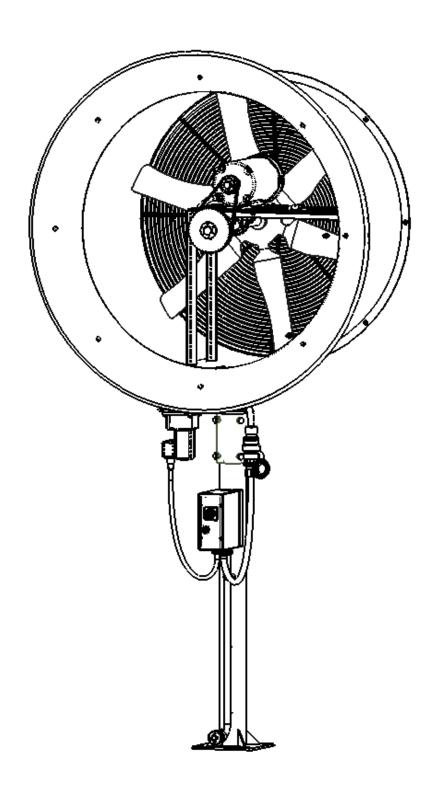
TurfBreeze



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Receiving, Handling, and Storage

ALL UNITS MUST BE INSPECTED FOR ANY SIGN OF TAMPERING OR DAMAGE PRIOR TO ACCEPTING DELIVERY OF YOUR TURFBREEZE FAN. ANY DAMAGES MUST BE NOTED ON THE BILL OF LADING ALONG WITH THE SIGNATURE OF THE DRIVER MAKING THE DELIVERY. ONCE THE DELIVERY HAS BEEN ACCEPTED, ANY AND ALL LIABILITY IS TRANSFERRED FROM TURFBREEZE TO THE RECEIVING PARTY.

TurfBreeze fans are carefully inspected before the leaving factory, but all nuts, bolts, and fasteners should be checked prior to installation to ensure vibration during shipping has not caused any of them to become loose.

Care must be taken when transporting the fans from the receiving location to the desired storage or installation site. It is recommended that equipment featuring lifting forks be used to transport the entire crate and or pallet as it was shipped from TurfBreeze. If lifting fork equipment is not available for transporting the assembly as shipped, the components must be removed from the packaging and moved individually. Always be sure to use caution and your best judgment when lifting heavy objects. A lifting lug on the top of the fan housing has been provided for hoisting the fan and oscillating assembly during installation or transporting the fan and oscillating assembly to the installation site. This lifting point is only designed to support the combined weight of the fan and oscillating assembly. The fan pole and any other items that may be contributing additional weight should be disconnected and or removed before lifting the fan and oscillating assembly by the provided lifting lug. When transporting always be sure to add additional support straps to prevent potential damage due to excessive spinning, swinging, or other instability while underway. Care must be taken, NEVER DROP THE FAN. This will almost always cause the housing to become out of round which will negatively affect the performance in addition to potentially resulting in damage due to interference between the housing and the blades. If a fan is accidentally dropped always check the impeller (fan blade) tip clearance prior to powering the fan to ensure that there is no contact with the housing.

If the fans are to be stored for an extended period of time, such as over the winter, it is recommended that they be cleaned and coated with a rust inhibiting aerosol lubricant such as WD-40 prior to storing. The fans should be stored in a dry area shielded from the weather. If a protected storage area is not available TurfBreeze fan covers, custom tailored for each model fan, are available upon request by calling (866) 641-6663.

Installation

- 1. Install ground pole per the instructions on installation drawing on page 18. Note that the use of the valve box is recommended, but not required. Once the ground pole has been placed in the concrete and angled and leveled properly, allow the concrete to cure at least two weeks before continuing on to step two.
- Ground pole concrete must cure for a minimum of two weeks prior to installing the fan pole and fan.
 - 2. Install the fan pole after the ground pole installation has been allowed to cure two weeks. It is recommended that fan pole be oriented such that the control package and wiring are facing away from the green for a cleaner appearance from the area of play.
 - 3. Place the fan and oscillating assembly on top of the fan pole with the set bolts facing away from the green. Starting at the top, lightly tighten the (4) set bolts to square the oscillating assembly on the fan pole (see included Fan Component Diagram for general part locations and identification). Once each of the (4) set bolts are snug, finish tightening each bolt such that the fan doesn't spin when given a moderate push on side of the inlet bell. Be careful not to over tighten the bolts or they may strip or cause excessive deformation of the pole creating a weak area just below the oscillating assembly.
- Step 4) should be completed either prior to connecting to the power supply ,or with the power sufficiently locked out at the power, and should only be performed by a qualified electrician.
 - 4. Disassemble the provided female power plug, route the power supply cable through the back shell of the plug, and terminate the individual stripped ends of the wires.

Start Up

- 1. Visually inspect inside the fan for any tools or foreign objects.
- 2. Rotate the wheel by hand. It should have a minimum of 1/4" clearance at all points.
- 3. Bump the fan to check rotation by quickly switching power on and off.
- 4. Start fan with amp meter attached (use inductive clamp on style meters). Fan should be at full speed and operating amps in 7 seconds. If it is not, shut down immediately or the motor will be damaged. If this situation occurs, record measured voltages and current (amps), fan motor nameplate voltage and phase, power supply voltage and phase, supply wire size, and length of supply wires. With a list of the above information call TurfBreeze for technical assistance. Toll-Free (866) 641-6663.
- 5. Visually inspect oscillating system through a minimum of (2) two cycles to insure that it is operating correctly without interference to any of the linkage components.
- Step 6) should only be performed by a qualified electrician.
 - 6. While operating, measure electrical voltage and amps at a safe location within 10 feet of the motor. The voltage should be within +/- 10% of nameplate rating on motor. If the operating voltage is out of this 10% range contact TurfBreeze for further instruction before continuing use as these voltages may cause irreparable damage to the motor and or electrical components.
 - 7. Adjust rod end assembly position in the torque arm to fine tune green coverage. If more coverage is required, move the connection outward away from the gear motor's shaft. If coverage is still insufficient, move the rod end connection at the U-Bracket to the next hole closer to the center of the fan. Loosen the (4) set bolts and rotate entire assembly for overall coverage adjustment to the left or right. Re-tighten bolts per the instructions given in step 4 of the Installation section.

2010 TB-50 Maintenance

- 1) The synchronous timing belts require no re-tensioning.
- 2) The sealed pillow block bearings re-quire no lubrication for the life of the fan.
- Note: The permanently sealed fan shaft pillow block bearings and synchronous timing belts require <u>no</u> preventive maintenance for the life of the fan.
- 3) Do not attempt maintenance on fan until the electrical supply has been completely disconnected and locked-out. If the Turf Breeze Control Package has not been provided, or no lockable disconnect switch has been installed, remove all fuses from the circuit and lock the fuse panel or breaker box so the fan cannot accidentally be powered while performing maintenance.
- 4) Inspect and lubricate the Rod-end assembly joints periodically using a liquid lubricant such as WD-40. If the fan is installed in a corrosive or dirty atmosphere, periodically clean the impeller, inlet and other moving parts using a rag and WD-40.
- 5) Inspect belts for tightness and wear. If the belts appear loose then belt may need to be replaced. Other problems that may cause the belt to appear loose could be worn bearings that have excessive play, a loose bearing collar, or the fasteners that secure the motor plate or pillow block bearings becoming loose allowing the components to move from the original locations.

2010 TB-50 Belt Alignment and Tensioning

The standard 2010 TB-50 fans are equipped with timing belts that physically engage the belt and sprockets using teeth much like a chain drive system. The advantages of the synchronous drive system over the previous V-belt configuration includes absolutely no re-tensioning or preventive maintenance associated with the belt, an increase in power transmission capacity allowing the use of a single belt, and closer center distances between the motor and fan shaft as well as significantly smaller diameter drive sprockets which provide reduced obstruction to the air flow increasing overall efficiency and reducing noise. The one trade off associated with synchronous timing drives is that they are much more sensitive to belt tension and alignment when compared to the older V-belt drives. Thus, if maintenance or repairs must be made to any of the other components that requires the removal of the belt, motor, or bearings the following notes and procedures should be followed carefully.

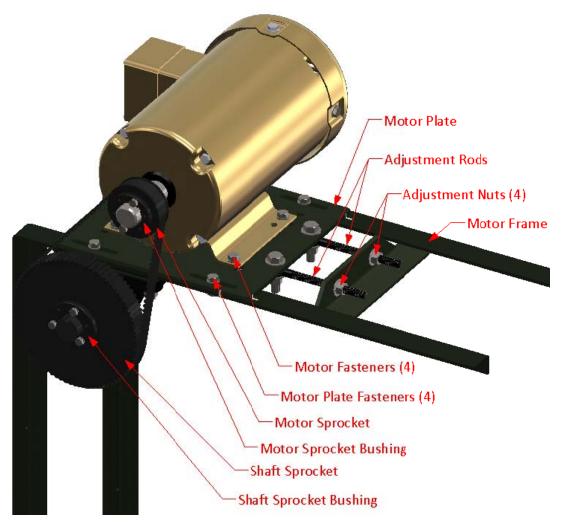


Figure 1: TB-50 synchronous drive frame component diagram

Early 2010 TB-50 fans did not have locating marks for each of the components and it is imperative that these marks be made prior to loosening any fastener or component on the motor frame. Use Alignment marker TurfBreeze part#:TB8534A, or suitable fine tipped paint marker in a highly visible color.

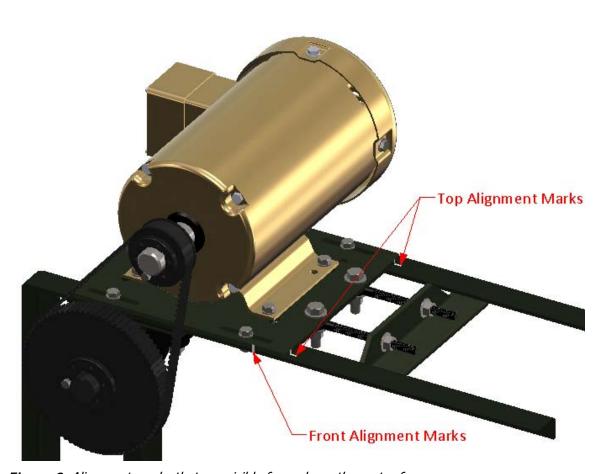


Figure 2: Alignment marks that are visible from above the motor frame

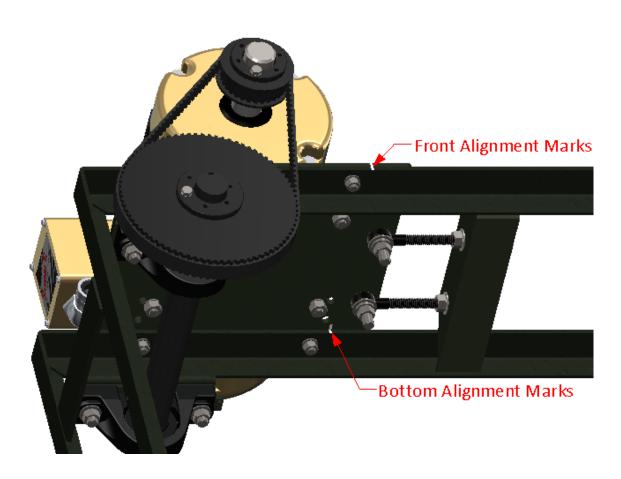


Figure 3: Alignment marks that are visible from below motor the frame

Timing Belt Removal & Reassembly Procedures

 Prior to loosening any fasteners or removal of any components carefully measure and record the motor sprocket bushing location on the motor shaft (X.XX) as shown in Figure 4 below. This measurement will be needed to properly relocate the bushing during reassembly.



