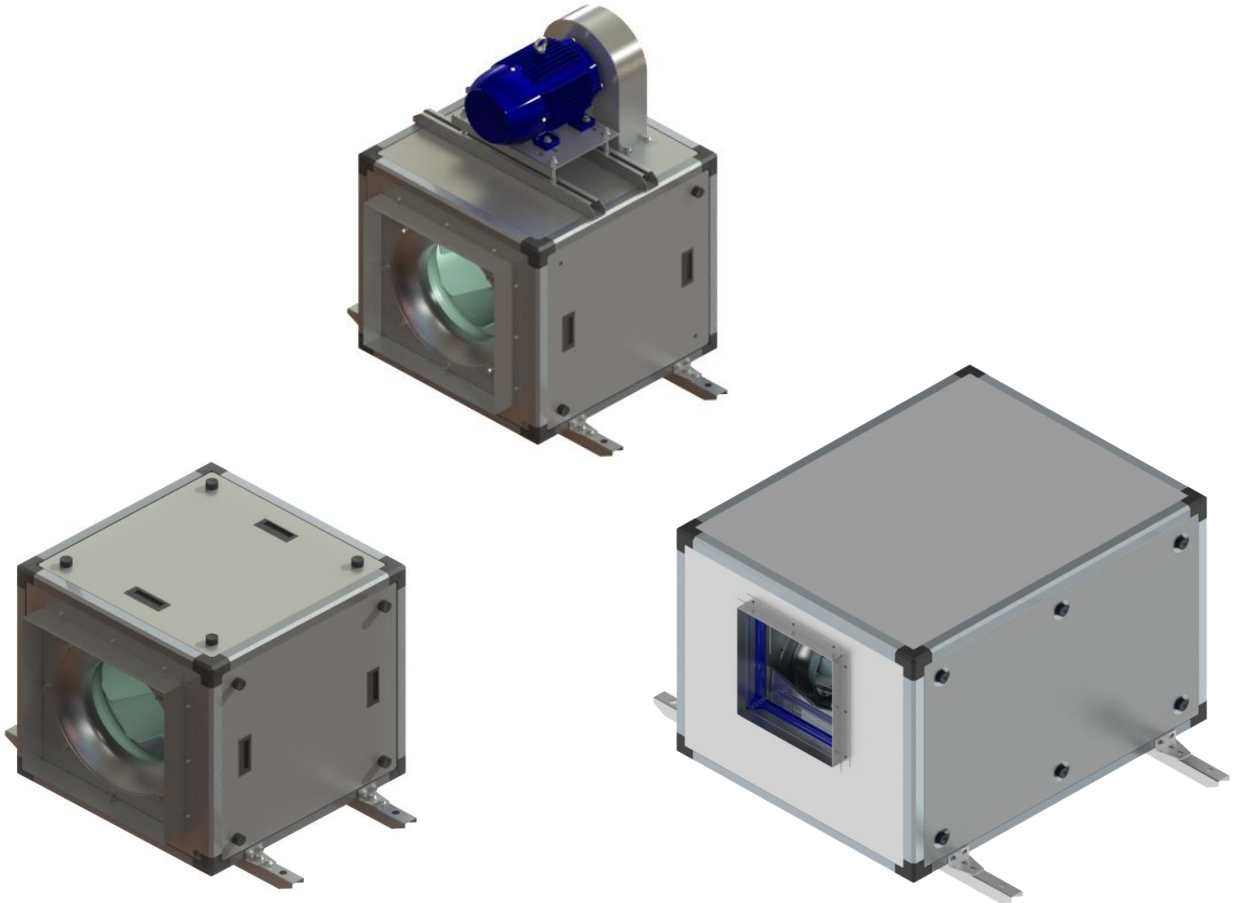
KRUGER

General Instructions
CFC CFK Series



IGB055.E0/2105

KRUGER

1. INTRODUCTION

DO NOT INSTALL, USE OR OPERATE THIS EQUIPMENT UNTIL THIS MANUAL HAS BEEN READ AND UNDERSTOOD. READ AND SAVE THESE INSTRUCTIONS FOR FUTURE USE.

