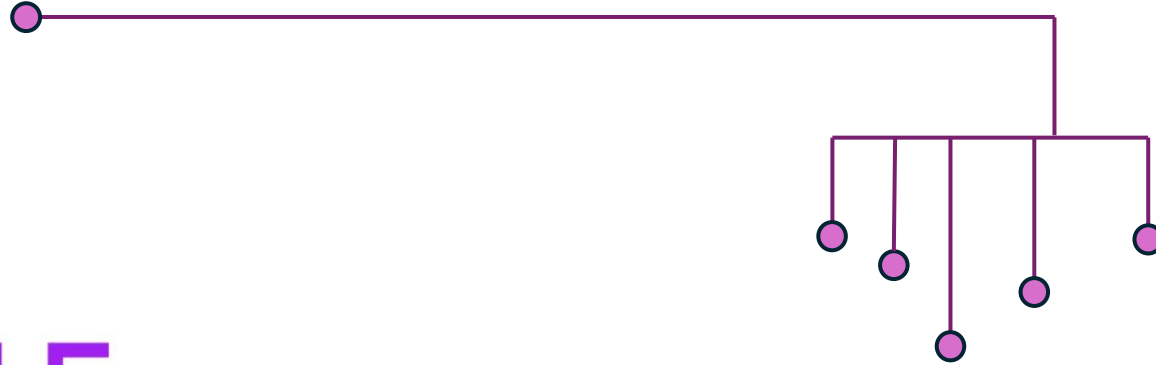




GRAPEVINE



- Data Clustering and Energy Management
- Digital/Polarized Saturation Controls
- HVAC - Refrigeration
- Grocer – Food Purveyor
- Food Service - Food Safety
- Utility Rebates – Energy Reductions
- Environmental & Social Governance

GRAPEVINE is a data clustering network built around the most current proven energy reduction technologies for refrigerated food storage environments and facility HVAC while additionally providing enhanced food safety capabilities and occupancy comfort:

This facility-wide network simply overlays any existing networks and controls currently operating and can use its own **LAN**/internet connection, if required.

GRAPEVINE does not “cut in” or attempt to use existing networks or digitally link data retrieval from existing control systems.

The **GRAPEVINE** network is completely independent and covers the entire grocery store or the purveyor’s cold storage/food service, restaurant or commercial kitchen facility temperature & energy data points and is protected with a **VPN**/Firewall, an electrical main service power conditioning system and a support network of **12+** hour battery backup for power that monitors box and case temperatures during power outages.

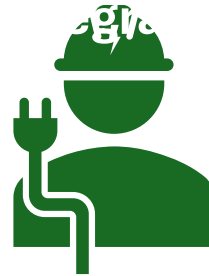
GRAPEVINE was designed by experienced mechanical contractors, energy experts with networking professionals and is engineered to provide every data point in every case, box, condenser or evaporator including heat exchange rates of **HVAC** (differentials, delta) and digital sight glass viewing for the best in remote diagnostics. Also monitored are heated food cabinets, steam pans, ovens and kitchen hood exhaust fan supply & make-up air temperature and energy use.

Installations will not interfere with existing set points, operations or cause disturbing shut-downs during the install process. After installation, bringing the new network online can usually take just a few hours.

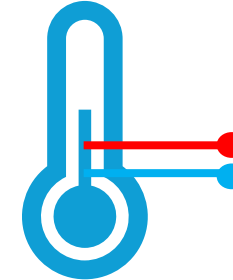




GRAPEVINE is a hardware, software and exothermic oil solution with a large focus on refrigeration and **HVAC** energy reductions without compromising important reliability or comfort. Food safety is monitored on levels like never before.



Utilizing Yaskawa **VFDs** on all motor loads, including compressors in refrigeration, air handlers and rooftop **HVAC** provides maximum power reductions with full building power conditioning preventing nuisance tripping of frequency drives.



Digital temperature saturation controllers with for foodservice refrigeration/freezers are proven to reduce energy consumption by **20% to 50%** or more. The addition of exothermic oil polarization improves heat exchange rates by more than **24%**.



