Matheson Chrysalis™ Zero Air Generators

Operating Manual

Models GEN-ZRC1000 & GEN-ZRC3500

Models GEN-ZRC1000-230 & GEN-ZRC3500-230

166 Keystone Drive
Montgomeryville, PA 18936
Phone: 215-641-2700
Fax: 215-641-2714

Table of Contents

1 INTRODUCTION

The Matheson GEN-ZRC1000/3500 or GEN-ZRC1000-230/3500-230 Zero Air Generators provide a cost-effective means for on-site generation of Zero Air. The Generator removes hydrocarbons from a user-supplied source of compressed air, producing a hydrocarbon free, zero-grade air with <0.1 ppm total hydrocarbon content. The compressed air is passed through a cellulose inlet filter, which removes particles, oil, and water. Hydrocarbons are removed when the compressed air is passed through a heated chamber with a platinum catalyst where hydrocarbons are converted to water and carbon dioxide. After cooling, another cellulose filter is used as a final filter for removal of any residual particulate material. The product gas is free of impurities and can be used in place of high-pressure cylinders of zero-grade air. Each Zero Air Generator comes pre-tested and produces 1,000/3,500 sccm of zero air.

Since the system contains no moving parts, maintenance and repairs are minimal. Maintenance is simple yet necessary. Filter maintenance procedures are especially important and should be followed carefully. If the recommended maintenance procedures are followed, your Zero Air Generator will provide you with many years of reliable service.

1.1 Overview

Matheson's Zero Air Generators offer operators the benefits of this advanced, but simple technology. The principle advantages are:

- Compact
- Low weight
- Safe, reliable operation
- Simple maintenance
- Ease of operation
- No high-pressure cylinders to change
- Less expensive than cylinder gas

1.2 Safety Information

The following section outlines the basic safety considerations regarding use of your Zero Air Generator.

Read carefully before installing, operating or repairing the unit.

- **The operator must employ safe working practices and rules when operating the Zero Air 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 maintenance and repair.**

- **Completely depressurize the generator prior to performing any mechanical work, including changing the filters.**

- **Do not open the generator while the machine is operating.**

WARNING

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

- **Always make certain that the electrical system is "locked-out" and that the unit is unplugged prior to performing any electrical work.**

WARNING

If the generator is opened, DO NOT touch the catalyst chamber and other piping components if the generator is still warm to avoid the risk for burns.

Matheson Tri-Gas Inc.

1.3 Service

General Service

A unit that 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 unit has been returned to its original operating parameters. To arrange for repair service, call Customer Service at 1-800-828-4313. **NO PRODUCT WILL BE RECEIVED BY MATHESON WITHOUT INDICATION OF GAS SERVICE AND WITHOUT PROPER RETURN MATERIAL AUTHORIZATION PROVIDED BY CUSTOMER SERVICE. (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. **NO PRODUCT WILL BE RECEIVED BY MATHESON WITHOUT INDICATION OF GAS SERVICE AND WITHOUT PROPER RETURN MATERIAL AUTHORIZATION PROVIDED BY CUSTOMER SERVICE.**

If advised by Customer Service to return the product to Matheson, prepare the product for shipment and write in large lettering the RMT number assigned by Customer Service on the outside of the box. Also, if required by Customer Service, supply the completed RMT 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:

Matheson Tri-Gas
166 Keystone Drive
Montgomeryville, PA 18936
RMT Number (fill in RMT number assigned by Customer Service)

The user is expected to periodically inspect the product for leaks, loose or worn parts, and 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.

NOTE
Any modifications made by customer without the consent of Matheson will void the product purity and output specifications.

1.4 Warranty

This equipment is sold by Matheson Tri-Gas (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 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.

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 Tri-Gas recommends that a written request for service advice be made to the Matheson Equipment Engineering Group in Montgomeryville Pennsylvania or to the nearest Matheson Tri-Gas 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 Tri-Gas or a service facility designated by Matheson Tri-Gas. Further, the ultimate user of the equipment is responsible for the training and safe operation of the equipment by personnel in his/her employ.

