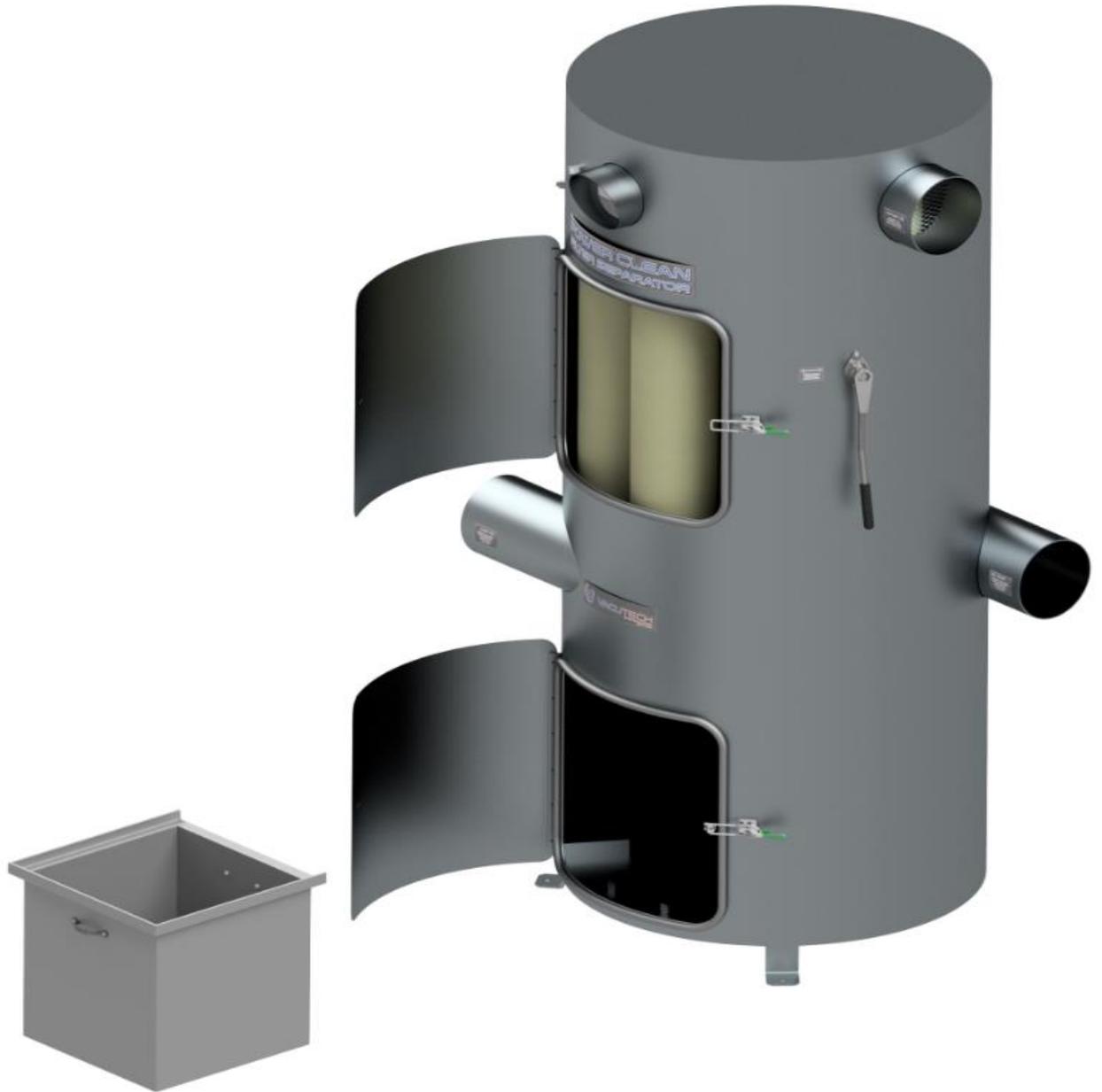


Filter Separator – Models 3160, 3179, 3888, 4596, 50108



Installation, Operations, & Maintenance Manual

Vacutech, LLC

5/1/2020

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List of Acronyms

°F	Degrees Fahrenheit
AC	Alternating Current
Hg	Mercury
OD	Outside Diameter
OSHA	Occupational Safety and Health Administration
PSIG	Pounds Per Square Inch Gauge Pressure
UoM	Unit of Measure
VFD	Variable Frequency Drive

1.0 Introduction

Vacutech LLC, (**Vacutech**) thanks you for choosing us to fulfill your environmental control needs.

The **Vacutech** Filter Separators (FS) provides an economical, low-maintenance, filtration system to efficiently separate particulates from an air stream. This manual serves to provide the basic information needed for the installation of a **Vacutech** FS and to provide a basic understanding of the filtration process to aid in the effective operation and maintenance of your **Vacutech** FS to ensure years of dependable service.

