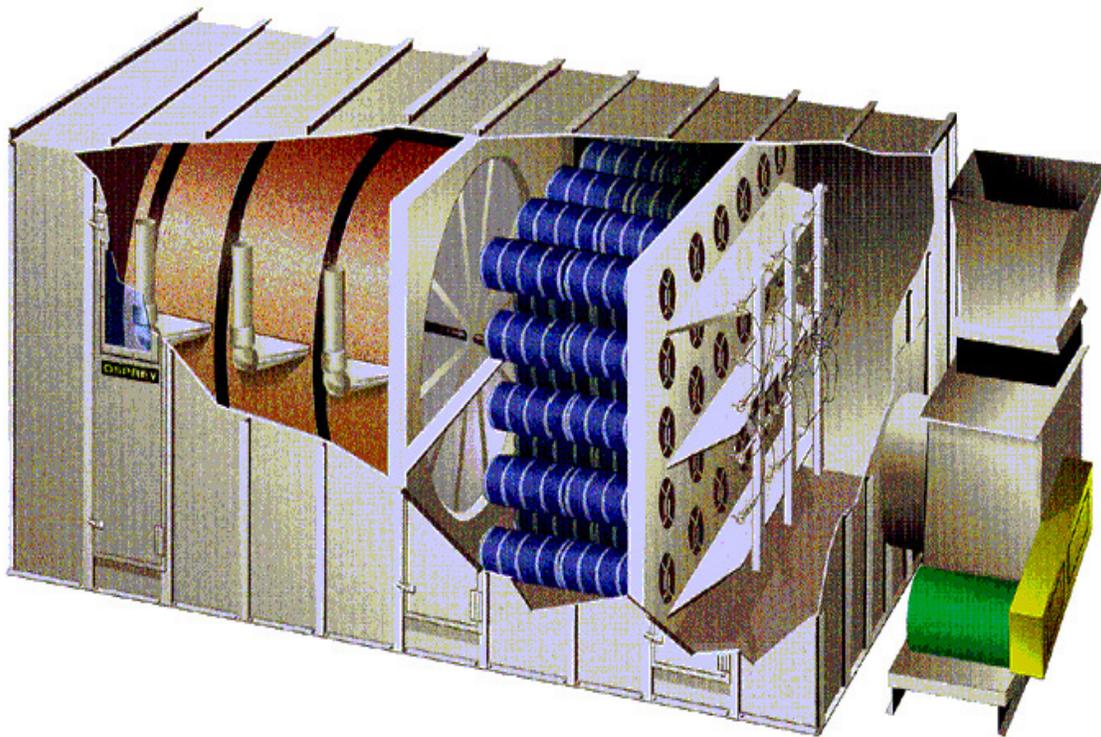




# Osprey Corporation Installation and Maintenance Manual Osprey Final Filter

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# INTRODUCTION

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The Osprey Final Filter is designed to enhance the filtering capacity of the Osprey Drum Filter or Phoenix™ Filter System. The purpose is to filter fine particulate material from an air stream. The filter cartridges remove 99.95% of particulate matter down to 1 micron. Clean air can be exhausted into manufacturing plant, atmosphere, or temperature control system.

The Final Filter uses a long lasting, fiber resistant cartridge design. This allows easy installation, low maintenance, and automatic pulsejet cleaning.

This manual was written for the Osprey Final Filter and is applicable to all sizes of the Osprey Final Filter. Drawings in this manual apply to the base model unless otherwise noted.

This manual is divided into five sections:

- 1) Introduction
- 2) Installation and Start-up
- 3) Operation
- 4) Maintenance
- 5) Spare Parts Listing

Safety information and information of special note are included throughout the manual. Four different types of notes are used in this manual and appear as shown.