The **GRAPEVINE** network and its facility is protected by an advanced electrical main service power protection/conditioning and data logger with network battery power backup that will maintain up to **12+** hours of temperature data logging events, alarms, history and trend for the entire facility during an outage. Our custom engineered **electrical power conditioning systems** are designed based on the final resulting power use & reductions data will balance and stabilize voltage, reduce power loads, eliminate nuisance (**VFD**) drive tripping and smooths out spikes, blips and surges from the grid. Additionally, installing this level of facility management strengthens the relationship between the facilities owner(s) and the mechanical contractor providing a more intelligent building with advanced diagnostic capability for all parties involved.





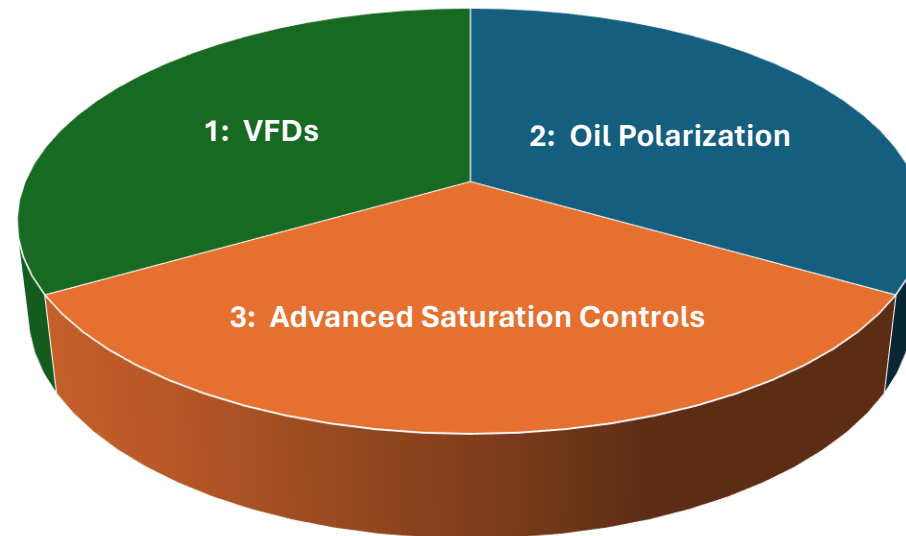
Blending Three (3) Energy Technologies on a Network:

Reducing Power (kW) and Energy (kWh)

1: Installing Yaskawa drives provides soft starting and eliminates contactor arcing that causes motor winding failure and prolongs compressor service life.

Shocks in start-up torque/amperage are removed by the drives and reduce inrush current by **60%**. Roof top **HVAC** applications with drives have proven energy reductions of **45%**.

The benefits when using drives go beyond energy with reduced costs of operation and all drives are monitored on the **GRAPEVINE** network for fault codes and to restart from remote, if needed.



3: Digital temperature saturation expansion and thermostat technologies are applied in every possible refrigeration application and can be disabled from the network if need be or to compare energy reduction results. Advanced saturation controls for refrigeration/freezer defrosting systems alone are proven to reduce energy use between **20%** and **50%**.

2: When polarizing the refrigerant oil, you get an increased coefficient of heat exchange reducing compressor run times and achieving set points more quickly.

The oil polarizing additive used in the **GRAPEVINE** network has been data tested for over **20** years in many applications well beyond refrigerator and freezer environments. The oil additive also contains nano-lubricants for reduced internal friction and wear.

Through oil polarization, saturation and heat removal with this exothermic technology, it has been proven to increase heat exchange efficiencies beyond **24%** while also removing any oil fouling in the refrigerant piping systems.

Data points and choices in energy reduction technologies are created by the existing mechanical contractor's requests and compatibilities:

The **GRAPEVINE** hardware and software network installation project is designed WITH your mechanical contractor & FOR your mechanical contractor, with the oversight of the utility rebate program providers.

