

**OPERATION, INSTALLATION, & MAINTENANCE MANUAL**

for all

**Aircon compressed air Below-Roof Filters**

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## **OPERATION OF AIRCON “BRF” BOTTOM BAG-REMOVAL FILTERS**

- A. Dust-laden air or gases enter the unit in the hopper below the bags.
- B. The typical setup calls for the system blower to push air through a BRS unit and into the BRF baghouse, although a negative pressure setup that pulls air through the unit may be encountered. Either way, the dirty air will be forced through the bags as it moves toward the top of the unit.
- C. As the air is filtered through the bags, the solid particulates in the airstream collect on the outer surface of the bags. When this airstream passes through this boundary, a pressure drop occurs. This drop in static pressure is proportional to the amount of dirt present on the outer surface of the bags. The use of a gage measuring the differential pressure between the plenum and the body section of the filter would assist maintenance personnel to set the desired sequence time and frequency of the pulsed cleaning air required for the filter to operate efficiently.
- D. Only a short duration blast of compressed air (50 to 500 milliseconds) is necessary to clean the bags of the lighter particulates. This blast "pops" or "snaps" the bags away from the cages by an increased pressure inside the bags. The instant this blast is exhausted, the movement of air through the bag collapses it against its cage. This snap action loosens dirt on the outer surface of the bag, and this dirt is then free to fall through the bottom of the filter.
- E. BRF units are designed to aspirate paper dusts created from a BRS (below-roof separator). Although this manual was designed primarily for BRF units, many of the suggested procedures would apply to any type of “BV” (bin vent) bottom bag-removal filter, as well to most “CAS” (compressed air square) top-bag-removal filters. This similarity is especially true of the electrical and sequence timer wiring diagrams.

## OPERATING INSTRUCTIONS

### RECEIVING

A quick inspection should be performed on the unit for damage that may have occurred in transit. Also, both the quantity and quality of any parts that may have been shipped loosely should be checked. Boxes containing these parts should be inspected for signs of improper handling that may have caused damage. Any missing or damaged parts should be noted with the shipper before accepting the shipment. Aircon is not responsible for any damage that occurs during shipping. **THE PURCHASER SHOULD BRING ALL DAMAGE CLAIMS AGAINST THE CARRIER.**

### INSPECTION

Upon accepting the shipment a closer inspection of the bin vent is necessary. Care should be taken to thoroughly inspect each section of the filter for dents or cracks. Aircon should be notified of any inconsistencies between the unit and a certified drawing containing Aircon specifications. No changes should be made without the consent of Aircon.

### INSTALLATION

The following procedures are recommended to facilitate installation:

Erection: If the unit arrives with the panels fully assembled, the bags and cages may already be installed. A sheet of galvanized steel bolted to the bottom flange of the unit in order to protect the bags during shipping may be removed. Rotate the unit so that the compressed air header and the access door have the correct orientation according to any Aircon filter or system drawings supplied for the project. For larger units, the panels may arrive unassembled, and the bags and cages will arrive on job site to be installed by an Aircon field crew. After the panels have been assembled and the structural steel has been erected, install any access platforms or any necessary ladders.

Bolting: Apply caulking to the bottom flange of the unit. Set, do not slide, the bin vent onto this bottom flange, taking care not to loosen the caulking. The use of drift pins may be necessary for good alignment. Finger tighten these bolts. Only after all bolts have been set, should the bolts be properly tightened.

Bag and Cage Installation: Although the unit comes complete with bags and cages already installed, it may later become necessary to replace worn bags or cages. Bags and cages are accessible through the door on the side of the unit.

Upon receiving any replacement bags, store them in an area free from moisture and harmful chemical vapors until the replacements can be made. Bags are to fit snugly against the cage with the excess bag length turned down at the top and clamped to the cage. Since a charge of static electricity collected on the bags presents a fire hazard, each bag contains a copper ground wire sewn in the bag. Caution is advised that the free end of the copper ground wire is to be secured between the bag cup and tube sheet for proper grounding.

Auxiliary Equipment: Install additional any equipment required for the operation of the system such an airlock, level indicator, or screw conveyor according to manufacturer specifications. A 3/4" NPT plugged coupling is available for the installation of an optional thermocouple in the plenum, and a 1" to 1 1/2" NPT plugged coupling is available for the installation of an optional sprinkler system in the top of the plenum.