**-WARNING-    *is used to prevent personnel injury.***

**-CAUTION-    *is used to prevent machine damage.***

**-IMPORTANT- *is used to show information that is necessary to insure proper installation and operation.***

**-NOTE-    *is used to provide information of special interest.***

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# INSTALLATION

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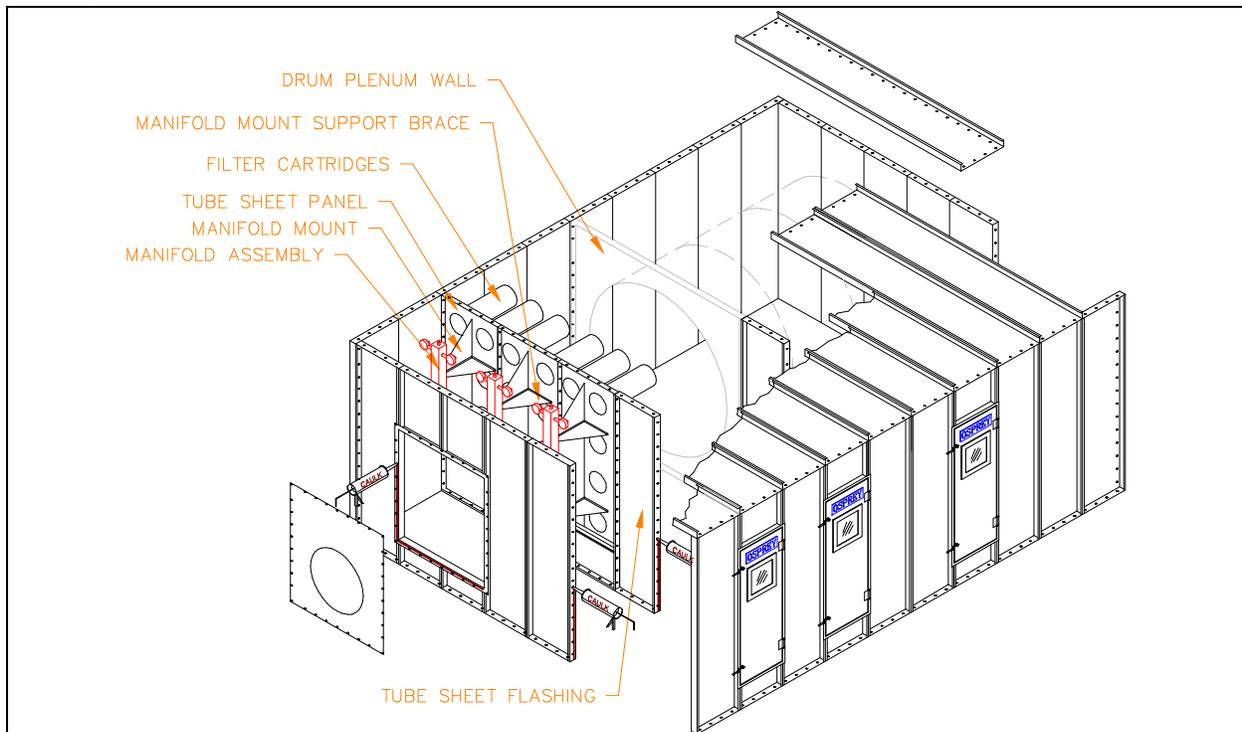
## Setup

First, check the crates shipped against the shipping list to identify missing or damaged parts. Follow the instructions in the bulletin titled “What to do if your shipment is damaged, lost, or stolen!” located in the Osprey job manual shipped with the equipment, if applicable. If all is well, uncrate the Final Filter and gather the parts near, but not on, the planned erection site.

Before beginning installation, go over the assembly drawings (included in the Osprey job manual shipped with the equipment) to become familiar with the components that will require assembly. Also, read the Drum Filter (or Phoenix™ Filter) Installation and Operation Manual completely.

