RITE-HITE®
ALWAYS LOOKING AHEAD

REVOLUTION® & ROGUE® FAN

This Installation and Owner's Manual Covers Units Shipped: ***June 2015 to Date***

Read and save these instuctions.

Language: English

The English version of this manual shall prevail over any error in, or conflicting interpretation of, any translations.

Model #: **Revolution/Rogue**

Publication No. **54450031 August 2015**

NOTICE TO USER

Thank you for purchasing a Rite-Hite Fan. The Revolution and Rogue Fans are high-volume/low-speed (HV/LS) industrial fans that provide more consistent air circulation and ventilation with better energy efficiency than traditional high-speed ceiling fans or industrial floor fans.

Read and understand manual prior to installation or operation of this equipment.

For best results, have this product serviced by your authorized RITE-HITE® Representative.

Your local RITE-HITE® Representative provides the Planned Maintenance Program (P.M.P.) fitted to your specific operation. Call your local representative or RITE-HITE® at 1-414-355-2600 or toll free at 1-800-456-0600. In Europe, call +31-(0)571-277505.

Installation Tools Required

2	7/16 in. wrenches	(1 can be socket/driver)
2	1/2 in. wrenches	
2	9/16 in. wrenches	
2	3/4 in. wrenches	
1	Vice grip	
1	(Each) Large & Small flat screwdrivers	
1	Small standard screwdriver	
1	Medium Phillips screwdriver	
1	Torque wrench, minimum 200-ft-lb (270 Nm), 1/2" drive	
1	1/2 in. to 3/4 in. socket adapter	
1	1/2 in. socket extender	
1	Metric 7 mm deep well socket – or Driver	
1	1/4 in. cable cutter	
4	Crimp on ring terminals, M4 (#8) stud, for motor wiring	
1	Torpedo level	

If you are mounting to support angles that span building joists, you will also need a drill and a 1/2 in. drill bit.

Components

Verify you received all components before installation. Notify the factory if parts are missing or damaged.

1 motor, hub assembly, remote mounted control switch and disconnect switches – approximately 160 lb [73 kg]

1 box containing miscellaneous mounting hardware and cables – approximately 50 lb [23 kg]

1 box containing the control box – approximately 35 lb [16 kg]

Revolution Fan- 2 boxes of fan blades (packed two per box for a total of four blades – approximately 50 lb [23 kg] per box)

Rogue Fan- 1 box of fan blades (packed two per box – approximately 50 lb [23 kg] per box)

SAFETY

Safety Identifications

DANGER

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

Indique une situation dangereuse qui, si elle n'est pas évitée, peut entraîner la mort ou de graves blessures.

WARNING / AVERTISSEMENT

Indicates a hazardous situation which, if not avoided, *could result in death or serious injury.*

Indique une situation dangereuse qui, si elle n'est pas évitée, *peut entraîner la mort ou des blessures graves.*

CAUTION / ATTENTION

Indicates a hazardous situation which, if not avoided, *could result in minor or moderate injury*.

Indique une situation dangereuse qui, si elle n'est pas évitée, *peut entraîner des blessures légères à modérées.*

NOTICE

Indicates a situation which can cause damage to the equipment, personal property and/or the environment, or cause the equipment to operate improperly.

NOTE : A note is used to inform you of important installation, operation, or maintenance information.

SAFETY *Continued*

Lockout/Tagout Procedures

The Occupational Safety and Health Administration requires that, in addition to posting safety warnings and barricading the work area, the power supply has been locked in the OFF position or disconnected. It is mandatory that an approved lockout device is utilized. An example of a lockout device is illustrated. The proper lockout procedure requires that the person responsible for the repairs is the only person who has the ability to remove the lockout device.

In addition to the lockout device, it is also a requirement to tag the power control in a manner that will clearly note that repairs are under way and state who is responsible for the lockout condition. Tagout devices have to be constructed and printed so that exposure to weather conditions or wet and damp locations will not cause the tag to deteriorate or become unreadable.

Rite-Hite Corporation does not recommend any particular lockout device, but recommends the utilization of an OSHA approved device (refer to OSHA regulation 1910.147). Rite-Hite Corporation also recommends the review and implementation of an entire safety program for the Control of Hazardous Energy (Lockout/Tagout). These regulations are available through OSHA publication 3120.

Specifications

Diameter	8, 12, 16, 20 and 24 ft [2440 mm, 3660 mm, 4880 mm, 6100 mm and 7320 mm]
Blades	Aluminum
Blade Finish	Mill-finish standard, custom colors optional
# of Blades	2 or 4
CFM	Up to 420,000 CFM (24 ft diameter, 4 blade)
Watts	75 (@ 10Hz) to 1750 (@ 60Hz) Typical
Frequency	50/60 Hz
Coverage	Up to 22,000 sq ft [2046 m^2] 85 ft [26 m] from the fan's center in all directions
Decibels	40 to 63 dBA depending on fan speed (measured 20 ft [6100 mm] below and 20 ft [6100 mm] from the fan's center)
Air Speed	Up to 7 mph [3 m/s] at full speed
Controls	Variable speed
Mounting Heights	15 to 80 ft [5 to 24 m] from finished floor to bottom of blade
Weight	300 lb [136 kg]

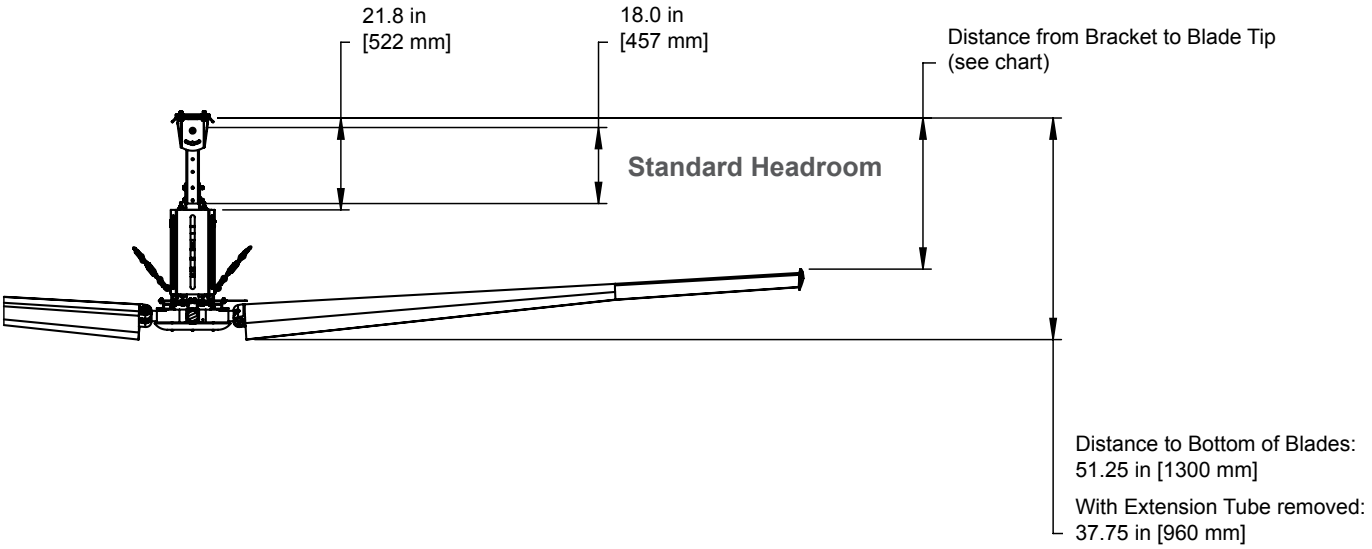
Revolution & Rogue Fan - 2 HP (1.5 kW)

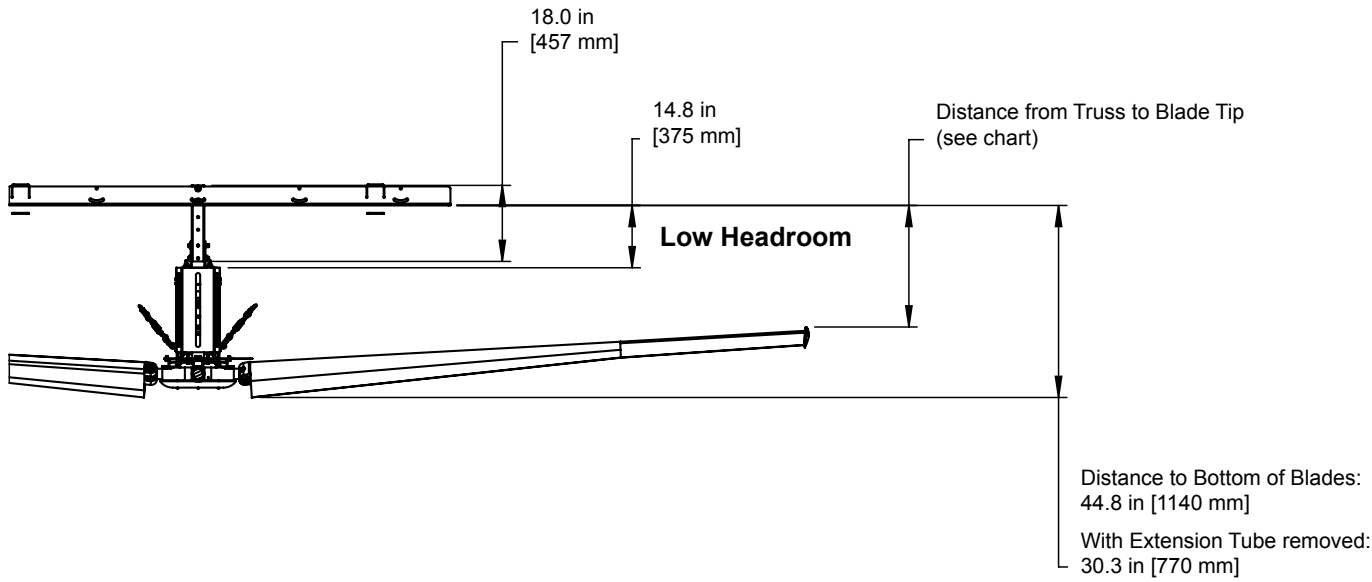
Voltage		230V 1Φ	230V 3Φ	400V 3Φ	480V 3Φ	575V 3Φ
VFD FLA		13.3	9.6	6.4	4.8	4.2
Motor FLA		5.8	5.8	3.3	3.0	2.6
CBox Fuse Amps		20	15	10	10	6
Min. Service Amps		20	15	10	10	10
VFD Nominal HP		2	2	2	2	2
Maximum Number of Fans per Branch Circuit						
Branch Circuit Amps	15	NA	1	1	2	2
	20	1	1	2	3	3
	25	1	2	3	4	4
	30	1	2	3	5	5
	35	2	2	4	5	6
	40	2	3	5	6	7

FAN DIMENSIONS

			Standard Headroom				Low Headroom			
			Distance from Bracket to Blade Tip*							
			Beam Kit Mounted		Truss Kit Mounted		Beam Kit Mounted		Truss Kit Mounted	
Diameter ft [mm]	Speed RPM	Weight lb [kg]	At Rest in [mm]	Full RPM in [mm]	At Rest in [mm]	Full RPM in [mm]	At Rest in [mm]	Full RPM in [mm]	At Rest in [mm]	Full RPM in [mm]
8 [2438]	30-152	268 [122]	42 [1067]	42 [1067]	36 [920]	36 [920]	43 [1092]	43 [1092]	36 [920]	36 [920]
12 [3658]	18-100	276 [125]	40 [1016]	39 [991]	33 [840]	32 [810]	43 [1092]	42 [1067]	36 [920]	35 [890]
16 [4877]	15-72	284 [129]	38 [965]	35 [889]	31 [785]	28 [710]	43 [1092]	40 [1016]	36 [920]	33 [840]
20 [6096]	12-58	292 [133]	36 [914]	31 [787]	29 [735]	24 [610]	43 [1092]	38 [965]	36 [920]	31 [785]
24 [7315]	10-48	300 [136]	34 [864]	27 [686]	27 [686]	20 [510]	43 [1092]	36 [914]	36 [920]	29 [735]

*Optional Extension Kit available to increase dimension from 18" [457mm] to 84" [2134 mm]





INSTALLATION

Mounting – General

⚠ WARNING / AVERTISSEMENT

Mount directly to a structural framing member to reduce risk of fire, electric shock or injury.

Monter directement sur un membre de charpente pour réduire les risques d'incendie, d'électrocution ou de blessure.

The weight of the fan that will be suspended from the ceiling is approximately 300 lb [136.4 kg] and will generate torque of up to 300 ft-lb [407 Nm].

NOTICE

Failure to follow these guidelines will result in limited air movement from the fan:

- If the ceiling support structure is an open-web design, all hanging dimensions can be taken from the underside of the ceiling.
- If the ceiling's support structure is a solid beam or solid channel, all measurements must be taken from the bottom of the beam as the basis point for the hanger dimension.
- If the roof is pitched, this must be accounted for above the tips of the blades.

The standard blade design on the Rite-Hite Revolution and Rogue Fan is angled upward to provide improved airflow. A combination of centrifugal force and air pressure causes the blades to move upward to their operating position.

NOTICE

To ensure the blades will have proper clearance in all areas when the fan is running: Measure the distance to possible obstructions and mount the fan using Standard or Low Headroom tables. Whenever possible allow 12 in. [305 mm] additional clearance to existing obstructions.

Mounting – I-Beam (TYPICAL)

If the fan is being mounted to a building support I-beam (6 – 13-1/2 in. [150 – 350 mm] wide), mount the fan directly to the beam with the provided brackets. Clamp the brackets around the beam using the holes in the upper beam mounting bracket that are closest to the edge of the beam (Figure 1).

If the fan is being mounted to a beam that is larger than the bracket (greater than 13-1/2 in. [350 mm] wide), clamp the bracket on one edge of the beam and drill holes through the beam to bolt the other side securely. Use only Grade 8 hardware.

Use a level to ensure the extension tube is hanging vertical.

