

# INSTALLATION, OPERATION & MAINTENANCE

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Fan Filter Units  
CRFF, CRFF-ARS,  
& CRFF-ARSM

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PSC Motors

Revision: 10.01.13

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## Critical operation conditions of the CRFF, CRFF-ARS and CRFF-ARSM

1. Touching of the HEPA filter could damage it, voiding the warranty on the filter. The screen is only to protect against an accidental 'touch' of the filter. Never place a hand or tool on the filter. Never lay the filter face flat down on a surface always have filter on its side or back to protect from damage.
2. Prior to powering the unit, verify that the unit has been plugged into the correct voltage. The serial number label on the top of the CRFF, CRFF-ARS and CRFF-ARSM unit has the required voltage.
3. For reorder purposes the CRFF, CRFF-ARS and CRFF-ARSM model number, configuration code and serial number should be recorded. This information is located on the product and serial number labels, located adjacent to the electrical box. If you cannot locate the FO# please contact Krueger for this information.

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## Part Numbers Covered by this Manual

- **CRFF** - Standard Critical Room Fan Filter Unit
- **CRFF-ARS** - CRFF with Access Room Side HEPA Filter Option
- **CRFF-ARSM** - CRFF with Access Room Side HEPA Filter and Motor Option



### Read and Save These Instructions

**To reduce the risk of fire, electrical shock, or injury to persons, observe the following:**

1. Installation work and electrical wiring must be done by qualified person(s) in accordance with all applicable codes and standards, including fire-rated construction.
2. When cutting or drilling into wall or ceiling, do not damage electrical wiring and other hidden utilities.
3. If this unit is to be installed over a tub or shower, it must be marked as appropriate for the application.
4. Use this unit only in the manner intended by the manufacturer. If you have any questions, contact your local Krueger representative.
5. Before servicing or cleaning unit, switch power off at service panel and lock service panel to prevent power from being switched on accidentally.

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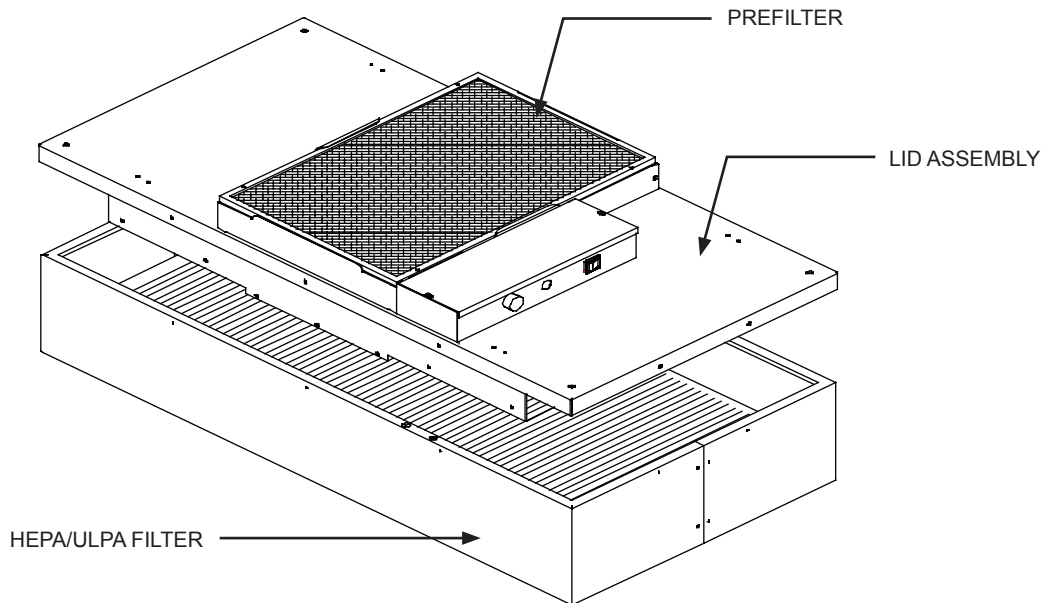
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## Installation

The CRFF Series Critical Room Fan Filter Units are completely assembled at the factory with the exception of the optional ¼” (0.64 cm)-20 eyebolts, which can be used when hanging the unit from an overhead structure. Krueger recommends that a minimum of 12” clearance is maintained between the prefilter bracket and ceiling. Please consult the local Krueger representative if this clearance is not available at the installation location.

1. Carefully remove the unit from the shipping carton and inspect for any damage that may have occurred during transportation. (See Figure 1)
2. Wipe down plastic bag and move unit into clean room. (Double bagging is available upon request.)
3. If using rigidly supported grid (usually 2” or wider), raise unit through ceiling and lower onto the gasketed grid. If using a flexible grid (typically supported with wires) the unit must be secured to an overhead structure with eyebolts, s-hooks and chain. A roll of high-density gasket has been provided for use with ungasketed grids.  
*Note: special size units are available to fit specific clean room grid systems.*
4. Have an electrician wire the unit to the appropriate voltage (115V, 220V, 277V AC), according to the wiring diagram in section IX and local electric codes. If optional power cord was purchased, plug unit into a grounded receptacle.