Figure 4: Bushing location dimensions

• Carefully note the distance between the edge of the pillow block bearing and the vertical leg of the motor frame for each bearing. Upon re-installation of the pillow block bearings secure the bearing back in precisely these same locations.

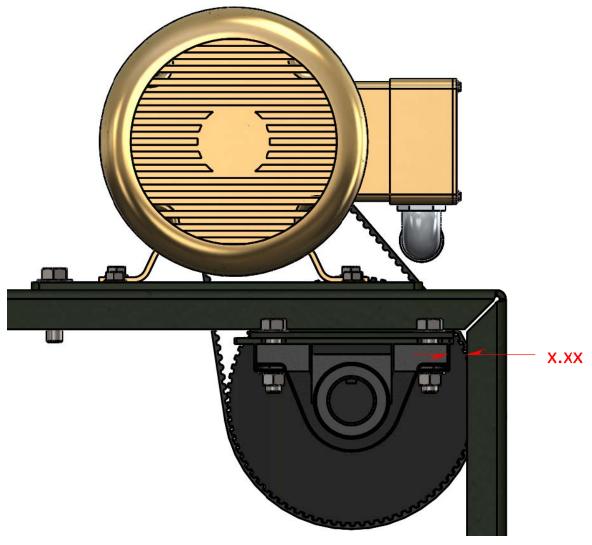


Figure 5: Pillow block to frame locating dimensions

Belt Removal

- Loosen the outer nuts on the adjustment rods, threading them back to near the end of the shaft.
- 2. Loosen the (4) motor <u>plate</u> bolts until they are finger loose.
- 3. Slide the motor base in towards the center of the fan by turning the inner nuts on the adjustment rods until the belt is loose enough to slide off of the bottom sprocket.
- Belt removal should be effortless. If you have to pry or pull then the belt isn't loose enough. Prying, pulling, or "rolling" a timing belt off of the sprockets will damage the internal tensile cords of the belt resulting in premature belt failure if reused.

The procedure outlined below is a step by step procedure to completely re-install all drive system components including the bearings, shaft, motor plate, and fan motor. Depending on your particular repair it may or may not be required that all of these components be removed. Thus, if any component has remained in its factory location the step(s) regarding the reinstallation of that item may be skipped.

Reassembly Procedure

- 1. Slide the pillow block bearings onto the fan shaft such that the bearing collars are facing each other, and install the shaft, bearings, and shims into the fan housing using the (4) 1/2"-13 x 2" bolts, (8) 1/2" washers, and (4) 1/2"-13 nuts. Only finger tighten at this time.
- 2. Carefully square and relocate the bearings using the pillow block to frame dimensions recorded prior to disassembly, see Figure 5, and torque the bolts to 57 ft-lbs.
- 3. Adjust the shaft such that the belt end is roughly 4-1/8" from the inner bushing of the bearing where it contacts the shaft.
- 4. Lightly tighten the socket head cap screw in each of the bearing collars to temporarily hold the shaft in position.
- 5. Slide the fan blade bushing onto the fan shaft, and insert the shaft key in the key way aligning the bushing with the shaft.
- 6. Install the fan blade onto the bushing and slide the fan blade assembly so that the edge of the bushing is even with the end of the shaft.
- 7. Finger tighten the (3) 1/4" bolts in the fan blade bushing.
- 8. Using a torque wrench, torque each bushing bolt to 102 in-lbs (8.5 ft-lbs) being sure not to turn any screw more than one revolution at a time to ensure even load distribution.
- 9. Tighten the set screw that holds the shaft key in the keyway.
- 10. Slide the fan shaft sprocket and bushing onto the fan shaft such that the bushing is facing away from the motor.
- 11. Install (3) 1/4" bolts into the bushing finger tight.
- 12. Align the bushing keyway with the shaft keyway and insert the shaft key.
- 13. With the fan shaft bushing even with the end of the shaft torque the bushing bolts to 102 in-lbs(8.5ft-lbs) being sure not to turn any screw more than one revolution at a time to ensure even load distribution.
- 14. Slide the motor sprocket onto the motor shaft.
- 15. Slide the motor bushing onto the shaft.
- 16. Align the motor bushing and motor shaft key ways and install the motor shaft key.
- 17. Slide the motor sprocket onto the bushing and carefully reposition the motor sprocket to the dimension recorded prior to disassembly, see Figure 4.

- 18. Finger tighten the (2) 1/4"-20 bolts in the motor sprocket bushing.
- 19. Re-check the motor sprocket bushing dimension, and adjust if necessary.
- 20. Use a torque wrench torque each motor sprocket bushing bolts to 90 in-lbs (7.5 ft-lbs) being sure not to turn any screw more than one revolution at a time to ensure even load distribution.
- 21. Set the motor on the motor plate, and loosely install the (4) 3/8" -16 x 1" hex bolts, (4) 3/8"-16 nuts and 3/8" flat washers.
- 22. Square the motor on the motor plate by pulling the motor towards you as shown in Figure 6 below.

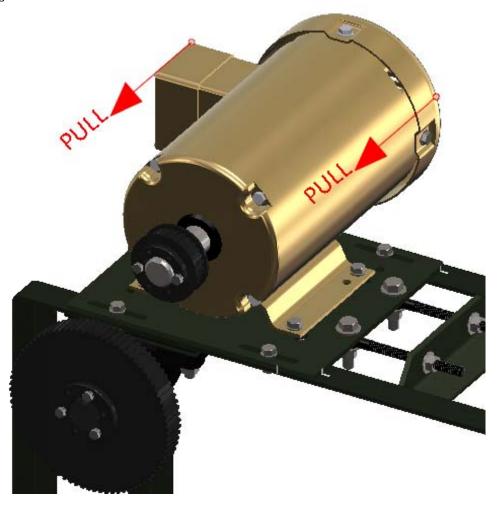


Figure 6: Pull the motor as shown to square it with the motor plate prior to tightening the motor bolts

- 23. Torque the motor bolts to 30 ft-lbs.
- 24. Re-install belt. Note that the adjustment rods should be fully loosened and the belt should go on easily.

Belt installation should be effortless. If you have to pry or pull then the belt isn't loose enough. Prying, pulling, or "rolling" a timing belt onto the sprockets will damage the internal tensile cords resulting in premature belt failure.

- 25. Re-align the (4) motor positioning marks as shown previously in Figures 2 & 3 by turning the nuts on the motor adjustment rods.
- 26. Re-check the belt tension using the tensioning and alignment tool, TurfBreeze part number: TB8533A, by applying force as shown in Figure 7. The tension on the "Pounds", scale on the tensioner should read as specified in Figure 7 just as the deflection collar reaches the tensioner guide tube.

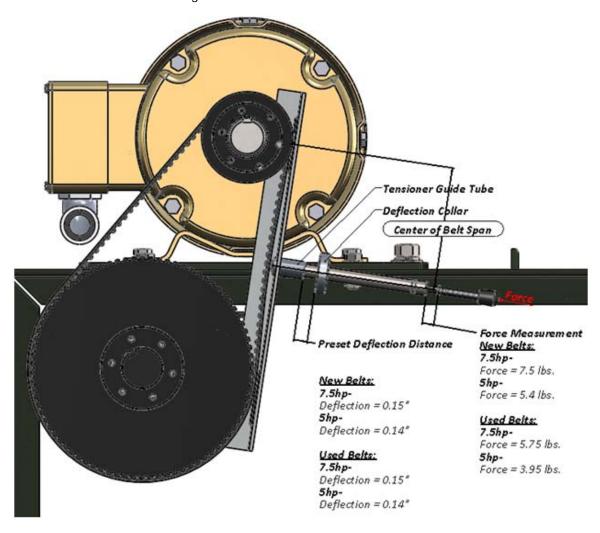


Figure 7: Timing Belt Tensioning Diagram, tensioning and alignment tool TB8533A shown

- Note: Tension reading should be taken precisely when the collar touches the guide tube. Continuing to apply pressure beyond this point will give false readings.
 - 27. If proper tension has not been reached by aligning the positioning marks, turn each of the outer adjustment nuts 1/4 turn and re-check the tension.
 - 28. Repeat until the proper tension is achieved.
 - 29. Remove the tensioner from the alignment frame and position the tool as shown in Figure

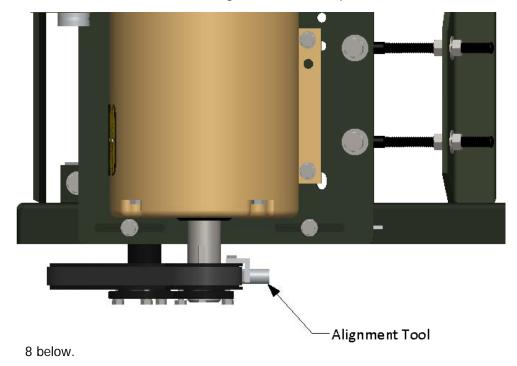


Figure 8: Top view of alignment tool orientation

30. Note the surface contact between the alignment tool or straight edge and the backside surfaces of the sprockets. Adjustments should be made as needed until the tool makes even contact with the sprockets as shown below in the Figure 9 illustration labeled "CORRECT".

