



**MATHESON
TRI•GAS**

ask. . .The Gas Professionals™

PSA Nitrogen Generator

Owner's Manual

All "N" Models

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1 INTRODUCTION

Congratulations on your purchase of a **MATHESON TRI-GAS, Inc. Pressure Swing Adsorption (PSA) type Nitrogen Generator**. This simple, turnkey machine provides a cost-effective means for on-site generation of nitrogen. The Nitrogen Generator is based on using the latest PSA technology and utilizes Carbon Molecular Sieve (CMS) to separate the nitrogen from the other gases contained in air. The Nitrogen Generator uses two beds of CMS to separate compressed air into a high-pressure nitrogen product stream and low-pressure oxygen enriched waste stream. Particulate and activated carbon filters are included to remove impurities from the feed air. Each Nitrogen Generator comes pre-tested and fine tuned to meet the customer specified nitrogen flow rate and purity.

Since the system contains very few moving parts, maintenance and repairs are minimal. Maintenance is simple yet necessary. Air compressor and filter maintenance procedures are especially important and should be followed carefully. If the recommended maintenance procedures are followed, your nitrogen generator will provide you with many years of reliable service.

1.1 Company Presentation

MATHESON TRI-GAS is established as a world leader in the supply of systems for generation hydrogen and Nitrogen. We have been supplying Hydrogen and Nitrogen generators since 1987. Information about our products and our company can be found at our web site: www.mathesontrigas.com

MATHESON TRI-GAS activities frequently include full responsibility for conceptual and detail engineering design, procurement, fabrication, supply and installation of packages for various industries worldwide.

MATHESON TRI-GAS' Nitrogen Generator offers operators the benefits of this advanced, but simple technology. The principle advantages of PSA systems are:

- Compact
- Low weight
- Safe, reliable operation
- Simple maintenance
- Ease of operation
- Rapid start-up

1.2 Safety Information

The following section outlines the basic safety considerations regarding use of your Nitrogen Generator. Please refer to the technical references for additional information.

Read carefully and act accordingly before installing, operating or repairing the unit.

- **The operator must employ safe working practices and rules when operating the nitrogen generator.**
- **The owner is responsible for maintaining the unit in a safe operating condition.**
- **Always use approved parts when performing maintenance and repairs. Make sure that replacement parts meet or exceed the pressure requirements.**
- **Only authorized, trained and competent individuals must perform installation, operation, maintenance and repair.**
- **Completely depressurize the generator, tanks, and lines prior to performing any mechanical work, including changing the filters. The nitrogen must be vented to the outside or to a large, well-ventilated room to avoid suffocation due to lack of oxygen.**
- **Safety glasses should be worn if the cabinet door is open while the machine is operating.**

WARNING

Pressurized gases are contained within the generator and the receiver and product tanks. High-pressure gases are dangerous and may cause injury or death if handled or used inappropriately.

- **Never allow high-pressure gas to exhaust from an unsecured hose. An unsecured hose may exhibit a whipping action, which can cause serious injury. If a hose should burst during use, immediately close all isolation valves.**
- **Never disable or bypass any safety relief valves on the air receiver or product tanks.**
- **Always make certain that the nitrogen generator is unplugged prior to performing any electrical work.**

NOTE

If any statement or specification within this booklet, especially with regard to safety, does not agree with legislation or standard industry practices, the more demanding shall apply.

1.3 Warranty

LIMITED WARRANTY

This equipment is sold by Matheson Gas Products (Matheson) under the warranties set forth in the following paragraphs. Such warranties are extended only with respect to the purchase of this equipment directly from Matheson or Matheson's Authorized Agent as new merchandise and are extended to the first Buyer thereof other for than the purpose of resale.

