

INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

RKW FRP FANS

The *M.K. Plastics* catalog on the above corrosion resistant FRP fan, provides additional information describing the equipment, fan performance, available accessories, and specifications.

For additional safety information, refer to AMCA publication 410-96, *Safety Practices for Users and Installers of Industrial and Commercial Fans*.

For Information on special fan application requirements, contact *M.K. Plastic's* corporate office at (514) 871-9999.

Receiving and Inspection

Carefully inspect the fan and accessories for any damage and shortage immediately upon receipt of the fan.

- Turn the wheel by hand to ensure it turns freely and does not bind.
- Inspect the dampers (if supplied) for free operation of all moving parts.
- Record on the *Delivery Receipt* any visible sign of damage.

WARNING

This unit has rotating parts. Safety precautions should be exercised at all times during installation, operation, and maintenance.

ALWAYS disconnect power prior to working on fan.



Fig. 1 – The RKW Fan

Storage

If the fan is stored for any length of time prior to installation, completely coat the bearings, (if the fan has pillow-block bearings), with grease or moisture inhibiting oil (refer to Lubricants on page 8). Rotate the wheel several revolutions every three to five days to keep a coating of grease on all internal bearing parts.

Outdoor Storage

To maintain good working condition of the fan when it is stored outdoors, follow the additional instructions below.

1. Cover the outlet to prevent the accumulation of dirt and moisture in the housing.
2. Periodically rotate the wheel and operate dampers (if supplied).
3. Periodically inspect the unit to prevent damaging conditions.

Personal Safety

Disconnect switches are recommended. Place the disconnect switch near the fan in order that the power can be swiftly cut off in case of an emergency, and in order that maintenance personnel are provided complete control of the power source.

Fan Installation

Roof Mounted Fans

Roof mounted fans should normally be attached to equipment support curbs to keep them above the roof line by at least 12". To install the roof curb, the fan must be disassembled to be able to attach the fan to the curb. See Fig. 2 for details.