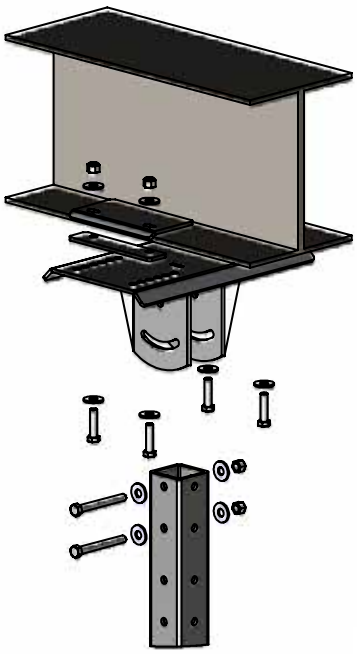


Figure 1

Mounting – Ceiling Truss Kit (OPTIONAL)

When using a support channel to span two building joists, use material that will securely support the fan. Two pieces of 3 x 3 x 1/4 in. [75 x 75 x 7 mm] angle is recommended. Mount angles so fan can be hung using standard I-Beam mounting bracket. Securely mount the angles to the building joists to ensure the angles cannot move. Use a level to ensure the extension tube is hanging vertical.

NOTE : If a Truss Kit is ordered, the typical I-Beam ceiling bracket will not be provided.

Two formed angles span existing building trusses. Figure 2 shows how the brackets are used to secure the angles to the building trusses while setting the gap between the angles for the 3 x 3 in. [75 x 75 mm] drop tube.

Several mounting positions have been cut into the angles to allow for flexibility in positioning the fan.

INSTALLATION *Continued*

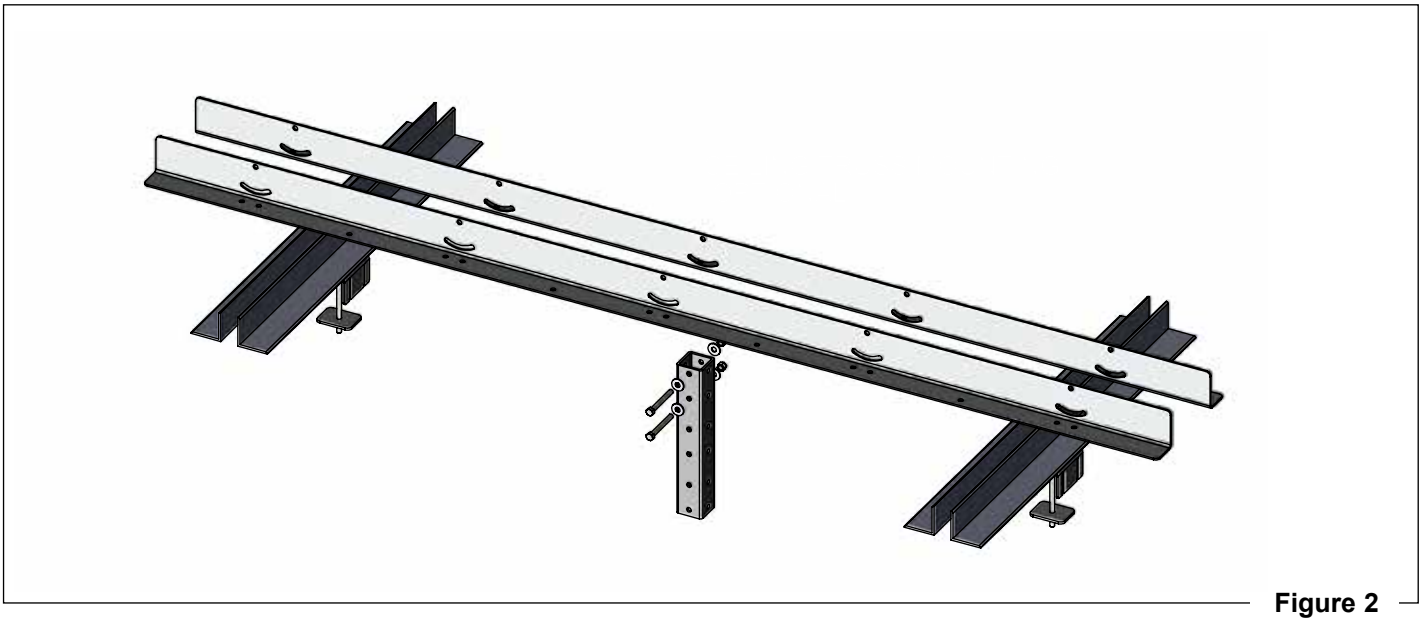


Figure 2

⚠ WARNING / AVERTISSEMENT

Always mount the fan to two joists. One joist will not provide the rigidity and support necessary for the fan during operation, and may cause the fan to fall and cause injury.

Toujours monter le ventilateur sur deux solives. Une seule solive n'apportera pas la rigidité et le soutien nécessaire au ventilateur en marche ; cela pourrait entrainer la chute du ventilateur et causer des blessures.

Mounting – Laminated Beam Kit (OPTIONAL)

1. Through-bolt the laminated beam brackets with one bracket on each side of the laminated (or concrete) beam (Figure 3).
2. Attach the standard ceiling mounting bracket to this bracket in the normal manner.

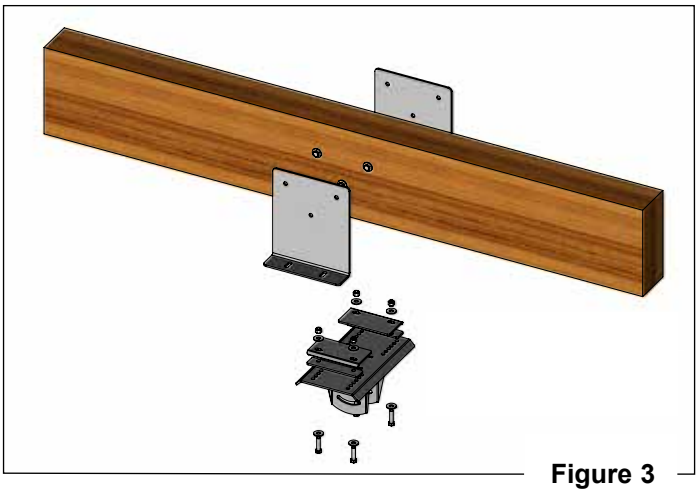


Figure 3

Mounting – (ALTERNATIVE METHODS)

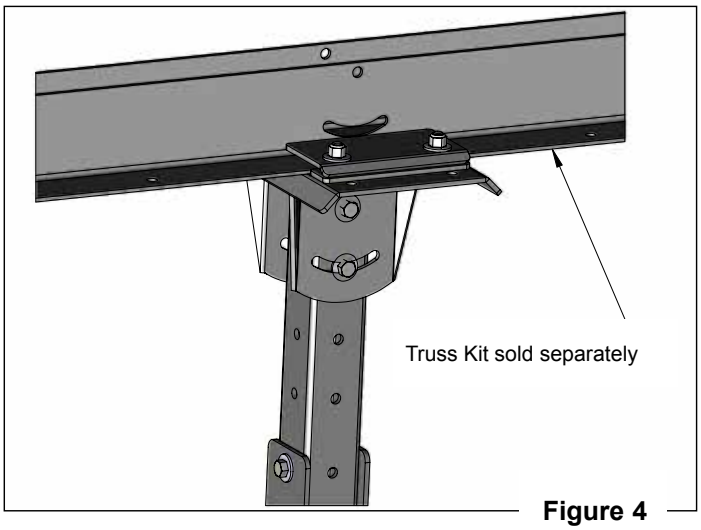


Figure 4

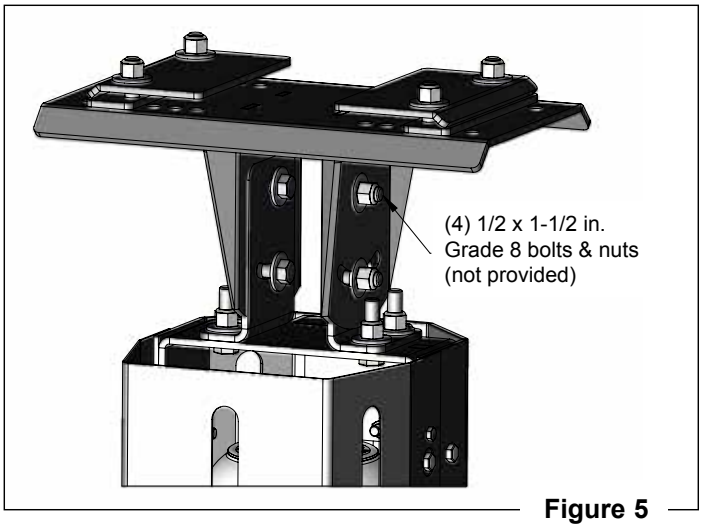


Figure 5

INSTALLATION *Continued*

Motor Bracket

The motor bracket attaches to the extension tube with two 1/2 x 4-1/2 in. Grade 8 bolts, washers, and locknuts.

1. Position the motor bracket so that one angle is on each side of the extension tube.
2. Insert the bolts through the holes in the angles at the top of the motor bracket and through the extension tube and back through the second angle.
3. Tighten both locknuts securely.

When an extended down tube is used:
The smaller square tubing (3 x 3 in. [75 x 75 mm]) will telescope inside the larger square tubing (3-1/2 x 3-1/2 in. [90 x 90 mm]). The brackets on the top of the motor bracket are bolted in slots to allow the larger tube to bolt to the top of the motor. The 3 x 3 in. [75 x 75 mm] tube should always bolt to the ceiling bracket.

When fan assembly is mounted directly to the ceiling:
Bracket without an extension tube, use four 1/2 x 1-1/2 in. Grade 8 bolts (not provided) to bolt the brackets properly.

Safety Cables (INCLUDED WITH KIT)

⚠ WARNING / AVERTISSEMENT

Always use safety cables. **They protect against a fan fall in the event of a bolted joint loosening.**

Toujours utiliser des câbles de sécurité. **Ils protègent contre la chute d'un ventilateur dans le cas d'un relâchement de l'assemblage boulonné.**

1. Wrap a safety cable around the bolted brackets at the ceiling and through the top of the extension tube (A).
2. If installing with adjustable-length extension tubes, use a third safety cable to secure the center bolted joint of the extension tubes (B).
3. Wrap a second safety cable through the bottom of the extension tube and through the top of the motor housing (C).

Secure the safety cables with the provided clamps.

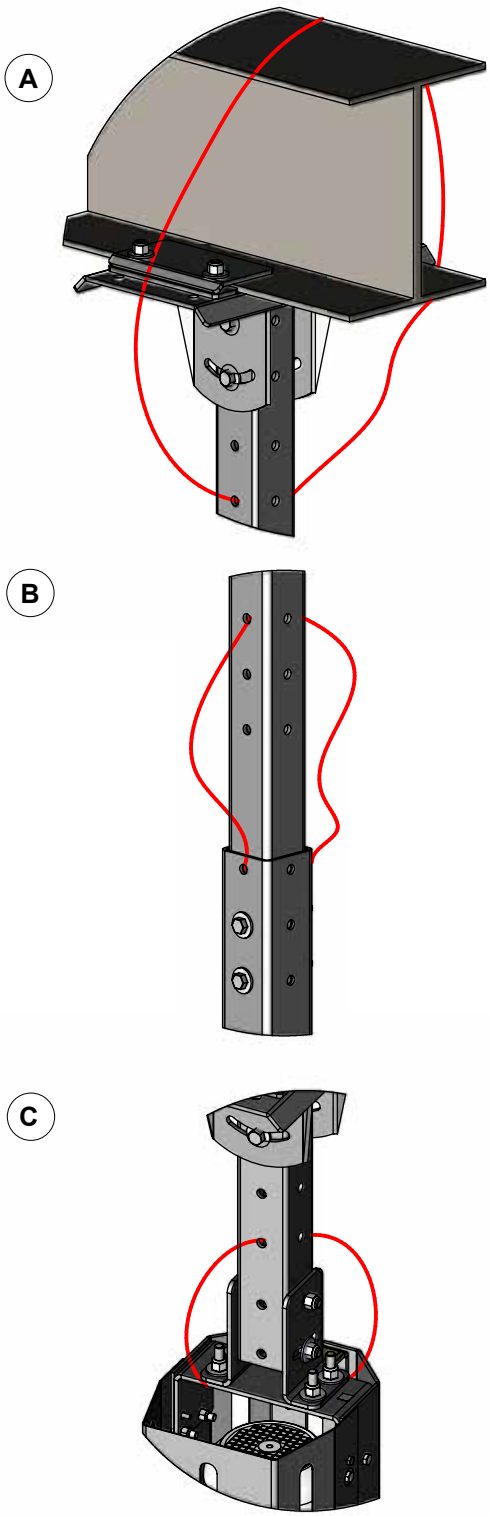


Figure 6

INSTALLATION *Continued*

Stabilization Cables (INCLUDED WITH KIT)

⚠ WARNING / AVERTISSEMENT

Always use stabilization cables. **They protect the fan from tilting and allowing the blades to impact a ceiling joist or object.**

Toujours utiliser des câbles de stabilisation. **Ils empêchent le ventilateur de basculer et ses pales d'entrer en contact avec une solive du plafond ou un objet.**

Stabilization cables, anchor the fan for situations like cross winds or impacts that could tilt the fan, causing the blades to impact a ceiling joist or other object. Use these cables to attach the fan bracket to the ceiling.

1. For greatest support, attach the stabilization cables to the ceiling at 90° to each other and as far away as possible from the point where the fan is mounted.
2. Secure the stabilization cables to the ceiling with two cable clamps, and tighten with a turnbuckle.
3. Cut stabilization cable to length as required.
4. Ensure that stabilization cables are attached in a position that does not allow the blades to hit the stabilization cables when the fan is operating.
5. Tighten the turnbuckle one turn past hand-tight.
6. Install stabilization cable clamp nuts away from turnback.

Blade Attachment

1. Clean each blade, removing fingerprints and dirt before the blades are installed.
2. Raise the fan blade above the arm of the fan hub and allow the blade to slide into the slot provided on the fan hub (Figure 7).
3. Attach each fan blade to the fan hub with a 1-in. bolt (provided).
4. Use a torque wrench with a 3/4 in. drive extension to tighten the bolt to 200 ft-lb [271 Nm].

