

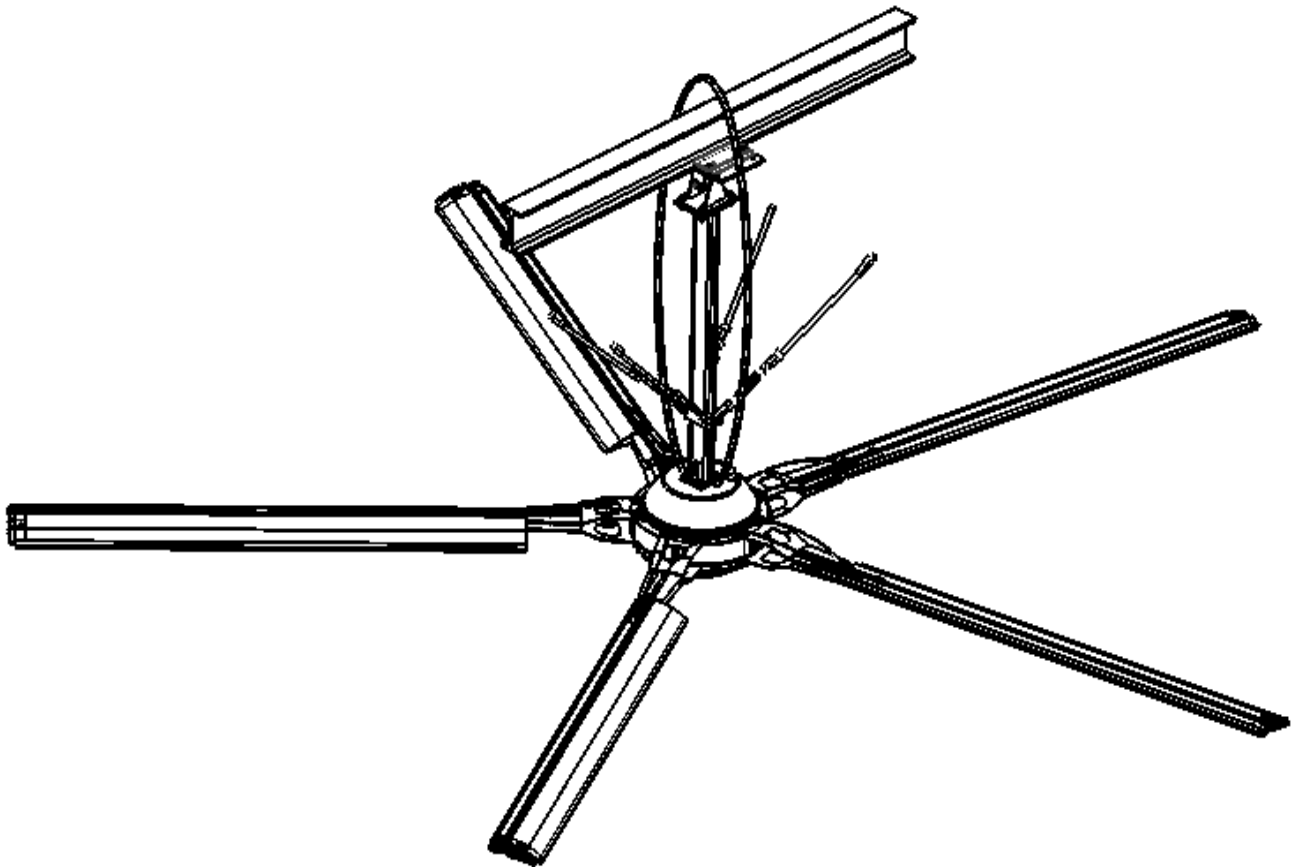
Falco eMotors Inc.



An Exciting Breakthrough
in Direct Drive
PMSM Motors and HVLS Fans

Epoch HVLS Fans User Manual

EPOCH HVLS FANS



⚠ 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 User's Manual. Failure to do so could result in death or serious injury.

Revision Sept 27, 2019

This manual applies to the following platforms: Epoch 0.5, 1.0, 2.0, 3.0 and 4.0

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1.0 IMPORTANT: PLEASE READ BEFORE INSTALLATION

1.1 SAFETY SIGNAL WORDS

You may find safety signal words such as DANGER, WARNING, CAUTION or NOTICE throughout this User's Manual. Their use is explained below:

Table 1 : Important Safety signs

	<i>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.</i>
	<i>Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.</i>
	<i>Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury</i>
	<i>Indicates a potentially hazardous situation which, if not avoided may result in minor or moderate injury.</i>
	<i>Notice is used to address practices not related to personal injury.</i>



2.0 READ AND SAVE THESE INSTRUCTIONS.

1. READ THESE SAFETY PRACTICES BEFORE INSTALLING, OPERATING OR SERVICING THE FAN.
2. Failure to follow these safety practices could result in death or serious injury.
3. READ AND FOLLOW THE OPERATING INSTRUCTIONS IN THIS MANUAL BEFORE OPERATING THE FAN.
4. If you do not understand the instructions, ask your supervisor to teach you how to use the fan.
5. To reduce the risk of personal injury, do not bend the blade brackets when installing the brackets, balancing the blades or cleaning the fan.
6. Do not insert foreign objects in between rotating fan blades.

DANGER

1. To reduce the risk of fire, electric shock and injury to persons, HVLS fan motor assemblies must be installed with the blade assemblies that are marked on their cartons to indicate the suitability with this model.
2. Other blade assemblies cannot be substituted.
3. Be certain to follow the instructions in this manual.
4. If you do not understand the instructions, ask your supervisor to explain them to you or call your authorized local distributor.

3.0 INSTALLATION AND OPERATION:

WARNING

1. Installation of the equipment must comply with local and national electrical codes and must be in accordance with **ANSI/NFPA 70-1999**.
2. To Reduce the Risk of Electric Shock, This Fan Must Be Installed with An Isolating Wall Control/Switch.
3. Do not use this industrial fan until you have received proper training.
4. Improper use could result in property damage, bodily injury and/or death.
5. Read and follow the complete OPERATING INSTRUCTIONS on the following pages before use.
6. If you do not understand the instructions, ask your supervisor to explain them to you or call your local distributor.
7. **DO NOT USE THE FAN IF IT APPEARS DAMAGED OR DOES NOT OPERATE PROPERLY.** Inform your supervisor immediately.
8. Do not operate the fan until all personnel, building structure and moveable equipment are clear of all moving parts.
9. Install guards as required.
10. To reduce the risk of electric shock, do not expose to water or rain.

CAUTION

1. Support directly from building structure.
2. Do not install the fan unit onto structure of insufficient strength. Consult a professional engineer or registered architect.
3. Improper installation of the fan could result in death or serious injury.
4. To reduce the risk of injury to persons, install fan so that the blade is at least 3.05m (10') above the floor.

5. Automatically Operated Device – To Reduce the Risk of Injury Disconnect from Power Supply Before Servicing.
6. To Reduce the Risk of Injury to Persons, Install Fan So That the Blade Is At Least 3.05 Meters (10 Feet) Above the Floor.
7. Risk of Electric Shock,” Wait for 15 seconds after turn off for the capacitor to discharge below 50V.



1. **Mise en garde:** Dispositif à fonctionnement automatique - Pour réduire le risque de blessure, déconnectez l'alimentation avant de procéder à un entretien
2. **Mise en garde:** Pour réduire les risques de blessures, installez un ventilateur de manière à ce que la lame atteigne au moins 3,05 mètres (10 pieds) au-dessus du sol.
3. "**Mise en garde** – Risque de choc électrique ", attendez 15 secondes après la mise hors tension pour que le capacitor se décharge en dessous de 50 V

4.0 MAINTENANCE AND SERVICE:

1. Before service, inspection, or cleaning make certain that the power is disconnected and properly locked out.
2. 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.
3. Call your local distributor for service.
4. Keep your body clear of moving parts at all times.
5. All electrical troubleshooting and repair must be done by a qualified technician and meet all applicable codes.
6. If it is necessary to make troubleshooting checks inside the Inverter or the Controller box with the power on, USE EXTREME CAUTION.
7. Do not place fingers or un-insulated tools inside the enclosure.
8. Touching wires or other parts inside the enclosure could result in electrical shock, death or serious injury.



1. Permanent Magnet Brushless Motor Inverters or Variable Frequency Drive (VFD) fan controllers contain high voltage capacitors. Before working on the fan or the fan controller, ensure isolation of the main voltage supply and verify voltage has bled off prior to beginning work.
2. Failure to do so may result in death or serious injury.
3. If you have problems or questions, contact your local distributor for assistance.

5.0 OWNER'S RESPONSIBILITIES

The owner's responsibilities include the following:

1. **Inherent Danger:** 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.
2. **Posted Warnings:** 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.
3. **Periodic Maintenance and Inspection:** Manufacturer's recommended periodic maintenance and inspection procedures in effect at date of shipment shall be followed, and written records of the performance of these procedures should be kept.
4. **Damage:** 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 in service.
5. **Manuals:** The owner shall see that all nameplates and caution and instruction markings or labels are in place and that the appropriate operating and maintenance manuals are provided to users.
6. **Alterations:** Modifications or alterations of industrial fans shall be made only with written permission of the original manufacturer.



6.0 SUPERVISOR'S RESPONSIBILITIES

1. **Manuals:** All instructions manuals should be read completely;
2. **Posted Warnings:** It is important to get familiar with all labels and posted warnings on the packaging, fan parts and controller.
3. **Training:** Ensure that your staff is well trained to operate and maintain the fan.
4. **Installer:** Installation must be carried out by a qualified installer.
5. **Electrical Mains:** Power must be turn off at the electrical mains at the circuit breaker fuse box before start of installation and during maintenance or servicing.
6. **Power Input:** Ensure single phase power supply input of 180~277 50/60Hz.
7. **Reverse Switch:** Do not operate the reverse switch on the controller box when the fan is still in motion. Wait until it stops completely before switching to reverse mode.
8. **Wire Routing:** When all electrical connections are done, route and store all wires neatly as per electrical code.
9. **Safety Cable:** When mounting the fan, ensure that safety cable is looped across the ceiling mounting hook.

10. **Retention Cable:** The fan should never be run without a properly installed retention cable, which is supplied with every fan along with all required hardware. If the retention cable is not installed, the warranty will be voided.
11. **Ceiling Weight Capacity:** The ceiling mount must be able to withhold a min. of 200 kg (440 lbs.).
12. **Clearance from Floor:** The fan must be mounted at a min height of 3 meter (10-ft) of clearance from the floor.
13. **Path of Blades:** Do not place any objects in the path of the blades at any time.
14. **Mechanical Hardware:** Make sure that all nut-bolts and connections are tightened properly with suitable torque values.