It is the responsibility of the purchaser to assure that the installation and maintenance of this equipment is handled by qualified personnel experienced in such work and equipment.

Contact your local representative should you need further information.

SHIPMENT AND RECEIVING:

Prior to shipment, all fans have been thoroughly inspected and tested.

All equipment shipped from KRUGER is skidded or crated to fully comply with trucking requirements. Inspect all shipments carefully for damage. **THE RECEIVER MUST NOTE ANY DAMAGE ON THE CARRIER'S BILL OF LADING AND FILE A CLAIM IMMEDIATELY WITH THE FREIGHT COMPANY, IN THE CASE OF ANY DAMAGE.** Keep a record of all equipment received, including inspection details and date of receipt, because of the possibility of partial shipments.

If you receive damaged goods, contact your KRUGER representative for repair or replacement service.

HANDLING:

Handle your equipment with caution. Some fans are provided with lifting lugs or holes for easy handling. Others must be handled using nylon straps that protect the fan's coating and housing. Spreader bars should be used when lifting large parts.

Fans should be lifted by using straps around the fan housing only. **DO NOT LIFT FANS BY THE MOTOR, BASE, WHEEL, OR FLANGES.**

STORAGE:

If fans are stored for any length of time, they should be stored in a clean, dry location to prevent rust and corrosion. No initial lubrication is required. Motors have been pre-lubricated by motor manufacturer and fan bearings by KRUGER as best as possible. Cover the fan inlet and outlet and keep motors dry and clean.

For extended storage, motor shafts and bearings should be rotated monthly. If stored greater than 6 months, bearing grease in motor and fan should be purged and replaced with compatible grease. Re-check belts for prope tension. Storage records should be kept to assure proper maintenance. The factory can advise warranty centers to provide motor and bearing service if needed.

2. INSTALLATION

Supports for suspended fans must be crossbraced for live load support to prevent side sway.

1. CAUTION! This fan contains rotating parts and requires special service. Appropriate safety precautions should be taken during installation, operation and maintenance.

2. WARNING! Do not install or operate this fan in an environment or atmosphere where combustible or flammable materials, gasses or fumes are present, unless it was specifically designed and manufactured for use in that environment. Explosion or fire can result. Explosive, corrosive, high temperature, etc. conditions may require special construction, inspection and maintenance. It is necessary to observe the fan manufacturer's recommendations and limitation concerning the type of material to be handled by and its application in special conditions.

3. CAUTION! All electrical work must be done in accordance with local and/or national electrical codes as applicable. If you are unfamiliar with methods of installing electrical wiring, secure the services of a qualified electrician.

4. WARNING! This product must be grounded.

5. DANGER! Make sure power is turned off and locked in the OFF position at the service entrance before installing, wiring or servicing fan.

6. CAUTION! Before wiring the motor, check the supply voltage against the motor nameplate voltage. High or low voltage can damage the motor and void the motor warranty.

7. WARNING! Be sure to keep all wiring clear of rotating or moving parts.

8. WARNING! Before starting the fan, turn the wheel to assure it rotates freely. If needed, adjust the wheel/shaft/bearing/motor position as required to achieve necessary clearances.

9. CAUTION! On belt drive units, assure belts are tensioned and aligned properly.(See Maintenance section)

10. WARNING! Check all setscrews and keys. Tighten as necessary prior to fan startup.

11. Due to the general nature of its applications, the basic air mover is available with protective guards and/or other devices for required operating safety as with most installations of rotating machinery. Before operating the basic unit in any of its applications determine requirements for such guards and/or devices needed for protection against accidental contact with moving parts or against injury to nearby personnel or critical equipmentdue to accidental rupture of fast moving parts.