This manual is organized as follows: Following a discussion on receiving and a diagram of the overall system, is a presentation of safety considerations. A description of the filtration process, followed by an operational sequence of the **Vacutech** FS, is then presented. Basic installation requirements, followed by operational and maintenance instructions, are then provided. Finally, a list of replacement parts is supplied, followed by the **Vacutech** warranty and service information.

1.1 Receiving

Prior to unloading, visually inspect your **Vacutech** equipment for dents, scratches, or other damage which may have occurred during shipment. Any observed damage should be photographed and documented with the transport company prior to their departure. Additionally, notification of damage should be made to **Vacutech** at the earliest opportunity. The equipment received should be compared to packing lists, with any variances reported to **Vacutech**. It is the customer's responsibility to file damage claims and shortage reports with the carrier who is responsible for the equipment during transit.

1.2 Vacutech Filter Separator Diagram

A diagram of your **Vacutech** FS is shown in Figure 1.1.

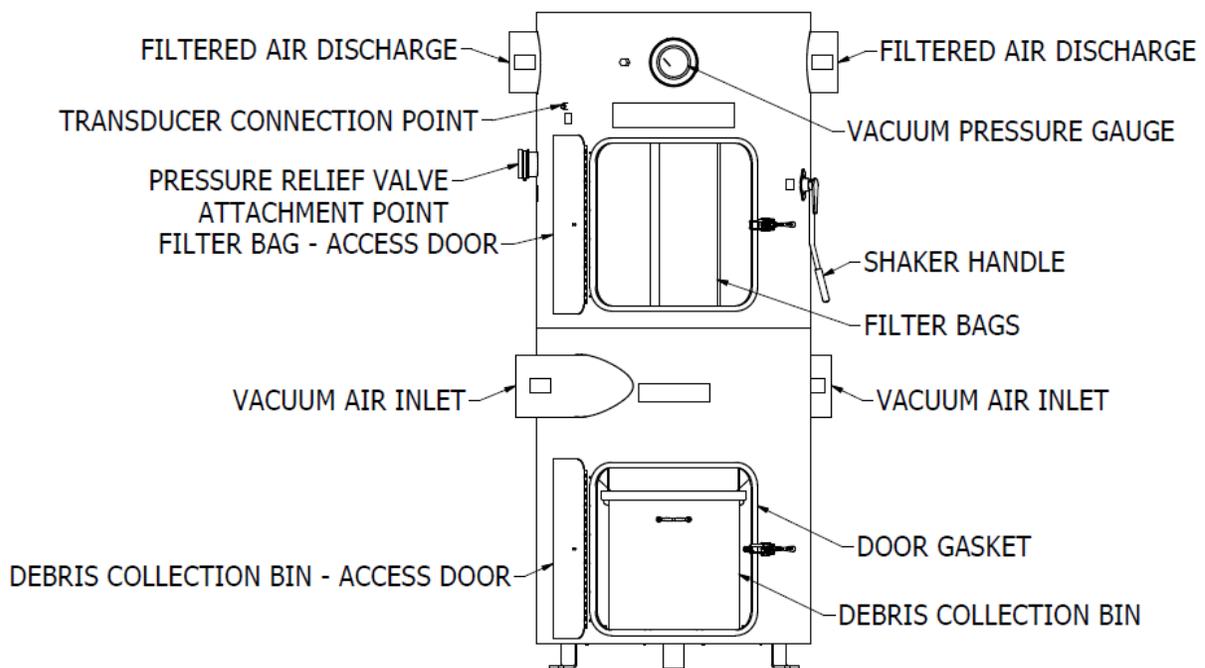


Figure 1.1 – Vacutech Filter Separator Diagram

2.0 Safety Precautions

All **Vacutech** equipment must be installed and maintained by qualified personnel, familiar with the equipment and this manual. **Vacutech** is not responsible for malfunctions or equipment failures resulting from improper installation or maintenance. Site-specific, OSHA-compliant safety procedures should be developed for your facility, with proper training provided to personnel prior to installation, operation, maintenance, and service of your equipment.

Warning! When using pressurized equipment, basic safety precautions must always be followed to reduce the risk of injury. Your company should develop site-specific, OSHA-compliant procedures for proper isolation of all energy sources associated with your FS system with all operations and maintenance personnel appropriately trained.