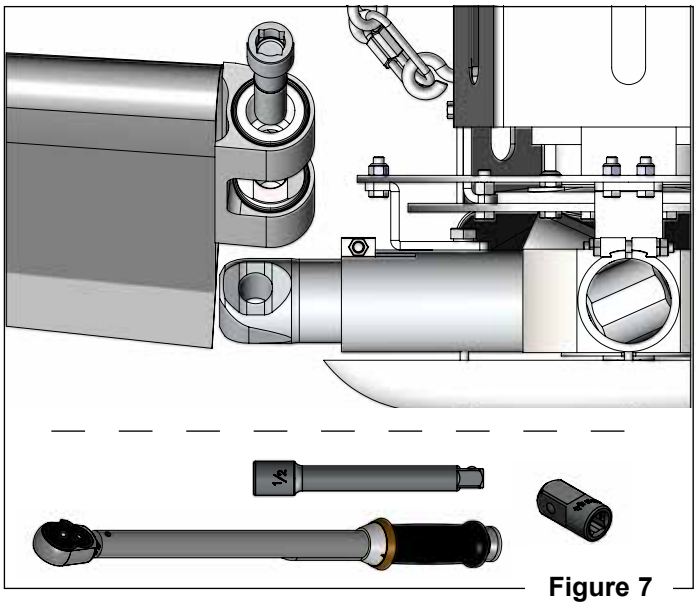


Figure 7

Fan Leveling

Level the fan hub after blade attachment.

1. Hold a level across the center of the hub (all directions).
2. Make fine adjustments with the (turnbuckle clamped) stabilization cables.
3. After operating a run/test, test and re-adjust level and cable tension.

SAFETY

Fan Guarding

Guard the fan if there is potential for a person or object to come into contact with moving fan blades. In some cases, this guarding can be a structure built near the edge of the blades to keep fork trucks and other objects from entering a danger area. In other cases, such as when fans are mounted on low ceilings, it may be necessary to build a "cage" around the fan blades to ensure objects do not come into contact with the moving fan blades. It is best to mount this cage independent of the fan and support the cage from the ceiling or columns as necessary.

Open Air Environment

When fans are used in open air environments, it is recommended that the fans be shut down during periods of high wind speed. A wind speed control kit is available from Rite-Hite Fans (Part number 76210072).

Remote Stop Input

Any device with a relay output (ie Fire Suppression, Wind Sensors, Building Automation, etc.) can stop the fan remotely by opening a contact.

INSTALLATION *Continued*

Typical – Fan Electrical Installation

A. Mount Remote Control Box (Speed Control) at user accessible height.
B. Mount Fan Control Box (VFD Enclosure) at maintenance accessible height
C. Mount disconnect at accessible height, according to local code.

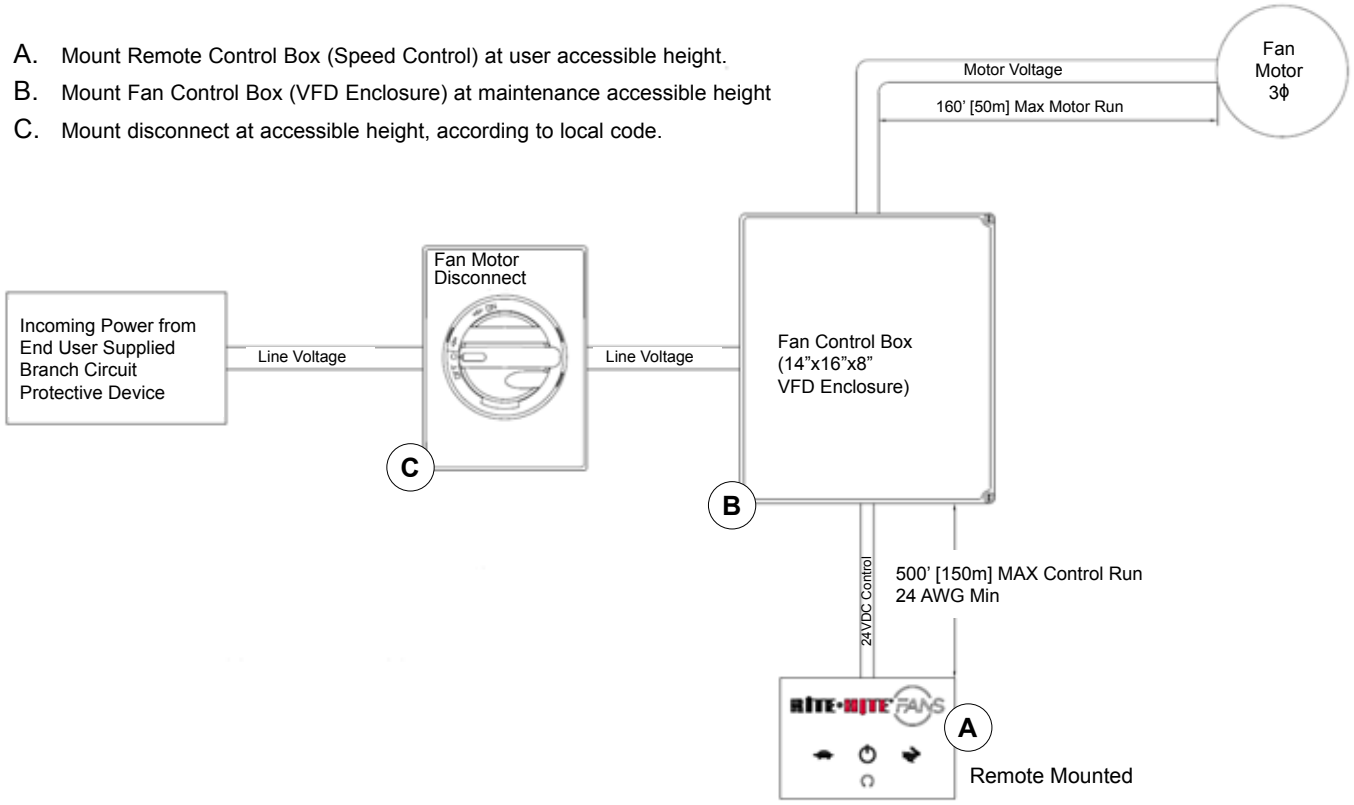


Figure 8

Field Wiring: Power

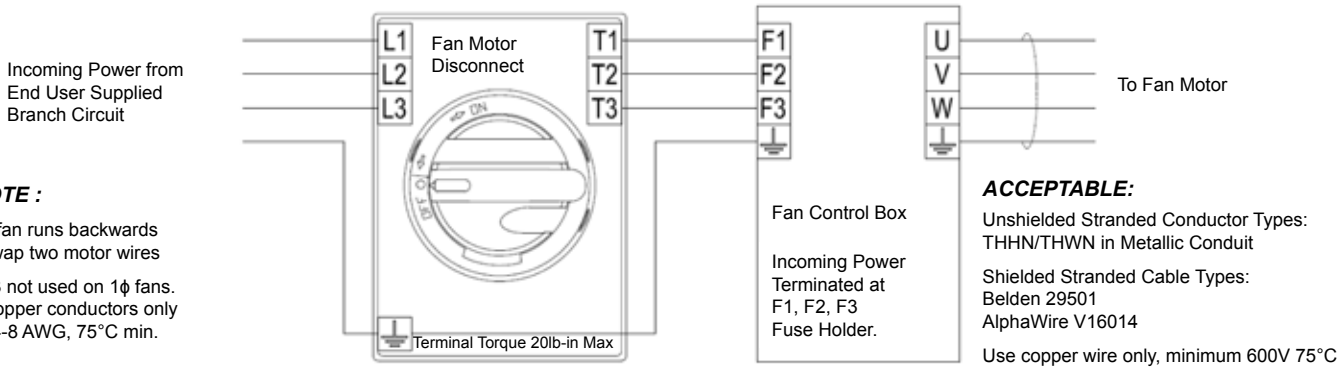


Figure 9

Field Wiring: Speed Control Station

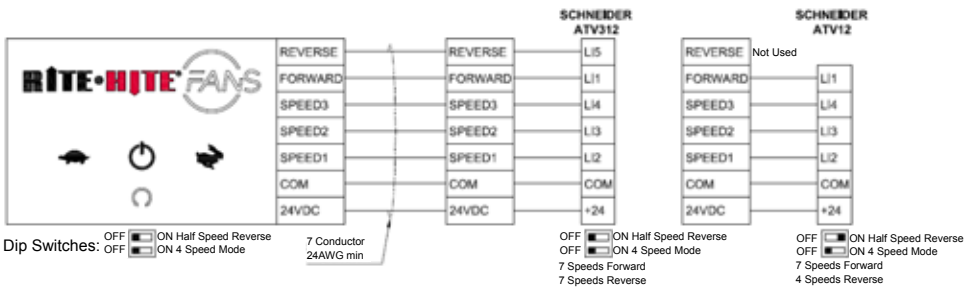


Figure 10

INSTALLATION *Continued*

Control Box

⚠ CAUTION / ATTENTION

Mount control boxes outside of the fan diameter. A control box mounted above a fan or inside the fan diameter cannot be locked out safely.

Monter les boîtes de commande en dehors du diamètre du ventilateur. Une boîte de commande montée au-dessus ou dans le champ du ventilateur ne peut être verrouillée en toute sécurité.

Mount the control box securely to a wall or building column with appropriate anchors (not provided). Mount the control box no farther than 160 ft [50 m] from the fan it is controlling. Ensure that the fan is visible from the control box mounting location.

Control Box Dimensions

Controls are mounted in a 16"x14"x8" enclosure. Overall size is 17.6"x16"x8.4" [447mm x 406mm x 212mm].

Label Plate

1. Attach the label plate mounting brackets to the bottom of the fan hub:
   a. Insert the four 1/4-20 x 1.0 in. bolts with lock washers through the end with the round hole.

      NOTE : Do not tighten completely until the label plate is attached.

   b. Align the bracket so the slotted hole faces outward, toward the fan blade.
   c. Repeat this process for the remaining three brackets.
2. Attach the label plate to the label plate brackets:
   a. Insert the bolt up through the label plate and through the label plate bracket.

      NOTE : You may need to puncture a small hole through the label with a sharp object to insert the bolt.

   b. Install a 1/4-20 in. Nylock nut on the bolt to secure it in position.
   c. Repeat this process to attach the label plate to the remaining label plate brackets.
3. Tighten all the bolts holding the brackets and label plate securely.

Motor Cover Attachment

Attach the motor cover over the motor bracket:

1. Insert a 1/4-20 x 1 in. bolt with locknut through the motor cover and motor bracket.
2. Secure bolt with a Nylock nut on the inside.
3. Repeat Step 1 and Step 2 for the other three bolts.
4. Tighten all four bolts securely.

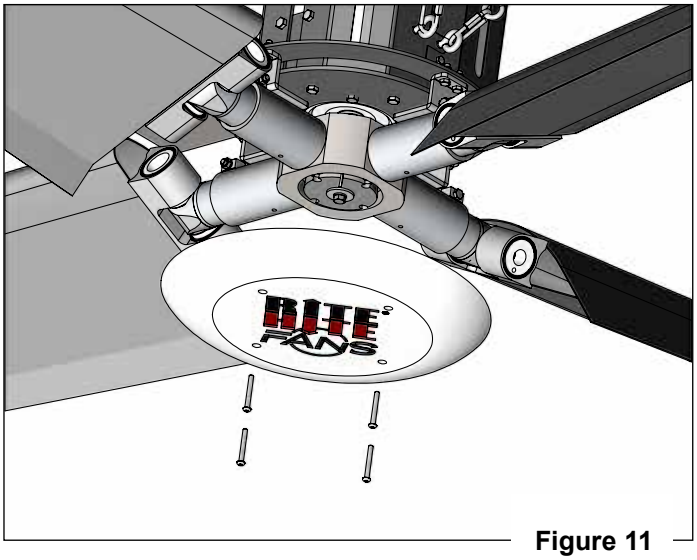


Figure 11

ELECTRICAL

Speed Control Station

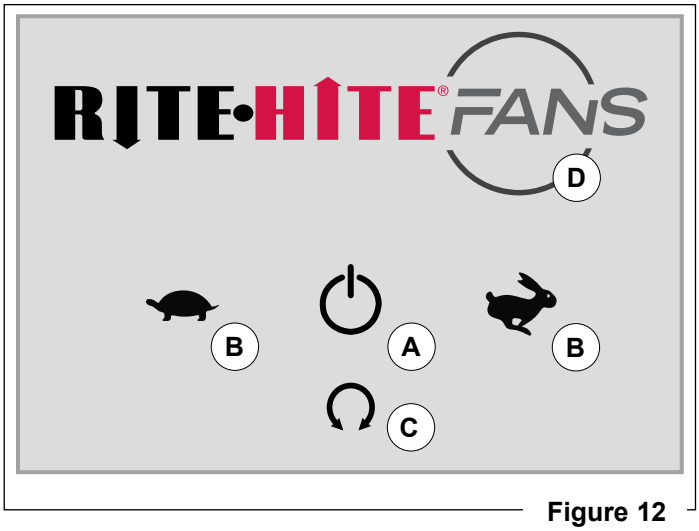


Figure 12

The speed control station is provided in a 4.75 x 4.75 x 1.75 in. [120 x 120 x 45 mm] enclosure suitable for mounting on a wall or column. The face of the controller may be removed and mounted flush in a standard double gang wall box.

The speed station uses low voltage (24 VDC) control. A 7-conductor cable (24 AWG min/0.5 mm diameter min, 0.2 mm^2 min) connects the control station to the variable-frequency drive (VFD) enclosure. CAT5 is acceptable for this run (500 ft [152 m] maximum length).

A. A power button is provided to turn the fan on and off.

B. The turtle and rabbit buttons incrementally decrease and increase fan speed.

C. Pressing the direction button causes the fan to change direction.

D. A ring of LEDs in the FANS logo provides a visual indication of fan speed (1 LED = slowest, 7 LEDs = fastest).

After turning the power on, or a direction change, the LEDs flash to indicate direction. Standing below the fan, looking up, the blades should turn clockwise (forward) when the LEDs flash in a clockwise pattern. If the rotation is counterclockwise, disconnect power to the control box and swap two of the three motor wires (terminals U, V, W) to reverse fan direction.

The VFD is factory-set to linearly increase fan speed to satisfy the majority of applications.

By changing parameters in the drive, the speed curve can be modified for specific applications.

Parameters

Fan Speed Indication	Default Frequency	Schneider Altivar Parameter
0 LED	OFF	
1 LED	10Hz	SP8
2 LEDs	18Hz	SP7
3 LEDs	26Hz	SP6
4 LEDs	35Hz	SP5
5 LEDs	44Hz	SP4
6 LEDs	52Hz	SP3
7 LEDs	60Hz	SP2

ELECTRICAL *Continued*

Motor Wiring

The fan motor will receive three-phase power from the fan control box even if single-phase power is provided to the control box. Remove the cover from the motor junction box. Change the wire leads as necessary for high or low voltage. See Figure 13 for the appropriate wiring.

NOTICE

Do Not use solid core wiring of any size or insulation class for controller output/motor leads.

