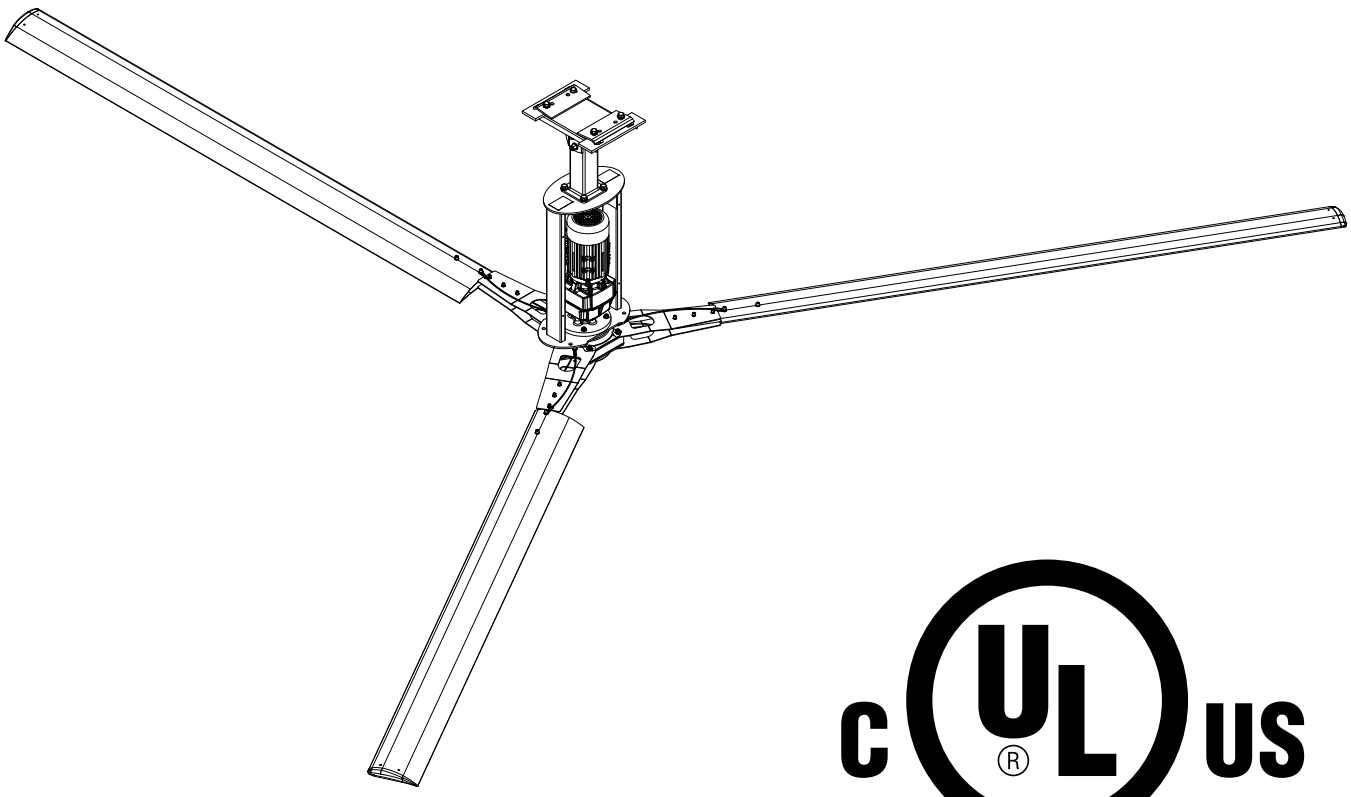
Industrial 3 Blade HVLS Fan



E506041

This manual applies to fans manufactured beginning April 2020.

⚠WARNING

Do not install, operate, or service this product unless you have read and understand the Safety Practices, Warnings, and Installation and Operating Instructions contained in this manual. Failure to do so could result in death or serious injury.

User's Manual

Installation, Operations Maintenance and Parts

Part No. 6022110C

WARRANTY

THIS LIMITED WARRANTY IS 4FRONT's (DBA ENTREMATIC) SOLE AND EXCLUSIVE WARRANTY WITH RESPECT TO THE HVLS FAN AND IS IN LIEU OF ANY OTHER GUARANTEES OR WARRANTIES, EXPRESS OR IMPLIED. THIS LIMITED WARRANTY APPLIES ONLY TO THE ORIGINAL PURCHASER OF THE HVLS FAN AND CANNOT BE TRANSFERRED.

4FRONT warrants that this 3-BLADE HVLS FAN will be free from flaws in material and workmanship under normal use for a period of one (1) year from the earlier of 1) 60 days after the initial shipment by 4FRONT, or 2) the date of installation of the 3-BLADE HVLS FAN by the original purchaser, provided that the owner maintains and operates the HVLS FAN in accordance with this User's Manual.

In the event that this 3-BLADE HVLS FAN proves deficient in material or workmanship within the applicable Limited Warranty period, owner shall so notify 4FRONT, and 4FRONT will, at its option:

1. Replace the 3-BLADE HVLS FAN, or the deficient portion(s) thereof, without charge to the owner (to include all parts and labor); or
2. Alter or repair the 3-BLADE HVLS FAN, on site or elsewhere, without charge to the owner.

In addition, 4FRONT warrants the 3-BLADE HVLS FAN for an additional two (2) years for replacement parts only.

Exclusions to the limited warranty: U.S. and Canada only. For International, visit https://entrematicfans.com/international-warranty.

This Limited Warranty does not cover any failure caused by improper installation including mounting location and exclusion zone violations, abuse, improper operation, negligence, or failure to maintain and adjust the 3-BLADE HVLS FAN properly. Parts requiring replacement due to damage resulting from vehicle impact, abuse, or improper operation are not covered by this warranty. 4FRONT DISCLAIMS ANY RESPONSIBILITY OR LIABILITY FOR ANY LOSS OR DAMAGE OF ANY KIND (INCLUDING WITHOUT LIMITATION, DIRECT, INDIRECT, CONSEQUENTIAL OR PUNITIVE DAMAGES, OR LOST PROFITS OR LOST PRODUCTION) arising out of or related to the use, installation or maintenance of the 3-BLADE HVLS FAN (including premature product wear, product failure, property damage or bodily injury resulting from use of unauthorized replacement parts or modification of the 3-BLADE HVLS FAN). 4FRONT's sole obligation with regard to a 3-BLADE HVLS FAN that is claimed to be deficient in material or workmanship shall be as set forth in this Limited Warranty. This Limited Warranty will be null and void if the original purchase does not notify 4FRONT's warranty department with ninety (90) days after the product deficiency is discovered.

THERE ARE NO WARRANTIES, EXPRESS OR IMPLIED, WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF, INCLUDING, BUT NOT LIMITED TO, A WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE, ALL OF WHICH 4FRONT HEREBY DISCLAIMS.

Warranty and Factory Service Request Procedure

Click here to view procedures for replacing your fan.

Entrematic HVLS Warranty Request

Click here to view procedures for replacing your fan.

TABLE OF CONTENTS

INTRODUCTION

Welcome and thank you for choosing this industrial fan from Entrematic.

This User's Manual contains information you need to safely install, operate, and maintain the fan. It also contains a complete parts list and information about ordering replacement parts. Please keep and read this User's Manual before using your new fan.

HOW TO USE THIS MANUAL

This section explains the visual clues and conventions that will help you quickly locate the information you need. Other conventions and icons identify interactive elements that will provide additional information when using the online version of this manual.

BASIC ELEMENTS

- Names of menus, buttons, icons, and fields are highlighted in bold text
- Text highlighted in **blue** indicates a link you can click to navigate to another topic.

INTERACTIVE ONLINE ELEMENTS

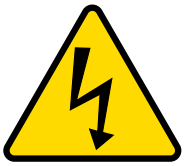
These elements are available in the online version of the document.

- The blue TOC icon at the top of every page takes you back to the Table of Contents.

SAFETY SIGNAL WORDS

You may find safety signal words such as DANGER, WARNING, CAUTION, or NOTICE in the User's Manual. The use of Safety Signal Words is explained below.

TOC

	**WARNING AND CAUTION SYMBOL** *This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible death or injury.*
⚠DANGER	**DANGER SYMBOL** *Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.*
	**ELECTRICAL WARNING SYMBOL** *Indicates an electrical hazard with a medium level of risk that could result in death or serious injury.*
⚠CAUTION	**CAUTION SYMBOL** *Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.*
⚠WARNING	**WARNING SYMBOL** *Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.*
NOTICE	**NOTICE SYMBOL** *Notice is used to address practices not related to personal injury.*

SAFETY PRACTICES

⚠WARNING	*READ THESE SAFETY PRACTICES BEFORE INSTALLING, OPERATING, OR SERVICING THE FAN. Failure to follow these safety practices could result in death or serious injury.* *READ AND FOLLOW THE OPERATING INSTRUCTIONS IN THIS MANUAL BEFORE OPERATING THE FAN. If you do not understand the instructions, ask your supervisor for instruction.* *To reduce the risk of personal injury, do not bend the blade brackets when installing the brackets or cleaning the fan. Do not insert foreign objects in between rotating fan blades.*
⚠DANGER	*To reduce the risk of fire, HVLS fan motor assemblies must be installed with the blade assemblies that are marked on their cartons to indicate the suitability with this model, Other blade assemblies cannot be substituted.* *Be certain to follow the instructions in this manual.*

⚠WARNING	*Installation of the equipment must comply with local and national electrical codes and must be in accordance with ANSI/NFPA 7-1999.* *Do not use this industrial fan until you have received proper training. Improper use could result in property damage, bodily damage, bodily injury, and/or death. Read and follow the complete* **Operating Instructions on page 32** *before use. If you do not understand the instructions, ask your supervisor to explain them to you or call your local distributor.* *DO NOT USE THE FAN IF IT APPEARS DAMAGED OR DOES NOT OPERATE PROPERLY. Inform your supervisor immediately.* *Do not operate the fan until all personnel, building structure, and equipment are clear of all moving parts and exclusion zones. Install guards as required.* *To reduce the risk of electrical shock, do not expose to water or rain.* *Support directly from the building structure. Do not install the fan unit onto a structure of insufficient strength. Consult a professional engineer or registered architect. Improper installation of the fan could result in death or serious injury.*
⚠WARNING	*Before service, inspection, or cleaning, make certain the power is disconnected and properly locked out.* *If the fan does not operate properly using the procedures in this manual, BE CERTAIN TO REMOVE POWER FROM THE UNIT AND LOCK-OUT THE DISCONNECT ON THE POWER CIRCUIT. Call you your local distributor for service.* *Keep your body clear of moving parts at all times.* *All electrical troubleshooting and repair must be done by a qualified technician and meet all applicable codes.* *If it is necessary to make troubleshooting checks inside the VFD box with the power on, USE EXTREME CAUTION, Do not place fingers or un-insulated tools inside the enclosure. Touching wires or other parts inside the enclosure could result in death or serious injury.*
⚠WARNING	*Variable Frequency Drive (VFD) fan controllers contain high voltage capacitors. Before working on the fan controller, ensure isolation of the main voltage supply and verify voltage has bled off prior to beginning Work. Failure to do so may result in death or serious injury.* *If you have problems or questions, contact your local distributor for assistance.*
⚠WARNING	*To reduce the risk of injury to persons, install the fan so that the blades are at least 3.05m (10') above the floor.*

⚠CAUTION	*Installation work and electrical wiring must be done by qualified person(s) in accordance with all applicable codes and standards.*
⚠CAUTION	*When cutting or drilling into wall or ceiling, do not damage electrical wiring and other hidden utilities.*
⚠CAUTION	*Exercise caution and common sense when powering the fan. Do not connect the fan to a damaged or hazardous power source. Do not attempt to resolve electrical malfunctions or failures on your own.*
⚠CAUTION	*When service or replacement of a component in the fan requires the removal or disconnection of a safety device, the safety device is to be reinstalled or remounted as previously installed.*
⚠WARNING	*Risk of fire, electric shock, or injury to persons during cleaning and user-maintenance. Disconnect the fan from the power supply before servicing.*
⚠WARNING	*Stay alert. Watch what you are doing. Use common sense when installing fans. Do not install fans when tired, or under the influence of drugs, alcohol, or medications. A moment of inattention while installing fans may result in serious personal injury.*
⚠CAUTION	*The installation of this fan requires the use of some power tools. Follow the safety procedures found in the owner's manual for each of these tools and do not use them for purposes other than intended by the manufacturer.*

OWNER'S RESPONSIBILITIES

The owner's responsibilities include the following:

The owner should recognize the inherent danger of the interface between the industrial fan and shop worker. The owner should, therefore, train and instruct operators in the safe use of the industrial fan.