7.0 INTRODUCTION

Welcome and thank you for choosing this industrial fan from Epoch. This User's Manual contains information that 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.

Epoch 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. Epoch fans are manufactured in India by Falco eMotors in the city of Pune, Maharashtra. The technology has been developed in collaboration with some major US and Canadian companies specializing in the sale of HVLS fans.

Important Epoch HVLS Fan Features and Benefits: In the paragraphs below, we have highlighted the various advantages for Epoch HVLS fans.

1. **Motor Technology:** Epoch 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.
2. **Controls:** Epoch 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. All other fans use non-power factor corrected controls. These controls are known to draw utility current with very high harmonics causing significant loss of efficiency and increased cost of operation.
3. **Cost/Watt:** Epoch fans have built-in high-efficiency controls using power factor correction (PFC) with field oriented controls (FOC) and space vector modulation (SVPWM). Other companies employ non-power factor scalar controls. Consequently, the input current draw is very high in comparison to Epoch fans. The high current draw can cause massive transmission losses and increase the cost/watt substantially. Epoch fans cost 40-50% as compared to all other industrial fans in the market.
4. **Sound Level (dB) at Max Speed:** Because Epoch fans use EDFs-PMSM technology with PFC-FOC-SVPWM controls, the sound levels at max speed are less than 35dB which is the lowest as compared to all other industrial HVLS fans in the market.
5. **Power Factor:** Epoch fans operate with a 0.97 to 0.99 power factor resulting in significant efficiency and cost savings. Such is not the case for other fans. Input power factor is generally unknown and can range from 0.6 to 0.8.
6. **Smartphone Interface:** Other companies do not have a Smartphone interface for running or data logging. Epoch fans can be operated with a Smartphone app.
7. **Weight (kg):** Other fans weigh much higher than Epoch HVLS fans. The weight difference indicates that Epoch technology is lighter than geared driven induction motors, BLDC controls or transverse flux technology available in the market today.

8. **Estimated Daily kWh:** Based on an 8-hour operation, estimated daily kilowatts hours for Epoch HVLS fans are 40-50% lower than all other industrial fans in the market place. Other industrial fans potentially consume more than double power than the Epoch fans.
9. **Cost per Unit of Air Flow:** Airflow is directly proportional to the output power. Airfoil technology is assumed to have a minimal impact from one manufacturer to the next as it is not a new area of science and technology. Based on the cost per watt number and airflow numbers, this cost is estimated to be 40 to 50% lower in the industry as compared to all other industrial HVLS fans in the market.
10. **Estimated Cost of Acquisition:** Epoch fans are estimated to cost 40-50% less than any other industrial fan in the market.
11. **Input Voltage Range:** Input voltage range for the Epoch fans is substantially more comprehensive. Although Epoch fans can operate from 90 to 300V input without any damage to the controls, the performance is guaranteed between 180 and 277V, single phase input.
12. **Dynamic Blade Adjustments:** Epoch fans employ adjustable blade technology with droop down and uplift mechanism. Such blades can weather the rotational stresses efficiently as compared to stiff blades. Other companies use rigid blades. Also, adjustable blades produce efficient and broader air flow area as speed increases as compared to rigid blades.
13. **Analog Controls:** Epoch fans come with analog controls with a built-in speed regulator for ease of operation.
14. **Number of Blades:** Epoch fans come with 5-blades. Epoch's use of 5 fans produces good airflow without producing harmful sound harmonics and turbulence resulting in high efficiency.
15. **External Motor Inverter:** Epoch fans are available with external motor and fan controls (non-integrated models).
16. **Blade Profile and Material:** Blade profile and material are equivalent with airfoil blades and aluminum T6061 material.
17. **Modbus Integration:** Standard Modbus integration is available.
18. **Building Management System Integration:** Standard building management system integration is available.
19. **Touchscreen Console:** Standard touchscreen controls are.
20. **IP Rating:** Both fans are rated with an IP65 rating.
21. **Design Safety Standards:** Epoch fans are designed for UL507, UL1004 and UL508C safety standards.

22. **Life Expectancy:** Epoch fans have a life expectancy of more than 100,000 hours.

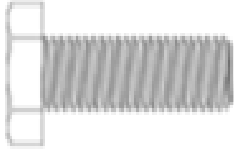








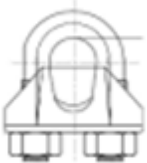
23. **Warranty:** Epoch fans offer highest warranty of any industrial HVLS fans in the market. Because of advanced manufacturing methods, state of the art controls, high MTBF, unique motor and mechanical design, Epoch fans are virtually indestructible.

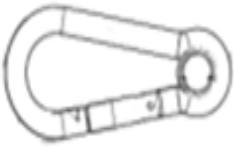


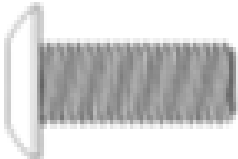
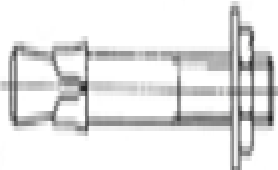

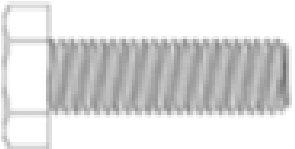

24. **Cost of Repair:** Epoch motors have a life expectancy of more than 100,000 hours, and because there of the high MTBF, Epoch fans have lowest costs of repair in the industry.

25. **Life Time Costs:** Lifetime costs for Epoch industrial fans are incredibly low as compared to any other industrial HVLS fan in the market.

7.1 Hardware

Table 2 : Hardware to be installed

	M10 x 50 mm Hex Bolt (Qty.8)		M10 Plain Washer (Qty.20)
	M10 Spring Washer (Qty.4)		M10 Nylock Nut (Qty.10)
	M12 X 120 mm Hex Bolt (Qty.2)		M12 Plain Washer (Qty.4)
	M12 Spring Washer (Qty.4)		M12 Nylock Nut (Qty.2)
	Turn Buckle (Qty.4)		U Clamps (Qty.10)

	Snapo Clamp (Qty.4)		Wire rope (Qty.10mtr)
	Bottom Cover Attachment (Qty.5)		M4 X 16 mm Allen Screw (Qty.5)
	M12 Anchor Fastener (Qty.4)		M8 Anchor Fastener (Qty.4)
	3/8" x 16 x 35L Bolt for Motor mounting		Plain Washer (M10)

Mount - Assembly





-  (x8) M10X50mm Hex Bolt
-  (x8) M10 Nylock Nut
-  (x32) M10 Plain Washer
-  (x32) M10 spring Washer

Figure 1: Mount Assembly Hardware

Mount - Assembly





-  (x2) M12X120mm Hex Bolt
-  (x2) M12 Nylock Nut
-  (x4) M12 Plain Washer
-  (x4) M12 spring Washer

Figure 2: Mount Assembly Hardware

Mount - Motor Frame



-  (x4) 3/8" 16 X 35 mm Hex Bolt
-  (x4) M10 spring Washer

Figure 3: Motor Frame Hardware

Mount - Blade Mount




-  (x10) M10X 120mm Stud
-  (x20) M10 Nylock Nut
-  (x10) M10 spring Washer

Figure 4: Blade Mount Hardware

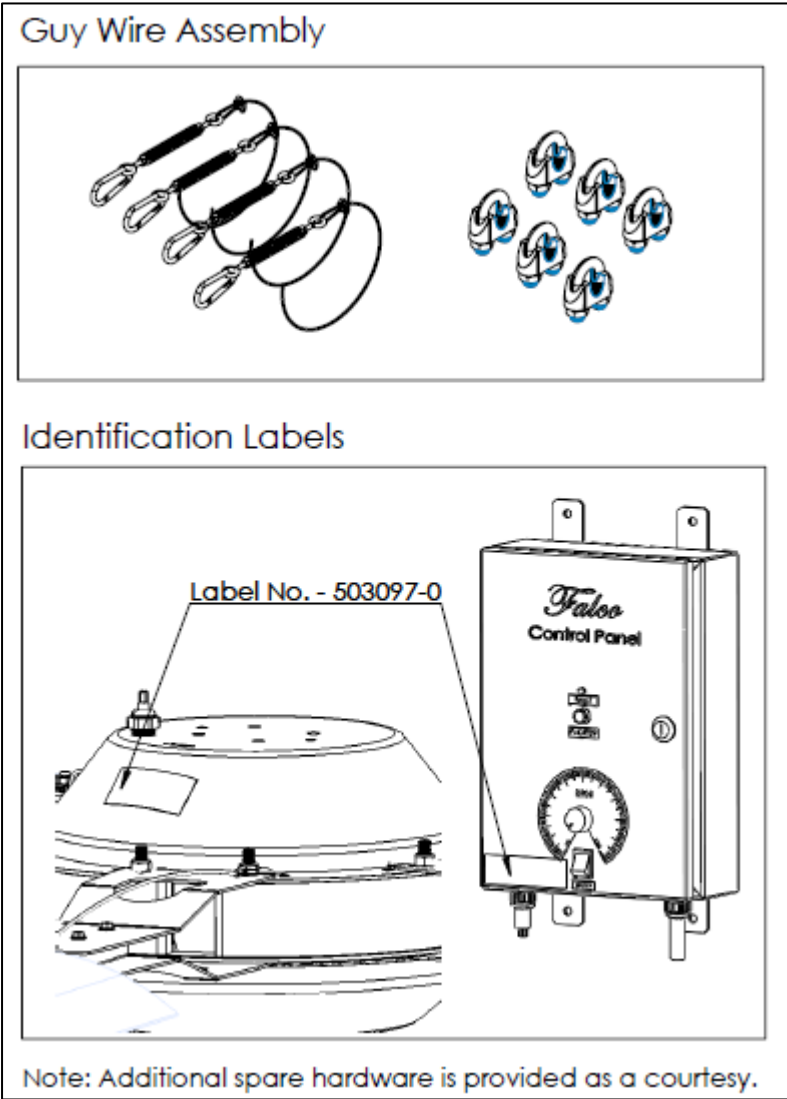
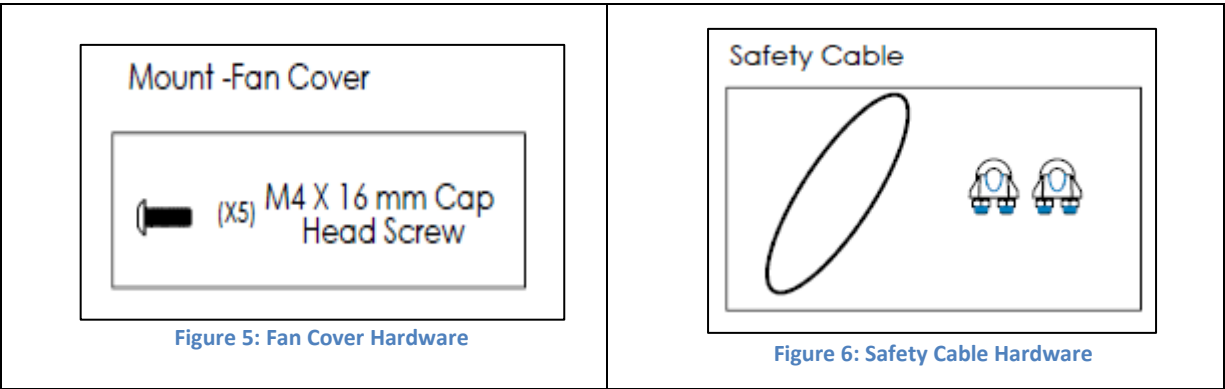