To connect the fan control box to the motor use these (14AWG Minimum Gauge) acceptable wire types:

Unshielded cable:
- THHN/THWN Minimum 600V 90°C

Shielded XLPE VFD cable:
- Belden 29501
- AlphaWire V16014

Conduit Restrictions

NOTICE

Power supply lines for a controller ***May*** share the same conduit with Power supply lines for one or more additional controllers.

Power supply lines for a controller and output/ motor leads for the same controller or another controller ***May Not*** share the same conduit.

The conduit with the incoming power and the conduit with the power going to the motor should be separated by a minimum of 6 in. [150 mm].

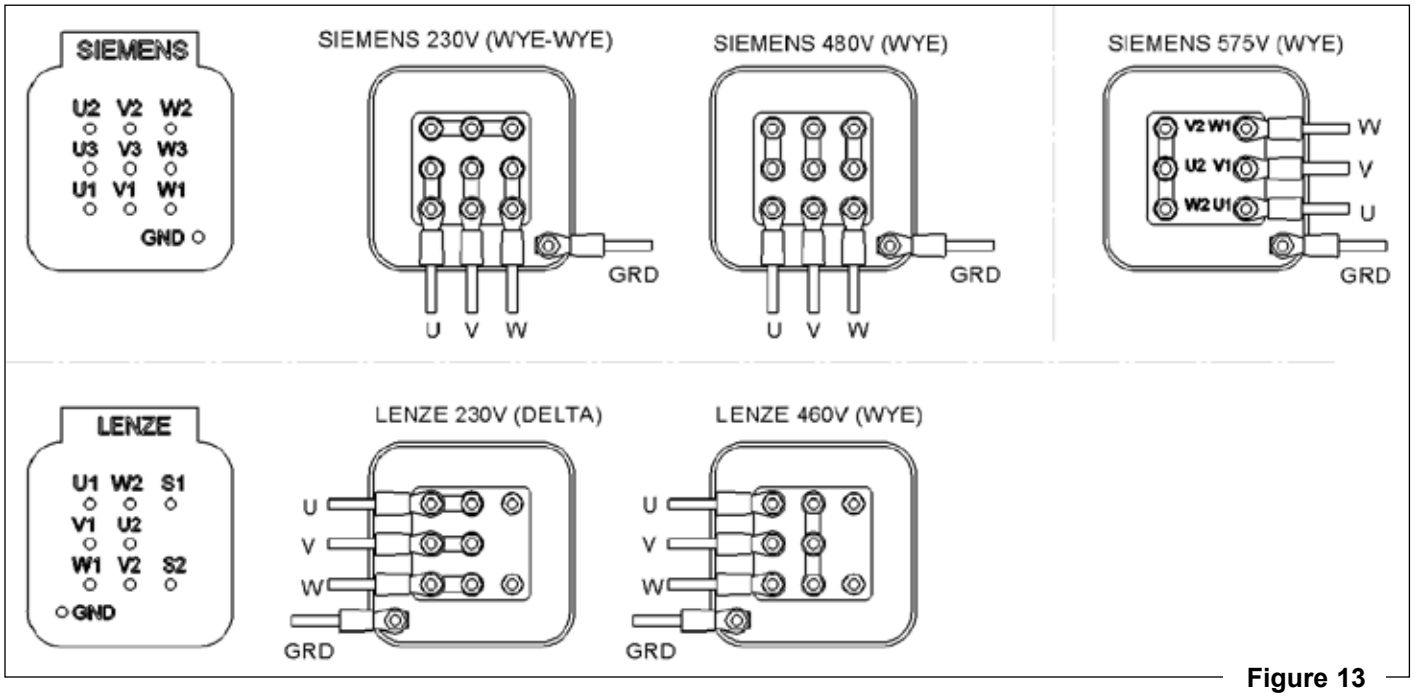
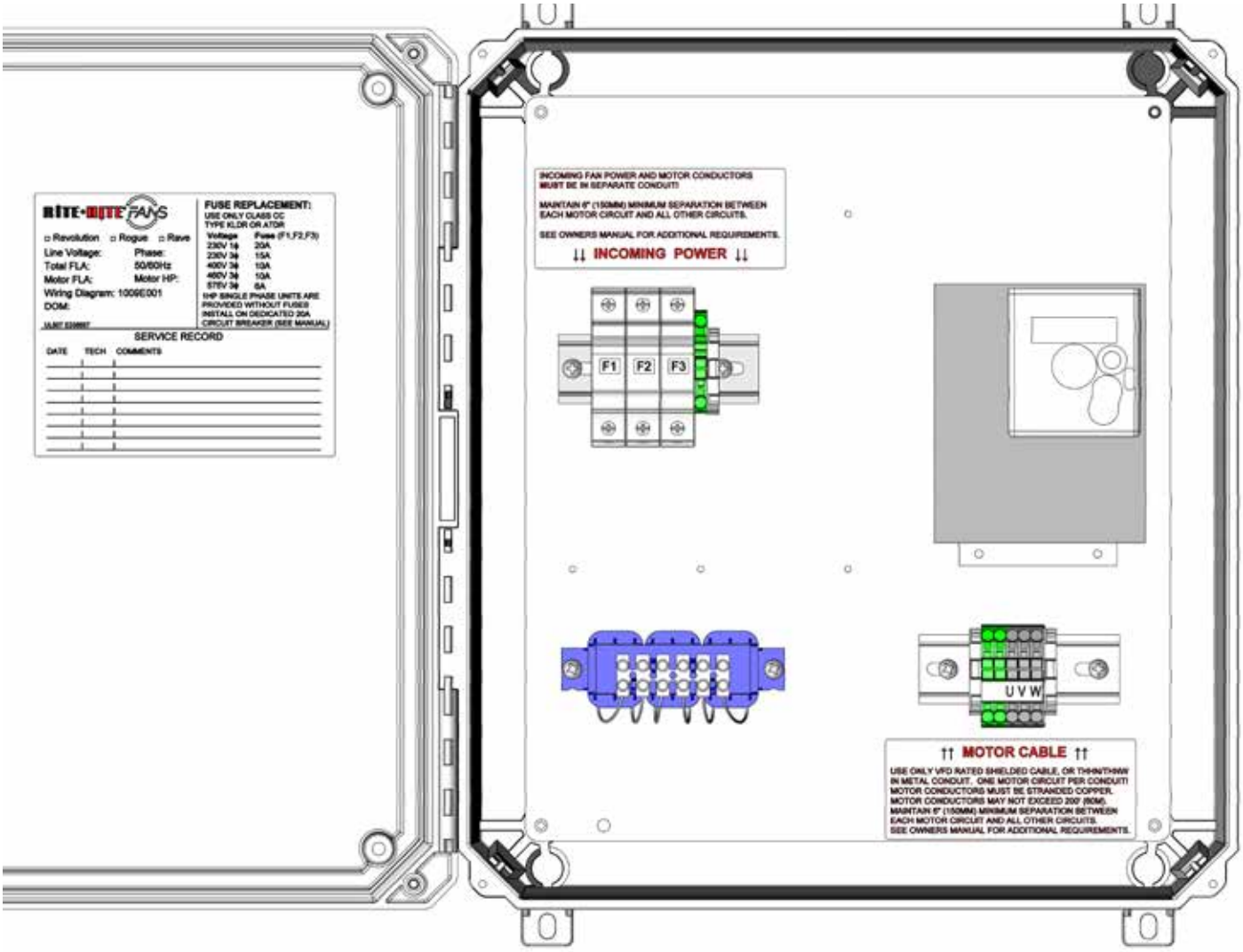
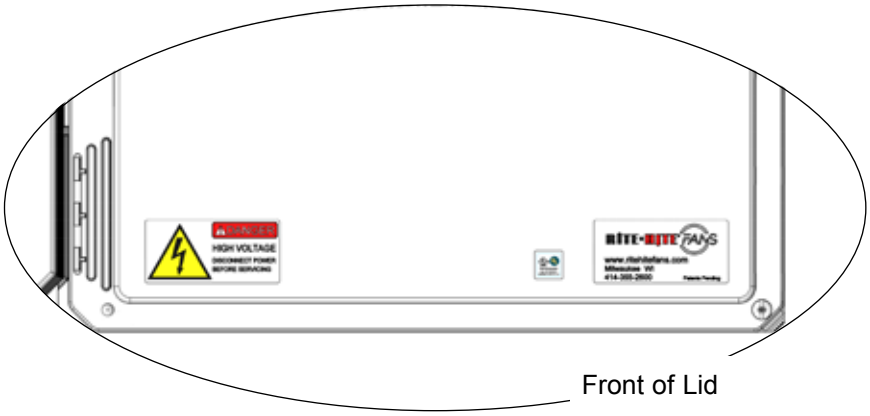


Figure 13

ELECTRICAL *Continued*

Fan Control Box Layout





Front of Lid

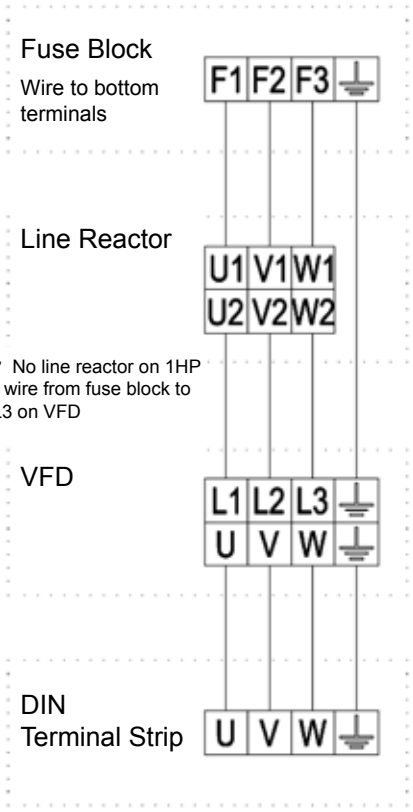
IMPORTANT

Use stranded copper conductors only, minimum 75℃. To maintain 4X rating, use only UL listed 4X fittings. Do not make conduit connections through the top of enclosure. To reduce risk of electric shock, an earth ground connection must be field installed to the Green/Yellow control box ground terminal.

ELECTRICAL *Continued*

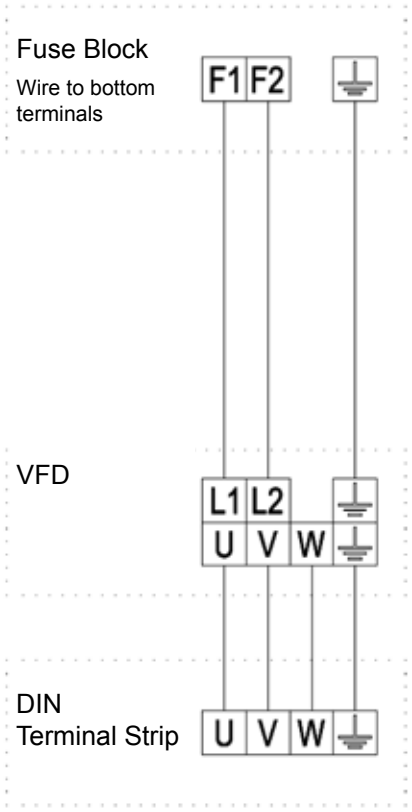
Control Box Wiring

3 Phase



NOTE : No line reactor on 1HP 230V 3ϕ wire from fuse block to L1, L2, L3 on VFD

Single Phase



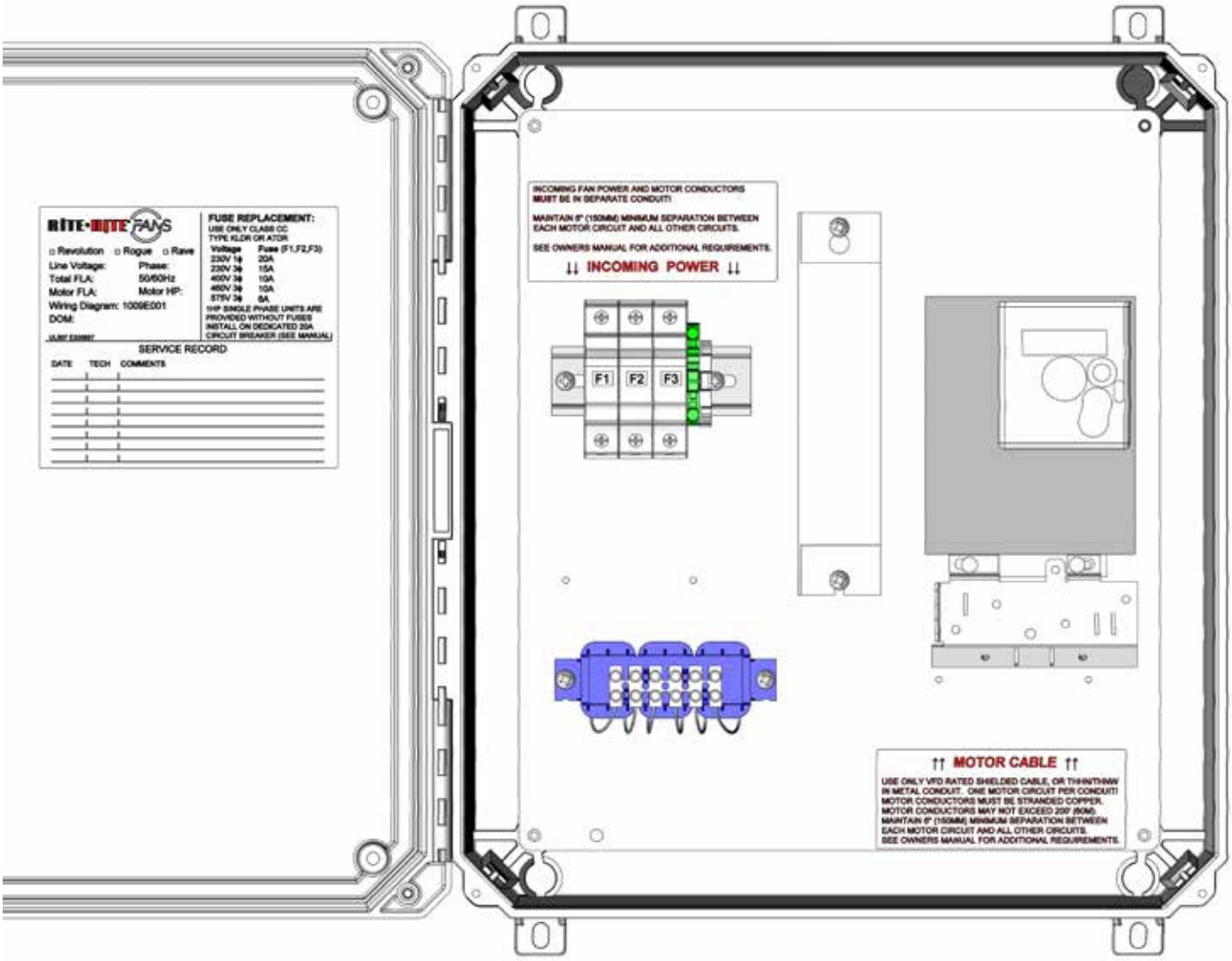
- All wiring to be 14 AWG AVLV2/8
- Power wiring to be black
- Ground conductors to be Green/Yellow

