

KRUGER

Agriculture Fan

KRUGER





Why KRUGER?

KRUGER has been a leading innovator and manufacturer of residential, commercial and industrial fan application solutions across Asia since 1985. Today with a direct presence in over 18 regions throughout Asia; world class R&D and manufacturing facilities; KRUGER are able to offer their customers unparalleled service and support at a local level. Our customers place their trust in KRUGER.

What is KRUGER Agriculture Fan?

The Kruger Agriculture Fan is designed to provide adequate air movement and ventilation for optimal environmental conditions in greenhouses.

Why use KRUGER Agriculture Fan?

GREENHOUSE

Ventilation in a greenhouse consists of replacing of the hot air inside the greenhouse with a high volume of cooler air from the outside to lower the temperature inside the greenhouse, at the same time changing the humidity in it.

There are two ventilation systems that can be adopted:

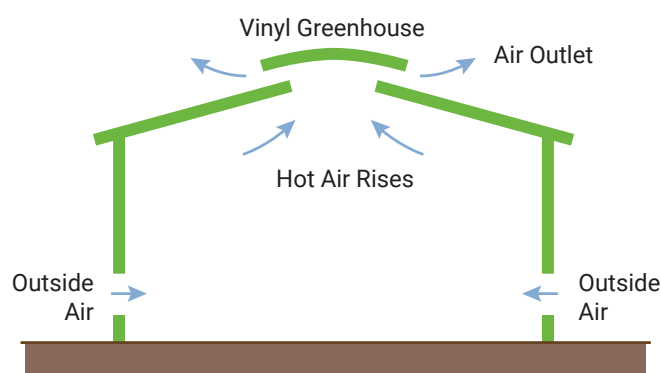


Figure 1. Natural Ventilation

1. NATURAL VENTILATION (in Greenhouse)

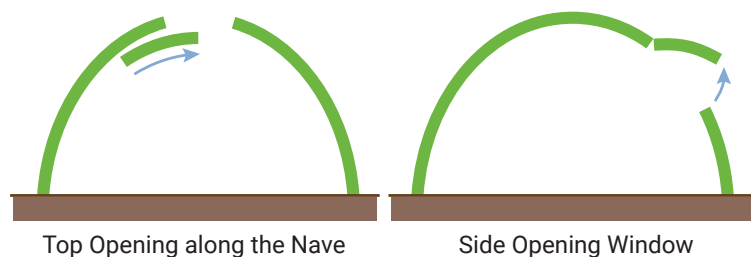


Figure 2. Local with Exfiltrations

Opening of at least 15-20% of the covered area, to obtain good air quality.

Common problem with natural ventilation

1. Difficult to know the air change achieved.
2. Impossible to regulate the speed of the airflow on the plants.

2. SIMPLE MECHANICAL VENTILATION

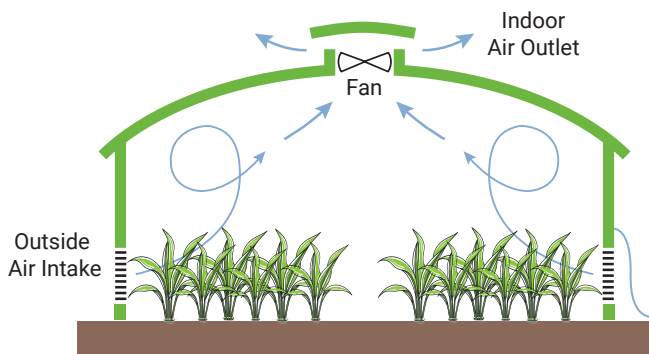


Figure 3. Simple Mechanical Ventilation (Wide Warehouses)

In agriculture work, it is important to be able to react quickly at any time to cope with the instantaneous change in weather. Therefore, an automatic system equipped with rain and wind sensors will help to provide a quick response in this case.

Mechanical ventilation consists of renewing the air with the installation of agriculture fans placed on the roof or on the upper part (at one side) of the building, depending on the building's width. The outside air intakes are normally located at the lower part of the wall opposite the fans, or on both sides of the wall if the discharge is central (see Figure 3.)