Nameplates, cautions, instructions, and posted warnings shall not be obscured from the view of operating or maintenance personnel for whom such warnings are intended. Warnings which are worn or non-legible should be replaced.

Manufacturer's recommended periodic maintenance and inspection procedures in effect at the date of shipment shall be followed and written records of the performance of these procedures should be kept.

Industrial fans that are structurally damaged or have experienced impacts from external sources shall be removed from service, inspected by the manufacturer's authorized representative, and repaired as needed before being placed back into service.

The owner shall see that all nameplates and maintenance manuals are provided to users.

Modifications or alterations of industrial fans shall be made only with written permission of the original manufacturer.

NATIONAL FIRE PROTECTION ASSOCIATION STANDARD

In accordance with NFPA 13 Standard from the National Fire Prevention Association as referenced in sections 12.1.4 and 11.1.7: High Volume Low Speed (HVLS) Fans: The installation of HVLS fans in buildings equipped with sprinklers, including ESFR sprinklers, shall comply with the following:

- The maximum fan diameter shall be 24 feet (7.3m).
- The fan shall be approximately centered between four adjacent sprinklers.
- The vertical clearance from the fan to the sprinkler deflector shall be a minimum of 3 feet (0.9m).
- All fans shall be interlocked to shut down immediately upon receiving a water flow signal from the alarm system in accordance with the requirements of NFPA 72-National Fire Alarm and Signaling Code.

HARDWARE

Mount — Building

(x4) 1/2-13UNC x 2-1/2

(x4) 1/2-13UNC lock nut

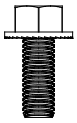
Mount — Assembly

(x2) 1/2-13UNC x 4-1/2 bolt

(x4) 1/2 dia. washer

(x2) 1/2-13UNC nyloc lock nut

Mount — Motor frame



(x4) 1/2-13UNC x 1-1/4 bolt

(x4) 1/2-13UNC lock nut

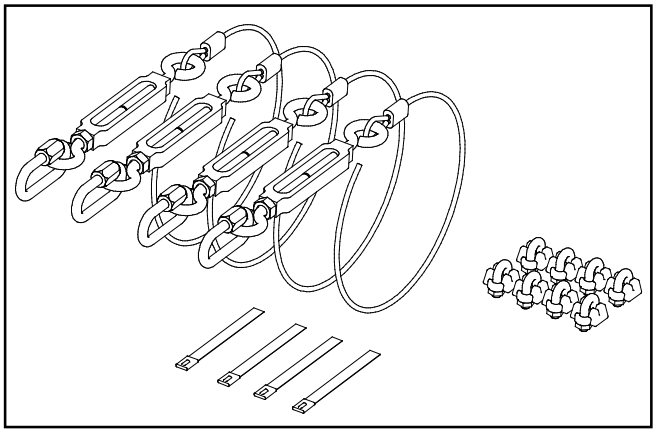
Mount — Blade

(x20) 3/8-16UNC lock nut

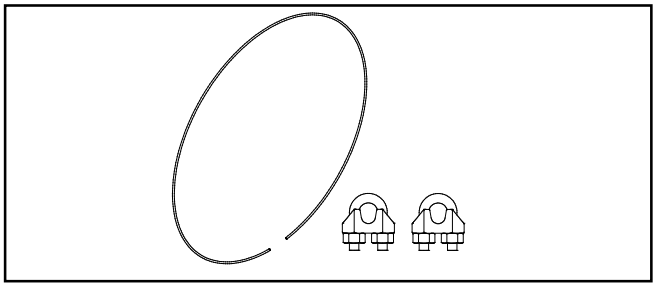
Fastener torque requirements

Description	Torque	Wrench size
1/2 dia mount hardware	44-48 ft-lbs.	3/4 hex
3/8 dia blade mount hardware	24-28 ft-lbs.	9/16 hex
Cable clamp, guy wire	Secure tight	5/16 nut driver
Cable clamp, safety cable	Secure tight	1/2 nut driver

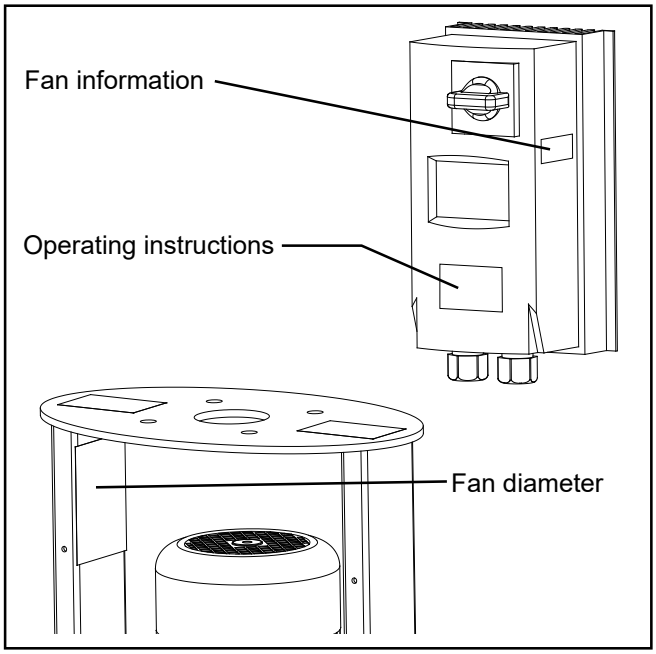
Guy wire assembly



Safety cable



Identification labels



NOTE:

Additional spare hardware is provided as a courtesy.

FAN KIT

PACKING KIT (STANDARD)

1. Blade Box - 3 blades per box
2. Fan Motor Box
   a. Motor/gearbox assembly
   b. Mounting hardware. See **Hardware on page 10**.
   c. Variable Frequency Drive (VFD) box.

REQUIRED TOOLS

- Wrenches: 9/16, 3/4 (x2), 1/2
- Sockets: 1/2, 9/16, 3/4
- Nut drivers: 5/16
- Torque wrench: 15-60 ft-lbs (for use with sockets)
- Wire strippers
- 1/4” cable cutter
- Tape measure
- Spirit level, short
- Gloves
- For laminated wood beam installations, a drill and 1/2” diameter drill bit are required.

Kit Hardware and Tool Requirements

Click here for video.

PRIOR TO FAN INSTALLATION

NOTICE

1. Ensure the supplied voltage matches the fan voltage.

   A label containing voltage information specific to the individual fan is located on side of the VFD box.

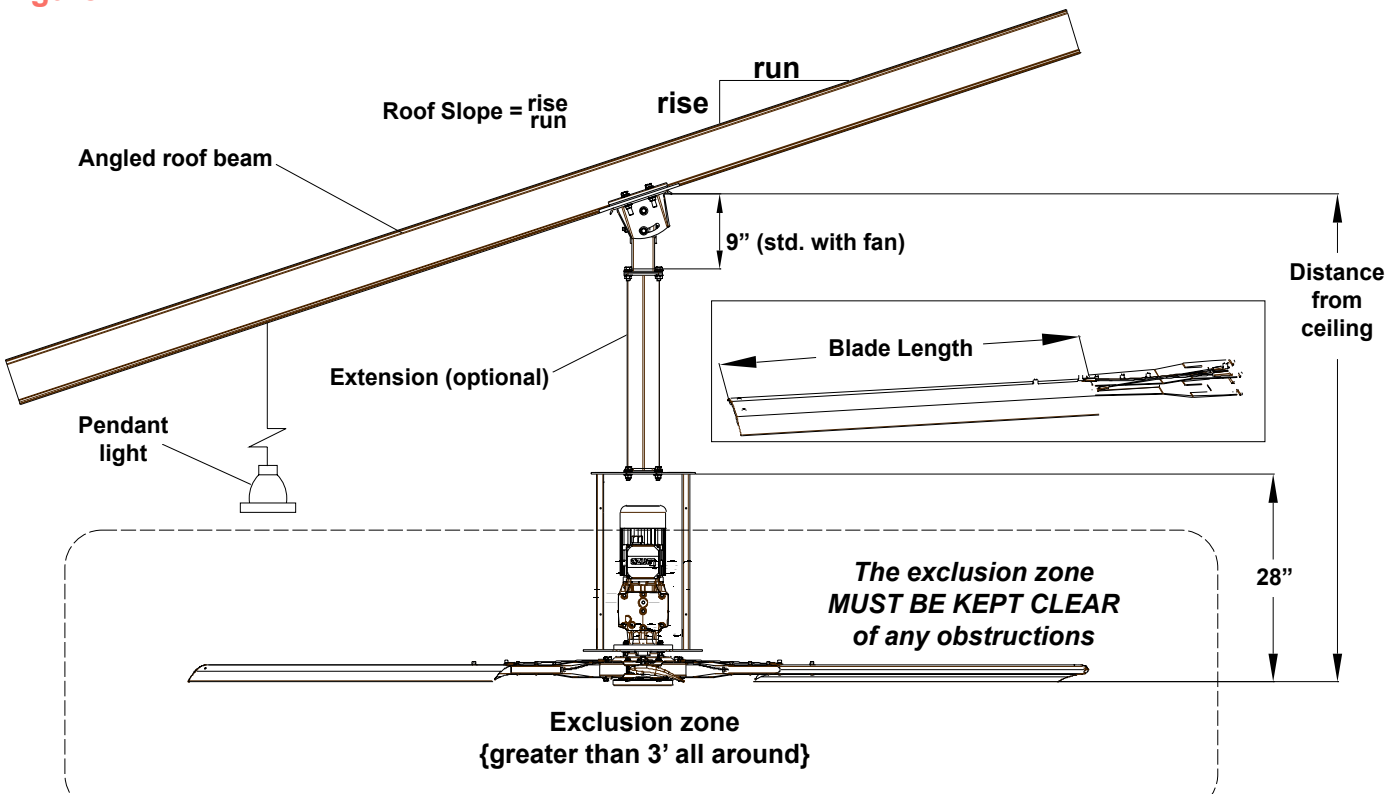
2. Ensure all mounting hardware shown in **Hardware on page 10** is present.

INSTALLATION CONSIDERATIONS

Installation
Considerations

Click here for video.

Figure 1



ROOF SLOPE

NOTICE	The chart below does not account for any obstructions below the mounting positions. All fans must still maintain 3’ between blades and typical obstructions.

INDUSTRIAL FAN							
Roof Slope*	0	2/12	3/12	4/12	Hanging Weight (LB)	Maximum Torque (Ft. Lb.)	
Roof Angle*	0	9.5°	14.0°	18.4"			Blade Length (in)
Fan Diameter	Extension requirement from mounting point (FT)						
12	0	1	2	2	165	300	45.16
16	0	2	2	3	170	300	69.16
20	0	2	3	4	180	300	93.16

* Non-standard obstructions may require additional length to the extensions. Please consult the factory for additional clarification on non-standard obstructions and assistance with fan placement and extension selection.

