

# HIGH-5

## INSTALLATION INSTRUCTIONS

**110/220V Single-Phase Input using ABB ACS255 VFD**



**PATTERSON**  
THE AUTHORITY IN AIR MOVEMENT

For an electronic copy of these instructions, please visit [www.pattersonfan.com/high-5](http://www.pattersonfan.com/high-5)

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Patterson Fan Company  
1120 Northpoint Blvd.  
Blythewood, SC 29016  
(800) 768-3685  
[www.pattersonfan.com](http://www.pattersonfan.com)



## IMPORTANT SAFETY INFORMATION

# READ AND SAVE THESE INSTRUCTIONS

TO REDUCE THE RISK OF FIRE, ELECTRIC SHOCK, OR INJURY TO PERSONS, OBSERVE THE FOLLOWING:

**WARNING:** Installation and electrical wiring of this fan must be performed by qualified person(s) in accordance with all applicable codes and standards.

**WARNING:** Ensure that power is off before attempting installation.

**WARNING:** Installation of this fan must be completed in accordance with the procedures set forth in this manual, the National Electric Code, ANSI/NFPA 70, and any applicable local codes. Code compliance is the responsibility of the installer, and ultimately the end user.

**WARNING:** Use this unit only in the manner intended by the manufacturer. If you have questions, contact the manufacturer.

**WARNING:** Before servicing or cleaning unit, switch power off at service panel and lock the service disconnecting means to prevent power from being switched on accidentally. When the service disconnecting means cannot be locked, securely fasten a prominent warning device, such as a tag, to the service panel.

**WARNING:** To reduce the risk of fire, electric shock or injury to persons, Patterson High-5s must be installed with Patterson High-5 supplied controllers that are marked (on their cartons) to indicate the suitability with this model. Other controllers cannot be substituted.

**CAUTION:** When service or replacement of a component requires the removal or disconnection of a safety device, the safety device is to be reinstalled or remounted as previously installed.

**WARNING:** Potential risk of fire, electric shock, or injury to persons during cleaning and user maintenance. Disconnect the fan from the power supply before servicing.

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

**WARNING:** To reduce the risk of fire, electric shock, or personal injury, mount directly to a structural framing member.

**ATTENTION:** This fan is suitable for use with solid-state speed controls.

**WARNING:** This product can expose you to chemicals which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).

## MECHANICAL ITEMS INCLUDED IN YOUR SHIPMENT

- 1 Fan Drive Assembly
- 1 Beam Mounting Bracket
- 5 Fan Blades
- 5 Fan Blade Flaps
- 5 Fan Blade End Caps
- 4 1/4" Turnbuckles with jam nuts
- Gearbox Vent **(Must be installed)**
- Bolts, nuts, washers, and clamps of various sizes (see Installation Instructions for types and quantities)

## ELECTRICAL ITEMS INCLUDED IN YOUR SHIPMENT

- 1 Lockable disconnect with installation instructions
- 1 ABB ACS355 Variable Frequency Drive (VFD)
  - a. Three (3) wire crimps for motor control cable
  - b. One (1) ACS255 drive User's Manual
  - c. 1 motor control cable (fan motor to VFD)
  - d. Two (2) motor cable strain reliefs

## FAN SAFETY COMPONENTS PROVIDED


- Drive Assembly safety cable (1)
- Guy wires (4)
- Blade Safety Brackets (5)

## TOOLS TO GET STARTED

- Scissor lift
- Wrench and socket set (5/16"-3/4" needed)
- Cordless power driver with clutch and Phillips Bit
- 1/4" Nut driver
- Torque wrench
- Standard and Phillips screwdrivers
- Instrument screwdriver (1/8" flat blade)
- Wire stripper/cutter
- Level
- 1/8" "L" shaped Allen wrench
- Four (4) beam clamps with eye bolts



Check that all necessary parts are included with your shipment. Should an item be missing, contact Patterson immediately at (800) 768-3985.

## FAN SPACING, PLACEMENT, & CLEARANCE

 Fans should be mounted such that the blades are a minimum of 10 feet above the floor. The ideal height is 20 to 25 feet. Also, ensure that the fan blades have a clearance equal to **15% of the fan's diameter in all directions**.

Care should be taken when installing the fan around a fire sprinkler system. The VFD is equipped with the ability to connect to a fire suppression system – stopping the fans in case of a fire. **However, it is the responsibility of the installer to read and comply with all local codes and regulations.**

## MAINTENANCE

  Prior to performing any maintenance on the fan, it **MUST** be disconnected from the power source by means of the separate lockable disconnect (provided).

**VFD Box** – Clean heat dissipating fins on the back of the box periodically.

**Gearbox** – Periodic maintenance will ensure your fan remains operational for its intended life. While Patterson recommends the end-user check and change the gearbox oil annually, failure to do so will not void any warranties. Oil type used is Chevron® Delo Gear ESI 85W-140. Contact Patterson at (800) 768-3985 for availability.

**Hub Grease** – Hub should be inspected yearly to ensure proper lubrication. Grease type is Chevron Delo HD Moly 5%. There are two grease fittings, an upper and lower. Add grease as needed, filling each area slowly until grease passes through the upper seal.

**Mounting Hardware** – All nuts and bolts related to mounting of the fan unit should be checked for tightness annually. In addition, guy wires need to be inspected to ensure they remain taut and show no signs of fraying.