Before startup or servicing of your **Vacutech** FS, the following safety items need to be considered:

- **Guarding:** Do not operate this equipment without all guards in place and access doors properly secured.
- **House Keeping:** The work area around the FS should be kept clean and free of flammable liquids, gases, and materials.
- **Airborne Particulate Inhalation:** There is a risk of inhalation of airborne particulates while accessing the FS. Your company's OSHA compliant procedures should be followed to ensure personnel safety.
- **Pressures:**
 - Do not start the system prior to installation being complete (with all ducting connected). High negative pressures within the separator may result in bodily injury.
- **Confined Space:** OSHA considers the separator a confined space. Proper procedures should be developed and followed to access the inside of the separator.
- **Inspections:** Inspections should be performed daily, as well as prior to and during startup, to check for any damage. If any damage is observed, the system should immediately be shut down and must be repaired by authorized personnel.
- **Parts: Warning!** Use of replacement parts from any source other than **Vacutech** could result in damage to your equipment and may void the equipment warranty.

3.0 System Overview

A filter separator provides economical and effective removal of solid particles from suspension which helps protect mechanical equipment and prevent discharge of the particulates to the environment. Filter separators typically use a manual shaker system as a method of cleaning the filter bags as part of the operational sequence to reduce maintenance frequency.

3.1 Filtration Process

Filtration is the process whereby solids (particulates) suspended in an air stream are separated from the air stream by placing a filter in the fluid path to prevent particulates from passing (Figure 3.1).

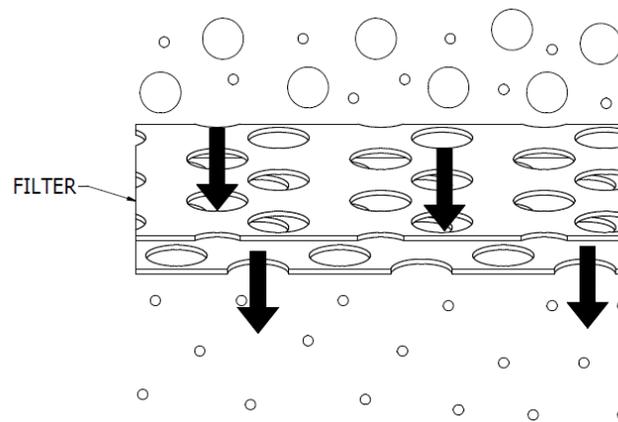


Figure 3.1 – Filtration Process

The Vacutech FS utilizes a tube-shaped filter bag for the filter media to separate particulates from the incoming air.

4.0 Installation

All **Vacutech** equipment must be installed and maintained by qualified personnel, familiar with the equipment and this manual. **Vacutech** is not responsible for issues or equipment failures resulting from improper installation or maintenance.

The **Vacutech** FS typically ships as a complete unit. Filter Bags are already installed but require a thorough inspection to verify the Filter Bags remained in their proper position through the shipping and installation process (see Section 6.1 for instructions).

Mounting: The **Vacutech** FS weighs between 320 and 1420 pounds, depending on the model, and is equipped with three mounting feet to accommodate up to 1/2" mounting hardware.

Connections: Referencing Figure 1.1, the *Vacuum Air Inlet(s)* are either 6", 8", or 10" straight pipe ($6\frac{5}{8}$ ", $8\frac{5}{8}$ ", or $10\frac{5}{8}$ " OD), depending on the FS model, and should be connected to the vacuum piping system with a vacuum compression coupling of the appropriate size. The *Filtered Air Discharge(s)* are also 6", 8", or 10" straight pipe and should be connected to the **Vacutech** vacuum producer with a vacuum compression coupling of the appropriate size. If one of either the *Vacuum Air Inlets* or the *Filtered Air Discharge* connections are not used, the unused port(s) must be capped.

Auxiliary Connections: Depending upon model, your **Vacutech** FS may be equipped with a *Pressure Relief Valve Attachment Point* as well as a *Transducer Connection Point*. A pressure relief valve is most commonly used on systems without a Variable Frequency Drive (VFD) to allow cooling air to flow through the system at all times, but may also be positioned at a different location in the system. A pressure transducer is most commonly used for VFD speed control of the vacuum producer.

The use of and location of a pressure relief valve as well as a transducer is specific to the complete vacuum system. Installation and setup require additional system specific information not contained in the Filter Separator IO&M manual.

The *Pressure Relief Valve Attachment Point* should be capped if not used. The *Transducer Connection Point* should be plugged if not used.

5.0 Operation

The **Vacutech** FS requires minimal effort to start-up and operate. However, it is important to perform some simple pre-operational inspection steps prior to starting in order to protect your equipment. Some simple operational adjustments will optimize the performance of the **Vacutech** FS for your application.

5.1 Pre-Operation Inspection

Prior to startup, the following steps should be taken (refer to Figure 1.1):

1. Ensure that *Debris Collection Bin* has been emptied (Reference Section 5.4 for instructions).
2. Close and secure *Access Doors*.

5.2 Normal Operation

Proper startup and shutdown procedures are very important in the successful operation of your FS system.

