

Installation, Operation and Maintenance Manual

Please read and save these instructions. Read carefully before attempting to assemble, install, operate or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with instructions could result in personal injury and/or property damage! Retain instructions for future reference.

Model VRF



General Safety Information

Only qualified personnel should install this unit. Personnel should have a clear understanding of these instructions and should be aware of general safety precautions. Improper installation can result in electric shock, possible injury due to coming in contact with moving parts, as well as other potential hazards. Other considerations may be required if high winds or seismic activity are present. If more information is needed, contact a licensed professional engineer before moving forward.

1. Follow all local electrical and safety codes, as well as the National Electrical Code (NEC), the National Fire Protection Agency (NFPA), where applicable. Follow the Canadian Electric Code (CEC) in Canada.

DANGER

Always disconnect power before working on or near a unit. Lock and tag the disconnect switch or breaker to prevent accidental power up.

CAUTION

When servicing the unit, motor may be hot enough to cause pain or injury. Allow motor to cool before servicing.

2. The rotation of the wheel is critical. It must be free to rotate without striking or rubbing any stationary objects.
3. Motor must be securely and adequately grounded.
4. Do not spin fan wheel faster than the maximum cataloged fan rpm. Adjustments to fan speed significantly affects motor load. If the fan RPM is changed, the motor current should be checked to make sure it is not exceeding the motor nameplate amps.
5. Do not allow the power cable to kink or come in contact with oil, grease, hot surfaces, or chemicals. Replace cord immediately if damaged.
6. Verify that the power source is compatible with the equipment.
7. Never open blower access doors while the fan is running.

Receiving

Upon receiving the product check to make sure all items are accounted for by referencing the bill of lading to ensure all items were received. Inspect each crate for shipping damage before accepting delivery. Notify the carrier if any damage is noticed. The carrier will make notification on the delivery receipt acknowledging any damage to the product. All damage should be noted on all the copies of the bill of lading which is countersigned by the delivering carrier. A Carrier Inspection Report should be filled out by the carrier upon arrival and the Traffic Department. If damaged upon arrival, file claim with carrier. Any physical damage to the unit after acceptance is not the responsibility of Greenheck Fan Corporation.

Unpacking

Verify that all required parts and the correct quantity of each item have been received. If any items are missing, report shortages to your local representative to arrange for obtaining missing parts. Sometimes it is not possible that all items for the unit be shipped together due to availability of transportation and truck space. Confirmation of shipment(s) must be limited to only items on the bill of lading.

Handling

Units are to be rigged and moved by the lifting brackets provided or by the skid when a forklift is used. Location of brackets varies by model and size. Handle in such a manner as to keep from scratching or chipping the coating. Damaged finish may reduce ability of unit to resist corrosion.

Storage

Units are protected against damage during shipment. If the unit cannot be installed and operated immediately, precautions need to be taken to prevent deterioration of the unit during storage. The user assumes responsibility of the unit and accessories while in storage. The manufacturer will not be responsible for damage during storage. These suggestions are provided solely as a convenience to the user.

INDOOR — The ideal environment for the storage of units and accessories is indoors, above grade, in a low humidity atmosphere which is sealed to prevent the entry of blowing dust, rain, or snow. Temperatures should be evenly maintained between 30°F (-1°C) and 110°F (43°C) (wide temperature swings may cause condensation and “sweating” of metal parts). All accessories must be stored indoors in a clean, dry atmosphere.

Remove any accumulations of dirt, water, ice, or snow and wipe dry before moving to indoor storage. To avoid “sweating” of metal parts allow cold parts to reach room temperature. To dry parts and packages use a portable electric heater to get rid of any moisture build up. Leave coverings loose to permit air circulation and to allow for periodic inspection.

The unit should be stored at least 3½ in. (89 mm) off the floor on wooden blocks covered with moisture proof paper or polyethylene sheathing. Aisles between parts and along all walls should be provided to permit air circulation and space for inspection.

Inspection and Maintenance during Storage

While in storage, inspect fans once per month. Keep a record of inspection and maintenance performed.