**FIGURE 1: BASIC UNIT ASSEMBLY**



## Cleaning the CRFF Prefilter



**Disconnect the unit from the electrical power source before attempting any service.**

**Tools Required: None**

**Filter Dimensions: 23.25" x 16"**

1. To gain access to the prefilter, remove the ceiling panel next to the unit, if applicable.
2. Switch the ON/OFF switch to the OFF position.
3. Remove the prefilter from the snap-in frame. (See Figure 1)
4. Clean the prefilter by hand washing in water with a mild detergent or by using a vacuum cleaner. Allow prefilter to dry completely before replacing.
5. Reassemble by reversing the above steps.

*Note: To keep the filter in top operating condition, washing the foam prefilter is recommended every three to six months.*

## Removal and Replacement of the HEPA/ULPA Filter (CRFF Type Units)



**Disconnect the unit from the electrical power source before attempting any service. The standard filter is protected with an expanded metal face screen. This is never to be used to handle the filter. It is only for protection against an accidental touch of the filter. Only handle the filter by the frame.**

**Tools Required: Phillips Head Driver**

1. Remove unit from ceiling.
2. Remove the 10 screws holding the HEPA/ULPA filter to the lid assembly.
3. Lift the lid assembly off the HEPA/ULPA filter (see Figure 1). Discard the used filter as per requirements of the applicable regulations.
4. Replace with the new HEPA/ULPA filter and assemble by reversing the above steps.

*Note: Before replacing with a new HEPA/ULPA filter, carefully inspect the new filter for any visible damage. Also inspect the gasket in the "tee" bar to insure a tight seal. Replace as necessary.*

## Removal and Installation of the Access Room Side Gel Seal Filter – Extruded Aluminum Housing (CRFF-ARS Type Units)



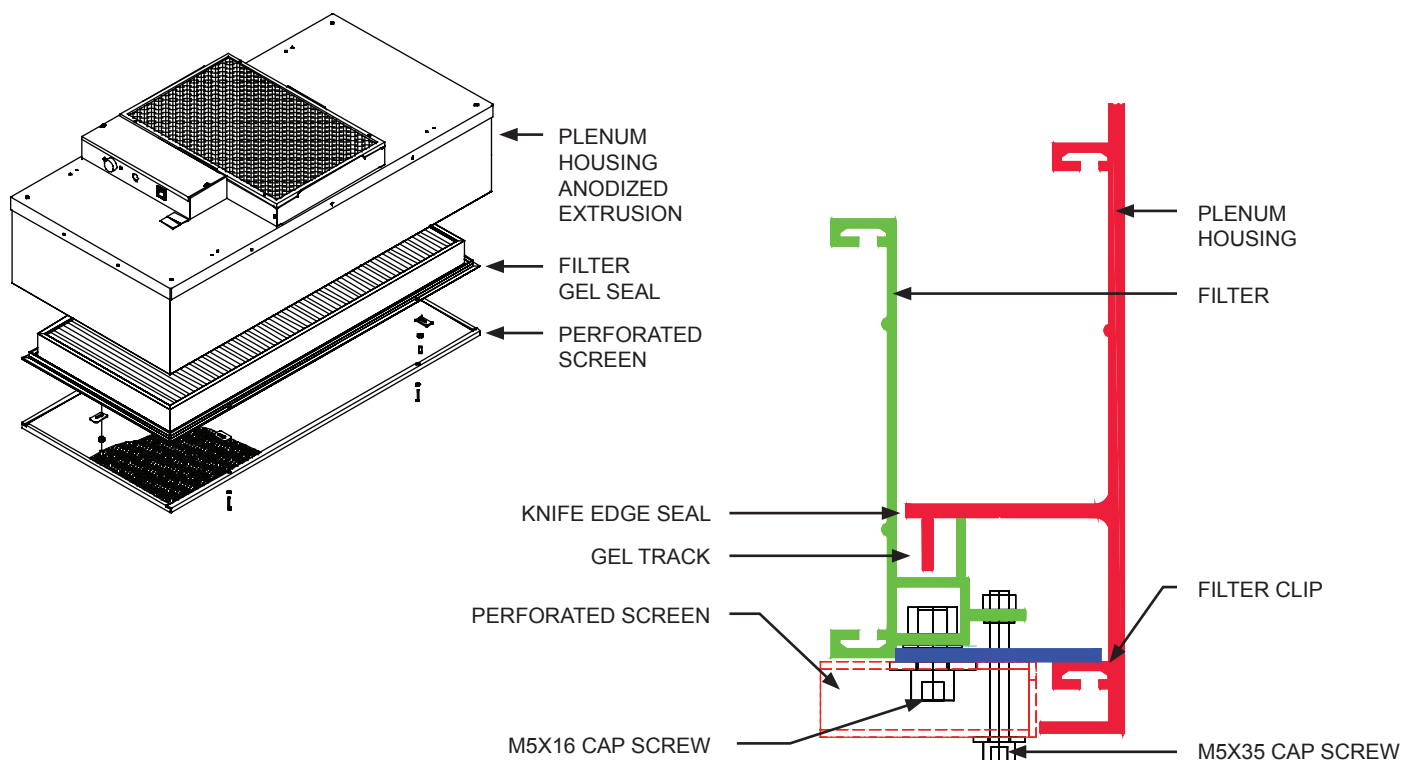
**Disconnect the unit from the electrical power source before attempting any service.**  
**The ARS filter is protected with an expanded metal face screen. This is never to be used to handle the filter. It is only for protection against an accidental touch of the filter. Only handle the filter by the frame.**