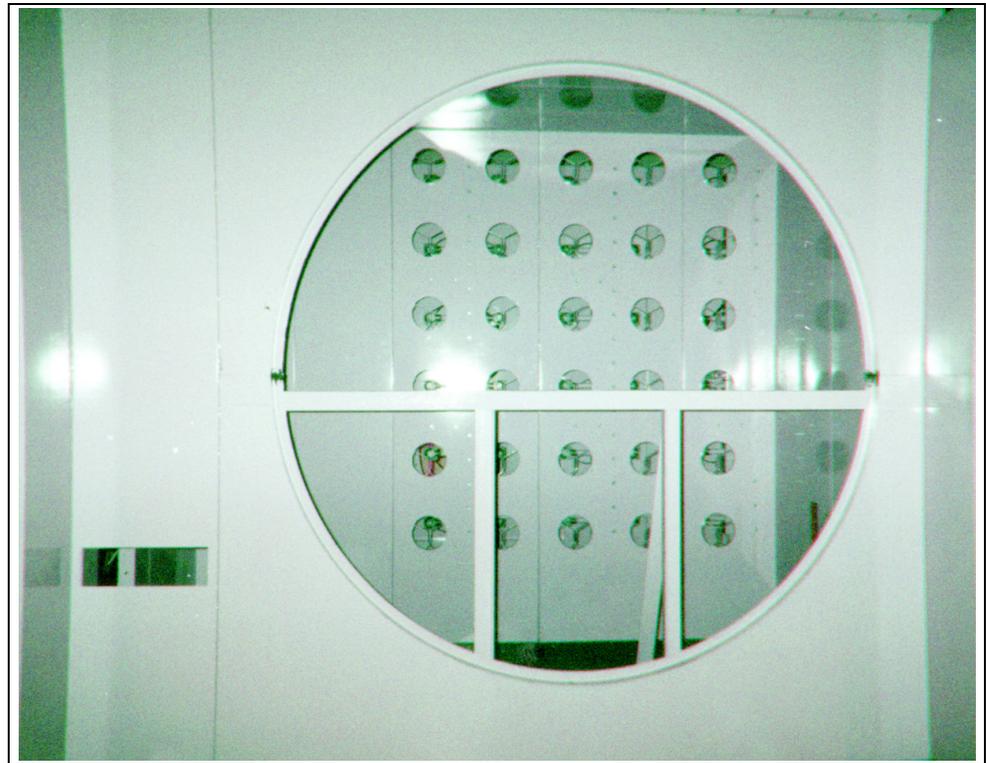
Install the drum filter and begin installation of the enclosure before installing the Final Filter. Assembly of the Final Filter section is best done while installing the drum filter enclosure. Use Figure 1 and the assembly drawings specific to your equipment (included in the Osprey job manual) as a guide throughout this installation. If you have purchased a stand alone Final Filter, assemble the filter enclosure following the section labeled “Enclosure Assembly for Stand Alone Final Filters”.

Assemble the drum enclosure except for the roof and front wall where the main system fan is located.



**Figure 1** Osprey Final Filter overall layout.

Assemble the tube sheet panels in their proper place in the same manner as the enclosure wall panels were installed. Also, install the tube sheet-flashing panel at this time. Be sure to place silicone (included in shipment) between all mating panel flanges. See Figures 2 and 3 for examples.



**Figure 2** Assembled tube sheet panels and tube sheet flashing, as viewed through the drum plenum wall.



**Figure 3** Assembled tube sheet panels and tube sheet flashing from a stand alone Final Filter.

Bolt on the enclosure roof panels at this time. This will steady the tube sheet panels for the rest of the installation.

Bolt the manifold mounts into their proper position, aligning the holes on its flange with the row of holes down the center of the tube sheet panels. Use 3/8"-16 wiz bolts and nuts to bolt it.

Locate the manifold mount braces and bolt them to the tube sheet panels and to the manifold mounts using 3/8"-16 wiz bolts and nuts.

Now, find the air manifolds. The air manifolds come preassembled with the diaphragm valves, solenoid valves, and air hoses. Secure them to the manifold mount braces installed earlier using 3/8"-16 x 1 1/4" bolts, 3/8" washers and lock washers, and 3/8"-16 nuts.

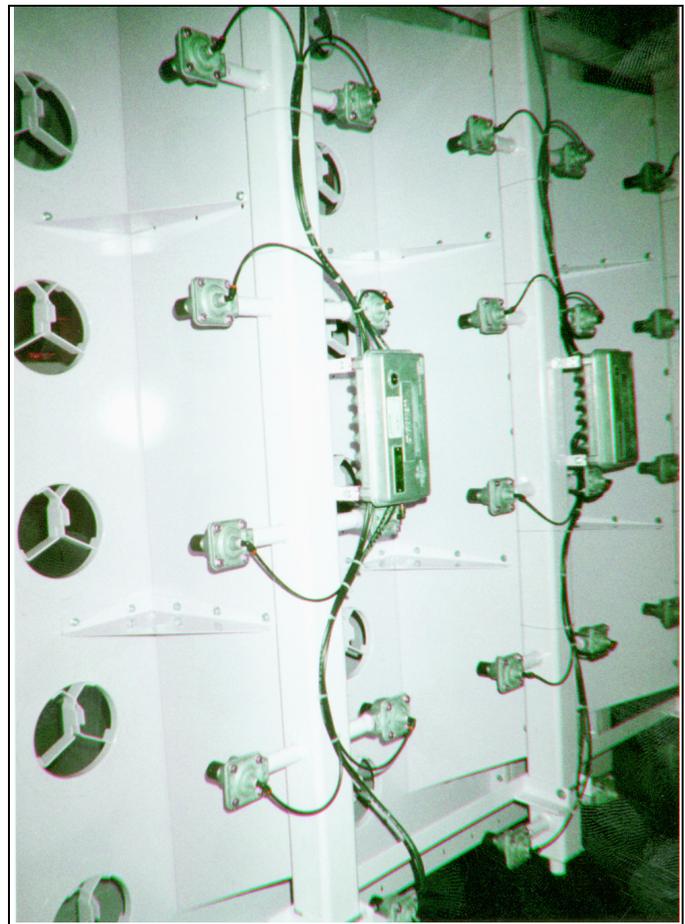
When the manifolds are installed, install the manifold stiffeners. These keep movement and vibration of the manifolds to a minimum when the diaphragm valves are activated and the filter cartridges are pulse cleaned.

