






# **BESF Box Ventilator**

USA

CAN



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-  **Mechanical Installation ..... Chapter 3**
-  **Electrical Installation ..... Chapter 4**
-  **Start Up and Configuration ..... Chapter 5**
-  **Maintenance and Troubleshooting ..... Chapter 6**

**Job Name:** \_\_\_\_\_

**Installer:** \_\_\_\_\_

**Installation Date:** \_\_\_\_\_



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## Symbol Legend:

The following terms are used throughout this manual to bring attention to the presence of potential hazards or to important information concerning the product.



**Danger:** Indicates an imminent hazardous situation which, if not avoided, will result in death, serious injury or substantial property damage.



**Caution:** Indicates an imminent hazardous situation which, if not avoided, may result in personal injury or property damage.



## TO REDUCE THE RISK OF FIRE, ELECTRICAL SHOCK OR INJURY TO PERSONS, OBSERVE THE FOLLOWING:

1. Use this unit in the manner intended by the manufacturer. If you have questions, contact the manufacturer at the address or telephone number listed on the front of the manual.
2. Before servicing or cleaning the unit, switch off at service panel and lock service panel to prevent power from being switched on accidentally.
3. Installation work and electrical wiring must be done by a qualified person(s) in accordance with applicable codes and standards.
4. Follow the appliance manufacturer's guidelines and safety standards such as those published by the National Fire Protection Associations (NFPA), and the American Society for Heating, Refrigeration and Air Conditioning Engineers (ASHRAE), and the local code authorities.
5. This unit must be grounded.

### How to use this manual

This installation manual does not contain any system design documentation. System design documentation is available from any authorized EXHAUSTO representative.

Accessories, fans and variable frequency drives are not covered by this manual. Please refer to these component's individual manuals.



## 1. Product Information

### 1.1 Function

**Use** EXHAUSTO Model BESF is a box ventilator that can be used for the movement of air in exhaust and air supply systems where no explosive gases are present. The ventilator cannot be used for transport of large particles. It is designed to provide a high capacity at a high static pressure. The ventilator can be installed indoors as well as outdoors. No special treatment or preparation is required for weather proofing. Suitable uses include, but are not limited to: comfort ventilation, residential kitchen ventilation, exhaust and air supply.

The exhaust temperature must be above 10°F(-12°C) but should not exceed 175°F(80°C). The ambient temperature must be within -20°F(-30°C) and 105°F(40°C).

### Construction

The ventilator housing is made of galvanized steel and insulated with fiber insulation. The collars are fitted with silicone seals to assure a tight assembly. The motor is a direct drive, variable speed class B insulated type. It has permanently lubricated, sealed ball bearings and is maintenance free.

### Listings

EXHAUSTO Model BESF is tested and listed to UL 705, Standard for Power Ventilators.

The BESF can be used as a component in a MCAS, Modulating Combustion Air System. The listings of this system incorporates the BESF Box Ventilator.



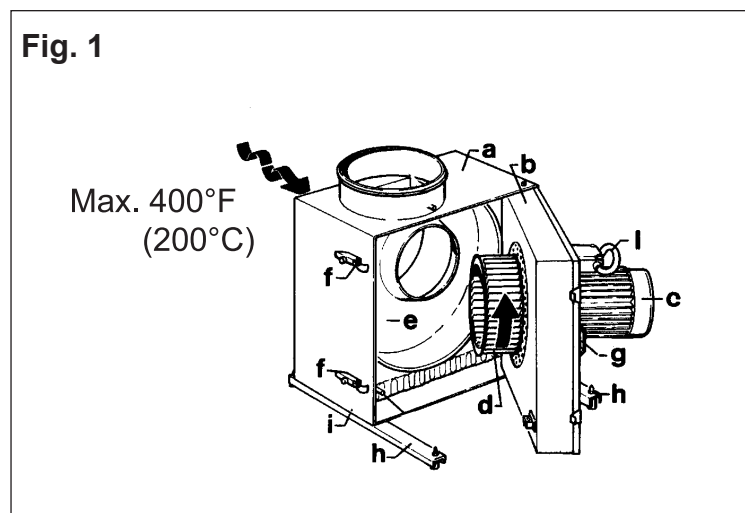
**Do not use with explosive gases. Do not use for transport of large particles.**

### 1.2 Components

The box ventilator consists of the following components:

- |    |                      |    |   |
|----|----------------------|----|---|
| a. | Housing              | f. | Locking hinge                           |
| b. | Access door          | g. | Door handle                             |
| c. | Motor                | h. | Support legs with vibration dampers (2) |
| d. | Centrifugal impeller | i. | Sheet metal screws (4)                  |
| e. | Ventilator housing   | k. | Door switch (optional)                  |

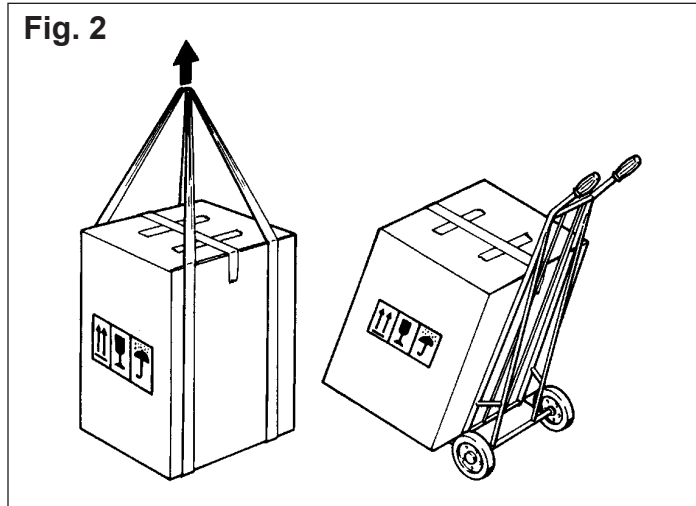
**Fig. 1**



### 1.3 Shipping

#### Protection

The ventilator is protected by a corrugated box. Do not place other products or items on top of the box. After unpacking, the product must be handled in a way to prevent damaging the collars and the ventilator housing.



**Never operate the power venter with the access door open!**  
To open access door loosen screws on latch handles and raise handles.



**Never operate the ventilator with the access door open!**  
To open access door loosen screws on latch handles and raise handles.

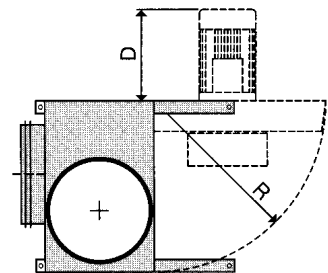
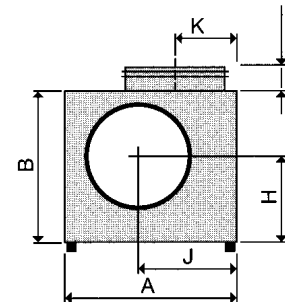
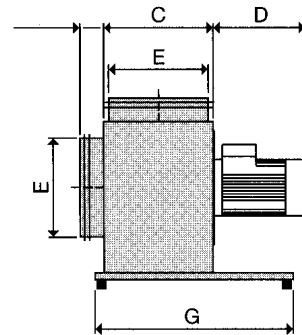
#### Standard Packing

The ventilator is shipped with motor installed on the access door. If other components are shipped, these will appear on the shipment packing list.