⚠WARNING	*Failure to maintain exclusion zones outlined in this section could result in fan failures, including blade separation, which could result in death or serious injury. DO NOT operate fans when physical obstructions or HVAC air flows extend into exclusion zones. Regularly inspect fans to ensure exclusion zones remain clear of interference before operating the fan.*

All fan blade parts must be greater than 3’ from all obstructions including lights, cables, sprinklers, and other building components and greater than one half 1/2 fan diameter from any wall to the end of the blade.

ROOF ANGLES

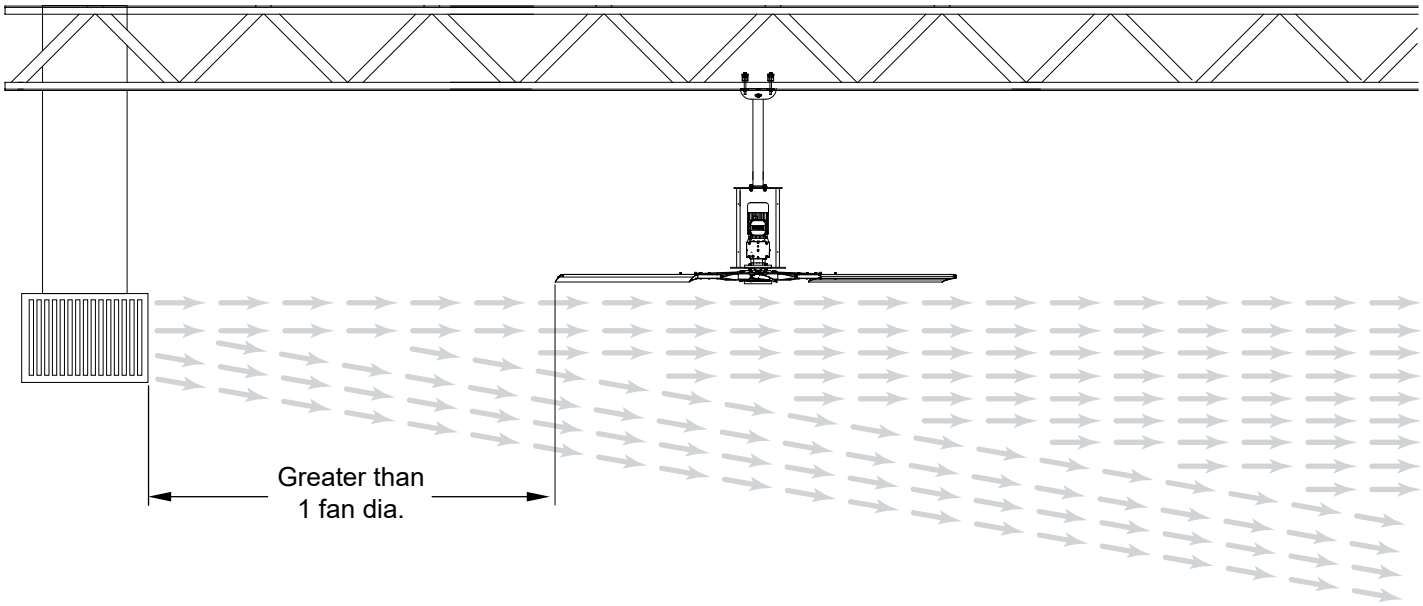
For roof angles in excess of 20°, consult the factory. The extension lengths shown are minimum recommendations only, based solely off roof pitch and fan diameter. Other considerations, such as placement of lights, sprinkler systems, HVAC systems, etc., must be evaluated when determining extension requirements. OSHA requirements state that fan blades must be at minimum 10’ above the floor.

CLEARANCE FROM HVAC EQUIPMENT

For applications near HVAC equipment, such as diffusers, radiant heaters, exhaust fans, louvers, etc., the HVLS fan must be installed at minimum distances. Refer to the figures below.

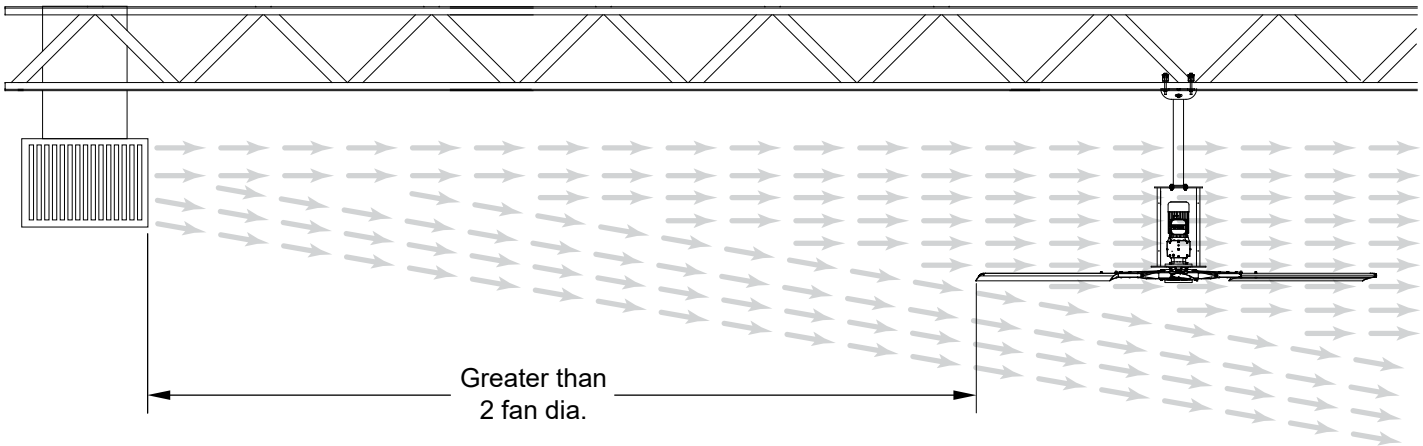
Fans located above HVAC equipment must have a minimum clearance of greater than or equal to 1 fan diameter. See **Figure 2**.

Figure 2



Fans located at or below HVAC equipment must have a minimum clearance of greater than or equal to 2 fan diameters. See **Figure 3**.

Figure 3

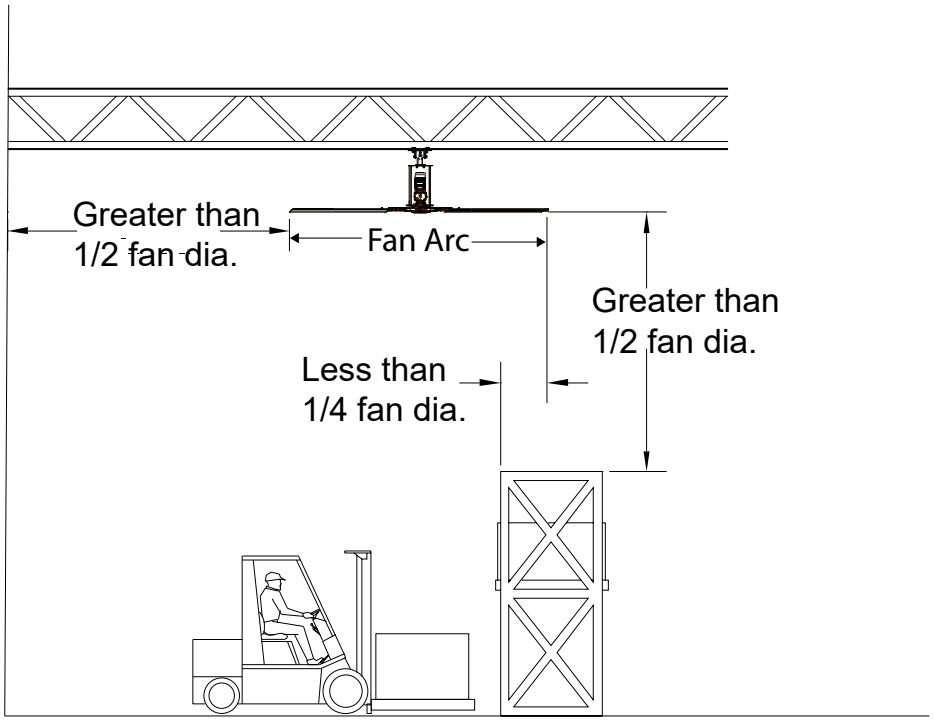


CLEARANCE FROM SOLID OBSTRUCTIONS CONSIDERATIONS

For applications near solid obstructions, the HVLS fan must be installed at minimum distances.

Fans located above solid obstructions, such as racks, walls, etc. must have a minimum distance of greater than or equal to 1/2 fan diameter above the obstruction. The obstruction below must also be less than or equal to 1/4 fan diameter inside the fan blade arc. See **Figure 4**.

Figure 4



BUILDING STRUCTURE

For open structure roof designs, the fan should only be hung from either an I-beam or angle iron. Do not hang the fan from purlins, joists, or truss structures unless all of the following apply:

- The truss can handle the load of the fan.
- The bottom chords of the truss are larger than 5 inches, but smaller than 101/2” combined.
- The fans are installed at the strongest point load on the truss.

For solid beam or laminated wood beam mounting, use the laminated wood beam mounting kit available from Entrematic.

Ensure the fan blade clearance meets the requirements shown in **Figure 1** through **Figure 4**.

NOTE:

Consult a professional engineer or registered architect for specific mounting concerns.

PLACEMENT AND SPACING

Consult your local distributor to help you plan the most efficient installation of your fans.

Ensure you place the fan so that fans are a minimum of 10’ from any manned working surface (floor or mezzanine).

Ensure the fan blades do not extend into the exclusion zone. Extensions are available if you need them. See **Installation Considerations on page 13.**

Avoid mounting fans directly under lights or skylights to avoid a visual strobing affect.

NOTICE	*Be sure to comply with all local and national codes during installation.*

INSTALLATION

⚠DANGER	*Before installation, make sure the power is disconnected and properly locked out.*

For fans that will be subjected to high cross winds due to open bay doors or air conditioning diffuser ducts, the fan must be at least one fan diameter (as measured from the end of the winglet) from open bays or A/C ducts mounted below the blade plane or there must be at least two fan diameters (as measured from the end of the winglet) for A/C ducts mounted at or above the blade plane.

FAN MOUNT ASSEMBLY

1. Fasten the pivot brackets to the extension tube with ears outboard.
2. Leave the 1/2” dia. x 4-1/2” bolts and nylock nuts finger tight. See **Figure 5**.

INSTALL FAN MOUNT

If the building support beam is not level, ensure the proper fan clearance using the mounting information in **Installation Considerations on page 13** or add mounting extensions as required to ensure clearance. See **Figure 1.**

If you have questions as to whether or not the truss can handle the fan load, you must consult a local structural engineer.

STANDARD I-BEAM

1. Locate the fan mount assembly on the bottom of the building support beam.
2. Align the mount assembly so that it is centered and square to the beam.
3. Install the clamps.