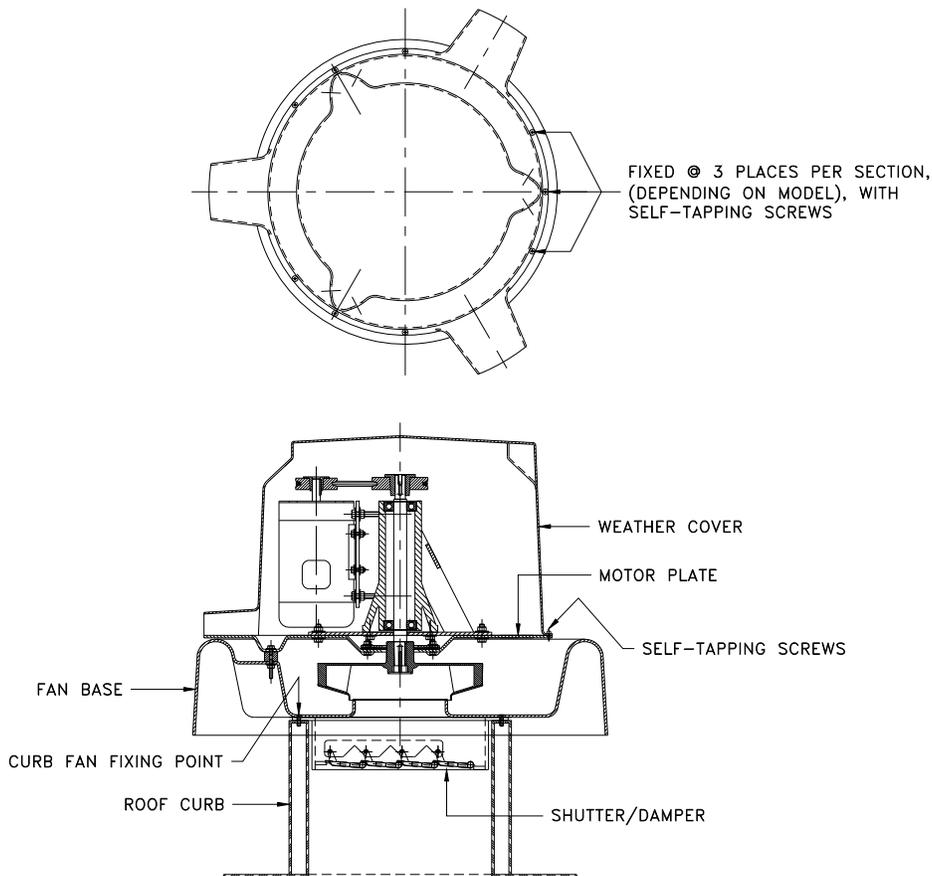


Fig. 2 – Roof Curb Mounted

Roof Curb Attachment

Please refer to Fig. 2. To attach an assembled fan onto a roof curb, do the following –

1. Remove the weather cover; it is attached to the motor plate with self-tapping screws.
2. Unbolt and remove the motor plate, complete with the motor/flange-bearing and wheel assembly.
3. If a shutter or damper is to be installed, then insert inside the roof curb, or attach to the underside of the fan base, depending on the type used.
4. Position the fan base section on top of the roof curb. Rotate the base so that the roof drain is on the outside of the curb for water run-off.
5. Fasten the fan base section to the roof curb with counter sunk, self-tapping screws at center distances as shown on the submittal 'Technical Data' sheets. Lag screws may also be used, as long as the bolt head is flush with the top of the curb.
6. Reassembly of the fan parts are the reversal of disassembly.

Wall Attachment

The fan is attached in a similar way to roof mounting, except that the curb is replaced by spacer blocks or frame, (not supplied). See Fig. 3 for details.

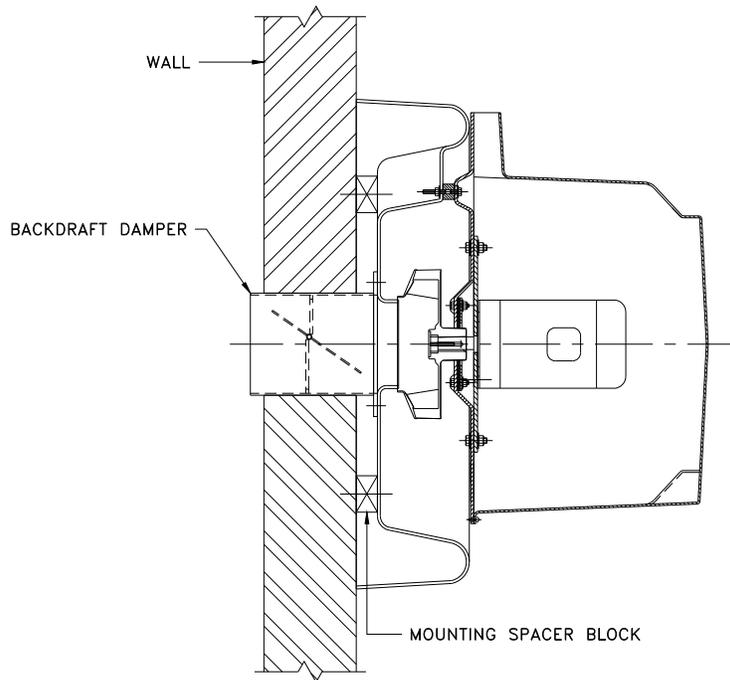


Fig. 3 – Wall Mounted

Wheel-to-Inlet Clearance/Overlap

The correct wheel-to-inlet clearance/overlap is critical to proper fan performance. This clearance should be verified before initial start-up since rough handling during shipment could cause a shift in fan components. Refer to Fig. 4 - Wheel/Inlet clearance for details – the gap should be 1/8" on all sizes of RKW fans.

