

# 2009 Variable Frequency Drive Rebate

## ***Instructions for completing the Retrofit VARIABLE FREQUENCY DRIVE (VFD) Rebate Worksheet***

### **General Notes:**

1. A vendor proposal is required for a rebate. The VFD Installation Information, page 3 may also be required.
2. VFDs offer a method of significantly reducing the energy consumed by fans, centrifugal pumps, and other motor-driven machinery operated under varying loads. For VFD applications not covered here, use the Custom Application.
3. Existing systems to be retrofit must have varying load operations such as variable flow or pressure regulation. Existing fan and pump operations using on/off cycling controls are not eligible for VFD rebates. Systems with constant speed and variable load operation (such as conveyors) are not eligible for VFD rebates.
4. Check with your specific utility for any harmonics or power quality requirements.
5. If power factor correction capacitors are present, they could be adversely affected by the VFD. The customer's design engineer should address this issue

### **Eligibility Requirements**

1. This form may be used for VFD's installed on the following types of applications:
  - a. Supply fan on constant volume supply air handler [Application Code - SFA]
  - b. Supply fan on VAV packaged HVAC unit [SFP] (*forward curved fans are not eligible*)
  - c. Return fan on constant volume return air handler [RFA]
  - d. Return fan on VAV packaged HVAC unit [RFP] (*forward curved fans are not eligible*)
  - e. Building exhaust fan [BEF]
  - f. Process exhaust fan (04) [PEF]
  - g. Fume hood exhaust fan and makeup air fan (04) [HEF]
  - h. Heating hot water pump (04) [HWP]
  - i. Circulation pump for water source heat pump loop (04) [WWP]
  - j. Boiler feed water pump [FWP]
  - k. Chilled water pump [CWP]
  - l. Boiler draft fan (04) [BDF]
  - m. Hydraulic pumps (04) [HYP]
  - n. Water supply or wastewater treatment pump (04) [WTP]
  - o. RAS pump in wastewater treatment plant (04) [RAS]
  - p. Cooling Tower Fan (05) [CTF]
2. Existing VAV fans with inlet guide vanes and forward curve fan blades are not eligible for rebates
3. Fans / pumps motors must operate a minimum of 2,000 hours per year.
4. Applicants must demonstrate significant load diversity that will result savings through motor speed variation
5. The VFD speed must be automatically controlled by differential pressure, flow or temperature.

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## VFD Installation Information Form

Check with your utility representative to determine if the attached VFD Installation Information Form needs to be completed and submitted.

### Pre-Installation:

1. Review the rebate eligibility requirements.
2. Review the proposed equipment specifications to confirm it meets the minimum efficiency requirements.
3. Provide to the utility representative the manufacturer's equipment specifications and confirm that it meets the minimum efficiency requirements
  - a. Motor HP (size) horsepower
  - b. Fan or Pump ID identification (example: AC-3, air handler #2, chilled water pump #1)
  - c. Area Served - location (example: lobby, cafeteria, 2nd floor offices)
  - d. Fan or Pump Application Code (Table 1 on the VFD worksheet)
  - e. Verify the fan is not forward curve type.
  - f. Annual Hours of Operation

If controlled horsepower falls between two listed values, interpolate to determine the maximum rebate.

### Explanation of how to fill out table:

<b>RETROFIT VARIABLE FREQUENCY DRIVE REBATE WORKSHEET</b>						
Item	Motor HP	Fan or Pump ID	Area Served	Application Code <sup>1</sup>	Annual Hours of Operation <sup>2</sup>	Rebate (\$) <sup>3</sup>
<i>Ex.</i>	<b>25</b>	<b>AC-3</b>	<b>Lobby</b>	<b>RFA</b>	<b>4400</b>	<b>\$2,050</b>
1	Motor nameplate	Equipment identification or name	Location of pump or fan	Refer to the Application Table	Must exceed min. hours on Table 2 on the rebate application	Refer to the Rebate Table

