

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

FIBERGLASS UPBLAST VENTILATORS MODEL HPUV

Serial Number: _____

Date Manufactured: _____

Drawing Number: _____

Tag: _____

Reference: _____

Project: _____



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General Information

1. All parts of the fan equipment have been thoroughly inspected and pre-tested at the factory. Upon receipt of shipment, a complete inspection of the equipment is recommended to determine if any damage was sustained during shipment. If any parts are found to be damaged, a claim should be immediately filed against the freight carrier.
2. It is advisable to have the equipment installed by personnel familiar with the installation of air handling equipment. In most cases, our sales representatives can recommend an expectable erector.
3. Check the nameplates and tags on fan motors and bearings for special instructions.
4. Fan should be mounted on vibration isolators, or mounted surface. When the fan is to be mounted on a platform above the floor, the platform should be thoroughly braced.
5. Air temperature in the fan should never exceed 160F
6. Do not use backwardly inclined centrifugal fans for material handling applications, or in applications where the air stream contains sticky or stringy substance.
7. Fans are constructed of fiberglass reinforced plastic. Care must be taken during handling and installation to prevent damage which may be caused by external stress or shock.

Installation

-Roof Mounting-

WARNING: Disconnect power before installing or Servicing.

CAUTION: Do not raise ventilator by its wind band (Ref. Nos. 2 and 4): use a sling or platform.

1. Remove motor dome (Ref. No. 3) and upper wind band (Ref. No. 2)
 2. Place ventilator on curb, aligning electrical conduit guide (Ref. No. 9) with conduit from power source.
- NOTE: Do not use cooling tube (Ref. No. 11) as a conduit guide to supply power to the motor.**
3. Pull the power cable through the electrical conduit guide.
 4. Secure ventilator to curb through vertical portion of ventilator base (Ref. No. 7)

NOTE: If fastening through the top surface of the ventilator base, neoprene washer under the head of each fastener to prevent water leakage.

5. Check ventilator wheel for free rotation.
6. Connect power cable to motor as indicated on motor nameplate or terminal box cover. Allow sufficient slack in power cable for belt tension adjustments.
7. Check all fasteners for tightness.
8. Make certain that the gasket seals motor dome (Ref. No. 3) to base assembly (Ref. No. 7)

-Wall Mounting-

Models HPUV 15 and 20 Only.

WARNING: OSHA regulations require the ventilator to be mounted at least seven feet above ground or floor level.

1. The same instructions, warnings and notes found under roof mounting will apply. Refer to steps 1 and 3 and steps 5 through 9.
2. Masonry Wall. Around the wall opening install an angle iron frame at least 3" x 3" x 1/2" to match the inside base dimension of the ventilator. Secure with least cinch type anchors with nonferrous bolts (3 per side). The ventilator should then be mounted (cooling tube down) to the mounting angle, with self-tapping sheet metal screws (min. 3 per side).
3. Wood Sidings. Around the wall opening install a wooden frame at least 3" x 4" to match the inside base dimension of the ventilator. Secure with counter-sunk expansion type leg bolts (3 per side). The ventilator should then be mounted (cooling tube down) to the mounting frame with square head wood screws (min. 3 per side).

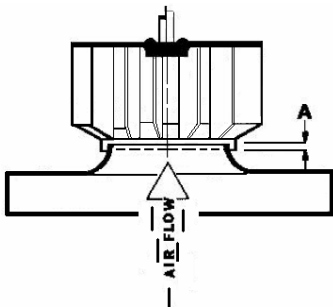
Preoperative Instructions

1. Rotate fan wheel by hand to check for free rotation and any shifting of the wheel which might have occurred during shipment. If necessary shift wheel to correct position to correct for a grinding or rubbing wheel. See Table 1 for correct wheel overlap for centrifugal fans.

**TABLE #1
INLET CONE/WHEEL CONE OVERLAP**

MODEL	HPUV 15	HPUV 20	HPUV 24	HPUV 30
A DIMENSION	1/2"	5/8"	3/4"	1 1/6"

2. Assemble motor and drive in their proper relative positions, if not already assembled on fan. (See Belt and Sheave installation procedure)
3. Check belt tension and belt and sheave alignment (See Belt and Sheave Installation Section)
4. Assure that all bolted connections are tight
 - (a) Check tightness of any flanges connection bolts
 - (b) Check tightness of adjustable motor base bolts.
 - (c) Check tightness of set screws in motor and fan pulleys sheaves. **IMPORTANT!**



- (d) Check tightness of set screws in bearing locking collar.
- (e) Check tightness of bearing mounting bolts.