**Tools Required: 5/32” Hex Head Wrench**


**Manpower Required: 2**

1. Remove the diffuser screen by removing the four M5x35 socket head screws securing the screen to the filter. (Figure 2)
2. Loosen the six M5x16 socket head screws far enough to rotate the filter clip 180°. The filter will not drop during this operation. Using the clips as handles, slowly pull the filter away from the knife-edge seal. It is important to pull the filter slowly away from the seal, so that the gel remains in the filter gel track.
3. Inspect filter for visible damage; if damaged, set aside for replacement or repair.
4. Inspect the gel seal if reinstalling the removed filter. Determine if the gel has lost its ability to seal; if so, repair the gel.
5. Place the filter against the filter-sealing surface of the ars unit. Install filter clips and screws. The clips can be rotated and angled into place. Using the clips as a lever, the filter can be seated. It is recommended to work either clockwise or counter clock wise around the filter; raise the filter into the gel.
6. Reinstall screen.

**FIGURE 2: CRFF-ARS EXTRUSION FILTER REPLACEMENT**



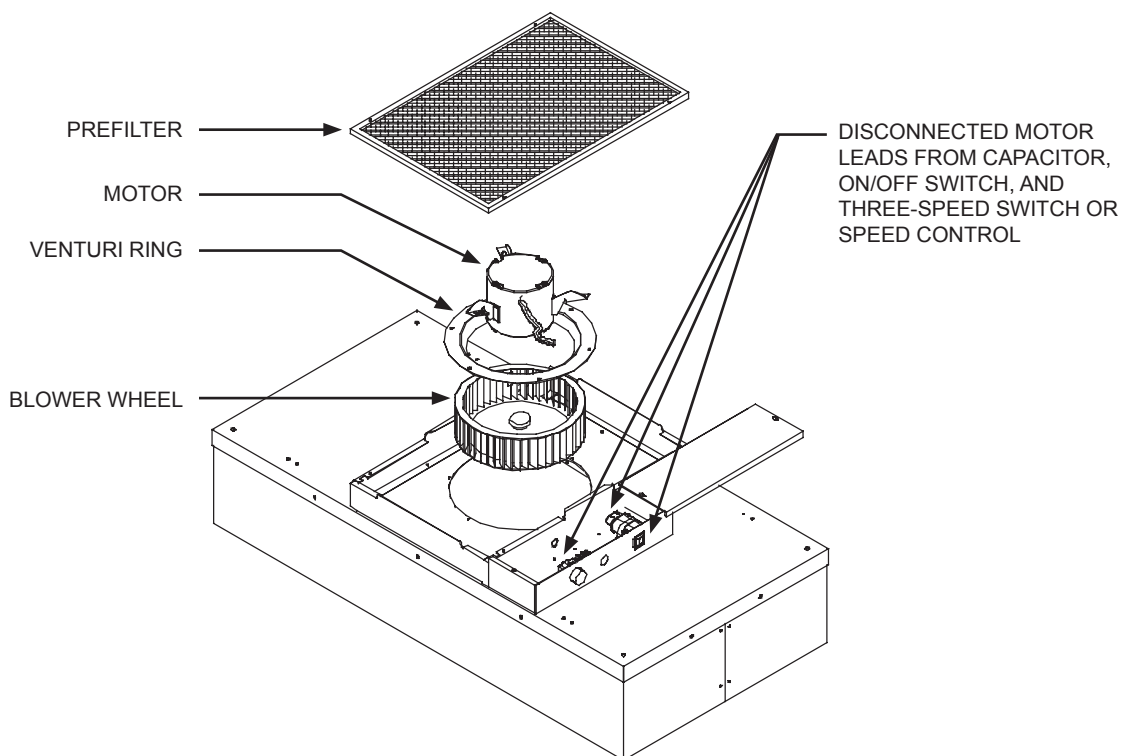
## Removal and Installation of the Motor (CRFF and CRFF-ARS Models)