**-NOTE- *Hardware may differ for some assemblies. Check the assembly drawings shipped with the equipment for proper mounting hardware.***

**-WARNING- *Do not damage the air hoses when installing the manifolds and manifold stiffeners.***

Figure 4 shows an installation of the tube sheet panels, manifold mounts and brackets, the manifolds, and the manifold stiffeners.

**-NOTE- *Actual assemblies may differ from figures used in this manual. Consult the assembly drawings shipped with the equipment for details.***



**Figure 4** Manifolds installed on manifold mounts.

## Enclosure Assembly for Stand Alone Final Filters

Determine component/equipment arrangement and establish critical locations for major items and mark on floor in appropriate manner (chalk line). Consult customer and/or Osprey drawings for details (Footprint drawings are available from Osprey).

**-IMPORTANT-** *Some panels are not interchangeable. Compare the tags located on the top of each panel with the enclosure assembly drawing(s) included in the blue job manual shipped with the equipment.*

Assemble the front wall by first laying two panels on the ground and putting a bead of silicone (supplied by Osprey) on the end flanges of the two mating wall panels to ensure an airtight seal. Bolt the two flanges together using 3/8"-16 w/nut and bolts supplied with the equipment. When the wall is assembled, raise it into place keeping it aligned with the mark that was made on the floor earlier. Anchor the wall to the foundation by drilling through every other hole in the bottom flanges of each panel and securing with an appropriate fastener (not supplied by Osprey). Figures 2 and 5 show a stand-alone Final Filter being assembled.

Attach the sidewall panels with 3/8" w/nut bolts and nuts. Silicone the flanges of all mating panels before bolting together. In addition, the enclosure panels must be level and plumb to insure proper fit, so shim as necessary.

**-NOTE-** *Do not anchor these panels to the foundation at this time. This should be done only after all other assembly is complete.*

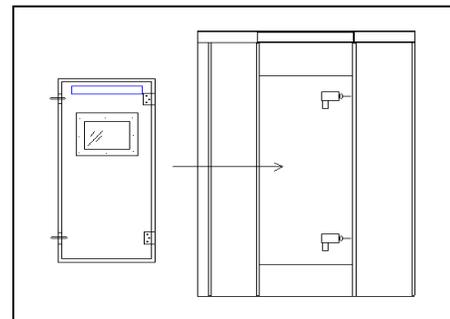
Assemble and install the roof panels only after the tube wall panels are installed to ease installation.



**Figure 5** Stand Alone Final Filter Enclosure (partially assembled).

### Door Installation

Silicone ends of wall panels making up door opening. Place preassembled door and frame in the panel opening and secure in place. Match drill all four corners of door and frame assembly with the enclosure panel flanges and bolt in place utilizing the standard hardware kit.



**Figure 6** Door installation.

## Enclosure Anchoring

When all the enclosure panels and doors are in place, tighten all screws holding enclosure panels together. Install any bolts not present in wall panels and roof panels. Check enclosure to make sure it is level and square. Shim where necessary by using wood or metal shims of appropriate thickness. Anchor enclosure to floor by drilling through holes in bottom flange of wall panels. Typical anchors used are 3/8" x 3" bolts or studs for concrete floors, 3/8" x 3" lag bolts for wooden floors or 3/8" hex bolts with nuts for steel plate or drilled and tapped holes. These items are not furnished by Osprey. These fasteners must be furnished by others or by Osprey at additional expense with prior notification of mounting surface specifications.

## Ducting a Stand Alone Final Filter

Stand Alone Final Filters may come with flanges or attachment points for ducting specified by the customer. If this is the case, attaching ducts to the Final Filter enclosure is as simple as aligning the duct flange with the corresponding flange on the enclosure then bolt the two together.

If no attachment points are present, holes may be cut in the enclosure wall panels and roof panels to bolt ducting to the filter. Avoid directing airflow directly into a filter cartridge as this may reduce the life of the cartridge. Place ducting so air flow is parallel with the direction of the filter cartridges.