Figure 7 : Guy wire and controller box details

Table 3 :Fastener Torque Requirement

Fastener Torque Values			
Description	Torque		Wrench Size
	Nm.	lb.ft.	
M10X50mm Hex Bolt	55	40.5658	17
M12X120mm Hex Bolt	62	45.72872	19
3/8" 16X35 mm Hex Bolt	55	40.5658	15
M10X110mm Stud	55	40.5658	17

8.0 FAN KIT (Non-Integrated Models)

1. Motor Box:

a. Epoch Motor Assembly

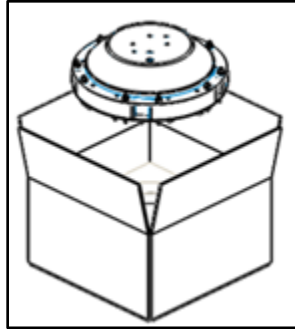


Figure 8: Motor Packaging box for non- integrated model

2. Blade Box:

a. Ceiling Structure

b. Controller Box

c. Blade Assembly

d. Bottom Cover

e. 5 Core Cable

f. Accessories box

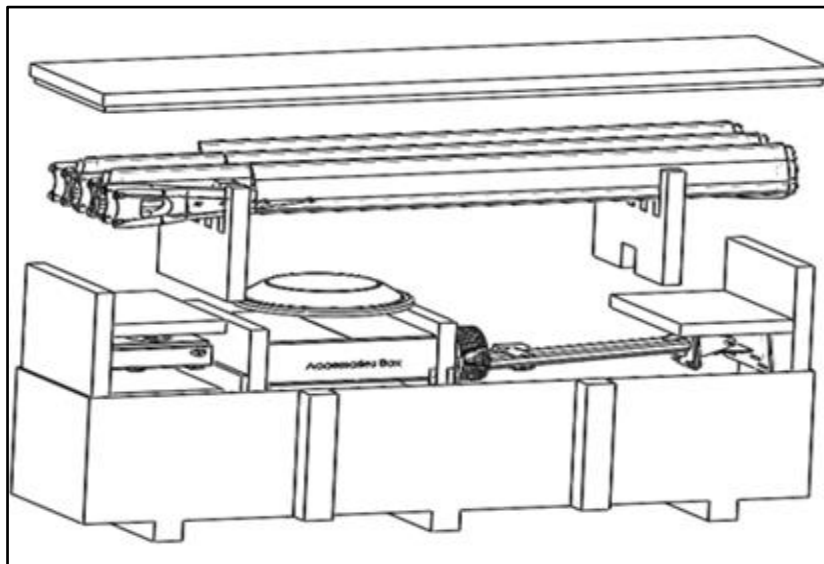


Figure 9: Fan and Accessories Packaging box for Non-Integrated Model

9.0 INTENTIONALLY LEFT BLANK

10.0 REQUIRED TOOLS:

1. Drill Machine – Concrete Drill Bit: 8mm,10mm,12mm
2. Grinder machine
3. Torque Wrench set
4. Spirit Level
5. Screwdriver / Tester
6. Wire/ Cable Tie (Tie wrap)
7. Loctite
8. Hammer
9. Mallet
- 10.Spanner Set– 6-7, 10-11, 12-13, 14-15, 16-17, 18-19, 20-22
- 11.Ratchet Bit-10,11,12,13,15,16,17,18,19,20,22
12. Measuring Tape
13. Allen Key – 2.5mm , 3mm

11.0 Prior to Fan Installation:

1. Ensure that the supplied voltage matches the fan voltage. A label containing voltage information specific to the individual fan is located on side of the Controller box.
2. Ensure blade length matches fan model size.
A.Consult fan model designation located on the side of the fan top cover.
3. Ensure all mounting hardware is present.

11.1 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 (7.3 m).
- The fan shall be approximately centered between four adjacent sprinklers.
- The vertical clearance from the fan to sprinkler deflector shall be a minimum of 3 feet (0.9 m).
- 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

12.0 INSTALLATION CONSIDERATIONS- Fan Location

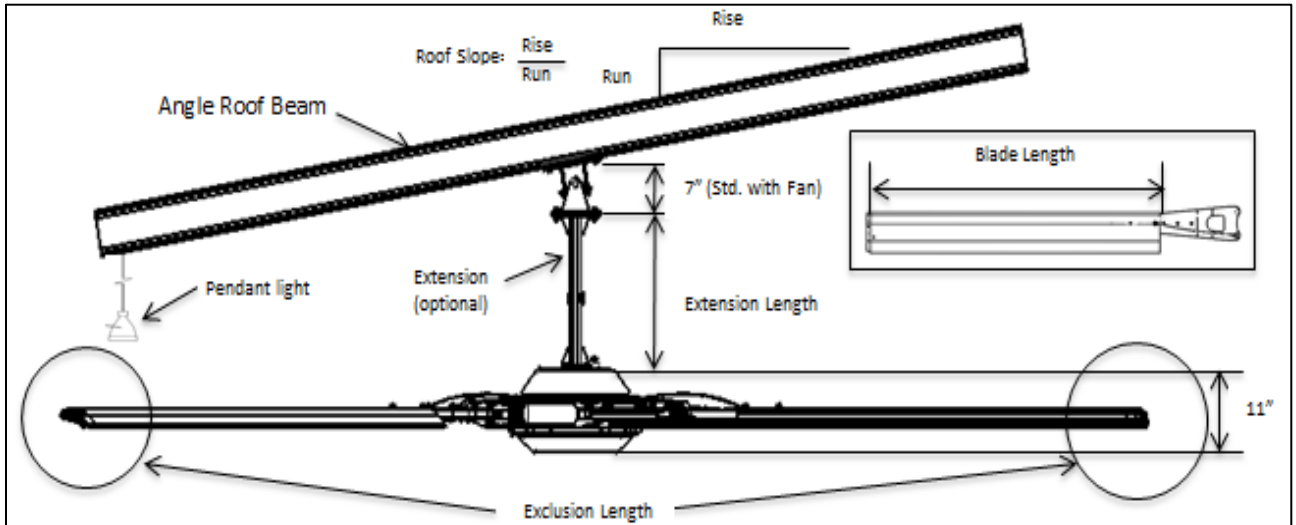


Figure 10: Motor clearance and exclusion zone

Note: *For roof angles more than 20°, consult factory. The extensions lengths shown are minimum recommendations only, based solely of roof pitch and fan diameter. Other considerations must be evaluated when determining extension requirements, such as placement of lights, sprinkler systems, HVAC systems, etc. In addition, OSHA requirements state that fan blades must be a minimum of 10' above the floor.*

Consult your local distributor for assistance with fan placement and extension selection.

12.1 INSTALLATION CONSIDERATIONS

15.1 Building Structure

Falco eMotors provide 2 types of ceiling structure for fan mounting :

- 1) Universal coupling.
- 2) Concrete

1) Universal Coupling - For open structure roof designs, the fan should only be hung from either I-beam or double L-shape.

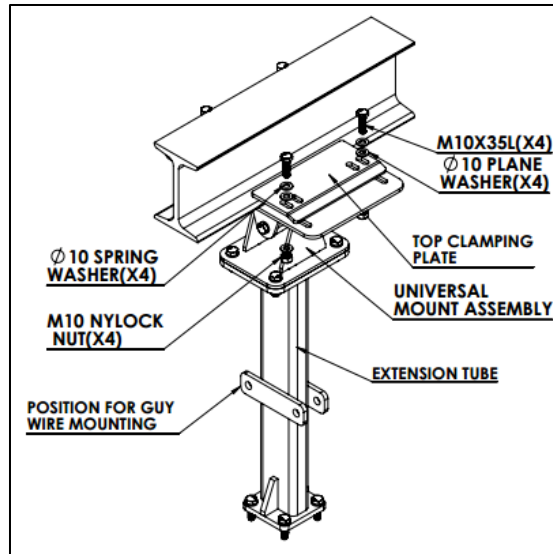


Figure 11: Installation of Universal coupling

2) Concrete beam - For concrete beam or concrete ceiling mounting, use the concrete beam mounting kit available from Falco eMotors.

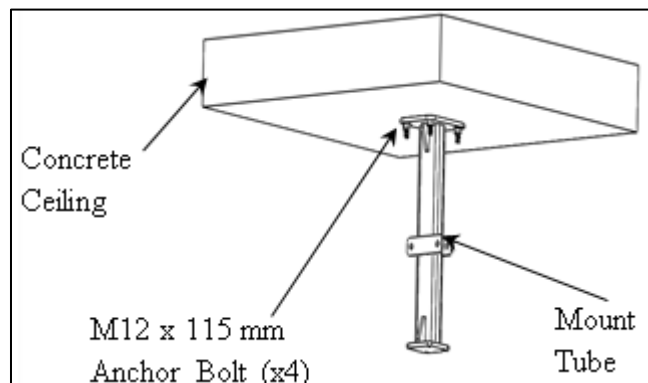


Figure 12: Installation of concrete beam ceiling assembly.

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

Ensure fan blade clearance meets the requirements.