If moisture or dirt accumulations are found on parts, the source should be located and eliminated. At each inspection, rotate the fan wheel by hand ten to fifteen revolutions to distribute lubricant on motor. Every three months, the fan motor should be energized. If paint deterioration begins, consideration should be given to touch-up or repainting. Fans with special coatings may require special techniques for touch-up or repair.

Machined parts coated with rust preventive should be restored to good condition promptly if signs of rust occur. Immediately remove the original rust preventive coating with petroleum solvent and clean with lint-free cloths. Polish any remaining rust from surface with crocus cloth or fine emery paper and oil. Do not destroy the continuity of the surfaces. Wipe thoroughly clean with Tectyl® 506 (Ashland Inc.) or the equivalent. For hard to reach internal surfaces or for occasional use, consider using Tectyl® 511M Rust Preventive or WD-40® or the equivalent.

REMOVING FROM STORAGE — As units are removed from storage to be installed in their final location, they should be protected and maintained in a similar fashion, until the equipment goes into operation.

Prior to installing the unit and system components, inspect the unit assembly to make sure it is in working order.

1. Check all fasteners, set screws on the fan, wheel, bearings, drive, motor base, and accessories for tightness.
2. Rotate the fan wheel(s) by hand and assure no parts are rubbing.

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Balancing the Model VRF

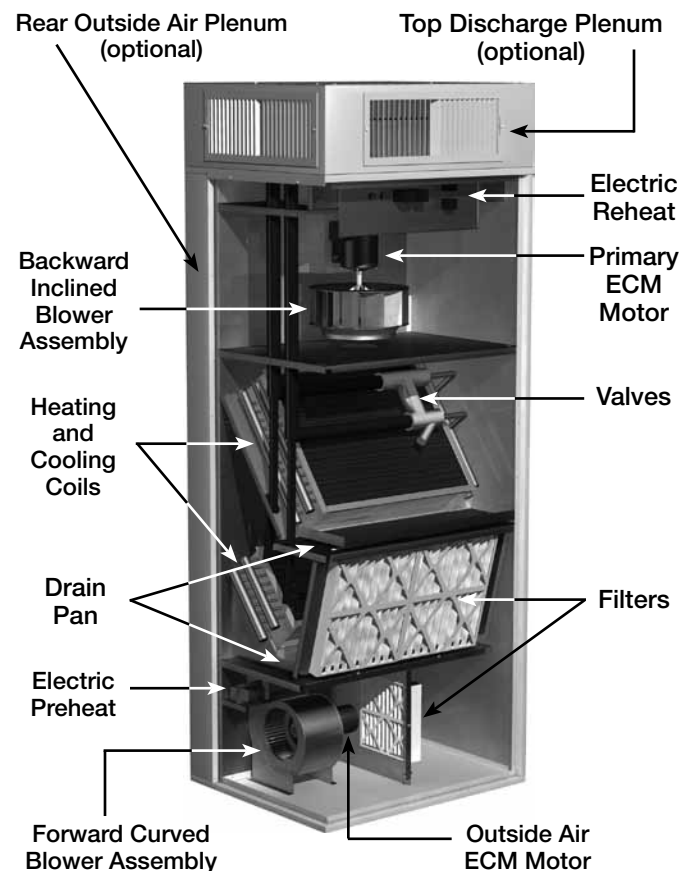
1. Verify all filters are in place.
2. Close and lock lower access door.
3. Set potentiometers based on chart below for performance needed.
4. Check total airflow and outside airflow through unit with both fans running.
5. Adjust potentiometers based on airflow readings and re-check.
 - a. Primary fan has greatest influence on system and should be the first potentiometer to be adjusted.
 - b. Once the primary fan is within 5% of the target above or below, the outdoor air fan potentiometer may be adjusted.
 - c. Re-check airflow through the system after each adjustment.

Total Airflow (CFM)	Primary Potentiometer Setting	Outside Airflow (CFM)	Outside Air Potentiometer Setting
1600	80	400	45
1600	80	300	35
1400	70	400	55
1400	70	300	45
1200	65	400	60
1200	65	300	50

NOTES:

- Potentiometer settings in the chart above are approximate and are to be used only for initial setup and airflow readings.
- Airflow must to be checked with both fans running due to the affects each fan has on the other.
- Primary fan has greatest influence on system and should be adjusted first.
- The process to set the potentiometers will be iterative as each unit setup varies.