For a period of one year from date of original delivery (ninety days in corrosive service) to Buyer or to Buyer's order, this equipment, is warranted to be free from functional defects in materials and workmanship and to conform to the description of this equipment contained in this manual and any accompanying labels and/or inserts, provided that this equipment is properly operated under the conditions of normal use and that regular and periodic maintenance and service is performed or replacements are made in accordance with the instructions provided. Expendable parts of this equipment are similarly warranted to be free from functional defects in materials and workmanship and to conform to the description of this equipment contained in this manual and any accompanying labels and/or inserts. The foregoing warranties shall not apply if the equipment has been repaired other than by Matheson or a service facility designated by Matheson, or if this equipment has not been operated and maintained in accordance with written instructions provided by Matheson, or has been altered by anyone other than Matheson, or if the equipment has been subject to abuse, misuse, negligence or accident.

Matheson's sole and exclusive obligation and the Buyer's sole and exclusive remedy under the above warranties is limited to repairing or replacing, free of charge, at Matheson's sole discretion, the equipment or part which is telephonically reported to be a problem to the local Matheson Branch Location, and which if so advised, is returned with a written statement of the observed deficiency, not later than seven days after the expiration of the applicable warranty, to the Matheson Gas Equipment Technology Center during normal business hours, transportation charges prepaid, and which, upon examination, is found to comply with the above warranties. Return trip transportation charges for the equipment or part shall be paid by the Buyer.

MATHESON SHALL NOT BE OTHERWISE LIABLE FOR ANY DAMAGES INCLUDING BUT NOT LIMITED TO INCIDENTAL DAMAGES, CONSEQUENTIAL DAMAGES, OR SPECIAL DAMAGES, WHETHER SUCH DAMAGES RESULT FROM NEGLIGENCE, BREACH OF WARRANTY OR OTHERWISE.

THERE ARE NO EXPRESS OR IMPLIED WARRANTIES WHICH EXTEND BEYOND THE WARRANTIES HEREINABOVE SET FORTH. MATHESON MAKES NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE EQUIPMENT OR PARTS THEREOF.

ACCEPTANCE OF THE EQUIPMENT BY THE FINAL BUYER INDICATES THE FINAL BUYER'S ACCEPTANCE OF ALL WARRANTIES AND LIMITATIONS SET FORTH ABOVE

USER RESPONSIBILITY

This equipment will perform in conformity with the description thereof contained in this manual and accompanying labels and/or inserts when installed, operated, maintained and repaired in accordance with the instructions provided. This equipment must be checked periodically, with the frequency of such inspections depending upon the scope of use. Damaged, worn or contaminated equipment should not be used. Parts that are broken, missing, plainly worn, distorted or contaminated should be replaced immediately. Should such repair or replacement become necessary, Matheson Gas Products recommends that a telephonic or written request for service advice be made to the Matheson Equipment Engineering Group in Montgomeryville Pennsylvania or to the nearest Matheson Gas Products Branch location.

This equipment or any of its parts should not be altered without the prior written approval of Matheson Equipment Engineering Group. The user of this equipment shall have the sole responsibility for any malfunction, which results from improper use, faulty maintenance, damage, improper repair or alteration by anyone other than Matheson Gas Products or a service facility designated by Matheson Gas Products. Further, the ultimate user of the equipment is responsible for the training and safe operation of the equipment by personnel in his/her employ.

The Nitrogen Generator, excluding air supply system, is warranted against defects in materials and workmanship, under normal use and operation, as applicable on the warranty listed below. All compressors and dryers are covered by the original equipment manufacturer's warranty.

These warranties shall be null, void, inoperative, and not binding upon MATHESON TRI-GAS, Inc. if a defect or malfunction occurs in the product or any part thereof from any **feed air malfunction, or improper filter element maintenance**, or repair, attempted repair, adjustment or servicing by anyone other than an authorized representative of MATHESON TRI-GAS, **or external causes**. Said warranty shall extend and apply to the Nitrogen Generator only while said system is owned and used exclusively by the original purchaser.