**Blades** – Blades can be occasionally wiped down with a damp cloth. A mild detergent can also be used if desired.

# PART 1

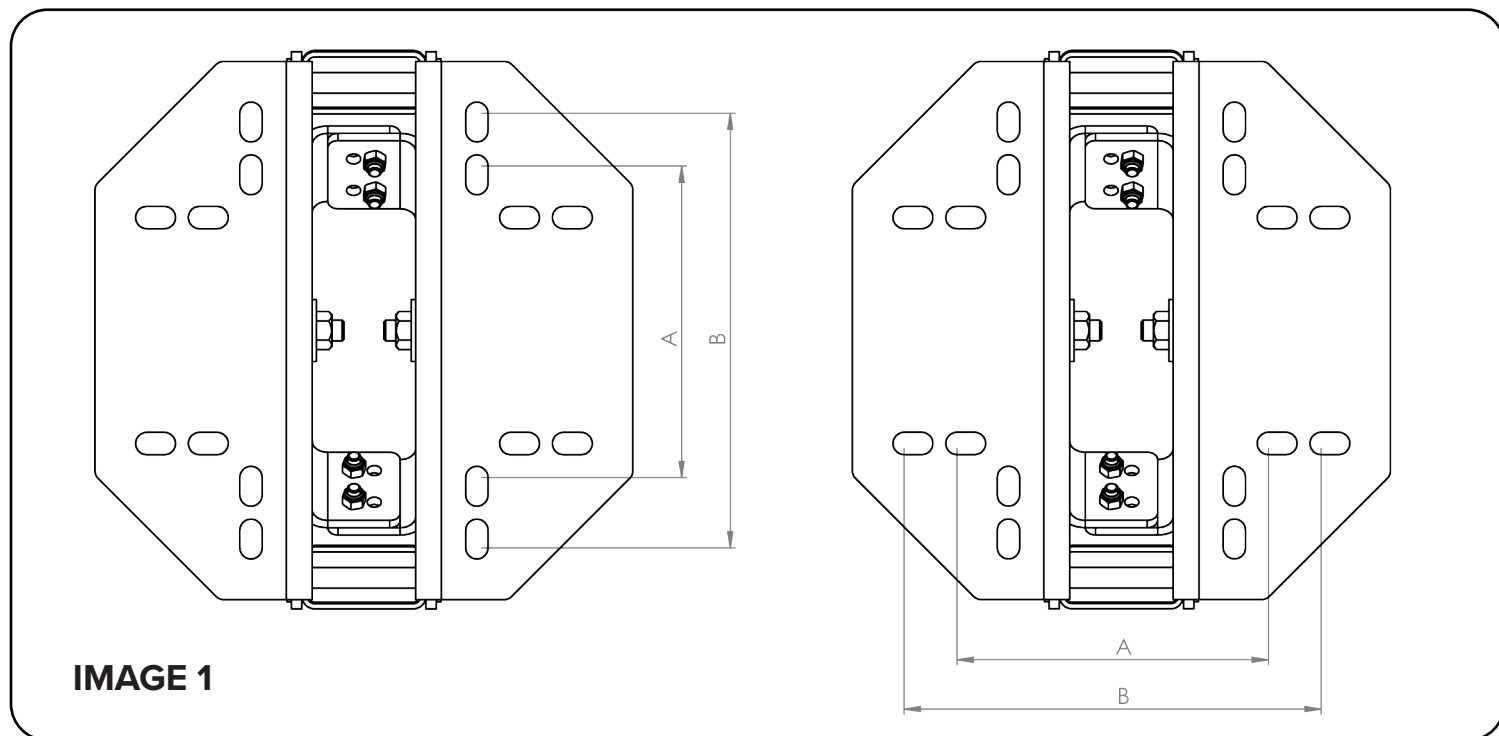
## MECHANICAL INSTALLATION

### STEP 1 - INSTALL VFD ON WALL OR OTHER STRUCTURE

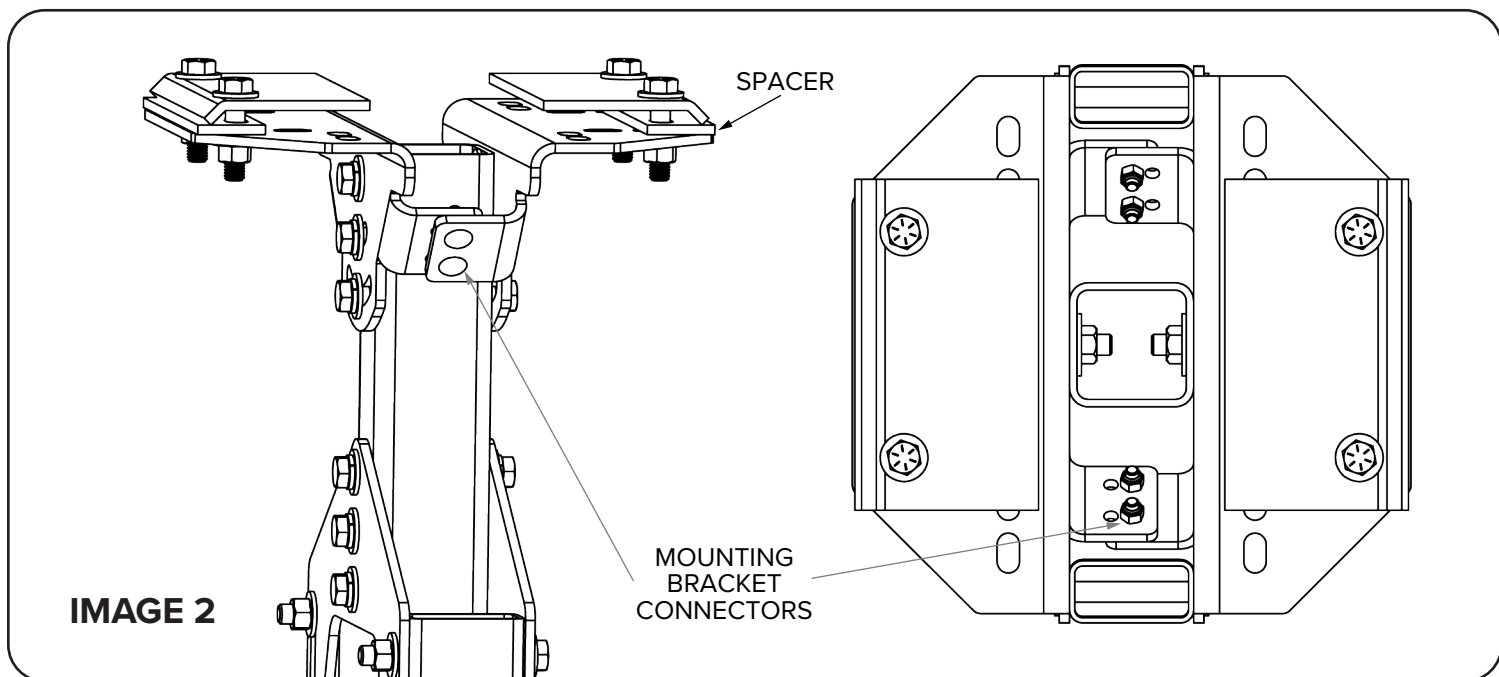
- 1) Determine where to mount the fan's VFD. It should be on a wall or other solid structure, and at a height that is easily accessible for fan control. Be sure to leave enough space around the VFD so that its heat dissipating fins can function properly.
- 2) Using the mounting holes provided, securely mount the VFD to the wall/structure (hardware not provided). Reference: Page 17 of the User's Manual.

## STEP 2A – MOUNT TO AN EXISTING I-BEAM

- 1) It is important to attach the mounting bracket to the structure **first** and **then** connect the fan assembly. If the mounting surface isn't level, the mounting bracket can be mounted in either direction to allow the fan to swivel and hang straight.



- 2) Refer to Image 1 to determine which set of bolt slots to use:
  - a. For I-beam width less than  $7\frac{1}{4}$ ", use slots labeled "A". I-beams wider than  $7\frac{1}{4}$ " should use slots labeled "B".
  - b. For I-beam thickness greater than  $\frac{1}{2}$ ", use the provided spacer as shown in Image 2.