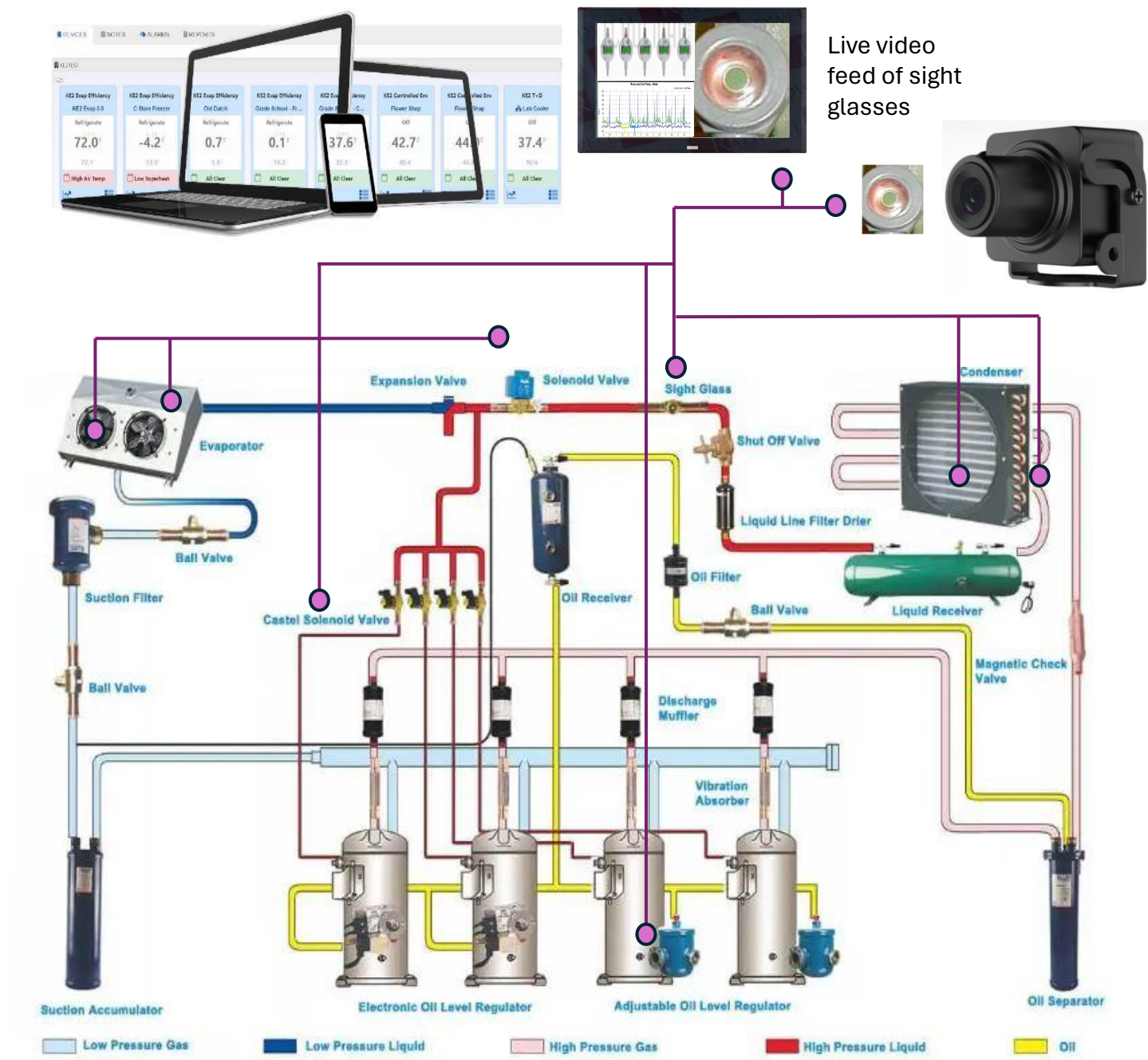
GRAPEVINE is different because it's monitoring & data logging the entire operational mechanical refrigeration, freezers and **HVAC**, kitchen & production, not just the compressor rack/case/box coolers. Energy reductions are achieved by using frequency drives with digital saturation controls and an oil polarizing agent in the refrigerant all together. Oil polarization and digital saturation are engineered to operate together to maximize energy reductions.