All ducts must be properly supported by means other than the bolts holding them to the Final Filter enclosure (Figure 7). Please read the "Design Standards for Ducting Osprey Equipment" paper located in the Osprey job manual. This paper gives guidelines for material and size of ducts in relation to air flow volume and velocity.



**Figure 7** Ducting to an Osprey Stand Alone Final Filter.

## Filter Cartridge Installation

The number of filter cartridges included with each Osprey Final Filter is determined by the volume of air passing through the filter and the speed of the airflow. There may be just a single cartridge for each opening in the tube sheet panels, or two cartridges may be installed end to end to provide desirable air flow characteristics.

In each case, install the cartridges starting at the top of the tube sheet panel. Work across and then down to provide best access.

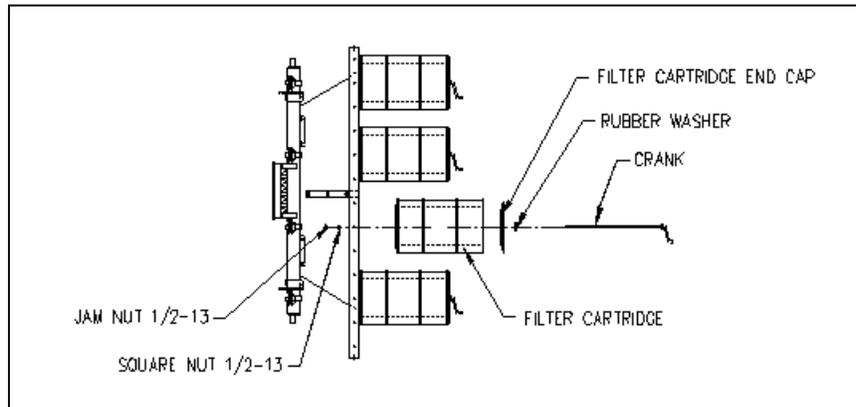
Figure 8 illustrates the installation of a single cartridge. The parts needed for this are:

1. Filter cartridge
2. Single length crank
3. Metal backed rubber washer
4. Filter cartridge end cap
5. ½ "-13 square nut
6. ½ "-13 jam nut

First, place the end cap on the end of the filter cartridge (not the end with the rubber seal). Slide the rubber washer on the crank, metal side first. This will ensure an airtight seal between the washer and the cartridge end cap.

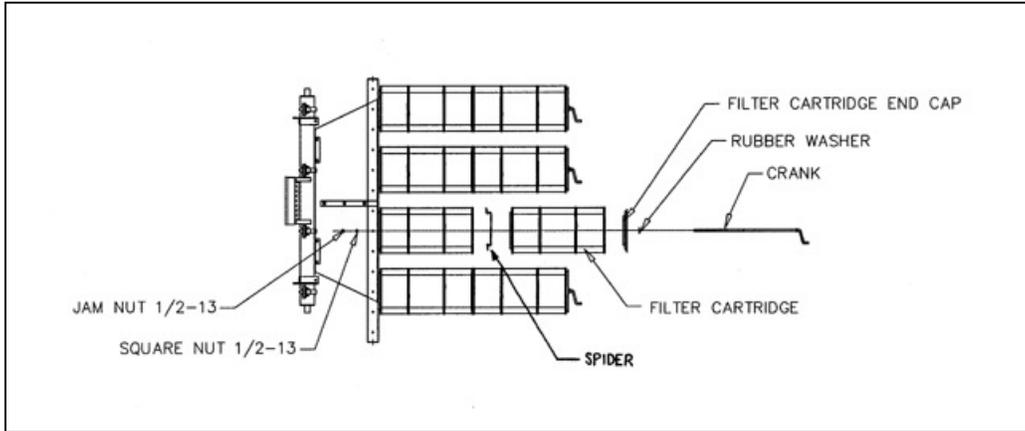
Put the straight end of the crank through the hole in the cartridge end cap, through the cartridge, then into the hole located in the tube sheet panel. Put the jam nut and square on the end of the crank handle. Turn the crank handle to secure the filter cartridges to the tube sheet panel.

