

**High Volume Low-Speed Fan
Comparison between Epoch 3.0 24-ft
and Hunter Titan 24-ft HVLS Fans**

by

Falco eMotors



Executive Summary: A 30-point comparison is done between Epoch 3.0 and Hunter Titan fans. This paper recommends Epoch 3.0 fans for reasons of high performance, high efficiency, high reliability, high technology, lower cost of acquisition, operation and maintenance, and ready availability.

Abstract: This article presents a side by side comparison between Epoch 3.0 HVLS fans and Hunter Titan fans. Published Specifications and Website information are taken into consideration. Parameters such as motor power, blade diameter, fan speed, current consumption, input voltage, power factor, torque, motor weight, number of blades, installation, etc. are compared between the various companies.

Introduction: Direct drive platforms for HVLS fans are gaining in popularity over the past few years. Several companies have launched their direct drive platforms since 2014 including MacroAir, BigAss, Greenheck, and Hunter, etc.. Several attempts have been made by other HVLS fan companies to manufacture direct drive fans. Most are either in the development stage or have experimented with various available direct drive platforms. Most of the manufacturers have an abysmal understanding of the characteristics of the motors and inverters required for HVLS fan performance. This paper limits its comparison between one type of Epoch 3.0 Ø 24 ft. HVLS fan and Hunter Titan Ø 24 ft HVLS Fan.

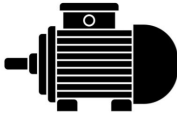
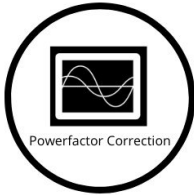




Epoch 2.0 Fans: Epoch3.0 fans are built using expanded diameter fractional slot permanent magnet synchronous motor (EDFS-PMSM) technology. The motor is controlled using power factor corrected field-oriented controls with space vector modulation. Epoch3.0 Fans have been developed by Falco eMotors located in the state of Virginia, USA. The technology has been developed in collaboration with some major US and Canadian companies specializing in the sale of HVLS fans. The company has several fan models available from 6ft to 24ft based on Epoch 0.5, 1.0, 2.0, and 3.0 motor platforms.











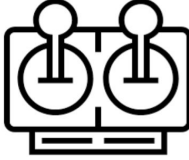






Hunter Titan Fans: Hunter fans manufacture both Commercial and Industrial fans. Hunter fans Located in Memphis, USA. Hunter fans use BLDC motors to run the fan. Motor controls are not a power factor corrected. Air produced by the Hunter fan is very less compared to the Epoch fans. Hence, the airflow and coverage area of the hunter fans are less. The maintenance cost and cost of repair of the Hunter fan is very high.



The Below table summarized the difference between the fans and will show the best fan for your organization or workplace.

Epoch 2.0 24-ft diameter HVLS fans	Parameters	Hunter TITAN 24-ft HVLS fans
Latest Technology EDFS-PMSM motor Technology	 Motor Technology	BLDC motor
Yes	 Power factor Correction	No
5	 No. of Blade	5
Airfoil Design	 Blade Profile	Airfoil Retention System
Anodised Aluminium 6061- T6	 Blade Material	Not mentioned
2.0 hp	 Input Power	1 HP

200-264 V AC, 1 Phase, 50-60 HZ	 Input Voltage	AC 1PH 200-240V 50/60Hz OR AC 3PH 200-240V50/60Hz OR AC 3PH 380-480V 50/60Hz
170 Nm	 Torque	90 Nm
62	 RPM speed	71
< 35 dB	 Sound Level	Not mentioned
Yes	 Forward and Reverse Option	Yes
30,000 Sq. ft. (2,787 Sq. m.)	 Coverage Area	22,500 Sq. ft. (2,090 Sq. m.)
500,000 to 550,000	 Airflow	Not Mentioned
99 Kg	 Weight	93 Kg

<p>Power factor Corrected field-oriented Controls with space vector modulation (PFC + FOC + SVPWM)</p>	 <p>Controls</p>	<p>Scalar BLDC Control</p>
<p>UL 507, UL 1004, UL 508C</p>	 <p>Design Safety Standards</p>	<p>UL 507</p>
<p>UL 507, CE</p>	 <p>Safety Certifications</p>	<p>UL 507</p>
<p>IP 65</p>	 <p>IP Rating</p>	<p>IP 65</p>
<p>Low</p>	 <p>Cost of Repair</p>	<p>High</p>
<p>Low</p>	 <p>Lifetime Cost</p>	<p>High</p>
<p>15 Years Mechanical, 7 Years Electrical, 1 Year Labor</p>	 <p>Warranty</p>	<p>15 Years</p>

CII Award	 Award	No
-----------	---	----

Discussion on the Comparisons: In the table above, we have highlighted in green the various advantages for each of the companies. Let us discuss each of the items below.

1. Motor Technology: Epoch 3.0 Fans are built using expanded diameter fractional slot permanent magnet synchronous motor technology (EDFS-PMSM) which helps to improve efficiency and reduce the cost of HVLS fans dramatically. Hunter fans use BLDC motor technology.