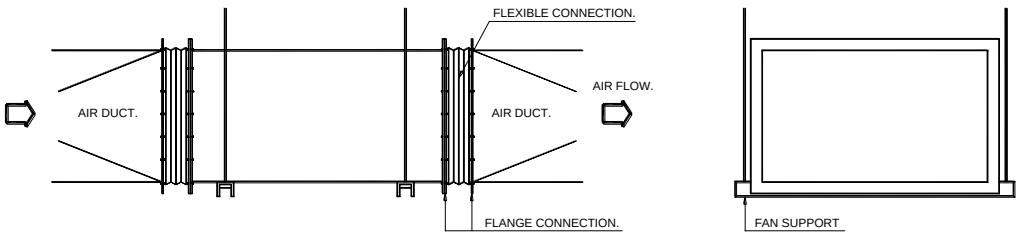


Fig.1

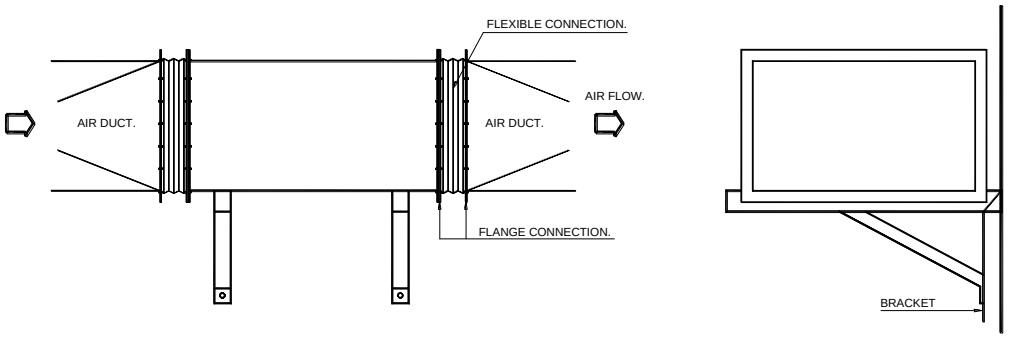


Fig.2

3. START-UP

Lock out the power source.

Tighten all bolts and setscrews securely and, on belt drive fans, check sheave alignment and belt tension. Tighten if necessary. **NOTE THAT ALL BOLTS, SETSCREWS AND BELTS SHOULD BE TIGHTENED AFTER TWO DAYS OF INITIAL OPERATION.**

Clearance should be checked all around between wheel and the housing before starting up. The wheel should not strike the housing.

No initial lubrication is required. Motors have been pre-lubricated by motor manufacturer and fan bearings by KRUGER.

Arrows to show direction of rotation and airflow are attached to the fan housings.

After the electrical connections are completed, apply just enough power to start the impeller as indicated by the directional arrows on the unit. If the impeller is turning the wrong direction, it will not deliver rated airflow and the motor connections must be altered to correct rotation.

Lock out the power source before the installation of all accessories.

Fan electrical power can now be applied and special attention should be given to determine if motor is working properly. At this time, with air system in full operation, with guards attached, it is well for the electrician to measure the operating amperage of the motor and compare with the nameplate rating to determine that the motor is operating under safe load conditions.

The fan should not need balancing, as it was balanced at the factory to meet stringent vibration levels before shipment. However, there are several things that may cause vibration, such as rough handling in shipment and erection, weak foundations, and alignments.

4. MAINTENANCE

1. Before performing any maintenance on the fan, be sure power is turned off and locked in the OFF position at the service entrance before servicing the fan.

2. Ventilators should be carefully checked at least once a year. For critical or rugged applications, a routine check every two or three months is suggested.

3. All motors supplied with KRUGER ventilators carry a one-year warranty from date of shipment. For repairs within the warranty period, the motor must be taken to the motor manufacturer's authorized service dealer. Contact your representative for additional warranty details.

4. A periodic motor check should consist of spinning the motor shaft with the power off to be sure the freely and smoothly. The belt on belt driven units should be removed from the motor sheave.

5. When removing or installing a belt, do not force the belt over the sheave. Loosen the motor mount so that the belt can be easily slipped over the sheave.

6. The belt on belt driven units should be removed and carefully checked for radial cracks, ply separation or irregular wear. A small irregularity in the contact surface of the belt will result in noisy operation. If any of these defects are apparent, the belt should be replaced. Check the sheaves also for chipping, dents or rough surfaces, which could damage the belt.

