

# **VORTEX<sup>®</sup> MAX** POWERED ENGINE PRECLEANER

## INSTALLATION AND SERVICE GUIDE

MINIMIZE  
DUST



MAXIMIZE  
**PROTECTION**

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### Vortex MAX System Part Numbers



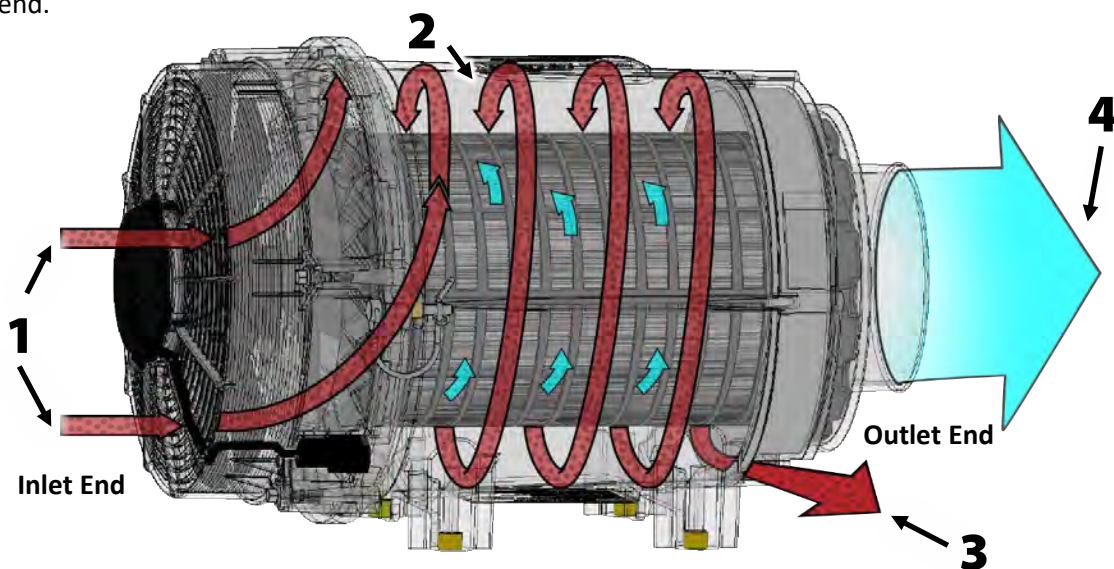
**With Rain Cap:**  
 VMAX0001 (12-volt)  
 VMAX0002 (24-volt)



**With Heavy-Debris Screen:**  
 VMAX0005 (12-volt)  
 VMAX0006 (24-volt)

### How the Vortex MAX Works: The Sy-Klone Effect

1. Dirty air enters the precleaner housing through the inlet end.
2. The debris-laden air is directed into a rotation – a “Vortex” – pushing the debris to the outside walls through centrifugal force. The debris rotates towards the outlet end.
3. Debris is ejected through the ejection port, and the fine dust that remains passes through Sy-Klone’s self-cleaning filter.
4. After passing through the high-efficiency filter, clean air is passed downstream to the engine and engine air filter through the outlet end.



The separation and ejection of debris, and high-efficiency filtering, all of which precleans air, is The Sy-Klone Effect.