Universal Coupling

INSTALL FAN MOUNT ASSEMBLY, (Universal coupling + Extension tube assembly) INSTALLING IN STANDARD I-BEAM

1. Locate fan mount assembly on bottom of building support beam. Align mount assembly so that it is centered and square to the beam. Orient mounts such that the pivoting axis is aligned with the building slope if required.
2. Install clamps on thick flange I-beams. Fasten using the supplied M10 X 50 mm hex bolts, plain washer, spring washer M10 nylock Nut. Apply torque to fasten bolts 55 Nm

NOTICE

NOTICE *If building support beam is not at level, ensure proper fan clearance using the mounting information shown on Figure 10: Motor clearance and exclusion zone or add mounting extensions as required to ensure clearance.*

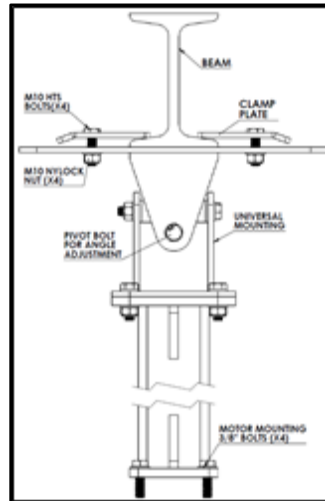


Figure 13 Front view of Universal coupling mounting

Concrete Beam

1. Ceiling attachment by using anchor fasteners – (Optional available from Falco eMotors)
2. Make a 4 nos. drill of diameter 12 mm (refer-) on a concrete ceiling where fan is to be install.

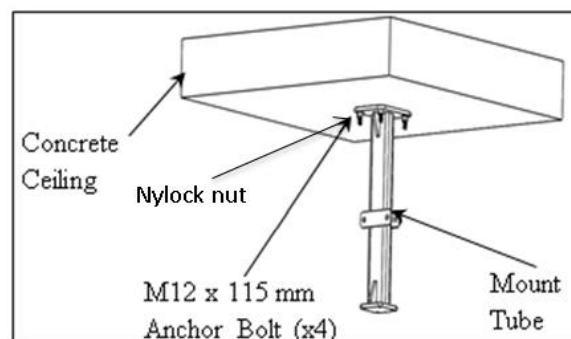


Figure 14: Concrete beam ceiling mounting

3. Attach a ceiling structure (optional) with the help of anchor fastener M12 X 115 mm and plain washer. Apply a torque 60Nm to tighten nylock nut and bolts.

Setting instruction for M12

	HST3	HST3-R	HST3/R BW	h ₁	h ₂
M12x85 10/-	✓	✓	-	10	-
M12x95 20/-	✓	✓	-	20	-
M12x105 30/10	✓	✓	-	30	10
M12x115 40/20	✓	✓	✓	40	20
M12x125 50/30	✓	✓	-	50	30
M12x145 70/50	✓	✓	-	70	50
M12x165 90/70	✓	✓	-	90	70
M12x185 110/90	✓	✓	-	110	90
M12x215 140/120	✓	✓	-	140	120
M12x235 160/140	✓	-	-	160	140
M12x255 180/160	✓	-	-	180	160
M12x295 220/200	✓	-	-	220	200
M12x345 270/250	✓	-	-	270	250

Figure 15: Anchor Fastener installation procedure

13.0 PLACEMENT AND SPACING

- Consult your local distributor to help you plan the most efficient installation of your fans. Ensure fan placement is such that the fans blades are a minimum of 10' from any manned working surface (floor or Mezzanine)
- Ensure fan blade does not extend into exclusion zone (Figure 10: Motor clearance and exclusion zone)
- Extensions are available if required, contact local distributor.
- Avoid mounting fans directly under lights or skylights to avoid visual strobing affect.

Note:

Be certain to comply with all local and national codes during installation

Table 4: Recommended ceiling extension for Epoch 0.5

Epoch 0.5 Motor Details												
Roof Slope	2 by 12		4 by 12		Hanging Weight		Maximum Torque		Exclusion Zone Radius		Blade Length (extrusion)	
Roof Angle	9.5 degree		18.4 degree									
Fan Diameter(Ft)	Extension Length (ft)	Extension Length (m)	Extension Length (ft)	Extension Length (m)	lb	Kg	ft.lb	Nm	Ft	m	ft	m
6	N/A	N/A	N/A	N/A	148.2	67.2	18.4	25.0	0.8	0.3	1.0	0.3
8	N/A	N/A	N/A	N/A	157.2	71.3	18.4	25.0	1.0	0.3	2.0	0.6
10	N/A	N/A	2	0.61	165.8	75.2	18.4	25.0	1.5	0.5	3.0	0.9
12	N/A	N/A	2	0.61	174.4	79.1	18.4	25.0	1.7	0.5	4.0	1.1
14	2	0.61	3	0.91	183.0	83.0	18.4	25.0	2.2	0.7	5.0	1.5
16	2	0.61	4	1.22	191.6	86.9	18.4	25.0	2.3	0.7	6.0	1.8

Table 5 Recommended ceiling extension for Epoch 1.0

Epoch 1.0 Motor Details												
Roof Slope	2 by 12		4 by 12		Hanging Weight		Maximum Torque		Exclusion Zone Radius		Blade Length (extrusion)	
Roof Angle	9.5 degree		18.4 degree									
Fan Diameter(Ft)	Extension Length (ft)	Extension Length (m)	Extension Length (ft)	Extension Length (m)	lb	Kg	ft.lb	Nm	ft	m	ft	m
6	N/A	N/A	N/A	N/A	148.2	57.7	36.9	50.0	0.8	0.3	1.0	0.3
8	N/A	N/A	N/A	N/A	157.2	61.8	36.9	50.0	1.0	0.3	2.0	0.6
10	N/A	N/A	2	0.61	165.8	65.7	36.9	50.0	1.5	0.5	3.0	0.9
12	N/A	N/A	2	0.61	174.4	69.6	36.9	50.0	1.7	0.5	4.0	1.1
14	2	0.61	3	0.91	183.0	73.5	36.9	50.0	2.2	0.7	5.0	1.5

Table 6 Recommended ceiling extension for Epoch 2.0

Epoch 2.0 Motor Details												
Roof Slope	2 by 12		4 by 12		Hanging Weight		Maximum Torque		Exclusion Zone Radius		Blade Length (extrusion)	
Roof Angle	9.5 degree		18.4 degree									
Fan Diameter(Ft)	Extension Length (ft)	Extension Length (m)	Extension Length (ft)	Extension Length (m)	lb	Kg	ft.lb	Nm	ft	m	ft	m
6	N/A	N/A	N/A	N/A	148.2	67.2	66.4	90.0	0.8	0.3	1.0	0.3
8	N/A	N/A	N/A	N/A	157.2	71.3	66.4	90.0	1.0	0.3	2.0	0.6
10	N/A	N/A	2	0.61	165.8	75.2	66.4	90.0	1.5	0.5	3.0	0.9
12	N/A	N/A	2	0.61	174.4	79.1	66.4	90.0	1.7	0.5	4.0	1.1
14	2	0.61	3	0.91	183.0	83.0	66.4	90.0	2.2	0.7	5.0	1.5
16	2	0.61	4	1.22	191.6	86.9	66.4	90.0	2.3	0.7	6.0	1.8
18	3	0.91	4	1.22	200.2	90.8	66.4	90.0	2.7	0.8	7.0	2.1
20	3	0.91	5	1.52	208.8	94.7	66.4	90.0	2.8	0.9	8.0	2.4
22	3	0.91	5	1.52	217.4	98.6	66.4	90.0	3.0	0.9	9.0	2.7
24	4	1.22	6	1.83	226.0	102.5	66.4	90.0	3.3	1.0	10.0	3.0

Table 7 Recommended ceiling extension for Epoch 3.0

Epoch 3.0 Motor Details												
Roof Slope	2 by 12		4 by 12		Hanging Weight		Maximum Torque		Exclusion Zone Radius		Blade Length (extrusion)	
Roof Angle	9.5 degree		18.4 degree									
Fan Diameter(Ft)	Extension Length (ft)	Extension Length (m)	Extension Length (ft)	Extension Length (m)	lb	Kg	ft.lb	Nm	ft	m	ft	m
16	2	0.61	4	1.22	191.6	96.4	118.0	160.0	2.3	0.7	6.0	1.8
18	3	0.91	4	1.22	200.2	100.3	118.0	160.0	2.7	0.8	7.0	2.1
20	3	0.91	5	1.52	208.8	104.2	118.0	160.0	2.8	0.9	8.0	2.4
22	3	0.91	5	1.52	217.4	108.1	118.0	160.0	3.0	0.9	9.0	2.7
24	4	1.22	6	1.83	226.0	112.0	118.0	160.0	3.3	1.0	10.0	3.0

14.0 SAFETY PRECAUTIONS

It is mandatory that the installer has the following safety equipment on him during installation.

- a) Safety shoes
- b) Safety belt
- c) Helmets
- d) Safety Goggle
- e) Safety jacket
- f) ID card



Figure 16: Safety Instructions

WARNING

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

- a. Use this unit only in the manner intended by the manufacturer. If you have questions, contact the manufacturer.
- b. 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.

15.0 INSTALL MOTOR

1. Using the powerlift raised the motor with top cover until it contacts the bottom of the fan mount assembly.
2. Now as shown in the figure (Figure 17 : Motor Assembly installation) insert the guy wire (Safety Cable) connected to the ceiling structure through the top cover hole (in part facing the ceiling) , and bend the wire such that it comes out of the other hole.

