



***“Often Imitated, Never Duplicated”***

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## **Energy Efficient Refrigeration System Control Will Save You Money**

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### ***Introduction***

Efficiency is the hallmark of any successful agricultural enterprise. Every onion growing operation should strive to maximize their efficiency in terms of agronomic inputs, equipment, and labor. One key area that is often overlooked is energy efficiency in storage. Although storage is a critical component of many onion operations, when was the last time you examined how efficiently your particular storages were operating?

Onion storages tend to be large energy users due to their high airflow rates, burners, and refrigeration systems. Improvements in energy efficiency can translate into significantly reduced power bills and storage costs. Increasing the efficiency of refrigeration system operation and control is one way to dramatically reduce energy consumption in nearly all existing and newly commissioned onion storages. Although refrigeration systems vary from manufacturer to manufacturer, all share several basic components. Each system is composed of refrigerant, evaporator coils, one or more compressors, condenser coils, and one or more condenser fans. Each component of the complete refrigeration system must work together under a unified control system for optimum efficiency to be reached. Unfortunately, nearly all current onion refrigeration systems are not controlled in an energy efficient manner.

### ***Refrigeration Control Systems***

In recent years, computers have revolutionized all aspects of agriculture and storage systems are no exception. If your refrigeration system is not operating under microprocessor-based control, you are not operating at peak energy efficiency. Virtually all existing refrigeration systems rely on a fixed head pressure control strategy with minimal staging of compressors and condenser fans. This strategy uses pressure switches, outdated mechanical relays, and fixed operating points to “control” the refrigeration system. This approach is highly inefficient because it does not take into account constantly changing operating conditions such as evaporator load, ambient temperature, and airflow through the condenser coils. Additionally, defrost cycles are typically controlled with a simple time-clock, without regard for the actual status of the evaporator.

The Gellert Co. has developed the CR-110 refrigeration control card to optimize energy efficiency. The CR-110 is a microprocessor-based control system that provides

integrated, real-time control of virtually any refrigeration system. It uses a proprietary 'Balanced Head Pressure Control' strategy that analyzes current operating conditions and adjusts the system operating parameters to precisely meet the refrigeration demand in the most energy efficient manner. The CR-110 provides optimized control of all system functions including defrost scheduling, compressor operation, and condenser fan airflow. Additionally, the CR-110 replaces the archaic relays and mechanical switches found in most systems with a simple and reliable control module (Figure 1).

### **Conclusions**

In today's world of shrinking profits and increasing production costs the efficiency of your operation is critical. The energy efficiency of your storage facilities should not be ignored. Modern control systems and refrigeration system components are available that can help you minimize storage costs and maximize your returns. Take the initiative to analyze the energy efficiency of your storage facilities and find out if inefficient refrigeration equipment and controls are secretly stealing money out of your pocket.



Figure 1. This assortment of pressure switches, relays, staging controls, wire, and a defrost timer were replaced by two CR-110 control cards.