GRAPEVINE is **100%** compatible with all facilities because of its complete independence of other networks and controls while continuing to operate during power outages for over **12+** hours.

GRAPEVINE monitors energy use through current transducers, and all exchange temperatures of both supply and return air. Existing case logic type controllers are not tampered with whatsoever unless they are scheduled for replacement by the mechanical contractor for a new digital saturation controller or required by utility rebate program.

GRAPEVINE is simply adding temperature sensors and clip-on **CTs** with paralleled saturation controls. NEVER are existing refrigeration systems tubing cut or series-tapping wiring made and pressure transducer or switches and expansion devices are NEVER tampered with.

Our saturation controls from the **GRAPEVINE** network are connected in parallel and can be disabled from remote. Additionally, the network provides live video feed of refrigeration sight glasses that can be viewed through the secure network by the mechanical service company or at the workstation **PC** in the facility.

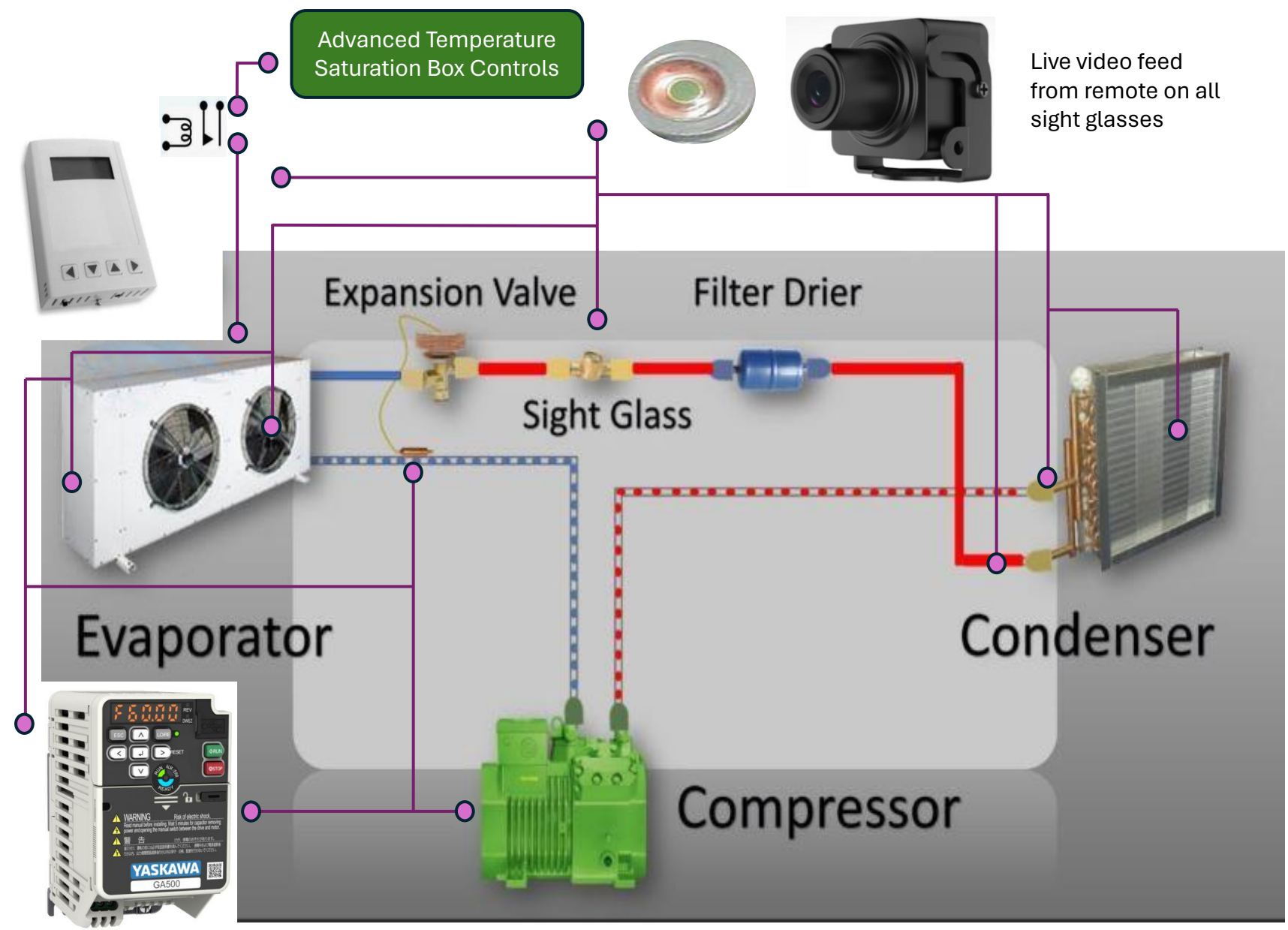


(Example drawing: Grocery store compressor rack and controls)



Typical walk-in cooler on a GRAPEVINE network:

- All temperature exchange points are monitored sensor air-over or by pipe strap and will alarm to the chosen min/max limit.
- Live **5MP+** magnified & illuminated video feed of the liquid sight glasses in all coolers viewable on the secure network.
- Yaskawa **VFD** on compressors with the ability to see fault codes and be reset from remote. Nuisance tripping is greatly reduced or eliminated by the power conditioning installed for all compressor loads.
- Evaporator fans are replaced with fixed permanent-magnet motor technology as per each rebate program incentive.
