



ADVANCING VENTILATION®

TORNADO HVLS

5-BLADE HIGH VOLUME LOW SPEED



FEATURES:

BLADES

- Equipped with 5 blades
- Extruded anodized aluminum
- High performance E420 design with STOL technology

CONSTRUCTION

- Mounting is to be 1/4" powder-coated steel and anodized aluminum
- All construction is to be protected from the element
- Stainless steel safety brackets

VFD

- Onboard, IP65 rating
- Factory assembled & programmed
- Minimum start/stop torque loads

WINGTIPS

- Equipped with 5 Wingtips
- Constructed of nylon 66
- Redirect outward airflow into downward airflow

MOTOR

- Direct drive ECM
- Totally enclosed
- IP65 rating
- Class F insulation
- 1.35HP (1.0 kW) nominal horsepower

WARRANTY

- 5 YEAR Housing
- 1 YEAR Motor and Control

MODEL	DESCRIPTION	FAN DIA.	VOLTAGE RANGE	MOTOR FLA	PHASE	HP	AREA COVERED FOR DESTRATIFICATION	MAX EFFECTIVE DIAMETER FOR DESTRATIFICATION	MAX EFFECTIVE DIAMETER FOR COOLING	MAX SPEED	INSTALLED WEIGHT
THVLS5102301	TORNADO 10FT 230V/1PH	10 Ft. (3.0 m)	207-253V	5.2	1	1.35 HP (1.0kW)	7,850 Ft ² (730 m ²)	100 Ft. (30 m)	50 Ft. (15 m)	113 RPM	191 lbs
THVLS5102303	TORNADO 10FT 230V/3PH		207-253V		3						
THVLS5104603	TORNADO 10FT 460V/3PH		414-506V		3						
THVLS5122301	TORNADO 12FT 230V/1PH	12 Ft. (3.6 m)	207-253V	5.2	1	1.35 HP (1.0kW)	11,304 Ft ² (1050.2 m ²)	120 Ft. (36 m)	60 Ft. (18 m)	92 RPM	204 lbs
THVLS5122303	TORNADO 12FT 230V/3PH		207-253V		3						
THVLS5124603	TORNADO 12FT 460V/3PH		414-506V		3						
THVLS5142301	TORNADO 14FT 230V/1PH	14 Ft. (4.3 m)	207-253V	5.2	1	1.35 HP (1.0kW)	15,386 Ft ² (1429.4 m ²)	140 Ft. (43 m)	70 Ft. (21.5 m)	78 RPM	236 lbs
THVLS5142303	TORNADO 14FT 230V/3PH		207-253V		3						
THVLS5144603	TORNADO 14FT 460V/3PH		414-506V		3						
THVLS5162301	TORNADO 16FT 230V/1PH	16 Ft. (4.9 m)	207-253V	5.2	1	1.35 HP (1.0kW)	20,096 Ft ² (1866.9 m ²)	160 Ft. (49 m)	80 Ft. (24.5 m)	64 RPM	249 lbs
THVLS5162303	TORNADO 16FT 230V/3PH		207-253V		3						
THVLS5164603	TORNADO 16FT 460V/3PH		414-506V		3						
THVLS5182301	TORNADO 18FT 230V/1PH	18 Ft. (5.5 m)	207-253V	5.2	1	1.35 HP (1.0kW)	25,434 Ft ² (2362.8 m ²)	180 Ft. (55 m)	90 Ft. (27.5 m)	55 RPM	277 lbs
THVLS5182303	TORNADO 18FT 230V/3PH		207-253V		3						
THVLS5184603	TORNADO 18FT 460V/3PH		414-506V		3						
THVLS5202301	TORNADO 20FT 230V/1PH	20 Ft. (6.1 m)	207-253V	5.2	1	1.35 HP (1.0kW)	31,400 Ft ² (2917.1 m ²)	200 Ft. (61 m)	100 Ft. (30.5 m)	53 RPM	285 lbs
THVLS5202303	TORNADO 20FT 230V/3PH		207-253V		3						
THVLS5204603	TORNADO 20FT 460V/3PH		414-506V		3						
THVLS5242301	TORNADO 24FT 230V/1PH	24 Ft. (7.3 m)	207-253V	5.2	1	1.35 HP (1.0kW)	45,216 Ft ² (4200.7 m ²)	240 Ft. (73 m)	120 Ft. (36.5 m)	40 RPM	306 lbs
THVLS5242303	TORNADO 24FT 230V/3PH		207-253V		3						
THVLS5244603	TORNADO 24FT 460V/3PH		414-506V		3						

