

Throughout this manual, there are a number of HAZARD WARNINGS that must be read and adhered to in order to prevent possible personal injury and/or damage to equipment. Two signal words "WARNING" and "CAUTION" are used to indicate the severity of a hazard and are preceded by the safety alert symbol.

**⚠ WARNING**

Used when serious injury or death MAY result from misuse or failure to follow specific instructions.

**⚠ CAUTION**

Used when minor or moderate injury or product / equipment damage MAY result from misuse or failure to follow specific instructions.

**NOTICE**

Indicates information considered important, but not hazard-related.

It is the responsibility of all personnel involved in installation, operation and maintenance to fully understand the ⚠ Warning and ⚠ Caution procedures by which hazards are to be avoided.



**Models BCFS 140A through 240A**

## Receiving, Inspection & Unpacking

When the equipment is received all items should be carefully checked against the bill of lading to be sure all crates and cartons have been received. Before accepting delivery, carefully inspect each carton or crate for visible shipping damage. If any damage is noticed, the carrier should make the proper notation on the delivery receipt acknowledging the damage. Make notations of all damage on all copies of the bill of lading and have all copies countersigned by the delivering carrier. The carrier should also fill out a Carrier Inspection Report. The factory Traffic Department should then be contacted. File claim for damage with the carrier. Physical damage to the unit after acceptance is not the responsibility of Twin City Fan Companies, Ltd.

Unpack each carton or crate and verify that all required parts and proper quantities of each item have been received. Refer to drawings for part descriptions. Report shortages or missing items to your local representative to arrange for replacement parts.

Due to availability of carriers and truck space, it is not possible to guarantee that all items will be shipped together. Verification of shipments must be limited to only those items on the bill of lading.

**The unit nameplate must be checked to make sure the voltage agrees with the power supply available.**

## Installation



### CAUTION

Sheet metal parts, screws, clips and similar items inherently have sharp edges, and it is necessary that the installer and service personnel exercise caution.

The installation of this equipment shall be in accordance with the regulations of authorities having jurisdiction and with all applicable codes.

This equipment is to be installed by an experienced installation company and fully trained personnel.

The mechanical installation of the exhaust ventilator consists of making final connections between the unit, building services, and duct connections.

1. Before setting unit on curb (if damper is to be used), make sure that the damper is installed correctly and that it is operative. See diagram, page 4.

2. Position unit on roof curb so that the wiring can be run through one of the knockouts provided. Wiring to the unit may be run through knockouts provided in the curb cap or the side of the unit. Provide enough slack in the wiring to the unit to allow lifting, and removal for cleaning, and inspection.
3. Connect supply leads to the disconnect switch.
4. Check line voltage with the motor nameplate and the attached instruction cards.
5. Determine if wheel is free to rotate and has not been subject to misalignment in shipping or installation.
6. Apply power and check rotation of wheel with directional label in motor compartment.
7. Lag bolt the unit to the roof curb using a minimum of four bolts, one at each corner. Replace unit top panel and fasten all latches securely.

## Check, Test and Start Procedure



### WARNING

Electric shock hazard. Could cause severe injury or death. Failure to bond the frame of this equipment to the building electrical ground by use of the grounding terminal provided or other acceptable means may result in electrical shock. Disconnect electric power before servicing equipment. Service to be performed only by qualified personnel. Make sure power is turned off and locked in the OFF position.

1. Check to verify that the wheel is free to rotate.
2. Verify that supply voltage on the line side of disconnect agrees with voltage on unit identification plate and is within the utilization voltage range as indicated in Table 1.
3. On three-phase units check and calculate phase unbalance as follows:

$$\% \text{ Voltage Unbalance} = 100 \times \frac{\text{max. voltage deviation}}{\text{avg. voltage} \div \text{avg. voltage}}$$

**Example:** Determine the percent voltage unbalance given voltages of 220, 216 and 213.

#### How To Use The Formula:

- a. Avg. Voltage =  $220 + 216 + 213 = 649 \div 3 = 216$
  - b. Max. Voltage Deviation From Avg. Voltage =  $220 - 216 = 4$
  - c. % Voltage Unbalance =  $100 \times (4 \div 216) = 1.8\%$   
Voltage unbalance should not exceed 2%.
4. Apply power to unit and check rotation of wheel with the directional arrow on the unit.



### WARNING

Especially check three-phase units for rotation. For three-phase, rotation can be changed by interchanging any two of the three line leads. If the unit is checked on temporary wiring, it should be rechecked when permanently installed. Motor burn-out or tripped overload protection devices are usually the result of wrong rotation.