Operation

After all preoperative inspection checks have been completed, the unit is ready for operation.

1. Connect motor to proper power source in accordance with wiring diagram attached to motor. (Refer to "Motor Installation" Instructions).
2. Momentarily start the blower motor to check for correct rotation as indicated by arrow on the fan outer shell. Fan wheel must rotate in the direction by the arrow on the outside of the casing. If the arrow has been removed, determine the fan rotation from the drive end, or consult factory. If fan wheel rotates in opposite direction, check motor manufacturer's wiring instructions and re-wire accordingly.
3. Check operation of the fan carefully during initial start-up. If excessive vibration is evident, shut fan off immediately, and determine the cause. Do not operate fan

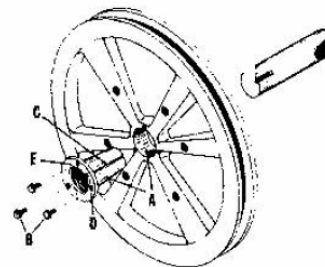
- until the source of vibration has been eliminated.
4. Check motor with an ammeter and compare current draw of motor with the amperes shown on the motor nameplate. Do not operate the fan unit with the motor overloaded as this may ruin the motor and void motor manufacturer's warranty.
 5. Re-check all bolts and set screws in one hour and again after 24 hours of operation. Re-check belt tension and make necessary adjustments.

Wheel Maintenance

Inspect wheel for built-up at least every three months, or as required for your application. If a crust or scale buildup has begun on the wheel, fresh water with a coarse rag or a soft brush will easily remove this buildup. This step will assure the precision static and dynamic balance of the wheel.

Wheel Removal and Installation

HEE wheels are furnished with split taper bushings for mounting the wheel to the shaft. When properly assembled, the bushings grip the hub of the wheel with a positive clamping action.



- (a) Bushing barrel and bore of wheel hub are topped-this assures concentric mounting and a true running wheel.
- (b) Cap-screws, when tightened, lock bushing in wheel hub. Use plated cap-screws threaded full length.
- (c) Bushing is split so that when the locking cap-screws force bushing into tapered bore, the bushing grips the shaft with a positive clamping fit. This will withstand vibration and pushing loads without being loosened.
- (d) Wheel and bushing assembled is keyed to shaft and held in place by compression-this gives added driving strength.

Installing Wheel Assembly onto Shaft

1. Put bushing loosely into wheel. Do not press or drive. Start cap-screws by hand, turning them just enough to engage threads in tapped holes on wheel. Do not use a wrench at this time. The bushing should be loose enough in the wheel to move slightly.
2. Be sure shaft and keyway are clean and smooth. Check key size with both shaft and bushing keyways. Slide wheel and bushing assembly onto shaft, making allowance for end play of shaft to prevent rubbing. Do not force wheel and bushing onto shaft. If it does not go on easily, check shaft, bushing, and key sizes.
3. Tighten cap-screws progressively with wrench. Do this evenly by taking a partial turn on each cap-screw successively until all are tight. These cap-screws force the taper bushing into the hub which in turn compresses the bushing onto the shaft. This makes a positive clamping fit.
4. Replace cap. Follow instructions supplied with kit.

WARNING: Do not attempt to pull flange flush with bud end - there should be 1/8" to 1/4" clearance when tightened.

Removing Wheel Assembly from Shaft

1. Remove fiberglass cap from center of wheel.
2. Remove all there cap-screws from wheel and hub assembly.
3. Start cap-screws into the threaded holes in the bushing flanges.
4. Tighten each bolt part of a turn successively to force the wheel off the bushing.
5. Pull the bushing off the shaft. If the assembly has been in place some time it may be necessary to use a wheel puller to remove the bushing. Never use a wheel puller on the wheel.

V-Belt Drives

Whether you are just installing new belts or a completely new drive, worn bearings, bent shafts or other components that might cause future problems, should be replaced at this time. If installing belts only, check existing

sheaves carefully for worn grooves or other damage. (Always use gloves or a rag for feeling in the sheaves grooves so that you will not cut your finger on nicks or burns.)