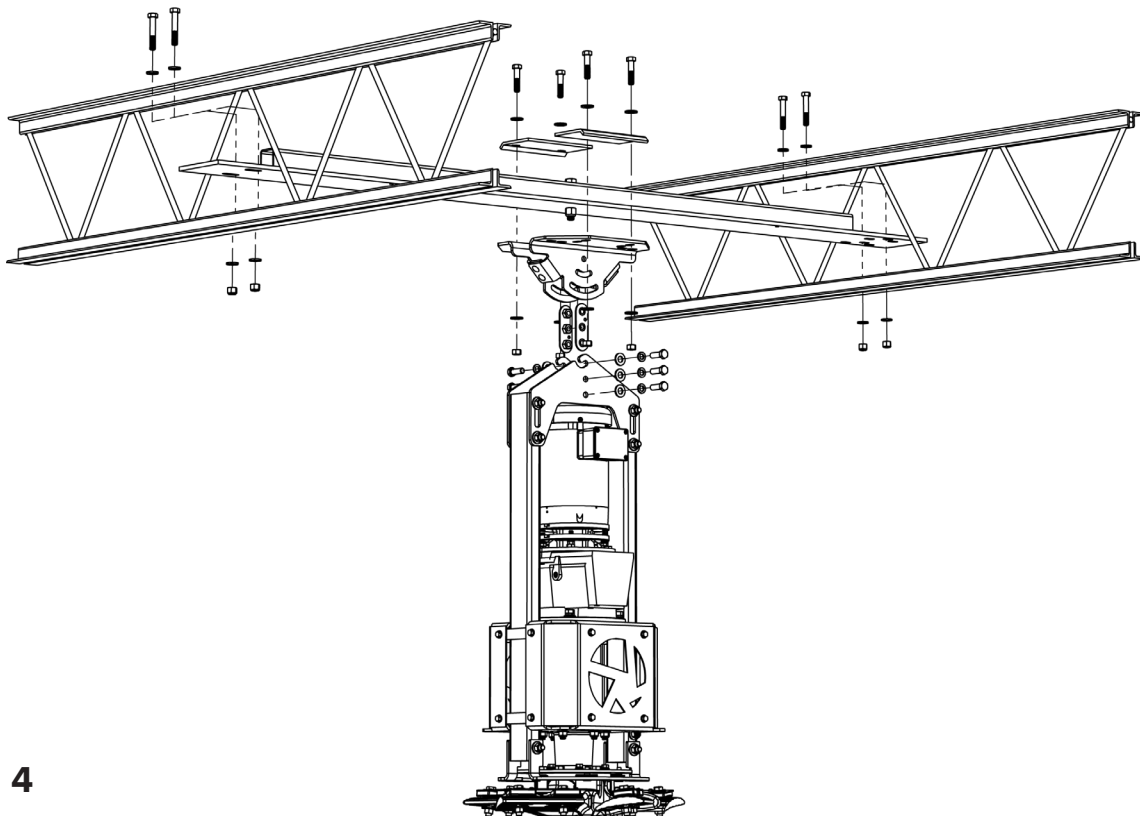
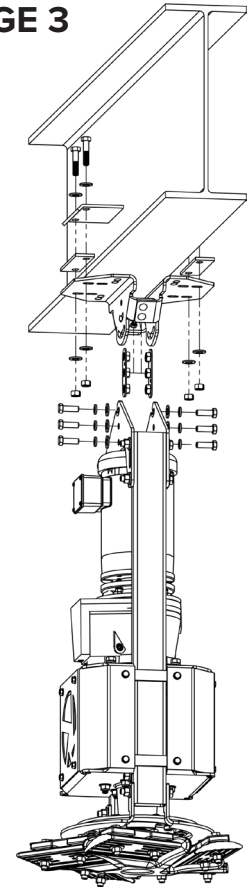


- 3) If a down rod was ordered, adjust the mounting bracket connectors to their widest position. Refer to Image 2.
- 4) Attach clamp to I-beam structure, as shown in the diagram labeled Image 3. Torque GRADE 8 ½” bolts to 80 ft-lbs.

## STEP 2B - MOUNT BETWEEN BAR JOISTS

- 1) This installation requires the spanning of building structure. While structures and distances may vary, we recommend using 2” steel tubing welded to a 3/8” thick steel plate as shown in the diagram labeled Image 4 (sold separately). Consult a structural engineer for spanning distances greater than eight feet.
- 2) Secure the spanning material to the building structure using ½” bolts, washers, and lock nuts (not provided) as shown in Image 4. Bolts should pass through the steel plate, and out the bottom of the joist or other structure. Torque bolts to 50 ft-lbs.
- 3) It is important to attach the mounting bracket to the spanning structure first and then connect the fan assembly. If the mounting surface isn't level, the mounting bracket can be mounted in either direction to allow the fan to swivel and hang straight.