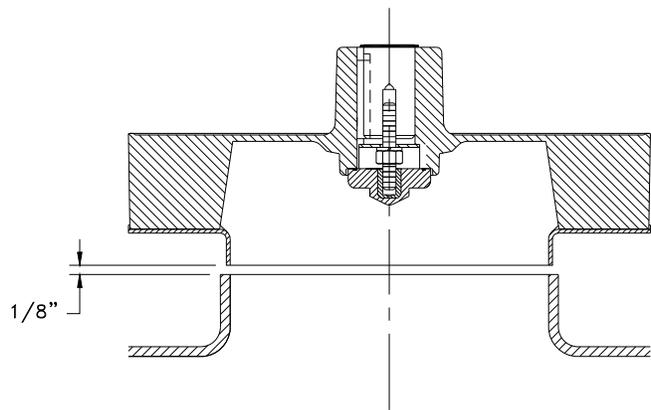


Fig. 4 – Wheel/Inlet Clearance

Belt and Pulley Installation

Belt tension is determined by the sound the belts make when the fan is first started. Belts will produce a loud squeal, which dissipates after the fan is operating at full capacity. If the belt tension is too tight or too loose, lost efficiency and possible damage can occur. Do not change the pulley pitch diameter to change tension. This will result in a different fan speed than desired.

1. Loosen motor plate adjustment nuts and move the motor plate in order that the belts can easily slip into the grooves on the pulleys. Never pry, roll, or force the belts over the rim of the pulley.
2. Slide the motor plate back until proper tension is reached. For proper tension a deflection of approximately $\frac{1}{4}$ " per foot of center distance should be obtained by firmly pressing the belt. Refer to Fig. 5.
3. Lock the motor plate adjustment nuts in place.
4. Ensure pulleys are properly aligned. Refer to Fig. 7

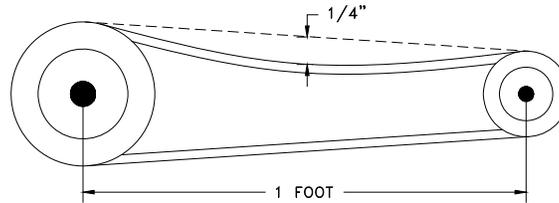


Fig. 5 – Belt & Pulley Tension

Pulley Alignment

Pulley alignment is adjusted by loosening the motor pulley setscrew and by moving the motor pulley on the motor shaft, or by moving the entire motor along the motor mounting bracket. Fig. 6 illustrates correct and incorrect pulley alignment.

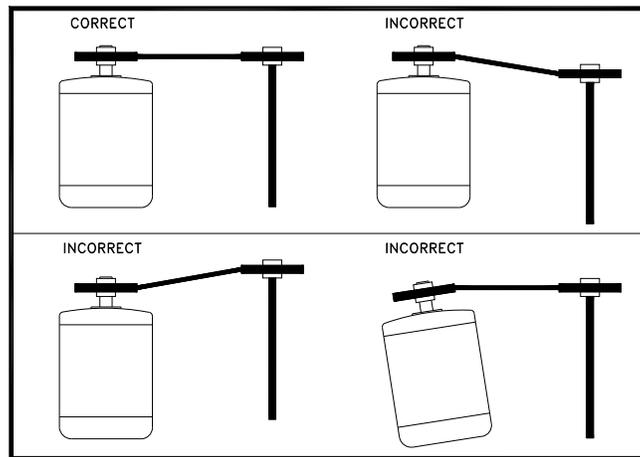


Fig. 6 – Pulley Alignment

A recommended method of inspecting the pulley alignment is shown in Fig. 7. With the shorter leg of a carpenter's square or other straight edge lying along the case of the motor, adjust the position of the motor pulley (or the motor) until the longer leg of the square is parallel to the belt. For more accuracy – use a laser alignment tool, if available. Read the instructions that come with the kit.

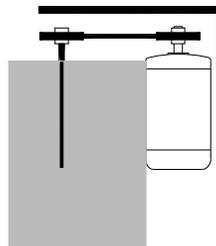


Fig. 7 – Pulley Alignment Method

Wiring Installation

All wiring should be in accordance with local ordinances and the National Electrical Code, NFPA 70. Ensure the power supply (voltage, frequency, and current carrying capacity of wires) are in accordance with the motor nameplate.

Lock off all power sources before unit is wired to power source.

Leave enough slack in the wiring to allow for motor movement when adjusting belt tension. Some fractional motors have to be removed in order to make the connection with the terminal box at the end of the motor. To remove the motor, remove bolts securing motor base to power assembly. Do not remove motor mounting bolts. The fans will have a hole provided at the base of the bearing pedestal to accommodate wiring.