1.4 Service Return Policy

General Service

A unit which is not functioning in a normal manner should be removed from service until such time that repairs or replacement can be made. Upon completion of repair, full testing should be performed to assure the user that the regulator has been returned to its original operating parameters. Matheson offers a repair service to its customers for all products that Matheson sells. To arrange for repair service, call 1-800-828-4313 and ask for the Warranty Administrator. **NO PRODUCT WILL BE RECEIVED BY MATHESON WITHOUT INDICATION OF GAS SERVICE AND WITHOUT PROPER RETURN MATERIAL AUTHORIZATION PROVIDED BY THE WARRANTY ADMINISTRATOR. (All repairs must be made by Matheson or an assigned and approved facility to maintain any warranties or guarantees)**

If the unit is under an applicable warranty, return the unit to Matheson for repair or replacement. To arrange for warranty service, call 1-800-828-4313 and ask for the Warranty Administrator. **NO PRODUCT WILL BE RECEIVED BY MATHESON WITHOUT INDICATION OF GAS SERVICE AND WITHOUT PROPER RETURN MATERIAL AUTHORIZATION PROVIDED BY THE WARRANTY ADMINISTRATOR.**

If advised by the Warranty Administrator to return the product to Matheson, prepare the product for shipment and write, in large lettering the RMA Number assigned by the Warranty Administrator on the outside of the box. Also, if required by the Warranty Administrator, supply the completed RMA form with the product. Make sure that the product is adequately packaged, in the original shipping container if possible, and shipped prepaid (Matheson will not accept COD freight) with a description of the observed deficiency to the attention of the:

Warranty Administrator
Matheson Gas Products
166 Keystone Drive
Montgomeryville, PA 18936

The user is expected to periodically inspect the product for leaks, loose or worn parts, broken or non-functioning components and to address those situations immediately. If the user would require verbal assistance in ascertaining the potential of a problem with any Matheson product, contact the local Matheson branch for assistance or your Matheson Sales Representative. The MATHESON TRI-GAS Warranty includes the following:

2 UNPACKING AND INSPECTING

The **Nitrogen Generator** is shipped in a single crate, including the accessory kit. If you ordered optional air receiver or product receiver tanks, these would be shipped in a separate crate. The contents of the crate(s) should be inspected upon delivery to assure that no damage has taken place during transit. Save the carton and wrapping, as it may be necessary to return the generator in event of shipping damage. If any components are found to be damaged, the carrier should be notified immediately. The individual pieces should be checked against the packing list. If any discrepancy is found, contact your local distributor or MATHESON TRI-GAS Inc. at (215) 641-2700. Please include the model number and the serial number with all correspondence.

3 SITE AND UTILITY REQUIREMENTS

The following requirements must be met to enable the nitrogen generator to perform at its rated capacity. Deviation from these requirements may result in poor performance, injury to persons or machinery, and voiding of warranty.

3.1 Air Supply

Air supplied to the generator must be between 100 °F / 38 °C and 33° F / 0.5 °C, with a water dew point of 40°F / 5°C or below. Air at temperatures higher or lower than this may cause damage not covered by warranty. Likewise, moisture content higher than that specified may damage the adsorbent material and void the warranty. Air pressure, air receiver and nitrogen receiver vessels must be compatible with the generator. Use of a correctly sized refrigerant dryer will ensure that air meets specified standards.

The performance of our PSA type Nitrogen Generators is based on minimum 100 psig / 6.9 bar g operating pressure. Operation at higher or lower pressure will result in a nitrogen production above or below design. Air consumption for each Nitrogen Generator depends on nitrogen product purity and flow rate. Please consult MATHESON TRI-GAS for details.

3.2 Additional Piping and Hoses

The air supply piping components must be capable of supplying the required amount of feed air at the required pressure measured at the generator inlet connection. If the length of piping from the air receiver is greater than 50 feet, an air supply line one size larger than the Nitrogen Generator inlet air nozzle size should be used.

3.3 Electrical Supply

Power supply must be 110 V or 220 V / 1 ph / 50 - 60 Hz as labeled on the unit. Power consumption is less than 0.1 kW.

3.4 Site Specifications

Select a non-hazardous area indoors for installation which remains above 33 °F / 0.5°C and below 100 °F / 38 °C. Adequate space should be provided around the generator for access and routine maintenance. Ensure that there is enough space for the air receiver and product receiver skid next to the unit.

The exhaust piping from the nitrogen generator may be vented outside, but any additional piping used should be the same size as the exhaust piping supplied with the generator or larger depending on the length of the pipe. Exhaust piping should not have any restrictions or valves, and should be as short as possible.