Image: Epoch 2.0 motor

2. Power Factor Correction: There is no power factor correction built-in for Hunter Titan fans causing substantial power consumption during the fan operation. Epoch 3.0 Fans have built-in power factor correction. Epoch 3.0 Fans operate with a

0.97 to 0.99 power factor resulting in significant efficiency and cost savings. Such is not the case for Hunter Titan fans. The input power factor is unknown and is assumed to be 0.6 to 0.7.

3. Number of Blades: Epoch 3.0 24-ft. Fans come with a 5 blade configuration. Airfoil design of blades creates the highest airflow in the world. Blade design combines modern-day Aeronautics and wing structure of a Falcon to create a remarkably dynamic and efficient airflow at every speed. Hunter fans come with 5 numbers of blades but the airflow and coverage area of the fan is very less compared to Epoch 3.0 24-ft. Diameter fans.

4. Blade Profile and Material: Blade profile for both the manufacturers are equivalent to airfoil blade design. Epoch blades are manufactured by using Anodized Aluminum 6061 T6. The material used for the blades is corrosion resistive. Also, the strength of the material is very high. Hunter fans disclosed the information regarding blade material.

5. Power (Watts and hp): The Output power of a fan is a good indicator of the amount of available airflow. Hunter Titan fan power is 1 hp against Epoch 3.0 fan 2.0 hp. Hunter Titan fans produce 40% less air than Epoch 3.0 fans.

6. Input Voltage Range: The input voltage range for the Epoch 3.0 Fans is substantially more comprehensive. Although Epoch 3.0 Fans can operate from 90 to 277V input without any damage to the controls, the performance is guaranteed between 200 and 264V, single-phase input. Hunter Titan fans have input voltage range options to operate on single-phase, three-phase, and five-phase. But the performance of the fan is not guaranteed while operating in such options.

7. Torque (Nm): The Torque given by Hunter fan is 90 Nm which is less against Epoch 3.0 HVLS fan for Ø24-ft. Because Torque is less it produces less air.

8. RPM: Hunter Titan fans can operate at 71 rpm at room temperature. It does not justify the airflow and coverage area claims in the datasheet.

HVLS Fan and Air Flow

In HVLS fans generally, the volume of air supplied is given more weightage than the airflow speed. According to the paper effectiveness (cooling/destratification) of an HVLS fan is decided from the air velocity not fan speed or CFM(volume of air displaced). The air velocity of the main jet flow is of more significance than the volume of air moved, which is proved by using the ASHRAE thermal comfort tool. For air-flow of speed 29.5 to 590.6 fpm is needed to decrease the temperature of the skin of the workers working in the closed complex and reduce the temperature of the surrounding from 36 Celsius to 29 Celsius, Epoch 2.0 produces more than the required performance.

9. Sound Level (dB) at Max Speed: Because Epoch 3.0 Fans use EDFS-PMSM technology with PFC-FOC-SVPWM controls, the sound levels at max speed are less than 35dB as compared to other manufacturers. We have the quietest fan in the world.

10. Input Current (A): Hunter fan draws more current i.e. 5.4 A versus 4.5A against Epoch 2.0 Fans. Hunter fans are highly inefficient in terms of power consumption and airflow.

11. Forward and Reverse Operation: Forward and Reverse operation is available from both the manufacturers.

12. Coverage Area (m²): Epoch 3.0 Ø 24-ft fan covers 30,000 sq. ft area, whereas Hunter Titan Ø 24-ft. fan covers 22,500 sq. ft. area. The area covered by the Hunter Titan fan is very less compared to Epoch 3.0 24-ft diameter fans.

13. Air Flow (m³/s): Epoch 3.0 fans produce the highest CFM 5,00,000 to 5,

50,000CFM, Hunter Titan fans have disclosed the airflow figure. Epoch HVLS fans recorded the highest CFM amongst the competitors.

14. Weight (kg): Hunter Titan fans weigh 93 Kg vs. 99 kg for Epoch 3.0 fans. But Torque produced by Epoch 3.0 fans is much higher than Hunter Titan fans.

15. Optional color: Optional colors are available from both the manufacturers.

16. BACnet: Falco Epoch 2.0 fans have a BACnet control system. The below figure will show its features. Hunter Titan fans do not provide BACnet system Control.