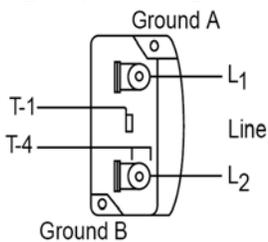
Personal Safety

Disconnect switches are recommended. Place the disconnect switch near the fan in order that the power can be swiftly cut off in case of an emergency, and in order that maintenance personnel are provided complete control of the power source.

Follow the wiring diagram in the disconnect switch and the wiring diagram provided with the motor. Correctly label the circuit on the main power box and always identify a closed switch to promote safety (i.e. red tape over a closed switch).

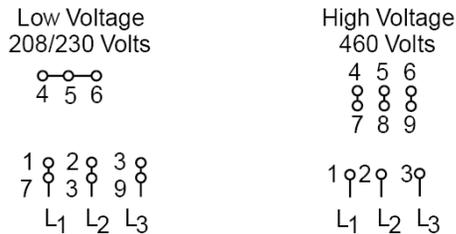
Wiring Diagrams

Single Speed, Single Phase Motor



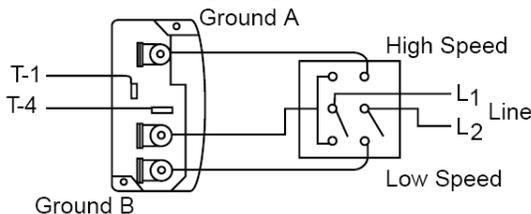
When ground is required, attach to ground A or B with No. 6 thread forming screw. To reverse, interchange T-1 and T-4 leads.

3 Phase, 9 Lead Motor



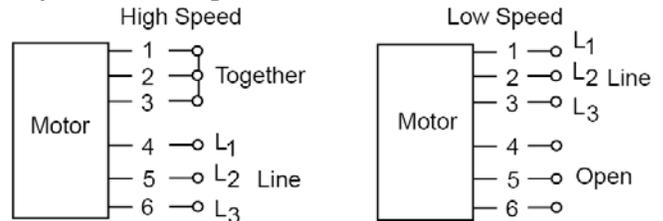
To reverse, interchange any 2 line leads.

2 Speed, 2 Winding, Single Phase Motor



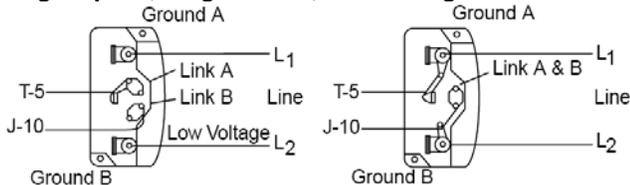
When ground is required, attach to ground A or B with No. 6 thread forming screw. To reverse, interchange T-1 and T-4 leads.

2 Speed, 1 Winding, 3 Phase Motor



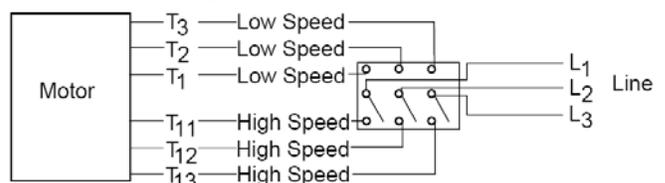
To reverse, interchange any 2 line leads. Motors require magnetic control.

Single Speed, Single Phase, Dual Voltage



When ground is required, attach to ground A or B with No. 6 thread forming screw. To reverse, interchange T-5 and J-10 leads.

2 Speed, 2 Winding, 3 Phase



To reverse: High speed-interchange leads T11 & T12. Low speed-interchange leads T1 & T2. Both speeds-interchange any 2 line leads.

Final Installation Steps

1. Inspect fasteners and setscrews, particularly fan mounting and bearing fasteners, and tighten according to the recommended torque shown in the table Recommended Torque for Setscrews/Bolts.
2. Inspect for correct voltage with voltmeter.
3. Ensure all accessories are installed.