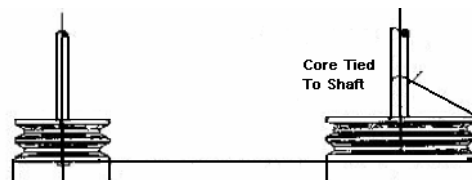
Worn grooves can be detected by feel, or by sight. If the grooves are worn excessively, the sheaves should be replaced. Worn grooves can shorten belt life by as much as 50%, which in turn increase the cost of maintenance.

Rusty or dirty sheaves also impair a drive's efficiency.

Clean existing sheaves thoroughly before installing a new set of belts. A safe cleaning fluid, such as methyl chloroform, is recommended.

Installation of Sheaves

1. Make sure the bore of the sheaves and the tapered cone surface of the Sure-Grip bushing is free of all foreign substance such as paint, dirt and lubricants.
2. Place bushing into sheave. Loosely insert the cap screws into the assembly. Do not lubricate the cap screws threads.
3. With key-seat of shaft, slide the sheave/bushing assembly to its desired position with cap screw heads to the outside. (A few small sheaves may have to be installed with the cap screws on the inside.) If the bushing is hard to slide onto the shaft, wedge a screwdriver blade into the saw cut to overcome the tightness.
4. Align sheaves with a straight edge or a piece of string. If he sheaves are properly lined up, the string will touch them at all points across the sheave. Rotate each sheave a half revolution to determine whether the sheaves in installed correctly. With the sheaves aligned, tighten the cap screws evenly and progressively.



Removal of Sheaves

1. Release bolt tension, remove bolts. Loosen and remove cap-screws.
2. Insert cap-screws into tapped removal holes and progressively tighten each one until mating part is loose on bushing.

3. Remove mating part from bushing and, if necessary, bushing from shaft. If bushing wont slip off shaft, wedge screwdriver blade into saw-cut to overcome tightness.

Adjusting Variable Pitch Sheaves

HEE belt drive fans may be furnished with variable pitch motors sheaves. Sheaves may be adjusted for lower fan speeds without concern of over-loading motors. When adjusting sheaves to increase fan speed check motor current to be sure motor is not overloaded. Keep motor current within nameplate and service factor ratings.

The following steps should be taken to adjust the pitch diameter:

1. Release belt tension and remove belt or belts from sheaves.
2. Loose setscrew and remove key holding adjustable half of the groove.
3. Screw adjustable half of sheave out for a smaller pitch diameter (decreased speed), or in for a larger pitch diameter (increased speed). Each one-half turn will change the pitch diameter one-tenth of an inch. Adjust two-groove sheaves the same amount on each groove.
4. Replace the key and tight setscrews to lock sheave half in position.
5. Replace the belt and tight to proper tension. If extreme amount of adjustment has been made, it may be necessary to replace belts with another length.

Belt Installation

1. Shorten the center distance between the driven and driver sheaves so the belts may be placed in the sheaves grooves without force.

NOTE: Never "roll" or "pry" the belts into the sheave grooves. This can damage the belt cords and lead to belt turnover, short life, or actual breakage.

2. With the belts in their proper grooves, adjust the centers to take up all slack and until the belts are fairly taut.
3. Operate the drive for a few minutes to seat the belts in the sheave grooves.
4. Observe the operation of the drive under its highest load condition (usually starting) a slight bowing on the slack side of the drive indicated proper tension. Excessive bowing

or slippage indicates insufficient tension. If the slack side remains taut during the peck load, the drive is too tight.

5. Check the tension on a new drive frequently during the first day, by observing the slack side span.

6. Excessive tension reduces belt and bearing life.

7. Keep the drive free of foreign material which might cause slippage or damage to belt and sheave surfaces.

8. Id V-Belt Slips, it is too loose. Increase the tension by moving the center. Never apply belt dressing as this will soften the belt and cause early failure.

NOTE: A common cause of short belt life is unequal distribution of load among the belts on a multiple-belt drive. This unequal distribution can be mismatched sets of belts or by grooves that because of wear or machining error are not matched. Always check for matching prior to installation.

MAINTENANCE

-Keep Belts Clean-

Dirt and grease reduce belt life, Belts should be wiped with a dry cloth occasionally to remove any build-up or foreign materials. If the belts have been splattered with grease and/or oil, clean them with methyl chloroform or soap and water. Inflammable cleaners such as gasoline are to be avoided as a matter of safety.