Figure 5

Grade 5 hardware or better

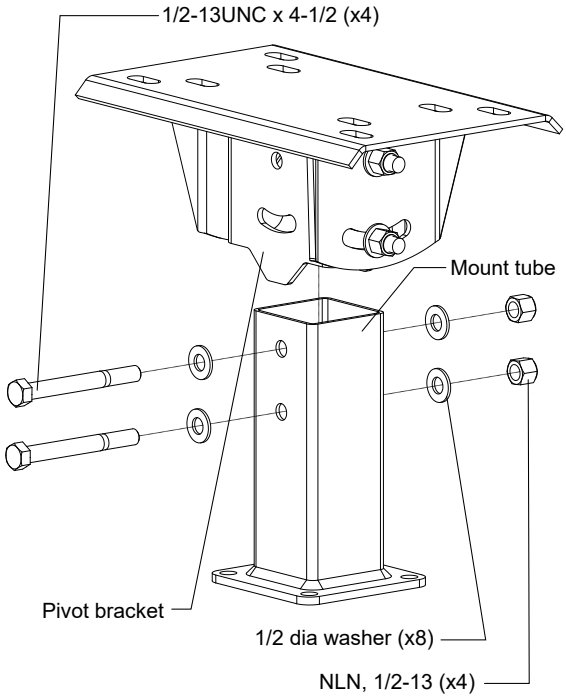
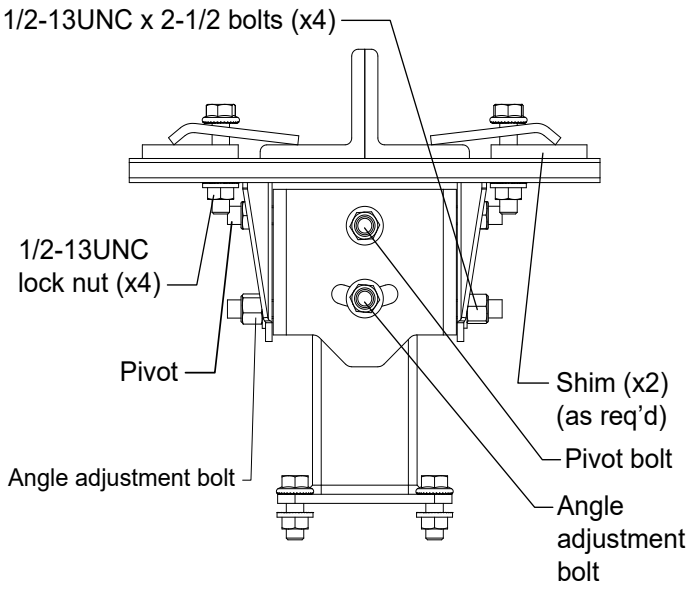


Figure 6



Fan Mount Assembly

Click here for video.

4. Add shims as required for thick flange I-Beams.
5. Fasten the clamps using the supplied 1/2” dia. x 2-1/2” screws, lock nuts, and washers.
6. Torque to 44-48 ft-lbs. See Figure 7.

LAMINATED WOOD BEAM MOUNTING — OPTIONAL KIT 6018028

1. Attach the laminated wood beam brackets to the wooden beam using a minimum of four 1/2” dia. grade 5 thru bolts and self-locking nuts (not supplied).
2. Ensure the brackets are square to the bottom of the beam.
3. Attach the mount assembly to the laminated wood beam brackets using the supplied 1/2” dia. x 2-1/2” screws, nylock lock nuts, and washers.
4. Torque to 44-48 ft-lbs. See Figure 8.

TRUSS MOUNT

To span two trusses or purlins with a gap of 96” or less, span the gap using two 4” X 4” steel angle irons. See Figure 9.

NOTE:

Do not span gaps larger than 96”.

Consult a professional engineer or registered architect for specific mounting concerns.

Drill holes in the appropriate locations to maintain proper exclusion zone clearance.

Figure 7

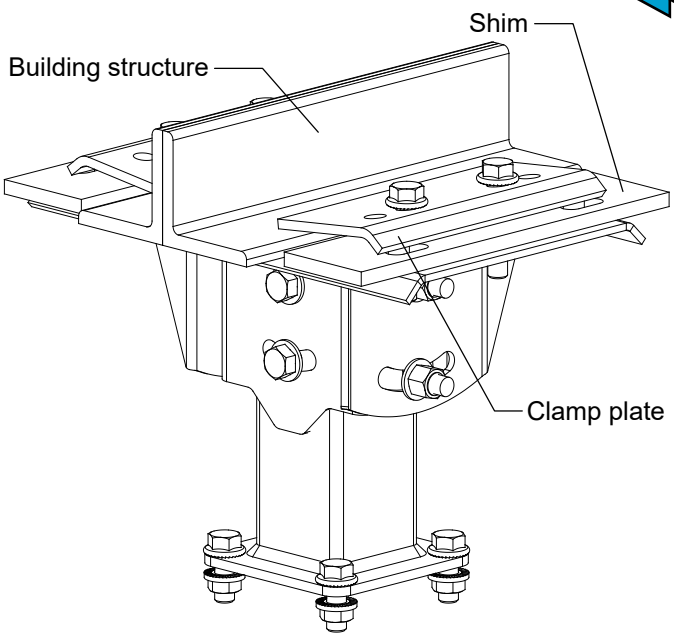


Figure 8

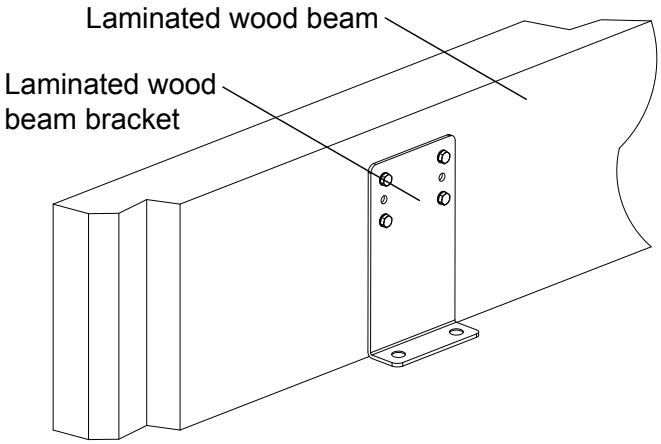
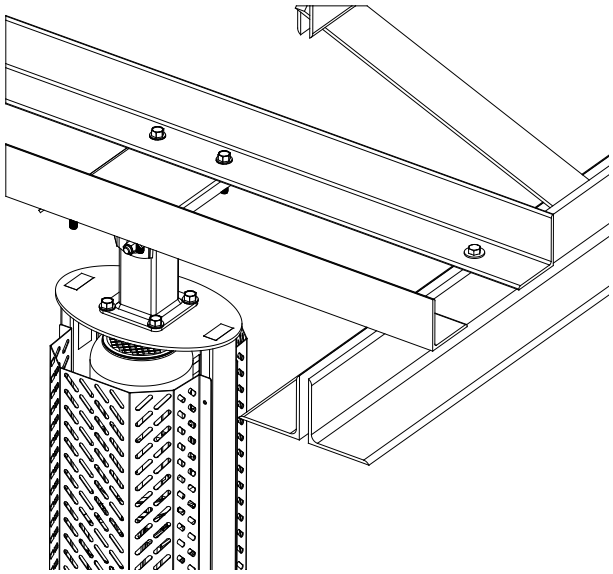


Figure 9



INSTALL THE POWER HEAD (MOTOR/ GEARBOX ASSY)

The power head may be oriented as required for aesthetics or commonality.

Leave the protective specialty foam bumper on the bottom of the power head assembly until the power head is mounted in place.

1. Using a powered lift, orient the power head with the blade hub down.
2. Block the motor as required for installation using the bottom of the frame assembly.

   Do not support it using the hub or hub cap.
3. Raise the power head up until it contacts the bottom of the fan mount assembly. See **Figure 10**. Attach the power head to the mount assembly using the supplied nuts and bolts. See **Figure 11.**
4. Immediately attach the safety cable.
   a. Slide two of the supplied 1/4” dia. cable clamps over each end of the cable spaced 6” apart.
   b. Slide the ends through the cable clamps.
   c. Make sure the cable goes through the motor frame. See **Figure 12.**
   d. Securely tighten the clamp fasteners.
   e. Make sure the u-bolts are over the free ends of the cable.
   f. Ensure the safety cable does not interfere with the fan motor housing.

Powerhead Installation

Click here for video.

Figure 10

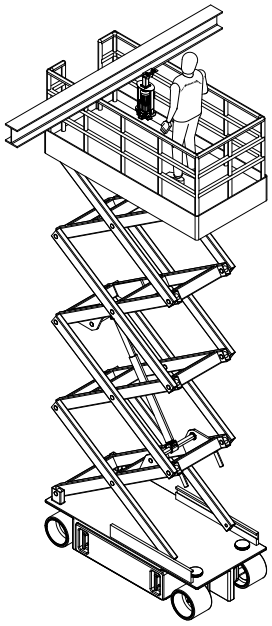


Figure 11

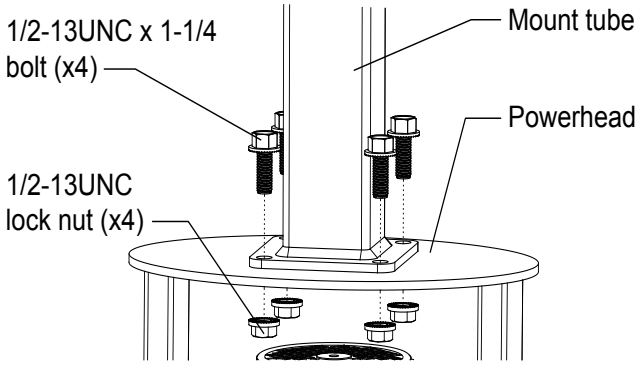
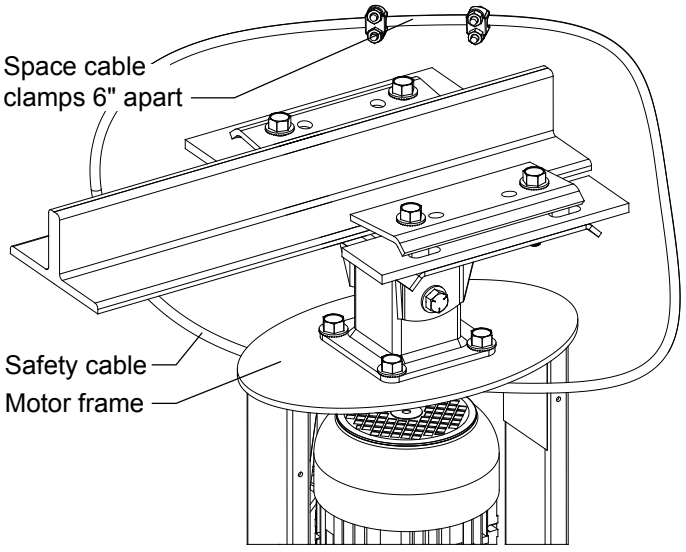


Figure 12



REMOVE THE GEARBOX VENT PLUG

1. Locate the ventilation plug on the gearbox. See **Figure 13.**
2. Pull and remove the plastic shipping brace and discard it.
3. Remove the yellow brace removal note and discard it.

INSTALL THE GUY WIRES

Guy wires are designed to constrain lateral movement of the fan when it is operating. This movement may be due to impacts on the fan or winds impinging on the blades causing the fan to sway.

Failure to attach guy wires may result in loss of warranty.

The longest extension allowed is 20’. Any extensions longer than 12’ must use the secondary guy wire kit (6020303 — standard and 60020304 — stainless steel).