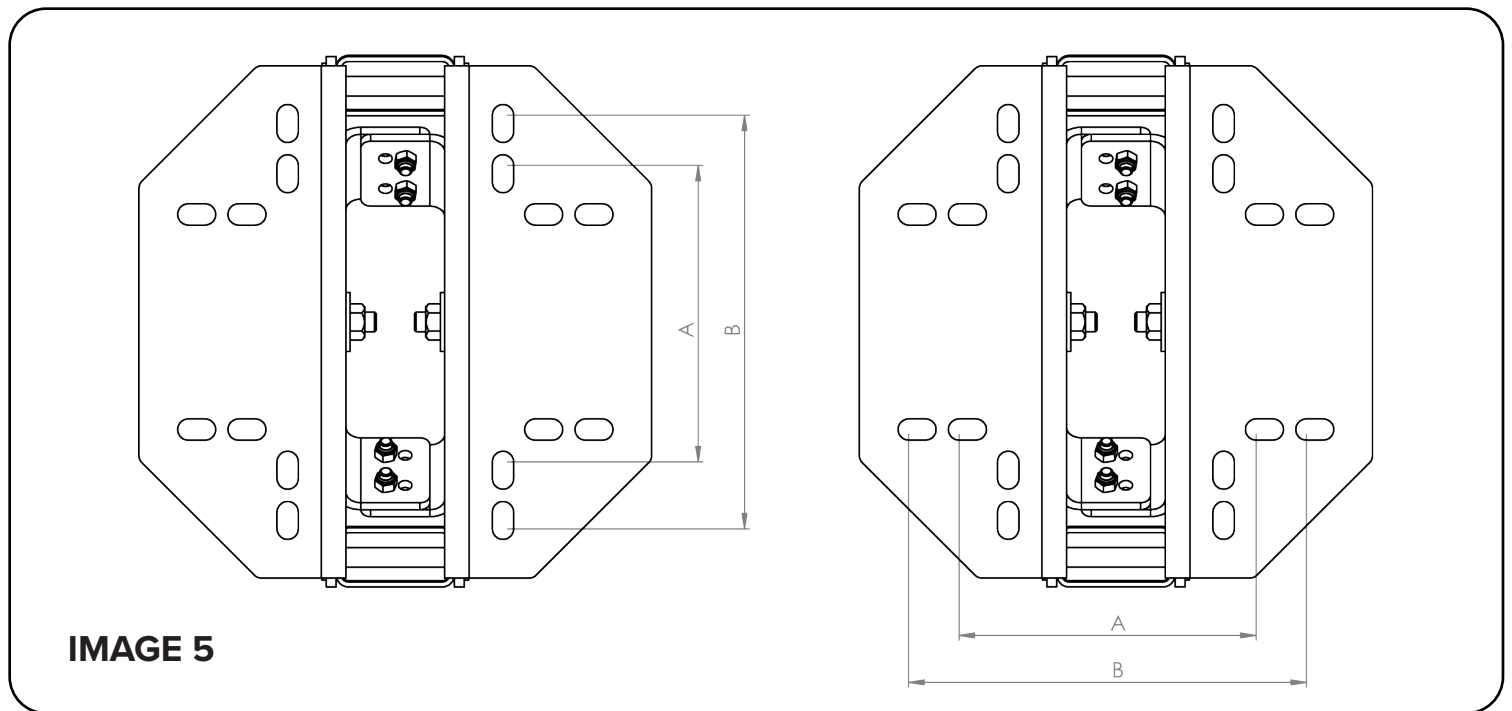
**IMAGE 3**



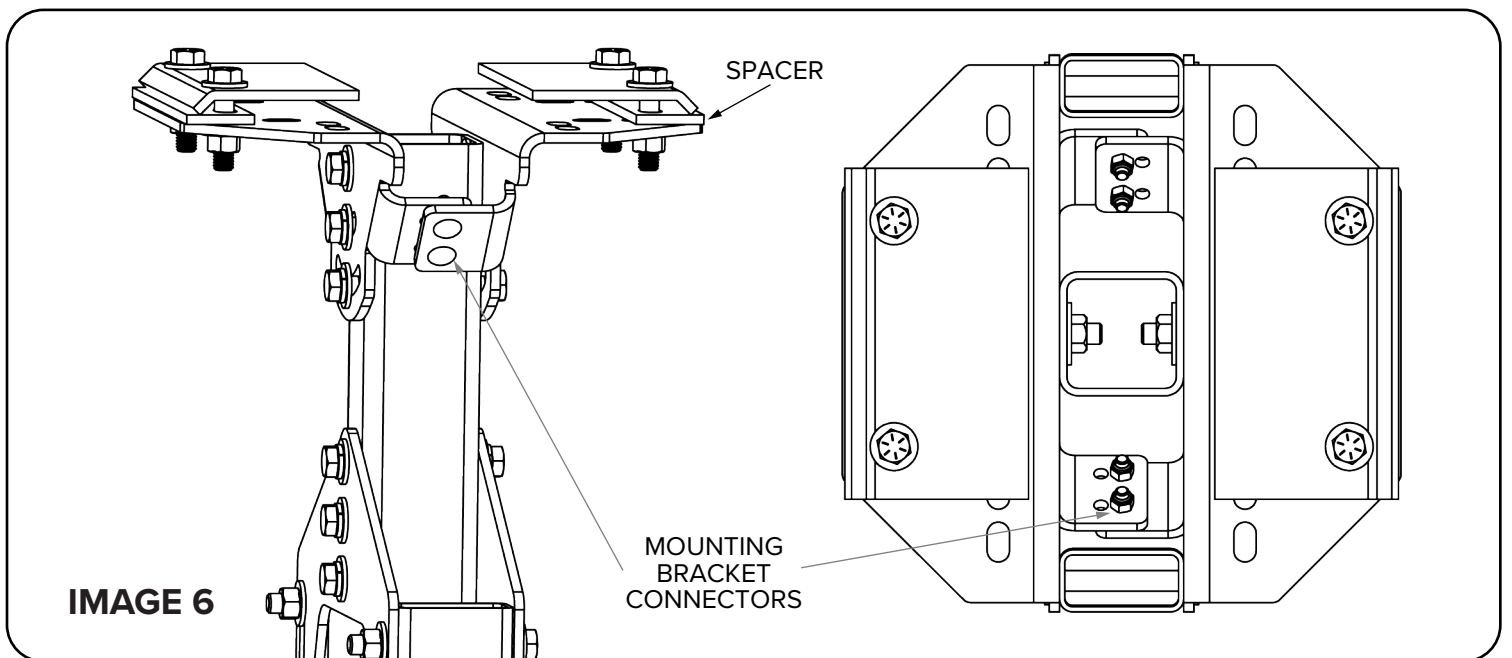
**IMAGE 4**



- 4) Refer to Image 5 to determine which set of bolt slots to use:



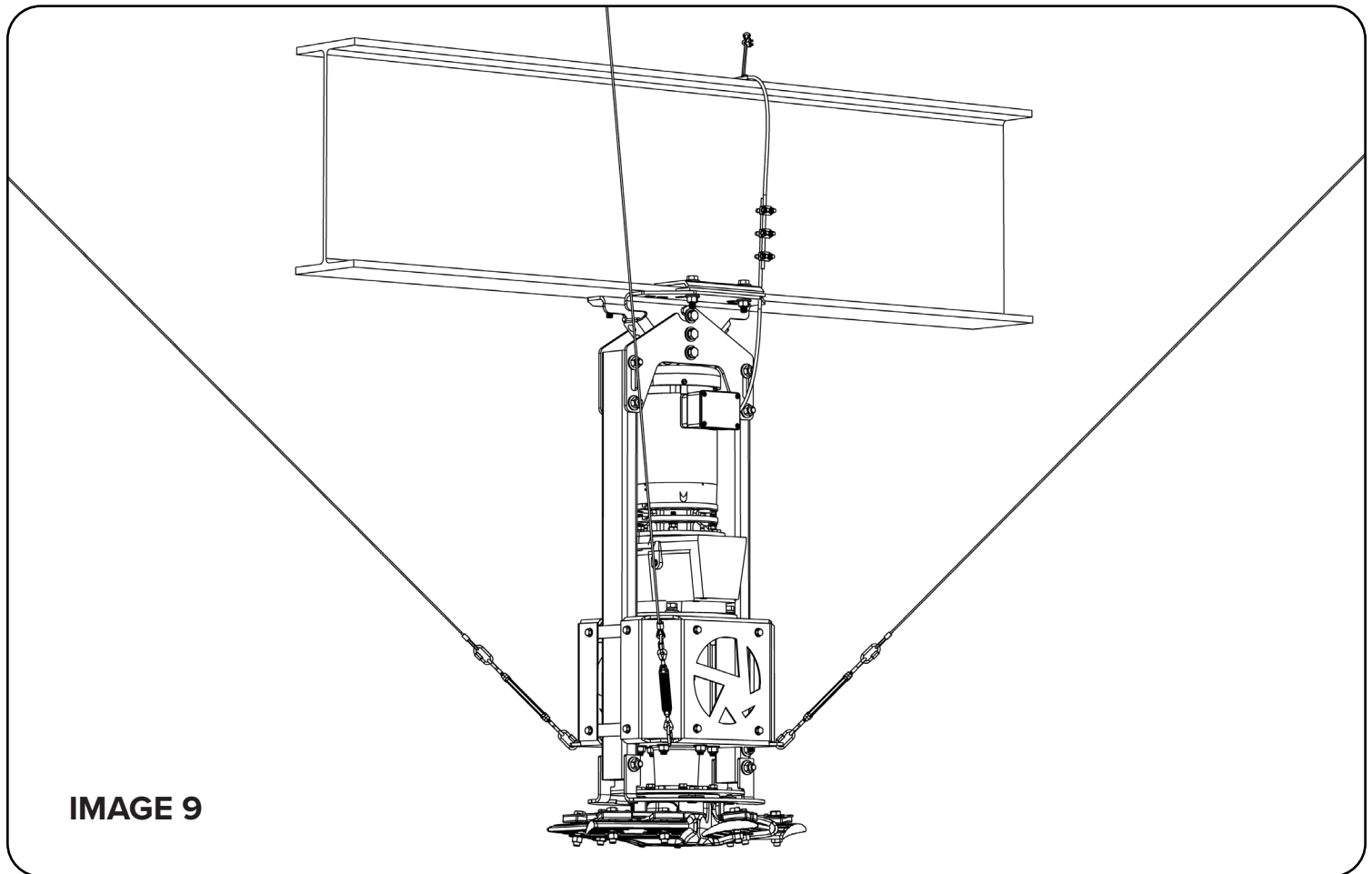
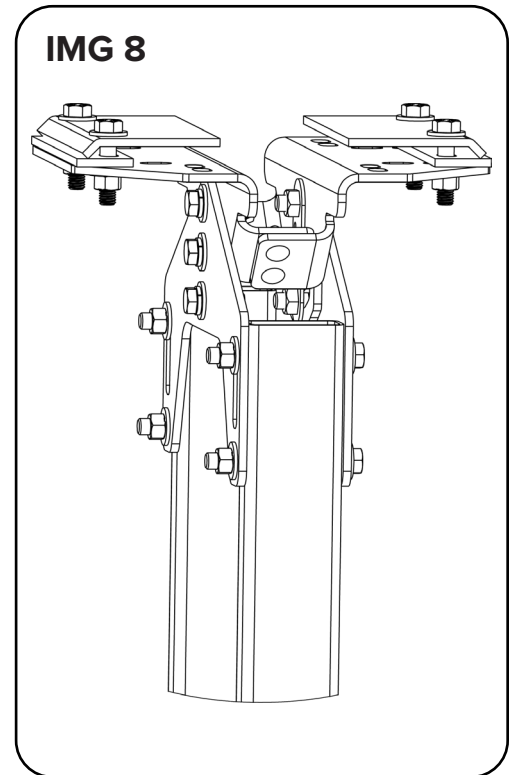
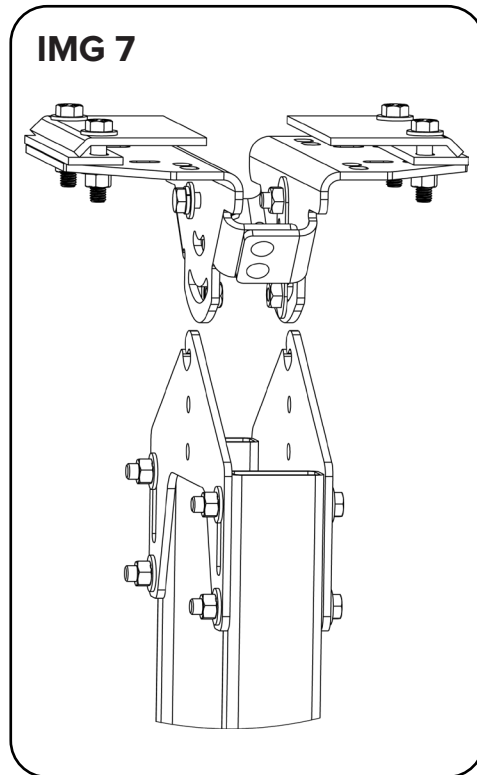
- a. For spanning structure width less than  $7\frac{1}{4}$ ", use slots labeled "A". Spanning structures wider than  $7\frac{1}{4}$ " should use slots labeled "B".
- b. If spanning structure thickness is greater than  $\frac{1}{2}$ ", use provided spacer as shown in Image 6.



- 5) If a down rod was ordered, adjust the mounting bracket connectors to their widest position. Refer to Image 6.
- 6) Attach clamp to spanning structure, as shown in the diagram labeled Image 4. Torque GRADE 8  $\frac{1}{2}$ " bolts to 80 ft-lbs.

## STEP 3 - ATTACH FAN ASSEMBLY TO MOUNTING BRACKET

- 1) Using a scissor lift, raise the fan assembly and guide the hangers onto the top bolt of the mounting bracket (see Image 7). If using a down rod, bolt the down rod to the mounting bracket first and place the top bolts on the lower section of the down rod to guide the hangers onto.
- 2) Add the final four bolts through the mounting bracket (or lower down rod section) and secure the fan as shown in Image 8. Torque bolts to 65 ft-lbs.