The air change per hour “N” that is assumed between 40 to 60, will indicate the necessary airflow.

$$Q \text{ total (m}^3/\text{h)} = \text{room volume} \times N$$

And the number of fans “n” will be:

$$n = Q \text{ total} / q \text{ (flow of a fan)}$$

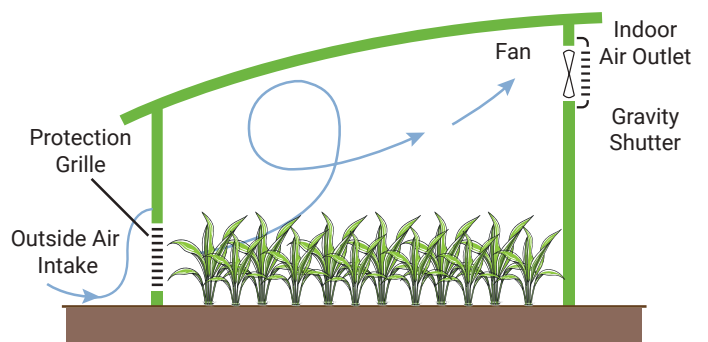


Figure 4. Simple Mechanical Ventilation (Narrow Buildings)

We call it “**simple**”, as it is a very straightforward system where the air is transferred from the outside, “sweeping” the interior of the building before being exhausted by the fan(s). In principle, the minimum internal temperature is to be expected with this system is at least the same as the outside air temperature.

Fans shall be distributed along the length of the building, and gravity louvers shall be placed on the roof or one side, spaced 7 to 10 meters apart. In the case of fans installed at the side of the building, gravity shutters should be installed to avoid backdraft air when the equipment is stopped.

The air inlets will be protected, towards the outside with an anti-bird screen or grilles. Deflectors should be provided towards the interior to avoid incoming outside air directly blowing on the nearby plants.

The electrical connection of the fans will be done through speed regulators that will allow obtaining different ventilation modes according to the needs.



FARMS

Emissions (gases) produced by animals in an enclosure are detrimental to the health of the animals.

To maintain optimal environmental conditions, it is necessary to extract these gases to ensure they are not exceeding the indicated levels, by replacing them with new air.

VENTILATION SYSTEM

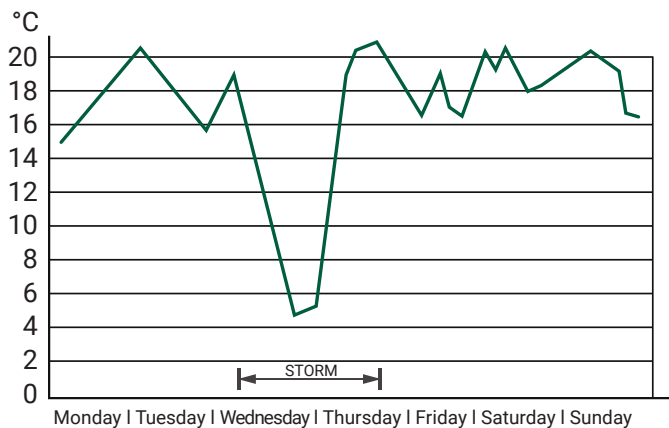


Figure 5.

2. MECHANIC VENTILATION

TWO Mechanical Ventilation Principles

- The clean air from the top of the farm so that it undergoes certain heating before reaching the animals.
- The air extraction from the bottom of the farm, after passing over the animal droppings and avoiding the air from spreading throughout the enclosure.

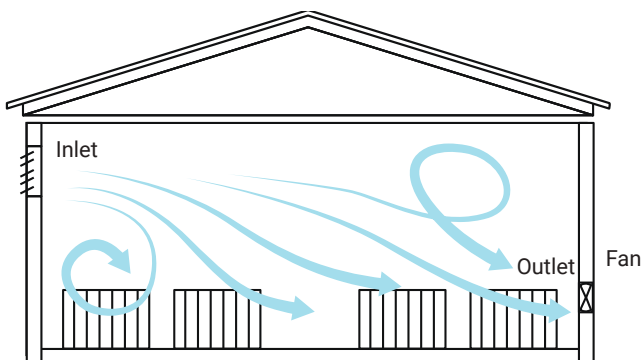


Figure 6. Vacuum Ventilation

- Very low air speed, at the level of the animals.
- Easier to blow air into the premises, preheated in winter when there is a flat ceiling.
- Better evacuation of harmful gases.
- Generally lower installation cost.
- Vacuum ventilation can be performed without the need to install ducts.