Unit Layout



Maintenance

CAUTION

Disconnect power before servicing the unit. The control box access panels has an interlocking door disconnect. Turn this switch off before servicing the unit. This will disconnect the power for the entire fan.

Greenheck recommends these procedures to ensure trouble free operation of this unit. It is especially important to maintain heater units for clean and efficient operation. Most unit failures can be attributed to poor setup or poor maintenance.

Maintenance - continued

A record of maintenance performed on this unit should be kept. This information will provide essential information if problems are encountered. A section at the end of this manual is provided for recording the unit's maintenance history.

Access to the components is gained by opening the front access panels. The panels are hinged and can be opened by unlocking the latch, flipping the latch up and turning it. The top panel must be opened first. Then the bottom panel can be opened.

CAUTION

When performing any maintenance on this unit, be sure that the power is disconnected and cannot be accidentally turned on. The control center disconnect can be locked in the off position.

The maintenance schedule greatly depends on the surrounding conditions (inside and outside of the building). The following is a typical maintenance schedule for a classroom fan coil unit.

Every three (3) months

Filters - The filter in the unit should be inspected at least every three (3) months. Depending on the environment, filters could require changing or cleaning more or less often. The filters can be accessed by opening the front access panels of the unit. The top access panel must be opened first.

If disposable filters are installed, check by holding up to a light source. If light cannot pass through the filter, it should be replaced. Replacement filters should be of the same manufacturer and size. When reinstalling filters, be sure to install with the airflow in the correct direction indicated on the filter.

Yearly

Motor - Motor maintenance is generally limited to cleaning and lubrication (where applicable). Cleaning should be limited to the exterior surfaces only. Removing dust and grease buildup on motor housing assures proper motor cooling. Greasing of motors is intended only when grease fittings are provided. Many fractional motors are permanently lubricated and require no further lubrication. Motors supplied with grease fittings should be greased in accordance with manufacturer's recommendations.

When motor temperature does not exceed 104°F (40°C), the grease should be replaced after 2000 hours of running time as a general rule. The inside of the unit and drain pans should also be vacuumed out and the strainers in the hydronic circuit should be cleaned. Damper should also be inspected to ensure proper operation and is closing fully.

Wheels - Wheels require very little attention when moving clean air. Occasionally oil and dust may accumulate on the wheel causing imbalance. When

this occurs the wheel and housing should be cleaned to assure smooth and safe operation. Inspect fan impeller and housing for fatigue, corrosion or wear.

Routinely check all fasteners, set screws and locking collars on the fan for tightness.

Coil Maintenance

Coils must be clean to obtain maximum performance. Check once a year under normal operating conditions and if dirty, brush or vacuum clean. Soiled fins reduce the capacity of the coil, demand more energy from the fan, and create an environment for odor and bacteria to grow and spread through the conditioned zone. High pressure water (400 psi or less) may be used to clean coils with fin thickness over 0.006 inches thick.

Test the spray pressure over a small corner of the coil to determine if the fins will withstand the spray pressure.

For coils with fragile fins or high fin density, foaming chemical sprays and washes are available. Many coil cleaners contain harsh chemicals, so they must be used with caution by qualified personnel only. Care must be taken not to damage the coils, including fins, while cleaning.

CAUTION

Fin edges are sharp.

Winterizing Coils

Coil freeze-up can be caused by such things as air stratification and failure of outdoor air dampers and/or preheat coils. Routine draining of water cooling coils for winter shutdown cannot be depended upon as insurance against freeze-up. Severe coil damage may result. It is recommended that all coils be drained as thoroughly as possible and then treated in the following manner. Fill each coil independently with an antifreeze solution using a small circulating pump and again thoroughly drain. Check freezing point of antifreeze before proceeding to next coil. Due to a small amount of water always remaining in each coil, there will be a diluting effect. The small amount of antifreeze solution remaining in the coil must always be concentrated enough to prevent freeze-up.

NOTE: Carefully read instructions for mixing antifreeze solution used. Some products will have a higher freezing point in their natural state than when mixed with water.