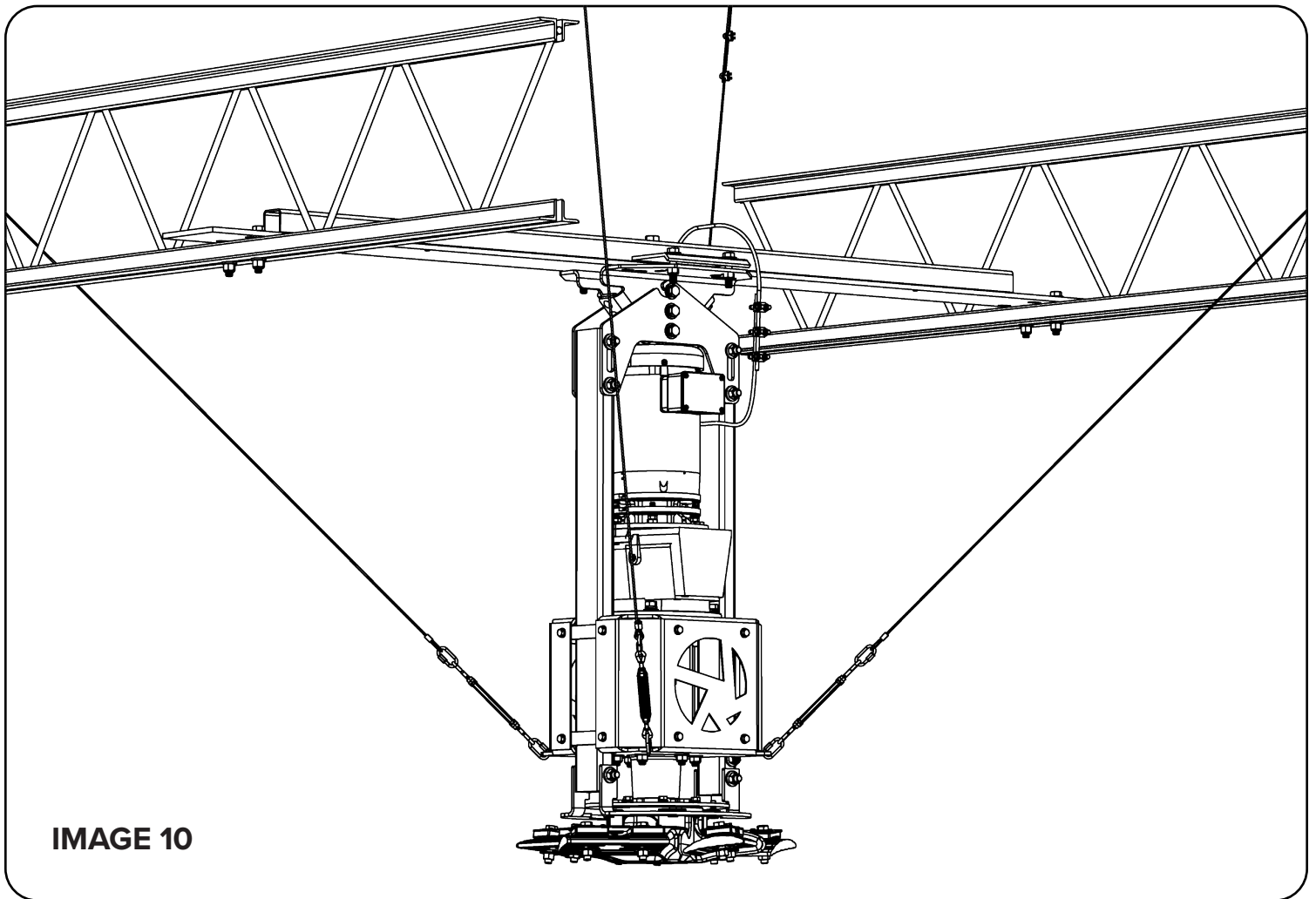


IMAGE 10

## STEP 4 - INSTALL FAN ASSEMBLY SAFETY CABLE



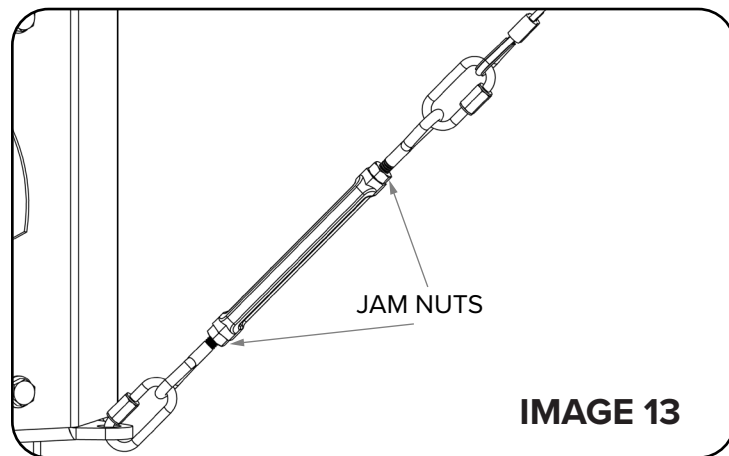
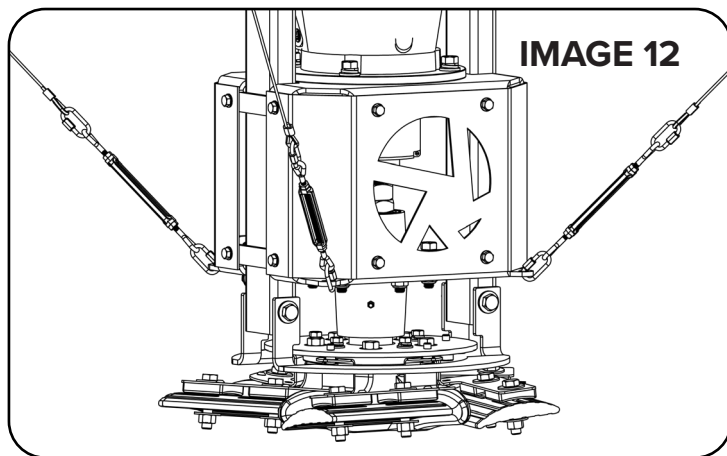
**Note: This step is required. Failure to install the safety cable may void the manufacturer's warranty.**


- 1) Pass one end of the safety cable under the hangers. Refer to Images 9 and 10 for more information.
- 2) The opposite end of the safety cable should be passed over the top of the I-beam or other mounting structure. Connect the two ends of the cable together by means of three saddle clamps (provided) in the manner shown in Image 11.
- 3) Tighten the saddle clamps securely using a ½" socket. Torque to 15 ft-lbs



IMAGE 11

## STEP 5 - INSTALL GUY WIRES



 **Note:** For maximum stability, the angle formed between the guy wire and the ceiling should be **less** than 45 degrees.