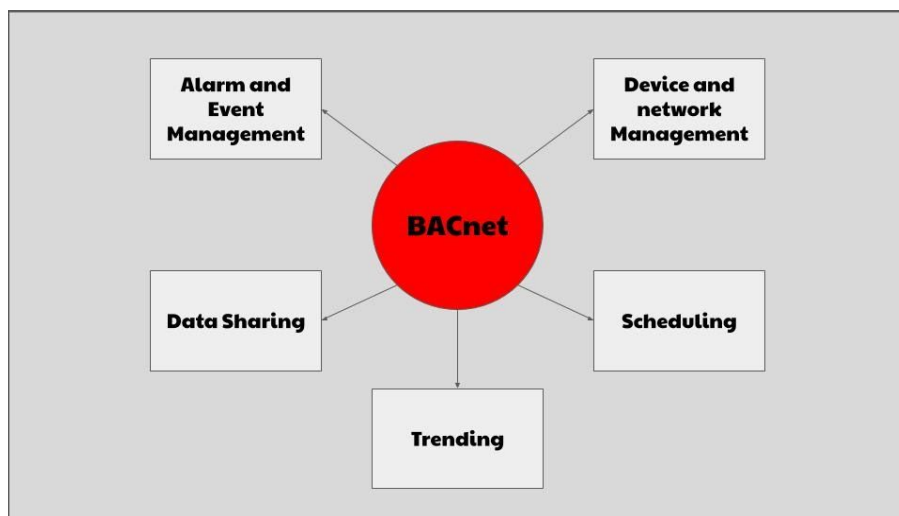


Image: Bacnet Control Features

17. Controls: Epoch 2.0 Fans use state of the art power factor corrected field-oriented controls with space vector modulation which further enhances the efficiency, reduces the cost of manufacturing and operations significantly. Hunter Titan fans use non-power factor corrected BLDC motors.

18. Design Safety Standards: Epoch 2.0 Fans are designed for UL507, UL1004, and UL508C safety standards. Hunter Titan fans are intended for the UL507 safety standard.

19. Safety Certifications: Epoch 3.0 Fans have undergone safety testing at Intertek Laboratories in Dallas, Texas, USA. Epoch 3.0 Fans have UL507 and CE certification. Hunter Titan fans have UL certification.

20. IP Rating: Both fans are rated with an IP65 rating.

21. Cost of Repair: The cost of repair and maintenance of Hunter Titan fans is very high as compared to Epoch HVLS fans.

22. Lifetime Costs: Lifetime costs for Hunter Titan fans are incredibly high. Given the high-power consumption, the high cost of acquisition, the high cost of repair, and the likelihood of a failure due to de-rating, lifetime costs for Hunter Titan fans are incredibly high.

23. Life Expectancy: Hunter titan fans disclosed life expectancy. Epoch 2.0 Fans have a life expectancy of more than 100,000 hours.

24. Warranty: Epoch 3.0 Fans provides the highest warranty than the Hunter Titan fan.

25. Smartphone Interface: Hunter Titan fans do not have a Smartphone interface for running or data logging. Epoch 3.0 Fans can be operated with a smartphone application.

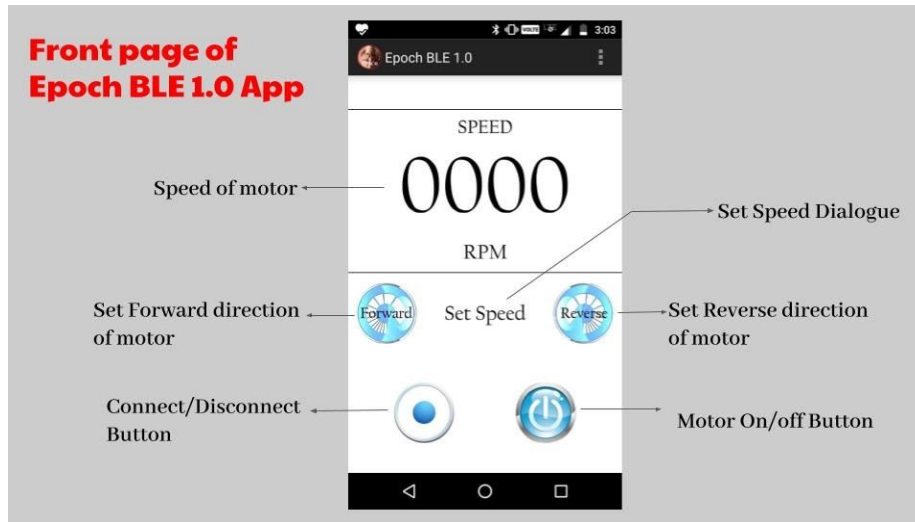


Image: Overview of Smartphone Application

26. Dynamic Blade Adjustments: Epoch 3.0 Fans employ adjustable blade technology with droop down and uplift mechanism. Such blades can weather the rotational stresses efficiently as compared to stiff blades. Hunter Titan fans use rigid blades. Also, adjustable blades produce efficient and broader airflow areas as speed increases as compared to rigid blades.

27. Analog Controls: Epoch 3.0 Fans come with analog controls with a built-in speed regulator for ease of operation. Such controls are not available with Hunter fans. The Epoch 3.0 fan controls also have a built-in circuit breaker for added safety protection.



Image: Analog Controller

28. Fire Control Panel Integration: Fire control panel system integration is

available from both the manufacturers.

29. Building Management System Integration: Standard building management system integration is available from both the manufacturers.

30. Touchscreen Console: Standard touchscreen controls are available from both the manufacturers.

31. Awards: Epoch fan manufacturer got the most innovative company award i.e. CII award amongst top companies in India. Hunter fans do not have such kind of award.



Award-winning moment

Conclusion: This paper recommends Epoch 3.0 Fans for various reasons. Primary reasons being high performance, high efficiency, high reliability, high technology, lower cost of acquisition, operation and maintenance, and make in India availability.