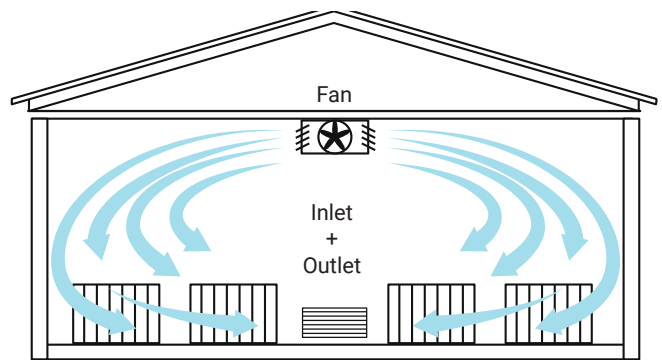


Figure 7. Overpressure Ventilation

- Better ventilation air control.
- Independent from external environmental conditions, mainly with respect to the prevailing winds in the region.
- Require additional treatment on the ventilated air (heating, filtering, etc.).
- Easier to ensure a good distribution of air inside the enclosure.

Ventilation in Winter: ventilation must be kept to a minimum to ensure healthy conditions in the farm.

Ventilation in Summer: to evacuate excess heat, significant amounts of air must be extracted and renewed to remove air that is harmful to animals.

1. NATURAL VENTILATION

As shown in Figure 5, it is difficult to respond quickly to sudden changes in temperature, due to the fact that with natural ventilation it is not possible to control the air ventilation rate and regulate the farm's interior environment. Therefore mechanical ventilation (with fan) will be taken into consideration in this case.

Figure 5 is an example of a possible variation in the interior temperature of a poultry farm with natural ventilation, not automatically controlled, caused by a sudden weather disturbance.



Tables 1 and 2 Ventilation requirement for various animals

Type of Animal	Optimal Temperature Zones with Calm Air	Sensible Heat Output in W per Animal	Release of Water Vapor in g/h per Animal	Desirable Ventilation Flow in m³/h	
				Winter	Summer
Milk Cow	-10 to + 30°C	780	680	per animal	
				120-160	400-800
Veal	8 to 16°C (first weeks)	50 Kg 120	120	per 100 kg of live weight	
		150 Kg 250		40-60	100-120
Calf	-10 to +25°C	300 Kg 350	300	40-60	100-120
		400 Kg 380			
Sheep + Lamb	8 to +20°C	85-90/ Sheep	60	100	300-400
Pregnant Sheep	-7 to +20°C	40-50/ 25 Kg Lamb	30		
Newborn Piglet	30 to 40°C	3.8	12	40-60	100-120
Cow	21 to 28°C	10 Kg 25	35		
Weaned 4 weeks	20 to 25°C	20 Kg 50	60		
Finishing Sow	15 to 25°C	90 Kg 125	150		
Pregnant Sow	12 to 20°C	150 Kg 220	180		
Rabbit (less than 8 days)	30 to 32°C	2 Kg 6.2	4.6	per kg of live weight	
Fattening or Adult Rabbit	12 to 25°C	3 Kg 9.3	7.2	-	2-3
Laying Hen	6 to 24°C	1.8 Kg 9.2	3.3	1.5	6-9
		2.3 Kg 11	3.9		
Chicken	"35°C 13 to 20°C"	0.04 Kg 0.35	0.21	0.7	3-5
Chick		0.45 Kg 4.3	1.5		
+ 4 weeks		1.22 Kg 7	2.5		