 **Disconnect the unit from the electrical power source before attempting any service.**  
**Electrical service should be performed by licensed electricians or authorized KRUEGER service technicians.**

**Tools Required: Phillips Head Driver, 3/8" (10mm) Hex Head Wrench, Pliers, and 5/32" (0.40 cm) Allen Wrench**

1. To gain access to the motor, remove the ceiling panel next to the unit, if applicable.
2. Switch the ON/OFF switch to the OFF position.
3. Remove the prefilter off the prefilter frame. (See Figure 4)
4. Loosen the electrical box cover screws (2), and slide/lift off cover. (See Figure 4)
5. Make note of all wire locations for reinstallation later.
6. Disconnect the two brown wires from the capacitor, using a pair of pliers.
7. Disconnect the motor wiring from the rotary switch and rocker switch or speed control and rocker switch and remove the grommet from the motor leads. Save this grommet for reinstallation.
8. Remove the six screws to free the venturi ring and remove the motor/blower assembly from the lid assembly. If using power drivers, set the unit to a low torque setting to avoid stripping the sheet metal screws. (See Figure 4)
9. Using a 5/32" (0.40 cm) allen wrench, remove the blower wheel from the motor shaft. Remove motor from the venturi ring using a hex wrench.
10. Replace with the new motor and reassemble by reversing the above steps. Set the spacing between the venturi ring and the blower wheel at 0.06" (0.15 cm) clearance.

**FIGURE 4: MOTOR REPLACEMENT**



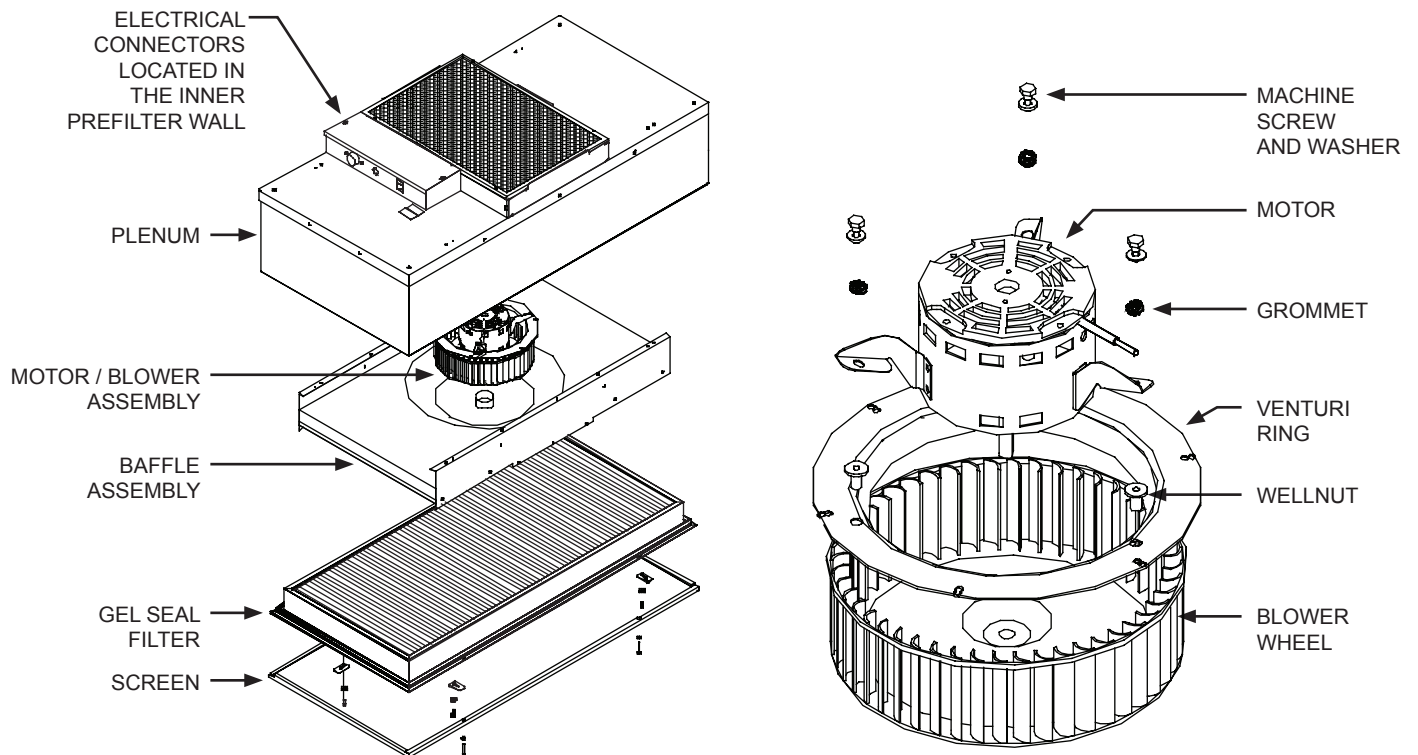
## Removal and Installation of the CRFF-ARSM with Access Room Side Motor