Setscrews				Hold Down Bolts	
Size	Key Hex Across Flats	Recommended Torque (Inch-lbs)			
		Min.	Max.	Size	Wrench Torque Inch-lbs
No. 10	3/32"	28	33	3/8"-16	240
1/4"	1/8"	66	80	1/2"-13	600
5/16"	5/32"	126	156	5/8"-11	1200
3/8"	3/16"	228	275	3/4"-10	2100
7/16"	7/32"	348	384	7/8"-9	2040
1/2"	1/4"	504	600	1"-8	3000
5/8"	5/16"	1104	1200	1-1/8"-7	4200
3/4"	3/8"	1440	1800	1-1/4"-7	6000

Recommended Torque for Setscrews/Bolts (IN/LB)

Operation

Pre-Start Checks

1. Lock out all the primary and secondary power sources.
2. Ensure fasteners and setscrews, particularly those used for mounting the fan, are tightened.
3. Inspect belt tension and pulley alignment.
4. Inspect motor wiring.
5. Ensure belt touches only the pulleys.
6. Ensure fan and any ductwork are clean and free of debris.
7. Inspect wheel-to-inlet clearance. The correct wheel-to-inlet clearance is critical to proper fan performance.
8. Restore power to the fan.

Start Up

Turn the fan on. In variable speed units, set the fan to its lowest speed and inspect for the following:

1. Direction of rotation.
2. Excessive vibration.
3. Unusual noise.
4. Bearing noise.
5. Improper belt alignment or tension (listen for squealing).
6. Improper motor amperage or voltage.

If a problem is discovered, immediately shut the fan off. Lock out all electrical power and check for the cause of the trouble. See Troubleshooting.

Inspection

Inspection of the fan should be conducted in the first **30 minutes**, **8 hour** and **24 hour** intervals of satisfactory operation. During the inspections, stop the fan and inspect as per the *Conditions Chart*.

30 Minute Interval

Inspect bolts, setscrews, and motor mounting bolts. Adjust and tighten as necessary.

8 Hour Interval

Inspect belt alignment and tension. Adjust and tighten as necessary.

24 Hour Interval

Inspect belt tension, bolts, setscrews, and motor mounting bolts. Adjust and tighten as necessary.

Maintenance

Establish a schedule for inspecting all parts of the fan. The frequency of inspection depends on the operating conditions and location of the fan.

Inspect fans exhausting corrosive or contaminated air within the first month of operation. Fans exhausting contaminated air (airborne particles) should be inspected every three months, or sooner. Regular inspections are recommended for fans exhausting non-contaminated air.

It is recommended the following inspection be conducted twice per year.

- Inspect bolts and setscrews for tightness. Tighten as necessary. Worn setscrews should be replaced immediately.
- Inspect belt wear and alignment. Replace worn belts with new belts and adjust alignment as needed. See Belt and Pulley Installation on page. 4.
- Inspect springs and rubber isolators for deterioration and replace as needed.
- Inspect for cleanliness. Clean exterior surfaces only. Removing dust and grease on motor housing assures proper motor cooling. Removing dirt from the wheel and housing prevents imbalance and damage.

Lubricants

M.K. Plastics uses petroleum lubricant in a lithium base. Other types should not be used unless the bearings and lines have been flushed clean. If another type of grease is used, it should be lithium-based grease conforming to NLGI grade 2 consistencies.

A NLGI grade 2 grease is a light viscosity, low-torque, and rust inhibiting lubricant that is water resistant. Its temperature range is from -30°F to +200°F and capable of intermittent highs of +250°F.

Motor Bearings

Motor bearings are pre-lubricated and sealed. Under normal conditions they will not require further maintenance for a period of 10 years. However, it is advisable to have your maintenance department remove and disassemble the motor, and lubricate the bearings after 3 years of operation in excessive heat and or in a contaminated air stream consisting of airborne particles.

Fan Bearings

RKW fans normally have permanently sealed flange-bearings that do not require greasing. However, some fans could have greasable pillow-block bearings. These bearings are lubricated through a grease fitting on the bearing and should be lubricated by the schedule, *Conditions Chart*.

