



M 5478, M 5478-24
Self Regenerating Dehumidification System
Operating Manual

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Products described in this manual are designed and assembled in the U.S.A. by
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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	
	<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>	

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'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.

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-circuitez 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 PRESSIION. 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.

II. Description of Contents



M 5478

M 5478-24



Item No.	Item	Qty.	Description
1	M 5478 or M 5478-24	1	Self-Regenerating Dehumidifier System.
2	Power / Signal Cable Assembly	1	For use with ETS Controllers, your M 5478 will include the appropriate cable assembly to connect to: <ul style="list-style-type: none"> • M 5100, M 5200 PID Controllers • M 5300 Series EnviroPro PLC
3	¼" Polyethylene Tubing	10'	Tubing required for airline input & system output
4	¼" Tubing to ¼" MNPT Adapter	1	Fitting will already be installed if purchased with an ETS glovebox/chamber.

III. Set-Up Guide

Set-Up Guide



Step 1. Install 1/4" Tubing to Air Output

Firmly insert one end of the 1/4" Polyethylene Tubing into the Fitting with the **Yellow** color-coded ring, labeled **AIR OUTPUT**.

Cut tubing to the length required to run the tube from the M 5478 to the 1/4" Fitting with the matching **Yellow** color-coded on the Chamber.

If this fitting is not installed yet, use the 1/4" Tubing to 1/4" MNPT Adapter supplied with the M 5478.



Step 2. Install 1/4" Tubing to Air Input

Run 1/4" Polyethylene Tubing from a nearby Compressed Air Source to the M 5478.

Firmly insert the 1/4" Polyethylene Tubing into the other Fitting on the M 5478 labeled **AIR INPUT**.

WARNING:

The Air Pressure from the Compressed Air Source must be in the range of 50 – 100 psi for safe & effective operation.

It is recommended that the Compressed Air Source has a filter to protect the Desiccant System from any contaminants.

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



Step 3. Identify Power / Signal Cable Assembly

The Power / Signal Cable Assembly has two separate plugs, which are important to differentiate.

The Power Plug is labeled **POWER** & the Signal Plug is labeled **DEHUMIDIFY**.



Step 4. Install Power / Signal Cable Assembly to M 5478

Plug the 4 Pin Connector into the 4 Pin Receptacle labeled **POWER / SIGNAL INPUT**.



Step 5. Install Power Plug into AC Outlet

Using the plug labeled **POWER**, install it in a nearby AC Outlet.

The AC supply must be single phase, with RMS Voltage in range 90 – 264 VAC, alternating at a frequency in range 47 – 63 Hz.

This indicates that the M 5478 is powered, but no signal is being received to Dehumidify the Chamber.



Step 6.A Plug in Signal Cable into Overpressure Sensor

The next steps focus on the interaction between the Overpressure Sensor and the M 5478. ETS strongly recommends utilizing an Overpressure Sensor with the M 5478. The M 5478 can create a high-pressure environment if proper ventilation is not in place.

Using the plug labeled **DEHUMIDIFY**, install it in the AC outlet labeled **Valve Power** on the Overpressure Sensor.



Step 6.B Verify Overpressure Sensor is set up correctly.

The Overpressure Sensor must be plugged into the outlet labeled **DEHUMIDIFY** on the rear of the ETS Controller.



Step 6.C Verify Overpressure Sensor is set up correctly.

The flexible tubing must be securely connected to the Overpressure Sensor & a chamber hose barb.



Step 6.D Verify Overpressure Sensor is set up correctly.

The Overpressure Sensor's AC DC Adapter must be plugged into a nearby AC Outlet.



Step 7. 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 3. Identify Power / Signal Cable Assembly

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



Step 4. 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 5. 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.