- Digital saturation control & refrigerant oil polarization added to existing thermostat/refrigerant.
- Current transducers (**CTs**) installed on all loads including compressors, evaporator/condenser fans and blowers for diagnostics.
- Our advanced saturation box controls can be disabled by remote on the network by the **GRAPEVINE** relay logic controller.



Multiple points of access to data and real time video of refrigerant sight glasses:

A wall mount **PC/HMI** workstation will be installed in every food wholesaler or grocer/food service facility. Remote access is always available there or from a secured connection to the network where mechanical contractors have **24/7** access.

Local **PLCs** at each data cluster in each facility have **LCD** readouts scrolling data readings in real time. Technicians in the facility can read data from the scrolling display or get it from the network.

Employees/maintenance can see real time heat exchange values from the **PLC** readout on the wall next to a walk-in cooler, compressor rack, or near a thermostat for **HVAC**. Multiple eyes and network data logging give everyone precise data for accuracy in diagnostics & troubleshooting. Alarms are sent to the portal for the mechanical contractor's online real time review of history and trend.

For example:

A service tech gets a text notification regarding a temperature alarm while driving. He calls into the service branch office and the service manager is now looking at the data points and can relay the condition of the sight glass from remote, giving him critical data to resolve the issue if any, or go to the next service call saving time, gas energy and money all together.



Case Study:

From September through November **2013**, a study was conducted on the walk-in freezer at the Taco Bell located in Union, MO. The study's purpose was to compare energy consumption and temperature control of the freezer using two scenarios.