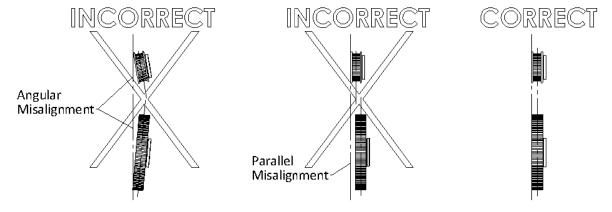


Figure 9: Alignment tool contact illustration (left view)

- Note: It's often helpful to hold alignment tool flush on the back surface of the bottom sprocket and slowly rotate the sprocket such that the tool is gradually moved into position behind the top sprocket. This can make it easier to visualize the alignment.
 - 1. Once proper alignment has been attained torque the socket head cap screws in each of the bearing collars to 180 in-lbs(15 ft-lbs).
- Always re-check tension after alignment adjustments have been made.
 - 2. Once proper alignment and tension are attained torque the motor plate fasteners to 30 ft-lbs, and the reassembly procedure is complete.

Pre 2010 TB-50 Belt Tension (50" Fans Only)

V - belt drives

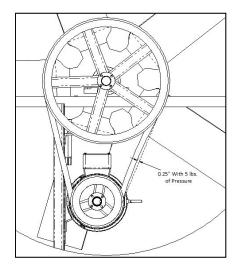
V-belt drives must be checked on a regular basis for wear, tension, alignment and dirt accumulation (see model specific adjustment procedures for recommended inspection intervals). Premature or frequent belt failures can be caused by improper belt tension (either too loose or too tight) or misaligned sheaves (pulleys). Abnormally high belt tension or drive misalignment will cause excessive bearing loads and may result in failure of the fan and/or motor bearings. Conversely, loose belts will cause squealing on start-up, excessive belt flutter, slippage and overheated sheaves. Excessively loose or tight belts may cause fan vibration.

Always replace all of the belts in a multi-belt system at the same time to insure uniform drive loading. Failure to do so may result in bearing and or motor failure. Do not pry belts on or off the pulleys. Loosen belt tension until belts can be removed by simply lifting the belts off the pulleys. After replacing belts, ensure the slack in each belt is on the same side of the drive. Belt dressing should never be used. If the belts are squealing or slipping then they are either improperly tensioned or need to be replaced.

It is imperative that the belt tension be checked at least two times during the first 24 hours of operation. During this time period, the belts will stretch quickly or "break-in" and can become loose enough to cause damage if slipping occurs. The tension can be checked monthly or roughly every 720 hours thereafter. Never install new belts on worn sheaves. If the sheaves have grooves worn in them, they must be replaced before new belts are installed.

Belt Tensioning (Pre 2010 V-Belt Model TB-50 Fans)

If belts are slipping during start up, the tension should be increased. Do not over tighten v-belts, as bearing damage will occur. Belt deflection should be around 0.25" with 5 lbs. of force as shown in Figure 10a. Inspect belts yearly for cracks, dry-rotting, or any other signs of excessive wear and replace as needed. Do not force new belts over the pulleys; first loosen the motor plate bolts and use the belt adjustment rods to raise or lower the motor as needed. Be sure to maintain proper alignment when retightening the adjustment rods. Pulley alignment can be checked by laying a straight edge across the face of the top and bottom pulley. The straight edge should make even contact across the faces of both the top and bottom pulley simultaneously as shown in Figure 10b.



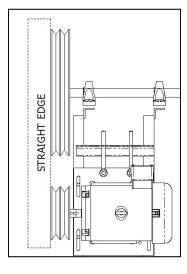


Figure 10: Belt Tensioning (left 10a), and Pulley Alignment (right 10b)

TB-50 Premium Belt Tensioning

The proper tension for operating a V-belt drive is the lowest tension at which the belts will not slip at peak load conditions. Belts are adjusted by raising or lowering the motor pivot plate (see Figure 11 for details). For tensioning, the proper belt deflection half-way between sheave centers is 1/64 of the belt span. For TurfBreeze Premium fans the belt deflection should be between 1/4" and 1/2" using with 5 pounds pressure applied at the mid-point of the free belt span (deflection and mid-point depicted in Figure 10a, on page 16).

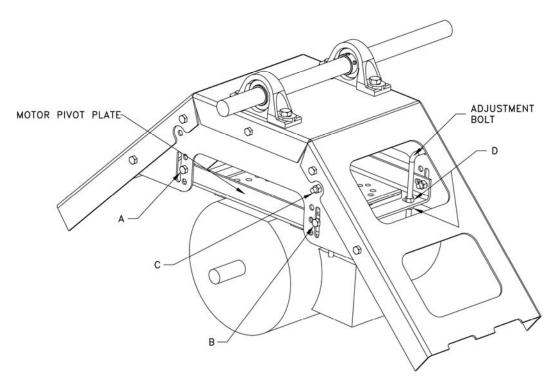
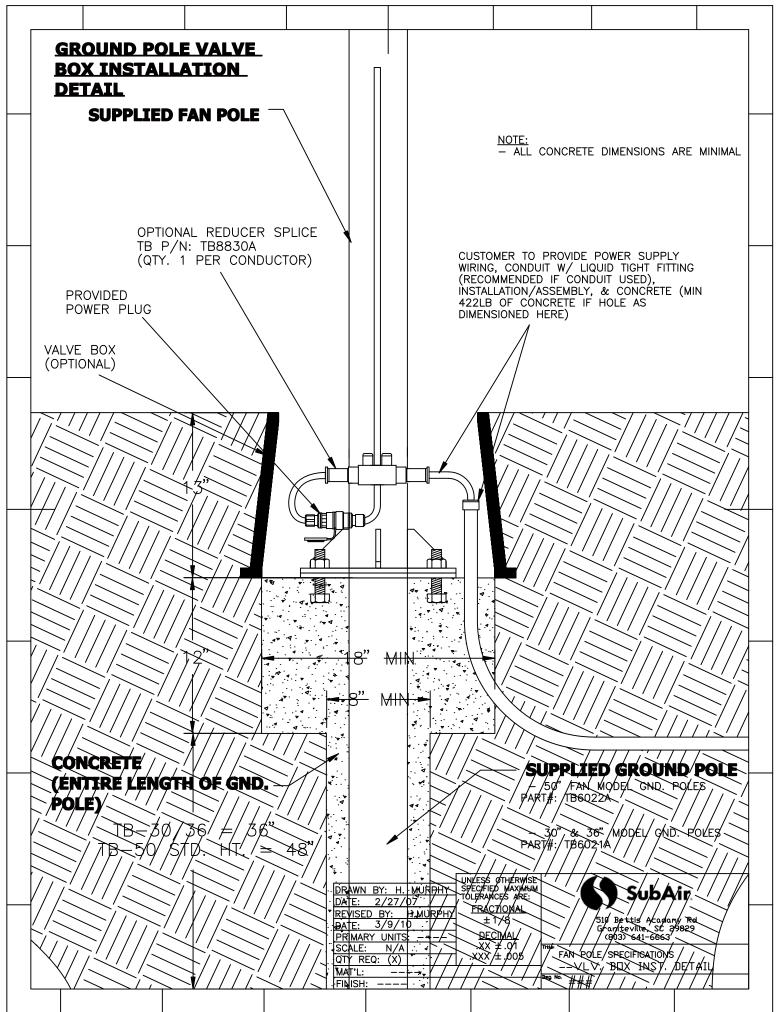


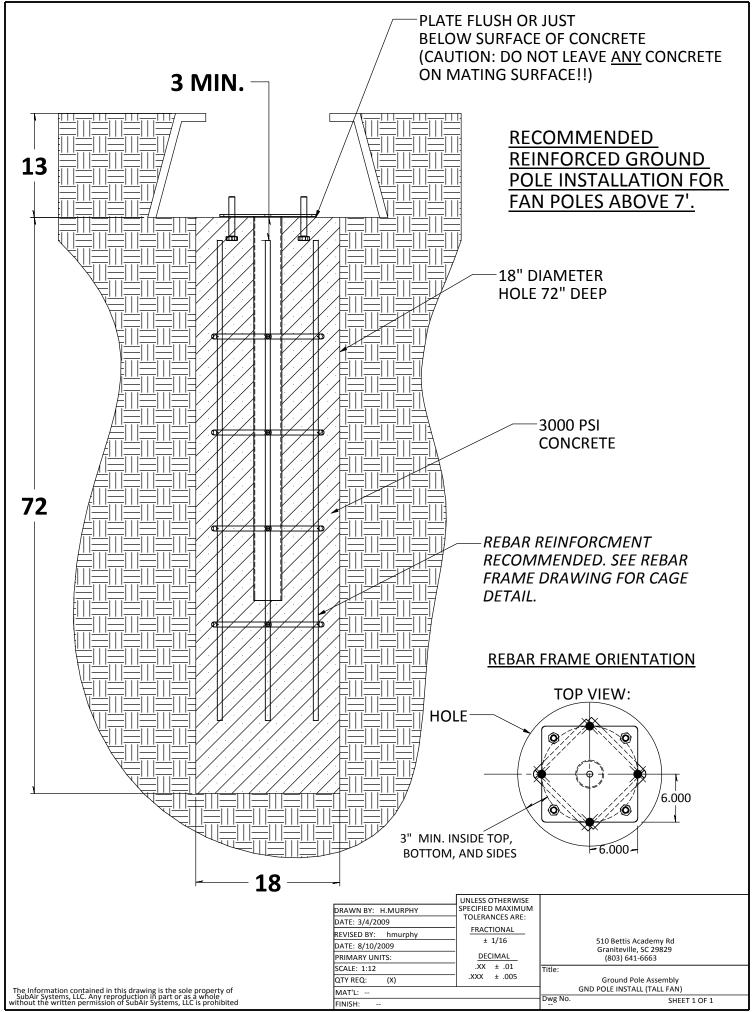
Figure 11: TurfBreeze Premium Fan V-Belt Tensioning adjustment points

