

General Instructions

(Induced Jet Fan)

IJA, IJB, IJC II





1 INTRODUCTION

Kruger Axial (IJA, IJB) and Cased Centrifugal (IJC II) Induced Jet Fan is special design fan to achieve high impulse throw of discharging air. IJA & IJB fan consists of an attenuator at the suction and discharge side, pre-designed inlet & outlet guide vane. Kruger Induced Jet Fans are also tested and certified by TUV SUB PSB Pte Ltd in compliance with the requirement of Standard EN 12101-3: 2015 for the following temperature ratings;

Class F _r 250	(250°C for 120 mins)
Class F300	(300°C for 60 mins)
Class F _r 300	(300°C for 120 mins)
Class F400	(400°C for 120 mins)

Kruger Induced Jet Fans has been manufactured to the rigorous standards of production and quality control in accordance with the International Quality Standards ISO 9001. All components have been checked and tested at the end of the manufacturing process.

The purpose of this manual is to aid the user in the proper storage, installation, operation and maintenance procedure to ensure maximum equipment life and trouble free operation. These instructions are intended to supplement good general practices and are not intended to cover detailed instruction procedures.

Handling and maintenance should always be performed by experienced and trained personnel or technician.

2 RECEIVING, HANDLING AND STORAGE

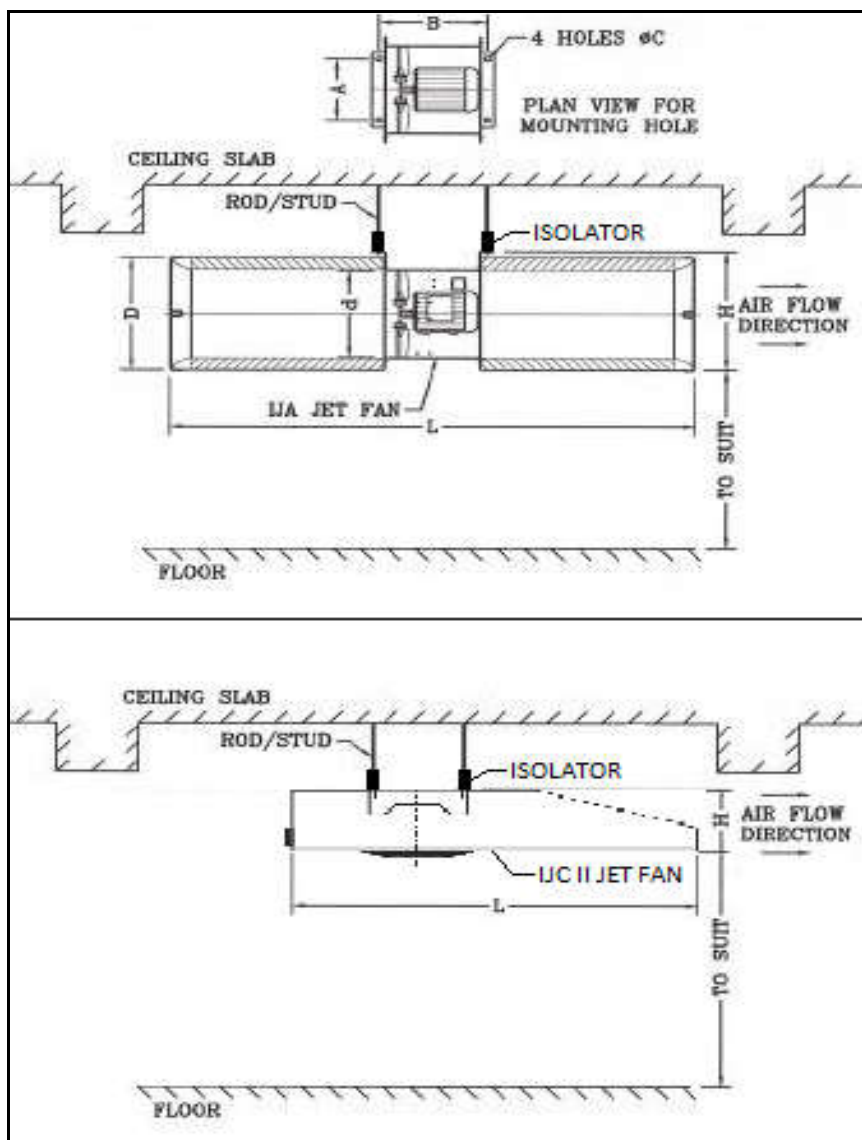
Rough handling during shipment and improper storage can cause damage that is not noticeable until the fan is in operation. This can be avoided with proper storage and handling techniques.