### Important Mounting Considerations



### READ CAREFULLY BEFORE PLANNING YOUR INSTALLATION

- The Vortex MAX is a powered engine precleaner and must be installed upstream from the engine filter housing.
- The Vortex MAX should be mounted externally to the engine compartment.
- Under-hood installations are not recommended. Fresh air to the Vortex MAX inlet is necessary and ejected debris could fill the engine compartment.
- Avoid mounting the unit in high-heat areas of the machine.
- When Vortex MAX is mounted on a different vibration plane than the engine filter housing, a soft connection must be used.
- When using flex hose, be sure to protect the flex hose from potential wear points.
- When plumbing with rigid pipe, use a soft connection such as a flex hose or rubber adapter between the Vortex MAX unit and the rigid pipe to prevent mechanical stress on the Vortex MAX outlet tube.
- Select a mounting location that will require the shortest possible run of plumbing with the fewest bends, not to exceed 6 feet (1.83 m).
- Leave adequate room to remove the Vortex MAX filter from the housing. The unit requires approximately 15 inches (381 mm) of clearance to service filter.
- Use a single Vortex MAX system for airflows up to 900 CFM (25.5 m<sup>3</sup>/min).
- For higher airflow engines, multiple units can be combined. Use two Vortex MAX systems for airflows up to 1800 CFM (51.0 m<sup>3</sup>/min). Use three Vortex MAX systems for airflows up to 2700 CFM (76.5 m<sup>3</sup>/min).
- Consider operator visibility when choosing the Vortex MAX system mounting location.
- The Vortex MAX ejection port is oriented whenever you install a filter. There are four possible positions in 90° increments.
- The Vortex MAX ejects debris at a high rate. Make sure the ejection port is pointed away from any surface and the operator's field of vision.
- The Vortex MAX system can be mounted in a variety of locations and orientations, as long as the ejection port is oriented where water can NOT fall/run into the filter housing.
- When mounting vertically with the inlet end down, the rain cap should not be used as it could retain debris and moisture.
- Care should be taken to prevent high-pressure water or air from entering the Vortex MAX ejection port during cleaning.

**NOTE:** Sy-Klone's powered engine precleaners are designed to be used as a pre-filter and are to be installed upstream from the primary engine filter. Installing engine precleaners in any method other than as designed and in their intended application voids all warranty.

### Mounting

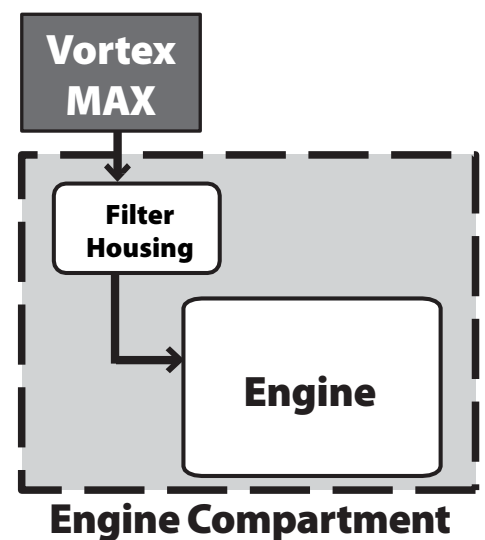
1. Turn off the main power to the machine.
2. Consider the routing and destination of the plumbing when determining the mounting location for the Vortex MAX system.  
*(See Plumbing section, below)*
3. The Vortex MAX system can be mounted in a variety of locations and orientations.  
*(See Important Mounting Considerations, previous page)*

4. Vertical and horizontal mounting plates are available through Sy-Klone.  
*(See Vortex MAX Service Part Numbers)*
5. The Vortex MAX system has four threaded mounting holes. Use 3/8 inch diameter-16 thread pitch mounting hardware. To prevent damage to the filter housing, drill bolt holes to a maximum diameter of 9/16 inches.  
**Note:** Torque 7.4 to 14.8 ft-lbs (10 to 20 Nm)