⚠WARNING	*If you have used a mounting extension, make sure you use the longer guy wires accompanying the extension. Ensure the angle formed by the guy wire with the roof structure is less than 45°. See* **Figure 14***.* *Avoid all sharp edges or corners to reduce fatiguing and fraying of the guy wires.* *Failure to attach guy wires may result in severe injury or death.*

Figure 13

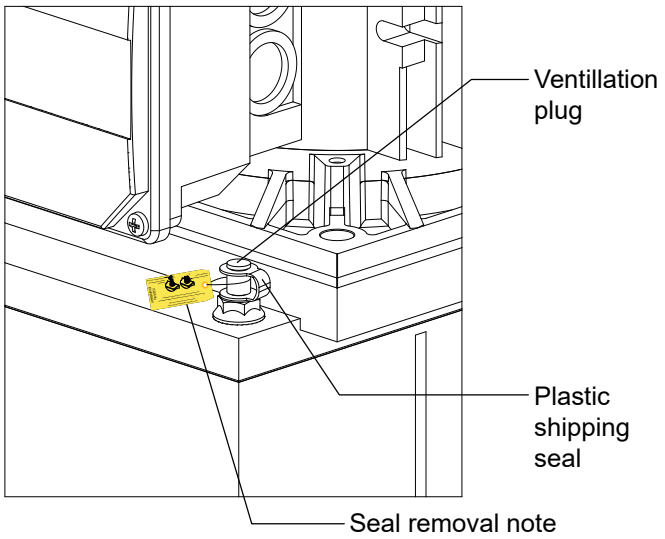
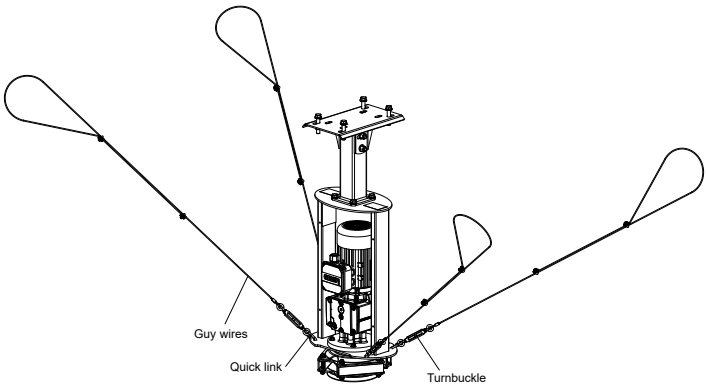


Figure 14



1. Adjust the turnbuckles to their longest position.
2. Attach the quick link with the attached turnbuckle to the fan as shown. See **Figure 15**.
3. Repeat for all four quick links.
4. Attach one end of the guy wire to the building structure.
5. Ensure the structure has sufficient strength to withstand the wire tension.
6. Repeat for all four guy wires.
   a. Slide two of the supplied 1/8” dia. cable clamps over one end of the wire.
   b. Feed that end of the wire through the building structure and back through the clamp fasteners.
   c. Securely tighten the clamp fasteners so they cannot slip.
   d. Make sure the u-bolts are over the free end of the cable.
7. Individually tighten the turnbuckles on each cable until it is taut and the power head unit hangs plumb.

   Use a spirit level to verify the power head unit hangs plumb.
8. Tighten the pivot and angle adjustment bolts on the fan mount. See **Figure 16**.
9. Torque to 44-48 ft-lbs. See **Figure 16**.

Attaching Guy Wires

Click here for video.

Figure 15

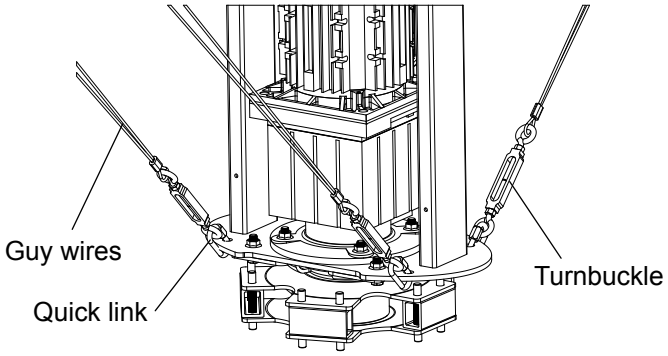
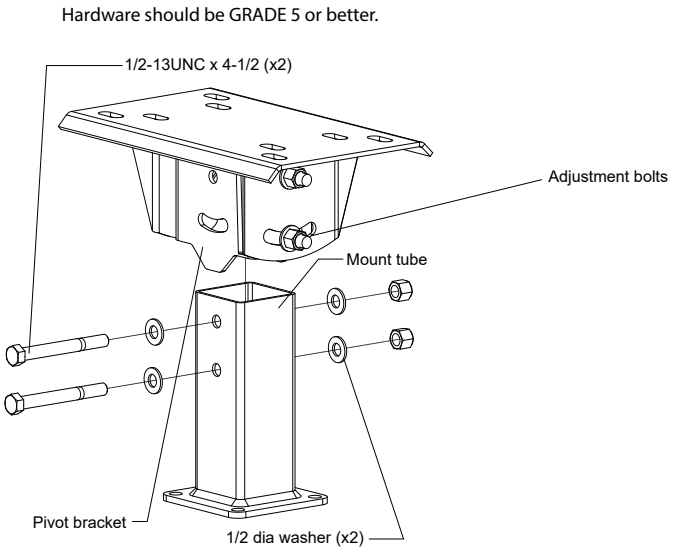


Figure 16



ELECTRICAL INSTALLATION

⚠DANGER	*Before doing any electrical work, make sure the power is disconnected and properly locked out and tagged out.* *Failure to do so may result in death or serious injury.* *All electrical troubleshooting and repair must be done by a qualified technician and meet all applicable codes.* *Do not route control wiring for any other device through the control box.* *Ensure that the voltage and phase of the incoming power agrees with the label located on the side of the VFD box and fan.* *Be certain the power is off when wiring to the control box.* *Failure to do so could result in electrical shock, death, or serious injury.*

STANDARD FANS

See **Electrical Schematics on page 27** for all field connections.

INSTALL THE VFD BOX

Verify the voltage and phase before mounting the box. Ensure the voltage from the building source wiring matches the voltage listed on the VFD box.

⚠WARNING	*The VFD must be mounted approximately 53" above the ground on the wall. Use no more than 82 linear feet (25m) of wire between the VFD and fan motor.*

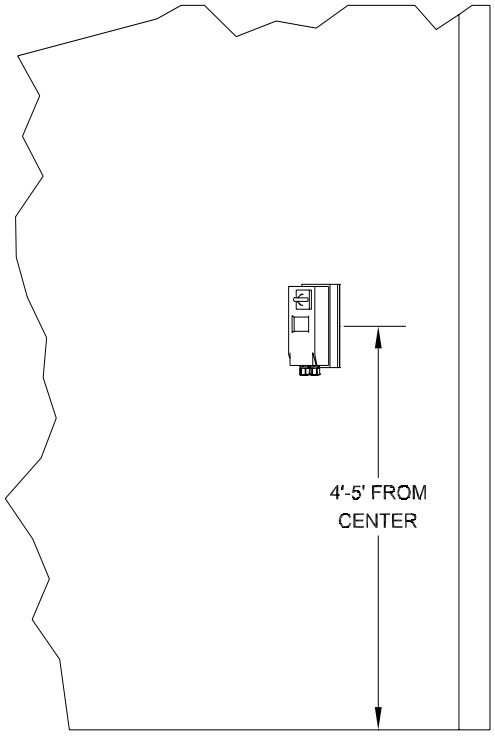
NOTICE	*Verify the voltage and phase before mounting.*

1. Ensure the voltage shown on the VFD box is correct.
2. Mount the VFD box approximately 53” above the floor on the wall. See **Figure 17.**

Install Fan Controls

Click here for video.

Figure 17



You will need to extend the cable.

Use a junction box and extend the cable using either SO or conduit and appropriately rated wire.

3. Route the fan S.O. cable from the fan to the VFD box and check to make sure the cable is supported throughout its routing.

NOTE:

Factory S.O. cable is 20 ft. long. Additional cable/conduit must be supplied by others.

4. Route the power supply from the building source to the VFD box.
5. Wire the VFD box in accordance with the Wiring Diagrams. See Figure 18 and Electrical Schematics on page 27.

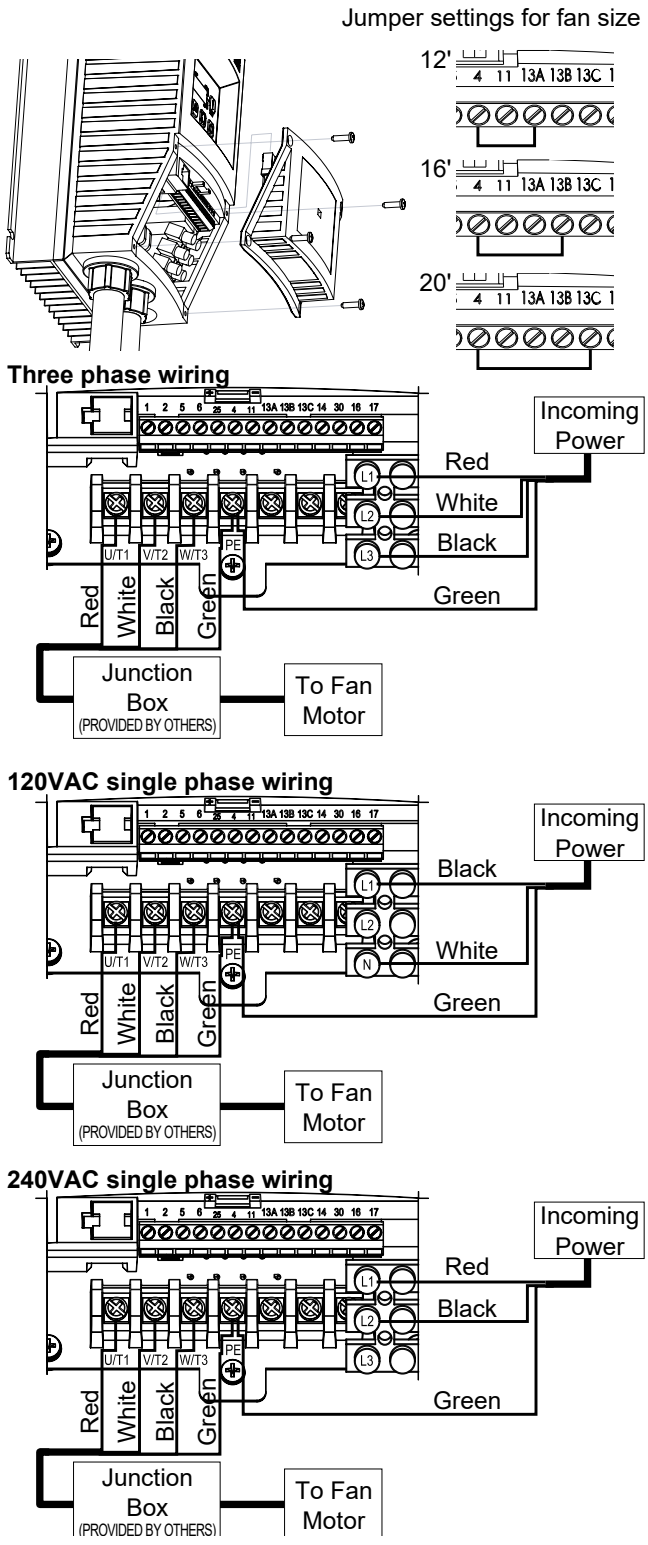
INSTALL THE BLADES

⚠ WARNING	*To reduce the risk of personal injury, do not bend the blade brackets when installing the brackets or cleaning the fan.* *Do not insert foreign objects in between the rotating fan blades.*

Blade assemblies come pre-assembled from the factory. Do not attempt to disassemble them.

The hub assembly has blade retention lock nuts pre-assembled to the hub. Remove them and use them to mount the assemblies as shown in the steps below.

Figure 18



Use only the factory supplied lock nuts provided for blade mounting.

1. With the blade oriented so that the blade retention lanyard is on top, support the blade assembly from below.
2. Orient and guide the assembly onto the top attachment studs on the hub assembly.
3. Spread the strut arms slightly onto the upper studs.
4. Angle the blade upward as needed onto the studs. See **Figure 19**.
5. Still supporting the blade assembly, rotate the blade assembly down and allow the bottom blade strut to ride up and over the bottom attachment studs on the hub assembly. See **Figure 20**.