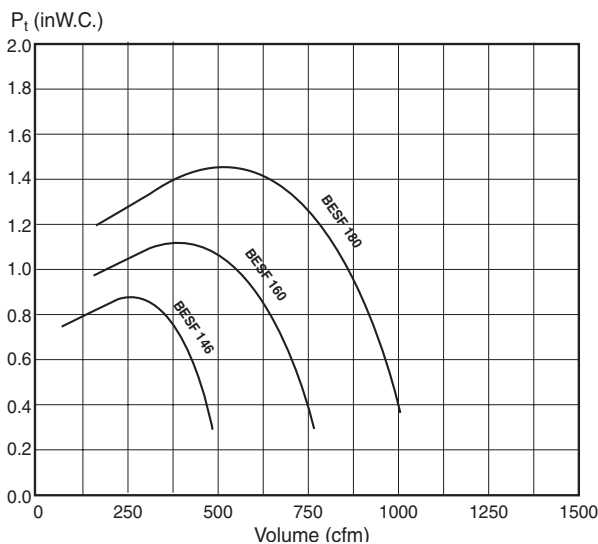
## 2. Specifications

### 2.1 Dimensions & Capacities

Model		BESF 146	BESF 160	BESF 180
Fan Type		Centrifugal Impeller (F-Wheel)		
Motor Type		TEFC		
Voltage	V AC	1x120		
Amperage	Amps	1.2	2.9	5.8
Motor Output	HP	0.1	0.2	0.5
	kW	0.08	0.16	0.35
RPM		1600		
Weight	lbs	28	38	60
	kg	13	17	27
Duct Connection	E in	7	8	8
	mm	177	200	200
Dimensions	A in	13.60	14.57	16.15
	mm	345	370	410
B	in	11.62	12.60	13.98
	mm	295	320	355
C	in	7.88	9.26	9.26
	mm	200	235	235
D	in	4.33	5.52	7.68
	mm	110	140	195
G	in	13.78	15.75	15.75
	mm	350	400	400
H	in	6.50	7.10	7.88
	mm	165	180	200
J	in	7.88	8.27	9.26
	mm	200	210	235
K	in	4.33	5.12	5.12
	mm	110	130	130
R	in	13.60	14.57	16.15
	mm	345	370	410



### Capacity Chart





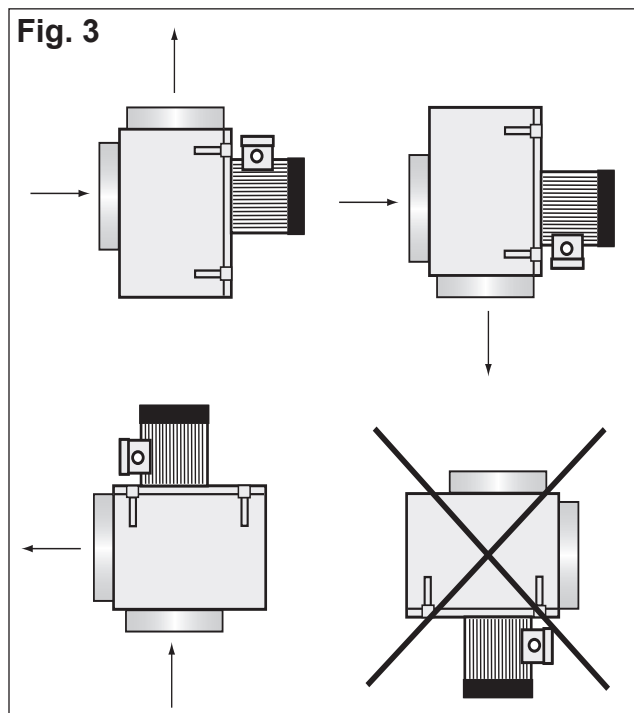
### 3. Mechanical Installation

#### 3.1 Positioning

The ventilator can be installed in many different positions. However, it should always be possible to open the access door at least 80 degrees, and the locking bolts should always be accessible. Acceptable ventilator positions are shown below in Fig. 3. Note that the ventilator motor can never point straight down as this could cause condensation build-up around the shaft, which can shorten the product life.



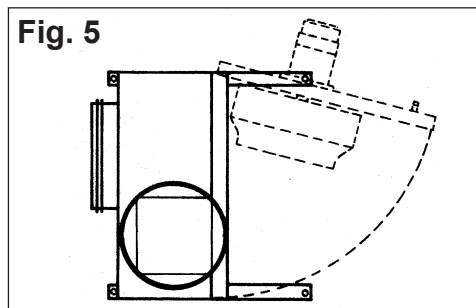
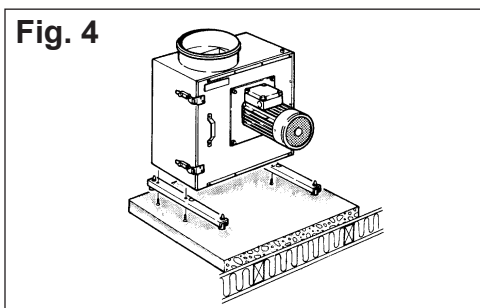
**Never install the power ventilator so the motor points down. This will shorten the life.**