• 277V power source is not accepted. • Estimated values based on typical conditions.



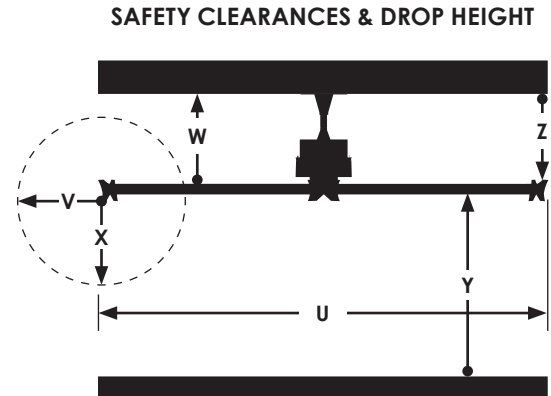
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SAFETY CLEARANCES AND DROP HEIGHT

MODEL	DIAMETER [U]	SIDE [V]	ABOVE [W]	BELOW [X]	MIN. BLADE HEIGHT [Y]	BLADE DROP HEIGHT [Z]
THVLS510	10 Ft. (3.0 m)	18"	33"	18"	10'	38"
THVLS512	12 Ft. (3.6 m)	22"	33"	22"	10'	38"
THVLS514	14 Ft. (4.3 m)	26"	33"	26"	10'	38"
THVLS516	16 Ft. (4.9 m)	30"	33"	30"	10'	40"
THVLS518	18 Ft. (5.5 m)	33"	33"	33"	10'	43"
THVLS520	20 Ft. (6.1 m)	36"	33"	36"	10'	45"
THVLS524	24 Ft. (7.3 m)	44"	33"	44"	10'	49"

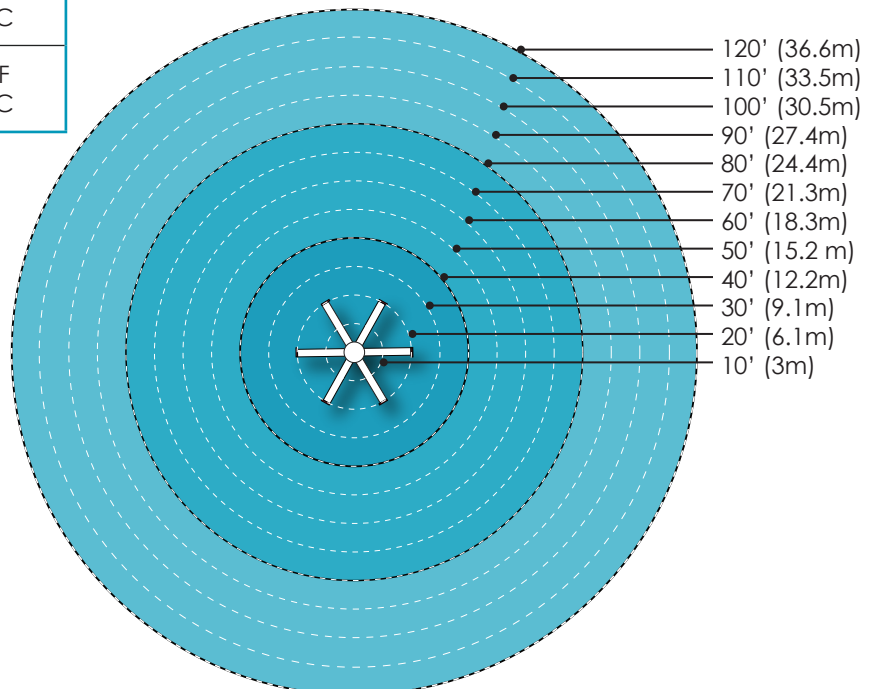


• All dimensions are based on a standard 1' extension bar.