2 UNPACKING AND INSPECTING

The **Zero Air Generator** is shipped in a single carton. The Generator 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 Zero Air 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 95°F / 35°C and 33°F / 0.5°C. Air at temperatures higher or lower than this may cause damage not covered by warranty. Compressed air with a total hydrocarbon content below 10 ppm can be used as feed air. This air quality is available from most air supply systems where a coalescing filter is included for removal of particles and liquids. Additional filtration or drying equipment may be considered where the air contains too high a level of hydrocarbons or other contaminants. Contaminants such as silicates, sulfur, phosphorous, halocarbons and lead, if present in the air, can be removed in an activated carbon filter to avoid contamination of the platinum catalyst.

The performance of the Zero Air Generators is based on a maximum flow rate of 1,000 ccm air for the **GEN-ZRC1000** and 3,500 sccm air for the **GEN-ZRC3500** at 100 psig / 6.9 barg. Operation at higher flow rate than maximum, or excessive pressure (max. 125 psig / 8.6 barg) or lower (min. 10 psig / 0.7 barg) pressure will result in poor performance.

3.2 Additional Valves

An air isolation valve should be installed in the airline upstream of the generator. The valve should be a non-restrictive type ball valve, capable of supplying the required amount of feed air at the required pressure.

3.3 Electrical Supply

Connect the power cord to the adapter located at the right side of the Generator before plugging it into a grounded outlet. The 417-IEC-5019-a label is attached next to the power adapter to stress the importance of grounding the Generator. **Do not attempt to bypass the grounding process in any way.**

Power supply is as follows:

GEN-ZRC	1000	3500	1000-230	3500-230
Voltage, VAC	120	120	230	230
Frequency, Hz	60	60	50	50
Power, Watts	75	90	75	90
Current, Amps	0.75	0.90	0.38	0.45
Fuse, Amps	1.0	1.25	0.5	0.75

3.4 Site Specifications

Select an area indoors for installation which remains above 33°F / 0.5°C and below 95°F / 35°C.

3.5 Weight and Dimensions

GEN-ZRC	1000 & 1000-230	3500 & 3500-230
Height	9.2 inches (23.4 cm)	9.2 inches (23.4 cm)
Width	10.3 inches (26.2 cm)	10.3 inches (26.2 cm)
Depth	5.9 inches (15 cm)	5.9 inches (15 cm)
Weight	15 lbs (6.8 kg)	16 lbs (7.3 kg)

4 SYSTEM ASSEMBLY

This section provides a step-by-step procedure for easy assembly of the Zero Air Generator.

1. Position the Zero Air Generator in an area as described in Section 3.4.

2. Connect a source of compressed air as described in Section 3.1 to the ¼" NPTF connection at the inlet air filter located towards the back of the generator at the upper, left side. Use Teflon tape on threaded connection.

3. Connect your zero air distribution line to the ¼" NPTF connection at the outlet filter located towards the front of the generator at the upper, left side. Use Teflon tape on threaded connection.

WARNING

Use only materials compatible with the compressed air pressure rating on product line components.

5. Plug in the Zero Air Generator into an approved outlet of the correct voltage and frequency.

5 SYSTEM OVERVIEW

5.1 Controls and Instrumentation Overview

This section describes the function of each control on the Zero Air Generator. The location and purpose of all instrumentation is also listed.

5.1.1 Main Power Switch

This switch supplies power to the Zero Air Generator. The green “Power Light” is lit when the switch is “ON”. The “Main Power” switch is located on the right side of the generator.

5.1.2 Power Light

This green indicator is lit when the “Main Power” switch is “ON”.

5.1.3 Ready Light

This amber indicator is lit when normal operating temperature is reached.

5.1.4 Overheat Light

This red indicator is lit if the operating temperature gets too high.

6 GENERATOR OPERATION

This section describes the procedure for starting, running, and stopping the Zero Air Generator.

6.1 Start-Up & Shutdown

This section describes the necessary steps of start-up and shutdown.

6.1.1 Start-Up

1. Verify that the Zero Air Generator is plugged into an approved outlet of the correct voltage and frequency.

2. Turn on the compressed air supply. Fully open the air supply valve to start air flow through the generator.

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 zero air piping can severely reduce production capacity!

