Eaton's patented, industry leading Active Energy Control® demonstration

Introduction

This document will demonstrate how Active Energy Control optimizes the drives output to reduce the energy consumption of the motor. This algorithm is built into the logic of the drive and is activated by default. Upon drive starts up, the algorithm begins to analyze the demand and starts to reduce the voltage by 5V steps. If the motor output frequency remains constant, the drive will continue to reduce the motor voltage until the output frequency becomes unstable. The algorithm will restart each time the frequency is changed either manually or by the demand. This is an automatic energy savings software – no manual tuning is required.

Procedure

Note: the data captured used an unloaded, low horsepower rated motor.

Figure 1 is a graph of Output Frequency(Green), Motor Speed in RPM (Dark Blue), Motor Current (Magenta), and Motor Voltage (Light Blue). In this example the motor is running at 50% speed (30 Hz) and Active Energy Control is disabled. The drive is using a linear V/Hz profile.

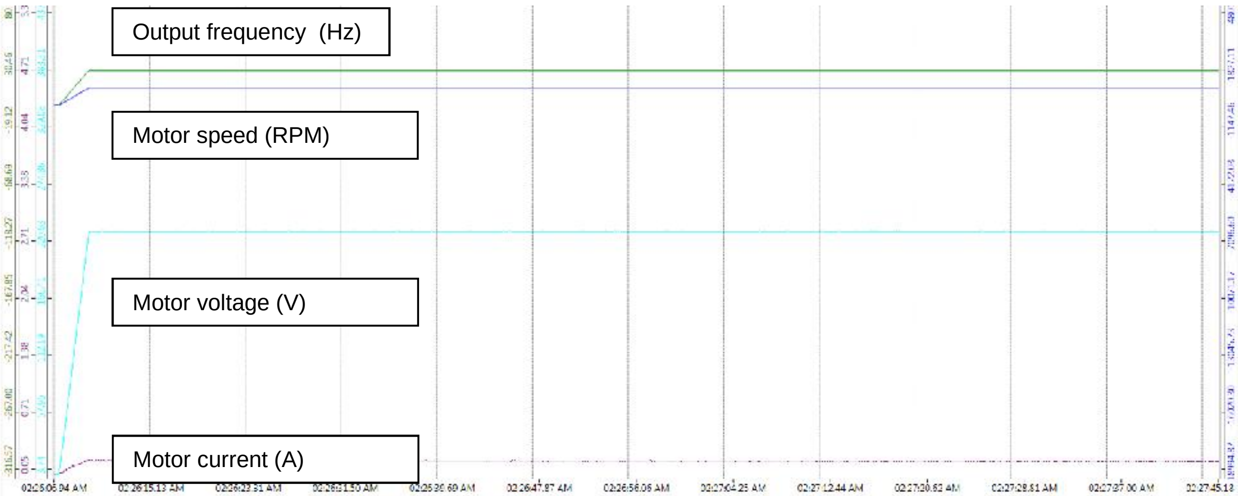

Figure 1

Once the Motor ramps up to 50% speed the output remains constant

The steady state running parameters are:

- Output Frequency - 30.00 Hz
- Motor Speed - 885 RPM
- Motor Current - 0.16 Amps
- Motor Voltage – 229.9 Vac

Figure 2 is a graph of the same drive's output with Active Energy Control activated.

Figure 2

This graph shows the output of the drive. After 50 seconds, Active Energy Control begins to reduce the voltage while continuing to monitor the motor output frequency.   The energy savings can be seen on the light blue line (Motor Voltage) as it steps down.

Motor start up values:

- Output Frequency - 30.00 Hz
- Motor Speed - 885 RPM
- Motor Current - 0.16 Amps
- Motor Voltage – 229.9 Vac

This next example shows how Active Energy Control will continue to step down the motor voltage until it senses that the motor speed slows.

Figure 3 shows the final result of Active Energy Control as it has determined the lowest voltage possible that will maintain the required speed.

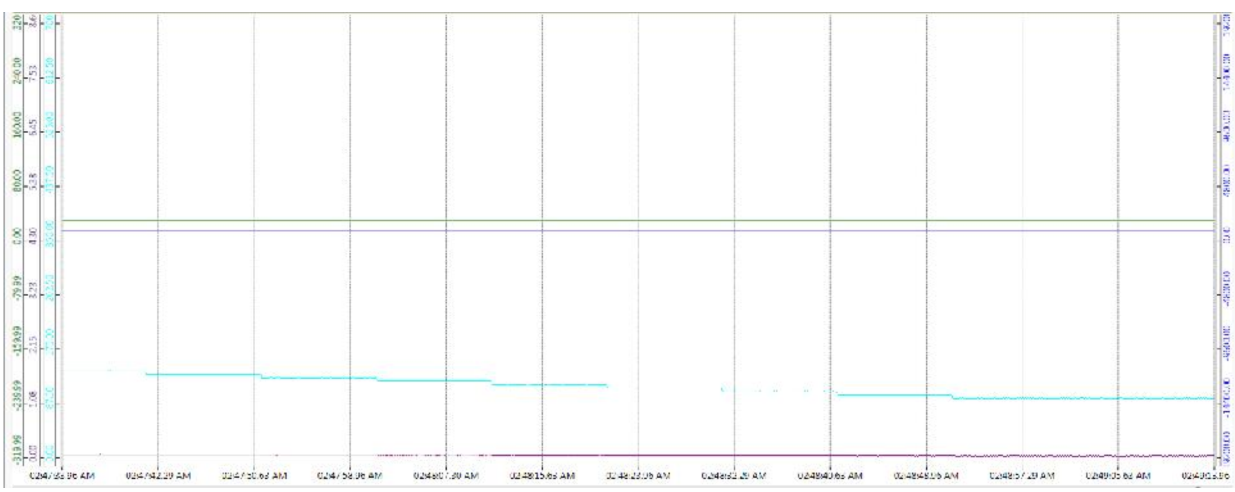

Figure 3

Final motor values:

- Output Frequency - 30.00 Hz
- Motor Speed - 885 RPM
- Motor Current - 0.05 Amps
- Motor Voltage – 96.6 Vac

Summary

In most applications, the drive reach maximum energy savings more quickly than shown here as this example demonstrates a motor with no load. However, this example illustrates how Active Energy Control will reduce the output and motor current as much as possible while ensuring the motor continues to spin at the required speed. In this example, Active Energy Control reduced the output voltage by 133 volts and motor current by 104%.

The reduction of current and voltage can drastically decrease your annual energy costs.

For this example: let's assume there are twenty (20) 0.16A motors that operate at 230V and 30 Hz or better for the majority of the run time. If the motors run 8 hours a day, 5 days a week and 50 weeks out of the year, you can save approximately $3,450 annually.

	V/Hz Control	Active Energy Control
kW per 5 minutes	0.06363	0.00837
KW per min	0.01273	0.00167
KW per hour	0.76354	0.10039
Cost per hour	$0.10	$0.01
Cost per day	$0.79	$0.10
Cost per week	$3.97	$0.52
Cost per year	$198.52	$26.10
Cost of 20 drives per year	**$3,970.39**	**$522.03**
	TOTAL SAVINGS	**$3,448.36**

Additional Help

In the US or Canada: please contact the Technical Resource Center at 1-877-ETN-CARE or 1-877-326-2273 option 2, option 6.

All other supporting documentation is located on the Eaton web site at www.eaton.com/Drives

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