INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

OPTIFLO MODEL AT AMBIENT AIR TUBESHEET

AmericanAirFilter

AT OPTIFLO

AMBIENT AIR TUBESHEET PULSE-JET CYLINDRICAL CARTRIDGE FILTER

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INDEX

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The AT OptiFlo Ambient Air Tubesheet filter is a factory assembled automatic self-cleaning filter. It uses a modular building block concept to meet any air flow capacities and design requirements.

This bulletin contains the information necessary for installation, operation, and maintenance of the AT OptiFlo Ambient Air Tubesheet filter.

Read the entire manual and check each carton and crate against the shipping sheet (Form 128l) before beginning installation.

1.0 GENERAL INFORMATION

1.1 Filter Elements

The basic filter element used in the AT OptiFlo Ambient Air Tubesheet filter is OptiFlo cartridge filter. The AT OptiFlo Ambient Air Tubesheet filter consists of pleated media in a cylindrical configuration. This design allows for installation and change-out with a minimum of time and effort. Each AT OptiFlo Ambient Air Tubesheet filter is supplied with its own gasket to insure a positive, airtight seal each time the filter is changed.

The filters are installed horizontally, end-to-end, in pairs. Filter pairs are cleaned automatically in sequence so that only a small portion of the filters are off-line at any given time.

1.2 Normal Operation

During normal operation, air enters the AT OptiFlo Ambient Air Tubesheet filter through the front and passes through the filter elements. Dust is collected on the outside surfaces of the elements and clean air flows through the center of the elements into the clean air plenum, in horizontal fashion where it exits through the clean air side.

During filter element cleaning, a solid-state control timer automatically selects pairs of elements to be cleaned, activating solenoid valves which open air diaphragm valves. High pressure air pulses directly into the center of the selected element pair for 100 milliseconds, blowing collected dust off the filter elements.

1.3 Sizes

The AT OptiFlo Ambient Air Tubesheet filter is available in 1x5, 2x5, 3x5 & 4x5 configurations. All modules are two filter elements deep.

1.4 Factory Assembly

All AT OptiFlo Ambient Air Tubesheet filter are shipped factory-assembled requiring only:

- Installation of Tubesheet into Device (AHU, etc.)
- Installation of the filter mandrels.

- Mounting and wiring of the control box (Timer or/and optional prressure control).
- Connection of compressed air supply,
- Differential and air pressure gauge connections,
- Installation of the filter elements.
- Detailed instructions are given in subsequent sections.

The main tubesheet is constructed of 7 gauge carbon steel. Each module is complete with pulse-jet pipework, 1-inch diaphragm pulse valves, pilot solenoid valve control boxes, and 6-inch diameter externally mounted compressed air reservoir. The compressed air reservoir is provided with a 1-1/2 inch NPT pipe coupling for compressed air attachment.

2.0 INSTALLATION

2.1 Inspection

The AT OptiFlo Ambient Air Tubesheet filter is normally shipped by truck and should be checked for any damage that may have occurred en route. Any damage should be noted and the carrier notified within 24 hours.

2.2 Assembly

See Cartridge Installation Dwg.1746684 sheets 1 and 2 for assembly of mandrels, cartridges and end covers to tubesheet assembly.

A forklift is recommended for unloading, assembly and installation of the AT OptiFlo Ambient Air Tubesheet filter.

2.3 FOUNDATIONS AND ANCHORING

The AT OptiFlo Ambient Air Tubesheet filter is usually mounted in a fan housing. However, a number of different installations are possible. When calculating for foundation or roof mounting, the weight of the Tubesheet, material collected, and all auxiliary equipment must be considered together with snow, wind and seismic loads. Refer to your individual project specifications for full details.

WARNING

Location must be clear of all obstructions such as utility lines or roof overhang if a crane must be used to move the Tubesheet into position.

2.4 DUCTWORK AND ACCESSORIES

The AT OptiFlo Ambient Air Tubesheet filter is not designed to support ductwork.

2.5 ELECTRICAL CONTROLS AND WIRING

CAUTION

Potential shock hazard. Disconnect power before servicing. Only qualified electrical personnel should work on this system.

The AT OptiFlo Ambient Air Tubesheet filter is supplied with NEMA 4 electrical solenoids and timer control (one control system per unit). Control wiring must be field installed between the solenoid valves and the timer output terminals as shown on the electrical connection diagram.

The pulse timer panel has a set of normally jumpered terminals labeled "pressure switch," used only when an **OPTIONAL** remote control device (called Demand Pulse option) is used. The metal jumper is removed and the "normally open" contacts of the optional pressure switch are then connected to the "PS" terminals - see wiring diagram provided with this option.

CAUTION

To avoid permanent damage to the solid-state control, **do not:**

(1)Connect 120v to the "PS" terminals.

(2)Connect 120v to any of the "Output" terminals.

(3)Connect an "Output" terminal to ground. The fuse on the panel does not protect from a direct short.