NOTICE	*Do not lean on the blade. Damage to the strut may occur.*

6. Install the blade retention lock nuts.
7. Hand tighten the nuts to ensure the strut arms are firmly pressing against the hub.
8. Torque the blade retention nuts to 24-28ft-lbs. See **Figure 21.**
9. Repeat steps 1 through 8 for each blade assembly.

Figure 19

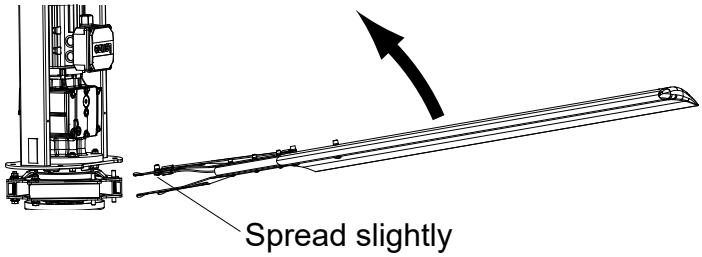


Figure 20

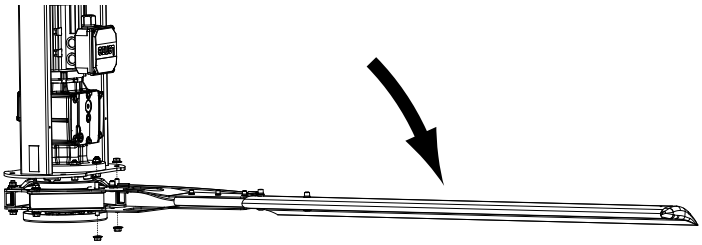
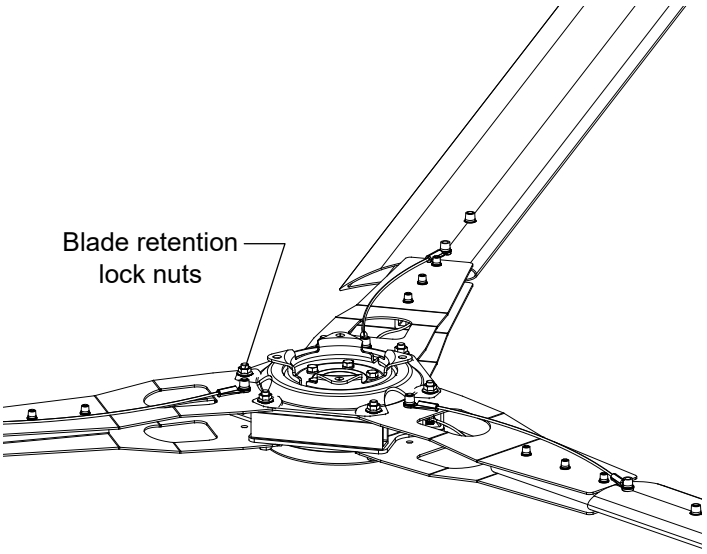


Figure 21



Install the Blades

Click here for video.

VERIFY CLEARANCE AND CABLE TENSION

1. Rotate the fan by hand and observe the clearance of each blade from its closest obstruction.
2. If necessary, reposition the fan.

NOTE:

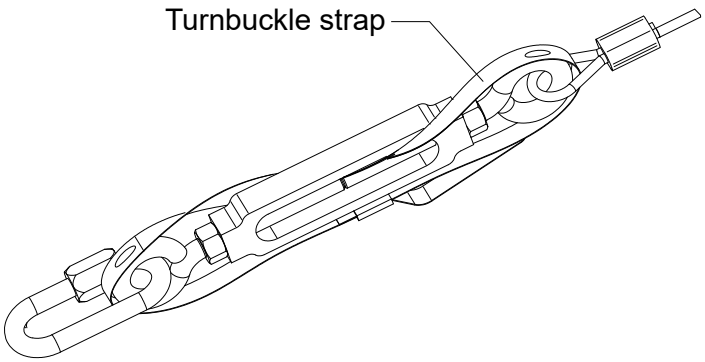
Blade tips droop when not in operation and rise when in operation.

3. Verify the guy wire tension by attempting to move the power head in any horizontal direction.

   If you detect movement, re-tension the guy wires.

4. Lock the individual turnbuckles using the stop nut on each.
5. Secure the turnbuckle with the turnbuckle strap. See **Figure 22**.

Figure 22



ELECTRICAL SCHEMATICS

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⚠DANGER

Before doing any electrical work, make certain the power is disconnected and properly locked out or tagged out. Failure to do so may result in death or serious injury.

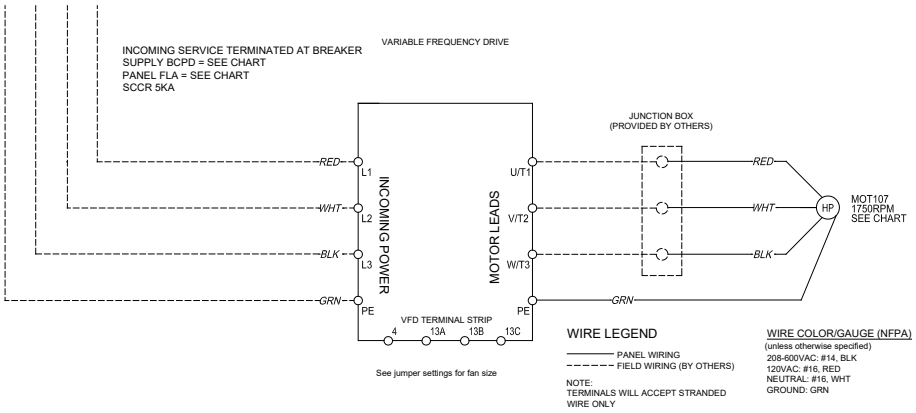
All electrical troubleshooting and repair must be done by a qualified technician and meet all applicable codes. Do not route control wiring for any other device through this control box.

Ensure the voltage and phase of the incoming power agrees with the label on the side of the VFD box and fan.

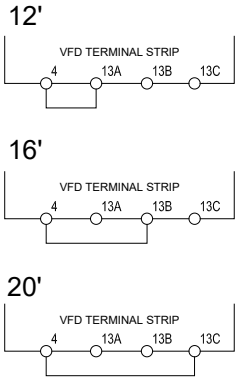
Be certain the power is off when wiring to the control box. Failure to do so may result in electrical shock, death, or serious injury.

THREE PHASE WIRING

Figure 23



Jumper settings for fan size



SIZING CHART

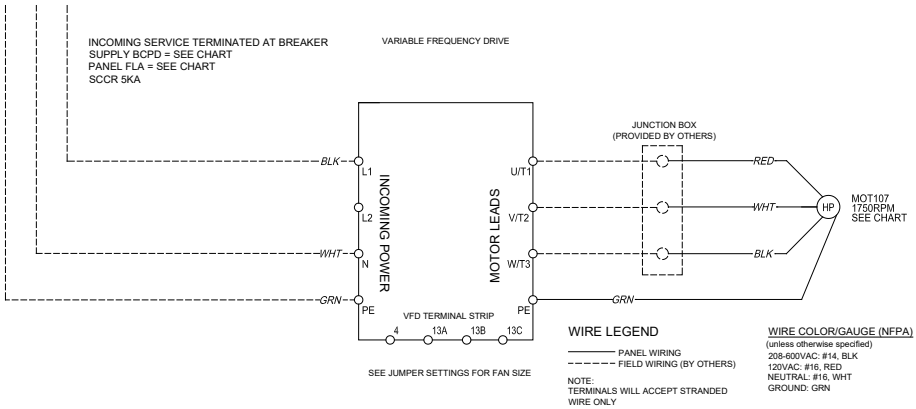
1. Field wiring is to be minimum 14AWG , 600V, 90°C.
2. The safety ground must be connected to the earth ground via the plant ground or business ground. Grounding points must comply with national and local safety regulations and/or electrical codes.

PART NUMBER	6022227	6022229	6022230
Voltage	460V 3PH 50/60HZ	230V 1/3 PH 50/60HZ	600V 3PH 50/60HZ
FLA	1.9A	1PH 7.2A/3PH 4.1A	1.8A
MOTOR	1HP, 1.46FLA@ 460V/60HZ	1 HP, 2.90FLA@ 230V/60HZ	1HP, 1.46FLA@ 460V/60HZ
VFD	480VAC 3PH 1HP/0.75KW 2.5A	240VAC 1/3 PH 1HP/0.75KW 8.8A/5.0A	600VAC 3PH 1HP/0.75KW 2.0A

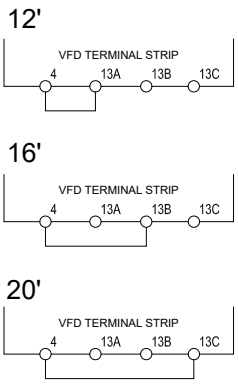
PART NUMBER	6022227	6022229	6022230
O/L	1.46	2.90A	1.46
Supply BCPD	10A	1PH 15A/3PH 10A	10A

120VAC SINGLE PHASE WIRING DETAILS

Figure 24



Jumper settings for fan size



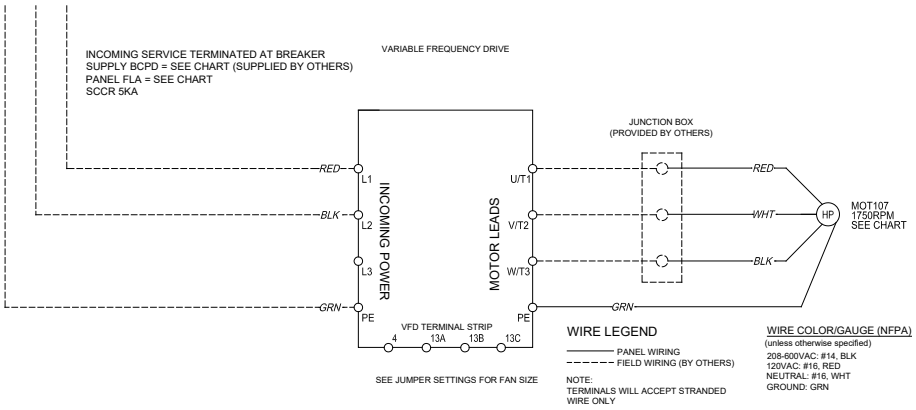
SIZING CHART

1. Field wiring is to be minimum 14AWG , 600V, 90°C.
2. The safety ground must be connected to the earth ground via the plant ground or business ground. Grounding points must comply with national and local safety regulations and/or electrical codes.

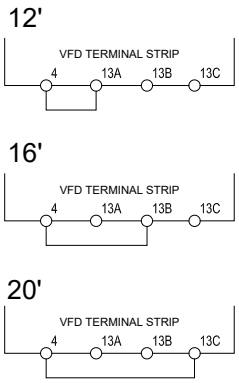
PART NUMBER	6022228
Voltage	120V 1PH 50/60HZ
FLA	12.1A
Motor	1HP, 2.90FLA @ 230V/60HZ
VFD	120V 1PH 1HP/0.75KW 16.6A
O/L	2.90A
Supply SCPD	25A

240VAC SINGLE PHASE WIRING

Figure 25



Jumper settings for fan size



SIZING CHART

1. Field wiring is to be minimum 14AWG , 600V, 90°C.
2. The safety ground must be connected to the earth ground via the plant ground or business ground. Grounding points must comply with national and local safety regulations and/or electrical codes.