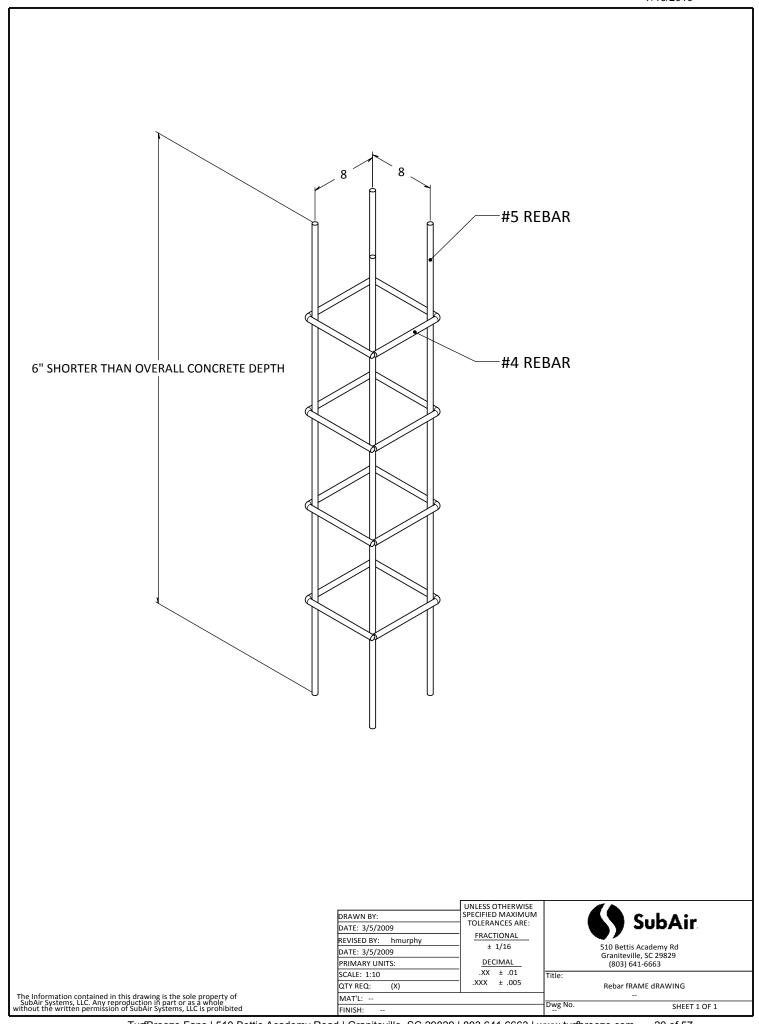
Motor pivot plate adjustment (belt tensioning) procedure:

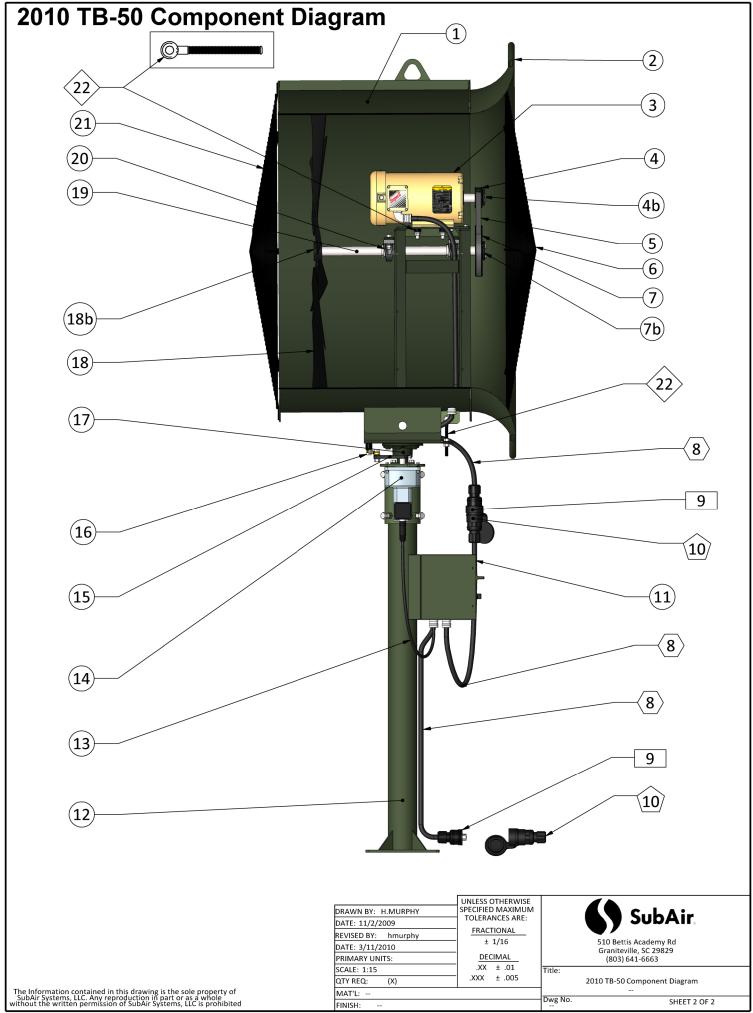
Follow the following steps:

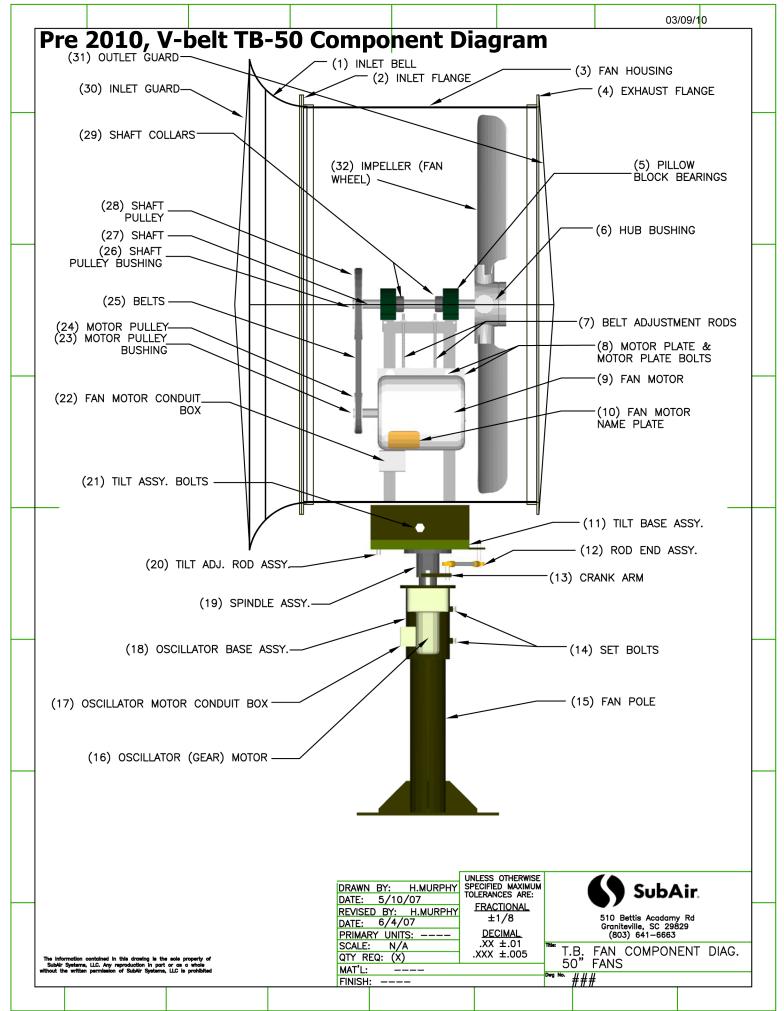
- 1. Loosen fasteners A, B, & C on both sides of the drive frame.
- 2. Loosen and adjust jam nuts (D) on both adjustment bolts equally until proper belt tension has been obtained.
- 3. Tighten jam nuts (D).
- 4. Tighten fasteners A, B, & C on both sides of drive frame.