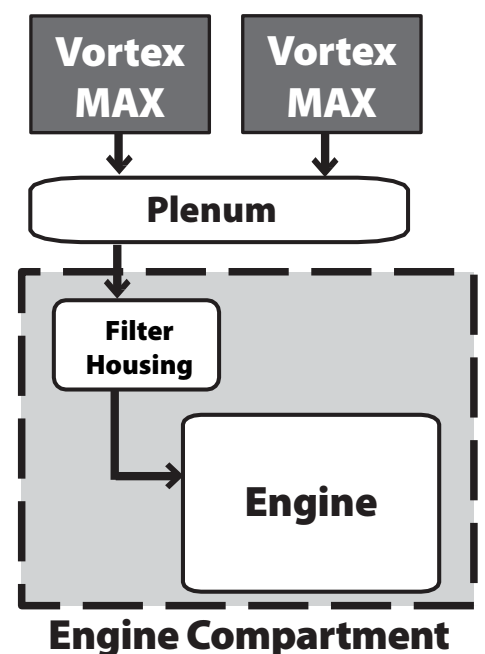
### Plumbing

1. Turn off the main power to the machine.
2. Clean the factory intake and engine filter housing following the manufacturer's approved methods after installing the Vortex MAX system.
3. Replace the engine primary filter and safety filter as necessary.
4. Route the clean, filtered air provided by the Vortex MAX system into the engine filter housing.  
**Note:** Do not remove the factory-installed filters.
5. A universal flange adapter can be used to create a port into the engine compartment.  
**Note:** Installation components are available through Sy-Klone.
6. If using a universal flange adapter, the port hole should be slightly larger than the adapter's tubing.
7. "T" adapters, "Y" adapters, or plenums can be used to combine multiple Vortex MAX systems.
8. Routing the hose or tubing:
  - a. For a single system installation, use 6-inch plumbing.
  - b. Use 9-inch or larger hose for dual installations.
  - c. Use 11-inch or larger hose for triple installations.
  - d. Excessive length and bends in the routing adds restriction; keep length and bends to a minimum.  
**Note:** Maximum plumbing length 6 ft (1.8m).
  - e. Avoid high-heat areas, routing across walkways, tight bends, and reducing operator visibility.
  - f. Secure plumbing as routed.
9. Use metal band clamps on all connections.

#### Single-Unit Plumbing Diagram



#### Multiple-Unit Plumbing Diagram



### Restriction Gauge Port

For total intake restriction, leave the factory restriction gauge in place. The Vortex MAX outlet has a 1/8 NPT port available for restriction gauge installation. The Vortex MAX gauge port must remain plugged when not in use.

### Wiring

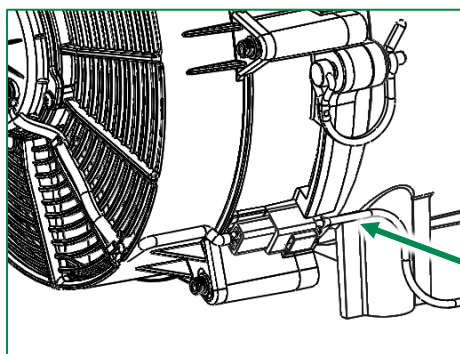
1. The machine should be off.
2. Finding proper power is critical for optimal system performance.
  - a. The unit must receive power when the ignition key is in the ON position.
  - b. The power must terminate when the ignition key is in the OFF position.
  - c. Do not wire the unit to a variable voltage source.
  - d. An appropriate relay can be used to provide suitable power from a non-terminating constant source.
  - e. A master system relay or ignition switch can be a good source of constant power.
  - f. The source power must provide sufficient current.
3. The current requirement:
  - 12-volt unit: 10.5 amps constant.
  - 24-volt unit: 8.0 amps constant.
4. The Vortex MAX system must be fused inline with a 15-amp blade fuse.
5. Ensure the input voltage correlates to the 12-volt or 24-volt unit being installed.
6. Use 14 GA or larger wire for the system.
7. Black wire = neutral (negative)  
Red wire = positive
8. Incorrect electrical connection will reverse motor polarity and the Vortex MAX will not function correctly.
9. Finding a good ground is also critical to the unit's performance. Use an existing grounding point if possible. If not, grind a small area to bare metal and use a self-tapping screw to ground the system.
10. Route the wiring, avoiding high heat areas, routing across walkways, and reducing operator visibility.
11. Use wire loom and grommets as necessary to protect the wiring.
12. Secure wiring as routed.

### Inspecting the Vortex MAX Installation

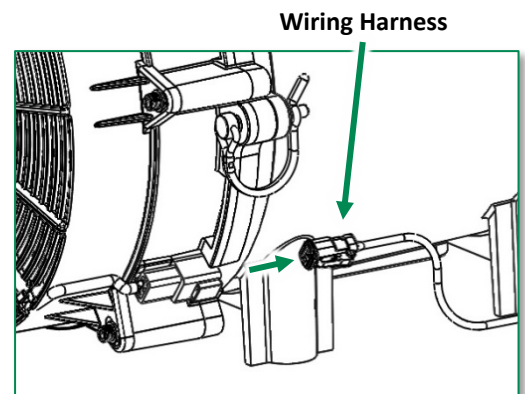
1. Turn the main power ON to inspect the system.  
**Note:** If the system powers on while the ignition key is off, an alternate power source must be located.
2. Inspect the following:
  - a. System is running. If not, an alternate power source must be located.
  - b. Air flow out of Vortex MAX ejection port is strong.
  - c. Fan rotation is counter-clockwise when viewed through the inlet.