Electrical: It is necessary to connect the sequence timer control box to a 115 VAC, 60 Hz. isolated circuit free of transient currents. This sequence timer control box may be remotely located from the filter (in a control station) or mounted on the side of the plenum near the header on a specially designed bracket.

Valve Orientation: Check for proper orientation of both solenoid and diaphragm valves. Solenoid valves should be turned so the "IN" label is the side to which the plastic tubing leading to the diaphragm valve is connected. Diaphragm valves should be oriented so that "IN" is connected to the toe nipples directly above the header. (See manufacturer's literature placed toward the end of this manual.)

Differential Pressure Gage: Two (2) 1/8" NPT plugged couplings are available for the installation of a differential pressure gage. Connect this instrument so that the low-pressure side is attached to the fitting above the tube sheet (on the clean air side). In order to connect the 1/4" OD tubing to the bin vent couplings and to the pressure gage, four (4) 1/4" OD to 1/8" NPT fittings are supplied.

Before Start-up: Purge the 1" to 1 1/2" NPT piping supply line first before connecting it to the compressed air header to ensure all contaminants are removed. Before pressurizing the header, check to see that all of the plastic tubing connecting the solenoids to the diaphragm valves are properly fit. Be careful that all diaphragm valves, valve fittings, unions, and plugs have been sufficiently tightened. If any parts require additional tightening, sealing compound should be re-applied. After wiring the sequence timing controller to the solenoid enclosure terminal strip, check both the "ON" firing time and the "OFF" delay time on the timing board. The recommended setting for the "ON" time is 200 milliseconds for all "OFF" times. The "OFF" time should at first be set to 25 or 30 seconds, and only the "OFF" time should be modified or reduced to enhance the performance of this unit. (See manufacturer's literature placed toward the end of this manual for more detailed operating instructions.)

Troubleshooting: Pressurize the header by supplying 90 to 100 [psig] clean, dry, uncontaminated, compressed air. Observe one complete firing cycle. (For the correct number output to each solenoid, please consult the field-wiring diagram in this manual.)

## **COMPRESSED AIR REQUIREMENTS**

The following compressed air requirements are essential for a maintenance-free cleaning operation:

- A. Pressure: 90 to 100 [psig]
- B. Quality: uncontaminated, clean, dry air that is free of water, oil, dirt, dust, rust, or scale

The importance of the above requirements for compressed air cannot be overly stressed. There are many methods and types of equipment to condition the air to meet these requirements.

To illustrate:

- A. Methods: types of compressors, receivers, after-coolers, dryers, and dirt legs where necessary
- B. Single line equipment
  - 1. In line filters
  - 2. Oil & water separators
  - 3. Centrifugal separators

## **“BRF” START-UP CHECKLIST**

- A. Unit body sections, supports, and compressed air piping secured with all bolts adequately tightened.
- B. Unit bags and cages properly installed.
- C. Differential pressure gage or controller properly mounted.
- D. Sequence timer controller properly wired.
- E. Any unused optional or auxiliary NPT connections plugged and sealed airtight.
- F. Clean-out door secured (if applicable).
- G. Before turning on process equipment, allow the system fan to blow air into or through the filter for at least ten (10) minutes. This will reduce the probability that dust will accumulate on cold surfaces within the filter due to condensation. At the conclusion of an operating period, turn off the system fan and other related process equipment twenty (20) minutes before the compressed air supply and timer. This routine will allow the filter to be purged after each use. Remember to discharge all related auxiliary equipment, i.e. any material-handling conveyors or rotary airlocks.

## **TROUBLESHOOTING**

A. **OBSERVATION:** Visible dust leakage

1. Dust exhausted from plenum at constant rate, regardless of valve blasts

**PROBLEM:** Unsecured or missing bag (or bags)

2. Dust exhausted from plenum at variable rate

**PROBLEM:** Improperly installed bags (clamp band not adequately installed)

Holes in bags (from either damage or wear)

Dirty plenum (not cleaned after previous bag failures)

B. **OBSERVATION:** Loss of compressed air below header and blowpipes (pressure below 85 psig)

**PROBLEM:** Loose pipe fittings or plastic tubing

Dirt in diaphragm valve or solenoid plunger

Electrical problem with either compressed air supply or sequence timer box

C. **OBSERVATION:** Any single blowpipe blowing constantly

**PROBLEM:** Defective solenoid or diaphragm valve

Plastic tubing from diaphragm valve to solenoid valve leaking

D. **OBSERVATION:** Any single blowpipe not blowing

**PROBLEM:** Defective solenoid valve or coil

Defective diaphragm valve

Dirt or foreign material in solenoid or diaphragm valve

E. OBSERVATION: Differential pressure too high (5" to 7" wg)

PROBLEM: Insufficient supply of compressed air

PROBLEM: Poor filtering media (condensation on bags within unit; dust trapped inside bags; bags stopped up)

Timer control (shut-off interval too long; timer skipping valves; improper timing sequence)

F. OBSERVATION: Flow rate of air through system too low

PROBLEM: System blower or fan (fan undersized; fan running backwards; fan belt slippage)

High differential pressure resulting from bags not being properly cleaned (See above example.)