Table. 1

Species	Age in Weeks	Ambient Temperature °C	Moisture Percentage	Ventilation m³/h	Illumination	
					Duration	Intensity/m²
Dove	Meat Production Reproducer	12-16	60-70%	2 to 3 m³/h/Kg live weight	12-15 h	2 to 3 W
Goose	1	20				
	2	17				
	3	17				
	4	15				
	5	15				
	6	15			lighting plan	
	7	15				
	8	15				
	Reproducer During the bait	15-16	70-80%			
Duck	1	18	75-70%	4 to 10 m³/h/Kg live weight	24 h during the 3 days after 16h	4 W
	2	18	70%			4 W
	3	17	70%			3.5 W
	4	17-16	70-68%			3.5 W
	5	16	70-68%			3 W
	6	15	70-68%			2.5 W
	7	15	70-68%			2.5 W
	8	15	70-68%			2.5 W
	9 to 16	15	70-68%			2.5 W
Guineafowls	Reproducer			5 m³/h/Kg of live weight and hour	lighting plan	
	1	30	70-68%			
	2	25	70%		24 h 14 to 15 h in addition to a lamp during the period of darkness	4 W
	3	19	70-68%			4 W
	4	18	68-65%			3 W
	5	18	65-55%			3 W
	6	18	65-55%			3 W
	7	18	65-55%			3 W
	8	18	65-55%			3 W
	9 to 16	Never less than 16	65-55%			3 W
	Reproducer	20	55-60%		lighting plan	
Quail	1	22-24	70%	4 to 5 m³/h/Kg live weight	All day plus a lamp at night	3 W
	2					
	3					
	4					
	5					
	6					
	7					
	Reproducer	22-24	70%	4 to 5	16 to 18 h	5 W
Turkey	1	24	78%	6 m³/h/Kg of weight & *8+	24 h	10-16 W
	2	!"	65%		16 h	3 W
	3	!!	55-60%		16 h	2 W
	4	20	55-60%		16 h	2 W
	5	18	55-60%		16 h	1.5 W
	6		55-60%			0.5 W
	7					0.5 W
	8	"from 16 to 18 Never below 14°C"			and always a lamp during darkness	0.25 W
	16					0.25 W
	24					0.25 W
	Reproducer	10-12	58-60%		lighting plan	

Table. 2

Propeller Fan - KAEF Series

KAEF 800, 900, 1000 and 1250

Its compact design allows for easy handling and installation, making it ideal for simple and versatile applications.

APPLICATIONS



WAREHOUSES
INDUSTRIAL
BUILDINGS



GREENHOUSES



COMMERCIAL
BUILDINGS



INSTALLATIONS
AGRICULTURAL



FEATURES:

- Sturdy galvanized sheet steel construction.
- Inlet protection net to avoid foreign items entering the fan.
- Pulley and belt transmission allow low-speed operation, reducing the noise level.
- Aerodynamic profiled blades impeller is made of galvanized sheet steel to generate a high flow rate.
- Mechanical opening backdraft shutter avoiding backdraft air.
- Three-phase AC motor as standard and PM motor option
- Motor over Impeller.

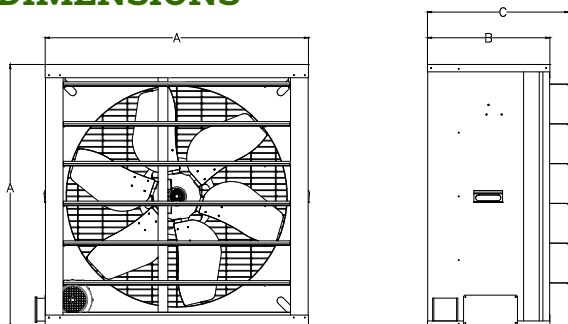
TECHNICAL CHARACTERISTICS

Model	Speed (RPM)	Installed Power (kW)	Voltage (V)	Hz	Max.Current (A)	Flow Rate at Free Discharge (CMH/CFM)	Sound Power Lw (A) (dB(A))	Sound Pressure Lp (A) (dB(A))**
KAEF800	550	0.55	380	50	1.189	11291/6645	73	52
KAEF900	500	0.55	380	50	1.356	14076/8284	75	54
KAEF1000	490	0.75	380	50	1.578	21128/12435	79	58
KAEF1250	540	2.20	380	50	4.729	40136/23623	88	67