Fan should be hoisted with slings placed around the fan housing. Touch up the scratch coated surfaces during lifting, to prevent corrosion to occur at this area. Store the fan in a clean and dry place, preferably indoor to ensure fan shaft, bearing and fan casing are protected against dust and corrosion. Do not store the fan in a location where it will be subjected to vibration. This can cause the internal surface to rub against each other and damage the bearings.

3 INSTALLATION

- 1) Induced Jet fans are shipped mostly assembled, however final checking and adjustments are required prior to hanging the fans to the ceiling.
- 2) Induced Jet fans should be installed close to the ceiling but below the beam and free any obstruction at the inlet and discharge.
- 3) Induced Jet fans shall be installed to its proper location and position in accordance to the final drawing used in the CFD simulation.
- 4) All electrical work must be done in accordance with all applicable electrical codes, by a qualified electrician.
- 5) Connect the power termination in accordance to the motor nameplate and supply voltage. Wiring diagram is shown in Section 3.2.
- 6) Ensure that the fan impeller rotates freely.

3.1 Installation Method

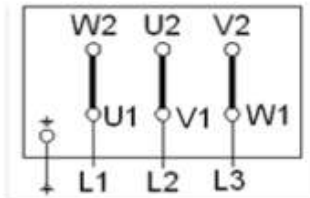


3.2 Wiring Diagram

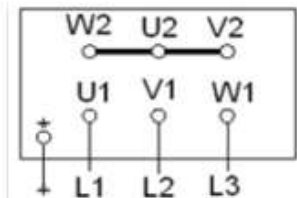
Jet fans are installed with a single speed or 2 speeds motor.

Single-speed motors

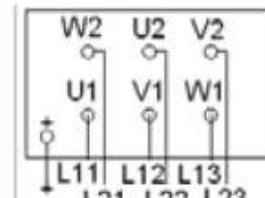
Three-phase motors with cage rotor



Delta Connection

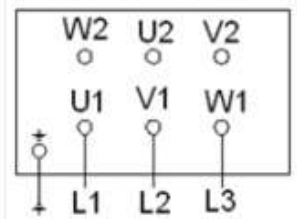


Star Connection

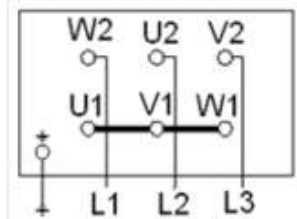


Connection to Star-Delta Starter

Multi-speed motors in Dahlander connection (Tapped winding)



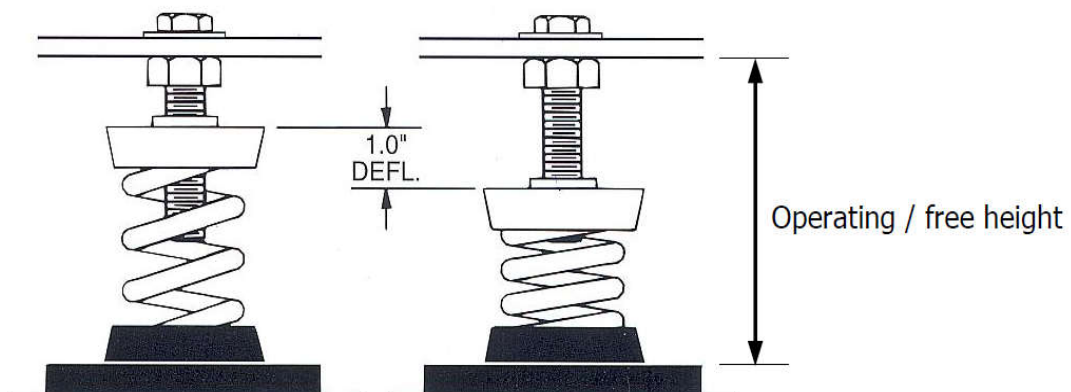
Low Speed



High Speed

3.3 Vibration Isolator Installation

- 1) Select proper isolator.
(Spring Isolator can be selected from Kruger selection program or isolator catalogue)
- 2) Adjust deflection based on the selected isolator.
- 3) Maintain the operating / free height at the same level through step 2.
(The entire assembly must be levelled)
- 4) Check all the deflection and operating / free height is properly maintained.





4 START-UP

4.1 Start-up Checklist

Before putting any fan into the initial operation the manufacturer's instruction must be followed. Complete the following checklist to make sure the fan is ready to run.