4 SYSTEM ASSEMBLY

This section provides a step-by-step procedure for easy assembly of the Nitrogen Generator with optional air supply system and tanks.

1. Position the nitrogen generator in an area as described in Section 3.4. Lift the nitrogen generator carefully to avoid damaging piping or control system.
2. Carefully lift the air receiver and nitrogen receiver (if supplied) and position next to the nitrogen generator skid. The tanks should be located as close as possible to the unit.

NOTE

Carefully attach lifting devices and any rigging to ensure that piping and valves are not damaged.

3. Install the air compressor and refrigerant dryer (if supplied) in accordance with the manufacturer's instructions. Attach air supply connections to the Nitrogen Generator. Install suitable piping or hoses from the compressor to the dryer, from the dryer to the air receiver, and from the air receiver to the Nitrogen Generator. The connections may be "hard plumbed" by the user, if desired.

NOTE

Use of piping sizes smaller than the recommended size will significantly decrease system performance.

WARNING

Use only materials with compatible pressure rating on components on the product pipe lines.

4. Install relief valve on the air receiver and nitrogen receiver.
5. Check all fittings for leaks using a leak detecting solution.
6. A qualified electrician should install all electrical connections and the electrical power supply. Plug in the nitrogen generator into an approved outlet of the correct voltage and frequency. Connect the optional compressor(s) and dryer to an appropriate power supply (according to the requirements stated on the motor nameplate).

5 SYSTEM OVERVIEW

5.1 Controls and Instrumentation Overview

This section describes the function of each control on the PSA Nitrogen Generator. The location and purpose of all instrumentation is also listed. An electro- mechanical timer located inside the control enclosure automatically controls your Nitrogen Generator. Do not attempt to alter the timer; any changes made will void the performance specifications.

Controls for supporting equipment, such as the compressor and dryer, are not included in this section. Please consult the original manufacturer's instructions, located in the appendices, for further information.

5.1.1 Main Power Switch

This switch supplies power to the nitrogen generator. The green "Power Light" is lit when the switch is "ON". The "Main Power" switch is located on the front of the control panel.

The "Main Power" switch allows the operator to disconnect power from the generator. PSA cycling will stop immediately whenever the switch is turned "OFF". Nitrogen production will stop; airflow from optional air receiver must be stopped manually using the isolation valve. The isolation valve must be opened and the switch must be returned to the "ON" position before the unit can be restarted.

5.1.2 Power Light

This green indicator is lit when the "Main Power" switch is "ON". This light uses a 110 or 220 volt bulb.

5.1.3 Hour Meter

This meter shows number of hours the generator has produced nitrogen and excludes standby time.

5.1.4 Pressure Switch

The nitrogen product pressure switch controls the on and off pressure range of the Nitrogen Generator. The pressure switch is installed in the nitrogen product line inside the cabinet.

The pressure switch can be set to turn the unit off and on at desired product pressure levels. The factory settings call for the generator to switch "OFF" when product pressure exceeds 75 psig and to switch "ON" when product pressure falls about 10 psi. The setting may vary with different models and applications.

5.1.5 Standby Light

This amber indicator is lit when the nitrogen product receiver pressure is above the high set point of the pressure switch. This light uses a 110 or 220 volt bulb.

5.1.6 Air Supply Pressure Gauge

This gauge monitors the feed air pressure. The inlet air pressure gauge is located on the optional air supply receiver.

5.1.7 Peak Pressure Gauge

This gauge monitors the pressure changes in the adsorber beds throughout the cycle. The “Peak Pressure” gauge is located on the front of the control panel.

The pressure variations throughout the cycle should be recorded for one complete cycle.

5.1.8 Tank Pressure Gauge

The “Tank Pressure” gauge monitors the pressure of the nitrogen product. The gauge is located on the front of the control panel.

5.1.9 Inlet Air Pressure Regulator

The regulator allows the operator to adjust the pressure of the feed air to the pressure range desired. The inlet air pressure regulator is located inside the cabinet.