### WARNING

Motor overloading is usually the result of incorrect rotation, high voltage, or low voltage. The NEC states that motors used in devices such as filtered roof supply units must be protected by a separate overload device that is responsive to motor current or a thermal protector integral with the motor. Refer to Sections 430-22 of the NEC for additional information.

5. **Electrical Input Check:** Perform check of fan ampere draw and verify that motor nameplate amps are not exceeded. Take account of the service factor range if motor is nameplated above a 1.0 service factor.
6. **Fan RPM Check:** Fan RPM should be checked and verified with a tachometer. Refer to Table 2 for maximum fan RPM values.



### WARNING

Running fan at an RPM greater than the maximum RPM value in Table 2 will overload the fan motor and lead to premature motor failure.



### WARNING

The BCFS centrifugal wheels run in a counterclockwise direction when viewed opposite the air intake. If the wheel is run in the wrong direction, the motor will overload and burn out.

Table 1. Utilization Voltage Ranges

SYSTEM VOLTAGE/ UNIT NAMEPLATE	UTILIZATION VOLTAGE	
	MIN.	MAX.
115/60/1	104	127
208-230/60/1 or 208-230/60/3	187	253
230/60/1 or 230/60/3	207	253
277/60/1	249	305
200/60/3	180	220
380/60/3	342	418
460/60/3	414	506
575/60/3	517	633
110/50/1	99	121
220/50/1	198	242
380-415/50/3	342	456
440/50/3	396	484

Table 2. Maximum Fan RPM


BCFS MODEL	MOTOR HP	MAXIMUM FAN RPM
140	1/6	1100
	1/4	1250
	1/3	1380
	1/2	1590
	3/4	1810
	1.0	2000
180	1/6	730
	1/4	840
	1/3	930
	1/2	1060
	3/4	1220
	1.0	1300
240	1.5	1530
	1/3	580
	1/2	660
	3/4	760
	1.0	840
	1.5	960
	2.0	1060
	3.0	1180
	5.0	1350

## Maintenance

**FILTERS:** To gain access to filters, unlatch top panel and slide top back approximately 2 inches. Lift filters out from top. Filters may be cleaned with soap and water or replaced. Filters should be cleaned regularly, as dirty filters will cause performance to be reduced. Frequency of cleaning depends upon the local environment and frequency of use of the fan.

- The motors in these units are equipped with prelubricated ball bearings which are considered to be permanently lubricated.
- Fan shaft pillow block bearings are equipped with grease gun fittings. These bearings are factory lubricated and, with normal operation, will need no lubrication for 3 to 6 months.
- For pillow block bearings, use a low pressure grease gun with Shell Gadus S2 V100 2 grease or equivalent. Only a few strokes of the gun are required. Excess grease will be forced out through the bearing pressure relief holes. Use of a high pressure gun, however, is liable to blow the bearing seals.
- Belt tension is adjusted at the factory. It should be readjusted after a break-in period of 24 hours of actual operation.
- To adjust belt tension, loosen the hex head screw in the tab of the motor plate. Snug belts by pulling on the motor until the belt is tight. Tension is correct if the belt can be twisted from 1/4 to 1/2 turn with moderate pressure at a point midway between sheaves.

- Belt condition and tension should be checked every 3 to 6 months depending on service. If belt tension is too tight, there is a possibility of overloading the motor as well as causing undue belt wear. If the belt tension is too slack, then the wheel will fall off in RPM, air delivery will decrease and the belts will wear quite rapidly.
- If the air handled by the unit is dust or grease laden, a regular inspection and cleaning of the backdraft damper and the wheel will ensure smooth, efficient operation.


WARNING

**Do not replace motor sheave with one larger in diameter. Do not replace fan sheave with one smaller in diameter. The sheave ratios are set so that the motor will not be overloaded within the range of the adjustable sheave.**

**CHECK:** Belt tension is adjusted at the factory, but it should be readjusted after a break-in period of approximately 24 hours of actual operation.