- Lock out the primary and all secondary power sources.
- Make sure that all fasteners and screws are properly tighten.
- Spin impeller to see whether it rotates freely and is not grossly out of balance.
- Inspect impeller for correct rotation for the fan design.
- Make sure the inlet (and outlet for IJA & IJB only) protection nets are properly installed & fastened.
- Switch on the electrical supply and allow the fan to reach full speed.
- Check carefully for:
 1. Direction of rotation
 2. Excessive vibration
 3. Unusual noise
 4. Proper amperage and voltage values

If any problem is arises, SWITCH OFF IMMEDIATELY. Lock out electrical supply, check carefully for the cause of trouble and correct as necessary.

4.2 Start-Up

The fan may now be put into operation but during the first 8 hrs of running, it should be periodically observed and checked for excessive vibration and noise. Checks should be made of motor input current and motor & bearing temperature to ensure that they do not exceed manufacturer's recommendation. After 8 hrs of operation, the fan should be shut down to check the following items: -

1. Hanger, screws and bolts
2. Impeller condition
3. Motor alignment
4. Motor temperature



5 TROUBLE-SHOOTING

5.1 Fan is developing or emitting abnormal or excessive noise

Problem	Possible Cause	Remedy
Motor	1) Lean-in cable not secure 2) Noisy motor bearings 3) Single phasing a 3 phase motor 4) Low voltage 5) Cooling fan striking shroud 6) Electromagnetic fault in motor 7) AC hum in motor or relay 8) Starting relay chatter	1) Fasten the cable properly 2) Replace bearings 3) Check power supply 4) Check power supply 5) Check motor assembly 6-8) Replace motor
Fan Components	1) Impeller loose on shaft 2) Impeller unbalance 3) Impeller not in center 4) Blade broken/damaged IJC II Only: 5) Impeller in contact with inlet cone 6) Impurities or foreign material inside fan housing	1) Tighten impeller 2) Balance impeller 3) Adjust impeller to center 4) Replace blades IJC II Only: 5) Correct inlet cone position 6) Clean inside fan and impeller

5.2 Fan is vibrating excessively

Problem	Possible Cause	Remedy
Impeller	1) Impeller unbalanced due to deposits (dirt or grease) 2) Impeller unbalanced due to wear	1) Clean impeller, rebalance the fan 2) Replace impeller



5.3 Required thrust not achieved

Problem	Possible Cause	Remedy
Impeller	1) Impeller/inlet dirty or clogged 2) Improper running clearance / inlet cone to impeller fit 3) Impeller installed or running at wrong direction 4) Incorrect speed of impeller because of: i) Wrong motor speed ii) Wrong calibration of inverter IJA & IJB Only: 5) Improper blade setting	1) Clean the impeller or inlet 2) Change to correct clearance 3) Change to correct rotation by changing poles of electrical feed line to motor 4) Change to correct speed: i) Change motor ii) Adjust inverter calibration IJA & IJB Only: 5) Adjust to correct angle
System	1) Obstructions near fan outlet or inlet	1) Clear obstruction / review CFD simulation fan positioning

5.4 Fan does not start or operate

Problem	Possible Cause	Remedy
Electrical Supply	1) Blown fuses 2) Electricity turned off 3) Wrong voltage 4) Failure of one or two phases 5) Low voltage, excessive line drop or inadequate wire size	1) Check fuses/circuit breakers 2) Check for switched off or disconnected 3) Check for correct power supply 4) Check for correct power supply 5) Check for correct wire size
Motor	1) Motor not correctly connected 2) Load inertia too large for motor 3) Motor protection unit or switch are stopping as temperature are too high 4) Motor too small and overload protector has broken circuit	1) Connect the motor according to the motor label 2) Change motor 3) Reduce temperatures, check and change insulation class, increase motor rating 4) Change motor



5.5 High power absorption

Problem	Possible Cause	Remedy
Impeller	1) Blade angle/wheel rotation not set properly	1) Adjust blade angle/wheel rotation
Motor	1) Faults in the motor windings 2) Motor power supply voltage lower than the value indicated on the identification plate	1) Replace motor 2) Check with motor supplier
Gas Density	1) Calculated horsepower requirements based on lower air density (e.g. High temperature) but actual air density is higher (e.g. Cold start up)	1) Check selection

6 ROUTINE MAINTENANCE

Maintenance should always be performed by experienced and trained personnel. Do not attempt any maintenance on a fan unless the electrical supply has been locked out or tagged out and the impeller has been secured.

Under normal circumstances, handling clean air, the system should require cleaning only about a Year. However, the fan and system should be checked at regular intervals to detect any unusual accumulation.

The fan impeller should be specially checked for build-up of material or dirt which may cause an Imbalance with resulting undue wear on bearings and belt drives. A regular maintenance program should be established as needed to prevent material build-up.

Periodic inspection of the rotating assembly must be made to detect any indication of weakening of the rotor because of corrosion, erosion, or metal fatigue.

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