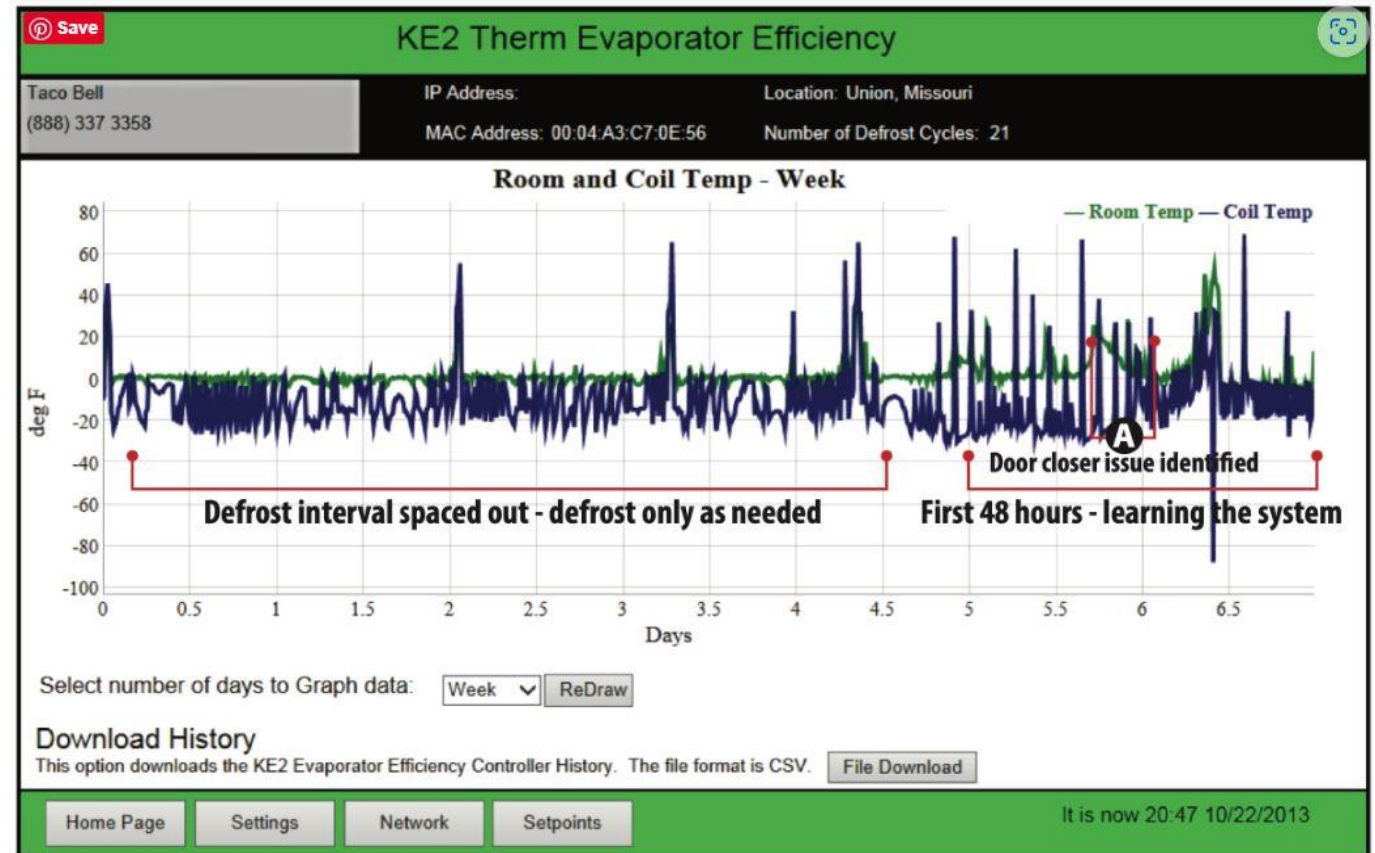
In the first, the system was operating with standard mechanical controls, including a thermostat, defrost timer and defrost termination device. In the second, the system was controlled using a **KE2** Evaporator Efficiency (**KE2 Evaporator**) controller in place of the mechanical controls.

At the start of the test, the **KE2** Evaporator Efficiency controller was installed to provide monitoring of the room and evaporator coil temperatures, while the mechanical controls were still providing the actual system control. The target temperature for the walk-in freezer was **0°F**.

The freezer was monitored, and data on the energy consumption of the compressor, evaporator fans and defrost heaters was gathered.

After gathering the data from the mechanically controlled system, the system was switched to the **KE2** Evaporator controller, and the same data points were monitored. Then, the pre and post retrofit results were annualized, to develop a comparison of the energy consumption.

See the entire study at this link [here](#).