Check to be sure the program wire (top right of timer panel shown) is connected to the correct program pin. To do this, make sure that the program wire/pin matches the wiring diagram. Power should be supplied to the solid state timer board across terminals L1 and L2 as shown on the connection diagram. When the power is energized, the "Power On" light should illuminate and the unit should start pulsing. With the Demand Pulse option, the pressure switch settings must be 'zero' to start pulsing. The Tubesheet should not be allowed to pulse for any extended time without compressed air being supplied to the Tubesheet. **Operation without compressed air can damage the solenoid valves.**

The pulse interval and duration are controlled by the solid-state timer. The pulse interval is factory set at 30 seconds which is satisfactory for most installations. However, since dust loads, media velocity and other factors will vary from one installation to another, it may be necessary to readjust the pulse interval to meet individual requirements. Contact your American Air Filter representative for assistance. The duration, preset at 100 milliseconds, is also adjustable. **The duration should not be adjusted without consulting your American Air Filter representative.**

2.6 COMPRESSED AIR CONNECTION

The AT OptiFlo Ambient Air Tubesheet filter requires dry compressed air (-40F dewpoint, 90-100 psig) for cleaning. The timer circuit is factory pre-set to pulse at a 30 second interval. This will require nominal compressed air supplies as shown below:

SIZE	AIR REQUIRED SCFM
AT 1x5	6
AT 2x5	8
AT 3x5	10
AT 4x6	12

Note: Adverse system conditions could require a reduced pulse interval which will **increase** compressed air usage.

Both compressed air manifolds on each module have a 1-1/2" NPT pipe connection for the air supply.

2.7 GAUGE INSTALLATION

The optional photohelic (pressure switch/gauge) must be installed before initial start-up. Using appropriate tubing and connectors, connect the gauge high pressure port to the dirty air side, connect the gauge low pressure port to the clean air side.

Install the air pressure gauge in the coupling on the compressed air reservoir.

2.8 FILTER INSTALLATION

A) Remove access covers and set aside in a safe place.

B) Rock used cartridges to break the gasket seal between cartridges and tubesheet (back wall).

C) Slide used cartridges out of the Tubesheet and dispose of properly.

D) Clean access covers, wipe off gaskets. Inspect covers and gaskets for damage. Replace any worn gaskets or damaged access covers.

E) Inspect new cartridges for damage from shipping, storage or handling. **Do NOT** use damaged cartridges.

F) Slide new cartridges, **gasket-end first,** onto the suspension yoke. While installing, be careful that cartridges do not contact the housing, handrails, open doors or any other objects which might damage or puncture the cartridge. Before the second cartridge is completely inside the Tubesheet, position the access cover against the end of the cartridge. Push the cartridge with the access cover into the Tubesheet. If any resistance is felt as the second cartridge is pushed, remove the access cover and check for obstructions. Pull the second cartridge out far enough to reposition the access cover and reinsert. Tighten the handle on the access cover.

Hand tighten only - do not use a wrench.

3.0 OPERATION

3.1 ON-LINE CLEANING

A) A timer continuously and progressively energizes the solenoid on each valve (attached to the compressed air reservoir), releasing a sharp burst of compressed air to a pulse pipe in line with a column of cartridges. On special applications using the Demand Pulse option, the timer operation can be activated (or deactivated) at high (or low) pressure drop settings.

B) This sharp burst of compressed air into the pulse pipe results in a shock wave traveling upstream through the center of the cartridges.

C) The shock wave and additionally induced clean air from the outlet side momentarily reverse air flow and dislodge accumulated dust from the filter cartridges.

D) The majority of the dislodged dust will be re-entrained and re-collected on the filter exterior. Some dust may fall and remain on the floor below.

3.2 INITIAL START-UP INSTRUCTIONS

A) Check the compressed air lines to be sure they are connected to the NPT connection on the compressed air manifold(s). Turn on the compressed air supply to the manifold(s). Pressure should be 90-100 psig.

B) Check that cartridges are properly installed. Close the access ports and secure tightly.

C) Energize the solid-state timer panel. The "On" light inside the enclosure will then be lit. With the Demand Pulse option, decrease the pressure switch set points to "zero" to activate timer.

D) Listen for firing of the pilot solenoids and diaphragm pulse valves to determine that they are operational. Note that as each solenoid is activated, a small puff of air vents from the hole at the solenoid valve base.

E) Partially open the fan damper .

F) Start fan and note the initial differential pressure gauge reading. This gauge reading indicates the pressure drop across the filter face and eventually the dust cake. Rising pressure readings indicate that dust is being collected.

WARNING

Efficient fan sizing includes an allowance for pressure drop across filter media with a thin residual dust cake as the normal operating condition. During the initial dust caking period for NEW media, unit airflow may have to be restricted to avoid fan motor overload. Partial blank-off of the inlet or outlet will do. Fan motor amperage readings will indicate need and adequacy.

Do not operate fan for extended periods without imposing the pressure drop induced by conditioned media or checking fan motor amperage.

NOTE: With a light dust load, changes in pressure drop may take days to change appreciably.