A typical startup of the FS system should follow this sequence of operation.

1. Start the vacuum producer. Prior to starting additional equipment, allow vacuum producer to run long enough to allow the producer and the FS temperature to stabilize, generally 5 to 10 minutes.
2. Start operation of the collection system that feeds the FS.

Reverse order of the above sequence to shut down the Separator System

1. Cease collection. Let system clear of solids and shut down collection system.
2. Shut down vacuum producer.

5.3 Filter Bag Mechanical Shaker System Operation

Your **Vacutech** FS utilizes tubular filter bags suspended from a shaker plate at the top of the FS. Cleaning of the filter bags is accomplished through the reciprocating motion of the shaker plate.

Instruction Steps:

1. Shut down the **Vacutech** FS.
2. With both hands, apply vigorous reciprocating back-and-forth action to the *Shaker Handle* shown in Figure 5.1. Experiment with the rate and duration for maximum effectiveness.

Operation of the Mechanical Shaker System should be performed when the system is off so that the dislodged dust cake can settle into the *Debris Collection Bin*. The Mechanical Shaker Operation should be performed daily for optimal system performance.

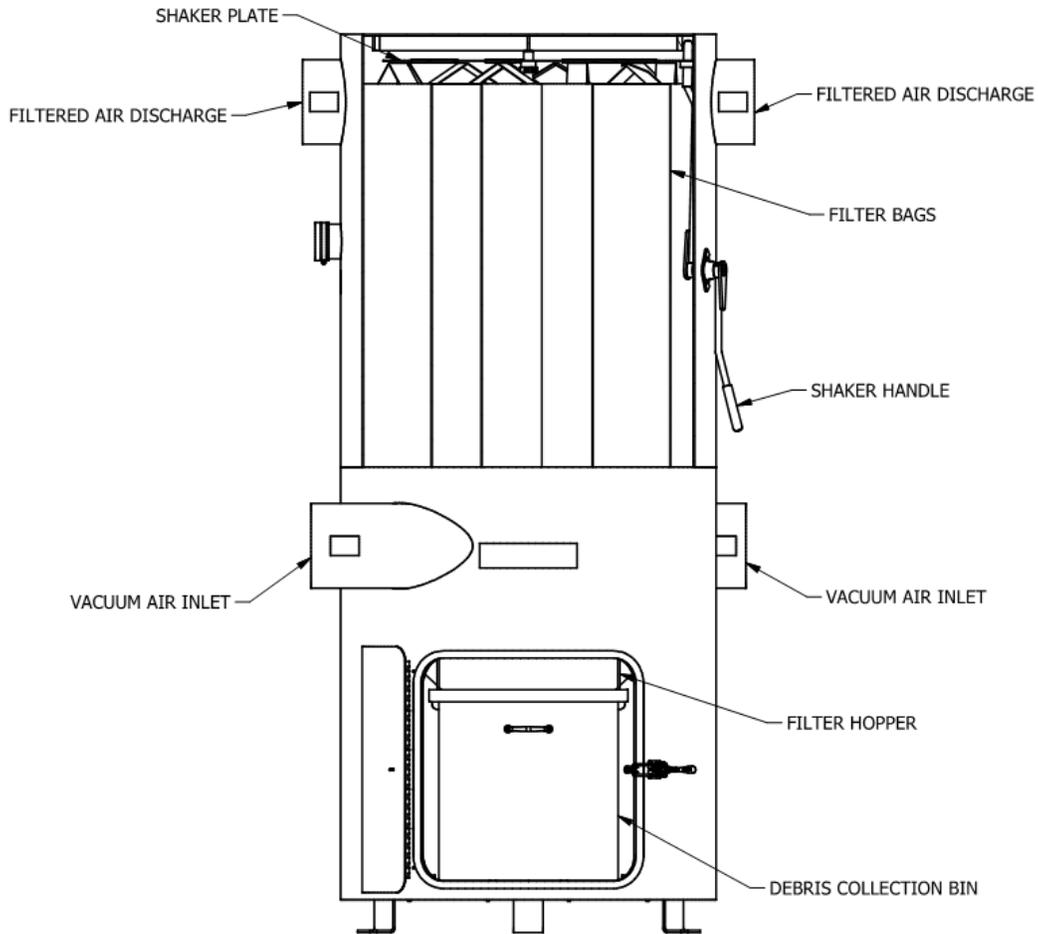


Figure 5.1– Shaker Filter Bag Cleaning System

5.4 Emptying the Debris Collection Bin

Solids collect in the *Debris Collection Bin*, which must be emptied at a frequency consistent with the rate at which they fill. (It is common for this to be done at least daily). Failure to empty the *Debris Collection Bin* in a timely manner could make the task much more difficult and possibly damage system components such as the *Debris Collection Bin*, the *Filter Bags*, as well as the Vacuum Producer.