**Disconnect the unit from the electrical power source before attempting any service.**  
**Electrical service should be performed by licensed electricians or authorized KRUEGER service technicians.**

1. To gain access to the motor, remove the gel seal filter. (See Figure 5)
2. While supporting the baffle assembly from below, remove the four corner screws on the baffle assembly and lower the assembly. (See Figure 5)
3. Prior to removing motor/blower assembly, remove electrical box cover (located underneath the lid panel) to expose motor connectors. Disconnect the nine pin connector from its mate in the prefilter bracket.
4. While supporting the motor/blower assembly from below, remove the six machine screws that secure the venturi ring to the bottom face of the lid.
5. Using a 5/32" (0.40 cm) allen wrench, remove the blower wheel from the motor shaft. Remove motor from the venturi ring by removing the three # 10 bolts.
6. Before removal of the motor mount bracket, measure the precise location of the bracket on the motor. Remove the bracket.
7. Replace with the new motor and reassemble by reversing the above steps. Set the location of the motor mount bracket as measured (see above Step 6). Set the spacing between the venturi ring and the blower wheel at 0.06" (0.15 cm) clearance. When reinstalling the motor plate, align the plate to insure that the leads will reach the electrical box.

**FIGURE 5: CRFF-ARSM WITH ROOM SIDE ACCESSIBLE MOTOR REPLACEMENT**

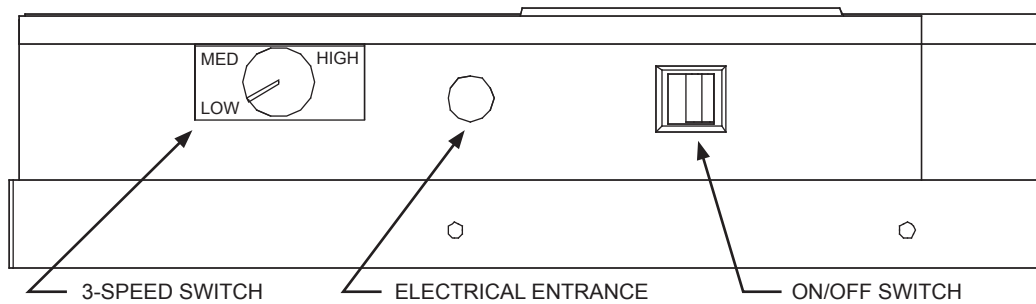


## ON/OFF Switch - Speed/Airflow Adjustment

All CRFF series units are equipped with either a three-position rotary switch or speed control, which is located on the side of the electrical box. (See Figures 6 and 7)

### 3 Speed Switch

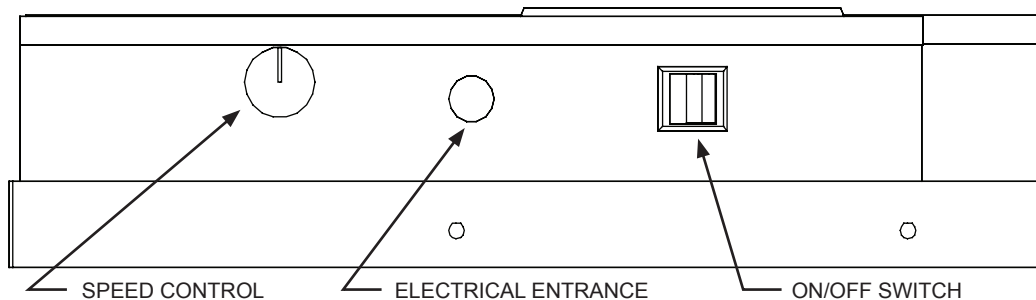
Recommended fan speed during initial start-up and operation is the “LOW” speed. As airflow eventually decreases due to filter loading, fan speed may be increased by moving the rocker switch to the top or “MEDIUM” position, and finally to the “HIGH” position. Periodic airflow velocity readings (Per I.E.S. Specifications) should be conducted to determine the filter condition and appropriate fan speed setting.



**FIGURE 6: 3 SPEED SWITCH ADJUSTMENT**

### Speed Control

Units furnished with the optional speed control (the speed control is standard with 2x2 and 2x3 units) enable adjustment of airflow at any setting within the recommended performance range. The speed control knob is located on the side of the electrical box, adjacent to the ON/OFF switch.



**FIGURE 7: SPEED CONTROL ADJUSTMENT**

Airflow/speed is adjusted by rotating the knob (See Figure 9):

1. Clockwise - Lowers the speed.
2. Counter Clockwise - Increases the speed.
3. Fully rotating the speed control knob to the left or counter-clockwise will turn the unit off.