PART NUMBER	6022229
Voltage	230V 1/3PH 50/60HZ
FLA	1PH 7.2A/3PH 4.1A
Motor	1HP 2.90FLA @ 230V/60HZ
VFD	240VAC 1/3PH 1HP/0.75KW 8.8A/5.0A
O/L	2.90A
Supply SCPD	1PH 15A/3PH 10A

FIRE CONTROL SYSTEM FAN SHUTDOWN — OPTIONAL

This fan includes a fire alarm jumper to use if you have a building fire control system option that allows the fan to be shut-down by the fire control system in case of a fire emergency.

NOTE:

Be sure the fire alarm jumper is in place or the building fire control system is connected and the jumper removed.

The normally closed (NC) contacts must be dry contacts. They open when there is an active fire alarm.

ENABLE THE FIRE CONTROL SYSTEM

NOTE:

This feature is optional.

The fire control system fan shutdown is not enabled when the fan is shipped. To enable the shutdown option:

1. Remove the jumper between terminals 4 and 13.
2. Replace the jumpers with a set of dry, normally closed contacts.

   See the **Fire Control System Fan Shutdown Panel — Standard Install — Optional (6015291) on page 31**

TEST THE FIRE CONTROL SYSTEM

To test the fire control system fan shutdown operation, remove the wire from the NC contact at the building fire control panel. The fan should coast to a stop.

NOTE:

If the jumper is left installed, the fan will not shut down due to fire control system contacts.

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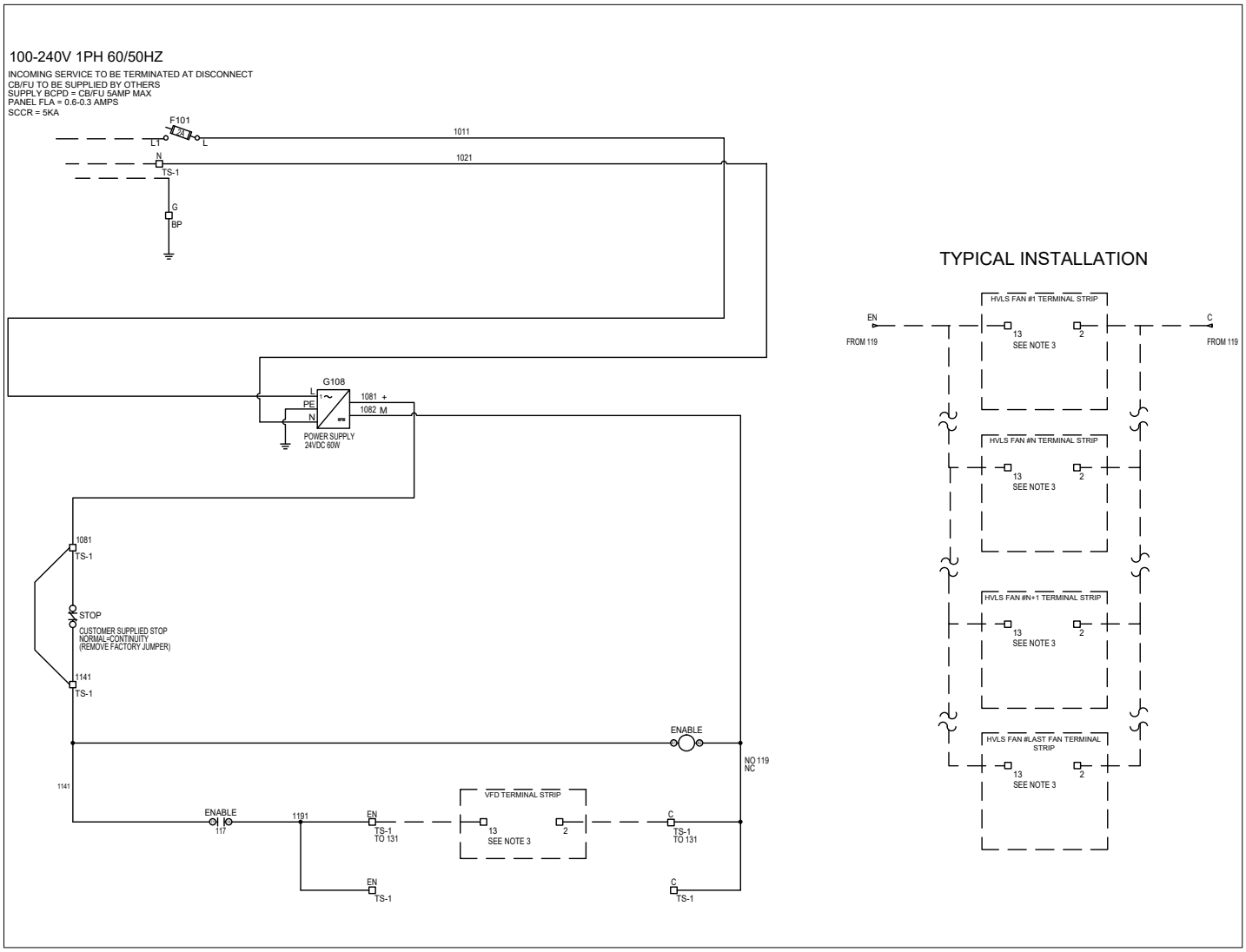
FIRE CONTROL SYSTEM FAN SHUTDOWN PANEL — STANDARD INSTALL — OPTIONAL (6015291)

NOTE:

This feature is optional.

Figure 26



OPERATING INSTRUCTIONS

⚠WARNING

Before operating the industrial fan, read and follow **Safety Practices on page 6** *and* **Operating Instructions on page 32** *Use by untrained personnel could result in death or serious injury.*

VERIFY PRIOR TO OPERATION

Before operating the fan, verify the following:

- The voltage and phase are correct.
- The fan is clear of all obstructions.
- The safety cables are present and properly installed.
- All fasteners are properly torqued.

RUNNING THE FAN

1. Look at the LED lights on the touchpad to determine if the fan is running in reverse or forward. See Figure 27.
2. To change directions, press the **Reverse/ Forward** button, and then within two seconds press the enter button.
3. Use the **Up/Down** buttons, select the desired speed (1-5).
4. Press the green RUN button and the fan begins motion.

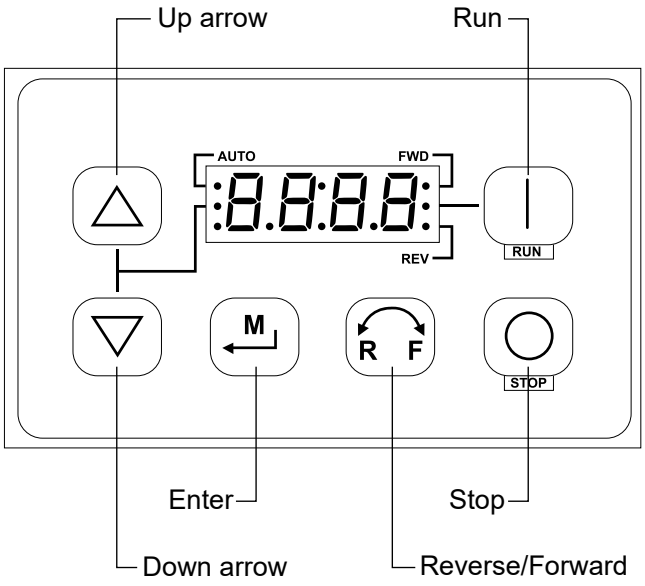
CHANGING DIRECTION DURING MOTION

It is not necessary to stop the fan before changing directions. To change direction:

1. Press the **R/F** (Reverse/Forward) button.
2. Within two seconds, press the **enter** button.

Figure 27

VFD Touchpad



Operate the Fan

Click here for video.

CHANGING SPEED DURING MOTION

- Press the up or down arrow to set your desired speed (1-5).

  The display automatically changes back to the running speed after two seconds.

  The fan slowly increases or decrease speed until it reaches the speed on the display.

STOPPING THE FAN

- To stop the fan, press the red stop button.

  The current fan speed starts decreasing. When it reaches 0.0, the display changes to STOP.

  The speed at shutdown remains in memory. The next time you start the fan, it resumes running at the last speed and direction.

FAULT CODES

If a Fault occurs, the code displays on the touchpad. Match the Fault Code with the faults listed in the table **Variable Frequency Drive — Fault Codes on page 34.**

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VARIABLE FREQUENCY DRIVE — FAULT CODES

The following codes display on the VFD when a fault occurs.

Display	Fault	Cause	Remedy
F_AF	High Temperature Fault	Drive is too Hot inside	Reduce drive load
			Improve cooling
F_HF	High DC Bus Voltage Fault	Mains Voltage is too High	Check mains Voltage
F_LF	Low DC Bus Voltage Fault	Mains Voltage is too Low	Check mains Voltage
F_OF 1	Output Fault: Ground Fault	Grounded Motor Phase	Check motor and motor cable
		Excessive capacitive charging current of the motor cable	Use shorter motor cables with lower charging current
F_OF	Output fault: Transistor fault	Output short circuit	Check motor/motor cables
		Severe motor overload	Check machine/system
		Excessive capacitive charging current of the motor cable	Use shorter motor cables
			Use low capacitance motor cables
			Install reactor between motor and drive
		Failed output transistor	Contact factory technical support
F_PF	Motor Overload Fault	Excessive motor load for too long	Check Motor/Load
F_SF	Single Phase Fault	Possible loss of power supply	Check supply volt
F_F 1	EPM fault	EPM missing or defective	Power down and replace EPM
F.JPr	Jumper Fault	Fan Size Jumper missing	Replace Jumper for Size by Schematic
		Fire Control Input Missing	Check Fire Control Relay Input
F_UF	Start Fault	Start command was present when power was applied	Must wait at least 2 seconds after power-up to apply start command

PLANNED MAINTENANCE

⚠DANGER	*Before service, inspection, or cleaning make sure the power is disconnected and properly locked out.*

⚠WARNING	*Before servicing the industrial fan, read and follow* **Safety Practices on page 6** *and* **Operating Instructions on page 32**. *Failure to do so could result in death or serious injury.*