#### 3.2 Floor or Roof Mounting

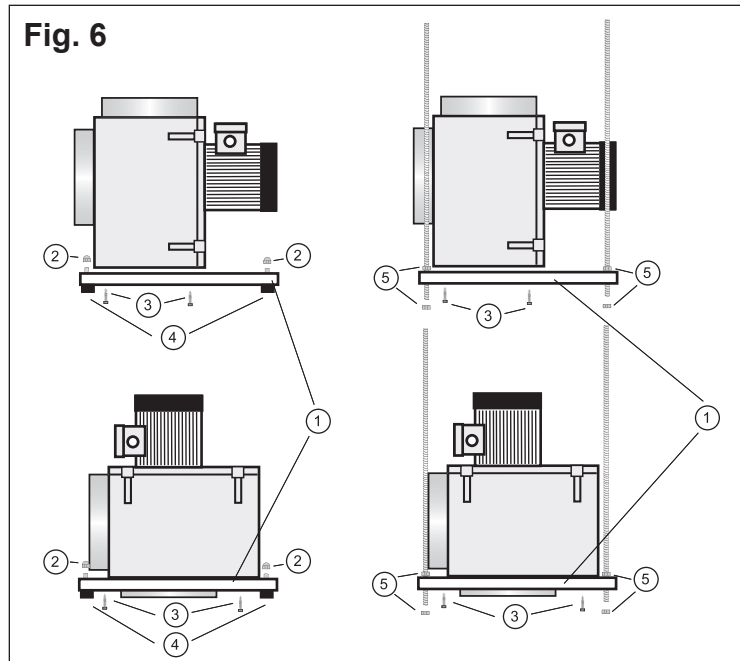
To minimize the transfer of noise and vibration the ventilator should be placed on a surface that is level, stable and vibration-free. The ventilator does not need to be secured by any means. See Fig. 4 on page 7. Once the installation location has been selected the support legs must be installed. For the standard position bolt holes are pre-drilled so the legs should just be aligned and secured with the enclosed sheet metal screws.

For all other positions, the legs should be placed in a proper position and holes should be drilled prior to securing the legs to the ventilator by means of the enclosed sheet metal screws. When placing the ventilator, make sure the access door can open approximately 80°. See Fig. 5.



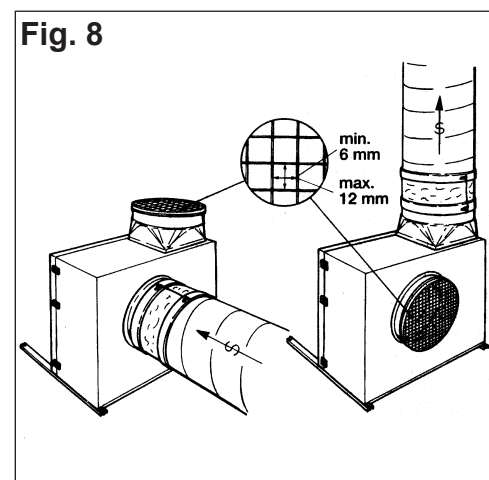
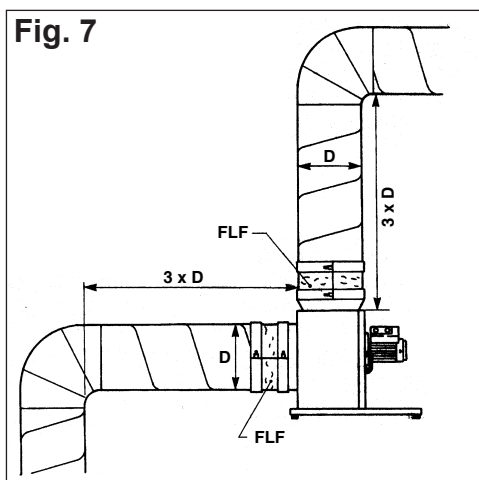
### 3.3 Ceiling Mounting

The box ventilator can be mounted with plumber's strap or threaded rod with nuts and washers, or it can be placed on support legs (included). As Fig. 6 illustrates, the ventilator can be placed in virtually any position or direction, except with the motor pointing down. When placing the venter on the support legs (1), the vibration dampers (4) should be used and secured by nuts (2). The support legs are attached to the bottom of the venter using the enclosed sheet metal screws (3). In this configuration the venter is typically placed on a shelf hung from a wall. If hanging the venter from the ceiling, threaded rods should be used. Attach the support legs (1) to the bottom of the fan and secure with the sheet metal screws (3). Do not use the vibration dampers. Instead use the holes on the top of the legs for the threaded rods and secure these with the nuts (5).