### Filter Removal

1. The machine should be off.



2. Unplug wiring harness from motor assembly.

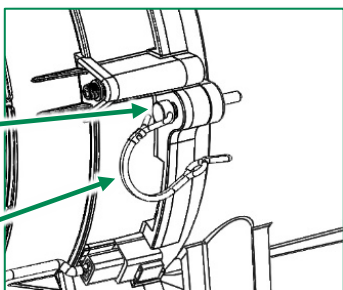


### Filter Removal, continued

- Release wire lock from clevis pin.

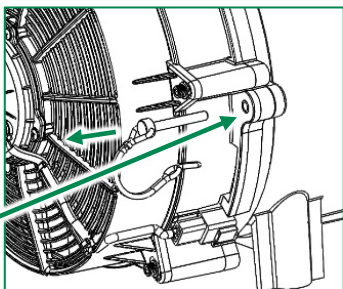
Clevis Pin

Wire Lock

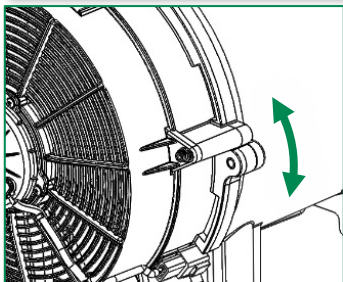


- Remove clevis pin from locking tab.

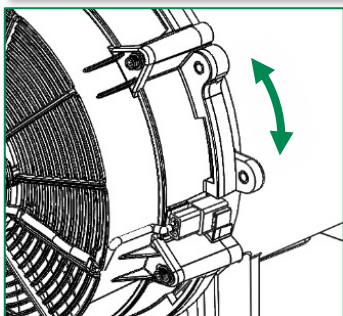
Locking Tab



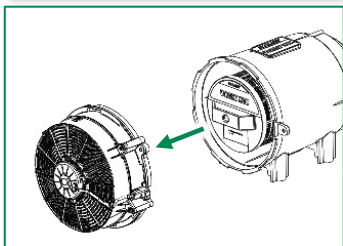
- Rotate motor assembly, approximately 20 degrees, until motor mount tabs disengage.



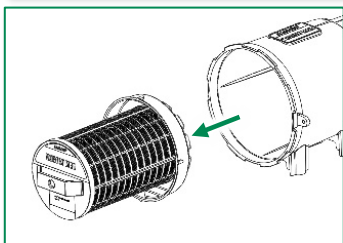
**Note:** Motor assembly can be rotated clockwise or counter-clockwise to disengage motor mount tabs.



- Pull motor assembly forward to remove and set aside.



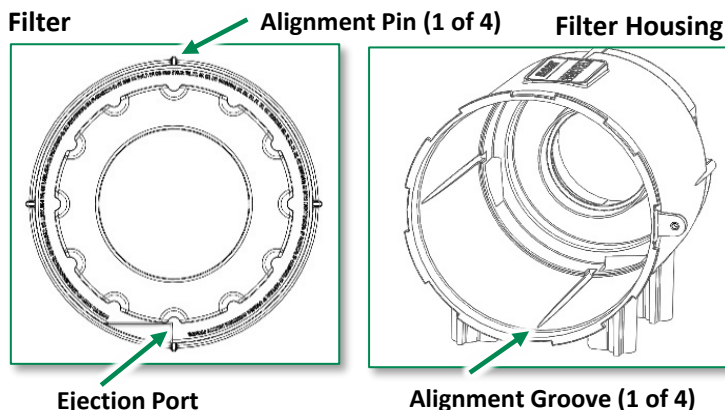
- Pull filter straight out of housing, noting the orientation of the ejection port.