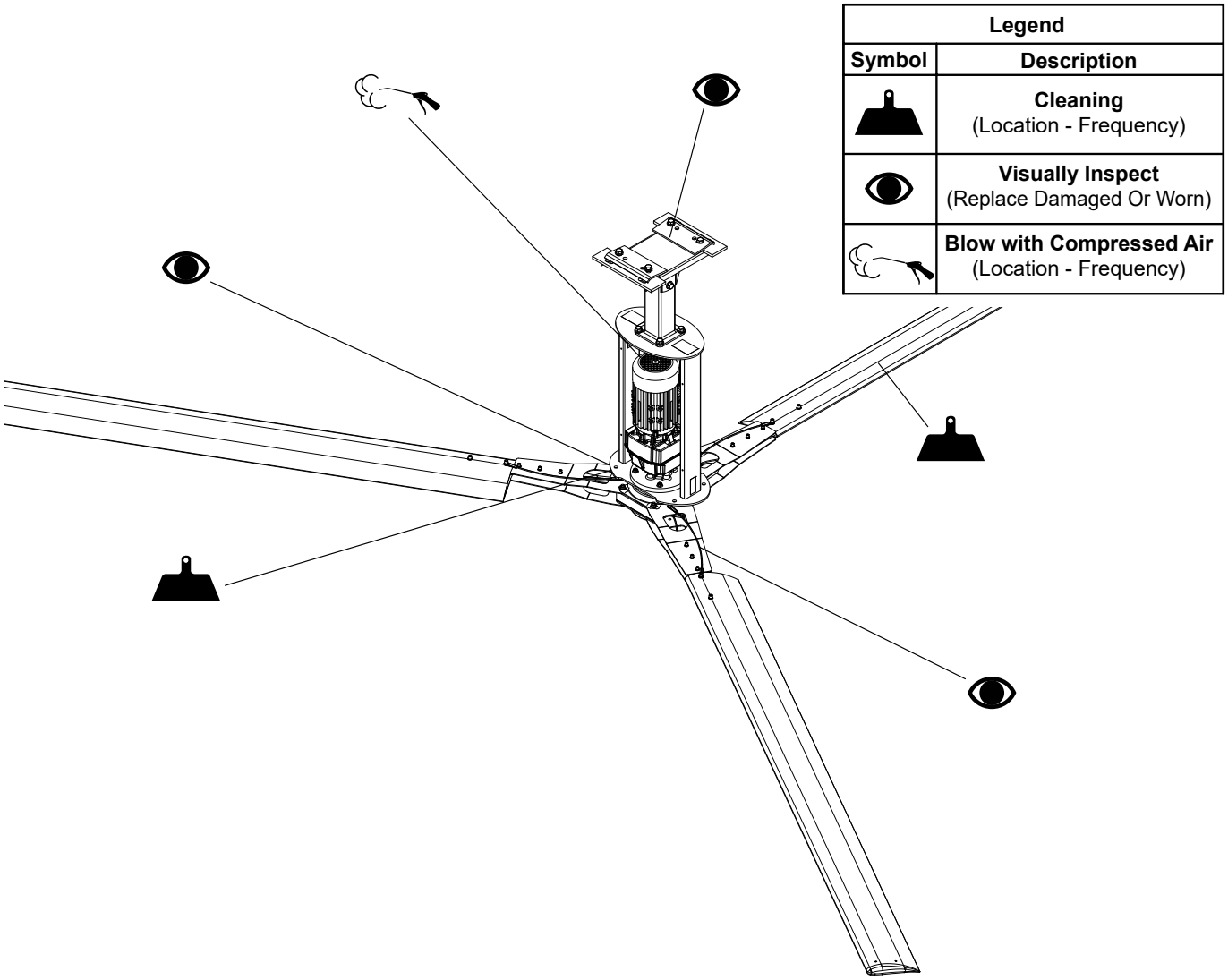
To ensure the continued proper operation of your industrial fan, perform the following maintenance procedures.

ANNUALLY

See **Figure 28**.

1. Inspect the VFD box for loose connections and tighten them as needed.
2. Use dry (shop) air to blow out debris from the fan cooling motor as required.
3. Inspect the motor/gearbox for oil leaks, and if present contact your distributor.
4. Inspect the mounting hardware and tighten as required. Torque to 44-48ft-lbs.
5. Inspect the safety and guy wires for chafing or wear. Replace as required.
6. Inspect the turnbuckle nut to ensure it is secure.
7. Inspect the guy wires for tension, and re-tighten as required.
8. Clean the fan blades as required with a soft, dry cloth. If necessary, use a mild detergent to clean surfaces. Do not use harsh cleaners.

Figure 28


Legend
Symbol
Description
Cleaning
(Location - Frequency)
Visually Inspect
(Replace Damaged Or Worn)
Blow with Compressed Air
(Location - Frequency)

TROUBLESHOOTING GUIDE

⚠DANGER	*Before doing any electrical work, make certain the power is disconnected and properly locked out or tagged out. Failure to do so may result in death or serious injury.* *All electrical troubleshooting and repair must be done by a qualified technician and meet all applicable codes. Do not route control wiring for any other device through this control box.* *Ensure the voltage and phase of the incoming power agrees with the label on the top of the VFD box and fan.* *Be certain the power is off when wiring to the control box. Failure to do so may result in electrical shock, death, or serious injury.*

⚠WARNING	*Before servicing the industrial fan, read and follow* **Safety Practices on page 6** *and* **Operating Instructions on page 32***. Failure to do so could result in death or serious injury.*

The functions of the industrial fan are controlled by a Variable Frequency Drive (VFD). Fault codes display on the VFD display.

Use the Troubleshooting Guide if the industrial fan fails to perform properly. Find the condition that most closely matches your situation and make the recommended adjustments.

PROBLEM	POSSIBLE CAUSE	SOLUTION
Fan does not operate.	No power to the control panel.	Ensure the disconnect is in the ON position. Check for primary power at the terminals.
Fan does not operate. Control panel has power	Obstructions are preventing movement.	Check the fan unit to ensure there are no obstructions preventing movement.
	VFD faulted	Check for a VFD fault. Check the fault code, and then resolve the code. Reset the drive by turning the power OFF and then ON.

PROBLEM	POSSIBLE CAUSE	SOLUTION
Fan is operating, but turning in the wrong direction.	Wire sequence is incorrect.	Switch the two phases of the output wiring from the VFD to the motor.
Fan is operating, but shows excessive wobble.	The guy wires are not properly tensioned.	Re-tension the guy wires in accordance with **Install the Guy Wires on page 21**.
Fan is generating a ticking noise and the tick increases as the fan speeds up.	The blade bolts are not properly tightened.	Loosen the blade nuts. Support the blade level (horizontally). Torque the bolts to 24-28 ft-lbs.

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COMPONENTS AND SPECIFICATIONS

VFD

- NEMA4X
- Solid State Variable Frequency Drive (VFD)
- 120VAC/1PH
- 208-240VAC/1PH
- 208-600VAC/3PH
- UL and ULC listed panel
- Power Disconnect
- FUSED by OTHERS

MOTOR

- NEMA Standard T.E.F.C.
- 1HP
- Continuous duty three phase

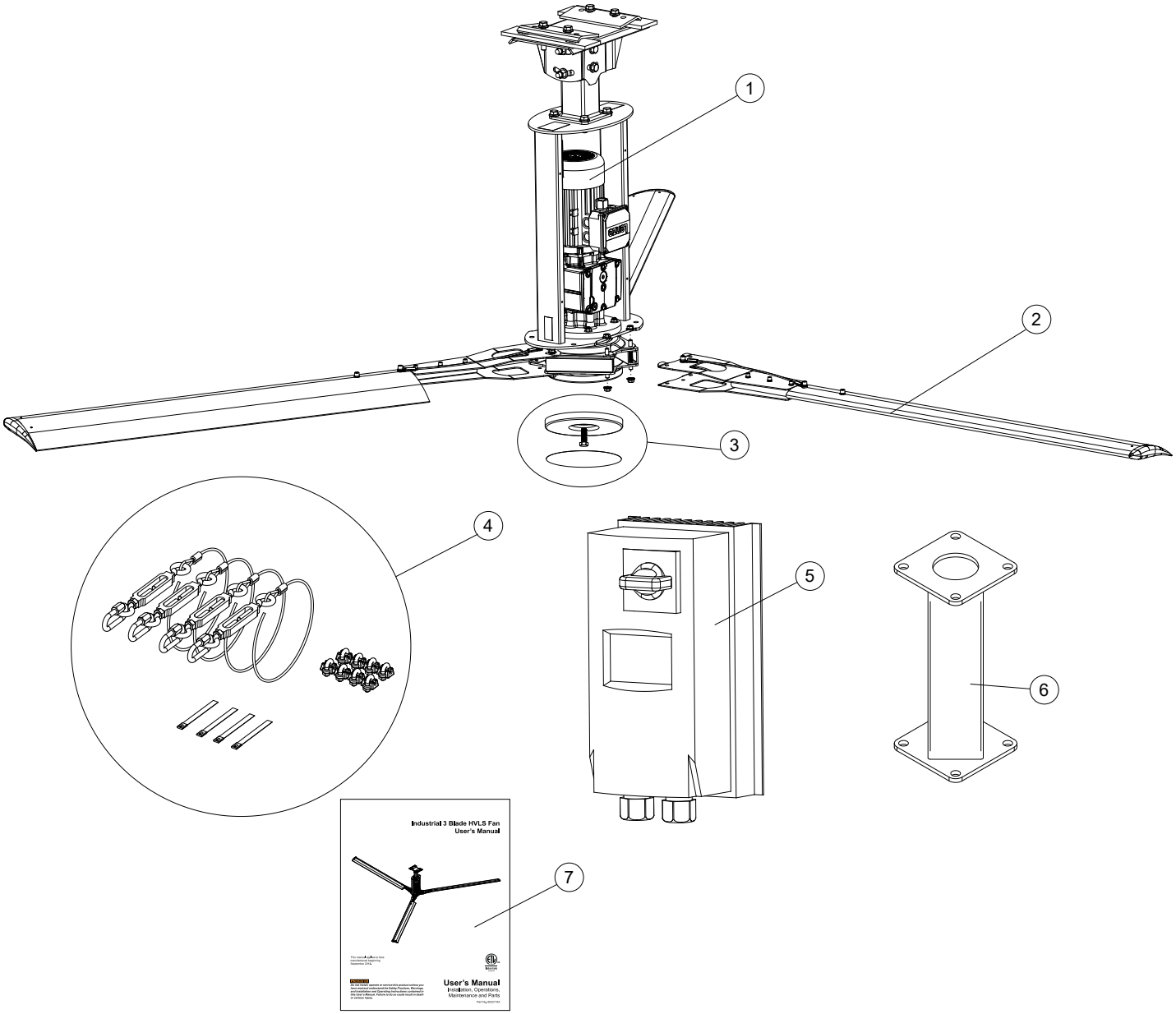
GEARBOX

- Double helical gear reduced
- Sealed lubrication

PARTS LIST

⚠WARNING	*To ensure proper function, durability, and safety of the product, only replacement parts that do not interfere with the safe, normal operation of the product must be used.* *Incorporation of replacement parts or modifications that weaken the structural integrity of the product, or in any way alter the product from its normal working condition at the time of purchase from Entrematic could result in product malfunction, breakdown, premature wear, death, or serious injury.*

Figure 29



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ITEM	QUANTITY	DESCRIPTION	PART NUMBER
1	1	POWERHEAD, 1.0HP, 2073 HIGH V, 3X FAN,	6021931
		POWERHEAD, 1.0HP, 2073, LOW V, 3X FAN	6021930
2	1	BLADE ASSY, 12', 3X FAN	6021936
		BLADE ASSY, 16', 3XFAN	6021934
		BLADE ASSY, 20', 3X FAN	6021932
3	1	HUB CAP KIT - SERCO	6015113
		HUB CAP KIT - KELLEY	6015112
		HUB CAP KIT-EPIC	6022250
		HUB CAP KIT-Amarr	6022249
4	1	HARDWARE KIT - 3X FAN	6021948
5	1	VFD, 12FT, 120-230VAC SINGLE PHASE, 3X FAN	6022228
		VFD, 12FT, 230V 1-3PHASE, 3X FAN	6022229
		VFD, 12FT, 480-600VAC 3 PHASE, 3X FAN	6022230
6	1	HVLS EXT MNT 24" - OPTIONAL	6015866
		HVLS EXT MNT 36" - OPTIONAL	6015867
		HVLS EXT MNT 48"' - OPTIONAL	6015868
		HVLS EXT MNT 60" - OPTIONAL	6015869
		HVLS EXT MNT 72" - OPTIONAL	6015870
		HVLS EXT MNT 84" - OPTIONAL	6015871
		HVLS EXT MNT 96" - OPTIONAL	6015872
		HVLS EXT MNT 108" - OPTIONAL	6015873
		HVLS EXT MNT 120" - OPTIONAL	6015874
		HVLS EXT MNT 132" - OPTIONAL	6015875
		HVLS EXT MNT 144" - OPTIONAL	6015876
7	1	USER'S MANUAL	6022110

Please direct questions about your industrial HVLS fan to your local distributor. Your local distributor is:

TOC

Corporate Office

1612 Hutton Drive, Suite 140

Carrollton, TX 75006

Tel: (972) 466-0707

Fax: (972) 323-2661

Scan this code or click here to locate an APS Resource distributor.

APS Resource

262.518.1000

For replacement parts, please call the number above.