Drain Pan Maintenance

Drain pans in any air conditioning unit will have some moisture in them. Therefore, algae and other organisms will grow due to airborne spores and bacteria. Periodic cleaning is necessary to prevent this buildup from plugging the drain and causing the drain pan to overflow. Inspect twice a year to avoid the possibility of overflow. Also, drain pans should be kept clean to prevent the spread of disease. Cleaning should be performed by qualified personnel.

Troubleshooting

If one of the fans are not running.

1. Verify that the disconnect is in the ON position.
2. Verify that thermostat/controller is set on the proper mode. If it is set on the unoccupied mode (night set-back), the fans will not operate.
3. Check the fan relay to see if it is working properly (is it energizing and de-energizing properly).
4. Check to see if the 24 volt transformer is working.
5. Ensure all wires are connected in the proper location and are secure.
6. Check to see if motor has proper line voltage between pins 4 and 5. (see Figure 1)

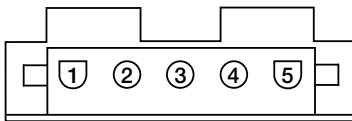


Figure 1: Connector on Motor

7. If the motor still does not turn on, contact Greenheck Fan Corporation for further instructions.

If one of the fans does not vary speeds or reach full speed.

1. Turn the potentiometer control to the motor to 100%
2. Touch the black lead of a multimeter to “X” on the unit terminal strip.
3. Touch the red lead of the multimeter to “1” on the unit terminal strip for the primary motor and to “2” for the outdoor air motor.
4. The voltage should be approximately 10 VAC between these terminals.
5. If the voltage is less than 10 VAC, either the wires between the potentiometer and the terminal strip in the control box are faulty or the potentiometer is faulty.
6. Touch the black lead of the multimeter to neutral on the control board (see Figure 2).
7. Touch the red lead of the multimeter to the signal terminal (see Figure 2).

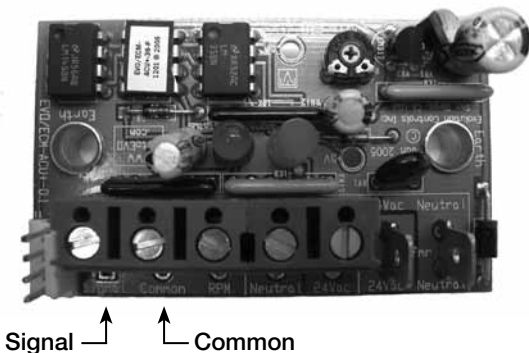


Figure 2: Control Board

8. The voltage should be approximately 10 VAC between these terminals.
9. If the voltage is less than 10 VAC, the wires between the control board and the terminal strip in the control box are faulty.
10. Touch the black lead to the common (green) wire on the 4-pin motor connector (see Figure 3).
11. Touch the red lead to the speed (red) wire on the 4-pin motor connector (see Figure 3).

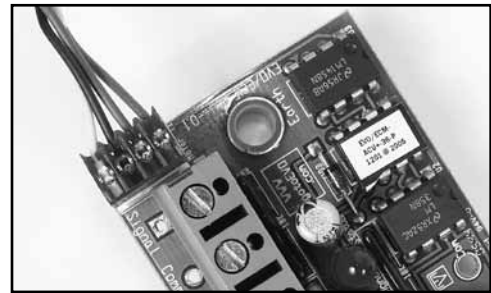


Figure 3: Control Wire Connector (Board view)

12. The DC voltage should be equal to the voltage on the white wire (~22 VDC). The motor should run at full speed.
13. If the motor does not run at full speed, the cable may be defective.

14. Go to the control connector on the motor (see Figure 4).
15. Insert the black meter lead into the connector shell hole containing the single green wire (see Figure 4).



Figure 4: Control Wire Connector (Motor view)

16. Insert the red meter lead into the connector shell hole containing the red wire (see Figure 4). The DC voltage should be equal to the voltage on the white wire (~22 VDC). If it is not, the control cable is defective. If the voltage is ~22 VDC and the motor does not run at full speed, contact Greenheck Fan Corporation for further instructions.