### 3.4 Connection to Duct

In order to achieve optimal performance and energy consumption, the duct must be installed as shown in Fig. 7 and the distances observed. If transfer of vibrations is a major concern special vibration dampening connectors (FLF) should be installed. These are available from EXHAUSTO. If a duct is not connected, a safety screen (accessory), as shown in Fig. 8, must be installed. Make sure the sizing of the ventilator takes the resulting static pressure loss into account.



## ⚡ 4. Electrical Installation

### 4.1 General



**Danger: Turn off electrical power before servicing. Contact with live electric components can cause shock or death.**

All electrical wiring must be in accordance with requirements of authority having jurisdiction or, in absence of such requirements, with National Electrical Code NFPA 70 — latest edition. If an external electrical source is utilized, system must be electrically grounded in accordance with requirements of the authority having jurisdiction or, in the absence of such requirements, with the National Electrical Code NFPA 70 — latest edition.

The ventilators have a split capacitor motor with infinitely variable speed.

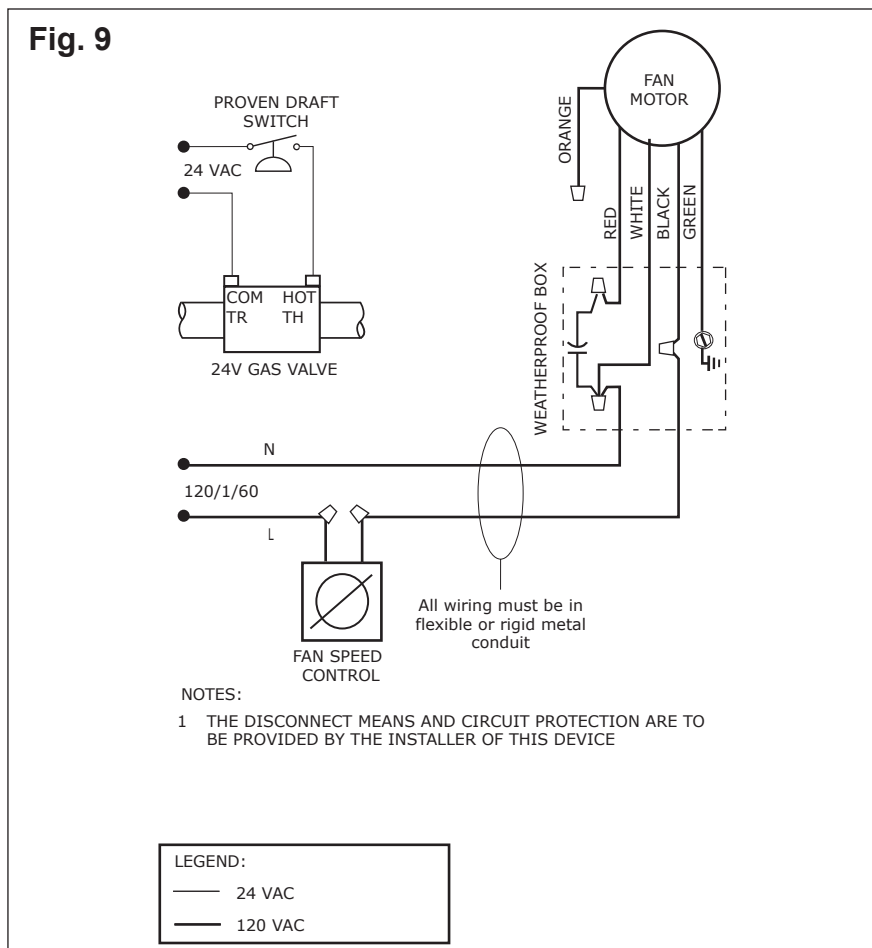
The fan speed control supplied is rated 1x120V/60 Hz and 5 Amps. It has an adjustable low voltage set point of min. 65 V +/- 5 V.



**Notice: If any of the original wire supplied with the system must be replaced, use similar wire of the same temperature rating. Otherwise, insulation may melt or degrade, exposing bare wire.**

### 4.2 Wiring Diagram - BESF 146-180

Ventilator and motor specifications can be found on page 5. The ventilator can be equipped with a variable speed motor. Fig. 9 shows a typical wiring diagram for a BESF utilizing a Fan Speed Control.







## 6. Start-up and Configuration

### 5.1 System Testing

Before any adjustments are made to the system, follow these procedures:

1. Turn the fan ON and make sure that it is operating. Increase and decrease the speed of the fan by adjusting the fan speed control to make sure it is operating properly.
2. Turn the fan OFF and make sure the pressure switch opens, so the power to the circuit, it controls, is disconnected.