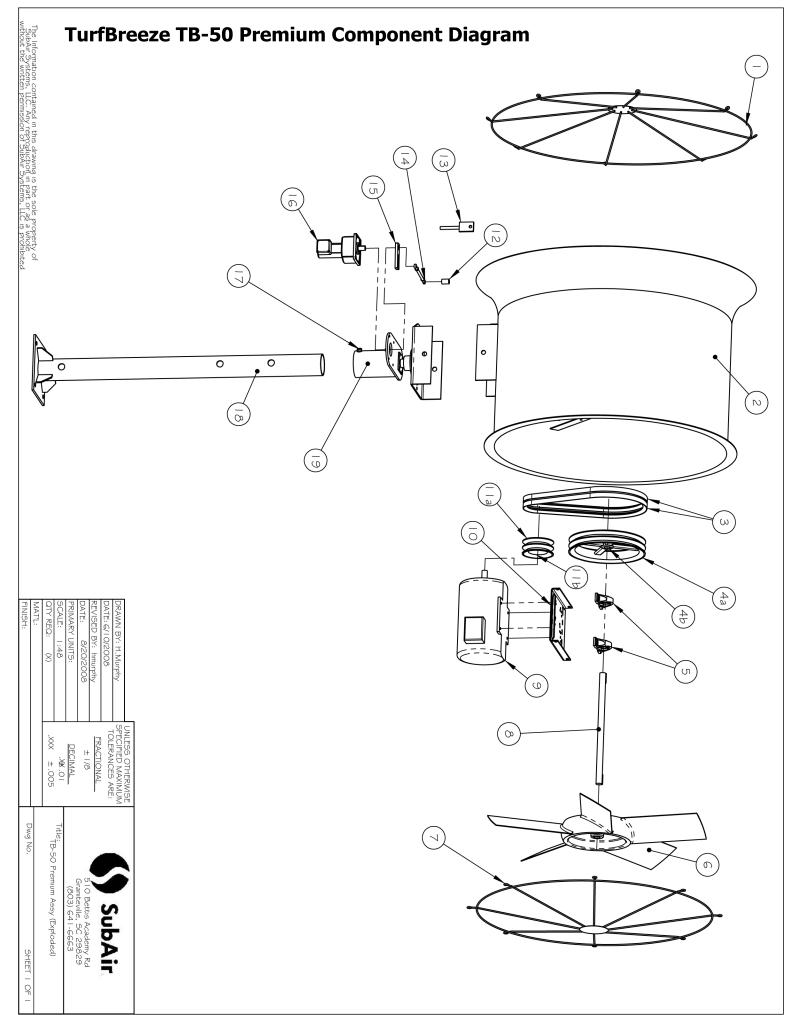


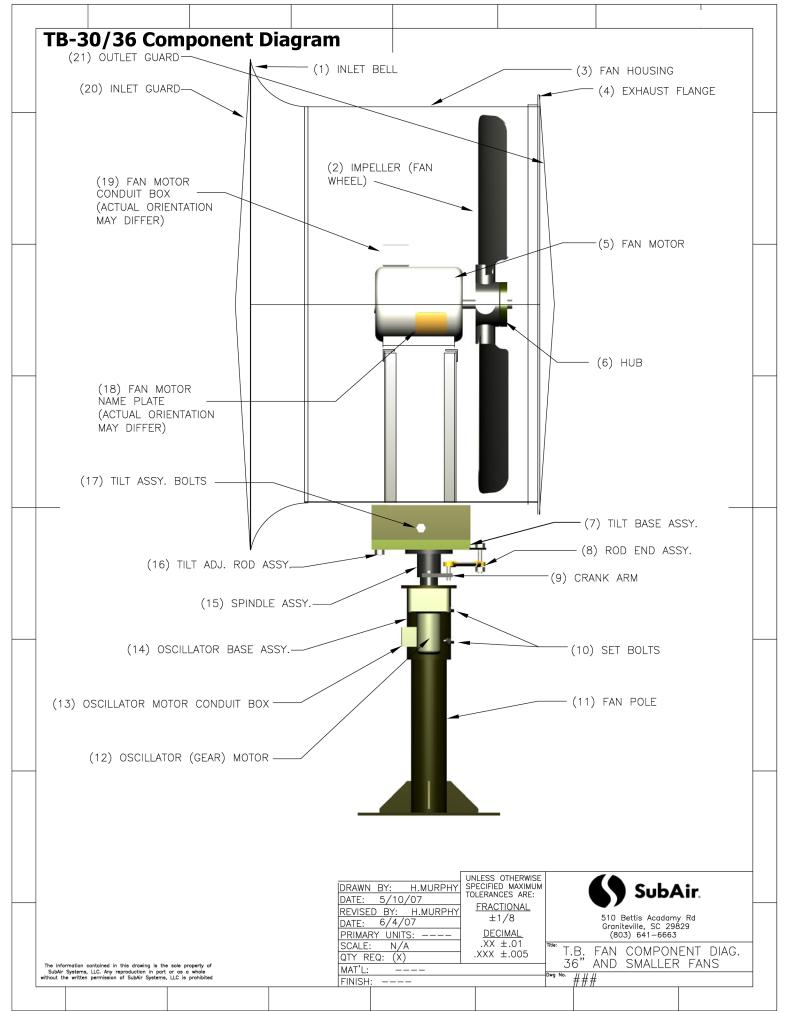


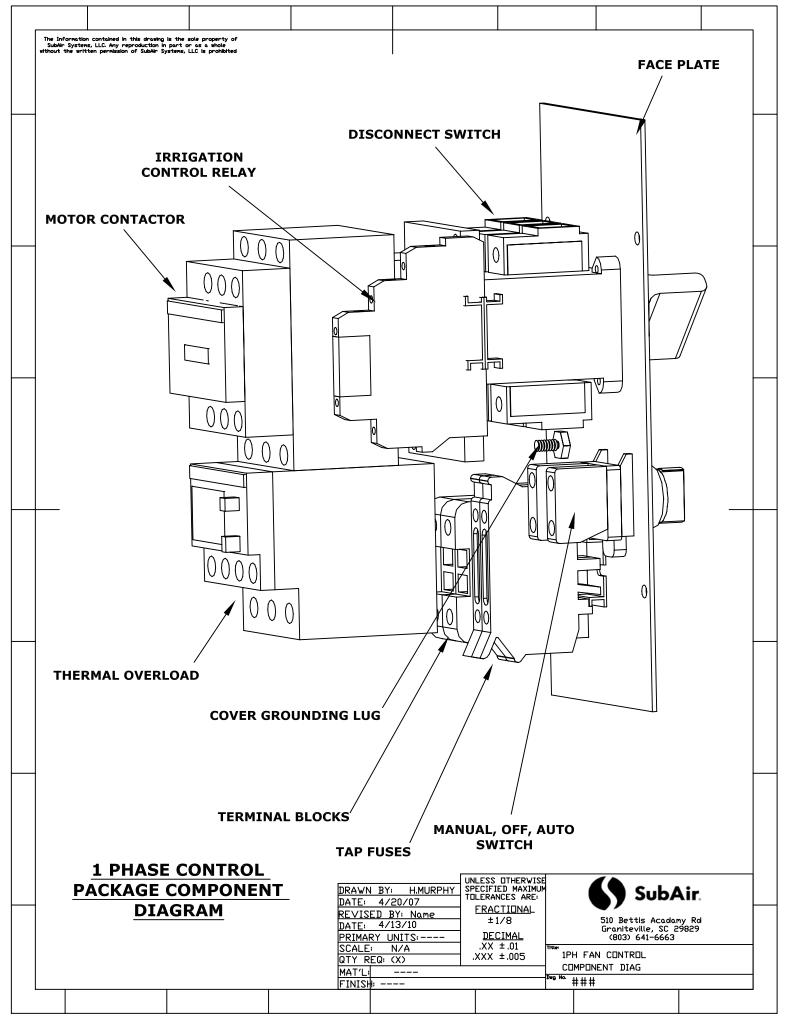


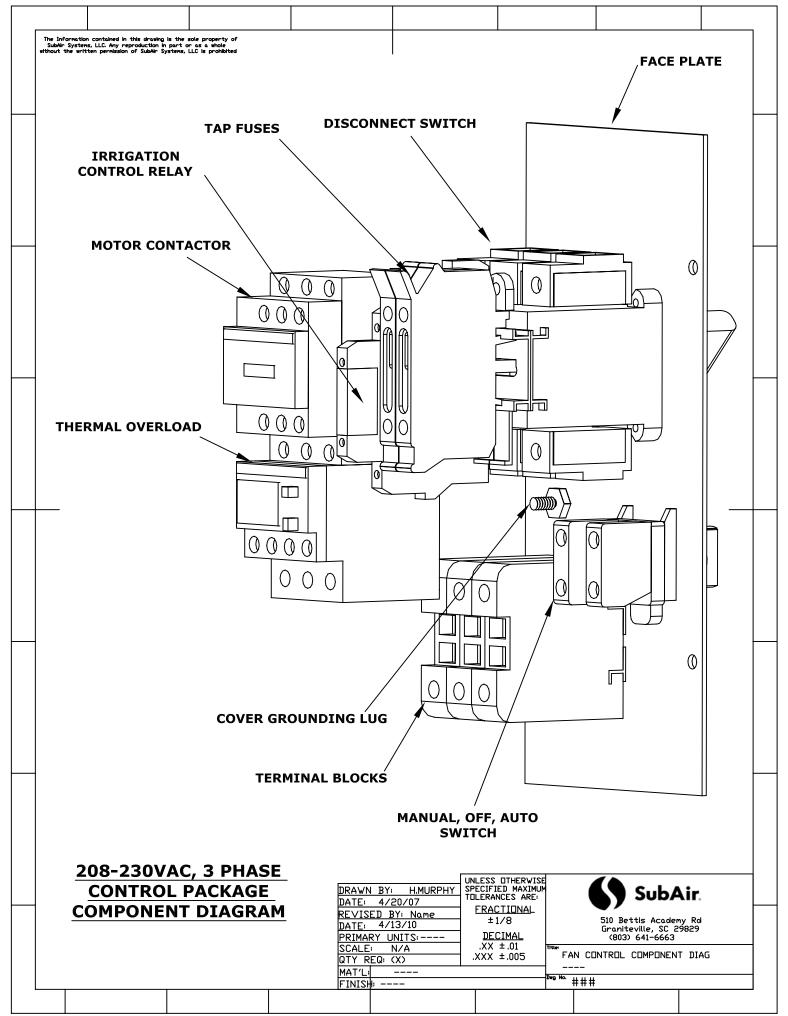


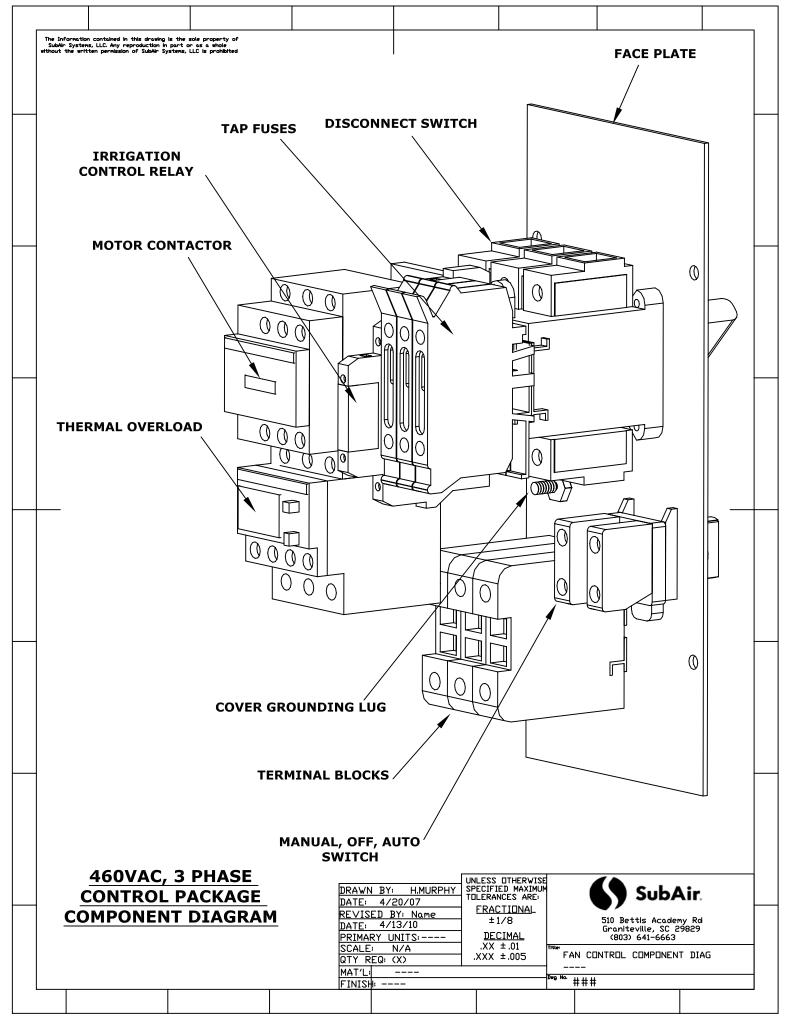


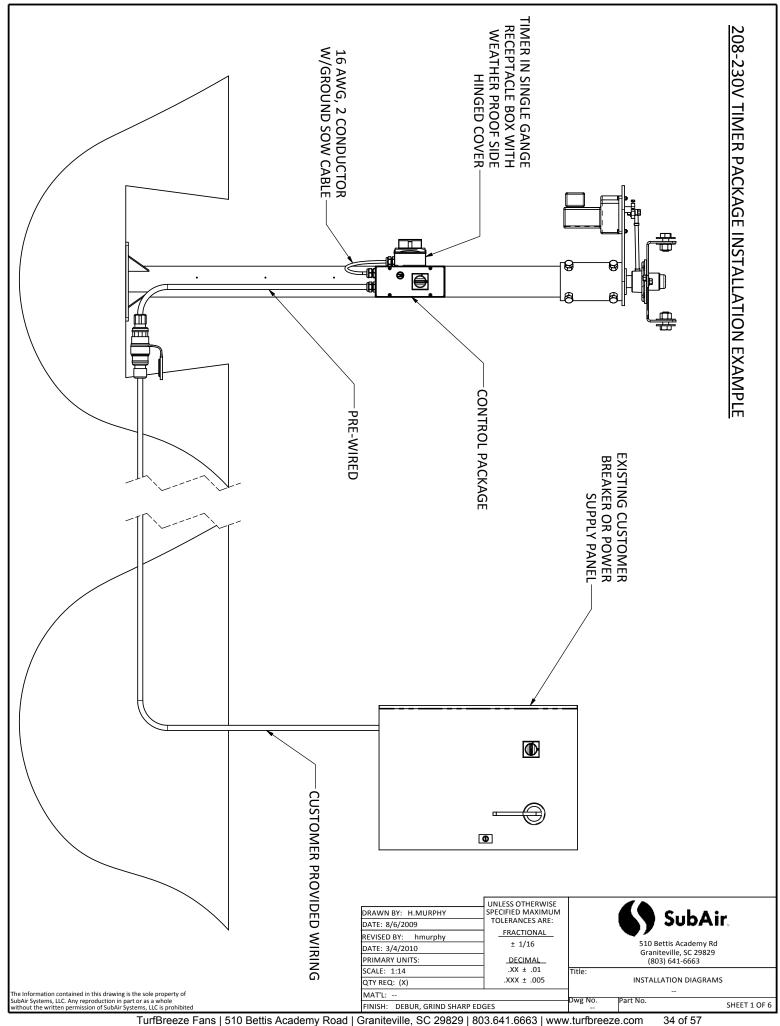