MAX EFFECTIVE DIAMETER FOR COOLING

DISTANCE FROM CENTER	AIR VELOCITY ³	COOLING SENSATION ³
0' - 40' (0 - 12.2m)	620 - 900 fpm 3 - 4.5 m/s	14 - 15°F 8 - 10°C
40' - 80' (12.2 - 24.4m)	340 - 620 fpm 1.7 - 3 m/s	9 - 15°F 5 - 8°C
80' - 120' (24.4-36.6m)	0 - 340 fpm 0 - 1.7 m	0 - 9°F 0 - 5°C

• Stated values are estimations based on standard installation at maximum power. Values such as building layout, obstructions, ceiling height, and drop ceiling height may effect these numbers.

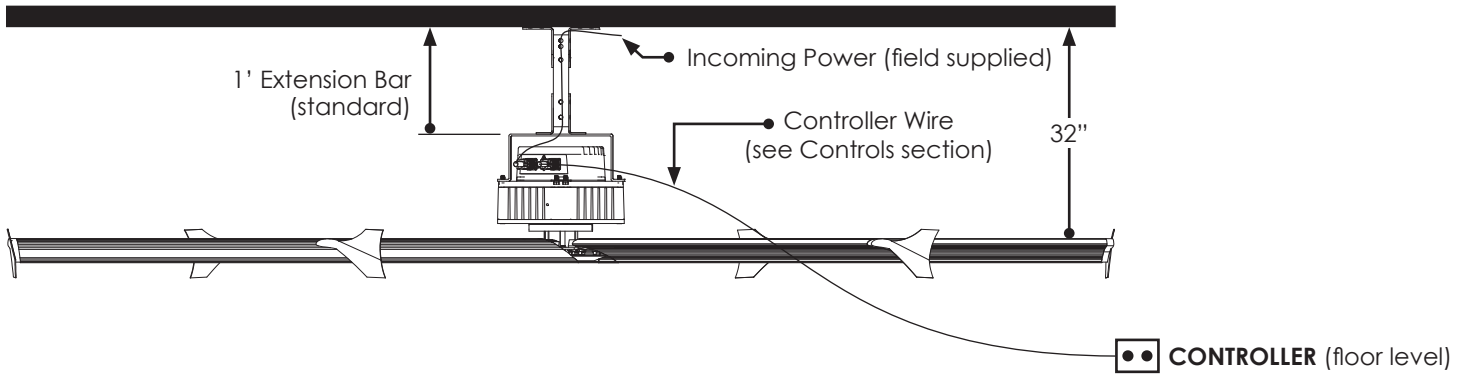




**ADVANCING
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TORNADO HVLS 5-BLADE HIGH VOLUME LOW SPEED

TORNADO INSTALLATION





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WRITTEN SPECIFICATIONS

- A. Basis-of-design product: Subject to compliance with requirements, provide S&P USA **Tornado** high volume low speed ceiling fans.
- B. Complete Unit: The fan shall be designed to move an effective amount of air for cooling and Destratification in large industrial/commercial applications over an extended life. The fan and components shall be designed specifically for high volume, low speed fans to ensure lower noise operation. The sound levels from the fan operating at maximum speed shall not exceed <35 dBA (measured 20' or 6.1 m below the blades and 20' or 6.1 m horizontally from the center of the fan).
- C. Blades: The fan shall be equipped with five (5) high volume, low speed blades of precision 6005-T5 extruded anodized aluminum alloy. Each blade shall be of the high performance E420 (Short Take-Off and Landing) design. The blades shall be connected by means of two (2) locking bolts per blade. The blades shall be connected to "H-Strut" which is connected to the hub and interlocked with two sets of six stainless steel retainers.
- D. Wingtips: The fan shall be equipped with five (5) Wingtips designed to redirect outward airflow into downward airflow, thereby enhancing the efficiency and effectiveness of the fan. The wingtips shall be molded of Nylon 66 and nominally measure 10"x6-3/8" (25.4 cm x 16.2 cm). The wingtips shall be attached at the tip of each blade by means of a single screw. The standard color of the winglets shall be Red, but may also be offered in black.
- E. Motor: The fan motor shall be an ECM (Electronically Commutated Motor), BLDC (Brushless DC), gearless direct drive 230V, 1-3 Ph and 460V, 3 Ph. The motor shall be totally enclosed with an IP65 NEMA classification. The motor shall be manufactured with Class F insulation. The output shaft of the motor shall be no less than a 3" keyless shaft with bearings that are lubed for life.
- F. Extension Bar: The fan shall be equipped with an extension bar that provides a structural connection between the fan assembly and upper mounting system. The extension bar shall be aluminum 2" x 2" (5.08 cm x 5.08 cm) square tubing and powder-coated for corrosion resistance and appearance. Standard length of extension bar is 1 FT available in 1 FT increments up to 10 FT as specified by the architect or owner.