**Danger: Check other heating appliances (water heater, furnace, fireplace etc.) for proper operation while the ventilator is operating. Make sure no flue gases are spilling out as this can lead to carbon monoxide poisoning.**

### 5.2 Adjusting the Fan Speed

Start up all appliances. Use the fan speed control to set the speed of the ventilator so no back pressure is experienced anywhere in the system. Check the system for flue gas spillage. Mark this setting on the fan speed control cover.

### 5.3 Adjusting the Proven Draft Switch Setting

Remove the snap-on cover from the conduit enclosure by loosening its retaining screw. Turn the slotted Adjustment Screw clockwise to raise the set point pressure and counter clockwise to lower the set point.

Set the adjustment to its lowest position. With all appliances operating, reduce the speed of the fan to the set point, where the appliance(s) starts to spill flue gas. Increase the speed of the fan gradually to the point where there is no more spillage. Raise the switch's set point so it opens. Return the fan speed to the original setting marked on the cover.

The system is now adjusted so the flue gas spillage will disconnect the heating appliance(s).

The procedure described here may not cover all Proven Draft Switches, so please review the Installation Manual for the switch being used.



## 6. Maintenance & Troubleshooting

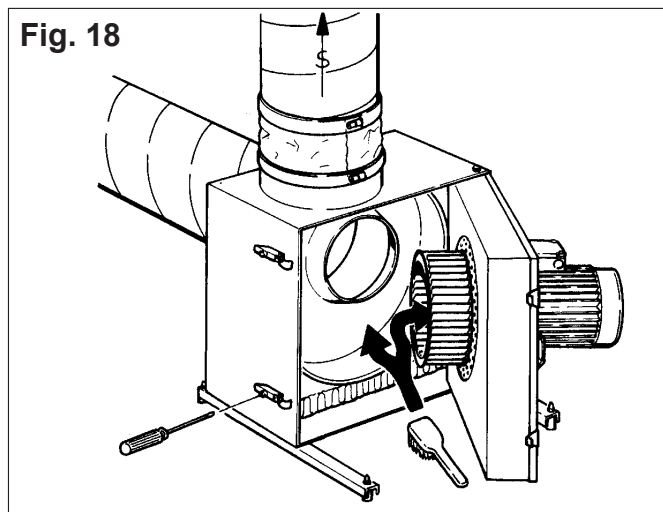
### 6.1 Cleaning Intervals

The ventilator is designed for prolonged use. It must be inspected and cleaned at least every 12 months. The need for cleaning is dependent on the type of application and how the ventilator is operated.

### 6.2 Cleaning

Deposits should be removed from the impellers and the bottom of the ventilator:

1. Turn the fan off at the repair switch.
2. When the blower wheel no longer rotates, open the access door.
3. Clean the inside housing and the wheel with water containing a detergent.
4. Dry all parts with a cloth.
5. Close and secure the access door.
6. Turn the fan on.



If necessary, the blower wheel can be removed. Prior to removal, mark the position on the shaft. The placement of the wheel is also shown on a label placed on the inside of the access door.

Do not remove the balancing weights on the impellers.

Vibration in the ventilator can be caused by a dirty impeller.

No other maintenance is required.

### 6.3 Troubleshooting

Problem	Probable Cause	What to do
Fan is making too much noise.	Ducting is too small for the volume of the air.	Resize ducts.
	Ducts/Filters are dirty/clogged.	Clean and inspect ducts and filters.
	Fan inlet or outlet is too close to the customer.	Relocate duct or fan.
Fan is vibrating and making noise.	Damaged during shipping or installation.	See if blower wheel is damaged or if motor shaft is bent. Replace if damaged.
	Dirt build-up on blower wheel.	Clean wheel.
	Fan and air ducts not installed with vibration dampers.	Install vibration dampers.
Fan is not working	Power is off.	Switch on power to the fan.
	Capacitor is not wired correctly.	Rewire connection.
	Fan speed control is bad.	Bypass fan speed control. If fan now operates at 100%, replace fan speed control.
Fan is getting power, but will not run.	Blower wheel is stuck due to dirt build-up.	Clean blower wheel.
	Fan speed control is set too low.	Set fan speed control to highest setting until fan is up to speed. Then reduce speed.
	Motor bearings have seized. (Refer to section 1.1 "Use".)	See that the fan is operating within its design parameters. Replace the motor.
	Motor capacitor has failed. (Refer to section 1.1 "Use".)	Please refer to Fig. 12 and insure that capacitor is connected correctly. Check amp draw with and without the capacitor being connected. If amp draw is the same, replace capacitor.
Fan is overheating and cycling on and off.	Dirt build-up on blower wheel.	Clean blower wheel.
	Motor capacitor has failed. (Refer to section 1.1 "Use".)	Please refer to note in section above.
	Motor windings or bearings are failing. (Refer to section 1.1 "Use".)	Check amp draw. If incorrect, replace blower motor.