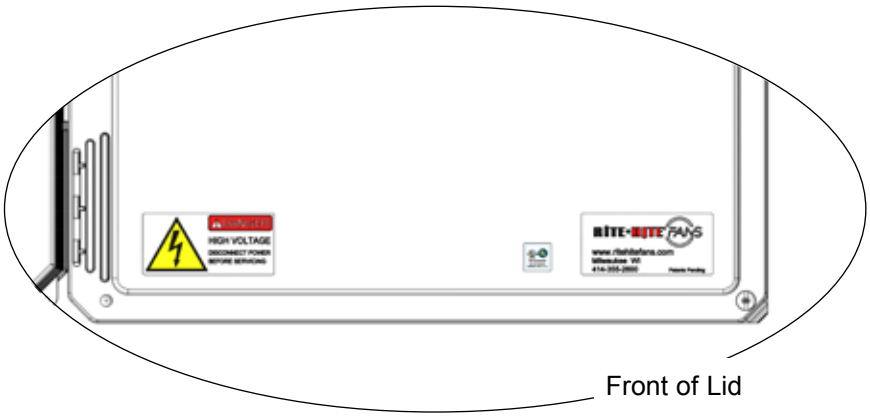
Control Wiring (All units)

Control wiring to be 16 AWG Yellow AVLV2/8

ELECTRICAL *Continued*

Fan Control Box Layout with EMC Filter (OPTIONAL)





Front of Lid

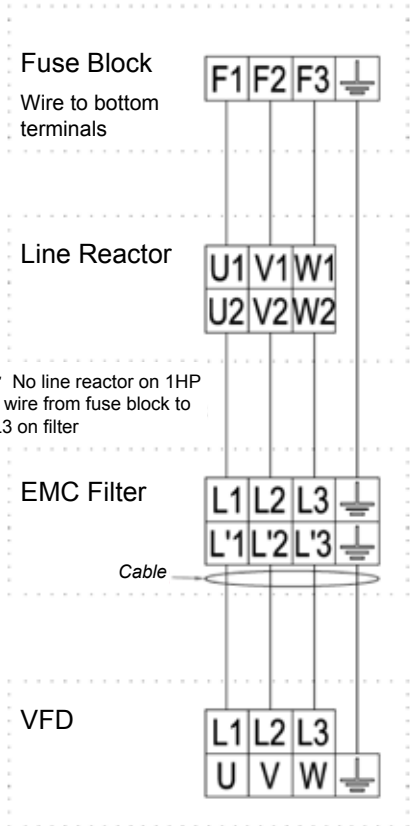
IMPORTANT

Use stranded copper conductors only, minimum 75℃. To maintain 4X rating, use only UL listed 4X fittings. Do not make conduit connections through the top of enclosure. To reduce risk of electric shock, an earth ground connection must be field installed to the Green/Yellow control box ground terminal.

ELECTRICAL *Continued*

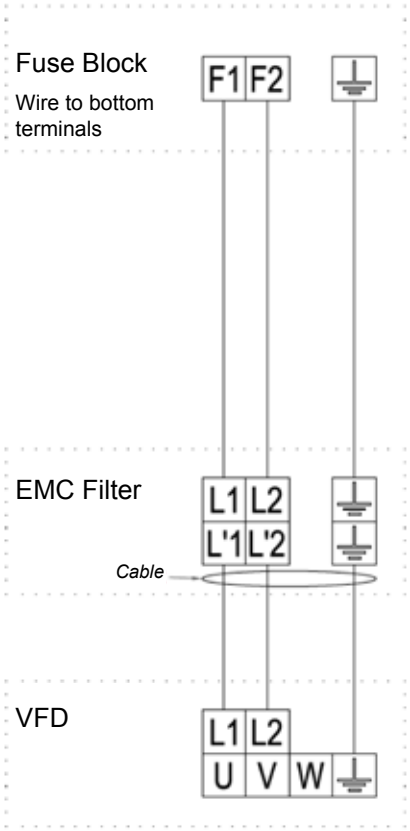
Control Box Wiring – with EMC Filter (OPTIONAL)

3 Phase



NOTE : No line reactor on 1HP 230V 3ϕ wire from fuse block to L1, L2, L3 on filter

Single Phase



- All wiring to be 14 AWG AVLV2/8
- Power wiring to be black
- Ground conductors to be Green/Yellow

Control Wiring (All units)

Control wiring to be 16 AWG Yellow AVLV2/8

ELECTRICAL *Continued*

EMC Compliance (OPTIONAL)

The EMC Compliance Option adds an EMC filter on the line side of the VFD, and a grounding plate for bonding the motor cable shield.

To maintain IEC 61800-3 C2 compliance, you must observer the following installation guidelines:

- Ensure maximum physical separation between low voltage control cables and high voltage power cables (minimum 150mm or 6").
- Ensure maximum physical separation between motor cable and all other circuits (minimum 150mm or 6").
- Use shielded, low capacitance VFD cable with XLPE (Cross-linked Polyethylene) insulation.
  Example products:
  - Belden 29501
  - AlphaWire V16014
- Bond motor cable shield to the VFD plate on one end (using clamps) and to the motor frame on the other end (using EMC cable gland).
- For 400V and 460V applications, maximum motor cable length must not exceed 50m or 160 feet.
  - 1.5kW VFD, 230V, 1Φ - 50m (160') maximum cable length
  - 1.5kW VFD, 230V, 3Φ - 5m (16') maximum cable length
  - 0.75kW VFD, 230V, 1Φ -10m (32') maximum cable length with internal filter if switching frequency (SFr) is set to 4, 8, or 12 kHz.

Clamp motor cable shield to EMC plate as shown in Figure 14.

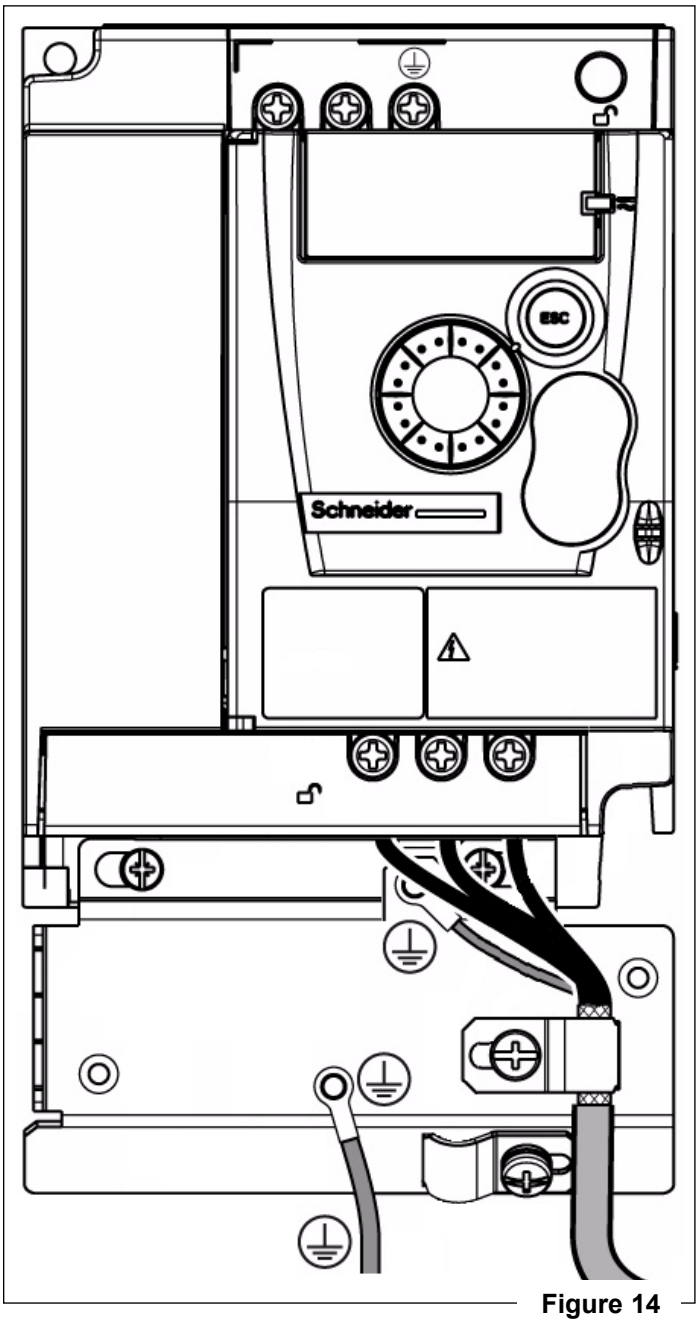


Figure 14

ELECTRICAL *Continued*

Stop Circuit

Lockout/Tagout all power supplies according to OSHA regulations or your country's local codes and standards.

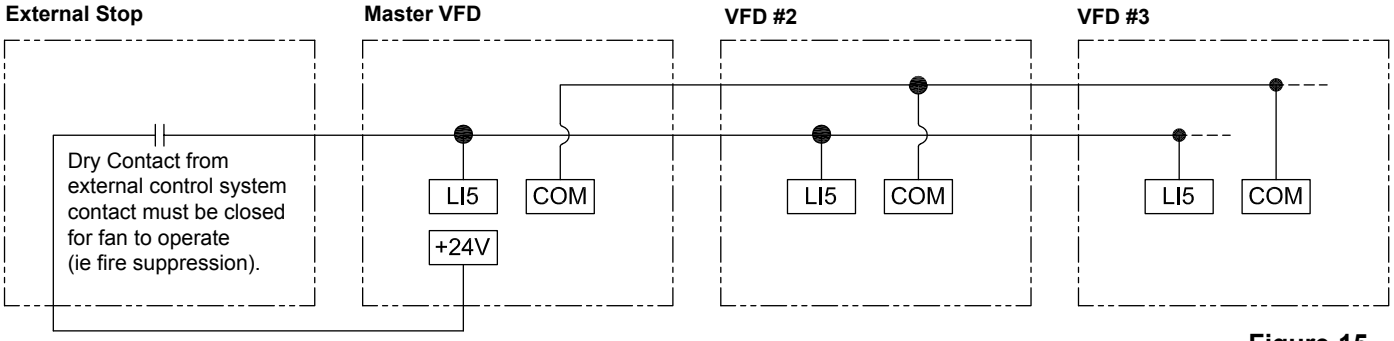


Figure 15

Field Wiring – Schneider 312 VFD

- If Speed Control Switch is currently wired to Terminal LI5:
  - Remove wire from LI5 and isolate.
  - On the back of the Speed Control Switch move the 'Half Speed' switch to the 'On' position
- Verify that the 4 speed switch is in the 'Off' position. After this change, the fan will run full speed forward, half speed in reverse (Figure 16).
- Connect VFD Terminal COM in all standard boxes
- Connect VFD Terminal LI5 in all standard boxes
- Install a relay between +24V and LI5 on Master VFD only. All fans will stop when relay opens.
- Required ALTIVAR 312 VFD Parameter Changes:
  1. Change parameter I-O- tCt =PFO
  2. Change parameter I-O- rrS =LI2
  3. Change parameter FUn- StC- nSt =LI5

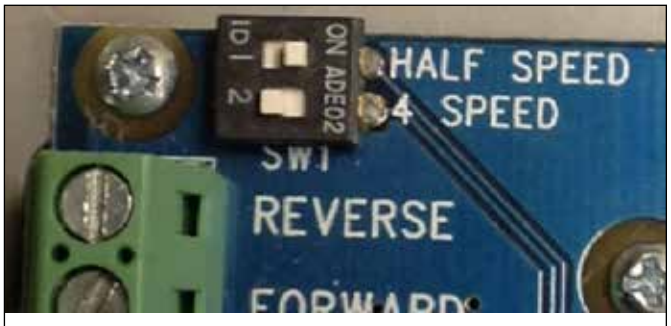


Figure 16

ANNUAL PLANNED MAINTENANCE

⚠ WARNING / AVERTISSEMENT

Follow lockout/tagout procedures before cleaning or re-torquing the fan.

Suivre les procédures de blocage/verrouillage avant le nettoyage ou le resserrage du ventilateur.

PLANNED MAINTENANCE TASK	INSPECT AND PERFORM THE FOLLOWING:
Fan Mounting	Re-torque all fasteners (1/2-13 Grade 8 [98 ft-lb or 133 Nm], 5/16-18 Grade 8 [29 ft-lb or 39 Nm]).
	Inspect fan and mounting supports for wear and tear. Tighten any loose hardware.
Cables	Re-torque clamps.
	Check for fraying or wear.
Gear Reducer	Check for oil leaks. If leaks are present, contact factory.
	Check oil level. Add oil if necessary (oil type is marked on the gear case).
Motor	Check for dust and dirt. Remove using a brush or compressed air.
Fan Controller	Inspect all terminal connections inside the VFD control box. Tighten any loose connections.

TROUBLESHOOTING

Run / Test

Turn the power disconnect switch on the control box to the ON position. Allow a few seconds for the frequency drive to power up.

Adjust the fan speed to 60 Hz. Count the number of revolutions the fan makes in 1 minute. They should be approximately the following:

If the fans do not spin at these speeds, consult factory for assistance.

24' [7320 mm]	Fans = 53 rpm
20' [6100 mm]	Fans = 61 rpm
16' [4880 mm]	Fans = 76 rpm
12' [3660 mm]	Fans = 98 rpm
8' [2440 mm]	Fans = 154 rpm

Motor Wobble

Verify:
- All hardware is tight
- Stabilization Cables are taut
- The motor bracket is installed vertically

Fan Noise

Maximum Speed Changes – Schneider Electric VFD

The maximum speed of the motor is limited by VFD parameters HSP and tFr. To ensure reliable operation in all applications, HSP is set to 60 at the factory.

To increase the maximum allowable fan speed, ensure that tFr is set to 70, and change the value of HSP to no more than 70.