Figure 1. Typical Installation

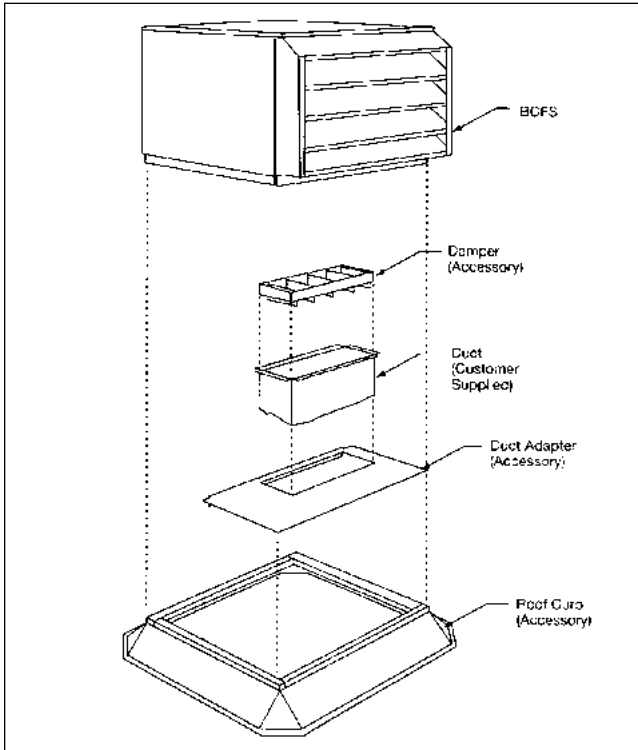
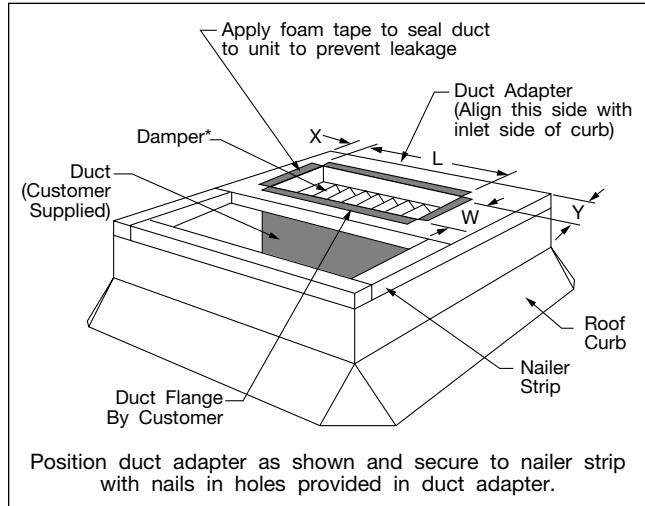


Figure 2. Opening Location of Duct Adapter Accessory

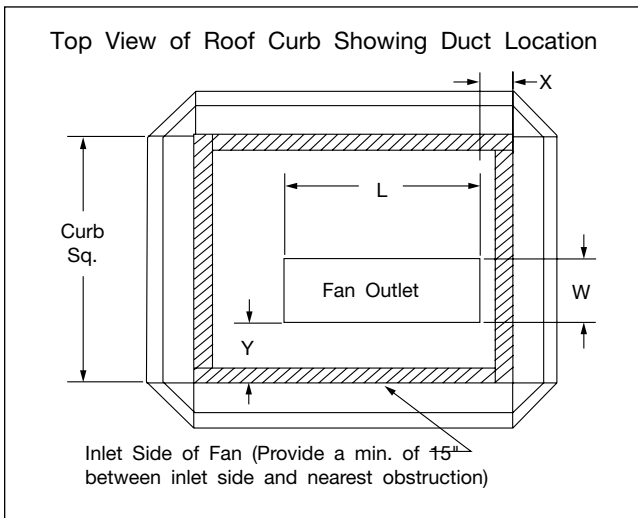


Position duct adapter as shown and secure to nailer strip with nails in holes provided in duct adapter.

\*For a standard gravity (spring return) damper, recess the damper a minimum of 2" inside the duct in order to clear the fan outlet. For an optional motorized damper, the damper must be recessed 12" to allow for clearance between the actuator and fan outlet.

MODEL BCFS	DIMENSION (IN.)			
	W	L	X	Y
140A	8½	19½	2¼	7
180A	10½	22½	1⅞	9
240A	13⅜	29½	1¾	11½

Figure 3. Location of Fan Outlet



MODEL BCFS	DIMENSION (IN.)				CURB SQ.	SUPPLY DAMPER
	W	L	X	Y		
140A	8	19	2½	7¼	30 x 30	8 x 19
180A	10	22	2⅞	9¼	36 x 36	10 x 22
240A	13⅜	29	2	11¾	47 x 47	13 x 29

DIMENSIONS ARE NOT TO BE USED FOR CONSTRUCTION.