** Inlet Lp(A) sound pressure levels at 3 m are measured at free discharge in spherical free field condition.

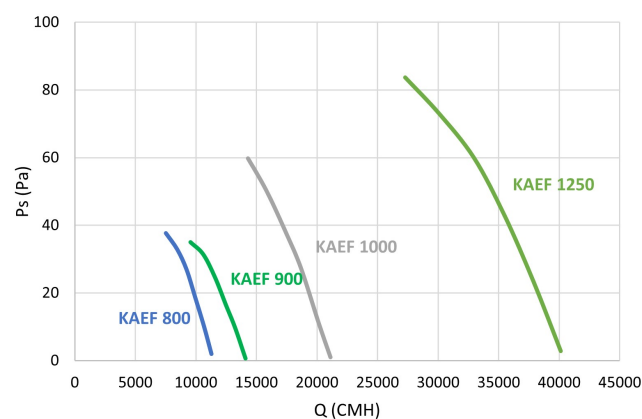
- Values shown are for inlet Lwi(A) sound power levels for installation type A: free inlet, free outlet. The A-weighted sound ratings shown have been calculated per AMCA International Standard 301.
- Performance shown is for installation type A - Free inlet, Free outlet. Performance ratings include the effects of inlet grille and backdraft damper. Speed (RPM) shown is nominal. Performance is based on actual speed of test.

DIMENSIONS



	A	B	C	Weight (kg)
KAEF800	950	467	552	80
KAEF900	1075	500	518	87
KAEF1000	1175	550	619	100
KAEF1250	1459	552	617	140

CHARACTERISTIC CURVES



Bellmouth Fan - KIBJ Series

KIBJ 355, 500 and 630

The compact bell mouth fan is suitable for installation on the ceiling of greenhouses and agricultural farms to provide air movement and induction.

APPLICATIONS



GREENHOUSES



SWINE FARMS



COW FARMS



CORRALS



FEATURES:

- Compact short housing made of galvanized sheet steel construction.
- Aerodynamic profiled blades impeller is made of galvanized sheet steel to generate a high flow rate.
- Inlet and Outlet protection net to avoid foreign items entering the fan.
- Direct coupling with single-phase AC motor.
- Motor over Impeller.

TECHNICAL CHARACTERISTICS

Model	Speed (RPM)	Installed power (kW)	Voltage (V)	Hz	Max.Current (A)	Flow (CMH/CFM)	Thrust (N)	Sound Power Lw (A) (dB(A))	Sound Pressure Lp (A) (dB(A))**
KIBJ355	1425	0.07	230	50	0.777	2491/1466	5.80	72	51
KIBJ500	1330	0.245	230	50	1.9	5796/3411	15.84	79	58
KIBJ630	1320	0.35	230	50	2.623	9715/5718	28.01	88	67

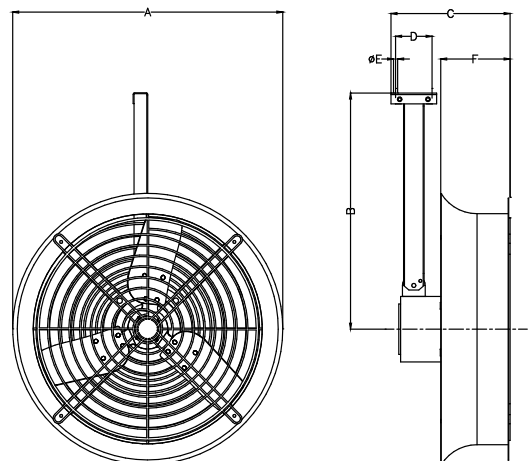
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DIMENSIONS