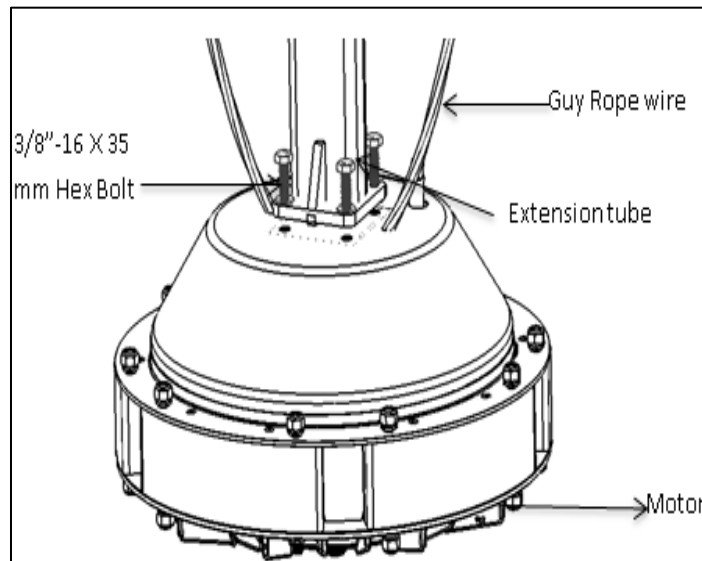


Figure 17 : Motor Assembly installation

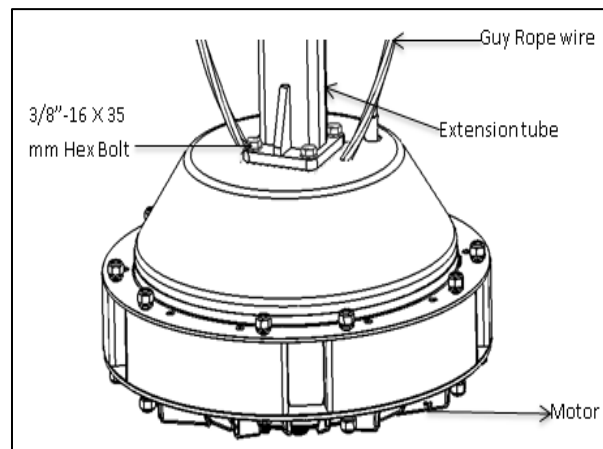


Figure 18: Motor assembly exploded view

3. Check if the guy wire is not touching the windings. Make sure the cable goes through the motor frame
4. Make sure the cable goes through the motor frame

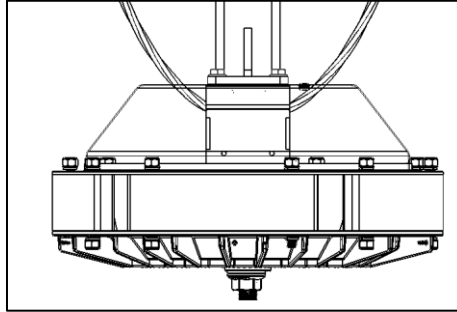


Figure 19 : Transparent view of guy wires from frame structure

5. Match top cover holes and extension tube holes
6. Fasten the motor to the mount assembly using the supplied 3/8" dia X 35 mm bolts, spring washer. Apply torque 55Nm.
7. Tighten the rope wire after making a loop from the I-beam or double-L structure.

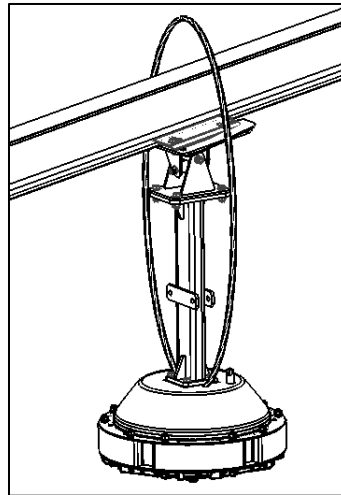


Figure 20: Guy wire (Safety wire) loop around the motor assembly and beam

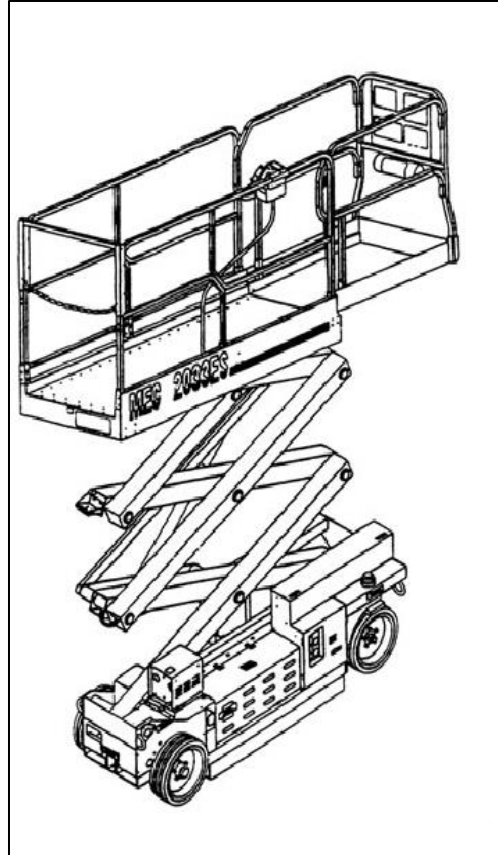


Figure 21 : Power Lift

NOTICE

If a mounting extension has been used, it may be necessary to obtain a longer cable from local supplier.

16.0 INSTALL GUY WIRE (Safety Cable)

Guy wires are designed to constrain lateral movement of the fan in operation. This movement may be due to impacts on the fan or winds impinging on the blades that would cause the fan to sway.

NOTICE

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

⚠ WARNING

If a mounting extension has been used, ensure that the longer guy wires accompanying the extension are used. Ensure that the angle formed by the guy

wire with the roof structure is less than 45°. See Fig. 10. Avoid any 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.

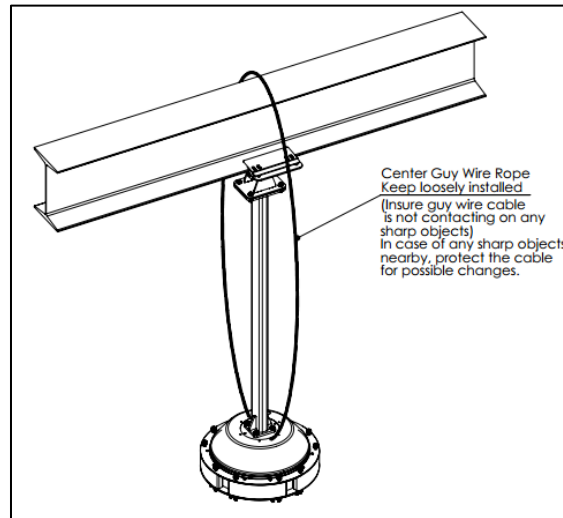


Figure 22 : Safety cable around the beam structure and motor

Ceiling structure with installed support guy wire.

1. Adjust turnbuckles to their longest position.
2. Attache snapo clamp with attached turnbuckle to the mount tube as shown. Repeat for all four snapo clamps.
3. Attach one end of guy wire to the building structure by using u-clamp. Ensure the structure has sufficient strength to withstand the wire tension. All guy wires should be 90 degree from each other. Repeat for all four guy wires.
 - a) Slide two of the supplied 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) Secuerely tighten the clamp fasteners so that it cannot slip. Make sure the U-bolts are over the free end of the cable.

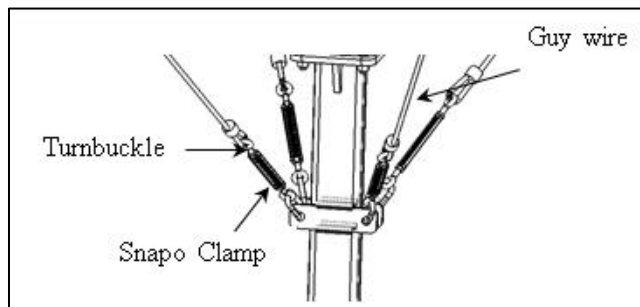


Figure 23: Support Guy wires installation

4. Individually tighten the turnbuckle on each cable until each cable is taut and the motor unit hangs plumb. Use a spirit level to verify motor unit hangs plumb.
5. Tighten universal coupling bolts on fan mount. Apply torque 60Nm.

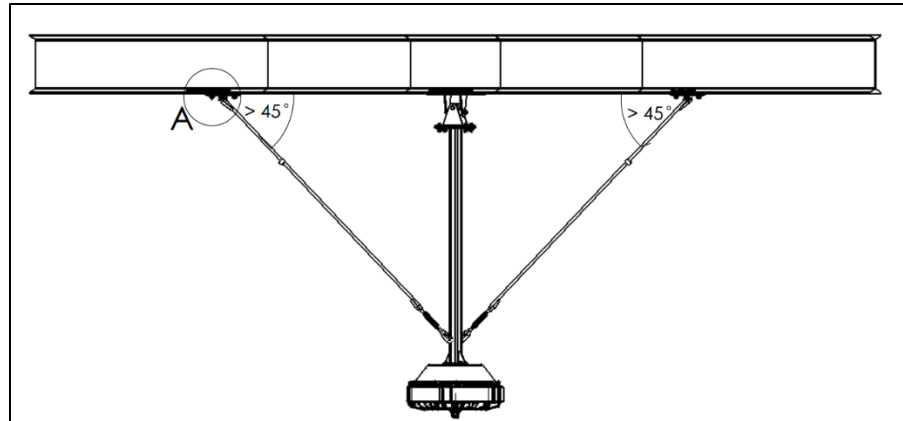
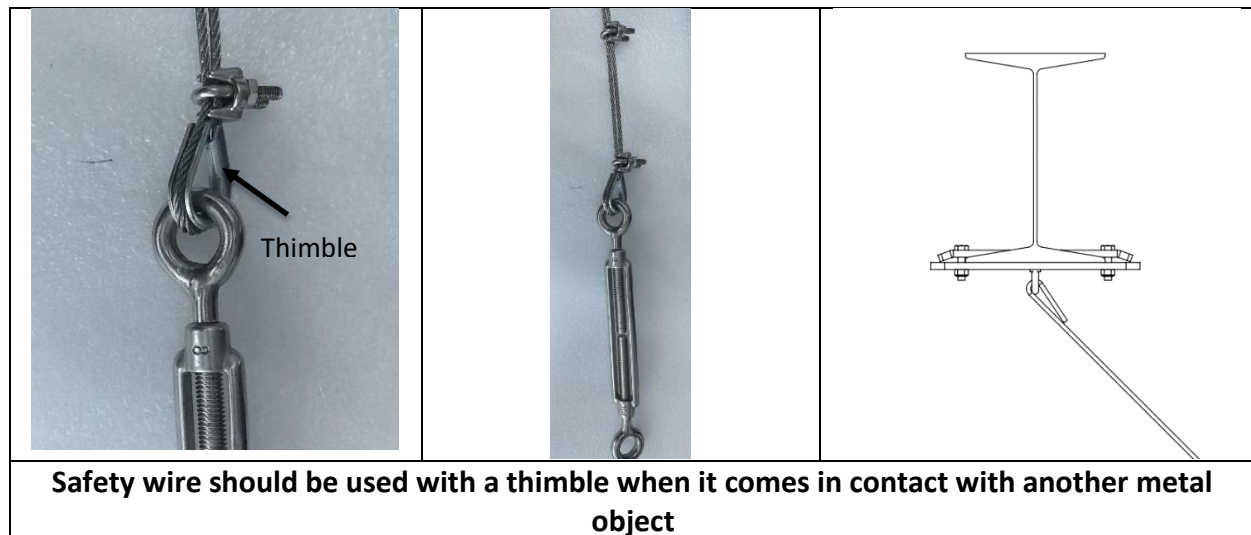
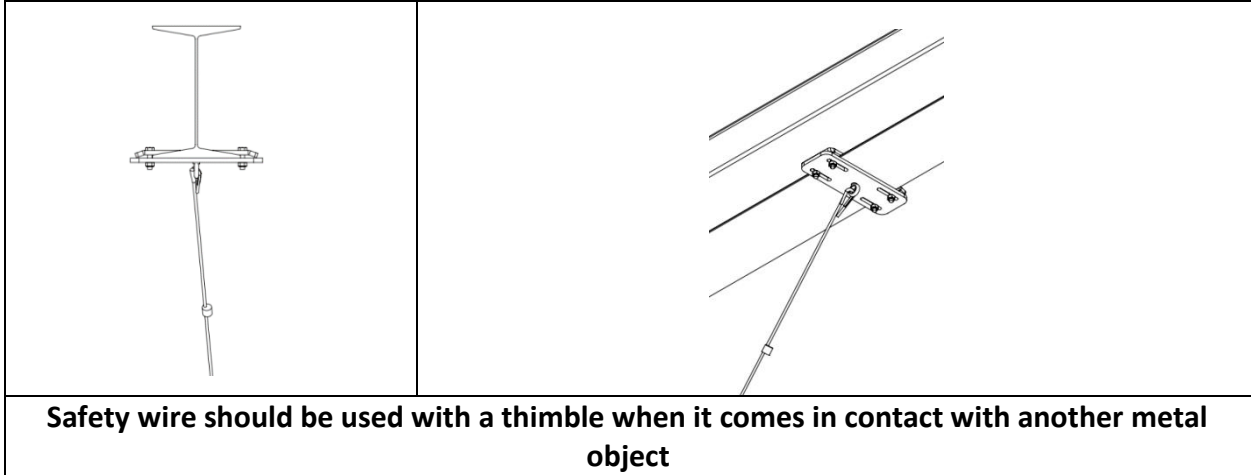