*Note: When turning the unit “ON” from the “OFF” position of the speed control, the fan is at the highest speed. Turning the speed control knob clockwise will lower the airflow.*



## Troubleshooting

### Low Air Velocity

1. Check prefilter media; replace or clean as necessary.
2. Flip switch from “LOW” to “MEDIUM” or “MEDIUM” to “HIGH” on units with 3-speed switch.
3. Adjust solid state speed control for higher blower output.
4. Check power supply for proper voltage, amperage and distribution frequency.
5. Replace HEPA/ULPA filter if the air velocity remains low.

### Non-Laminar Flow and/or Excessive Contamination

1. Ensure that no large obstructions are upstream of airflow pattern.
2. Determine that no other air-moving devices are operating in or around clean room which disrupt room’s airflow pattern.
3. Check air velocity and if low, conduct the “Low Air Velocity” procedure outlined above.
4. Conduct smoke and photometer test on HEPA filter. Seal or replace HEPA filter as necessary.

### High Air Velocity

1. Flip switch from “HIGH” to “MEDIUM” to “LOW” on units with 3-speed switch.
2. Or adjust solid state speed control for lower blower output.

## CRFF Series Replacement Parts

Replacement parts are available through your authorized Krueger representative.

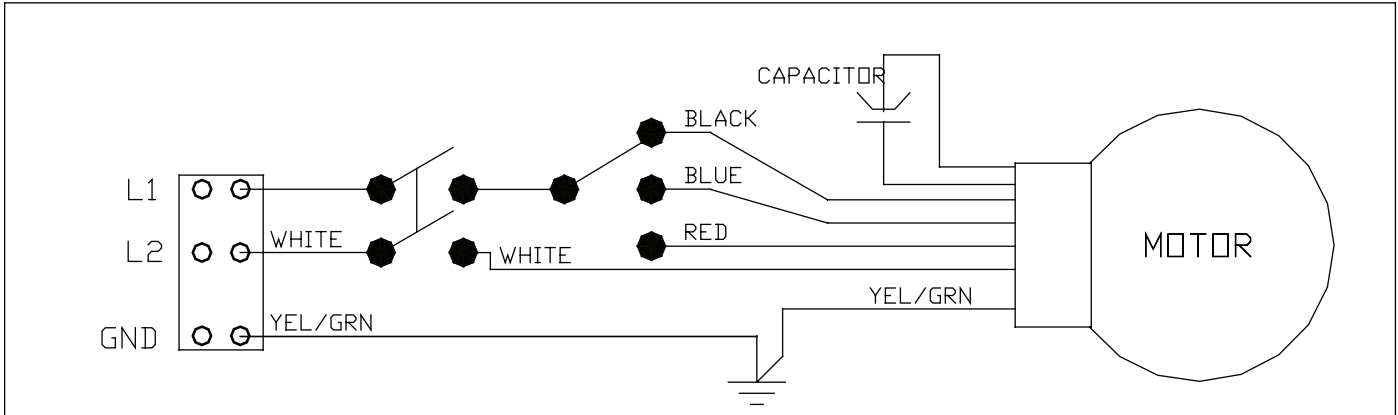
Please visit the Krueger website at [www.krueger-hvac.com](http://www.krueger-hvac.com) to find your local Krueger representative.

## Warranty

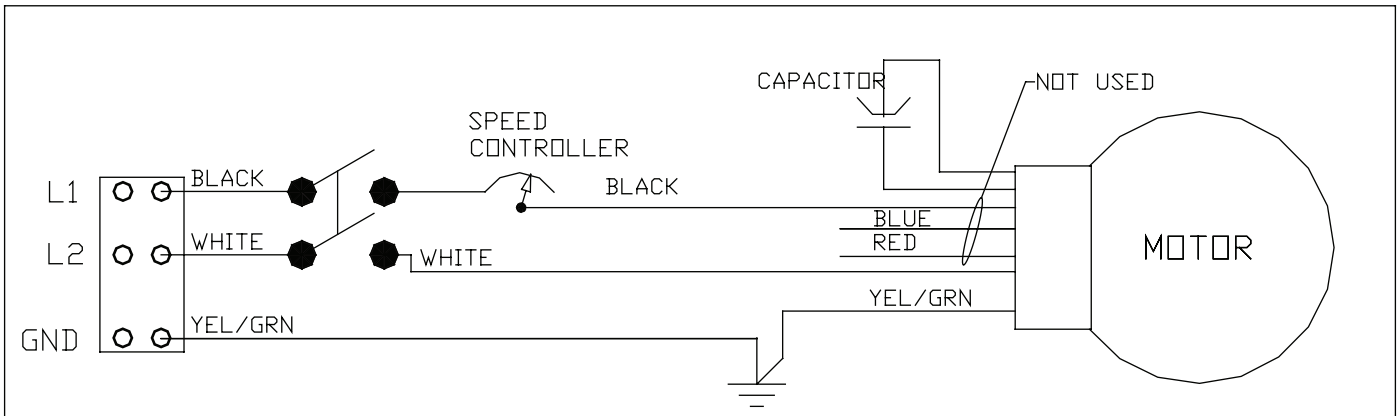
Please reference the Krueger website for Warranty information located in the Terms and Conditions of Sales document or click on the following link.