**-IMPORTANT-**     *Do not over tighten the crank handles, as it may cause damage to the seal.*



**Figure 8** Single filter cartridge installation.

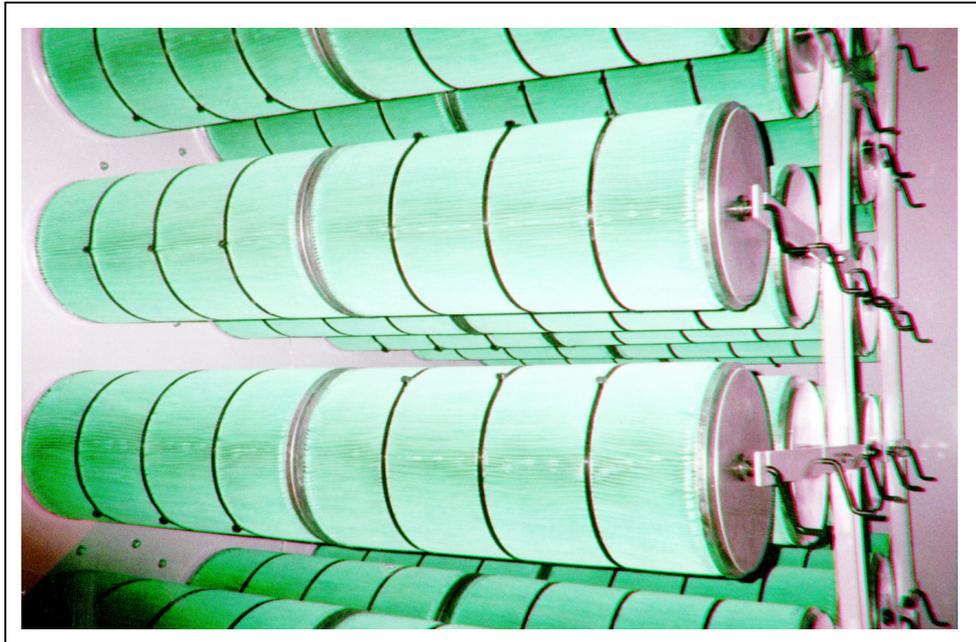
Double cartridge installation is similar to the single cartridge installation. The only differences are that there are two cartridges on a longer crank, with a spider in between the cartridges for support. Figure 9 illustrates this.



**Figure 9** Double filter cartridge installation.

### Cartridge Support Installation

Some Osprey Final Filters come with a support structure for the filter cartridges. Installation of this support assembly is straightforward. Bolt the cross arms to the vertical support, and place this behind the filter cartridges so that the cranks holding the cartridges in place rest in the slots in the cross arm. When in place, drill holes through the bottom feet of the vertical supports into the foundation. Anchor into place with fasteners suitable for the foundation material. Drill holes through the top feet into the roof panels and bolt in place. Figure 10 below shows a double cartridge final filter with a cartridge support assembly.



**Figure 10** Double cartridges with cartridge support assembly.

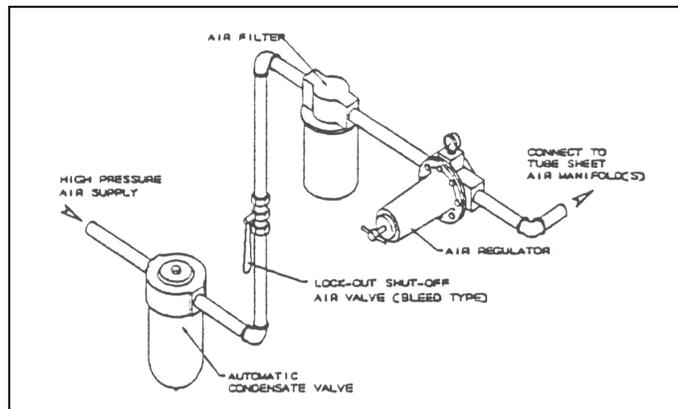
## Compressed Air Supply

**-CAUTION- Purge air lines to remove debris before connecting to air manifold.**

Remove the plastic pipe cap from the end of the air manifold and connect the air supply line. Osprey recommends an air supply pressure between 80psi and 100psi, with 90psi the optimum pressure. 2.1scfm is required for systems with 3/4" [20mm] diaphragm valves and 3.4scfm is required for systems with 1" [25mm] diaphragm valves. 1" NPT connections for air supply lines are located at each end of the air manifold(s). Use Teflon tape on all threaded air connections.

Osprey recommends additional components installed on the compressed air supply to the final filter manifolds. These components are not supplied by Osprey as part of the base model.

A lock out shut-off air valve (bleed type), bleed type regulator and gauge, filter, and automatic condensate valve should be installed to the air supply line. These components should preferably be located in the building for convenient service and startup/shutdown of the unit. Figure 11 illustrates an example arrangement of these components.