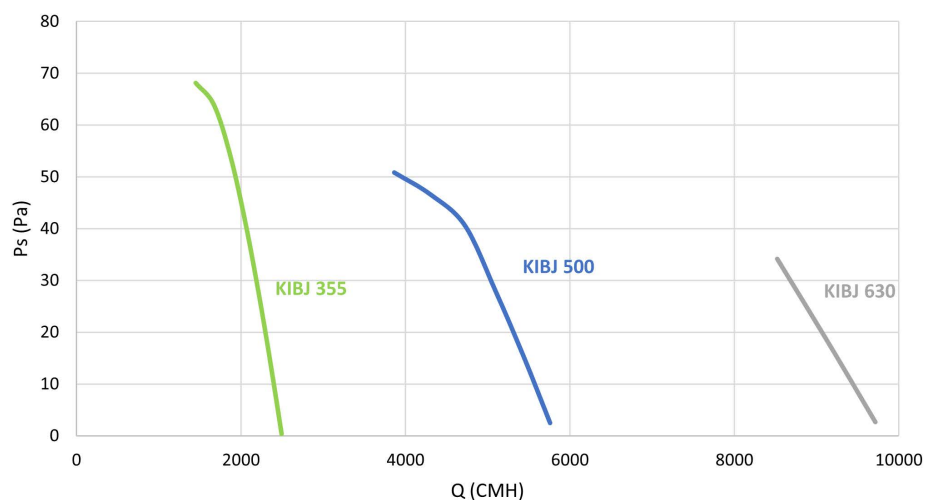
	KIBJ355	KIBJ500	KIBJ630
A	455	592	720
B	442	516	589
C	252	261	256
D	80	80	80
ΦE	9	9	9
F	152	152	147
Weight (kg)	9	15	18



