elements.

Problem	Possible Causes	Corrective Actions
Power LED is Green , but no mist is being generated	Humidifier is overfilling due to malfunctioning float switch or water fill valve leaking.	Confirm if the water level float switch is malfunctioning by turning off the system, drain the basin, and restart the system. The system should start with red 'Low Water' lit. The water fill valve should be heard to click on. Upon filling to the proper level, the LED should turn Green and the water fill valve should be heard to click closed.
		Confirm if the water fill valve is leaking by turning off system, drain and dry the basin, ensure water supply is connected. Allow the system to sit overnight and check for leakage the next morning. Contact ETS for repair if leaking is occurring.
	Other electrical or PCB issue	Contact ETS for troubleshooting and repair.

IX. Warranty

Limited Warranties. Seller warrants that all goods manufactured and delivered hereunder shall (a) conform to any samples, drawings, specifications, or other written documents provided to Seller by Buyer or approved by Buyer to Seller and (b) be free from all defects in workmanship and material. Buyer's sole remedy against Seller for breach of either of the specifically mentioned warranty shall be the repair or replacement, at Seller's sole option, of the defective workmanship or material. Seller expressly disclaims all other warranties, express and/or implied, including but not limited to those of merchantability and fitness for a particular purpose. In no event shall Seller be liable, under either warranty or otherwise, to Buyer in excess of the purchase price of the products paid to Seller by Buyer. In no event shall Seller be liable for any loss or damage arising directly or indirectly from the use of the product or for consequential or incidental damages. Seller's specified warranties will expire and lapse (i) for renewable items (such as gloves, iris ports and desiccants), sixty (60) days from date of shipment and (ii) for all standard equipment and otherwise nonrenewable items, one year from date of shipment.