7. The correct belt tension is important. If the belt is too tight it will result in excess bearing pressure on the motor bearings and shaft pillow block and may also overload the motor. If the belt is too loose it will result in slippage, which will quickly burn out belts. A belt should feel "live" when thumped, approximately ¼" belt deflection when subject to finger pressure (3-5 lb.) at midpoint between sheaves.

8. The belt alignment should also be checked to be sure the belt is running perpendicular to the rotating shafts. Motor and drive shafts must be parallel. Improper alignments will result in excessive belt wear.

9. Check sheave set screws to ensure tightness. Proper keys must be in keyways.

10. Do not adjust fan RPM. If sheaves are replaced, use only sheaves of identical size and type.

11. If unit is to be left idle for an extended period, it is recommended that belts be removed and stored in a cool, dry place to avoid premature belt failure.

12. The standard pillow block bearings on belt driven ventilators are factory lubricated and are provided with external grease fittings. Relubrication annually or more frequently, if required, is recommended.

13. During the first few months of operation, it is recommended that the setscrews be checked to assure they are tight.

14. The rotating wheel requires particular attention in most applications since materials in the air being handled can build up on the blades to cause destructive vibration; and may also corrode and/or erode the blade metal to weaken the structure of the impeller. Regular inspection and corrective action at intervals determined by the severity of each application are essential to good service life.

BEARINGS AND LUBRICATION:

All KRUGER belt drive fan bearings are heavy duty, self-aligning ball type and are relubricable for continuous service.

Selection of the correct bearing grease and greasing intervals depends on several things. Extreme high or low temperatures, dirty or damp surrounds, and vibration exceeding 1 or 2 mils are all things that will require more frequent greasing or special greases. For standard service, use a lithium base grease that conforms to NLGI grade 2 consistency.

The motor bearings and the fan bearings on the belt drive fans should be greased at regular intervals. Motor manufacturer's greasing instructions and recommendations should be followed closely. Avoid the use of a pressure greasing system which tends to fill the bearing chamber completely. Do not over grease. Use only 1 or 2 shots with a hand gun in most cases. Maximum hand gun rating 40 P.S.I. Rotate bearings during lubrication where good safety practice permits.
NOTE: On motors with non-regreasable sealed bearings, no lubrication is required for the life of the bearings.

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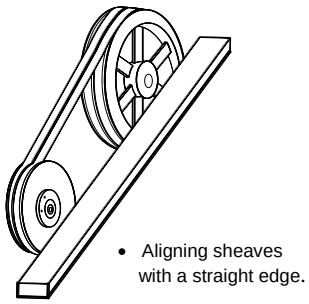
BEARING REPLACEMENT:

Fan bearings on belt drive fans should not need to be replaced for many years if the above recommendations are strictly adhered to. However, use the following procedure when bearing replacement is necessary:

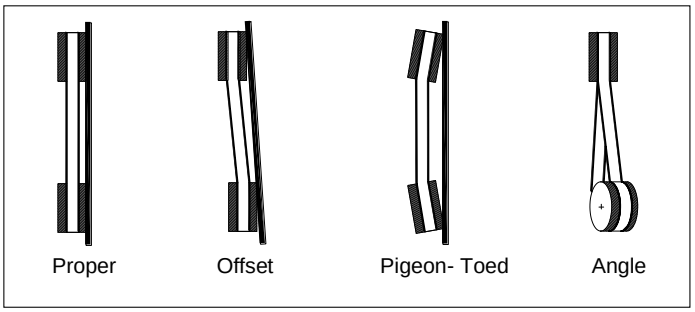
1. Gain access to the fan bearings. Remove the bearing cover, if any.
2. Loosen the belts by shifting the motor.
3. Remove the impeller and disconnect the remote lube tubes (if applicable).
4. Measure the location of the bearing to the impeller end of the shaft and the bearing spacing.
5. Remove the shaft and bearing assembly. Note the position of the bearings' shims (if applicable).
6. Loosen all bearing/shaft setscrews or other locking device.
7. Remove bearings (may have to be pressed off the shaft).
8. Polish the shaft with fine emery paper (240 Grit or finer) and file the setscrew dimples flat.
9. Install new bearings on the shaft, making sure that the collars are together, (i.e., facing each other on the shaft). Lightly seat one setscrew or eccentric locking collar on each bearing to hold in the approximate marked position.
10. Mount the shaft/bearing assembly in the fan, with bolts. Do not tighten yet. Just snug up. Loosen the setscrew.
11. Center the shaft in the housing (both ends) as closely as possible. (The fan impeller may need to be temporarily installed to get its clearances equal).
12. Tighten the bearing mounting bolts.
13. Reinstall the lube tubes (if applicable).
14. Install bearing cover, impeller, and belts, and adjust the motor to get proper belt tension. Also, make sure that the sheaves are properly aligned.
15. If a new shaft is supplied, then ignore items #6 through #8.