**Figure 11** Compressed air supply components.

**-NOTE- It is important that the air supply be oil and moisture free. Contamination in the air used to clean filter elements will result in poor cleaning and loss in performance.**

## Electrical Connections

**-NOTE- All electrical work must be done by a qualified electrician and according to local codes.**

Electrical control panels are built by Osprey at world voltages. All electrical schematics and panel layouts are enclosed in the panel at time of shipping. Another copy is included in the Osprey Job Manual sent with the equipment.

Determine the power requirements of the Final Filter.

## The Wiring Process

For Final Filters, the wiring process begins with the Control Panel. The Control Panel should be situated as close as possible to the filters in order for controls and wiring to be highly accessible.

## Choosing the Correct Wiring Procedure

The wiring procedure between the Control Panel and the Final Filter manifolds may be accomplished in various ways. Osprey suggests a single EMT or Sealtight from the Control Panel to each manifold bank. This depends on the size of the Final Filter and implies that anywhere from two (2) to seven (7) runs between the Final Filter and the Control Panel would be needed.

A second suggestion would be to run a sufficiently larger EMT from the Control Panel to a junction box located within the Final Filter. (From the junction box, single runs of Sealtight can be wired to each Solenoid junction box as needed.)

## Wiring from the Timer Board to the Solenoid

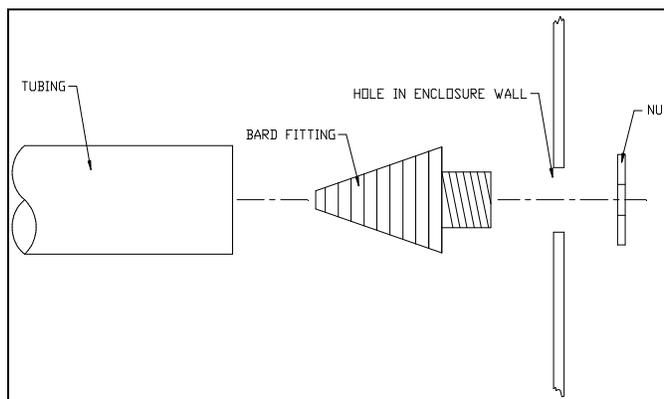
Notice as the wiring from the solenoids to the timer boards is being done, that there will be occasions where two (2) solenoids are wired on one (1) output terminal, which is located on the timer boards. This doubling up of solenoids on the timer board outputs may be randomly wired through the terminals. Doubling up is executed to guarantee that each solenoid is wired back to the timer boards. When wiring two solenoids from one output terminal on the timer boards, observe that the solenoids are located on different manifolds. This is to insure proper function of the air valve and air pressure. The cleaning process entails sequential operation of each individual manifold firing independently. When initial wiring takes place, consider the order of the cleaning procedure: The system begins at the top of the manifold, travels across, and downward to the next manifold. The beginning of the following cleaning series originates at the first manifold once again. This method always progresses from top to bottom, repeatedly.

## Photohelic Connections

Install the pressure taps for the pressure gauge(s) by drilling holes in the proper location in the filter enclosure. These locations will depend on which pressure or differential pressure is being measured. Place the threaded end of the barb fitting through the hole from the outside of the filter enclosure.

Tighten a nut on the fitting from inside the enclosure. Attach one end of tubing to the barb fitting and the other end to the appropriate pressure gauge connection.

Make sure that the tubing is fitted tightly on the barb fitting to prevent unexpected slipping. Double check the tubing connection to make sure each tube connects to the filter enclosure in the proper location.



**Figure 12** Installing taps for pressure gauges.

## Initial Checks

7. Check all fasteners to that they are properly tightened.
8. Check all electrical connections.
9. Check compressed air supply connections.
10. Check filter cartridges, making sure they are properly sealed against tube sheet panels.
11. Check all access doors, hatches, etc., to make sure that they are closed and properly secured.

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# OPERATION

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## Electrical Settings

### Solenoid Sequence Setup

The timing setup between the firing of each solenoid, or pair of solenoids, should be set at ten (10) seconds for the off time. The on time setting is 0.1 second. This allows the manifold to recharge with air for the next solenoid firing.

### Selector and Push Button Switch Operation

The Off-ON switch when turned to the **“on”** position will allow the final filter to start operating; this is indicated by the amber **“Filter On”** light.

The **“Photo-Timer”** selector switch is used as follows.

**“PHOTO”** When the switch is on Photo, the final filter is controlled by the Photohelic Gauge that is monitoring the final filter pressure, when the pressure exceeds the Photohelic preset high pressure. The Final Filter will go thru a cleaning cycle until the pressure drops below the preset low pressure setting on the photohelic and then will stop.