Bellmouth Fan - KIBJ Series

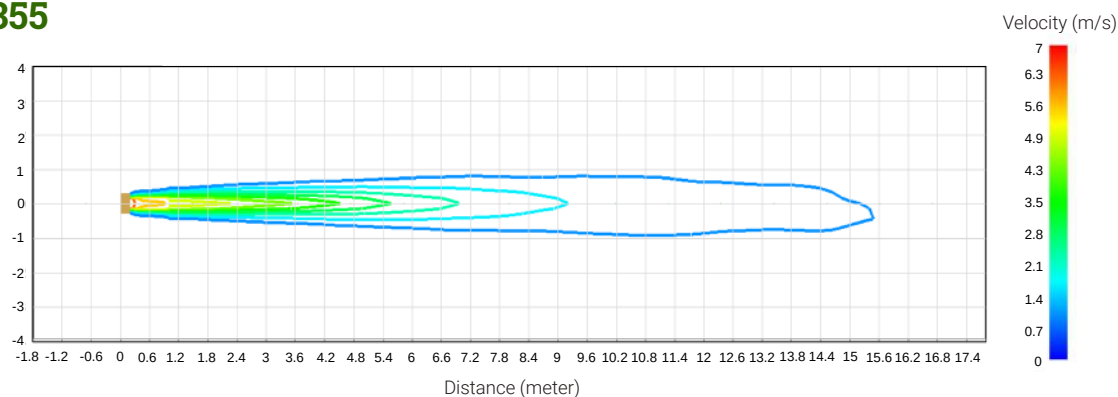
CHARACTERISTIC CURVES

Fan Curve

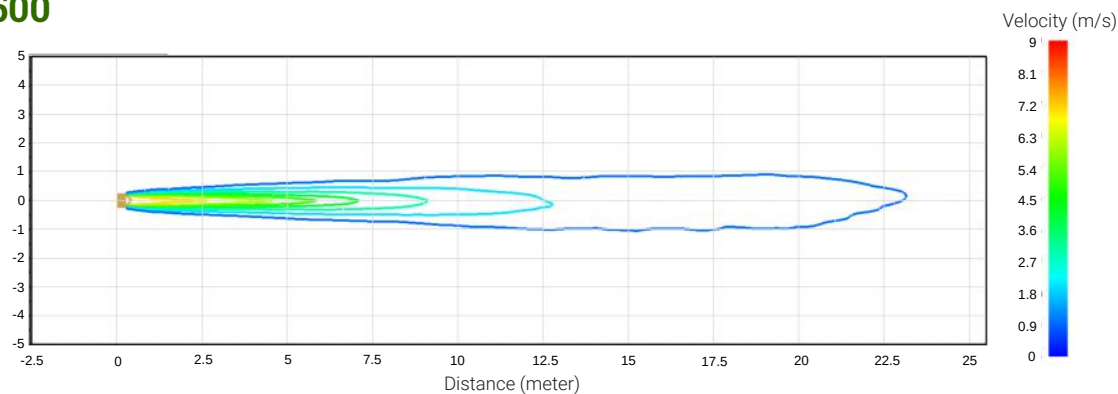


Velocity Profile

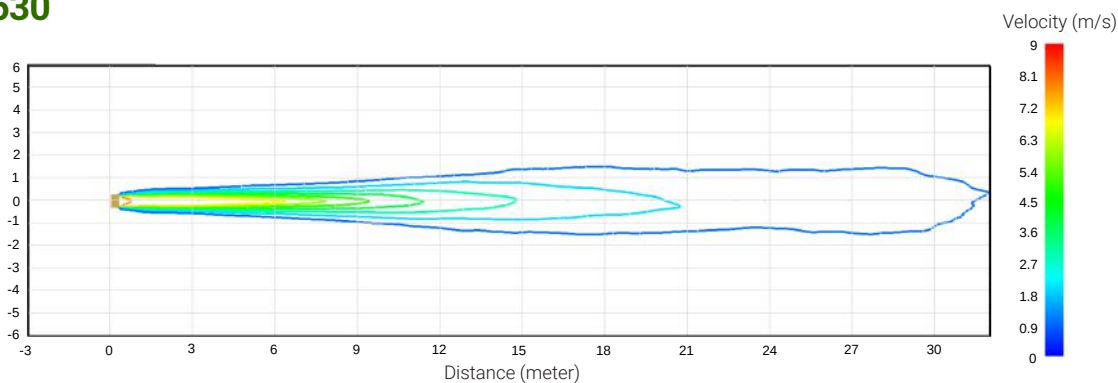
KIBJ355



KIBJ500



KIBJ630



■ Axial Fan - KITJ Series

KITJ 500

The KITJ provides air recirculation that helps to homogenize the temperature and humidity conditions inside greenhouses.

APPLICATIONS



GREENHOUSES



FEATURES:

- Fan housing made of galvanized sheet steel construction.
- Aerodynamic profiled blades impeller is made of galvanized sheet steel to generate a high flow rate.
- Inlet and Outlet protection net to avoid foreign items entering the fan.
- Direct coupling with three-phase AC motor as standard and PM motor option is available upon request.
- Impeller over motor.

TECHNICAL CHARACTERISTICS

Model	Speed (RPM)	Installed power (kW)	Voltage (V)	Hz	Max.Current (A)	Flow (CMH/CFM)	Thrust (N)	Sound Power Lw (A) (dB(A))	Sound Pressure Lp (A) (dB(A))**
KITJ 500	1420	0.37	380	50	1.060	5184/3051	12.67	83	62

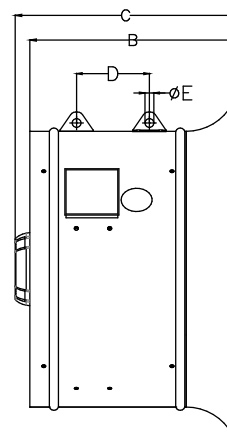
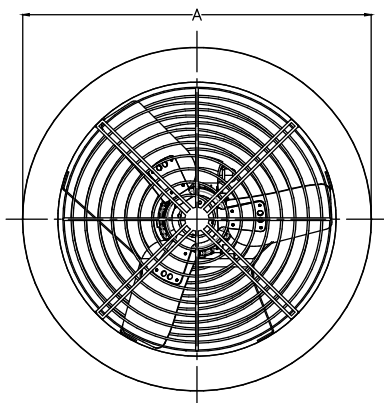
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- Performance shown is for installation type A - Free inlet, Free outlet. Performance ratings include the effects of inlet grille and backdraft damper. Speed (RPM) shown is nominal. Performance is based on actual speed of test.