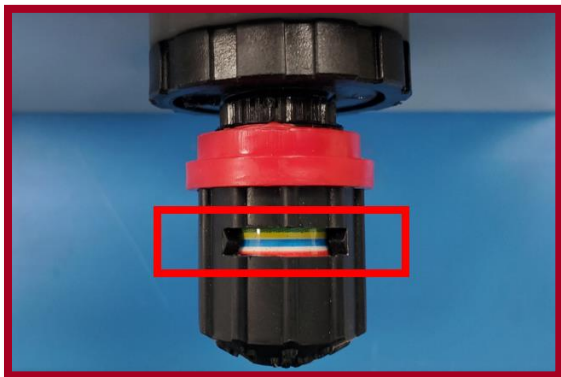
See the Operating Manual of the EnviroPro PLC if you have any questions regarding the functionality of the controller.

IV. Functionality

The Model 5478 Self-Regenerating Dehumidification System is designed to reduce the relative humidity in a glovebox/chamber to 5% RH or less for most applications. Operation of the Model 5478 can be controlled manually or by a controller, such as in a chamber. The system consists of a dual tower compressed air dryer (molecular sieve) and a 3-way solenoid valve to direct the dried air and a flow regulator to control the output flow. The dryer and valve are installed inside the enclosure. Desiccant is automatically renewed while the System is running. The System never has to be shut down to renew or replace desiccant. All moisture-laden air is evacuated through a muffler inside of the enclosure. When energized, the solenoid valve allows dried air to flow to the output.

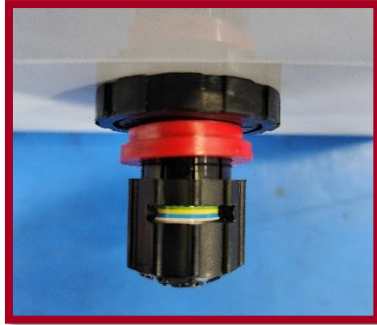
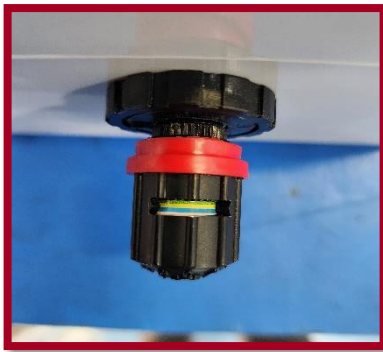
- The dryer operates using a house air system at 50 to 100 psi. At 100 psi, twice as much dry air is produced, reducing drying time. The system is factory set to operate optimally at 90 psi and a flow rate of 120 SCFH. If necessary, the flow control on the M 5478 can be adjusted to increase or decrease the flow rate.

Adjust the Flow Rate



Step 1. Verify Flow Control is in Correct Position

The indicating ring of the Flow Control Knob is set to the **Blue** indicating ring at the factory. If the ring is not set to this position, adjust the flow control knob by rotating it clockwise or counterclockwise to the correct position (see Step 7.A, 7.B).

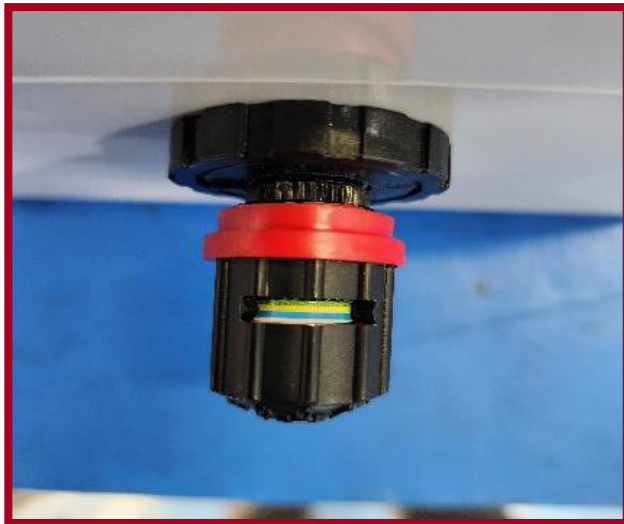


Step 2.A Unlocking Flow Control Knob

To Lock or Unlock the Flow Control Knob for flow control adjustment, slide the **Red** Lock Ring towards or away from the unit, respectively. The movement is slight (~ 1/8") and does not require much force to move.

When the ring is pulled away from the unit, and reaches its physical limit, it is in the unlocked state. The Flow Control can be adjusted: it will rotate clockwise or counterclockwise.