**“Continuous Cycle Timer”** In the Timer position the continuous cycle timer controls the duration that the Final Filter is cycling On and OFF, example: 5 minutes on and 15 minutes off. When the cleaning process is in the off time and if the preset high pressure is reached the cleaning process will begin and the photohelic gauge will override the timer **“OFF”** sequence. The cleaning process will continue until the low pressure preset is reached and then turn off.

**“CYCLE”** Pressing the cycle push-button allows the Final Filter to cycle thru one complete cycle and turn off. Cycle time should be set to the length of time it takes to complete one cleaning cycle.

## Startup

First, turn on the air supply to the air manifold and adjust the pressure from 80 psig to 100 psig. Experience indicates 90 psig to be the typical setting for satisfactory cleaning performance.

Now, turn the switch on the electrical panel to **“ON”**.

Compressed air is specified at a pressure of 90 psig. The control timer is factory set to clean a segment of elements every 10 seconds. The control timer is factory set for a pulse width of 1/10 sec. These are the recommended operating specifications.

Adjustments other than these specified may result in poor cleaning performance or degradation of the cartridge filter. Additional cleaning energy may be obtained by adjusting the pressure to a maximum of 100 psig.

**-WARNING- DO NOT increase air pressure beyond 100 psig or damage to the filter cartridges may result.**

The filter cleaning proceeds horizontally by rows and from left to right when facing the filter clean air discharge.

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# MAINTENANCE

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## Periodic Maintenance Schedule

The following is a recommended maintenance cycle for the Final Filter.

Time Period	Actions
Every month	Check for cartridge damage and air leaks. Replace as necessary. Check air supply line for leaks and correct pressure.
Every 3 months	Run a full cartridge purge cycle (described below). Remove dust buildup on filter floor.
Every year	Tighten all fasteners as needed.

**-WARNING-     *Turn Final Filter off and lock out electrical power, along with stopping air flow, before entering Final Filter.***

**-WARNING-     *Always wear dust mask over mouth and nose along with eye protection when entering the Final Filter cartridge chamber.***

Dust will build up on the floor of the filter cartridge section. This will need to be removed periodically. The time period between cleaning will differ from process to process and will depend on the type and amount of material being handled. Osprey recommends that the material be gently swept or vacuumed from the floor. This is to prevent inhalation of airborne particles. A door is located on the side of the filter enclosure for easy access.

**-WARNING-     *Do NOT use compressed air to blow out the accumulated material on the Final Filter floor.***

Every 3 months, a full cartridge purge cycle is recommended. Begin by stopping all airflow through the filter. When airflow ceases, turn the selector switch on the control panel to ◀CYCLE▶ or by pushing the ◀CYCLE▶ push-button. This allows the Final Filter to cycle thru one (or more) complete cleaning cycle(s) and let the material fall to the floor. Let the material settle to the floor before starting air flowing through the filter. For convenience, these full cartridge purge cycles should be scheduled just before the dust buildup on the floor is cleaned.

## Filter Cartridge Replacement

When a filter cartridge is damaged or too worn to continue in service, it needs to be replaced.

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**-WARNING- Turn Final Filter off and lock out electrical power, along with stopping air flow, before entering Final Filter.**

**-WARNING- Always wear dust mask over mouth and nose along with eye protection when entering the Final Filter cartridge chamber.**

Enter the Final Filter through the door on the enclosure. Locate the filter cartridge to be replaced. Remove the cartridge by turning the crank handle counter-clockwise and pulling the crank handle from the end of the cartridge. Place a new filter cartridge in place, insert the crank handle and rubber washer, and then tighten. See Figures 8 and 9, and the section titled ◀Filter Cartridge Installation▶ for more information.

**-IMPORTANT- Do not over tighten the crank handles, as it may cause damage to the seal.**

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## **SPARE PARTS LISTING**

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When ordering parts for your Final Filter. ALL of the following information must be included. If you are ordering by phone, be sure to have this information available when you place the call.

- 1.) Part number
- 2.) COMPLETE description of the part
- 3.) Product model number - this is ESSENTIAL
- 4.) Product serial number
- 5.) Quantity needed
- 6.) Length, size, color - where applicable
- 7.) Voltage, RPM, cycle (hertz), ratios, shaft size, etc.
- 8.) Shipping address and method
- 9.) Customer order number

Consult the spare parts quote that shipped with the Final Filter for specific information on various parts. Contact Osprey Parts Department to place orders.



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