



M 5461, M 5461-24

Dehumidification System Operating Manual

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



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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

	WARNING Read and fully understand operator's manual before using this machine. Failure to follow operating instructions could result in death or serious injury.	
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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.**

POWER



POWER CORD: Use only the power cord specified for this equipment and certified for the country of use. If the power (mains) plug is replaced, follow the wiring connections specified for the country of use. When installing or removing the power plug, **hold the plug, not the cord.** The AC supply must be single phase, with RMS Voltage in range 90 – 264 VAC, alternating at a frequency in range 47 – 63 Hz.

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.



DO NOT IMPEDE THE CHAMBER FROM VENTING EXCESS PRESSURE. Dehumidification system is an open loop system that pumps external air into the chamber. If the chamber is not allowed to vent, pressure can build up and cause serious damage to the chamber. A pressure monitoring system is highly recommended.



INLET AIR PRESSURE MUST BE LESS THAN 100 PSI (6.89 Bar) & INLET AIR TEMPERATURE MUST BE WITH RANGE OF 33° - 120° F (0.5° - 49° C) Serious injury could result.



APPROPRIATE FILTRATION OF COMPRESSED AIR IS RECOMMENDED. Build-up of contaminants can damage the desiccant towers & reduce their effectiveness in drying inlet air. **AIR PRESSURE MUST BE GREATER THAN 50 PSI (3.45 Bar)** For optimal system performance.



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'innocuité



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.

ALIMENTATION



CORDON D'ALIMENTATION : Utilisez uniquement le cordon d'alimentation spécifié pour cet équipement et certifié pour le pays d'utilisation. Si la fiche d'alimentation (secteur) est remplacée, suivez les connexions de câblage spécifiées pour le pays d'utilisation. Lors de l'installation ou du retrait de la fiche d'alimentation, **tenez la fiche, pas le fil.**



MISE À LA TERRE : Le cordon d'alimentation fourni est équipé d'une **fiche à 3 broches avec mise à la terre (une fiche avec une troisième broche de mise à la terre)**. Il s'agit à la fois d'une fonction de sécurité pour éviter les chocs électriques et d'une exigence pour le bon fonctionnement de l'équipement. Si la prise à utiliser n'est pas compatible avec la fiche à 3 broches, changez la prise ou utilisez un adaptateur de mise à la terre.



FUSIBLES : Remplacez les fusibles uniquement par des fusibles ayant le courant nominal, la tension et le type spécifié tels que fusion normale, temporisation, etc. **N'UTILISEZ PAS** de fusibles de fortune ou ne court-circuitiez pas le porte-fusible. Cela pourrait entraîner un risque d'électrocution ou d'incendie ou endommager gravement l'instrument.

OPÉRATION

PRUDENCE



NE PAS UTILISER AVEC LES COUVERCLES OU LES PANNEAUX RETIRÉS. Les tensions à l'intérieur de l'équipement consistent en une ligne (secteur) pouvant aller de 100 à 240 VAC.



NE PAS UTILISER AVEC DES PANNES D'ÉQUIPEMENT SUSPECTES. Si une odeur ou de la fumée se dégage, éteignez l'équipement et débranchez-le immédiatement. Le non-respect de cette consigne peut entraîner un choc électrique, un incendie ou des dommages permanents à l'équipement. Contactez l'usine pour plus d'instructions.



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 que la purge d'air sec ou de gaz inerte, les barrières de sécurité intrinsèque et/ou les enceintes antidéflagrantes..



NE PAS EMPÊCHER LA CHAMBRE D'ÉVACUER L'EXCÈS DE PRESSION. Les systèmes de déshumidification disponibles comprennent des systèmes en boucle ouverte qui pompent l'air extérieur dans la chambre. Si la chambre n'est pas autorisée à s'aérer, la pression peut s'accumuler et causer de graves dommages à la chambre.



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.