<b>DK: EU-OVERENSSTEMMELSESERKLÆRING</b> <b>GB: DECLARATION OF CONFORMITY</b> <b>D: EU-KONFORMITÄT SERKLÄRUNG</b> <b>F: Déclaration de conformité de l'Union Européenne</b>	<b>N: EU-OVERENSSTEMMELSESERKLÆRING</b> <b>NL: EU-KONFORMITEITS VERKLARING</b> <b>S: EU-ÖVERENSSTÄMMELSEDEKLARATION</b> <b>SF: EU-VAAIMUSTENMUKAISUUSVAKUUTUS</b> <b>IS: ESS-Samræmisstaðfesting</b>
<b>EXHAUSTO A/S</b> Odensevej 76 DK-5550 Langeskov DANMARK	
<i>erklærer på eget ansvar, at følgende produkter:          declare on own responsibility that the following products:          Verantwortet, daß folgende Produkte:          déclare sous sa propre responsabilité que le produit          suivant:</i>	<i>erklærer på eget ansvar, at følgende produkter:          vekaard dat onderstaande produkten: deklarerer på eget          ansvar, att följande produkter:          vastaa siitä, että seuraava tuote:          Staðfesti á eigin ábyrgð, að eftirfarandi vörur:</i>
<b>BESF 146, BESF 160, BESF 180</b>	
<i>som er omfattet af denne erklæring, er i overensstem-          melse med følgende standarder:          covered by this declaration, are in conformity with the          following standards:          mit den folgenden Standardbezeichnungen:          auquel s'applique cette déclaration est en conformité          des normes mentionnées ci-dessous:</i>	<i>som er omfattet av denne erklæring, er i overensstem-          melse med følgende standarder:          met de onderstaande standard koderingen:          som omfattas av denna deklaration, överensstämmer          med följande standarder:          joka koostuu tästä selvityksestä, on seuraavien          standardien mukainen:          sem eru meðalín í staðfestingu Pessari, eru í fullu sam-          ræmi við eftirtalda staðla:</i>
<b>IEC 335-1, IEC 342-1, DS/EN 292-1, DS/EN 292-2</b>	
<i>i.h.t. bestemmelser i direktiv:          according to conformity in directive:          gemäß folgenden EU-Richtlinien überstimmen:          suivant les dispositions prévues aux directives:</i>	<i>i.h.t. bestemmelser i direktiv:          voldoen aan de heironder gestelde eisen:          enligt bestämmelserna i följande direktiv:          seuraavien direktiivin määräysten mukaan:          með tilvísun til ákvarðana eftirlits:</i>
<b>Maskindirektivet:</b> <b>Machinery Directive:</b> <b>für Maschinen:</b> <b>La directive des machines:</b>	<b>Maskindirektivet:</b> <b>voor machines:</b> <b>Maskindirektivet:</b> <b>Konedirektiivi:</b> <b>Vélaeftirlitið:</b>
<b>89/392, 91/368, 93/44, 93/68</b>	
<b>Lavspændingsdirektivet</b> <b>Low voltage Directive:</b> <b>für Niederspannung:</b> <b>La directive de la basse tension:</b>	<b>Lavspenningsdirektivet</b> <b>laagspanning:</b> <b>Lågspänningsdirektivet:</b> <b>Matalajännitedirektiivi:</b> <b>Smáspennueftirlitið:</b>
<b>73/23</b>	
<b>EMC-direktivet:</b> <b>EMC Directive:</b> <b>für EMC</b> <b>La directive de la compatibilité électromagnétique:</b>	<b>EMC-direktivet:</b> <b>voor EMC:</b> <b>EMC-direktivet:</b> <b>EMC-direktiivi:</b> <b>EMC-efirlitið:</b>
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