Figure 24 : Angle of guy wires

⚠ WARNING

Safety guy wires can fail over time if they touch a sharp object. Failed safety guy wire can entangle with the rotating fan and damage the blades or struts. Safety guy wires should always be used with a thimble as shown in pictures below.





17.0 INSTALL BLADES

Note:

Blade assemblies come pre assembled from the factory. Do not attempt to disassemble. The Motor assembly has special blade retention lock nuts pre-assembled to it. Remove them now and use them to mount the blade assemblies in the steps below. Use only the factory supplied lock nuts provided for blade mounting.

1. With the blade oriented such that the blade retention guy-wire is on top, support the blade assembly from below, orient and guide the assembly onto the top attachment studs on the motor assembly. Spread the strut arms slightly to facilitate installation onto the upper studs as shown. Angle the blade upward as needed to slide blade onto studs.
2. Still supporting the blade assembly, rotate the blade assembly down as shown and allow the bottom blade strut to ride up and over the bottom attachment studs on the hub assembly.

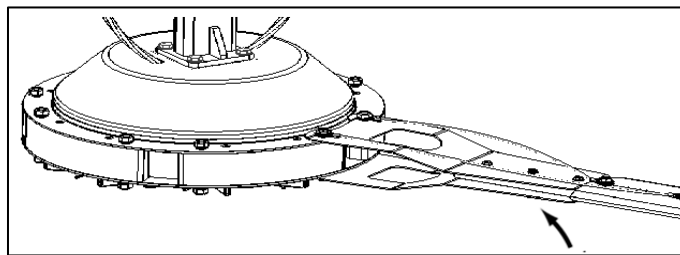


Figure 25: Blade Installation movement 1.

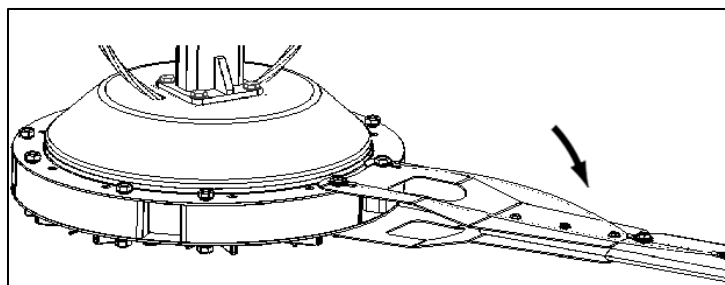


Figure 26: Blade Installation Movement 2

3. Remove 2 numbers of nut & stud from motor assembly (as shown in Figure 27 : Blade Assembly). Slide the stud into strut attachment hole.

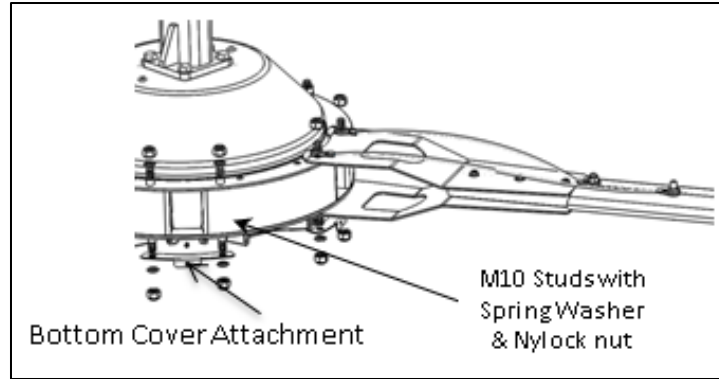


Figure 27 : Blade Assembly

4. Attach two support guy wires on studs from top side (as shown in the figure Figure 27 : Blade Assembly). Install spring washer & nylock nut from top side .
5. Install the bottom cover attachment after placing the blade assembly on bottom side (as shown in Figure 27 : Blade Assembly.)
6. Install spring washer & nylock nut from bottom side.
7. Always apply Loctite 242 for all fasteners, bolts & nuts before using.
8. Use torque wrench for tightening. Use Torque range as given in table (Table 3 :Fastener Torque Requirem).
9. Repeat procedure for 5 numbers of blade assembly

NOTICE

Do not lean on blade. Damage to strut may occur.

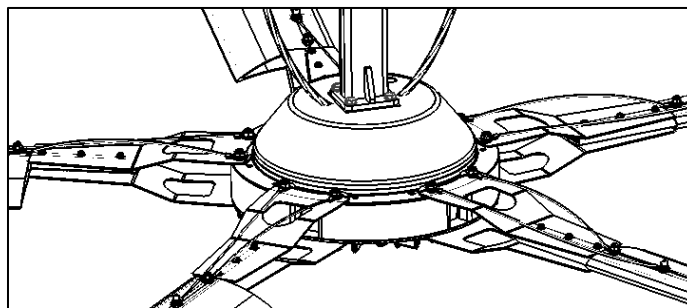


Figure 28: Blade assembly with Motor

18.0 BOTTOM COVER ASSEMBLY INSTALLATION

1. Use M4 round head screws (cap head) for mounting bottom cover
2. Always apply Loctite 242 for all screws and nuts.
3. Repeat the procedure 5 times.

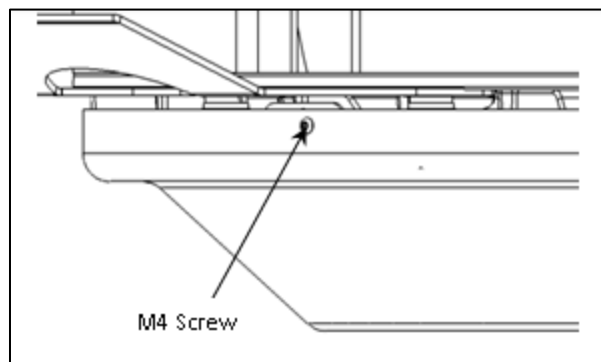


Figure 29: Bottom cover installation

Controller Box (Inverter) with Switches & Wirings.

1. Mount M8 Anchor fastener bolts on wall. (Figure 15: Anchor Fastener installation procedure)
2. Mount Controller box by using Nylock nut with plain washer on anchor bolt.
3. Always apply Loctite 242 on nut & bolt.
4. Refer this table to apply proper and specified torque. (Table 3 :Fastener Torque Requirements.)

Connectors Wiring

1. For Connectors, the customer can use conduit box/ junction box, to house the connectors.
2. Connect wires as per given in picture.
3. Visually inspect connection of wires on controller box.
4. Key of controller box handover.

19.0 ELECTRICAL INSTALLATION:

Electrical Connection for Non-Integrated System:

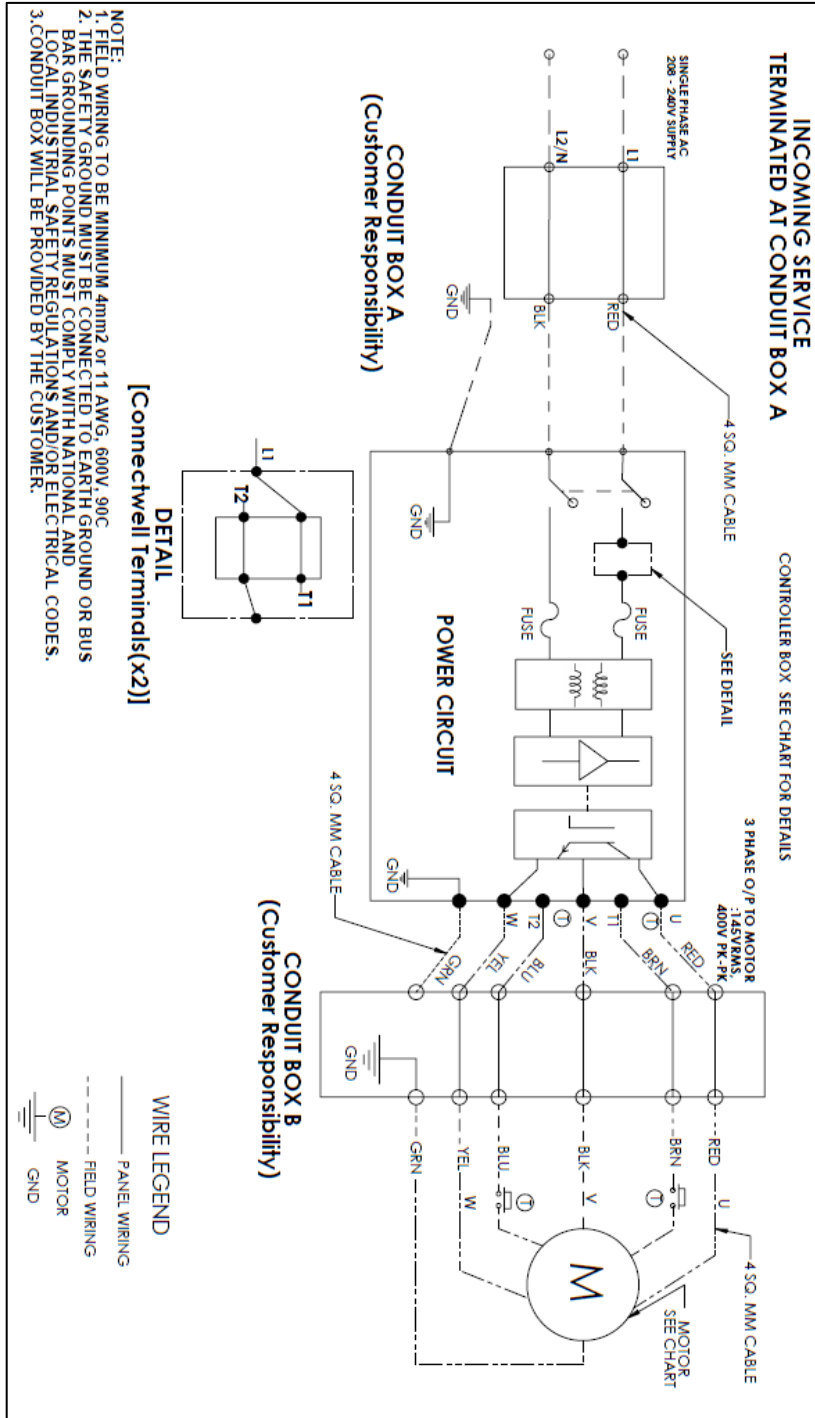


Figure 30 : Electrical connection for Non-integrated Model

⚠ WARNING

WARNING: Make sure supply is disconnected.

⚠ CAUTION

CAUTION: Check between line and neutral for 180 V to 277 V AC.

1. Three lines from supply: line, neutral and ground must be connected to the conduit box A.
2. Connect the cable near the motor with the conduit box B as shown in Figure 33.
3. Connect two thermostat wires with Connectwell connector as shown below in Figure 34.

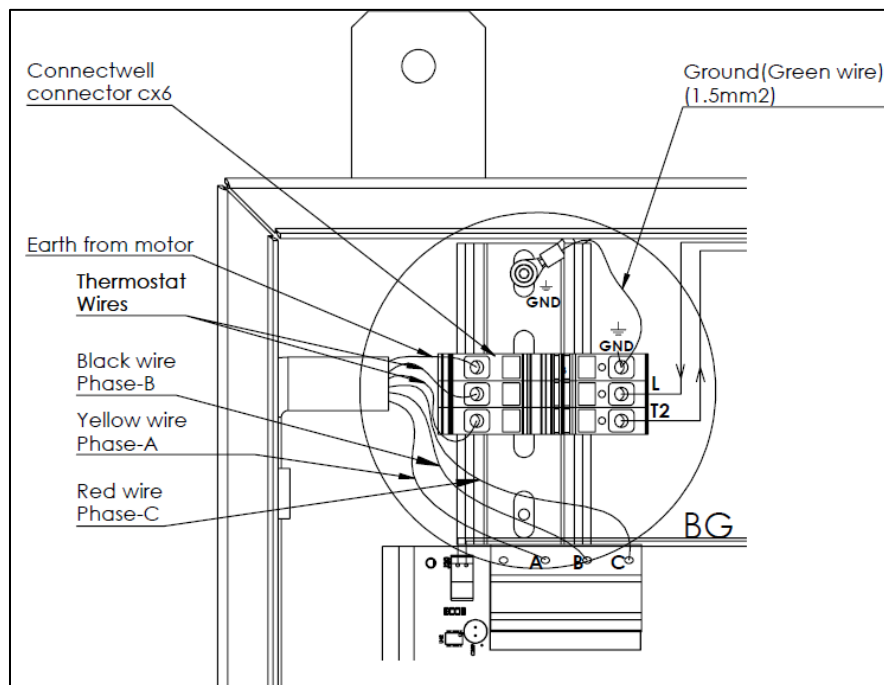


Figure 31 : Thermostat, earth and Phase connection.

⚠ WARNING

WARNING: Before turning on, please check if all the connections are terminated properly.

CAUTION

CAUTION: Contact your local Distributor / Dealer for proper installation and service.

Note -

The installation is to be in accordance with the National Electrical Code, ANSI/NFPA 70 and local codes.

After making the wire connections, the wires should be spread apart with the grounded conductor and the equipment-grounding conductor on one side of the outlet box and the ungrounded conductor on the other side of the outlet box.

Supply connections: conductor of a fan identified as grounded conductor to be connected to a grounded conductor of power supply, conductor of fan identified as ungrounded conductor to be connected to an ungrounded conductor of power supply, conductor of fan identified for equipment grounding to be connected to an equipment-grounding conductor.

Splices after being made should be turned upward and pushed carefully up into the outlet box.

WARNING

Warning - make sure power is off before attempting installation;

WARNING: Make sure supply is disconnected.

CAUTION: Check between line and neutral for 180 V to 277 V AC.

1. Connect the Line and Neutral to the Disconnect switch.
2. Connect the Disconnect switch with conduit box.



WARNING: Before turning on please check if all the connections are terminated properly.



CAUTION: Contact your distributor / dealer for proper installation and service.

Note -

The installation is to be in accordance with the National Electrical Code, ANSI/NFPA 70 and local codes.

After making the wire connections, the wires should be spread apart with the grounded conductor and the equipment-grounding conductor on one side of the outlet box and the ungrounded conductor on the other side of the outlet box

Supply connections: conductor of a fan identified as grounded conductor to be connected to a grounded conductor of power supply, conductor of fan identified as ungrounded conductor to be connected to an ungrounded conductor of power supply, conductor of fan identified for equipment grounding to be connected to an equipment-grounding conductor

Splices after being made should be turned upward and pushed carefully up into the outlet box.

Communication Interface Schematics

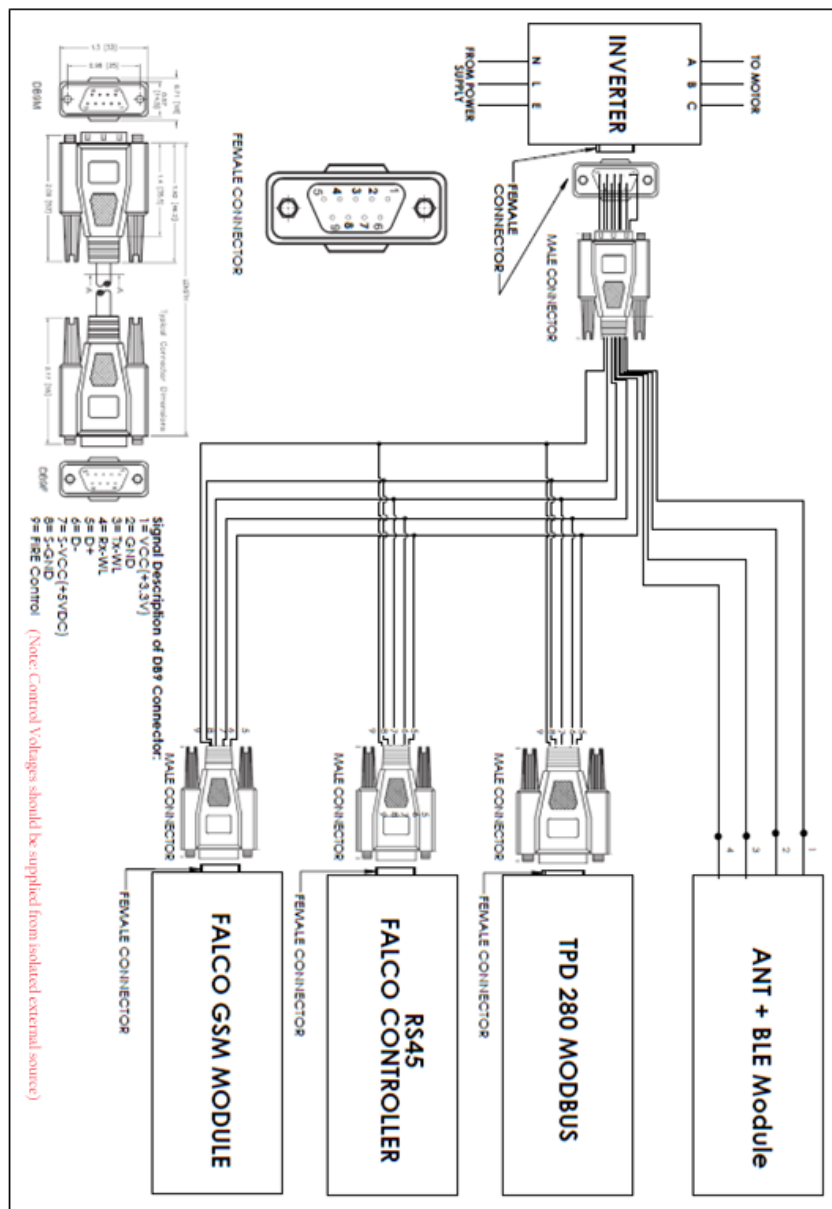


Figure 32: Available Communication Protocols and Interface with Epoch Inverter

20.0 CLAMPS, TURNBUCKLES, CABLES AND HARDWARE ACCESSORIES

1. After the fan assembly is complete adjust turnbuckles to their longest position.

This manual applies to the following platforms: Epoch 0.5, 1.0, 2.0, 3.0 and 4.0

2. Securely tighten the clamp fasteners so that it cannot slip. Make sure the U-bolts are over the free end of the cable.
3. Individually tighten the turnbuckle on each cable until each cable is taut and the motor unit hangs plumb. Use a spirit level to verify motor unit hangs plumb.