Description of Contents



M 5461



M 5461-24

Item No.	Item	Qty.	Description
1	M 5461 or M 5461-24	1	Desiccant Dehumidification System include built-in fittings, locking nut, desiccant basket, and filter.
2	Power / Signal Cable Assembly	1	For use with ETS Controllers, your M 5461 will include the appropriate cable assembly to connect to: • M 5100, M 5200 PID Controllers • M 5300 Series EnviroPro PLC
3	Desiccant	1	800cc bag of indicating molecular sieve desiccant.
4	Caps	2	Caps used to cover inlet and outlet locking nuts on the Desiccant Dehumidification system.
5	Tool	1	A tool used to install or remove locking nuts on the Desiccant Dehumidification system

II. Set-Up Guide

Set-Up Guide



Step 1.A. Uninstall system

If purchased with a glovebox/chamber, the M 5461 system will have been installed on the inside of the chamber for shipping purposes.

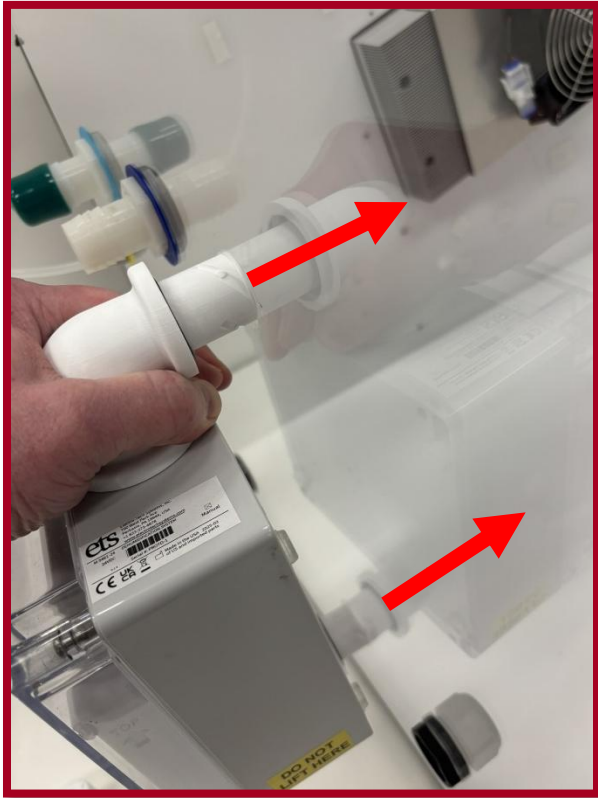
The desiccant box will need to be removed and reinstalled on the outside of the chamber.

Remove the two large, triangular lock nuts on the outside of the chamber using the provided tool. The desiccant box can then be removed from the inside of the chamber and reinstalled on the outside.



Step 1.B. Uninstall system

Firmly grasp the desiccant system by the Top and Bottom elbows and remove the system from the inside of the chamber wall.



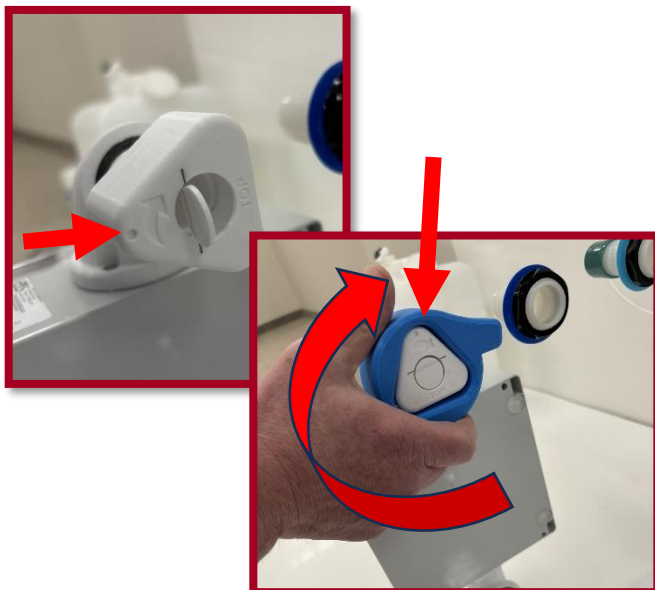
Step 2. Install on outside of chamber

Maintaining the same orientation of the desiccant box (connector and fan should be on the top side), reinsert the desiccant fittings through the two holes from the outside the chamber.