## Motor Installation

To prevent damage during shipment, the motor of this unit has been installed at the factory, tested, then removed and shipped separately. Please follow the instructions below to reinstall the motor.

1. Fasten the motor plate to the bearing plate by inserting the hinge pin in the holes and then putting a hitch pin in the hole of the hinge pin. See Figure 4.
2. Install the belts on the sheaves, apply tension and tighten the bolt at the top of the motor plate or the nut on the jacking bolt to maintain tension. The ideal belt tension is to be enough so that the belt does not slip under peak load. Do not over-tighten the bolt as it will severely reduce the life of the bearings.

3. Check the sheave alignment as shown in Figure 5 below and align sheaves with a straightedge if necessary. Be sure the belt tension is rechecked if the sheave alignment is changed.

### NOTICE

The belt tension will need to be rechecked after the fan has been operating for a few days. There is an initial break-in period for the belts in which they may stretch.

Figure 4. Motor Plate Assembly

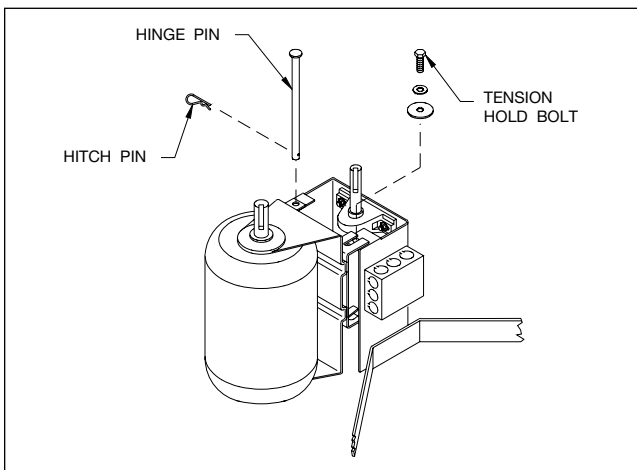
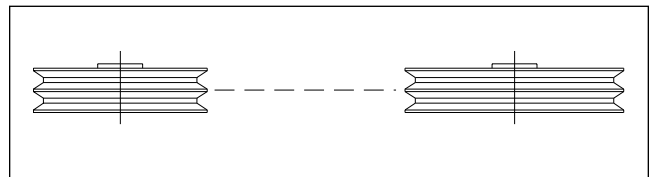


Figure 5. Sheave Alignment



## Limitation of Warranties and Claims

Seller warrants to the original purchaser that the goods sold hereunder shall be free from defects in workmanship and material under normal use and service (except in those cases where the materials are supplied by the buyer) for a period of one year from the date of original installation or eighteen (18) months from the date of shipment, whichever occurs first. The liability of seller under this warranty is limited to replacing, repairing, or issuing credit (at cost, F.O.B. factory and at seller's discretion) for any part or parts which are returned by buyer during such period provided that:

- a. seller is notified in writing within ten (10) days following discovery of such defects by buyer, or within ten (10) days after such defects should reasonably have been discovered, whichever is less;
- b. the defective unit is returned to seller, transportation charges prepaid by buyer.
- c. payment in full has been received by seller for said products; and
- d. seller's examination of such unit shall disclose to its satisfaction that such defects have not been caused by misuse, neglect, improper installation, repair, alteration, act of God, or accident.

No warranty made hereunder shall extend to any seller product whose serial number is altered, effaced or removed. Seller makes no warranty, express or implied, with respect to motors, switches, controls, or other components of seller's product, where such components are warranted separately by their respective manufacturers. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, WHETHER STATUTORY OR OTHERWISE, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. In no event shall seller be liable to buyer for indirect, incidental collateral, or consequential damages of any kind. (BUYER'S FAILURE TO PAY THE FULL AMOUNT DUE WITHIN SIXTY (60) DAYS OF DATE OF INVOICE SHALL OPERATE TO RELEASE SELLER FROM ANY AND ALL LIABILITY OR OBLIGATION ARISING PURSUANT TO ANY WARRANTY, EXPRESS OR IMPLIED, WHETHER STATUTORY OR OTHERWISE, INCLUDING ANY IMPLIED WARRANTY OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, MADE IN CONNECTION WITH ANY CONTRACT FORMED HEREUNDER. BUYER AGREES THAT SUCH FAILURE TO PAY SHALL CONSTITUTE A VOLUNTARY WAIVER OF ANY AND ALL SUCH WARRANTIES ARISING PURSUANT TO SUCH CONTACT.)



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