The regulator is set at the factory but may require minor adjustment in the field. Note that the output pressure of the compressor limits the maximum pressure.

5.1.10 Product Regulator

The regulator sets the delivery pressure of the nitrogen product. The regulator is located on the optional product receiver tank. Please refer to Section 1.2 for safety information regarding high-pressure nitrogen.

5.1.11 Product Oxygen Analyzer

The oxygen analyzer (optional) receives a small sample flow from the product receiver tank to continuously monitor the product nitrogen purity. Most of the oxygen analyzers are equipped with alarms that will be activated when the oxygen content gets too high. The oxygen analyzer display is located on the front of the control panel. The sensor is installed inside the panel. The sample must be connected to the 5/32” tube located at the side of the control panel. It should be supplied from the product receiver tank through 5/32” tubing.

5.2 Control Timer

An electro mechanical cam timer automatically controls the nitrogen generator. The cams are adjusted to the optimum time settings at factory. Do not attempt to change the time settings since this will affect the system performance and void the performance specifications.

6 PRINCIPLES OF OPERATION

The **Matheson Tri-Gas Nitrogen Generator** uses state of the art technology to provide the end user with a reliable source of nitrogen. An overview of the operation of the generator is given below.

The Nitrogen Generator is a two-bed adsorber system. The Nitrogen Generator consists of two adsorber vessels filled with CMS, a valve assembly, air filters, main pressure regulator, and a product receiver tank. Dry, compressed air (78%nitrogen, 21% oxygen, <1% argon) at about 100 psig / 6.9 bar g and normally 68 °F / 20 °C is passed through the air filters, which remove particles and oil vapor, and then through the air inlet regulator (if supplied), which reduces the air to the final operating pressure. It is important to maintain the inlet air at the correct pressure; otherwise, generator performance may deviate from design. Clean and dry air is directed to one of the adsorber beds where oxygen and water vapor is adsorbed faster than nitrogen in the pore structure of the CMS, thus increasing the nitrogen purity of the product gas stream to the desired level (95 – 99.999% as required by customer). This product flows out of the top of the adsorber bed, through the pureflo valve, and into the product receiver at a pressure slightly below the feed air pressure.

A portion of the intermediate product produced is directed through the purge orifice. This nitrogen is allowed to flow back through the other adsorber sieve bed and out through the exhaust line at atmospheric pressure. This action purges the CMS of oxygen, and prepares the bed for the next cycle. The pressure in the adsorber vessels is equalized after about one minute before the next cycle starts. The beds switch roles; the first bed is purged while the second bed produces nitrogen product. The active bed will remain on-line until just prior to becoming saturated with oxygen. When the cycle is completed, the controller will exhaust the saturated bed, and pressurize the fresh adsorber bed. This allows a continuous flow of nitrogen gas from the unit for as long as the unit is in operation.

Oxygen enriched waste gas is piped to the atmosphere through a silencer.

Dry nitrogen product stream, with the specified max O₂ content, exits the adsorber vessels and is stored in a common product receiver tank (optional). Nitrogen purity and flow rate can be checked before the nitrogen is supplied to the consumer.

7 GENERATOR OPERATION

This section describes the procedure for starting, running, and stopping the nitrogen generator. The operator should notify personnel in the area that the generator will be started and make sure the start-up will not interfere with any other operations.

7.1 Start-Up

This section describes the necessary steps of both the initial start-up and a normal routine start-up. If this is the first time the unit has been started, follow the Initial Startup procedure.

7.1.1 Initial Start-Up

1. Verify that power supply is 110 V or 220 V / 1 ph / 50 - 60 Hz as labeled on the unit.
2. Turn on the compressed air supply. Follow air compressor manufacturer's start-up instructions (see your manufacturer's manual). Check that air pressure is in the range of 90-175 psig / 6.2 – 12.1 barg [620-1210 kPa]. Open the air supply valve.

WARNING

Shut off the main air supply valve and depressurize the generator before repairing any leaks.

NOTE

During the start up sequence, check for leaks in all pipe fittings and valves. Remember, even a small leak on the product nitrogen piping can severely reduce production capacity!