System blockage (blockage in duct leading up to filter)

## **ROUTINE MAINTENANCE**

### **INSPECTION**

#### Daily

Check differential pressure and re-adjust the "OFF" time on the sequence timer unit accordingly.

#### Weekly

Inspect timer and solenoid valves. Check to see if both the "ON" time and "OFF" time functions are working properly.

#### Monthly

Lubricate bearings on fan.

#### Quarterly (every three months)

Remove several bags to observe their texture. Since a clean bag has a soft texture, a bag will have a hard texture to the degree to which it is not being cleaned.

Check to see if each bag is clamped snugly over the bag cage.

Observe the dust accumulation in the plenum. This will alert maintenance personnel to any filtering problems.

## **SAFETY**

Before opening the access door on the side of the unit, please observe the following safety precautions:

- A. Turn off the system fan or blower and lock out all electrical disconnects for all associated and auxiliary equipment.
- B. Operate pulse-jet cleaning system for several cycles.
- C. For instances where toxic material is being removed by the filter, install a blank in the inlet duct. Open the plenum access door, and purge the filter with the pulse-jet system for at least twenty (20) minutes.
- D. Turn off electrical power to sequence timer, compressed air unit, and airlock.
- E. Turn off compressed air.

## **STANDARD FEATURES OF ALL BOTTOM BAG-REMOVAL “BRF” FILTERS**

- A. 10 or 12 gage mild steel bolted construction to operate up to +/- 17" [wg]
- B. Lifting lugs on clean air plenum
- C. Handrail surrounding plenum
- D. 6" schedule 40 pipe header for compressed air reservoir
- E. Removable internal compressed air hard piping
- F. 1" or 1 1/2" NPT diaphragm valves
- G. Compressed-air cleaning regulated by manually adjustable sequence control timer housed in a NEMA 4 enclosure
- H. 1" to 1 1/2" NPT coupling in plenum for optional sprinkler sized to accommodate one (1) 1/2" sprinkler per every 50-sq. ft. of plenum floor space
- I. 3/4" NPT coupling in plenum for optional thermocouple
- J. Differential pressure gage with 1/4" OD tubing connected to two (2) 1/8" NPT couplings (one each on opposite sides of the tubesheet) for differential pressure gage connections
- K. Unit painted Aircon gray with metal prepared with rust-inhibitive primer on both interior and exterior surfaces
- L. 5 7/8" diameter, 12 ounce singed polyester, bottom- removal, open-top bags with anti-static, copper ground wire and quick-release, stainless steel clamp bands
- M. 5 3/4" diameter bottom-removal, galvanized bag cages with aluminum venturies
- N. Body-hinged, vertical access door
- O. Fabricated grating in bottom of unit to facilitate bag removal
- P. Pyramidal hopper with inlet and 60-degree slope
- R. Two sets of installation & maintenance manuals

## **OPTIONAL FEATURES OF BOTTOM BAG-REMOVAL “BRF” FILTERS**

- A. Outlet and header orientation per job
- B. 24" to 36" square pressure relief ventilation panels to provide an approximate 40 to 1 (or any customer specified) [cu. ft. unit volume per sq. ft. vent] ventilation ratio.
- C. NEMA 9 explosion-proof solenoid valves, conduit, and sequence timer enclosures.
- D. Customer specified filtering media (such as a heavier 16 oz. singed polyester, or Nomex for high-temperature applications, or an epitropic fabric with interwoven carbon fibers to suppress static electricity).
- E. Epoxy paint or regular paint per specified color
- F. Thermocouple to monitor temperature of discharge air
- G. Sprinkler system installed in plenum
- H. Compressed air header service platform or access ladder
- I. Interactive pressure gage/sequence timer with "high" and "low" pressure controls for automatically regulating power to the timer
- J. Carbon steel bag cages
- K. Non-standard shaped or sloped hopper on bottom of unit