Figure 5.2 illustrates the bottom section of the **Vacutech FS**. Instructions for emptying *Debris Collection Bin* are below.

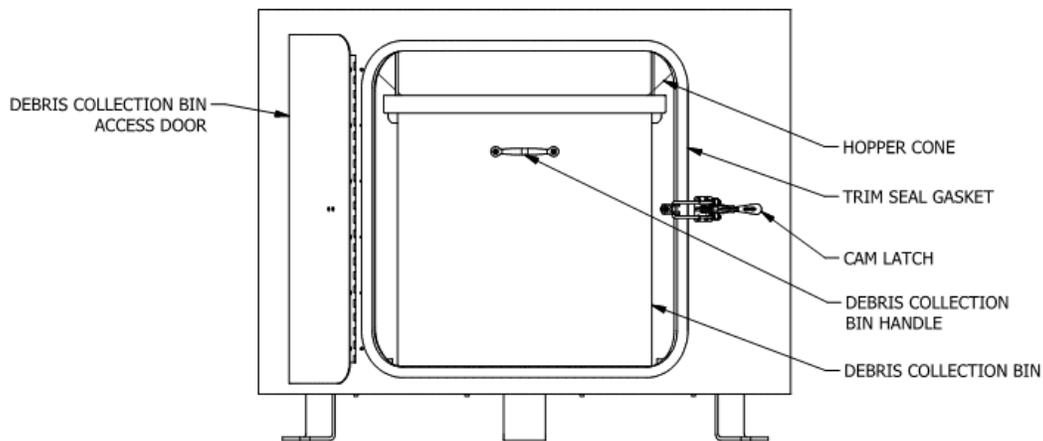


Figure 5.2 – Emptying Debris Collection Bin

Instruction Steps:

1. Shut down **Vacutech FS** in accordance with your company's OSHA-compliant procedures to ensure personnel safety.
2. Open the *Debris Collection Bin Access Door* by releasing the Cam Latch.
3. Slide *Debris Collection Bin* out by pulling on the *Debris Collection Bin Handle*. Note that the accumulated material may be very heavy and proper techniques should be used to prevent personal injury.
4. Empty the *Debris Collection Bin* which may be done manually or may require special equipment depending upon the weight of the debris collected. Company procedures should be developed and used for handling of the *Debris Collection Bin*.
5. Reinstall the *Debris Collection Bin*. Make sure it is positioned properly and centered below the Filter Hopper Cone. Secure *Access Door* with *Cam Latch*.
6. Restart the FS system following **Normal Operation** instructions presented in Section 5.2.

6.0 Maintenance

The **Vacutech** FS is designed to minimize maintenance, however, over the life of the FS, the filter bags will need to be replaced and the door gaskets may become damaged and need replacement. Use only replacement parts from **Vacutech** for proper sizing and operation as well as to prevent damage to equipment.

Warning! – Use of replacement parts from any source other than **Vacutech** could result in damage to your equipment and may void the equipment warranty.

6.1 Filter Bag Replacement

Replacement of filter bags is recommended to occur annually, at minimum, or if any of the filter bags are damaged.

Instruction Steps:

1. Shut down **Vacutech** FS in accordance with your company's OSHA-compliant procedures to ensure personnel safety.
2. Access filter bags through the *Filter Bag - Access Door*, as shown on Figure 1.1, only after shut down of the FS system, in accordance with your company's procedure.
3. Remove *Filter Bag Strap* from *Hanger Tab* shown in Figure 6.1.1.

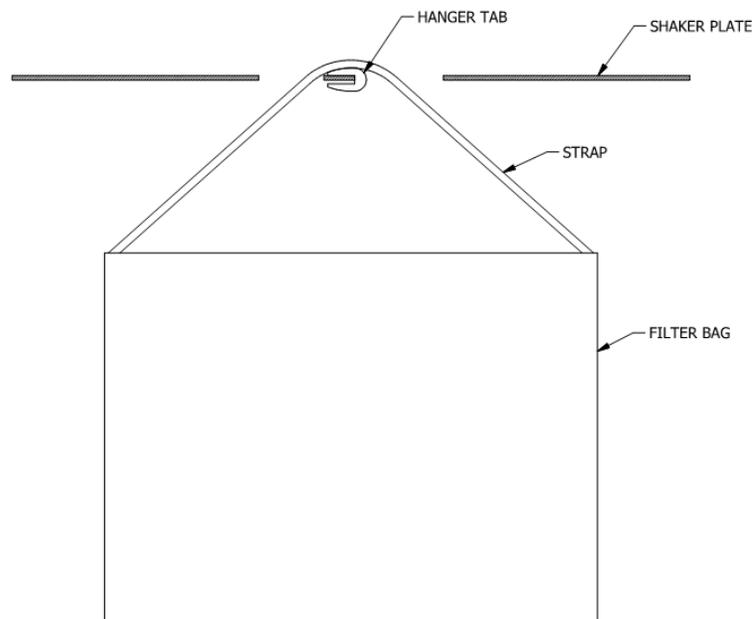


Figure 6.1.1

4. Remove individual *Filter Bags* (Figure 6.1.2). Deforming the *Snap Ring* of the *Filter Bag* into the shape of a kidney bean (Figure 6.1.3) allows the *Filter Bag* to be removed by pulling or pushing it out of the *Bag Plate*.