3. Turn the Main Power switch to the “OFF” position.
4. The Nitrogen Generator may have a time delay relay. This is only applicable at initial start up to maximize purity.
5. Plug the power cord into a properly fused and grounded electrical outlet of the correct voltage as marked on the unit.
6. Turn Main Power switch to “ON”. Observe that the power indicator light is on. If light is off, check fuse or light bulb.
7. Observe pressure gauges for one or more cycles. There should be pressure at the “Peak Pressure” gauge. (Product pressure will vary with certain models.) Record the results in the Operator’s Logbook.
8. Nitrogen will start to flow to the product tank.

9. When Product Pressure reaches 70 to 90 psig / 4.8 to 6.7 bar g. (480 – 670 kPa), the amber light should go on and nitrogen production will stop. When product is used and Product Pressure falls about 10 psi below the high set point, the amber light will go off and nitrogen production will resume. The pressure switch may be adjusted to other desired set pressures.

NOTE

When the nitrogen generator is turned on for the first time or after a prolonged shutdown period, it is likely that the Product Receiver is full of air. Product purity can be increased by purging the Product Receiver to safe area / outside the building for approximately 15 minutes before using the product.

7.1.2 Normal Start-Up

Follow this procedure to start the generator for normal operation. If this is the first time the unit has been started, follow the Initial Startup procedure.

1. Open the air isolation valve.
2. Turn on the Main Power switch.
3. Open any shut off valves in the product nitrogen line to the user's piping system. Allow the system purity to rise before using product.

NOTE

If the generator or any part of the system has been opened to the atmosphere, the system must be purged of any residual air.

7.2 Shutdown

This section describes how to perform both an emergency shutdown and a normal shutdown.

7.2.1 Emergency Shutdown

In case of an emergency, simply **turn the Main Power Switch to OFF**. This will stop all generator functions immediately. Nitrogen supply can be shut off manually closing the nitrogen product ball valve located on the optional product receiver tank.

7.2.2 Normal Shutdown

This procedure allows the generator to be restarted more quickly than execution of an emergency or abnormal shutdown procedure would.

1. Turn the Main Power switch to “OFF”. There is no need to close the nitrogen product ball valve.

WARNING

The generator will remain pressurized after shut down. Before performing any maintenance or opening any piping systems, always depressurize the system. Failure to do so may result in injuries.

8 MAINTENANCE

MATHESON TRI-GAS Generators will provide many years of trouble-free operation if the recommended maintenance is performed thoroughly and regularly. In addition to the procedures given below, the customer must also perform all maintenance recommended by the manufacturers of the component items employed in the MATHESON TRI-GAS Generators. Note that where any component manufacturer specifications are different from those of MATHESON TRI-GAS, the more demanding schedule should be adopted.

WARNING

Read and follow all safety procedures given below and in Section 1.2, Safety Information.

8.1.1 Nitrogen Generator

The nitrogen generator is a rugged unit and requires only minimal maintenance. Failure to follow the maintenance schedule may result in damage to the unit and voiding the warranty.

Every day:

1. Check for air and product leaks.
2. Check instrument air pressure.
3. Visually check control panel.
4. Record nitrogen concentration and flow rate; operating or ambient temperature, feed air pressure, product tank pressure, and sieve bed pressures throughout one cycle.
5. Verify that the automatic filter drain is working properly.
6. Manually operate air receiver drains.

Every month:

1. Clean filter bowls.
2. Calibrate optional oxygen analyzer as per attached manufacturer's instructions.

Three months:

1. Change Particulate pre filter element.
2. Operate safety valves.
3. Operate manual valves.
4. Check for leaks and repair if necessary.

Six months:

1. Change Coalescing filter element

Annually:

1. Install valve repair kits on flow control valve and equalizer valves.
2. Disassemble and inspect all air-operated valves; install repair kits if required.
3. Test all air pilot valves.
4. Check for air and product leaks.
5. Change activated carbon tower and/or activated carbon filter element upstream of the adsorber vessels. The steel activated carbon towers should be returned to Matheson TriGas for refill. We recommend keeping a filled, spare tower in stock to reduce downtime during replacement.
6. Check O₂ analyzer sensor for proper operation as per manufacturer's instructions and order replacement.