Reinstall the locking nuts using the provided tool. Note that there is a top and bottom locking nut. The locking nuts are marked.

Reinstall each locking nut by lining up the dot/arrow on the locking nut to be oriented at approximately 9 o'clock and then install by turning clockwise.

Firmly hand tighten such that the dot/arrow are oriented to be at 12 o'clock.



Step 3. Install on outside of chamber

Reinstall the locking nuts. Note that there is a top and bottom locking nut. The locking nuts are marked.

Reinstall each locking nut by lining up the dot/arrow on the locking nut to be oriented at **approximately 9 o'clock** and then install by turning clockwise using the provided tool.

Firmly hand tighten such that the dot/arrow are oriented to be at **12 o'clock**.

After tightening, you should be able to visually see the black O-ring through the chamber wall is properly seated and sealing the chamber environment from the outside environment. If the O-ring is dislodged (or missing), it will need to be located and resealed.

Set-Up with M 5100 / M 5200 Series PID Controller



Step 4. Identify Power / Signal Cable Assembly

The Power / Signal Cable Assembly has a single power AC/DC power supply for plugging into the PID controller.



Step 5. Install Power / Signal Cable Assembly to the dehumidification system.

Plug the 4 Pin Connector into the 4 Pin Receptacle on the top of the dehumidification system.



Step 6. Connect to PID controller.

The AC/DC Adapter must be plugged into the back of the PID Controller plug marked **DEHUMIDIFY**



Step 6.A. Turn on Dehumidify Function

Using the ETS Controller, set the desired set point for the relative humidity in the chamber. Turn on the Controller's ability to decrease the relative humidity in the chamber.

Set-Up with M 5300 Series EnviroPro PLC



Step 7.A. Identify Power / Signal Cable Assembly

The Power / Signal Cable is a single 4-wire cable with a quick disconnect connector on each end.



Step 7.B. Install Power / Signal Cable Assembly to M 5478-24

Plug the 4 Pin Connector into the 4 Pin Receptacle labeled **DEHUMIDIFY** on the PLC and connect to the sole connector on the M 5478-24.





Step 7.C. Turn on Dehumidify Function

Using the ETS Controller, set the desired set point for the relative humidity in the chamber. Turn on the Controller's ability to decrease the relative humidity in the chamber.

See the Operating Manual of the EnviroPro PLC if you have any questions regarding the functionality of the controller.

III. Functionality

The Model 5461 Desiccant Dehumidification System is a closed loop system, designed to reduce the relative humidity within a sealed chamber to as low as 5%. When used with a Controller, such as the ETS Model 5100 or Model 5200 PID controllers or M 5300-24 EnviroPro PLC, the chamber may be maintained to within $\pm 0.5\%$ RH of the set-point.

A desiccant basket filled with 800cc of renewable Molecular Sieve ("MS") desiccant is installed inside the enclosure. The desiccant removes moisture from the air. The dried air is forced back into the chamber by small, quiet linear fan mounted inside the enclosure.

Twenty percent (20%) of the Molecular Sieve granules are indicating granules, visible as the blue granules in a fresh system. These turn to gray when the MS material has absorbed its full capacity of water. At this point, the Molecular Sieve needs to be renewed or replaced.

The desiccant basket is easily removable for replacing the desiccant or see Section VII for instructions regarding renewing the desiccant.

IV. Specifications

PERFORMANCE:

Relative Humidity: As low as 5% RH in sealed environments up to 12 cubic feet (343L).

Duration: Maintains low humidity sealed environments for up to 80 hours of continuous operation (varies based on size).

MECHANICAL

Enclosure Dimensions: 6.3" W x 3.5" D x 6.3" H

External Dimensions: 6.3" W x 5.3" D x 11.3" H

Center to Center: 9.31"

Material: Polycarbonate Construction

Weight: 3.5 lbs.