Under no circumstances is the use of belt dressing recommended on a V-Belt. The remedial effect is only temporary. It is much better to keep the belts and grooves of the drive clean.

Maintenance Belt Tension

Maintaining correct tension is the most important rule of V-belt care. It will give the belts 50% to 100% longer life.

Belts that are to loose will slip, causing excessive belt and sheave wear. V-belts that sag to much are snapped tight suddenly when the motor starts or when peak loads occur. That snapping action can actually break the belts, because the added stress is more than the belt was designed to take.

Inspect Sheaves Often

Keep all sheaves groove smooth and uniform. Burrs and rough spots along the sheaves rim can damage belts. Dust, oil and other foreign matter can lead to pitting and

rust and should be avoided as much as possible.

A shiny groove bottom indicates that the sheaves, the belt or both are badly worn and the belt is bottoming in the groove.

Badly worn grooves cause one or more belts to ride lower than the rest of the belts. This is called "differential driving." The belts riding high in the grooves travel faster than the belts riding low. In a drive under proper tension, a sure sign of differential driving is when; one or several belts on the tight side are slack.

Bearings

Lubrication Instructions

The bearing manufacturer does not recommend additional lubrication.

CAUTION: Bearings lubricated at factory. Additional lubrication not recommended.

CAUTION: To prevent bearings failure fan wheel must be rotated at least once a week.

Bearing Mounting Procedure

It is important to follow the assembly and alignment procedure when making an installation of replacement bearings. Inspect the shaft for wear at the bearing mounting position. Shaft diameter should not be undersized more than commercial ground and polished tolerance. Excessive undersized will result in rapid wear.

1. Place new bearings on shaft loosely, with locking collars toward the ends of shaft as shown in illustration. Drop mounting bolts in place, snug them and adjust the position of shaft with proper spacing at either end.
2. Center both shaft ends in housing, using the clearance in the mounting holes for horizontal adjustment and shims if necessary for vertical adjustment.
3. Tighten the bearings to the base plate and check the position of the shaft again. Before tightening the locking collars be sure the shaft and bearings are in proper alignment. The shaft should slide freely end to end.
4. Refer to page 3, table 1 for proper inlet cone, wheel cone overlap.
5. Tighten the eccentric cam locking collar of the bearing at the wheel end. (The locking collar design provides a positive lock of the wide inner ring bearing to the shaft. To tighten, turn the locking collar in the direction

of shaft rotation to the lock position; then tighten the collar set screw.)

6. Grasp the sheave end of the shaft and pull on it: at the same time tap the locking collar of the sheave end bearing with a soft mallet in the opposite direction, toward the wheel

7. The final step is to tighten the sheave end bearing eccentric cam locking collar.

For special heavy-duty bearings a spring locking collar is used. The two knurled cup-point set screws extend through the inner ring of the bearing and lock firmly onto the shaft. Tighten the propeller end collar first: then take hold of the sheave end of the shaft, pull and then tighten the locking collar. The locking collar is tightened by using two set screws mentioned above.

Motors-General

Storage: Storage of motors on equipment and component equipment prior to installation should be protected from the weather. Keep the motor dry. If the equipment is exposed to the atmosphere, remove the breather-drain plug in the end frame at both ends, and cover the motor with a waterproof cover.

CAUTION: Do not completely surround the motor with the protective covering. The bottom area should be checked with a megohm-meter (Megger) as given under subtitle "Insulation".

Location: For maximum motor life, motor should be located in a clean dry, well ventilated place easily accessible for inspection, cleaning and lubricating. The temperature of the surrounding air should not exceed 104 (40C) except for motors with nameplates indicating a higher maximum ambient temperature. Enclosed motors are equipped with condensation vents, located in the bottom center of both end frames. When the motor is exposed to the weather or is subject to high humidity conditions the drain plugs should be removed.

Connections and Wiring: Check power supply to make certain that voltage frequency and current carrying capacity are in accord with the motor nameplate. Motors with nameplates stamped 208-220/440 volts may be operated on 208, 220, or 440 volt lines. When such a motor is operated with 208 volts at the motor terminals, the motor will deliver approximately 11% less locked motor and breakdown torque and draw up to 4% more line current at rated load as

compared to operation with 220 volts at the terminals.