**Note: This step is required. Failure to install the guy wires properly may void the manufacturer's warranty AND become a safety hazard.**

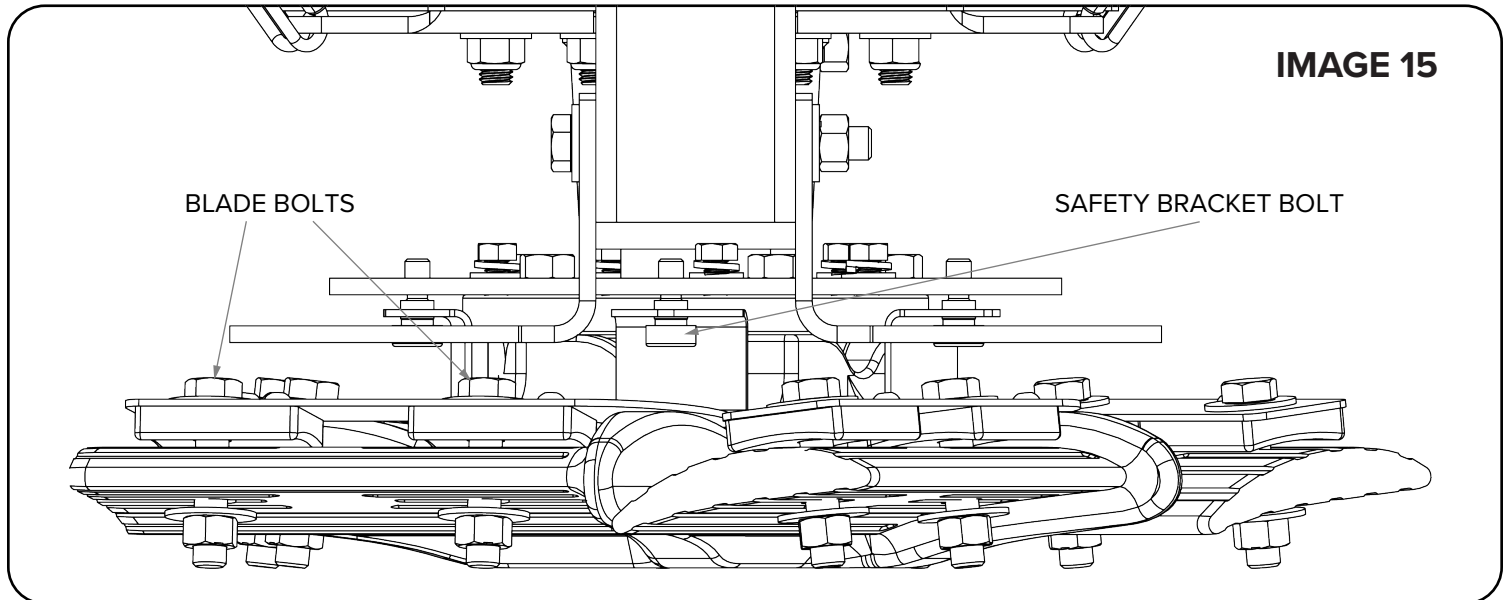
The following steps should be performed with the aid of a scissor lift.

- 1) Attach the looped end of the guy wire to the turnbuckle located on the fan assembly. It should appear like the Image 13.
- 2) Pass the opposite end of the guy wire through the eye bolt of a beam clamp (not supplied). **Thimbles must be used to protect the cable from damage. Refer to Image 14.**
- 3) Reduce the slack in each cable, making sure the fan assembly remains in the vertical position. Use 3 saddle clamps to crimp the end of the guy wire together (Image 14). Ensure saddle clamps are positioned so that the teeth on the nut side grab the end of the cable that is most likely to slip.
- 4) Repeat steps 1 – 3 for the remaining three guy wires.
- 5) Once all guy wires are in place, use the turnbuckles to take out any remaining slack. Periodically check the fan assembly with a level to ensure it remains in the vertical position. Continue adjusting by means of the turnbuckles until all cables are satisfactory. Guy wires should be taut, but not overstressed. Recheck all saddle clamps for tightness.
- 6) **Tighten all jam nuts on turn buckles (Image 13). This step is required. Failure to install the guy wires properly may void the manufacturer's warranty AND become a safety hazard.**

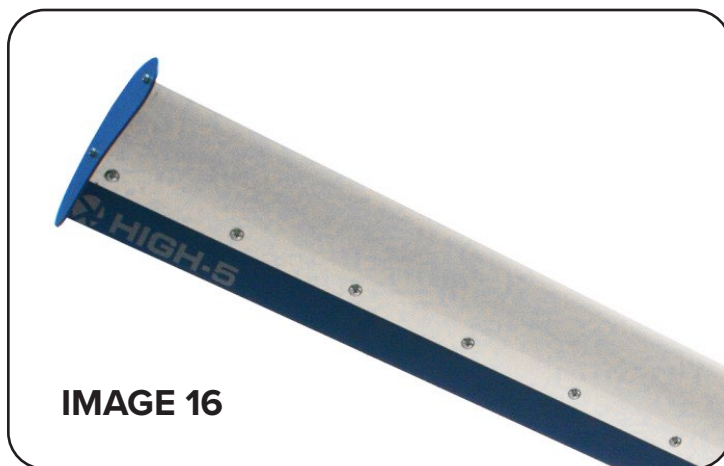


## STEP 6 - INSTALL FAN BLADES & SECURE BLADE SAFETY BRACKET

- 1) Care should be taken when installing the blades to ensure they are not bent or damaged, as this may affect fan performance.
- 2) Remove blade bolts, nuts, and washers from blade “paddle” on the fan’s hub. Carefully slide the fan blade into position until all blade bolt holes on the fan, blade, and safety bracket are aligned. Replace blade bolts, nuts, and washers. Torque to 65 ft-lbs.



- 3) Install blade flaps using  $\frac{1}{4}$ " bolts and end caps using #10 x  $\frac{1}{2}$ " screws provided. Ensure  $\frac{1}{4}$ " bolts are tight on flaps. The pan head of the bolts go into the countersinks in the bottom of the blades. Refer to Images 16 and 17 for more information.
- 4) Repeat steps 2 – 3 for the remaining four blades.



**THIS COMPLETES THE MECHANICAL  
INSTALLATION OF YOUR HIGH-5 FAN.**

# PART 2

# ELECTRICAL INSTALLATION



**WARNING:** This portion of the installation **MUST** be completed by a licensed electrician with knowledge of all national and local electrical codes.



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## STEP 1 - BREAKER SIZING

- 1) Refer to Table 1 below for recommended circuit breaker sizing based on input voltage and fan motor horsepower.

**TABLE 1**

VFD Model	Input V	Input Max Amp/ Recommended Fuse	Output V	Output A,
ACS 255 series	220, 1ph, 1 HP	8.2/15	0-240, 3ph	4.3
ACS 255 series	110, 1ph, 1 HP	16.3/25	0-240, 3ph	4.3

## STEP 2 - CONNECT MOTOR CONTROL CABLE TO FAN MOTOR

- 1) Remove the cover of the motor junction box, and then remove one of the junction box knockouts.
- 2) Pass the cable conductors and shielding through one of the provided strain reliefs, and then through the knockout hole in the junction box.
- 3) Connect the end of the motor control cable to the fan motor. The wiring configuration is input voltage dependent. Please wire the motor for a 220V input using the wiring diagram found on the fan motor's nameplate. This 220V wiring configuration also applies if the power source is 110V single phase.
- 4) Once cable is properly connected inside the junction box, tighten the strain relief. Replace junction box cover.
- 5) Run the rest of the motor control cable down near the wall mounted VFD. Using conduit for this run is recommended.