3. Turn Main Power switch to "ON". Observe that the green power indicator light is on. If light is off, check fuse or light bulb.

4. The catalyst chamber is warming up. The amber "Ready" light will come on once the normal operating temperature is reached after 45 - 60 minutes.

5. The zero air can be supplied to the end user(s) once the "Ready" light is lit.

6.1.2 Shutdown

1. Stop the flow of zero air to the end user(s).

2. Turn Main Power switch to "OFF". Observe that the green power indicator light is off.

2. Close the air supply valve to stop air flow through the Generator.

NOTE

During normal operation, the red overheat light may light if the demand flow rate is low or flow is turned off. This condition is normal, and the overheat light will cycle on and off as the unit cools and heats up. If the light remains on steady, unplug the unit and notify Matheson Tri-Gas.

7 MAINTENANCE

Matheson Tri-Gas Generators will provide many years of trouble-free operation if the recommended maintenance is performed thoroughly and regularly.

WARNING

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

7.1 Maintenance Overview

It is strongly recommended that all maintenance work be recorded. This procedure will assure that a good maintenance policy is employed and will provide valuable information should troubleshooting become necessary.

The content of each type of maintenance activity is described below.

WARNING

Before attempting to perform any maintenance procedures, make certain that the air supply is turned OFF, the electrical cord unplugged, and the Zero Air Generator system is depressurized!

The Zero Air 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. Verify that there is no liquid in the filter bowls or that the automatic filter drain is working properly.

Every month:

1. Clean filter bowls.

Three months:

1. Change air inlet and zero air filter elements.
2. Check for leaks and repair if necessary.

Annually:

1. Verify that your instruments do not show signs of receiving contaminated air. If signs of contamination are observed, the catalyst may have to be replaced. (See Section 3.1 for contaminants in air affecting the catalyst performance.) Catalyst replacement must be performed by the factory. Contact Matheson to schedule the repair.

7.2 Filter Removal Procedure

Clean filter elements are vital to good system performance. The filters remove particulates as well as liquid water and oil. The inlet filter removes 99.97% of particles 0.3 through 0.6 µm in size, and the final filter removes 95% of particles 0.3 through 0.6 µm in size. The filter elements should be changed every three to six months.

WARNING

Do not try to remove filter bowls unless the Zero Air generator is depressurized.

1. Disconnect the tubes from the bottom of the bowls (if applicable).
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 elements that look damaged or excessively dirty.

NOTE

A plugged drain system will cause water and oil to carry over into the platinum catalyst, which may cause permanent damage. 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 (if applicable). Make sure the bowl latches are securely locked in place. Be careful to avoid cutting O-rings.
8. Slowly open the air inlet valve to pressurize the bowls. Examine for leaks and tighten if needed.

7.3 Replacement Filters

Following table shows Matheson's part numbers for the inlet filter and final filter elements. The part numbers are the same for all Zero Air Generators.

Item	Matheson Part #	Filter Rating
Inlet filter	MFTR-0227-XX	99.97% @ 0.3 through 0.6 µm
Final filter	MFTR-0228-XX	95% @ 0.3 through 0.6 µm