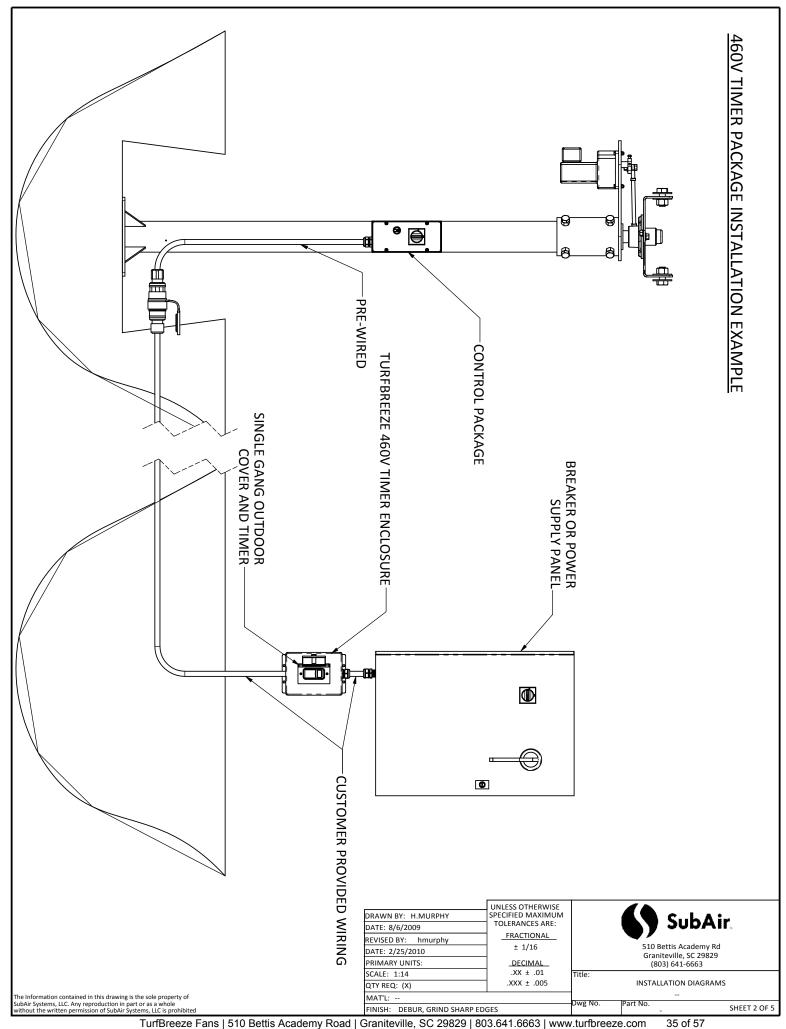


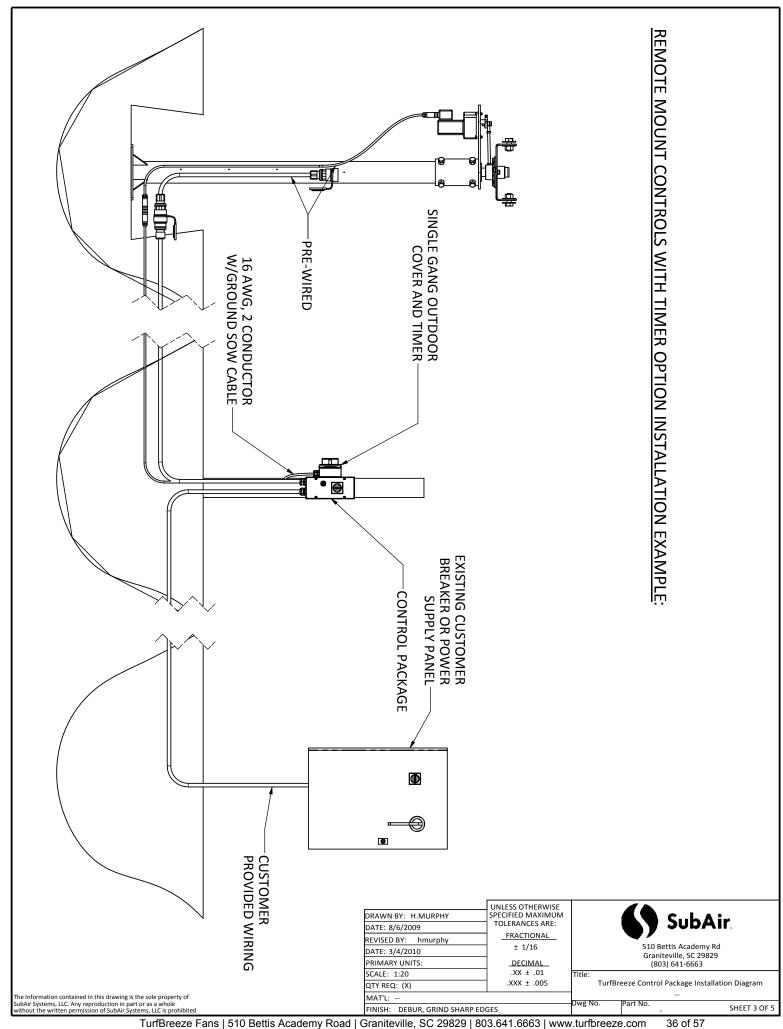


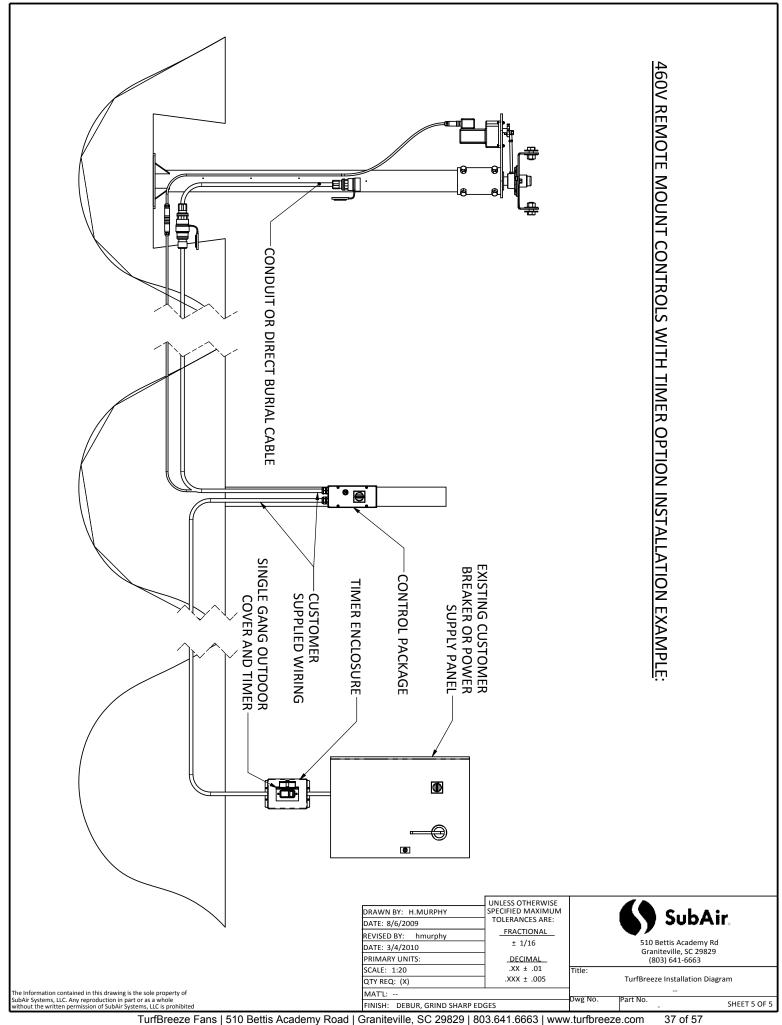


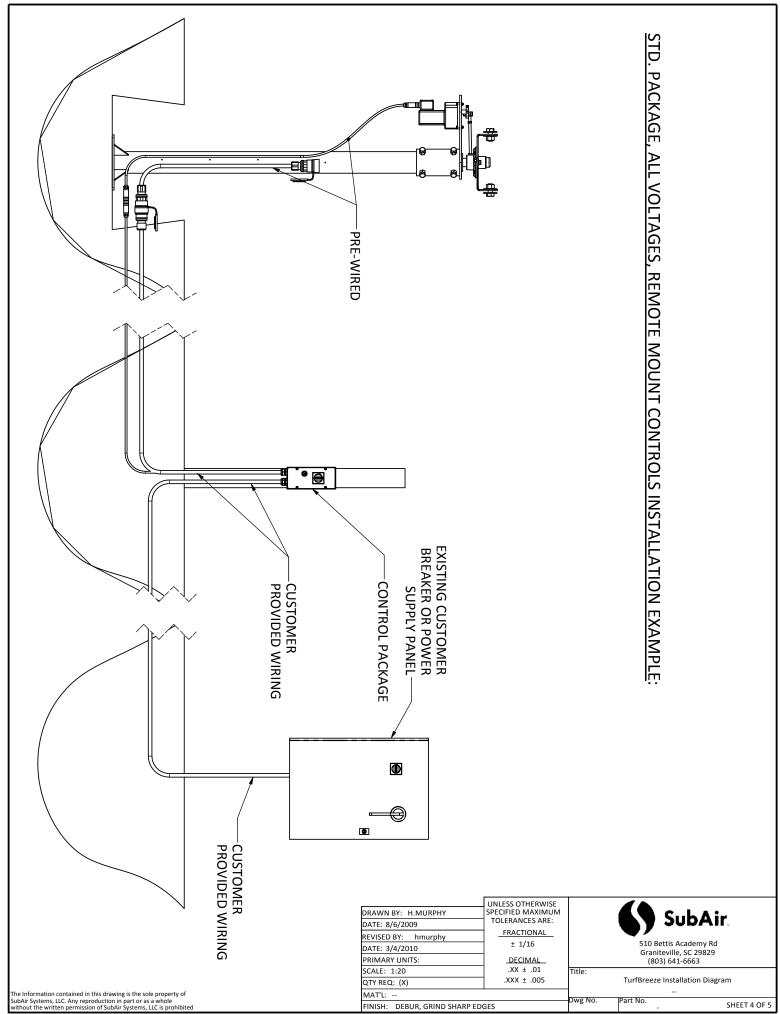








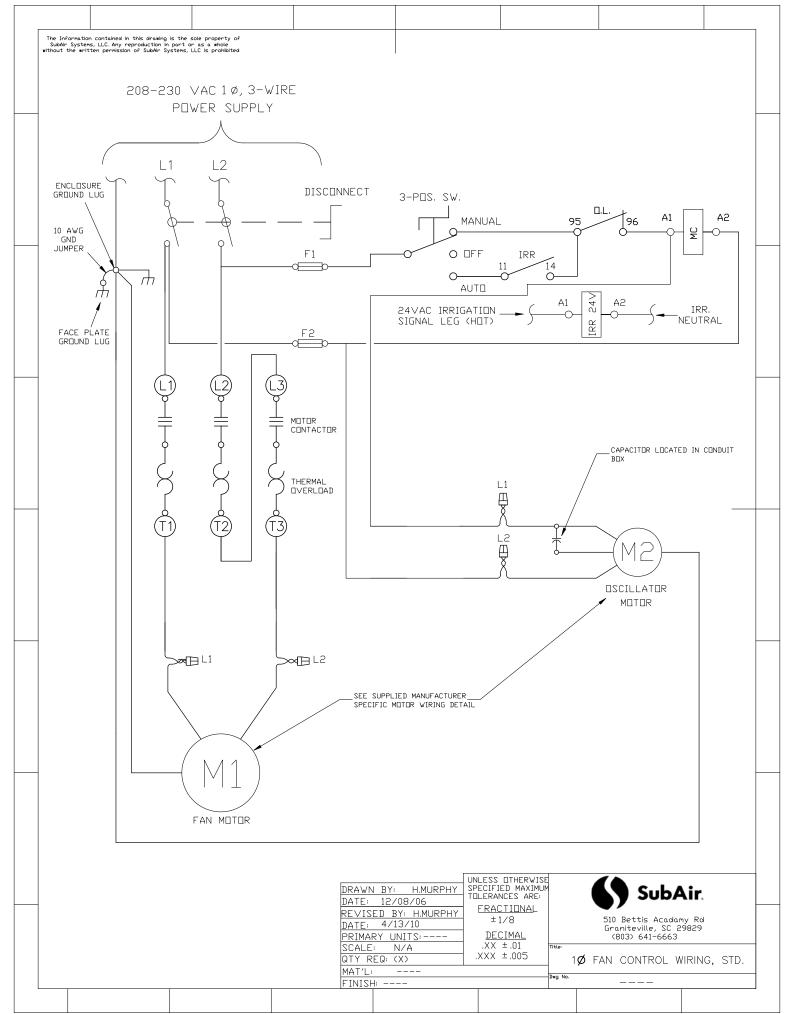




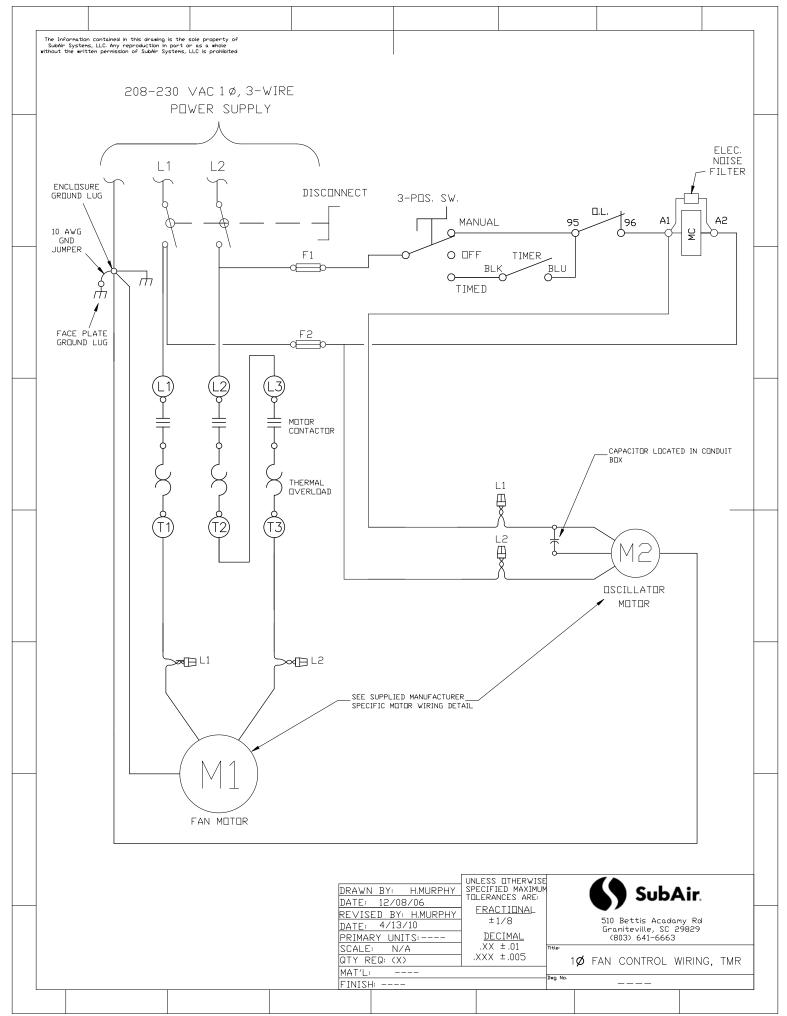