In this case study, **KE2 Therm solutions** provided a **51%** total energy reduction through the advanced saturation controls and more intelligent defrosting controls and schedules.

The **GRAPEVINE** system operates with **KE2 Therm** controls and the oil polarization, gaining another **24%** in heat exchange efficiency.



GRAPEVINE for HVAC:



Dependable Yaskawa drives are implemented for compressors and blowers both for full **100%** variable **HVAC** and temperature saturation technologies with oil polarization.

Advanced Rooftop Controls

www.advancedrooftopcontrols.com

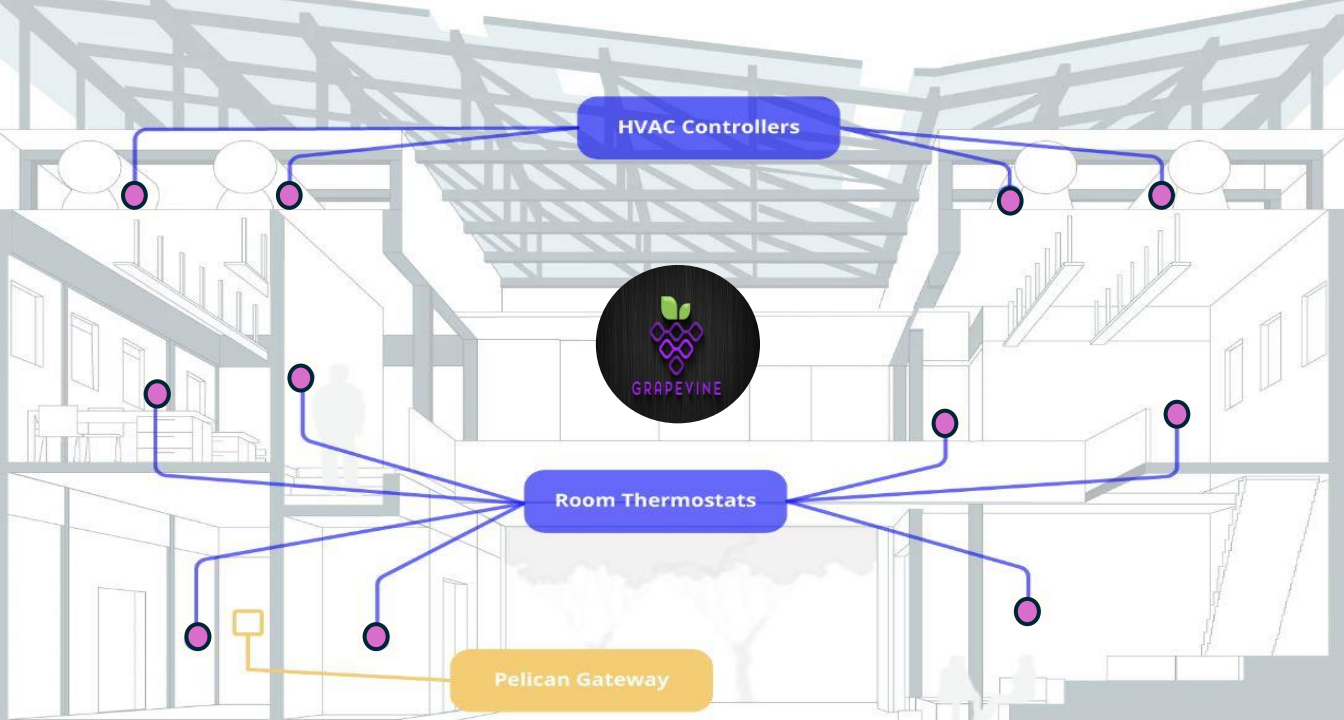
www.pelicanwireless.com

- Provides variable speed **HVAC** compressors and blowers achieving energy reductions of up to **45%**.
- Stabilizes air temperatures in occupied spaces and monitors all exchange temperatures with energy use.
- Provides reductions in demand and energy both with real time monitoring/alarms, history and trend.
- Can be installed on any air handler or roof top unit with a blower load of at least **1+ HP**.
- Works well with chiller and boiler driven air handlers.
- Allows for “gear-belting”, a process that converts the blower drive to a timing belt, eliminating the V-belt system and pulleys entirely providing a **100,000-hour** rated (**10-year +**) service life. Gear-belting greatly reduces rotational weight, torsional load and provides an extra **8%** in energy savings.