The actual fan speed for each set point is determined by the values in parameters SP2 through SP8. See *Speed Control Station* (page 11) to change speed set points.

Increasing fan speed may cause the VFD to fault in many applications. If this occurs, reduce the value of HSP.

As a reference, motor current is displayed in parameter LCr. When increasing speed, verify that LCr does not exceed the motor nameplate FLA.

Increasing blade speed will cause the blade tips to rise higher during operation. Ensure adequate overhead clearance before increasing speed.

High-Frequency Motor Noise

When installing a fan in an abnormally quiet area, one may notice a high frequency noise from the motor. This noise is the VFD's carrier frequency. By default, the carrier frequency is set at 4 kHz to maximize the performance of the drive. To decrease audible noise the carrier frequency (SFr) may be increased up to 16 kHz. However, increasing the carrier frequency above 4 kHz results in decreased drive performance. Adjust this setting only as high as necessary to mitigate the objectionable noise.

For optimal performance and component life, the maximum fan speed (HSP) should be limited such that the output current (LCr) does not exceed the maximum allowable drive current for the selected carrier frequency.

Maximum Drive Output Current (Amps)

	Carrier Frequency kHz (SFr)							
	2	4	6	8	10	12	14	16
2HP 600V Altivar 312	2.7	2.7	2.5	2.4	2.2	2.1	1.9	1.7
2HP 400V Altivar 312	4.1	4.1	3.8	3.6	3.4	3.2	2.9	2.6
2HP 200V Altivar 312	8.0	8.0	7.6	7.2	6.8	6.4	5.8	5.2
1HP 200V Altivar 12	4.2	4.2	3.9	3.7	3.5	3.3	3.1	2.9

TROUBLESHOOTING *Continued*

Speed Controller

1. Verify proper DIP switch settings.
   For most applications, both DIP switches should be off (as shown).

   If your fan uses a Schneider Alitvar 12 VFD (model number on front of VFD starts with ATV12*), the "HALF SPEED" DIP switch on the top must be switched to the ON position.

2. The speed controller is powered by 24 VDC, supplied by the VFD.

   Using a DMM (Digital MultiMeter), set to DC Volts; measure the voltage between the COM and 24VDC terminals on the back of the speed controller.
   If this voltage is less than 22 VDC, check wiring for a short or open circuit.

3. The speed controller uses discrete outputs to communicate speed to the VFD. Each output is either on or off, and can be easily measured with a digital multimeter (set to measure DC Volts) at the terminals on the back of the speed controller.

   - If the voltage from output to COM is less than 5 VDC, the output is off.
   - If the voltage from output to COM is greater than 20 VDC, the output is on.
   - If the voltage is between 5 VDC and 20 VDC, check wiring for a short or open circuit.

   At the slowest speed (one LED illuminated), in the forward direction (default at power up), the speed controller should have the following outputs:

   SPEED1: ON (COM to SPEED1 > 20VDC)
   SPEED2: ON (COM to SPEED2 > 20VDC)
   SPEED3: ON (COM to SPEED3 > 20VDC)
   FORWARD: ON (COM to FORWARD > 20VDC)
   REVERSE: OFF (COM to REVERSE < 5VDC)

   If the correct voltages are measured, the speed controller is sending the proper signal, but the VFD is not receiving or interpreting the signal. Skip to Step 5.

   If the correct voltage is not observed, remove the wires from SPEED1, SPEED2, SPEED3, FORWARD, and REVERSE. With output wires disconnected, repeat the measurements at the terminals on the back of the speed controller.

   If correct voltages are still not measured, you may have a bad speed controller. Call Rite-Hite Customer Service.

   If correct voltages are measured with the output wires disconnected, a wiring error or short in the cable is likely causing the voltage to drop.

   Verify that each wire is terminated at the proper VFD terminal.

   With both ends of the cable disconnected and isolated, verify with a DMM that there is no continuity (open circuit indication in "ohms" mode) between conductors, and no continuity between any conductor and ground.

4. If the speed controller appears to be functioning properly, but the fan is not operating properly, the VFD may not be receiving the proper signal. With a DMM, measure the voltage at each corresponding VFD input (Figure 17):

   - If the proper voltage is present at the speed controller, but not at the VFD, a wiring error or break in the cable is likely. Verify connections and test cable for continuity.

   If the proper voltage is present at the VFD, but the VFD is not running at the commanded speed (10 Hz, forward), a parameter setting may have been changed. Go to Step 6.

5. The speed controller uses three VFD inputs to select a preset speed. The actual speed value (in Hz) corresponding to each preset speed is stored in the VFD parameters. For example, when the speed controller displays six LEDs (Speed 6), it turns on input (LI3). When the VFD sees input LI3 on, with inputs LI2 and LI4 off, it runs the fan at the speed stored in parameter SP3 (52 Hz by default).

   Rotational direction is determined by the Forward and Reverse signals. For the previous example, the fan will run forward if VFD input LLI is on. If VFD input LI5 is on, it will run in reverse. If neither input is on, the fan will not operate.

   Using a DMM, step through each of the seven speed settings and verify the proper input states. If the input states do not match the table (Figure 18), check for swapped wires.

   If all the I/O states match the table, it is possible the preset parameters were changed in the VFD.

   Verify that each preset matches the desired speed (i.e., SP2 = 60 Hz, SP3 = 52 Hz, etc.).

6. If any parameters have been changed from the factory settings, the speed controller may not work properly.

   Verify the following Allen-Bradley parameter settings:

P034 = 10	P035 = 60	P036 = 2	P038 = 4
A051 = 4	A052 = 4	A053 = 4	

   Verify the following Schneider parameter settings:

FUn- PSS- PS2 = L4H/LI4	FUn- PSS- PS4 = L3H/LI3	FUn- PSS- PS8 = L2H/LI2

TROUBLESHOOTING *Continued*

Speed Controller *Continued*

I/O Check: Set Fan to Slowest Speed (1 LED), Forward Direction					
Speed Control Terminals	**Proper DC Voltage at output of Speed Controller**	**AB Powerflex 40 Terminals**	**Proper DC Voltage at inputs of AB PowerFlex 40 VFD**	**Schneider Altivar Terminals**	**Proper DC Voltage at inputs of Schneider Altivar VFD**
SPEED1	(COM to SPEED1 >20VDC)	7	(4 to 7 >20VDC)	LI2	(COM to LI2 >20VDC)
SPEED2	(COM to SPEED2 >20VDC)	6	(4 to 6 >20VDC)	LI3	(COM to LI3 >20VDC)
SPEED3	(COM to SPEED3 >20VDC)	5	(4 to 5 >20VDC)	LI4	(COM to LI4 >20VDC)
FORWARD	(COM to FORWARD >20VDC)	2	(4 to 2 >20VDC)	LI1	(COM to LI1 >20VDC)

Figure 17

		AB PowerFlex 40 VFD Input Terminal				**Schneider Altivar 12/312 VFD Input Terminal**			
Set Speed	**HZ**	**7**	**6**	**5**	**Speed Preset**	**LI2**	**LI3**	**LI4**	**Speed Preset**
Speed 7	60	OFF	OFF	**ON**	A071	OFF	OFF	**ON**	SP2
Speed 6	52	OFF	**ON**	OFF	A072	OFF	**ON**	OFF	SP3
Speed 5	44	OFF	**ON**	**ON**	A073	OFF	**ON**	**ON**	SP4
Speed 4	35	**ON**	OFF	OFF	A074	**ON**	OFF	OFF	SP5
Speed 2	26	**ON**	OFF	**ON**	A075	**ON**	OFF	**ON**	SP6
Speed 2	18	**ON**	**ON**	OFF	A076	**ON**	**ON**	OFF	SP7
Speed 1	10	**ON**	**ON**	**ON**	A077	**ON**	**ON**	**ON**	SP8

Figure 18

TROUBLESHOOTING *Continued*

Schneider Electric Frequency Drive

<table>
<tr><th>Problem</th><th>Cause</th><th>Resolution</th></tr>
<tr><td rowspan="5">Display on Frequency drive does not light up.</td><td>No power to control box</td><td>Use voltage meter on AC setting to determine if there is incoming power. Measure across L1/L2, L2/L3, L1/L3. All readings should be within 2%.</td></tr>
<tr><td>Loose wires</td><td>Check for loose wires along path at locations where readings change.</td></tr>
<tr><td>Verify fuses are good</td><td>Replace if necessary.</td></tr>
<tr><td>Load Switch is not turned on</td><td>Turn to ON position.</td></tr>
<tr><td>Frequency drive failure</td><td>Consult factory.</td></tr>
<tr><td rowspan="5">Display on Frequency drive lights up + fan not does run.</td><td>No start command given</td><td>Turn fan control switch off and then back on.</td></tr>
<tr><td>Loose wire</td><td>Check for loose wires at frequency drive and switch.</td></tr>
<tr><td>Fire protection system Stop Signal</td><td>If fan is wired to shut off with fire protection system, verify that fan is not getting signal to shut down from fire protection system.</td></tr>
<tr><td>Reset from fault</td><td>Turn fan load switch off. Wait for 30 seconds, and then turn back on. Turn fan control switch off and then back on.</td></tr>
<tr><td>VFD is not programmed for correct control switch</td><td>If you are using the Speed Control Switch, set to these parameters:
<table>
<tr><th>Menu</th><th>Parameter</th><th>Description</th><th>Value</th></tr>
<tr><td>FUn-</td><td>PSS-PS2</td><td>Preset Speed Bit</td><td>LI4</td></tr>
<tr><td>FUn-</td><td>PSS-PS2</td><td>Preset Speed Bit</td><td>LI3</td></tr>
<tr><td>FUn-</td><td>PSS-PS2</td><td>Preset Speed Bit</td><td>LI2</td></tr>
<tr><td>I-O-</td><td>PSS-PS2</td><td>Reverse Direction</td><td>LI5</td></tr>
</table>
If you are using Analog Control Switches, set to these parameters:
<table>
<tr><th>Menu</th><th>Parameter</th><th>Description</th><th>Value</th></tr>
<tr><td>FUn-</td><td>PSS-PS2</td><td>Preset Speed Bit</td><td>nO</td></tr>
<tr><td>FUn-</td><td>PSS-PS4</td><td>Preset Speed Bit</td><td>nO</td></tr>
<tr><td>FUn-</td><td>PSS-PS8</td><td>Preset Speed Bit</td><td>nO</td></tr>
<tr><td>I-O-</td><td>rrS</td><td>Reverse Direction</td><td>LI2</td></tr>
</table></td></tr>
<tr><td rowspan="6">Frequency drive faults when fan starts.</td><td rowspan="5">OLF Motor Overload</td><td>Check the fan for damage. Restart if no damage is found. Consult factory if damage is found.</td></tr>
<tr><td>Verify that motor current (LCR) is no greater than motor rated FLA.</td></tr>
<tr><td>With power off check that gearbox spins smoothly.</td></tr>
<tr><td>Verify proper fan speed, reference RUN/TEST section (Page 20) If the fan rotates at a different speed than above, check the gearbox label to ensure the wrong size blades were not installed on the fan.</td></tr>
<tr><td>Check to ensure motor wiring matches voltage provided.</td></tr>
<tr><td>Check to make sure all blades are locked in at the same angle, and that one or more did not turn.</td></tr>
<tr><td>OCF, OLF, OPF, OPF1, OPF2, SCF, SCF1, SCF3, SCF5 Motor Fault</td><td>See Motor Troubleshooting Section</td></tr>
<tr><td rowspan="2">Fan runs, but operation is not smooth.</td><td>Gearbox</td><td>Spin the fan blades by hand. Listen for irregular noises that could be related to gear issues. Consult factory if irregular noises are present.</td></tr>
<tr><td>Incoming / Outgoing wiring not separated</td><td>Run incoming wire and outgoing wiring in separate conduit a minimum of 6 in. [150 mm] apart.</td></tr>
</table>

TROUBLESHOOTING *Continued*

Motor

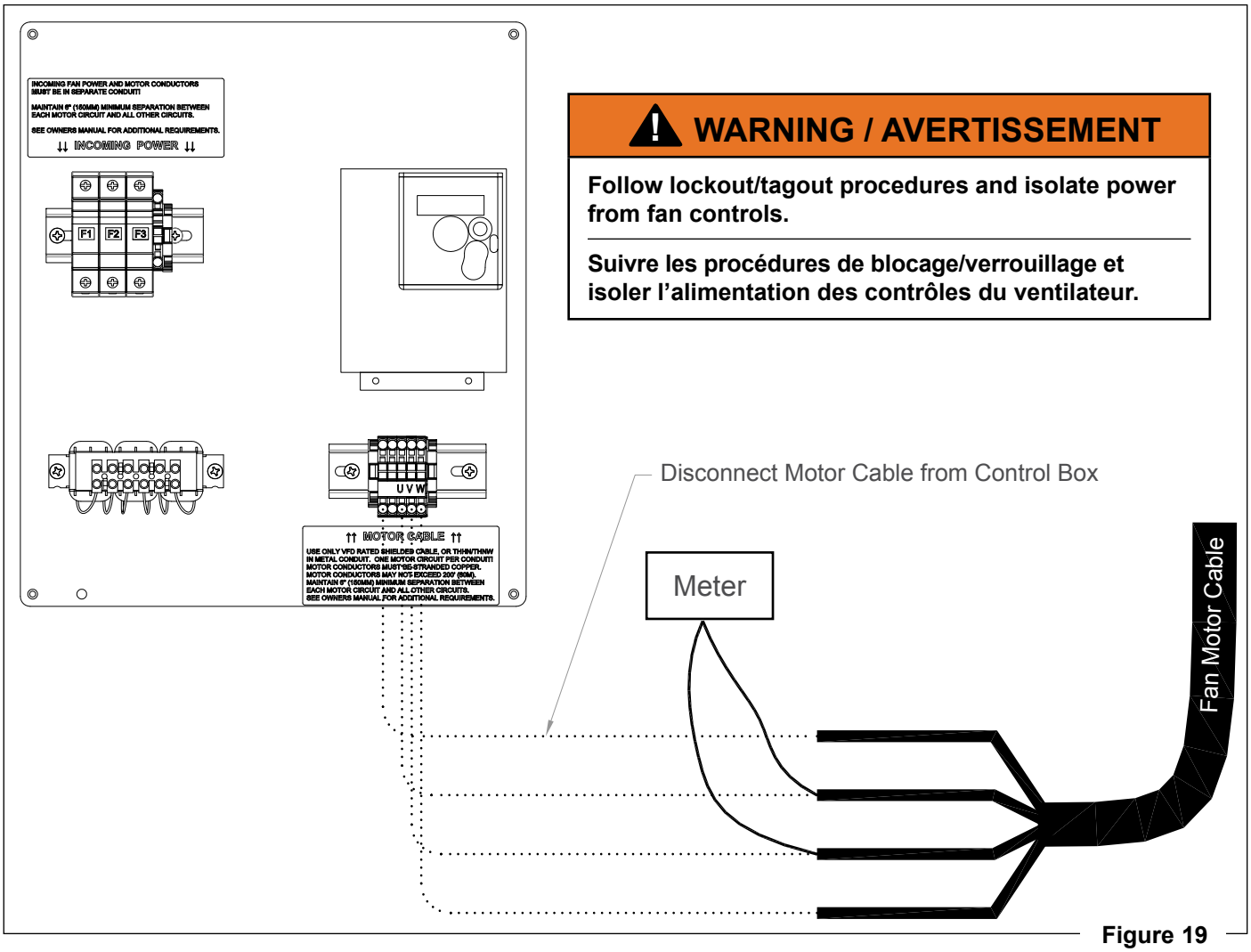


Figure 19

1. Disconnect fan motor cable from U, V, W, and ground terminals (GND).
2. Using electrical meter, measure resistance (OHMS, Ω) between phase wand Phase V (as shown). Record the following six resistance values:

Phase W to V	☐ Ω	Phase W to GND	☐ Ω
Phase W to U	☐ Ω	Phase V to GND	☐ Ω
Phase V to U	☐ Ω	Phase U to GND	☐ Ω

Phase to phase values should be equal. (±5%).

