

Evaporator Fan Controller for Medium-Temperature Walk-In Refrigerators



Fan Controller Saves Energy in Two Ways

With assistance from DOE's Inventions and Innovation Program, Advanced Refrigeration Technologies (ART) commercialized an innovative control strategy for walk-in refrigeration systems. The ART Evaporator Fan Controller is inexpensive and easy to install.

The concept and operation of the ART controller is technically quite simple: refrigerant flow is sensed by temperature differential at the expansion valve within the evaporator. When refrigerant is not flowing through the evaporator/evaporators, voltage is dropped to the evaporator fans, saving energy in two ways. First and foremost, the evaporator fans consume less energy. Secondly, heat introduced to the refrigerated chamber from the evaporator fan motors is decreased. This decrease in heat, coupled with a decrease in thermal inversion, results in a decreased overall box load, thereby reducing the compressor/condenser on-duty cycle. The slow fan speed maintains air circulation to avoid temperature stratification. The lower air speed also maintains natural product moisture, thereby increasing shelf life.

Benefits

Energy Savings

Reduces evaporator and compressor energy consumption by 30% to 50%.

Productivity

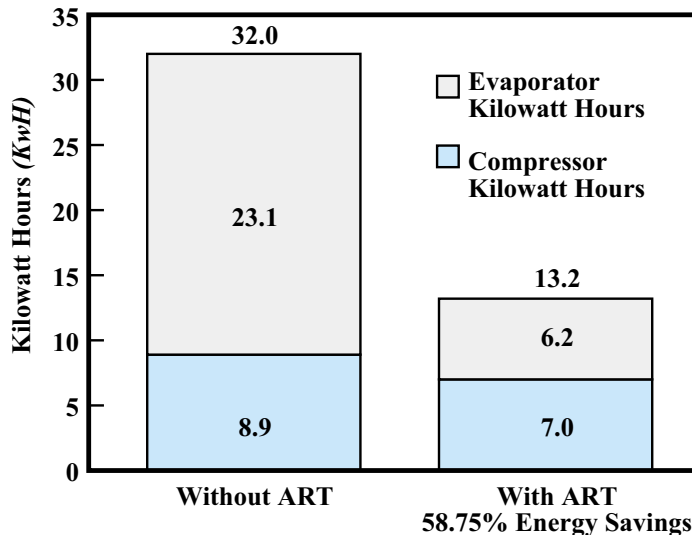
Even temperature distribution and lower air velocity improve working conditions and result in workers keeping refrigerated spaces closed.

Product Quality

Less air movement maintains the natural moisture in open product, so freshness and shelf life is increased without affecting overall relative humidity within the refrigerated chamber.

Profitability

Lower running times increase equipment life span and cut maintenance and replacement costs.



Average Daily Energy Consumption for a 29,200 Btu Evaporator

Overview

- ◆ Developed by Advanced Refrigeration Technologies, Inc.
- ◆ Commercialized in 1997
- ◆ Over 1375 units operating in 2003

Energy Savings

(Trillion Btu)

Cumulative through 2003	2003
0.038	0.015

Emissions Reductions

(Thousand Tons, 2003)

Particulates	SO _x	NO _x	Carbon
0.0	0.003	0.002	0.297

Applications

Decrease in energy consumption in low- and medium-temperature walk-in refrigeration and freezer systems in restaurants, cafeterias, mess halls; grocery and convenience stores; hospitals; colleges and other educational facilities; naval vessels; and custom industrial and commercial applications

Capabilities

- ◆ Control logic cuts evaporator and compressor energy consumption and lengthens component life.
- ◆ Controller can be retrofitted into existing refrigeration systems or incorporated into the design of new equipment.
- ◆ New models have the capability to monitor energy use and savings associated with the ART controller. Monitored information may be downloaded to a PC.