HARDWARE PORTS:

Two 1.08" OD reducing elbows with quarter turn lock nuts

ELECTRICAL

Voltage: 24VDC

Max Power Consumption: 2.4 W or 0.10A @24VDC

DESICCANT

Material: Molecular Sieve

Weight: 800 cc total: 650 cc non-indicating / 150 cc indicating)

CONTROLLER COMPATIBILITY

ETS Model 5100 or 5200 and 5300 Series Controllers

V. Repair and Maintenance

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

Preventive Maintenance

Preventative maintenance primarily consists of monitoring the system for particulate accumulation and monitoring the indicating desiccant for when it has expired.

1. Particulates

The filter on the bottom of the desiccant basket acts to prevent desiccant particulates from exiting the desiccant system and becoming FOD (Foreign Object Debris) inside your glovebox chamber environment. However, particles of desiccant or desiccant dust may accumulate as the desiccant basket is removed and reinstalled. Periodically cleaning the desiccant enclosure when renewing or replacing the desiccant is recommended to minimize any accumulation of particulates.

When cleaning the enclosure, be aware that the enclosure and most of the components are made of plastics, primarily polycarbonate. Polycarbonate is strong but can be damaged by some lab cleaners. Generally, diluted forms of alcohol including isopropyl (IPA) are acceptable.

2. Monitoring the Indicating Desiccant:

Twenty percent (20%) of the Molecular Sieve granules are indicating granules, visible as the blue granules in a fresh system. These turn to gray when the MS material has absorbed its full capacity of water. At this point, the Molecular Sieve needs to be renewed or replaced.

CHANGING THE DESICCANT

1. Remove the 4 screws from the lid using a size #1philips screwdriver.
2. Set the lid aside
3. Remove the desiccant basket
4. Slide the clear window open on the basket
5. Pour out old desiccant and refill (see instructions below for renewing desiccant).
6. Slide the clear window back into place.
7. Return the desiccant basket back to the enclosure (filter side down)
8. Reinstall the lid on the system using the four screws. Partially install each of the 4 screws before tightening to be hand tight.

RENEWING THE DESICCANT

The desiccant can be renewed approximately ten (10) times before having to be replaced. The granules should be removed from the drying column and spread evenly, one granule deep on a tray. The desiccant should then be heated for approximately one (1) hour at 300°F (150° C) to 400°F (200° C), or until all the indicating granules turn from gray to blue. The material should be allowed to cool in an airtight container before refilling the desiccant basket.

The desiccant can also be renewed in a Microwave by cooking on High setting for approximately 10 minutes. Proper precautions must be utilized to utilize microwaveable glassware suited for high temperatures and ensure no flammable or explosive gases were at risk of accumulating in the desiccant that may be a fire or explosive hazard in a microwave. Do NOT place the desiccant basket directly in the microwave or you will cause heat damage to the desiccant basket, and it will need to be replaced.

Irrespective of which method is utilized to renew the desiccant, do not place hot desiccant back into the desiccant basket. All the desiccant to cool back to room temperature first.

VI. Troubleshooting

Troubleshooting Guide

Problem	Possible Causes	Corrective Actions
No Power to Unit	Unit is not receiving power	Ensure the power/signals cable is connected properly. (See pages 10 – 11 in the Setup Guide).
Unit is not dehumidifying at all	Controller is not outputting Humidity Decrease Signal	Ensure that Controller Humidity Decrease Function is turned on (See Steps 6-7 in Set-up Guide, See pages 10 – 12).
	Inlet / Outlet caps are installed	Ensure the caps have been removed. 
	Full blockage of inlet / outlet ports	Ensure inlet and outlet are free of any materials that have sucked into the intake or physically blocking the ports.
Poor performance	Partial blockage of inlet / outlet ports	Ensure inlet and outlet are free of any materials that have sucked into the intake or physically blocking the ports.
	Desiccant is depleted	Verify desiccant visually. If the blue indicating desiccant has faded to a light blue/gray, then the desiccant needs to be replaced or renewed. See page 15

VII. 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.