Phase to ground values should be infinite. (Open circuit - meter display "OL")

If phase-phase values are not equal. Or if phase-ground resistance is measured:

- Disconnect motor cable from motor.
- Repeat measurements at motor wiring terminals.

TROUBLESHOOTING *Continued*

Before calling Rite-Hite Customer Service:

1. Make a note of any active faults diplays on the VFD.
2. Check the previous fault code (parameter LFt on a 312, dP1 on a 12)

Schneider VFD Fault Codes

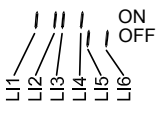
Altivar 312	Altivar 12	Fault Description	Cycle Power to VFD. *If Fault Persists:*
bLF		Brake Control	Reset VFD to Rite-Hite Defaults
CFF	CFF	Incorrect Parameters	Reset VFD to Rite-Hite Defaults
CF I	CF I	Invalid Parameters	Reset VFD to Rite-Hite Defaults
CnF		Com Card	Reset VFD to Rite-Hite Defaults
COF		CANopen	Reset VFD to Rite-Hite Defaults
CrF	CrF I	Capacitor Charge	Replace Drive
EEF		EEPROM	Replace Drive
EPF		Blade Impact Detected (LI6)	Call Customer Service
IF I	InF I	Unknown Rating	Replace Drive
IF2	InF2	Display/Power card	Replace Drive
IF3	InF3	EEPROM/Serial	Replace Drive
IF4	InF4	EEPROM	Replace Drive
	InF9	Current Measurement	Replace Drive
	----	Firmware	Replace Drive
	InFb	Thermal Sensor	Replace Drive
	InFE	CPU	Replace Drive
LFF	LFF I	4-20mA Loss	Reset VFD to Rite-Hite Defaults
nOF		No Code	Reset VFD to Rite-Hite Defaults
ObF	ObF	Bus Overvoltage	Verify line voltage and decel ramp
OCF	OCF	Overcurrent	Verify motor parameters & gear ratio, ohm motor
OHF	OHF	Drive Overheat	Reduce Carrier Hz, check VFD fan
	OLC	Blade Impact Detected	Call Customer Service
OLF	OLF	Motor Overload	Verify motor parameters & gear ratio. ohm motor
OPF	OPF I	Motor Phase Loss	Verify motor wiring, ohm motor at Cbox
	OPF2	Motor Phase Loss	Verify motor wiring, ohm motor at Cbox
OSF	OSF	Line Overvoltage	Verify line AC voltage
PHF	PHF	Line Phase Loss	Verify line AC voltage
SCF	SCF I	Motor Short Circuit	Ohm motor at Cbox and at motor Jbox
	SCF3	Motor Ground Fault	Ohm motor at Cbox and at motor Jbox
	SCF4	IGBT Short	Replace Drive
	SCF5	Motor Short Circuit	Ohm motor at Cbox and at motor Jbox
SLF	SLF I	Modbus	Verify Modbus wiring and Fan Commander settings
SOF	SOF	Motor Overspeed	Call Customer Service
	tJF	IGBT Overheat	Reduce Carrier Hz, check VFD fan
tnF	tnF	Auto-Tuning	Call Customer Service
	ULF	Process Underload	Reset VFD to Rite-Hite Defaults
USF	USF	Line Undervoltage	Verify line AC voltage

JBox= Junction Box CBox= Control Box

TROUBLESHOOTING *Continued*

Accessing Altivar 312 Parameters

1. Press the navigation dial.
2. Turn the dial to scroll through parameter menus.
3. Press the dial to enter a menu.
4. Press the ESC key to return to the previous parent menu.

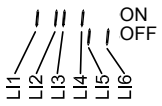
Menu	Parameter	Value*	Description
rEF-			
SEt-	ItH	30	Motor Nameplate Current: 3.0A*
	Ctd	50	Impact Detection Threshold: 5.0A
	SFr	40	Carrier Frequency: 4.0kHz
drC-	UnS	460	Motor Nameplate Voltage: 460V*
	FrS	600	Motor Nameplate Frequency: 60.0Hz*
	nCr	30	Motor Nameplate Current: 3.0A*
	nSP	1745	Motor Nameplate Speed: 1745 RPM*
	COS	075	Motor Nameplate PF: 0.75*
	FCS	rEC 1	Reset VFD to Rite-Hite Defaults
I_O-			
CtL-			
FUn-			
FLt-			
COM-	Add	1	Modbus Address: 1
	tbr	96	Modbus baudrate: 9600 baud
SUP- Monitoring (Read Only)	rFr		VFD Output Frequency
	LCr		Motor Current
	ULn		AC line voltage (calculated)
	tHd		Drive Thermal State (%)
	LFt		Line Fault Code
	Otr		Motor Torque (%)
	rtH		Motor Run Time (hours/kilo-hours)
	LIS	1111,11	Digital Input State Example shown is slow forward: • LI1, LI2, LI3, LI4 are ON (high) • LI5, LI6 are OFF (low) 

*Example values. *Always verify actual motor nameplate data.*

TROUBLESHOOTING *Continued*

Accessing Altivar 12 Parameters

1. Press the navigation dial.
2. Turn the dial to scroll through parameter menus.
3. Press the dial to enter a menu.
4. Press the ESC key to return to the previous parent menu.

Menu 1	Menu 2	Menu 3	Menu 4	Parameter	Value*	Description
rEF						
MOn Monitoring (Read Only)				rFr		VFD Output Frequency
				LCr		Motor Current
				ULn		AC Line Voltage (calculated)
				tHd		Drive Thermal State (%)
				OPr		Motor Power (%)
	MA I-			L I S I	I I I I	Digital Input State Example shown is slow forward: • LI1, LI2, LI3, LI4 are ON (high) • LI5, LI6 are OFF (low) 
				dP I		Last Fault Code
CONF				Fr I	A I I	Speed Reference
				FCS	rEC I	Reset VFD to Rite-Hite Defaults
	FULL	I_O-				
		drC-		COS	070	Motor Nameplate PF: 0.70*
				UnS	230	Motor Nameplate Voltage: 230V*
				nCr	29	Motor Nameplate Current: 2.9A*
				FrS	500	Motor Nameplate Frequency: 50.0Hz*
				nSP	930	Motor Nameplate Speed: 930 RPM*
				SFr	40	Carrier Frequency: 4.0kHz
		CtL-				
		FUn-				
		FLt-	tHt-	ItH	29	Motor Nameplate Current: 2.9A*
		CON-		Add	1	Modbus Address: 1
				tbr	96	Modbus baudrate: 9600 baud

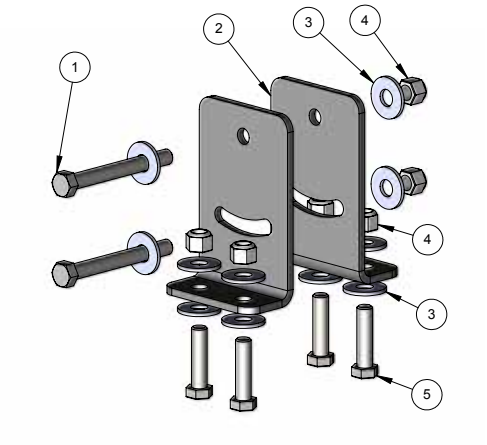
*Example values. *Always verify actual motor nameplate data.*

PARTS

Mounting

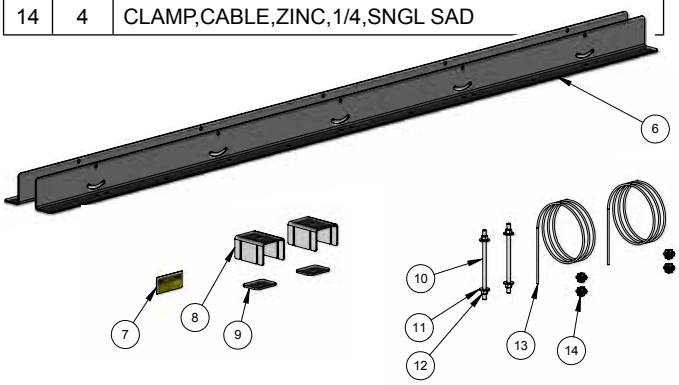
BRKT,ASSY,SWVL,HOUSING,FAN,GY **PART # 14501306**

#	QTY	DESCRIPTION
1	2	SCR,HHMS,1/2-13X4-1/2,GR8,ZNC
2	2	BRKT,MNT,HOUSING,SWVL,FAN,GY
3	12	WSHR,FLAT,1/2X1-3/8X7/64,ZNC
4	6	NUT,HEX,NYL LOCK,1/2-13,GR8,Z
5	4	SCR,HHMS,1/2-13X2,GRD8,ZNC



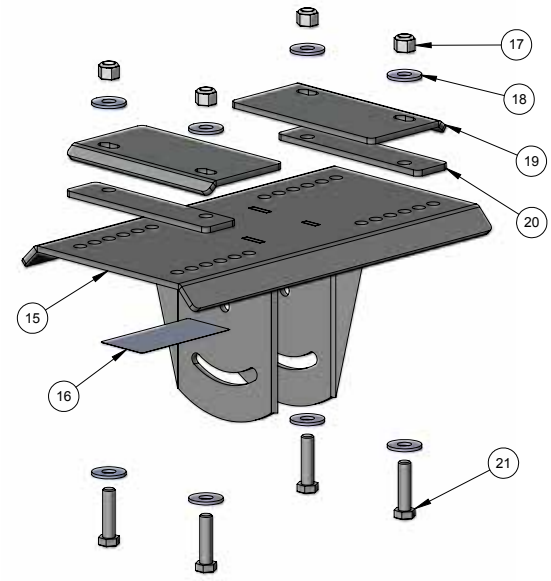
MOUNT,ASSY,TRUSS,FAN,GY **PART # 55290016**

#	QTY	DESCRIPTION
6	2	BRKT,MNT,TRUSS,FAN,GY
7	1	LABEL,DECAL,INSTL,SUPPORT,FAN
8	2	BRKT,CLAMP,TRUSS,FAN,GY
9	2	PLATE,CLAMP,TRUSS,FAN,GY
10	2	ROD,THRD,1/2-13X10",FLTD,STNLS
11	4	WSHR,FLAT,1/2X1-3/8X7/64,ZNC
12	4	NUT,HEX,NYL LOCK,1/2-13,GR8,Z
13	2	CABLE,AIRCRAFT,GLV,1/4,84"
14	4	CLAMP,CABLE,ZINC,1/4,SNGL SAD



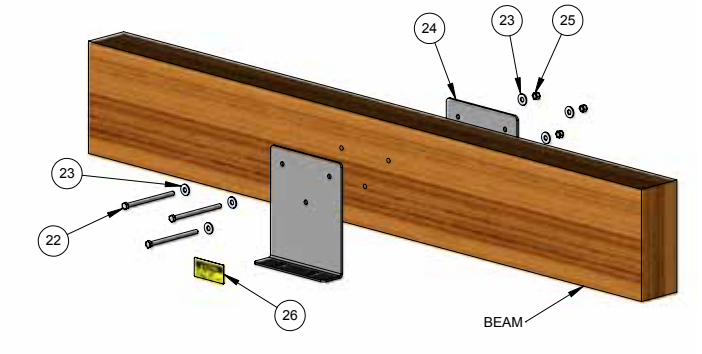
BRKT,ASSY,SWVL,CLNG,FAN,GY **PART # 14501233**

#	QTY	DESCRIPTION
15	1	BRKT,WLDMNT,SWVL,FAN,GY
16	1	LABEL,DECAL,INSTL,SUPPORT,FAN
17	4	NUT,HEX,NYL LOCK,1/2-13,GR8,Z
18	8	WSHR,FLAT,1/2X1-3/8X7/64,ZNC
19	2	PLATE,CLAMP,MNT,FAN,GY
20	2	PLATE,SHIM,MNT,FAN,GY
21	4	SCR,HHMS,1/2-13X2,GRD8,ZNC



BRKT,ASSY,MNT,LAM BEAM,FAN,GY **PART # 14501239**

#	QTY	DESCRIPTION
22	3	SCR,HHMS,1/2-13X8,GRD8,ZNC
23	6	WSHR,FLAT,1/2X1-3/8X7/64,ZNC
24	2	BRKT,MNT,LMNTD BEAM,FAN,GY
25	3	NUT,HEX,NYL LOCK,1/2-13,GR8,Z
26	1	LABEL,DECAL,INSTL,SUPPORT,FAN