- G. Hub: The fan hub shall be minimum 1/4" precision press broken stainless steel for high strength and rigidity. The hub shall be secured to the output shaft of the motor by means of a precision cut stainless steel cylinder & interlocking bushing system. Both hub and steel bushing shall be precision machined to achieve a factory balanced and solid rotating assembly. The hub shall incorporate five (5) safety retaining brackets no less than 1/8" made of stainless steel that shall restrain the hub/blade assembly in case of motor output shaft failure.
- H. Mounting System: The fan mounting system shall be designed for quick and secure installation from a structural support beam. All components in the mounting system shall be of welded construction using 1/4" powder-coated steel. All mounting bolts shall be Grade 5 or Grade 8 SAE.
- I. Guy Wire: The fan shall be equipped with a safety cable that provides an additional means of securing the fan assembly to the building structure. The safety cable shall be a four point restraint 3/16" (.47 cm) diameter and fabricated out of 7 x 19 stranded galvanized steel with each cable having a breaking strength of 2,475 lbs. The cable is to be secured with supplied wire rope clips or fasteners. Field construction of safety cables is not permitted.
- J. Safety Cable: The fan shall be equipped with a safety cable that provides an additional means of securing the fan assembly to the building structure. The safety cable shall be 3/16" (.47 cm) diameter and fabricated out of 7 x 19 stranded galvanized steel a break strength of 2,475 lbs. The cable is to be secured with supplied wire rope clips or fasteners. Field construction of safety cables is not permitted.
- K. VFD Enclosure: The fan controller shall be constructed using a Variable Frequency Drive (VFD) that is pre-assembled and factory programmed to communicate a 60 second ramp up/down to the fan, to minimize the starting and braking torques and for smooth and efficient operation. The VFD enclosure shall be pre-assembled and internally wired for ease of installation. The controller shall be onboard with IP65 rating.
- L. Warranty: The Manufacturer shall replace any products or components defective in material or workmanship, free of charge to the customer (including transportation charges within the USA, F.O.B. , pursuant to the complete terms and conditions of the S&P USA Non-Prorated Warranty in accordance to the following schedule:
- Blades - 5 years (Parts)*
 - Hub - 5 years (Parts)*
 - Motor -1 yeas (Parts)*
 - Controller - 1 yeas (Parts)*
- *If factory supplied installation methods are shown not to be valid, S&P USA has right to void warranty. Further Information on the terms and conditions of the standard & purchased warranties can be found in Warranty Card.
- S&P USA is not liable for any voltage disturbances with explicit reference to electronic magnetic interference (EMI). Voltage disturbance refers to transient overvoltage, voltage unbalance, voltage swells, rapid voltage change, flicker, superimposed signals, harmonic voltages, supply voltage variations, voltage dips and frequency/time deviation.