The final (stabilized) pressure drop reading will typically be in the range of 2 to 4 inches W.G. Cleaning pulses will cause momentary spikes in the pressure reading. In making adjustments to the factory settings, remember that:

- Increasing the time interval between pulses will increase the pressure drop.
- Decreasing the time interval will tend to lower the pressure drop.
- Excessive pulsing can cause premature cartridge wear and adversely affect overall filtration efficiency.

With the Demand Pulse option adjust only the pressure settings.

Never adjust the pulse duration ("on time") without first consulting your American Air Filter representative.

4.0 Maintenance

A) Daily or Weekly - Record the Tubesheet pressure drop for at least the first 30 days of operation. Adverse operating conditions can be detected by a change in pressure drop. After start-up, the pressure drop will gradually rise to its normal operating level, which will be about 4.0" W.G.

B) Monthly - The access door(s) should be opened for internal inspection on a regular basis, at every 30 days.

- Check that all cartridge retaining knobs are tight, and look for signs of excessive wear or damage on the cartridges.
- Open the air reservoir drain plugs to expel any condensation. Check the compressed air line regulator, dryer and filter for proper operation.

C) Six Months - Ducts leading to and from the Tubesheet should be inspected for dust build-up at least once every six months. In addition, perform the following inspections:

- Examine the filter cartridges.
- Inspect joints for evidence of air or dust leakage.
- Check for evidence of moisture or dust buildup within the Tubesheet.
- Check all electrical apparatus for proper operation.
- Check to see if the diaphragm pulse valves and solenoid valves are pulsing when energized by the timer.
- Check discharge gas condition for signs of dust.

D) Filter Cartridge Replacement - Follow the procedures in the sections for Filter Cartridge Installation and Initial Start-Up Instructions.

5.0 TROUBLE SHOOTING

5.1 HIGH PRESSURE DROP READING

- **Improper Timer Operation**
- Check the wiring, fuses, and setting of pulse duration and interval. **Do not adjust the pulse duration without consulting an American Air Filter representative.**
- **Insufficient Compressed Air -**
- Check the air supply to be sure the compressor is providing 90 to 100 psig. Check for a plugged filter in the compressed air line.
- **Solenoid Pilot Valve Malfunction -**
- Listen to be sure the solenoids are firing. Check for momentary air venting each time each solenoid fires. Clean and replace if necessary.

5.3 CONDENSATION

- High humidity will create blinded filter cartridges which results in excessive pressure drop. Run the cleaning mechanism with the fan off and timer activated to release the dust cake. If condensation is a recurring problem, pre-processing warm-up and post-processing purge periods of 15 to 20 minutes may help. Exterior insulation may also be necessary. Sources of moisture may come from leaky process ductwork, moisture in the process gas stream, or moisture in the compressed air system. Try blow-down of the compressed air reservoir(s) to eliminate condensate.

5.4 TUBESHEET OVERLOADS -

- Too much air or to much dust will create high pressure drops across the Tubesheet. Check the fan speed, system design, pre-cleaners and the damper position. Be sure the dust load and air volume are those the system was designed to handle.

5.5 VISIBLE DISCHARGE:

- **Improper Cartridge Installation -**

  Check that filter retainer knobs are tight.
- **Improper Sealing of the Cartridge -**

  Check sealing gasket on cartridge.
- **Insufficient Dust Cake**

  The unit could be pulsing too frequently resulting in over-cleaning. Increase pulse interval or raise the high setting on the optional Demand Pulse switch to increase pressure drop slightly.
- **Cartridge Replacement Required -**

  Eventually the filter cartridge will wear out. Normally this results in excessive pressure drop. However, if the dust is very abrasive leaks can occur.

5.6 INSUFFICIENT HOOD CONTROL:

- **Incorrect Fan Rotation -**

  The incorrect rotation of the fan will not provide the system static pressure or volume required.

5.7 Fan V-belt Slippage -

Tighten the v-belts if necessary. Replace worn, broken or stretched belts.

5.8 Leaks -

Leaking ductwork, access doors, or housing will cause reduced airflow at the unit inlet. Seal all leaks. **Follow manufacturer's recommended procedures for service on the housing.**

5.9 Clogged Air Passages -

Clogged ducts, closed dampers or closed gates will shut off air flow.

5.9 Undersized Ducts -

Undersized ducts will create excessive pressure losses for which the fan may not have been sized.

6.0 TABLES-DRAWINGS-DIAGRAMS

A. Sales Drawing R135D-1772193 (Pace Gamewell)

B. Cartridge Installation Dwg. 1746684

C. Connection Diagram R135P-1746874 (4x6)

7.0 PARTS LIST

Serial Number, Size and Model Number are required for all parts identification.

Part Description	Part Number
Filter cartridge end cap (cover)	1719954-1
Cover gasket	1646306-1
Knob (cover)	1676188-1
Filter element (Standard)	1658301-1
Solenoid valve assy	1388784-1
Air valve	2351492-1
Pressure demand photohelic (NEMA 4)	5212139
Pressure gauge	852756
Timer control	925370-1
Mandrel (support yoke)	1646264-1