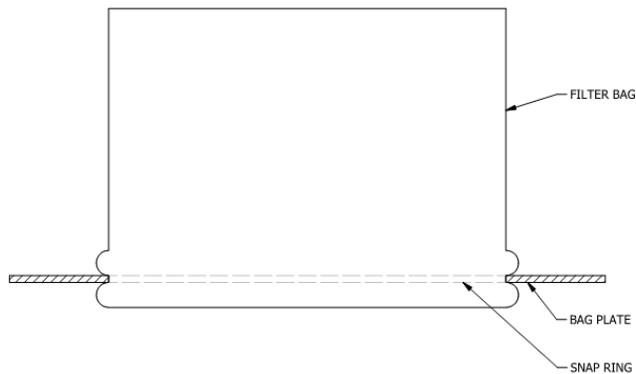


Figure 6.1.2



Figure 6.1.3

5. Replace *Filter Bag* and place *Strap* in the same manner as it was removed.
6. Repeat steps 3 through 5 for remaining filter bags.
7. Restart the FS system following **Normal Operation** instructions presented in Section 5.2.

6.2 Filter/Separator Door Gasket Function Check

The Filter/Separator Door Gasket will permanently deform after a period of operation under vacuum. After system has been in operation for approximately one week, check the seal around the doors, and tighten the nuts on the door cam latches as necessary maintain tension between the latch and the door, shown below.

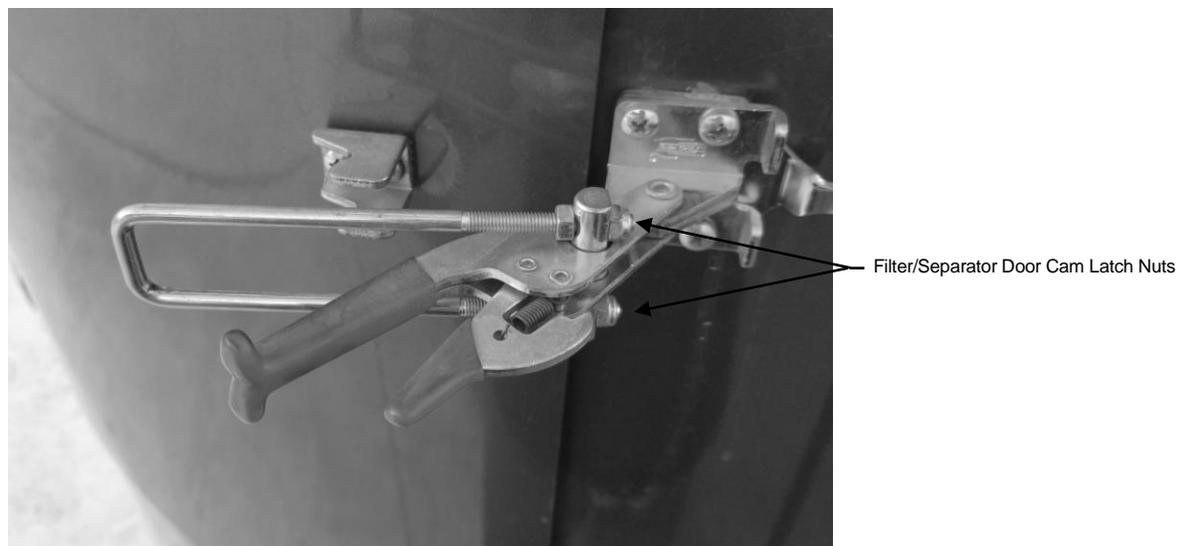


Figure 6.2.1

6.3 Filter/Separator Door Gasket Replacement

Access doors use a trim seal type gasket that employs a grip to hold the gasket in place and a bulb which makes the door airtight. The gasket is durable, but as an exposed flexible seal, over time, it has the potential of being damaged and is therefore made to be replaceable. In order to replace, use the following steps.