Electrical Schematics Bundle

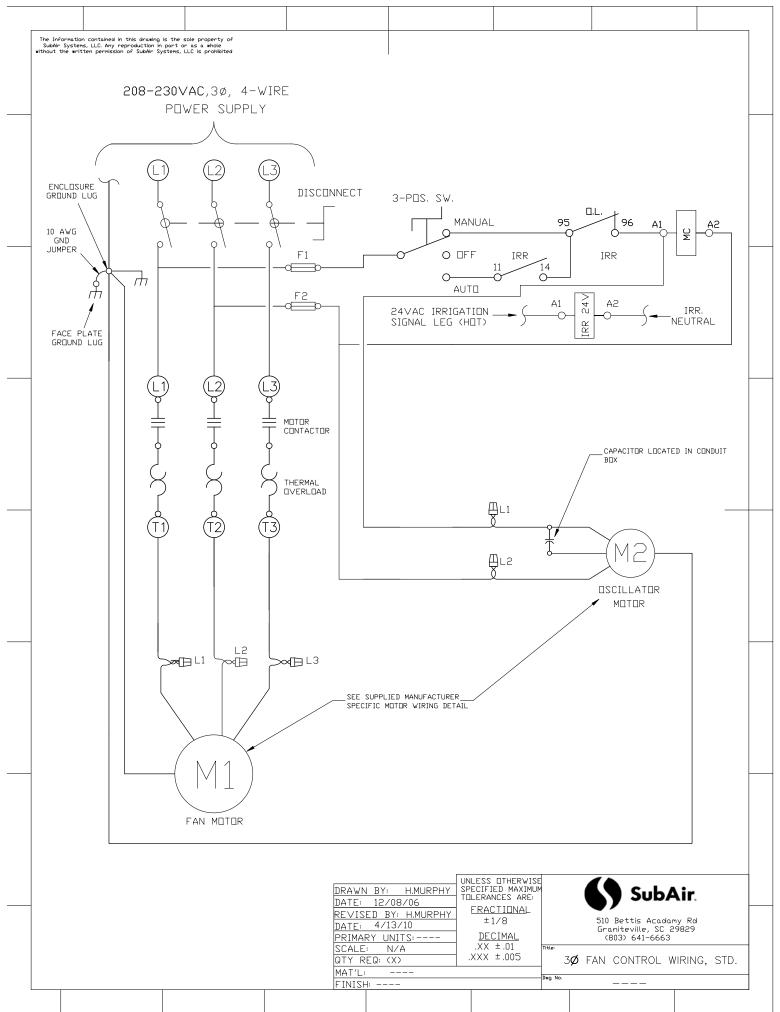
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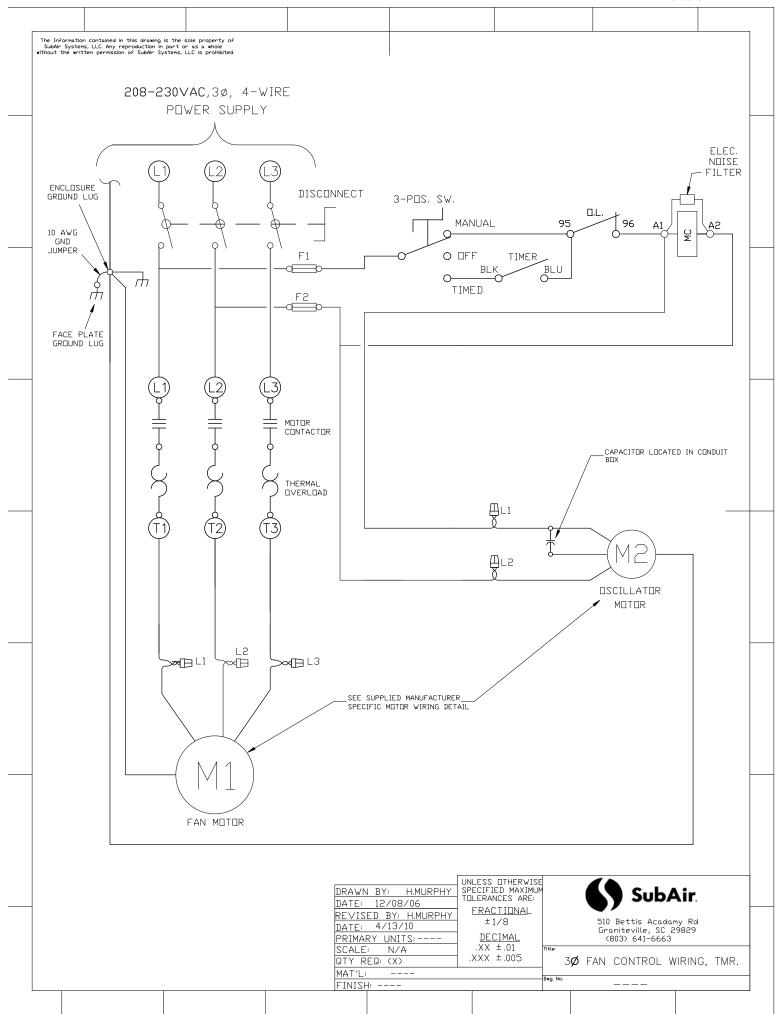
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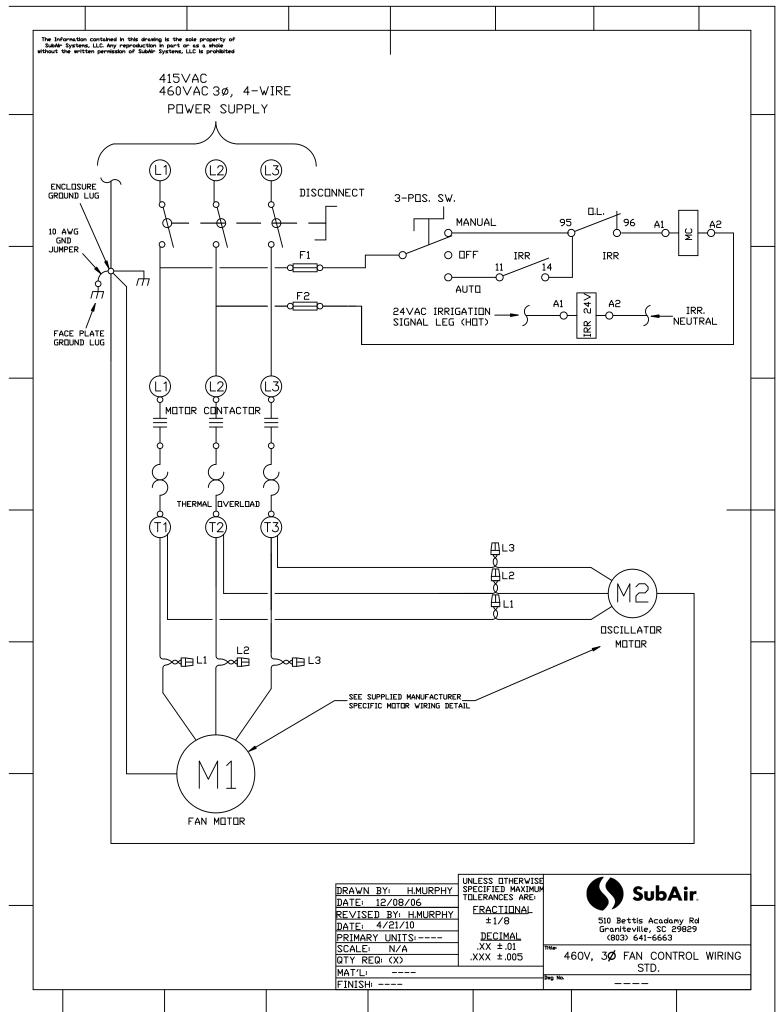