The motor will perform satisfactorily on voltage variations of 10%, or frequency variations of 5% of the nameplate rating, or a combined voltage and frequency of 10%. The preceding variations do not apply to the 208 volt rating of motors with a nameplate stamped 208-220-440 volts.

Connect the motor to the power supply according to the diagram on the connection plate. Connections should be clean and tightly bolted. To reverse the direction of rotation of a three phase motor, interchange any two of the line wires to the motor leads. Two phase motors are reversed by interchanging T-1 and T-3 or T-2 and T-4.

Motor Maintenance

Cleaning and Inspection: A clean motor runs Cooler. The motor should be cleaned and inspected at regular intervals. Operating conditions involving continuous running, hot,

dirty or dusty surroundings, etc. require frequent attention. Inspect bearings for roughness by uncoupling the motor from driven unit, if possible, and turning shaft by hand. If bearings feel "rough" or stick in spots, replace them. Always check bearings when any unusual noise or vibration develops in motor.

Insulation: The insulation resistance should be checked before placing motor in service after any extended storage period, and severe conditions encountering high humidity. Check the insulation resistance with megohm meter or similar instrument employing a 500 volt d.c. potential. Resistance should be at least 1.5 megohms; if it is less, the motor should be removed from service, cleaned, dried, rechecked, and the windings given at least two coats of high grade insulating varnish to assure adequate winding protection.

Type of Enclosures	Insulation	FRAME SIZE		
		143 to 215T		364 to 499T
Open-DP	B	2 years	18 months	1 year
Enclosed-FC Open -DP	B F	18 months	1 year	9 months
Enclosed-NV Enclosed-FC Open-DP Enclosed-Lint Free-FC	B F H B	1 year	9 months	6 months
Enclosed-NV Enclosed-FC Enclosed-Lint Free-FC	F H F	9 months	6 months	3 months

Note:

- For motors over 1800 RPM Use ½ of tabled period.
- For heavy Duty-Dusty Locations Use 1/2 of tabled period.
- For severe Duty-High Vibration, Shock Use 1/3 of tabled period.

VOLUME-REFERENCE TABLE

Shaft Diameter
(At Face of bracket)
3/4" to 1 1/4"
1 1/4" to 1 7/8"
1 7/8" to 2 3/8"
2 3/8" to 3 3/8"

Amount of Grease
To Add
1/8" cu. In. or 01oz.
1/4" cu. In. or 02 oz.
3/4" cu. In. or 06 oz.
2 cu. In. or 16 oz.

Motor Lubrication

Grease-Lubricated bearings, as furnished, are adequate for a long period of operation without re-lubrication. Good maintenance schedules for regreasing will vary widely depending on motor size, speed and environment.

The table shown on suggests re-lubrication intervals for motors on normal, steady running, light duty indoor loads in relatively clean atmosphere at 104F (40C) ambient temperature or less. Fractional horsepower motors follow a similar schedule to that shown under frames 143 to 215T.

Motors with no provision for lubrication are equipped with sealed bearings and require no maintenance. Motors mounted in inaccessible locations are provided with extended grease lines to facilitate lubrication. They are equipped with relief fittings to prevent over-lubrication. The grease lines are filled with lubricant at the factory.

Procedure for Re-Lubrication

1. Stop motor.
2. Remove grease relief plugs in bearing housings.
3. Grease with hand gun until new grease appears at relief hole.

4. Run motor for ten (10) minutes before replacing relief plugs.

CAUTION: Do not over lubricate. This is a major cause of bearing and motor failure. Make sure dirt and contaminants are not introduced when adding grease.

Type of Grease

Lubricate with or equivalent to the following greases:

- Chevron BRB-2 – Standard Oil of California
- SRI-2 – Standard Oil Company
- Alvania #2 – Shell Oil Company

For motors lubricated with special greases check lubrication tag on motor.

Typical Motor Current and Starter Size Amperes shown are nominal and were used for sizing of the starters only. These values are not to be used for sizing heaters or other overload protection. Consult the motor nameplates for the correct motor current and refer this to the heater size chart for the particular starters used.

NOTE: When sizing overload heaters, conditions under which the starter will operate must be considered. Enclosed starters should have heaters one size larger than open starters. Where enclosures are subjected to external heat, such as radiant heat from the sun or heat accumulation under a roof, it may be necessary to increase the size even more. Experience with the operating conditions and measurement of the actual line current will aid in proper sizing of heaters.