Tools Required:

- Rawhide or Rubber Mallet (Not Steel)
- Tin Snips
- Scotchbrite Scouring Pad (included with **Vacutech** replacement gaskets)

Instruction Steps:

1. Remove existing Separator door gasket.
2. Use Scotchbrite Scouring Pad to remove dirt, grease, and glue residue from the gasket mounting surface. (*Figure 6.3.1*) Use wet towel or rag to wipe away loose debris.



Figure 6.3.1

3. Place one end of the new gasket at the center of the opening on the hinge side. (*Figure 6.3.2*) Press the gasket firmly into place using your hands making sure the gasket is fully seated. Gasket adhesive is pre-installed in gasket channel.



Figure 6.3.2

4. Continue pressing the gasket firmly into place working your way from top to bottom. (*Figure 6.3.3*)



Figure 6.3.3

5. At the first corner press the gasket as firmly as possible into the corner by hand then use the rounded head of a rawhide or rubber mallet to *gently* press and/or tap the gasket firmly into the corner. (Figure 6.3.4) **Caution:** Using the mallet to strike the gasket may cause leaks as a result of deformation of the gasket material. System leaks can lead to performance loss and potential for introducing water into the Separator.



Figure 6.3.4

6. Continue this gasket installation process until you reach the starting point. Double check the entire gasket to ensure it is fully seated, especially in the corners. (Figure 6.3.5)



Figure 6.3.5

7. Cut the overhanging piece of the gasket so it overlaps itself by 1", cut 1" between the gasket tube and the channel, and cut the last 1" of the channel completely off. (Figure 6.3.5). Pinch the overhanging 1" of gasket tube, feed it inside the end of the gasket, and seat it firmly on the lip of the separator, and (Figures 6.3.6). The finished gasket should be tight all the way around and the ends should meet without any gap. (Figure 6.3.7)



Figure 6.3.6



Figure 6.3.7

7.0 Replacement Parts

Table 1 presents replacement components for the **Vacutech** FS.

<u>Description</u>	<u>Qty</u>	<u>UoM</u>
Door Cam Latch	2	Ea
Door Gasket w/ Glue	Model Specific	Ea
Filter Separator Filter Bags	Model Specific	Ea
Vacuum Pressure Gauge	1	Ea

Table 1 – Vacutech FS Replacement Parts

8.0 Warranty

Vacutech Limited Warranties

General Limited Warranty on Equipment: Subject to the terms and conditions set forth herein, Vacutech, LLC (“Vacutech”) warrants to the original purchaser (“Purchaser”) of Vacutech central vacuum systems (the “Equipment”) that, for a period of two (2) years from the date of shipment (the “General Warranty Period”), the Equipment will be free from material defects in parts and workmanship; provided, however, if Vacutech factory trained personnel install the Equipment, the foregoing General Warranty Period shall be extended for an additional one year period, for a total limited warranty period of three (3) years from the date of shipment (collectively, the “General Limited Warranty”). This General Limited Warranty does not cover Vac Star Direct Drive Turbines, variable frequency devices (VFDs) or Services, which are addressed separately below.

Limited Warranty on Turbines: Subject to the terms and conditions set forth herein, Vacutech warrants to a Purchaser of any Equipment containing a Vac Star Direct Drive Turbine (“Turbines”) that, for a period of three (3) years from the date of shipment, the Turbines will be free from material defects in materials and workmanship (the “Turbine Limited Warranty”).

Limited Warranty on Services: Subject to the terms and conditions set forth herein, Vacutech warrants to a Purchaser of installation services (the “Services”) that it shall perform the Services in a professional and workmanlike manner in accordance with industry standards for similar services (the “Services Limited Warranty”) and that such Services shall be warranted for a period of one (1) year from the final date of installation.

Manufacturer’s Warranty on Variable Frequency Devices (VFD): To the extent permitted, Vacutech hereby assigns to a Purchaser of a Variable Frequency Device (VFD) the manufacturer’s warranty for any such VFD, subject to the terms and conditions set forth therein (the “VFD Manufacturer’s Warranty”). Vacutech will provide Purchaser with a copy of such warranty upon request. Other than the foregoing assignment of warranty, VFDs ARE SOLD “AS-IS” AND VACUTECH MAKES NO WARRANTY FOR VFDs, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Limited Warranty on Powdercoat. Subject to the terms and conditions set forth herein, the Company warrants to Dealer, for a period of one (1) year from the final date of installation that the powdercoat will be free from material defects; provided, however that Vacutech will not be responsible for: (i) discoloration due to heat; (ii) rusting caused by chips or gouges on the powder coating surface; (iii) damage caused by improper use by customers or the owner or, (iv) damage caused by the use of abrasive cleaners, bleach or chemicals. Furthermore, products powdercoated using red, yellow, orange and purple are known to be more susceptible to color fade as a result of exposure to ultraviolet light and other environmental conditions. As a result, neither Vacutech, nor the powder coat manufacturer, can guarantee or warranty these color choices against color fade. In an effort to maximize the color and gloss retention characteristics, Vacutech uses the most advanced powder coat finishes available. The color and gloss retention characteristics can be prolonged by the regular use of an automotive wax with UV protection on all powder coated surfaces. Vacutech will not be responsible for the fading, color degradation, or other finish imperfections, which arise after installation as a result of the customer’s, color selection.