Start-Up Documentation

Job Information

Job Name _____
Address _____
City _____ State _____ Zip _____
Phone Number _____
Contact Person _____

Start-Up Company Information

Service Organization _____
Address _____
City _____ State _____ Zip _____
Phone Number _____
Fax Number _____
Start-Up Date _____
Start-Up Personnel Name _____

Nameplate Information

Unit Model Number _____
Volts _____ Hertz _____ Phase _____
Amps _____ Mark _____
Motor Voltage _____ Motor Amperage _____
Fan rpm _____

Field Start-Up Documentation

- Check blower rotation
- Check air volume (cfm)
_____ Design
_____ Actual
- Actual motor voltage _____ Volts
- Actual motor hertz _____ Hertz
- Actual motor phase _____ Phase
- Actual motor amps _____ Amps

Drive

- Level of fan _____ L or H
- Fan RPM Range
_____ Minimum
_____ Maximum

System Start-Up

For proper unit function and safety, follow everything in this start-up procedure in the order presented. This is to be done after the electrical connections are complete.

PRE-START CHECK LIST

1. Disconnect and lock-out all power switches to fan.
2. Check all fasteners, set screws and locking collars on the fan for tightness.
3. Rotate the fan wheel by hand and assure no parts are rubbing.

SPECIAL TOOLS REQUIRED

- Voltage Meter
- Amperage Meter

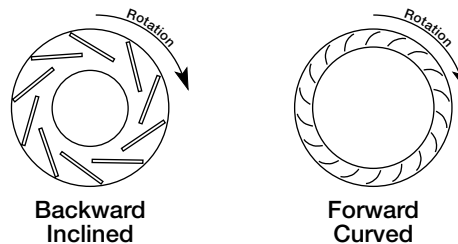
1. Check Voltage

Before starting the unit, compare the supplied voltage with the unit's nameplate voltage and the motor voltage. Units are not provided with thermal overload protection unless a control center has been ordered with the unit or the motor has been selected with thermal overload protection.

2. Check Blower Rotation

A common problem is wheel rotation in the wrong direction. For centrifugal fans, incorrect wheel rotation will provide poor air performance, motor overloading and possible burnout. Rotation should be checked while the fan is coasting to a stop. Proper wheel rotation is shown.

To reverse rotation, motor must be reprogrammed at the factory.



Proper Wheel Rotation

3. Check for Vibration

Check for unusual noise, vibration or overheating of bearings. Left unchecked, excessive vibration can cause a multitude of problems, including structural and/or component failure. Many conditions can be discovered by careful observation. If the problem is wheel unbalance, in-place balancing can be done providing there is access to the fan wheel.

4. Air Volume Check and Measurement

Along with the building balance, the unit's air volume (cfm) should be measured and compared with its rated air volume. This unit is flexible for varying air volume, but the actual air volume should be known for making final adjustments. The most accurate way to measure the air volume is by using the pitot traverse method in the ductwork away from the blower. Other methods can be used, but should be proven and accurate. To adjust the air volume, change the fan rpm or the system losses.

5. Measure Motor Voltage and Amperage

All access doors must be installed. Measure and record the input voltage and motor amperage(s).

Compare measured amps to the motor nameplate full load amps and correct if over amping.

Maintenance Log

Date _____ Time _____ AM/PM

Notes: _____

Date _____ Time _____ AM/PM

Notes: _____

Date _____ Time _____ AM/PM

Notes: _____

Date _____ Time _____ AM/PM

Notes: _____

Date _____ Time _____ AM/PM

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Date _____ Time _____ AM/PM

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Date _____ Time _____ AM/PM

Notes: _____

Date _____ Time _____ AM/PM

Notes: _____

Warranty

Greenheck warrants this equipment to be free from defects in material and workmanship for a period of one year from the shipment date. Any units or parts which prove defective during the warranty period will be replaced at our option when returned to our factory, transportation prepaid. Motors are warranted by the motor manufacturer for a period of one year. Should motors furnished by Greenheck prove defective during this period, they should be returned to the nearest authorized motor service station. Greenheck will not be responsible for any removal or installation costs.

As a result of our commitment to continuous improvement, Greenheck reserves the right to change specifications without notice.

Greenheck Catalog VRF provides additional information describing the equipment, fan performance, available accessories, and specification data.

AMCA Publication 410-96, Safety Practices for Users and Installers of Industrial and Commercial Fans, provides additional safety information. This publication can be obtained from AMCA International, Inc. at www.amca.org.



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