V-BELT DRIVE INSTALLATION

- Remove the protective coating from the end of the fan shaft and assure that it is free of nicks and burrs.
- Check fan and motor shafts for parallel and angular alignment.
- Slide sheaves on shafts – do not drive sheaves on as this may result in bearing damage.
- Align fan and motor sheaves with a straight-edge or string and tighten.
- Place belts over sheaves. Do not pry or force belts, as this could result in damage to the cords in the belts.
- Adjust the tension until the belts appear snug. Run the unit for a few minutes (see section on unit start-up) and allow the belts to "set" properly.
- Switch off the fan, adjust the belt tension by moving the motor base. When in operation, the tight side of the belts should be in a straight line from sheave to sheave with a slight bow on the slack side.



- Aligning sheaves with a straight edge.



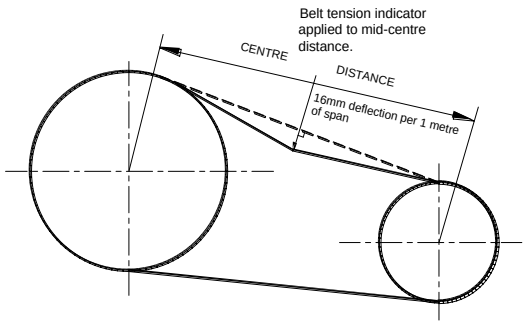
BELT TENSION

Proper belt tension is important for long belt life. Too much tension puts excessive loads on the belts and the bearings, reducing the lives of both components. Not enough tension allows belt slippage, which generates heat and drastically reduces the life of the belt.

Belt tensioning gauges can be used to determine whether the belts are tensioned properly. A chart that comes with the gauge specifies a range of force required to deflect the belts a given amount based on the centre distance of the sheaves and the belt cross section. The belts are properly tensioned when the force required to deflect the belt, the specified amount falls within this range.

If a belt tensioning gauge is not available, re-tension the belts just tight enough so that they do not squeal when starting the fan. A short "chirp" is acceptable; a squeal lasting several seconds or longer is not acceptable.

Before starting the fan after tensioning the belts, recheck the alignment and realign the sheaves if necessary. New belts may stretch a little at first, so recheck belt tension after a few days of operation.



Tensioning Forces

Belt Type	Belt tension setting standard		
	Small Pulley Diameter (mm)	Standard (kg)	
		Initial new belt	Run in used belt
SPZ	Less than 71	20	15
	72 to 90	25	20
	91 to 125	36	25
SPA	Less than 100	36	25
	101 to 140	41	31
	141 to 200	51	41
SPB	Less than 160	66	51
	161 to 224	71	56
	225 to 355	92	71
SPC	Less than 250	102	82
	251 to 355	143	112
	356 to 560	183	143

BEARING LUBRICATION

- Fan equipped with deep grooved ball bearing inserted in rubber damper has sufficient high grade grease sealed in at the time of manufacture, there is no need for replenishment while in use at normal speed & normal condition.