8 TROUBLE SHOOTING

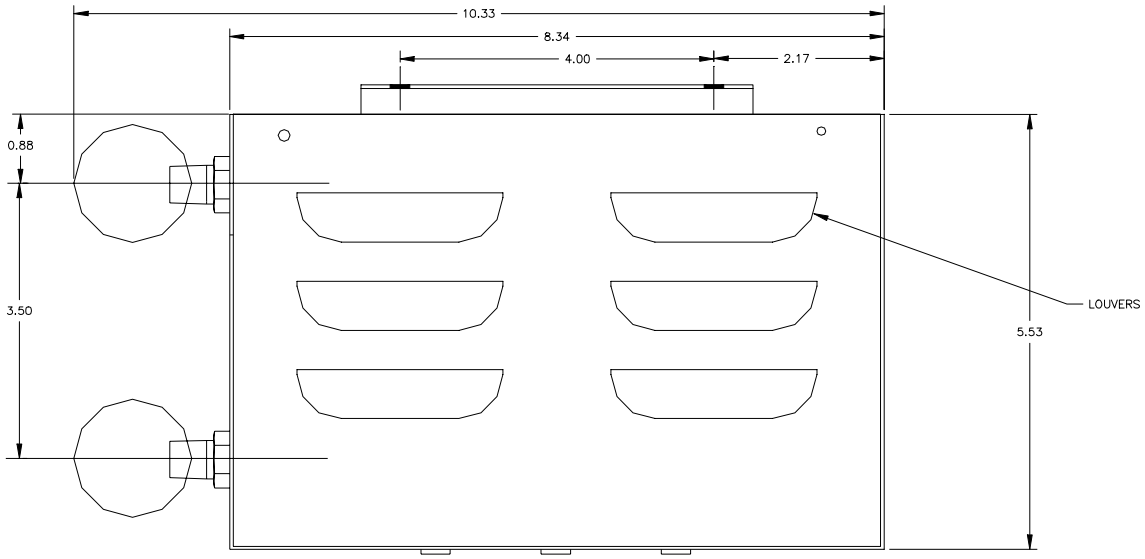
This section enables the operator to determine the cause of operation problems and suggests remedies for the problems. If there are several likely causes, investigate the simpler solutions first. Regardless of the type of malfunction, a person who is thoroughly familiar with the system performs the troubleshooting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

Symptom	Probable Cause	Corrective Action
Zero Air Generator "Ready" light not on	Main power is OFF	Turn power switch ON
	System not warm	Wait 45 – 60 min.
	Low voltage or low amperage	Check electrical source
	Circuit breaker tripped	Reset circuit breaker
	Fuse blown	Replace fuse located inside enclosure
	Bulb defective	Replace bulb
Zero Air Generator "Overheat" light on steadily	No air flow through generator	Establish air flow
	Defective control system	Contact Matheson
Zero air contains impurities	Filters are dirty	Replace filter elements
	Feed pressure too low	Increase operating pressure
	Air flow too high	Reduce flow
	Catalyst is contaminated	Contact Matheson
Low zero air flow	Inlet air flow rate is too low	Adjust air supply pressure and flow

Symptom	Probable Cause	Corrective Action
Filter drain remains open	Drain valve dirty	Clean valve
Filter drain does not open	Drain valve plugged	Clean valve
	Low operating air pressure	Increase air pressure
	Tubing plugged or pinched	Replace tubing

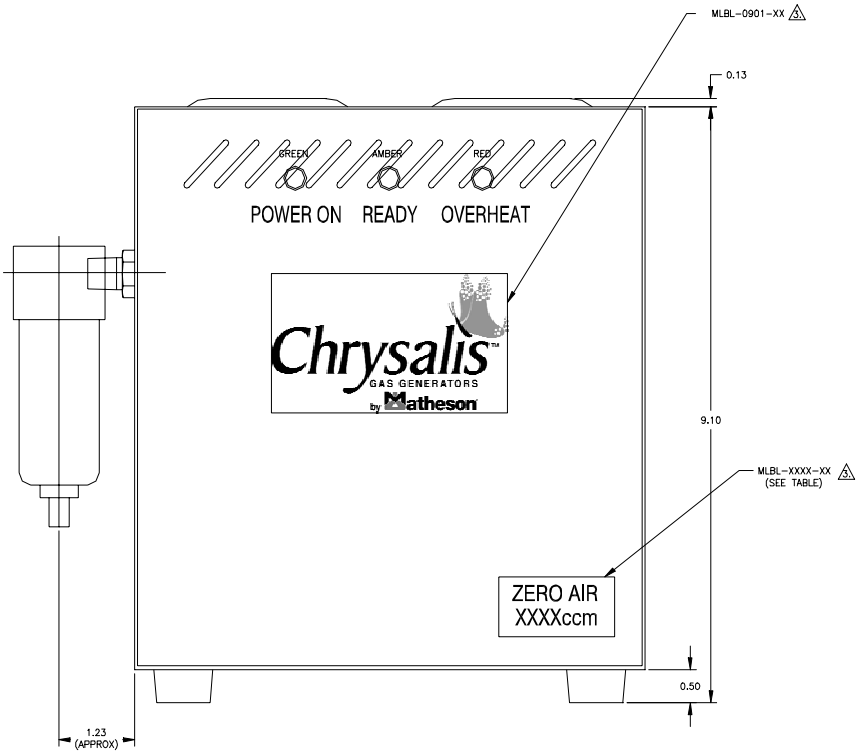
9 GENERATOR LAYOUT

This section shows the different views of the Matheson Tri-Gas Zero Air Generators:



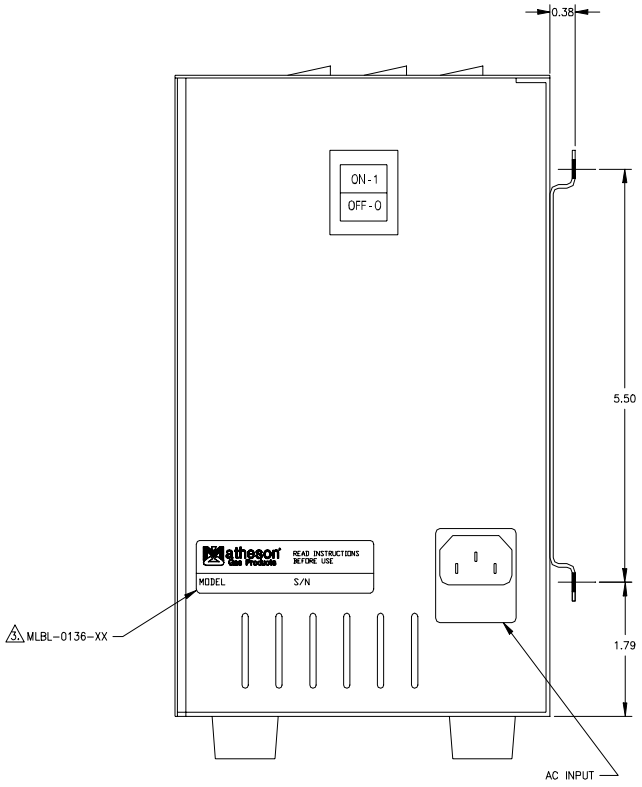
TOP VIEW

TOP VIEW

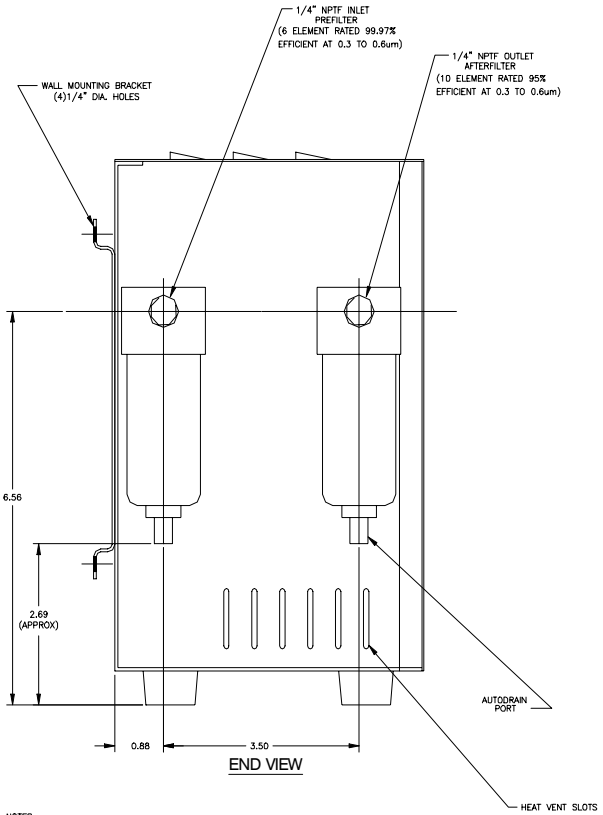


FRONT VIEW

FRONT VIEW



RIGHT END VIEW



LEFT END VIEW