<http://www.krueger-hvac.com/pdf/terms.pdf>

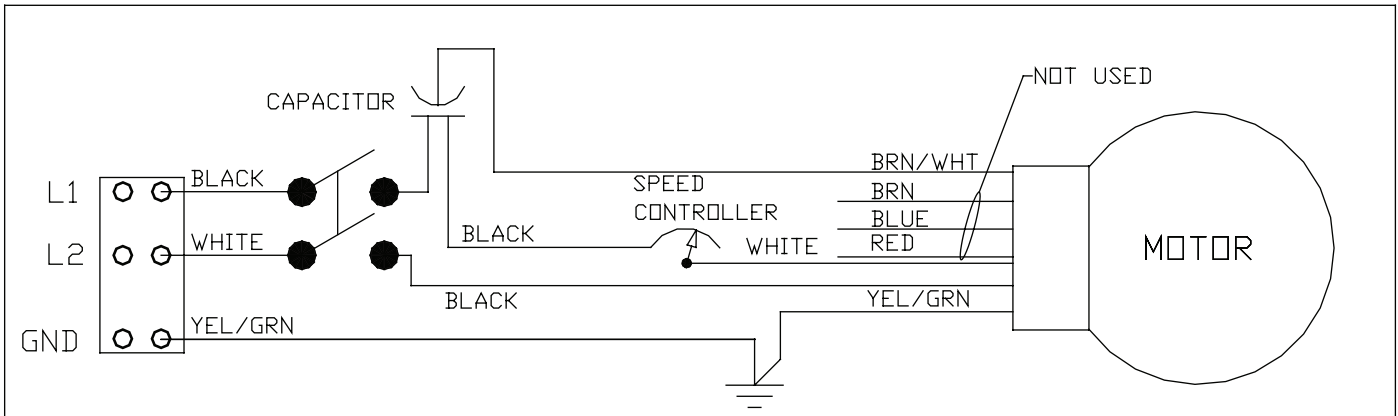
**Wiring Diagrams**



**FIGURE 8: 3-SPEED WIRING DIAGRAM**

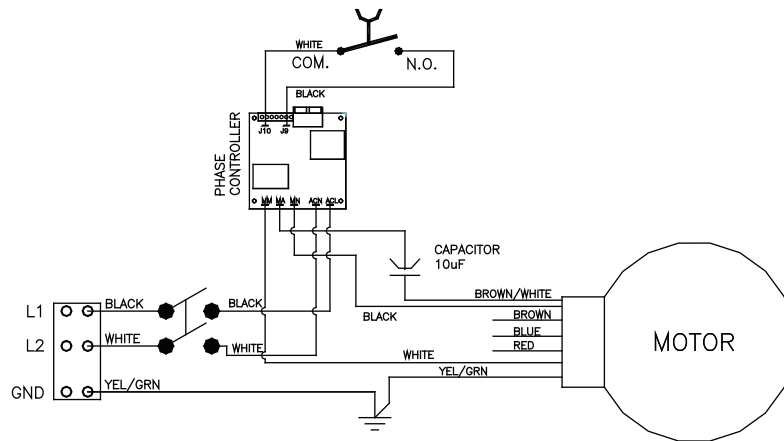


**FIGURE 9: SPEED CONTROL (FASCO AND GE MOTORS) WIRING DIAGRAM - 2 WIRE CONFIGURATION**

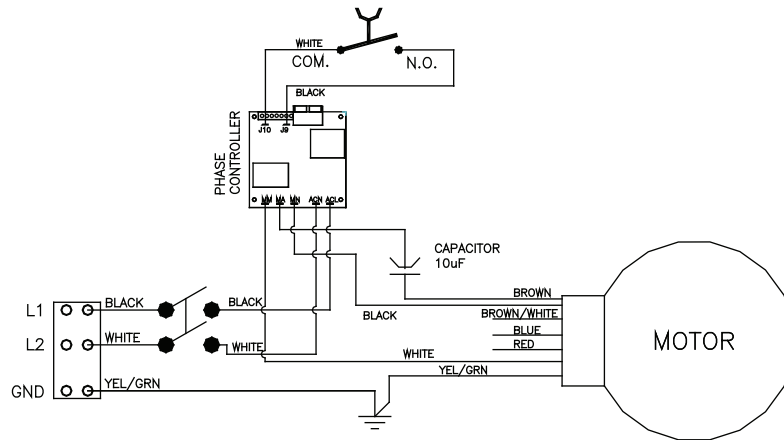


**FIGURE 10: SPEED CONTROL (BOM MOTORS) WIRING DIAGRAM - 3 WIRE CONFIGURATION**

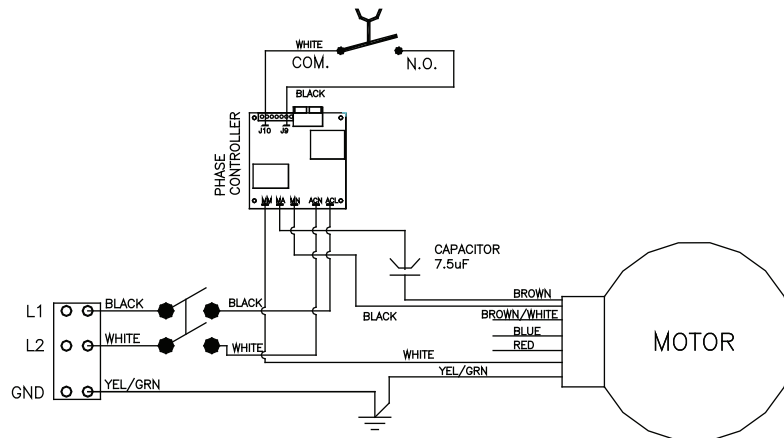
## Wiring Diagrams



**FIGURE 11: BROAD OCEAN WIRING DIAGRAM**



**FIGURE 12: GE WIRING DIAGRAM**



**FIGURE 13: FASCO WIRING DIAGRAM**

## Testing

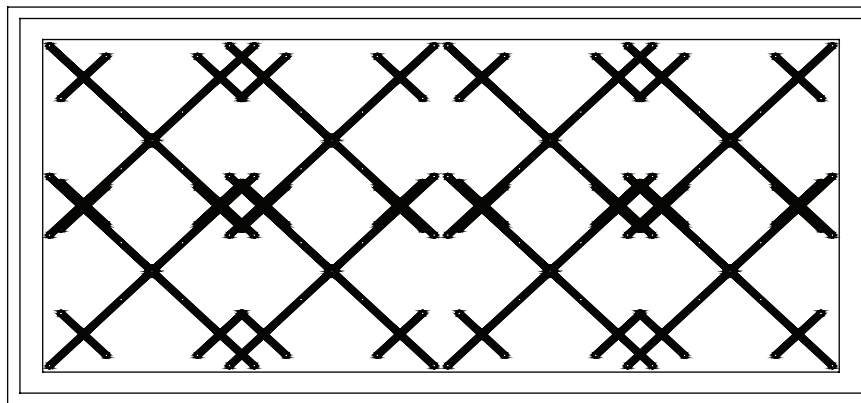
Each CRFF series unit is thoroughly tested at the factory before shipment. However, because of the “rigors” of shipping, Krueger encourages its re-test after installation.

Krueger recommends that the customer contact an independent organization, with technicians trained and experienced in performance evaluation and maintenance of clean air equipment.

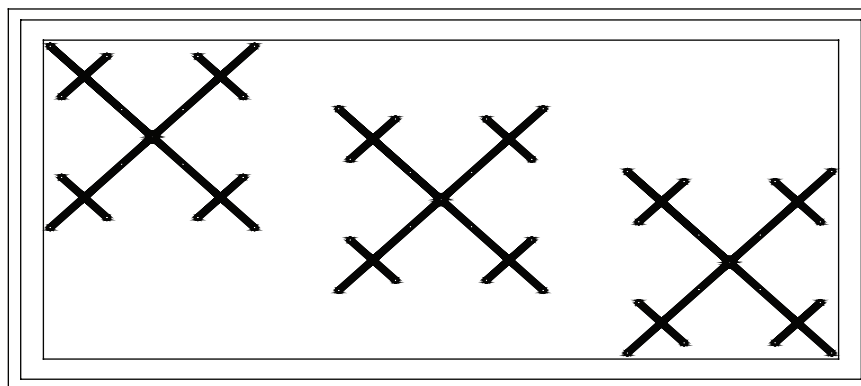
Some of the testing procedures performed on the CRFF series units include PSL challenge of HEPA/ULPA filters to assure specified performance, along with air velocity measurement and adjustment tests. No DOP is used on CRFF series filters, unless requested.

### Recommended Testing

All units that are airflow tested at Krueger are tested using a Shortridge Airdata Multimeter 800 series with a Velgrid head. The recommended method of reading is to place one corner of the Velgrid head 1-1/4” from the corner of the filter face and then take four position readings evenly spaced along the four foot side, then repeat these readings for the other long side. This gives a total of eight reading to test the unit. All advertised data is based on using the Velgrid with eight position readings (128 velocity points). Krueger recognizes using an eight position readings during a cleanroom start-up may be time consuming and recommends using three position Velgrid readings taken on a diagonal, as shown below.



**FIGURE 14: RECOMMENDED TESTING – 8 POSITION READINGS WITH A VELGRID**



**FIGURE 15: FACTORY APPROVED TESTING – 3 READINGS WITH A VELGRID**