Three years:

1. Install repair kits in all pneumatically operated valves.

8.2 Filter Removal Procedure

Clean filter elements are vital to good system performance. The filters remove particulates as well as liquid water and oil. The prefilter removes particles down to 5 microns in size. It should be changed every 3 months.

The coalescing filter removes particles down to 0.01 microns in size. The life of the coalescing filter is dependent on how well the prefilter performs its job; it will last for 6 months when the prefilter is regularly maintained.

The activated carbon tower and/or activated carbon filter element removes oil vapor down to about 0.003 ppm. The life of the activated carbon tower and/or activated carbon filter element is dependent on the oil content in the feed air. An activated carbon tower will typically last for 12 months when the upstream filters are regularly maintained.

WARNING

Do not try to remove filter bowls unless both the Air Supply gauge and the Process Pressure gauge clearly read zero psig.

1. Disconnect the tubes from the bottom of the bowls.
2. To remove the bowls, push the bowl latch down and rotate the bowl while pulling down.
3. Inspect the bowls. If the drain system is working properly, the bowls should be empty.
4. Replace any filter element that looks damaged or excessively dirty.

NOTE

A plugged drain system will cause water and oil to carry over into the adsorber, which will cause permanent damage to the adsorbent. Such damage is not covered by the Manufacturer's Warranty. Use of filters other than those specified by MATHESON TRI-GAS could result in damages not covered by the warranty.

5. Wash the bowls in soapy water and rinse thoroughly.
6. Reconnect the drain tubes. Make sure the bowl latches are securely locked in place. Be careful to avoid cutting O-rings
7. Remove activated carbon tower and replace with new activated carbon.
8. Slowly open the air inlet valve to pressurize the bowls. Examine for leaks and tighten if needed.

9 TROUBLE SHOOTING

This section enables the operator to determine the cause of operation problems and suggests remedies for the problems. If there are several likely causes, investigate the simpler solutions first. Regardless of the type of malfunction, a person who is thoroughly familiar with the system performs the troubleshooting best. If further assistance is required, contact your local distributor or MATHESON TRI-GAS Inc.

Symptom	Probable Cause	Corrective Action
Nitrogen generator Not cycling	Low voltage or low amperage	Check electrical source
	Circuit breaker tripped	Reset circuit breaker
	Fuse blown	Replace fuses located inside control enclosure.
	Main power is OFF	Turn Nitrogen generator power switch ON.
	Low operator air pressure	Increase air regulator pressure
	Defective wiring	Check wiring connections
Nitrogen generator runs continuously; Amber light OFF	N ₂ pressure switch set too high	Reduce standby pressure
	Defective N ₂ pressure switch	Replace switch
	Excessive product usage	Reduce product consumption
	Product line leak	Repair leak
	Cycle pressure too low	Increase air regulator pressure
	Defective wiring	Check wiring connections

Symptom	Probable Cause	Corrective Action
Low product flow	Feed air flowrate is too low	Adjust air supply pressure and flow
Low product purity	Product flow too high	Decrease product flow
	O ₂ analyzer malfunction	Check operation and calibration
	Feed pressure too low	Increase operating pressure or flow
	Switching valve not opening / closing	Dirty or defective valve; clean or replace
		No pilot signal; check pilot valve using manual override; replace coil or pilot valve
		Tubing plugged or pinched; replace tubing
	Check-valves leak	Rebuild or replace check valves
Muffler plugged	Clean muffler	
Oil or water in unit	Contact Matheson Tri-Gas	
Filter drains remains open	Drain valve dirty	Clean valve
Filter drain does not open	Drain valve plugged	Clean valve
	Low operator air pressure	Increase regulator pressure
	Tubing plugged or Pinched	Replace tubing

*******CAUTION*******

**DO NOT DISCONNECT OR
TURN OFF AIR TO GENERATOR
UNLESS GENERATOR POWER SWITCH
IS TURNED OFF**