HP	Three Phase						Single Phase			
	230 V		460 V		575 V		115 V		230V	
	Amps	Starter	Amps	Starter	Amps	Starter	Amps	Starter	Amps	Starter
1/4		00		00		00	5.8	00	2.9	00
1/3	1.7	00	.9	00		00	7.2	00	3.6	00
1/2	2.0	00	1.0	00	.8	00	9.8	0	4.9	00
3/4	2.8	00	1.4	00	1.1	00	13.6	0	6.9	00
1	3.5	00	1.8	00	1.4	00	16.0	0	8.0	00
1 1/2	5.0	00	2.5	00	2.0	00	20.0	1	10.0	0
2	6.5	0	3.3	00	2.6	00	24.0	1	12.0	0
3	9.0	0	4.5	0	4.0	0	34.0	1	17.0	1
5	15.0	1	7.5	0	6.0	0			28.0	1
7 1/2	22.0	1		1	9.0	1			40.0	2
10	27.0	2		1	11.0	1			50.0	3
15	40.0	2		2	16.0	2				
20	52.0	3		2	21.0	2				
25	64.0	3		2	26.0	2				

-Limited Warranty-

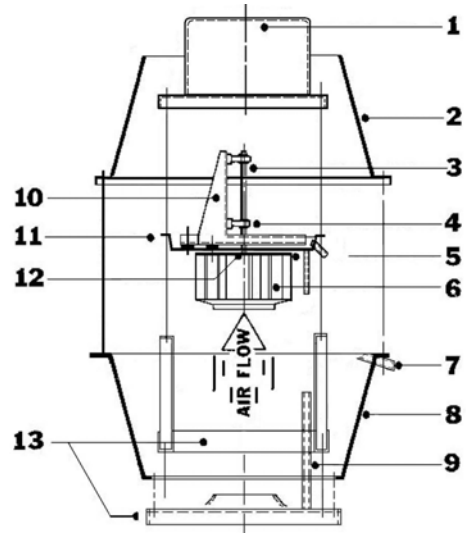
HEE belt-drive up-blast ventilators Models HPUV 15, HPUV 20, HPUV 24, and HPUV 30 are warranted by HEE to the original user against defects in workmanship or materials under normal use for one year after date of purchase. Any part which is determined to be defective in material or workmanship and returned to an authorized service location, as HEE designates, (shipping cost prepaid) will be repaired or replaced at HEE option. HEE will make a good faith effort for prompt correction or other adjustments to any product which proves defective within warranty. For any product believed to be defective under warranty first write or call the representative from whom the product was purchased. The representative will give you further instructions. If the product was damaged in transit to you, file a claim with the carrier.

-Warranty Disclaimer-

HEE has made a diligent effort to illustrate and describe the product in the literature accurately; however, such illustration and descriptions are for sole purpose of identification and not to express or imply a warranty that the products are merchantable, fit for a particular purpose or the product will necessarily conform to the illustrations or descriptions.

Except as provided below, no warranty or affirmation of fact, expressed or implied other than as stated in "Limited Warranty" above, is made or authorized by HEE and HEE liability in all events is limited to the purchase price paid.

Certain aspects of disclaimers are not applicable to consumer products: e.g.
 (a) Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.
 (b) Also, Some states do not allow limitations on how long an implied warranty lasts, consequently the above limitation may not apply to you.
 (c) By law, during the period of this Limited Warranty, any implied warranties of merchantability or fitness for a particular purpose applicable to consumer products purchased by consumers, may not be excluded or otherwise disclaimed.



Replacement Illustration-Parts List

Item	Description	Qty
1	Motor Drive	1
2	Upper Windband	1
3	Wheel Shaft	1
4	Bearings	2
5	Vibration Isolators	4
6	Centrifugal Wheel	1
7	Cooling Tube	1
8	Lower Windband	1
9	Electrical	1
10	Motor- Bearing Plate	1
11	Top Plate	1
12	Shaft Seal	1
13	Base Assembly	1

ORDER REPLACEMENT PARTS
 THROUGH REPRESENTATIVE
 FROM WHOM PRODUCT WAS
 PURCHASED

Please provide following information:

- Model Number
- Serial Number (if any)
- Part Description and Number as shown in parts list



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