PARTS *Continued*

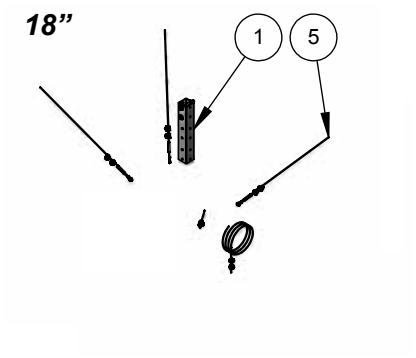
Extension Tube Assemblies and Cables

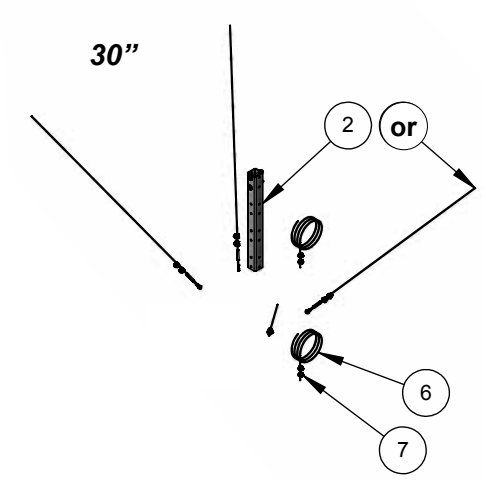
DESCRIPTION	PART #
KIT,EXTN,W/CABLES,REV,18"	53760032
KIT,EXTN,W/CABLES,REV,30"	53760033
KIT,EXTN,W/CABLES,REV,84"	53760034
KIT,EXTN,W/CABLES,REV,240"	53760035

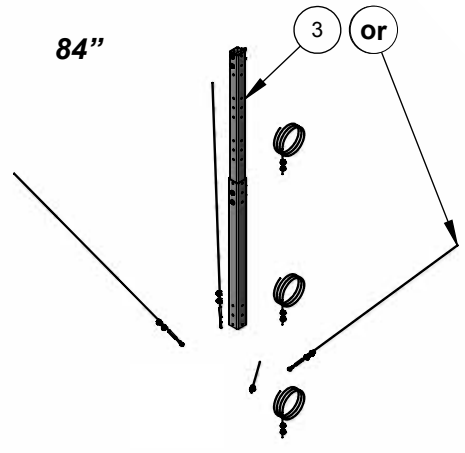
#	DESCRIPTION	18"	30"	84"	120"
1	EXTN,ASSY,FAN,18",GY	1	–	–	–
2	EXTN,ASSY,FAN,30",GY	–	1	–	–
3	EXTN,ASSY,FAN,84",GY	–	–	1	–
4	EXTN,ASSY,FAN,240",GY	–	–	–	1
5	CABLE,AIRCRAFT,GLV,1/4,120"	4	–	–	–
or	CABLE,AIRCRAFT,GLV,1/4,240"	–	4	4	–
or	CABLE,AIRCRAFT,GLV,1/4,420"	–	–	–	4
6	CABLE,AIRCRAFT,GLV,1/4,84"	1	2	3	3
7	CLAMP,CABLE,ZINC,1/4,SNGL SAD	10	12	14	14

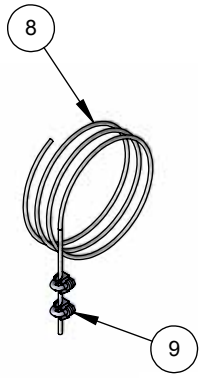
CABLE,ASSY,SAFETY,84" PART # 15700022

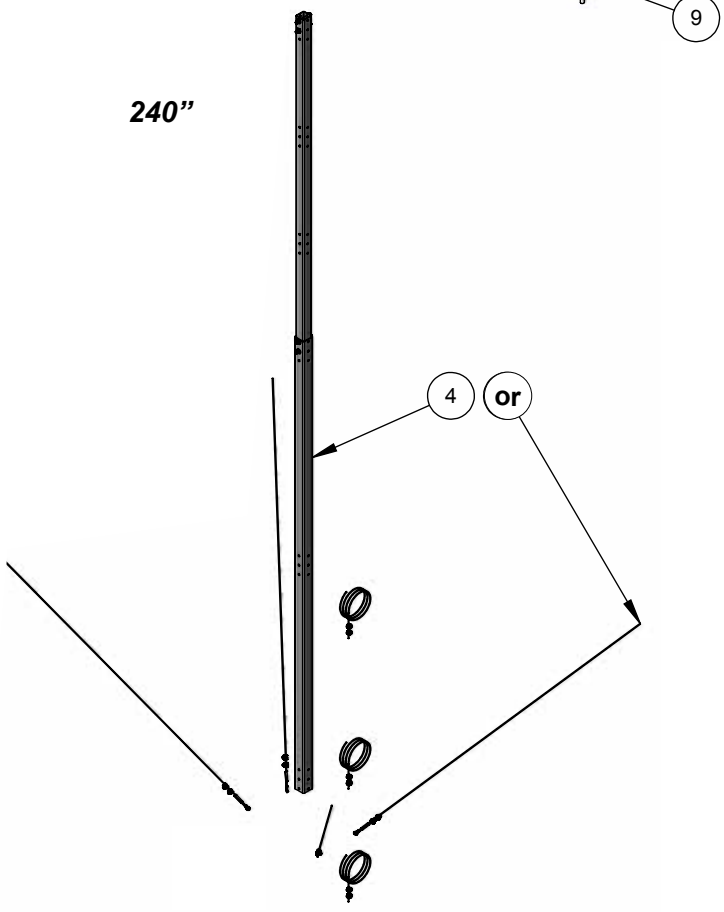
#	QTY	DESCRIPTION
8	1	CABLE,AIRCRAFT,GLV,1/4,84"
9	2	CLAMP,CABLE,ZINC,1/4,SNGL SAD









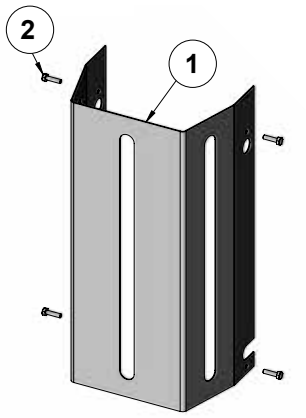


PARTS *Continued*

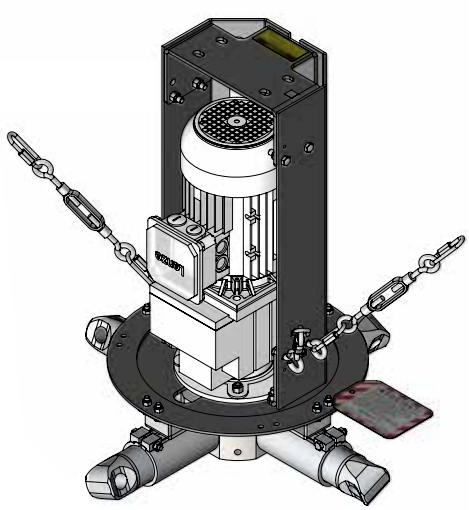
Motor Assembly and Cover

CVR,KIT,HOUSING,MOTOR,W/HRDW PART # 17900208

#	QTY	DESCRIPTION
1	1	CVR,HOUSING,MOTOR,REV
2	4	SCR,HHMS,1/4-20X1,GR8,ZNC



MOT,ASSY,FAN,W/VOLTAGE
PART # 1012.XXX

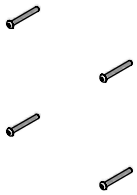


Blades and Hub Parts

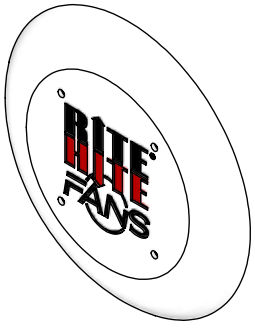
DESCRIPTION		PART #
STANDARD HEADROOM	BLADE,SET(2),FAN,8'DIA	12510003
	BLADE,SET(2),FAN,12'DIA	12510002
	BLADE,SET(2),FAN,16'DIA	12510020
	BLADE,SET(2),FAN,20'DIA	12510019
	BLADE,SET(2),FAN,24'DIA	12510014
LOW HEADROOM	BLADE,SET(2),FAN,8'DIA,LHR	12510017
	BLADE,SET(2),FAN,12'DIA,LHR	12510016
	BLADE,SET(2),FAN,16'DIA,LHR	12510015
	BLADE,SET(2),FAN,20'DIA,LHR	12510018
	BLADE,SET(2),FAN,24'DIA,LHR	12510013

KIT,BLD,SCR,M24X100MM,AL
PART # 53760007

SCR,BHMS,SCKT,1/4-20X2,SS
PART # 67870130



CVR,HUB,DOME,RITEHITE,REV
PART # 17900203

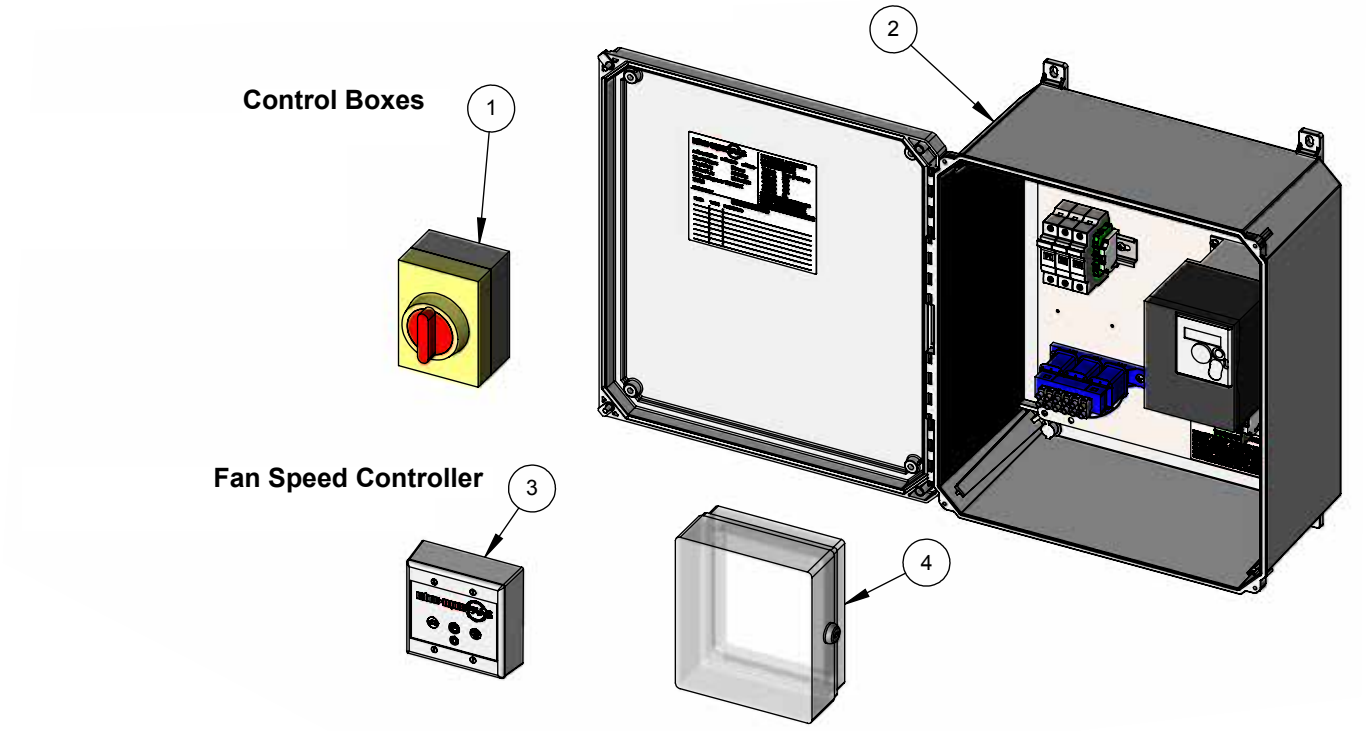


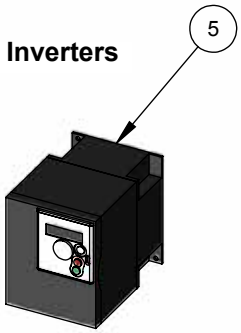
NOTE : Images not to scale

PARTS *Continued*

Controls

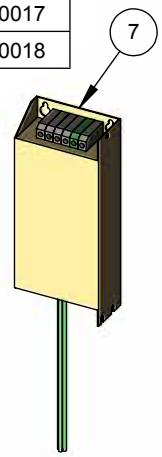
#	PART #	DESCRIPTION
1	38400010	DISC,RTRY,MOT,25A
2	1752.XXX	CONTROL BOX,HVLS FAN
3	72700260	SW,ASSY,RH FAN
4	17900188	CVR,FAN CONTROL, LOCKING
5	7639.XXX	VFD,FAN
6	SEE TABLE	FUSE,[X]A,600V,CC,ATDR
7	SEE TABLE	FILTER,EMC,A312,[X]HP,[X]PH,[XXX]V

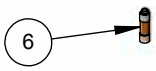




EMC Filters

DESCRIPTION	PART #
FILTER,EMC,A312,2HP,1PH,230V	45500017
FILTER,EMC,A312,2HP,1PH,230V	45500018





Fuses

DESCRIPTION	PART #
FUSE,6A,600V,CC,ATDR	51000065
FUSE,10A,600V,CC,ATDR	51000066
FUSE,15A,600V,CC,ATDR	51000067
FUSE,20A,600V,CC,ATDR	51000068

NOTE : Images not to scale

NOTES

RITE-HITE Company, LLC and its affiliates (collectively "RITE-HITE") warrants that the Product sold to the Owner will be free of defects in design, materials and workmanship (ordinary wear and tear excepted) for the periods set forth below ("Limited Warranty").

Three (3) Years on all mechanical and electrical parts.
Three (3) Years labor, based on approved travel and labor repair times.

REMEDIES
PARTS- RITE-HITE's obligations under this Limited Warranty is limited to repairing or replacing, at RITE-HITE's option, any part which is determined by RITE-HITE to be defective during the applicable warranty period. Such repair or replacement shall be RITE-HITE's sole obligation and the Owner's exclusive remedy under this Limited Warranty. **LABOR-** RITE-HITE will provide warranty service without charge for labor per the specified warranty period. Thereafter, a charge will apply to any repair or replacement under this Limited Warranty.

CLAIMS Claims under this Limited Warranty must be made (i) within 30 (thirty) days after discovery and (ii) prior to expiration of the applicable warranty period. Claims shall be made in writing or by contacting the representative from whom the Product was purchased directly. Owner must allow RITE-HITE or its agent, a reasonable opportunity to inspect any Product claimed to be defective and shall, at RITE-HITE's option, either (x) grant RITE-HITE or its agent access to Owner's premises for the purpose of repairing or replacing the Product or (y) return of the Product to the RITE-HITE, f.o.b. RITE-HITE's factory.

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