When the red ring is pushed in towards the unit, and reaches its physical limit, it is in the locked state. The Flow Control cannot be adjusted: it will not rotate clockwise or counterclockwise.



Step 2.B Adjusting Flow Control Knob

To adjust the Flow Control Knob, ensure that the knob is in the unlocked state (see Step 7.A).

The knob is incrementally opened when rotated counterclockwise & incrementally closed when rotated clockwise.

When the knob is fully opened, it cannot be rotated any further counterclockwise & when fully closed, it cannot be rotated any further clockwise.

Once done adjusting, lock the controller knob (see Step 7.A).

V. Specifications

PERFORMANCE:

Output Flow Rate 120 SCFH @ 90 psig.

MECHANICAL

External Dimensions: 10.5" W x 9.5" D x 4" H

Material: Polycarbonate Construction

Weight: 5.5 lbs.

HARDWARE PORTS:

Two ¼ Inch Quick Connects

ELECTRICAL

Voltage: 90VAC to 264VAC, 47 to 63 Hz

Max Power Consumption: 11 W

CONTROLLER COMPATIBILITY

ETS Model 5100, 5200, and M 5300 Series Controllers

VI. 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 dehumidification system inside the M 5478 has a muffler that is recommended to be replaced every year of operation or after a Unit Purge. Contact ETS for replacing this part.

VII. Troubleshooting

Troubleshooting Guide

Problem	Possible Causes	Corrective Actions
No Power to Unit	Unit is not receiving power	Ensure power and signals cables are connected properly. (See Steps 3 – 6 in the Setup Guide).
Unit is not dehumidifying at all	Controller is not outputting Humidity Decrease Signal	Ensure that Controller Humidity Decrease Function is toggled on (See Step 7 in Set-up Guide).
	Overpressure Sensor is not passing Humidity Decrease Signal	If Overpressure Red Sensor LED is illuminated, an Overpressure Condition has occurred in the Chamber. Allow Chamber to vent & correct chamber ventilation.
		If Overpressure Green Sensor LED is not illuminated, Ensure the Overpressure Sensor has power (See Step 6.D in Set-up Guide).
	M 5478 Output is not connected to Chamber	Connect ¼” Tubing from M 5478 Output Fitting to Chamber Fitting (See Step 1 in Set-up Guide).
	Compressed Air Source is not connected to M 5478 Input	Connect ¼” Tubing from compressed air source to M 5478 Input Fitting (See Step 2 in Set-up Guide).
	Flow Control Knob is Fully Closed	Adjust the Flow Control Knob indicator to blue ring (See Steps 7.A, 7.B in the Set-up Guide)
Poor performance	Flow Control Knob is Fully Open	Adjust the Flow Control Knob indicator to blue ring. Choking of the flow is necessary for the desiccant system to fully remove water content from the input air. (See Steps 7.A, 7.B in the Set-up Guide)
	Dehumidification System is contaminated	Ensure compressed air supply is not contaminated with water/contaminates in the line. Empty/clean or incorporate filters in supply airline prior to M 5478.

Problem	Possible Causes	Corrective Actions
Unit is delivering wet air /water	Water/contaminates in compressed air supply line	Ensure compressed air supply is not contaminated with water in the line. Empty/clean or incorporate filters in supply airline prior to M 5478.
	Air flow is more than rated capacity	Verify incoming compressed air supply does not exceed 100 psi. The recommended value is 90 psi.
	Low inlet Pressure	Verify incoming compressed air supply is greater equal or greater than 50 psi. The recommended value is 90 psi.
Flow Control will not Adjust	Flow Control Lock is Engaged	Disengage the Flow Control Lock (See Steps 7.A, 7.B in the Set-up Guide).
	Flow Control is Fully Open	Flow Control will not rotate counterclockwise any further. Only allowable adjustment is to incrementally close the flow control by rotating clockwise (See Steps 7.A, 7.B in the Set-up Guide).
	Flow Control is Fully Closed	Flow Control will not rotate clockwise any further. Only allowable adjustment is to incrementally open the flow control by rotating counterclockwise (See Steps 7.A, 7.B in the Set-up Guide).

VIII. 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.