DIMENSIONS

A	B	C	D	ΦE	Weight (kg)
626	370	397	131	16	23

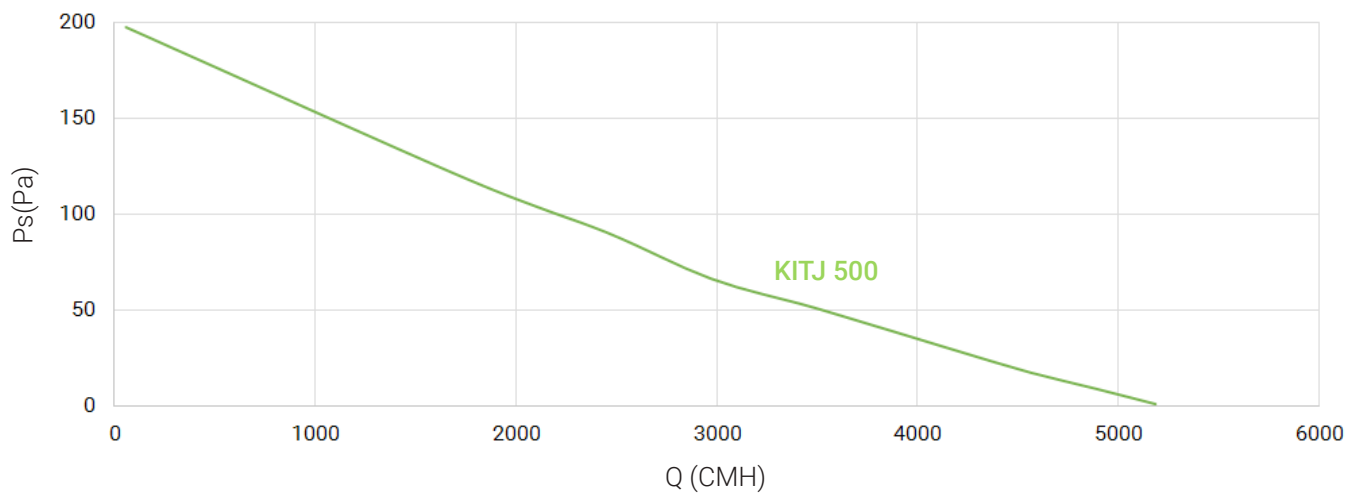


Axial Fan - KITJ Series

CHARACTERISTIC CURVES

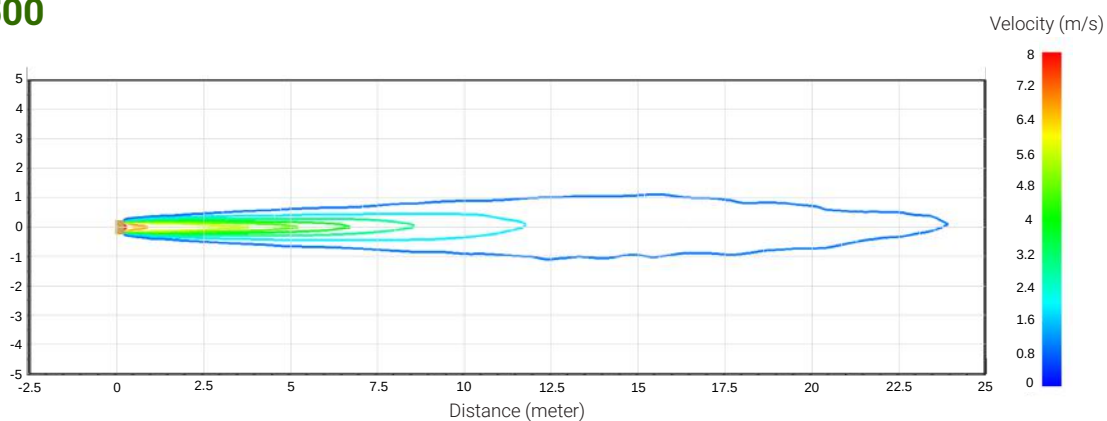
Fan Curve

KITJ 500



Velocity Profile

KITJ 500



KRUGER Ventilation Group

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