### Filter Orientation/Reinstallation

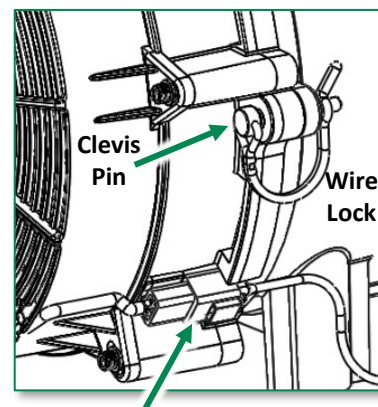
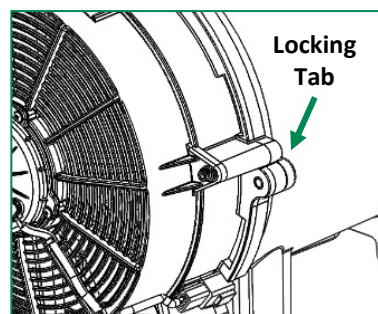
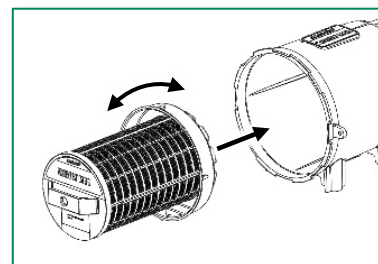
The Vortex MAX filter has four alignment pins and one ejection port. The ejection port can be oriented in four different positions, every 90°, in the filter housing.

The filter housing has four alignment grooves for orienting the filter ejection port.



### Install Filter

- Orient filter ejection port in desired position.
- Align filter pins with filter housing alignment grooves.
- Insert filter until fully seated in outlet port.
- Reinstall motor assembly on filter housing.
- Align locking tab.
- Insert clevis pin and secure with wire lock.
- Plug in wire harness.



### When to Replace Filters

- Replace the Vortex MAX filter when the restriction reaches the manufacturer’s suggested limit.
- Change the Vortex MAX filter element every 1000 hours of operating time, even if the restriction limit is not reached and there are no noticeable performance changes.
- Replace factory-installed engine filter(s) per the manufacturer’s suggested maintenance cycle.

### Replacing the Vortex MAX Filter

1. Work in a clean, covered area to reduce intake exposure to harmful particles.
2. Wear appropriate personal protection equipment, such as gloves, mask, and coverall to protect against contaminants.
3. The machine should be off.
4. Inspect the Vortex MAX system for any damage.
5. Remove the filter, noting the orientation of the ejection port.
6. Bag and seal the used filter element and dispose of according to local regulation.
7. Inspect and remove any loose debris using a clean rag.  
**Note:** Never use compressed air.
8. Install new filter, ensuring the ejection port orientation is correct.
9. Install the motor assembly, ensuring it is properly locked in position.
10. After installing the new filter, inspect the Vortex MAX system for proper operation:
  - a. System is running.
  - b. Air flow out of Vortex MAX system ejection port is strong.

### Warnings

- **Replace filter only; do not clean or re-use filters. Re-using filters can cause filter failure. Replace with genuine Sy-Klone filters only.**
- **When cleaning equipment, care should be taken to prevent high-pressure water or high-pressure air from entering the Vortex MAX ejection port.**
- **When replacing the filter, do not point ejection port at a solid surface in close proximity to the port, as ejected debris exits at high velocity and may damage glass, paint, or other surface area.**

### Service Part Numbers

Part Number	Description
EF800	Vortex MAX: Replacement Filter
VMAX0701	Vortex MAX: Vertical Mounting Plate
VMAX0702	Vortex MAX: Horizontal Mounting Plate
VMAX0901	Vortex MAX: Rain Cap
VMAX0902	Vortex MAX: Motor Mount
VMAX0903	Vortex MAX: 24V Motor
VMAX0904	Vortex MAX: 12V Motor
VMAX0905	Vortex MAX: Clevis Pin Assembly
VMAX0906	Vortex MAX: Filter Housing Section
VMAX0907	Vortex MAX: Heavy Debris Screen
VMAX0908	Vortex MAX: Wiring Kit

### Technical Support

Contact your dealer for Sy-Klone filters, parts and technical support, or contact Sy-Klone.

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