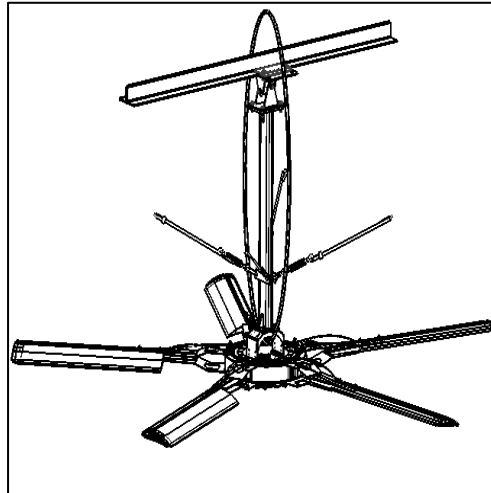


Figure 33: Ceiling structure with fan and guy wires

NOTICE

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

WARNING

If a mounting extension has been used, ensure that the longer guy wires accompanying the extension are used. Ensure that the angle formed by the guy wire with the roof structure is less than 45°. See Figure 24 : Angle of guy wires. Avoid any sharp edges or corners to reduce fatiguing and fraying of the guy wires. Failure to attach guy wires may resulting severe injury or death.

21.0 TROUBLESHOOTING:

Table 8: Troubleshooting description

Problem	Possible cause	Solution
---------	----------------	----------

Fan is not moving	1.Main cables not connected	1. Check all the connections to inverter and inverter to fan.
	2.Wire connection loose	2.Check the line wire connection to the fan & switch housing
Fan is noisy	1.Housing bolts are loose	1.Tighten all bolts to the required torque specification with Loctite
	2.Wire nut connections rattles against each other	2.Seperate and store neatly the wire nut connections
	3.Top cover touches the Rotor	1.Ensure that top cover does not touch the rotor or rotating assembly
Fan is not starting	Fan oscillating back and forth	Loss of a phase. Check the cable and the motor's connection Phase shorted, defective Inverter.
Over speed Fault	Over speed fault occurring frequently	Cable in between Motor and Inverter used is more than prescribed length, reduce the cable length.
LEDs on the board are off	No LEDs are shown open on in the board	Fuse is blown, replace the fuse. Check the power connections. Contact your local supplier/distributor
App not getting connected	Wrong ID in the ANT connection	Power cycle the board and try connecting again

22.0 START GUIDE FOR ANALOG CONTROLS:

1. How to start EPOCH FAN?

This manual applies to the following platforms: Epoch 0.5, 1.0, 2.0, 3.0 and 4.0

- Make sure proper supply connection (E, L, N) is there at the input connector.
- Now turn ON power supply from the MAINS SUPPLY.
- Press the ON/OFF button (RED color) on front of the controller box.
- Once the system turns ON, vary the KNOB from zero position to desired speed and wait for few seconds so that fan starts rotating at respective SPEED.

2. How to clear the faults?

- If there is a fault (phase loss, overvoltage, gatekill, etc) then it will be indicated by Red LED (continuously lit) on front of the controller box.
- Then vary the KNOB to zero position (Initial Position).
- Wait for few seconds until the RED LED turns OFF, indicating that the FAULT is cleared.
- If not cleared, then RESTART (Power Cycle) the system.

3. What to do if the FAN turns off suddenly?

- Check the power supply from the AC MAINS SUPPLY.
- Check for the FAULTS if any (Indicated by RED LED), If not then open the controller box and check whether both GREEN and RED LED's are glowing. If there is a FAULT then follow the steps to CLEAR the FAULT.
- Check for the output of the inverter and MOTOR TERMINALS (U, V, W) connection.
- If the problem is not resolved then contact FALCO eMOTORS for support.

23.0 Parts List — Fan

To ensure proper function, durability and safety of the product, only Falco recommended replacement parts for the safe, normal operation of the product must be used. Incorporation of non-recommended 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 could result in product malfunction, breakdown, premature wear, death or serious injury.

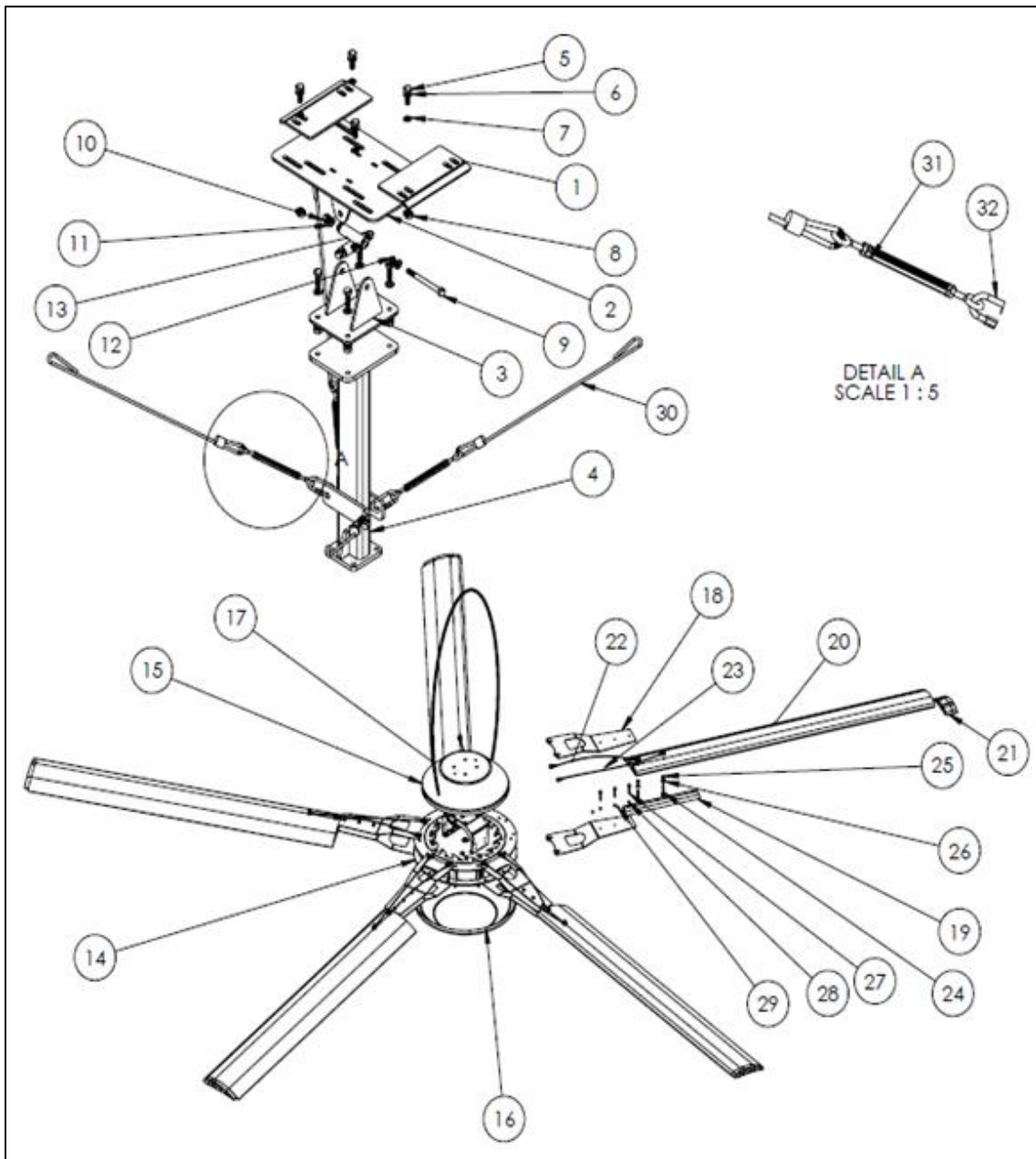


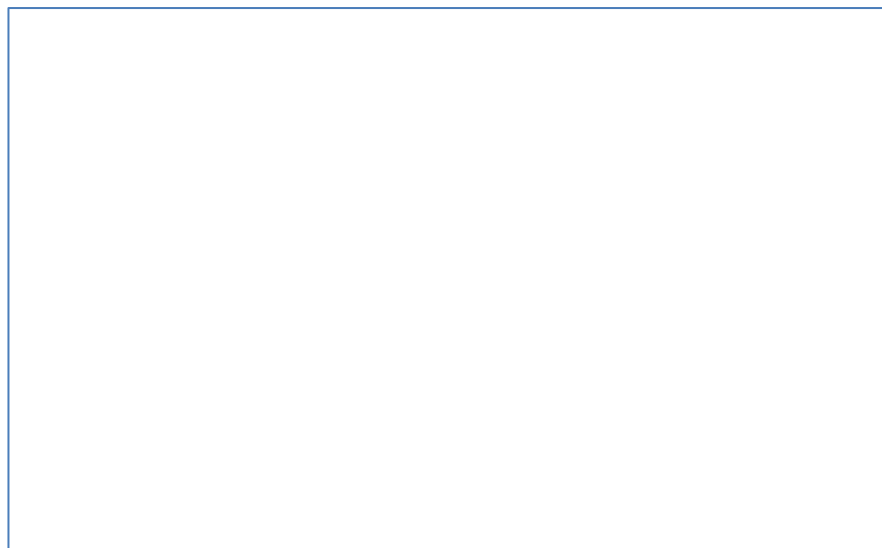
Figure 34 : Different Part Numbers for Epoch fan

Parts List — Fan

Table 9:Part List

Item No.	Quantity	Description	Part Number
1	2	Top clamp for I-Beam	502635
2	1	Coupling Top plate assy.	101312
3	1	Coupling Bottom plate assy.	101318
4	1	Extension assembly	101319
5	8	M10X50L Hex bolts	502770
6	32	M10 plain washer	502772
7	32	M10 Spring washer	502771
8	8	M10 Nylock Nut	502768
9	2	M12X120L Hex bolts	502831
10	2	M12 Nylock Nut	502830
11	4	M12 plain washer	502834
12	4	M12 Spring washer	502835
13	1	Bush assembly	101314
14	1	Motor Assembly	100926
15	1	Top cover	502690
16	1	Bottom cover	502691
17	1	Centre Guy wire	502773
18	10	Strut for Blades	502194
19	5	Blades attachment	502218
20	5	Blades 16 feet	502517
21	5	End Caps	502228
22	5	Small Wire rope assembly	101095
23	5	Big Wire rope assembly	101151
24	10	M8 X 45 MM Flange bolts	502318
25	10	Nylock nut for M8	502322
26	10	M10 Plane Washer	502772
27	15	M6 X 40 MM Flange bolts	502317
28	15	Nylock nut for M6	502321
29	15	Nord Lock M6	502319
30	4	Guy Wire	502773
31	4	Turn Buckle	502776
32	4	Snapo Clamp	502775

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



Falco eMotors Pvt. Ltd.

A-105, H-Block,
Pimpri MIDC
Near Morwadi Court
Pune, MH – 411 018, India
+91 20 69 33 22 55 / 66
+91 91 12 29 00 51 / 52 / 53

Falco eMotors Inc.

100 Executive Dr.Ste.C
Dulles, VA 20166
USA