## STEP 3 - RUN INPUT POWER CABLE & INSTALL LOCKABLE DISCONNECT

References: Page 9 and Chapter 5 of the ACS255 User's Manual

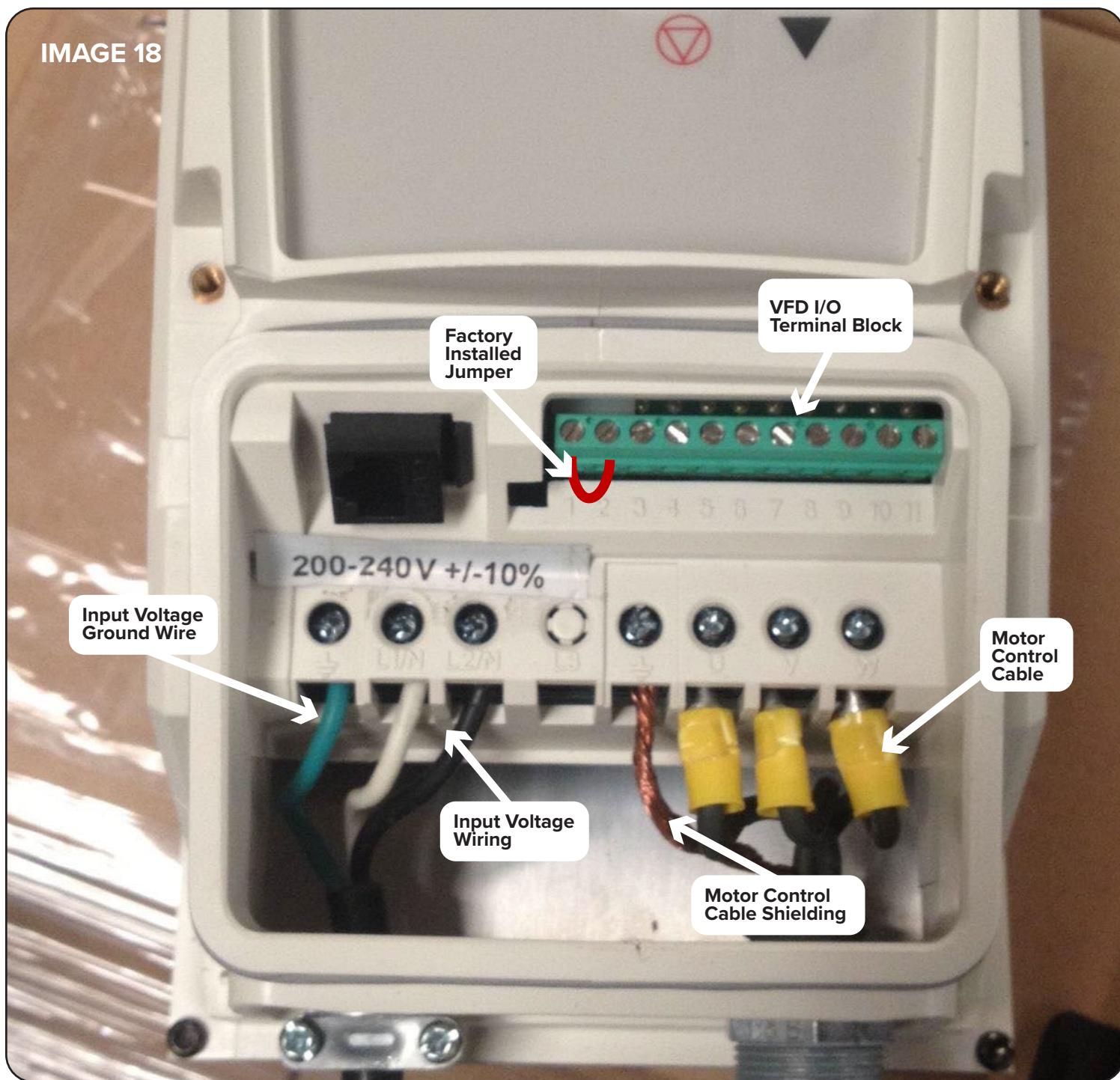
**⚠ WARNING: The Lockable Disconnect must be installed per local electrical codes. AT MINIMUM it must be installed outside the diameter of the fan blades.**

- 1) Be sure to size the input power cable properly for the application. Most installations will require 12-gauge wire. However, longer runs of power cable may require 10-gauge or higher.
- 2) Run input power into the top of the Lockable Disconnect, using the appropriately sized knockout.
- 3) Connect conductors to terminals L1 and L2, respectively. Ground wire should be fastened to the protective earth (PE).
- 4) On the output side, T2 should be looped back to input L3.
- 5) Continue running input power to the drive by connecting two (2) conductors to terminals T1 and T3, respectively. A ground wire should be fastened to the protective earth (PE) provided.
- 6) Run the rest of the input cable near the wall mounted VFD. Using conduit for this run is recommended.
- 7) Remove the cover of the VFD using a Phillips screwdriver. For more information, refer to the bottom of page 18 of the "ACS255 User's Manual."




- 8) Connect the opposite end of the input power cable to the VFD in the manner shown on page 21 of the “ACS255 User’s Manual.” The two conductors should be connected to L1/L and L2/N, respectively. The ground wire should be connected in the manner shown in Image 18.
- 9) Connect the motor control cable to the VFD in the manner shown on page 21 of the “ACS255 User’s Manual.” The three conductors should be connected to U, V, and W, respectively. The ground wire should be connected in the manner shown in Image 18.
- 10) A successfully wired drive, regardless of voltage, should appear like Image 18. A “block diagram” of these connections is also shown on page 9 of the “ACS255 User’s Manual.”
- 11) Be sure to replace the VFD cover.

**IMAGE 18**



## STEP 4 - CONNECT THE VFD TO A FIRE SUPPRESSION SYSTEM (OPTIONAL)

 **WARNING:** There should be no voltage on the fire suppression system cable. Placing voltage on the VFD terminal block will destroy the unit and void all manufacturers' warranties.

 **CAUTION:** DO NOT connect Patterson High-5 fans to the fans of another company for purposes of fire suppression. A separate line must be run for Patterson fans **ONLY**.

 **CAUTION:** If the drive will not be connected to any fire suppression system, the factory installed jumper across 1 & 2 **MUST** remain in place.

- 1) Remove the factory installed jumper between terminals 1 and 2. The terminal block is located at the bottom of the ACS255. For more information, refer to Image 18 on page 18.
- 2) Connect the fire suppression system wires to terminals 1 and 2. Again, the fire system cable will leave the drive enclosure out of one of the holes on the bottom, using a strain relief (**not provided**).
- 3) Drive is now wired to shut down upon activation of any fire suppression signal.

# THIS COMPLETES THE ELECTRICAL INSTALLATION OF YOUR HIGH-5 FAN.