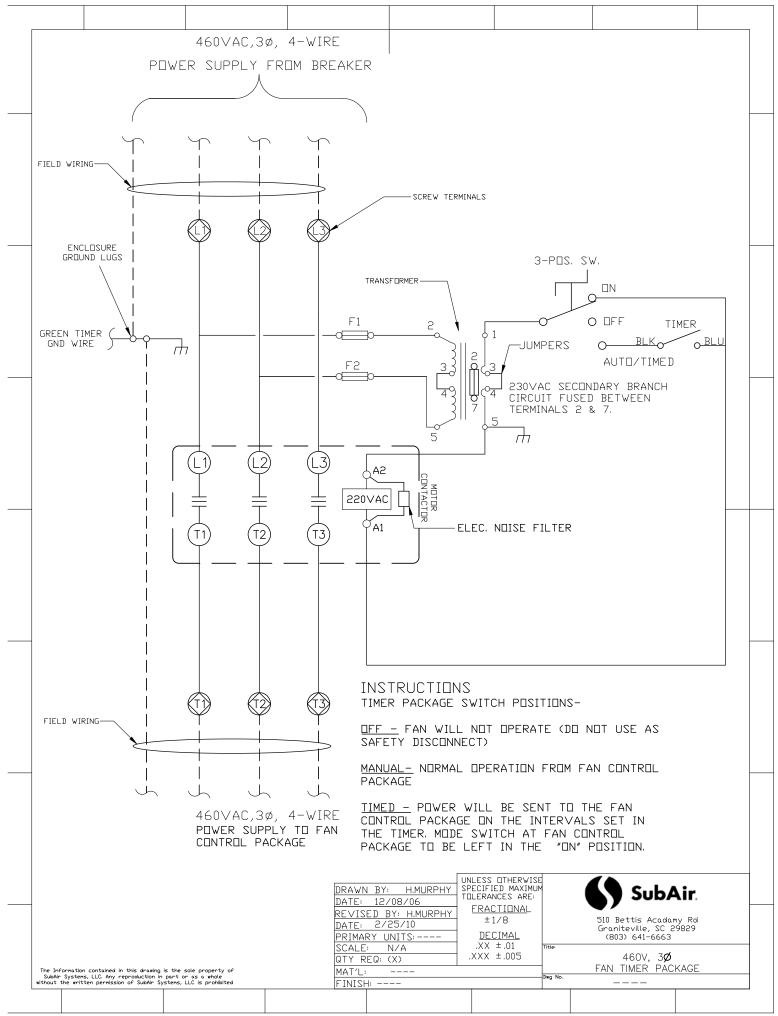
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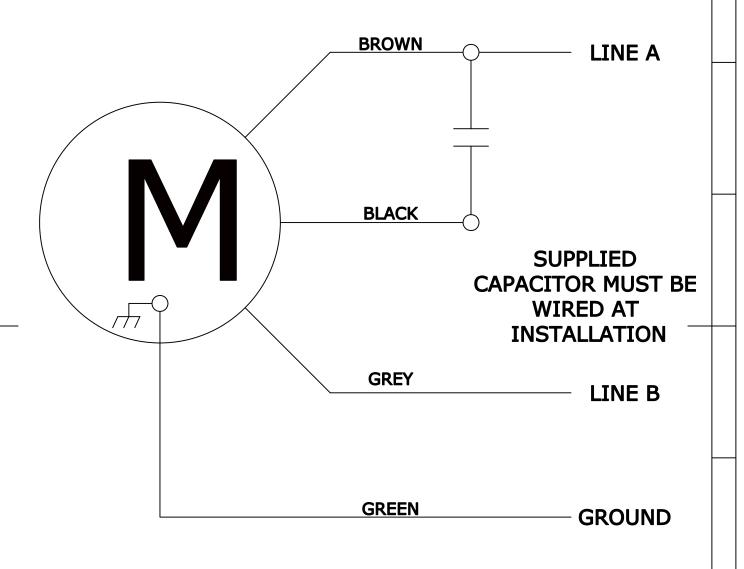




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BROTHER GEAR MOTOR 208-230VAC, 1Ø & 3Ø



DRAWN BY: H.MURPHY DATE: 6/05/07 DATE: 6/28/07
PRIMARY UNITS:--SCALE: N/A
QTY REQ: (X)

DECIMAL .XX ±.01 .XXX ±.005 MAT'L:

UNLESS OTHERWISE SPECIFIED MAXIMUM TOLERANCES ARE:

FRACTIONAL

±1/8



510 Bettis Acadamy Rd Graniteville, SC 29829 (803) 641-6663

BROTHER GEAR MOTOR WIRING

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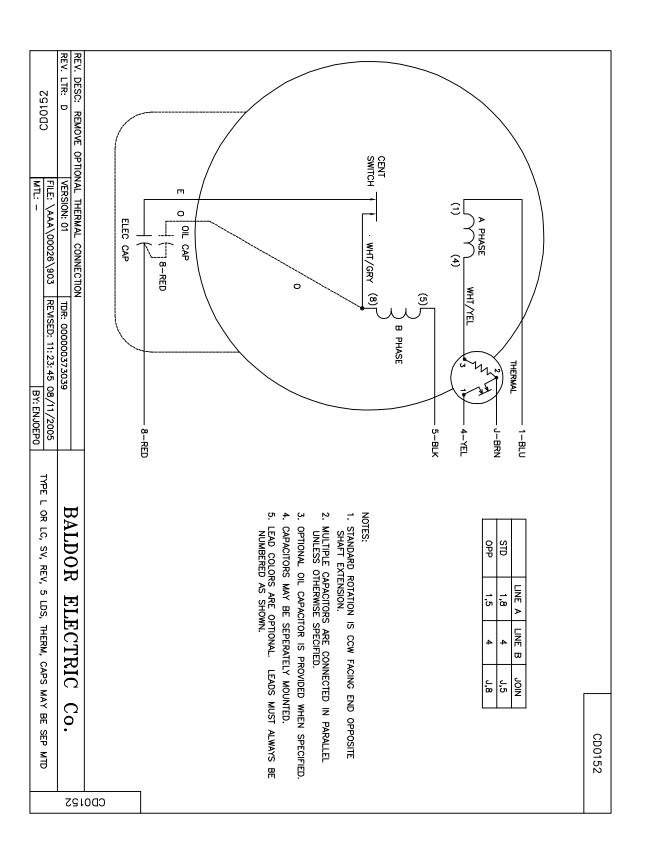
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7/16/2010 The Information contained in this drawing is the sole property of SubAir Systems, LLC. Any reproduction in part or as a whole without the written permission of SubAir Systems, LLC is prohibited **BROTHER GEAR MOTOR** 460VAC, 3Ø **BLACK** LINE A **BROWN** LINE B WHITE LINE C **GREEN GROUND** NOTE: SCHEMATIC USED FOR ALL 380V - 480V, 3-PHASE APPLICATIONS. UNLESS OTHERWISE DRAWN BY: H.MURPHY SPECIFIED MAXIMUM TOLERANCES ARE: SubAir. DATE: 6/05/07 **FRACTIONAL** REVISED BY: Name 510 Bettis Acadamy Rd Graniteville, SC 29829 (803) 641-6663 $\pm 1/8$ DATE: --/--/--PRIMARY UNITS --**DECIMAL** SCALE: N/A QTY REQ: (X) XX ± 01 BROTHER GEAR MOTOR WIRING $XXX \pm .005$

MAT'L:

FINISH:----

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