- Fan equipped with deep grooved ball bearing inserted in pillow block also has sufficient high grade grease sealed in at the time of manufacture, there is no need for replenishment while in use at normal speed & normal condition. The pillow block housing has lubrication point suitable for lubricating when the bearing operating temperature exceeding its nominal of 70 degree, or the bearing is used in very dusty or damp or high contamination environment.

- Fan equipped with spherical roller bearings and CARB toroidal roller bearings, assembled in plummer block housings has lubrication point suitable for lubricating.

- Experience from bearing manufacturer indicates a first relubrication exercised after a few days of operation is very beneficial to all rollers bearings and may even be a prerequisite if the expected relubrication interval is to be attained when operating speeds are high. For this first relubrication, half of the normal quantity recommended for regular relubrication is sufficient.

- Type of grease used for relubrication should be the same as that used during first fill (mounting). Never mix greases if it is not known whether they are compatible.

- Referring to manufacturers' instructions, the amount of grease required for relubrication can be determined from

$$Gp = 0.005\ D\ B$$

Where

Gp = Grease quantity for periodic relubrication, g
D = Bearing outside diameter, mm
B = Bearing width, mm

The relubricating interval may be determined from the following diagram. At bearing temperatures above 708˚C, relubricating interval obtained from the diagram should be halved for every 158˚C increase.

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

Type of bearing	Type of grease	Temperature
FYH Deep Groove Ball Bearing	FYH Lithium Bearing Grease	Normal
SKF Deep Groove Ball Bearing	SKF Grease LGMT 3	Normal
SKF Spheriodical Roller Bearing	SKF Grease LGMT 3	Normal / High
SKF Carb Roller Bearing		

5. REPAIR PARTS

1. Belts – use only belts of the same type and size furnished.

2. Bearings – replacement adapter bearing units are available from trade channels for installation in pillow block housings when required.

3. Fan Blades – Repair of individual fan blades or impeller assemblies is not recommended. Contact factory with order/tag information for replacement of impeller.

4. Misc. Parts – Not available from local trade channels should be returned for repair or replacement. Be sure to obtain return tags or authorization before shipment.

5. Electric Motors – Repair or replacement of motors is normally performed by a repair station authorized by the manufacturer. Contact your representative or the factory for locations nearest to you. **DO NOT** ship motor to the factory without specific authorization.

7. FAN TROUBLE-SHOOTING CHART

PROBLEM	POSSIBLE CAUSES
Excessive Vibration	Impeller loose on shaft
	Belts loose or too tight
	Out of balance impeller
	Excessive buildup of dirt/dust on impeller
	Bent shaft
	Weak mounting base for fan
	Fan mounting bolts loose
	Loose or worn bearings
	Bearing or drive misalignment
	Mismatched belts
	Structures not crossbraced (wall fans)
	Curb not flat and level
Excessive Horsepower	Static pressure higher than design
	Wheel or impeller rotating in wrong direction
	Fan speed higher than design
Too Little Air	Restricted fan inlet or outlet
	Filters are dirty or clogged
	Impeller rotating in the wrong direction
	System is more restrictive (more static pressure) than expected
	Fan speed lower than design
	Inlet or Outlet screens clogged
Too Much Air	Filters not in place
	Fan speed higher than design
	System is less restrictive (less static pressure) than expected
Fan Does Not Operate	Wrong voltage
	Electricity turned off or note wired properly
	Loose pulleys
	Blown fuses
	Overload protector has broken circuit
	Broken belts
Excessive Noise	Impeller loose
	Bearing or drive misalignment
	Accumulation of material on impeller
	Worn or corroded impeller
	Impeller out of balance
	Impeller hitting housing
	Bent shaft
	Defective or bad bearings
	Bearings need lubrication
	Loose bearing bolts
	Loose or worn bearings
	Mismatched belts
	Belts too loose or too tight
	Belts oily or dirty
	Belts worn
	Loose fan mounting bolts
	Rattle of components in high velocity airstream
	Electrical noise
	Noise from high velocity air system
	Vibrating parts not isolated from building
	Vibrating duct work

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