Limitations and Exclusions. The General Limited Warranty, the Turbine Limited Warranty, the Limited Services Warranty (collectively the “Limited Warranties”) and the VFD Manufacturer’s Warranty are only available to the original Purchaser and none of them are transferrable. The VFD Manufacturer’s Warranty is subject to terms and conditions, including limitations and exclusions, provided by the manufacturer. The Limited Warranties do not

cover any of the following: normal wear and tear; damage or accidents resulting from freight damage; damage or accidents arising from failure to follow precautionary safety measures; abuse, misuse or modification of the Equipment; improper electrical connections; misapplication; improper installation (if not installed by Vacutech); connection to separator not manufactured by Vacutech; dismantling or attempts to repair Equipment by any person not factory-trained and certified by Vacutech; or any defects, damage or other harm that is not the result of the acts or omissions of Vacutech. Routine maintenance of the Equipment is required. Purchaser and its representatives are solely responsible for testing and determining the suitability of the Equipment for the intended use and purpose, even if Vacutech may have suggested the Equipment, and Vacutech assumes no responsibility for use of the Equipment outside of the normal course of business or unintended use of the Equipment.

Remedies and Procedures. In the event of a breach of either the General Limited Warranty or the Turbine Limited Warranty which Vacutech determines to be covered by an applicable Limited Warranty, Vacutech will, at its option, (a) replace, or (b) repair, the defective Equipment or Turbine, as applicable. In the event of a breach of the Services Limited Warranty which Vacutech determines to be covered by the Services Limited Warranty, Vacutech will, at its option, (i) re-perform such Services or (ii) credit or refund the price of such Services for the price paid. Any claim regarding breach of a Limited Warranty must be received by Vacutech before the expiration of the applicable warranty period. Vacutech reserves the right to inspect and investigate the alleged breach prior to any remedy being provided. Vacutech may require Purchaser to return the allegedly defective Equipment or Turbine to Vacutech's factory for inspection, or Vacutech may elect to ship a new part to Purchaser; in either case, Purchaser is responsible for freight. If Vacutech determines that the claims are not covered by any applicable Limited Warranty, Purchaser will be notified and will be provided with the cost of repairs, replacement or re-performance, as applicable. Vacutech reserves the right to charge reasonable amounts for travel and labor associated with investigation of invalid claims. Warranty claims should be submitted via email to warranty@vacutechllc.com, or via phone at 1-800-917-9444.

Exclusive Remedies; Disclaimer. The Limited Warranties and the remedies set forth above are the sole and exclusive warranties and remedies for a breach therefore, and Vacutech shall have no other liability to Purchaser or any other person or entity. Any efforts by Vacutech beyond the obligations provided for herein will not in any way change the limitation of remedies and damages stated in this Limited Warranty, and no agent, reseller, or other representative of Vacutech is authorized to change any warranty, expressed or implied, of Vacutech. To the extent permitted by law, all express and implied warranties (including implied warranties of merchantability, fitness for a particular purpose and non-infringement) other than the express limited warranties set forth above are expressly disclaimed. Upon the expiration of the applicable limited warranty period, any and all applicable implied warranties are disclaimed.

Limitations of Liability. Vacutech shall not have any liability to purchaser or any other person or entity for incidental, consequential, indirect or special damages of any description, including without limitation, loss of revenue or lost profits, whether arising out of warranty (including any implied warranties), breach of contract, strict liability, negligence, other tort, or otherwise, and regardless of whether such damage was foreseeable and whether Vacutech had been advised of the possibility of such damages, and notwithstanding the failure of any agreed or other remedy of its essential purpose. In no event will Vacutech's aggregate liability arising out of related to the equipment or services, as applicable, sold to purchaser, exceed the total amounts paid by purchaser for the equipment or services, as applicable.

9.0 Customer Service

The **Vacutech** team wants your business to be successful. That's why we take a personal interest in your goals and your requirements when designing the custom central vacuum system you need.

We walk you through every step of the design process from your first call. And because installation is crucial in a system's success, we offer installation services.

Vacutech also provides warranties and options for continued system maintenance.

We can also service or repair most manufacturers' central vacuum equipment.

Contact us today to learn more about central vacuum system design, manufacturing, installation, warranties and servicing.

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Or, visit our Customer Resources website for more information:

<http://www.vacutechllc.com/customer-resources/>