### Post-Installation:

Utility Representative must verify that:

1. The equipment including the VFD, motor and line reactors has been installed and is operable.
2. The VFD equipment matches the rebate application information. If the equipment has changed from what was approved for the initial rebate offer, the substituted equipment/material specifications must be submitted and reviewed by the utility to verify compliance with technical requirements and approved before a rebate is considered.
3. Verify that the prior control is disabled
  - a. inlet or outlet dampers are fully open or removed
  - b. inlet or outlet valves are fully open or removed, bypass loop valved off or removed
4. Observe operation of drive, motor, and driven equipment
5. If possible, observe variation in drive speed with changing operating conditions
6. the invoice or proof of payment has been submitted
7. The Utility Representative & Customer have signed / dated the post installation inspection block on the rebate form.

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**VFD Installation Information Form**

**Equipment Information**

Item ID reference number found in the rebate worksheet table: \_\_\_\_\_  
 Fan or Pump ID(s) \_\_\_\_\_ (Example: FW-1, Feedwater Pump #1; CW-1, Condenser Water Pump #1)  
 VFD Application: \_\_\_\_\_ (Use list of applications from page one, or describe other)  
 Building Type: \_\_\_\_\_ (Office, Hotel/Motel, Healthcare, Elementary/High School, College/University, Warehouse, Restaurant, Manufacturing, Other?)  
 Type of area(s) served by fan(s) or pump(s): \_\_\_\_\_  
 Equipment served by the fan (s) or pump (s): \_\_\_\_\_  
 If fan, note type: \_\_\_\_\_ (centrifugal, forward curve, backward curve, axial, etc)  
 Fan or Pump Nominal HP \_\_\_\_\_ (if multiple motors, list individual HP's) Nameplate motor efficiency(s)  
 Fan or Pump Manufacturer: \_\_\_\_\_ Model: \_\_\_\_\_  
 Full Load Design Conditions: Flow \_\_\_\_\_ (CFM, GPM) Pressure \_\_\_\_\_ (inches static, feet of water, PSI, other?)  
 Existing Controls: \_\_\_\_\_ (discharge damper, inlet guide vanes, outlet control valve, bypass valve, etc.)  
 Existing setpoint: \_\_\_\_\_ (inches static, feet of water, PSI, other?)

**Operating Hours**

The fan or pump operates the following hours: (Example: 0600 to 1800)

<u>Summer</u>	<u>Winter</u>
Weekdays _____ to _____	Weekdays _____ to _____
Saturdays _____ to _____	Saturdays _____ to _____
Sundays _____ to _____	Sundays _____ to _____

Number of shifts per weekday: \_\_\_\_\_ Number of shifts per weekend day: \_\_\_\_\_

**Motor Load**

**Option 1:** (retrofit): Measured input power under full load: \_\_\_\_\_ kW, (true RMS power) \_\_\_\_\_ Power Factor  
**Option 2:** (retrofit): Measured current and voltage under full load: \_\_\_\_\_ Amps \_\_\_\_\_ Volts  
 Load calculation = \_\_\_\_\_ volts X \_\_\_\_\_ amps X \_\_\_\_\_ PF = \_\_\_\_\_ kW  
**Option 3:** (retrofit or new): Estimated Fan or Pump Load: \_\_\_\_\_ %, Estimated Power \_\_\_\_\_ kW  
 If estimating load, provide description, assumptions and formula used to calculate power: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Proposed Operations**

The proposed VFD will be automatically controlled to maintain the following setpoints:  
 Flow \_\_\_\_\_ (CFM, GPM, other?) Pressure \_\_\_\_\_ (inches static, feet of water, PSI, other?)  
 Other? (describe) : \_\_\_\_\_  
 \_\_\_\_\_

**Estimated VSD speed in future operations**

% Load	Summer		Winter	
	Week-day	Week-end	Week-day	Week-end
90% to 100%				
80% to 90%				
60% to 80%				
20% to 60%				
Off				
<b>Totals</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>