Conditions Chart

RPM	Temperature	Fan Status	Greasing Interval
100	Up to 120°F	Clean	6 to 12 months
500	Up to 150°F	Clean	2 to 6 months
1000	Up to 210°F	Clean	2 weeks to 2 months
1500	Over 210°F	Clean	Weekly
Any Speed	Up to 150°F	Dirty	1 week to 1 month
Any Speed	Over 150°F	Dirty	Daily to 2 weeks
Any Speed	Any Temperature	Very Dirty	Daily to 2 weeks
Any Speed	Any Temperature	Extreme Conditions	Daily to 2 weeks

For best results, lubricate the bearings while the fan is in operation. Pump grease in slowly until a slight bead forms around the bearing seals. Excessive grease can burst seals resulting in high operating temperatures, thus reducing bearing life.

In the event the bearing cannot be seen, use no more than three injections with a hand-operated grease gun.

Motor Service

Should the motor prove defective within one-year period, contact *M.K. Plastics* directly, or your nearest motor service representative.

Changing Shaft Speed

All belt driven fans with motors up to and including 3 hp (182T max.) are equipped with variable pitch motor pulleys. To change the fan speed, perform the following:

1. Loosen setscrews on driver (motor) pulley and remove key, if equipped.
2. Turn the pulley rim to open or close the groove facing. If the pulley has multiple grooves, all must be adjusted to the same width.
3. After adjustment, inspect for proper belt tension and alignment.

Speed Reduction

Open the pulley in order that the belt rides deeper in the groove (smaller pitch diameter).

Speed Increase

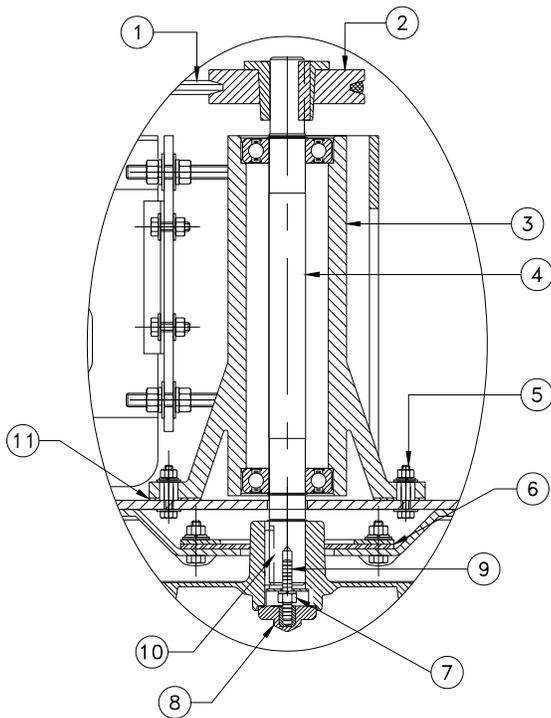
Close the pulley in order that the belt rides higher in the groove (larger pitch diameter). Ensure that the RPM limits of the fan and the horsepower limits of the motor are maintained, which can be read on the motor nameplate.

Pulley & Belt Replacement

1. Remove pulleys from their respective shafts.
2. Clean the motor and fan shafts.
3. Clean bores of pulleys and coat the bores with heavy oil.
4. Remove grease, rust, or burns from the pulleys and shafts.
5. Remove burrs from the shaft by sanding.
6. Place fan pulley on the fan shaft and motor pulley on its shaft. Damage to the pulleys can occur when excessive force is used in placing the pulleys on their respective shafts.
7. Tighten in place.
8. Install belts on pulleys and align as described in the *Belt and Pulley Installation* section.

Flange Bearing & Wheel Replacement

Please refer to Fig. 8 for the following procedures. The fan bearings are housed inside the flange bearing assembly, which includes the shaft. It is easier and quicker to replace the entire assembly, rather than the bearings themselves.



- | | |
|-----|----------------------------|
| 1. | V-belt |
| 2. | Motor Pulley |
| 3. | Flange-bearing assembly |
| 4. | Shaft |
| 5. | HEX screws, nuts & washers |
| 6. | Shaft seal |
| 7. | HEX nut & washers |
| 8. | Cap |
| 9. | Threaded stud |
| 10. | Wheel key |
| 11. | Neoprene gasket |

Fig. 8 – Flange Bearing Assembly

1. Remove the fan motor cover.
2. Remove the fan drive belt and pulley.
3. Unbolt and remove the motor plate, complete with the motor/flange-bearing and wheel assembly – see page 3. for further details. This will give you access to the wheel.
4. Remove by unscrewing the front protective cap, and then the nut, washers and threaded stud.
5. Remove the wheel from the shaft – a 2-jaw puller may be needed.
6. Remove the assembly hardware that holds the entire flange-bearing assembly to the motor support. The flange bearing assembly can now be removed, complete with the shaft.
7. Before replacing the assembly, make sure the shaft and keys are clean and smooth.
8. Re-attach the flange bearing assembly to the stand plate, but make sure the gaskets and seals are in good condition. Replace if necessary.
9. Inspect and clean the bore of the wheel. Gently slide the wheel onto the shaft after inserting the key, and re-install the threaded stud, nut and washers to the shaft, and tighten. Make sure the wheel hub is sitting well against the snap ring on the shaft. Re-install the cap and tighten well.
10. Re-attach all the pulleys and adjust the belt tension.
11. Test run and retighten all screws and bolts if necessary.

Troubleshooting

Problem and Potential Cause
<p>Low Capacity or Pressure</p> <ul style="list-style-type: none"> • Incorrect direction of rotation. Make sure the fan rotates in same direction as the arrows on the motor or drive belt assembly. • Poor fan inlet conditions. There should be a straight clear duct at the inlet. • Improper wheel alignment.
<p>Excessive Vibration and Noise</p> <ul style="list-style-type: none"> • Damaged or unbalanced wheel. • Belts too loose; worn or oily belts. • Speed too high. • Incorrect direction of rotation. Make sure the fan rotates in same direction as the arrows on the motor or drive belt assembly. • Bearings need lubrication or replacement. • Fan surge or incorrect inlet condition.
<p>Overheated Motor</p> <ul style="list-style-type: none"> • Motor improperly wired. • Incorrect direction of rotation. Make sure the fan rotates in same direction as the arrows on the motor or drive belt assembly. • Cooling air diverted or blocked. • Improper inlet clearance. • Incorrect fan RPM. • Incorrect voltage.
<p>Overheated Bearings</p> <ul style="list-style-type: none"> • Improper bearing lubrication. • Excessive belt tension.

Parts List

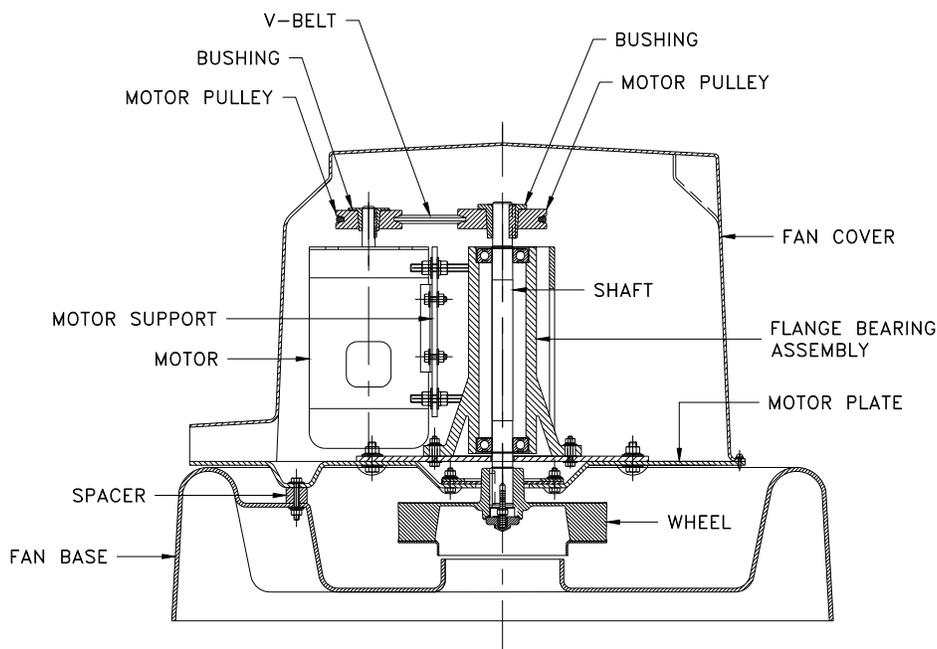


Fig. 9 – RKW Fan (typical)