GRAPEVINE for commercial kitchens:

- Unbalanced airflow in kitchen hoods unfortunately removes conditioned air, causing unnecessary **HVAC** compressor runtimes. Most all existing commercial hood systems are out of balance.
- By adding speed controls (**VFDs**) to the exhaust & make-up air system, the air volume can be adjusted to a slightly positive pressure creating a “bubble” of elevated pressure around the hood keeping your conditioned air in the building with a correctly balanced hood.
- Motor starting shock is the **#1** cause of exhaust hood failures. By adding a soft start to a fixed speed and converting to a gear-belting system the damaging shocks and torsional strains are removed, and the demand on the electrical grid is reduced as well.
- The **GRAPEVINE** network can attach to virtually any kitchen equipment, heat exchanger, hood air or kitchen appliance energy monitoring. A commercial bakery with bread proofers and retarders can be monitored for overnight critical data in cooling, humidity, proof warming with alarms, monitoring, energy use trend and history even when the electrical power is out.
- Dish machine wash and rinse temps can be monitored for the required food safety mandatory water temperatures of **160F** and **180F**. Food holding cabinets and steam pans are data logged for trend and history, reports can be generated for food safety and delivered to health departments.
- The **GRAPEVINE** network is designed for the highest levels possible of food safety with our existing technologies and digital notifications.



Revolutionizing diagnostics and energy use in HVAC, refrigeration and freezers:

- Digital polarized refrigerant saturation & variable speed control are the future for refrigeration, freezer and **HVAC** energy reductions.
- Most utility rebate programs are widely under utilized but incentivize greatly for these levels of energy reductions. **GRAPEVINE** qualifies for rebates under most electrical utility programs.
- Variable volume **HVAC** retro-commissioning has the greatest impact on reductions in conditioned air energy, along with intelligent thermostats that can detect **CO2** levels and relative humidity.
- Pelican Wireless **HVAC** controls use local airport weather data for more precise readings, as individual temperature sensors on rooftops can be inaccurate.
- **GRAPEVINE** uses matrix networking reading most all data points every **8-10** seconds. Alarm notifications are made in the same timeframes and uses sustained limits on programming to eliminate false alarms.
- The **GRAPEVINE** network has extra open inputs for just about any future application that arises and needs to be on the network for alarm, like discrete door sensors on beer and wine coolers, or a new data point for relative humidity in a storage area. Sensors can also be added for water detection on floors, or for motion sensing. Our wall mount **PLC** has a system to detect light levels and can notify you if the lights are left on in a room.
- As more equipment is added to the facility, the network can be easily expanded. If an existing piece of equipment is replaced, the sensors can easily be reinstalled.



GRAPEVINE for commercial ice production:

Ice is a critical component to any food service operation. **GRAPEVINE** increases ice production by **24%** or more, with proven testing from the US Dept. of Energy study on exothermic oil polarization. Additionally, the **GRAPEVINE** network can track energy use and water temperatures for accurate diagnostics from remote.

- Ice bin levels are reported back to the network and will alert on any change in ice level as programmed. The network will provide data on the replacement production rate of ice as well.
- Compressor energy can be tracked in trend and history. Consistent energy use is a metric of consistent ice production.
- Refrigerant temperatures are tracked in trend and history and can alert if temperatures exceed nominal values. For example, an air screen filter that is clogged will cause the condenser coil to rise in temperature, sending a text or email alert to managers and services providers together.
- Water temperatures are data logged and can monitor the overall performance of the ice machine.
- **GRAPEVINE** sensors do not void manufacturers warranties and can be installed on any brand of ice machine that are either leased or owned.

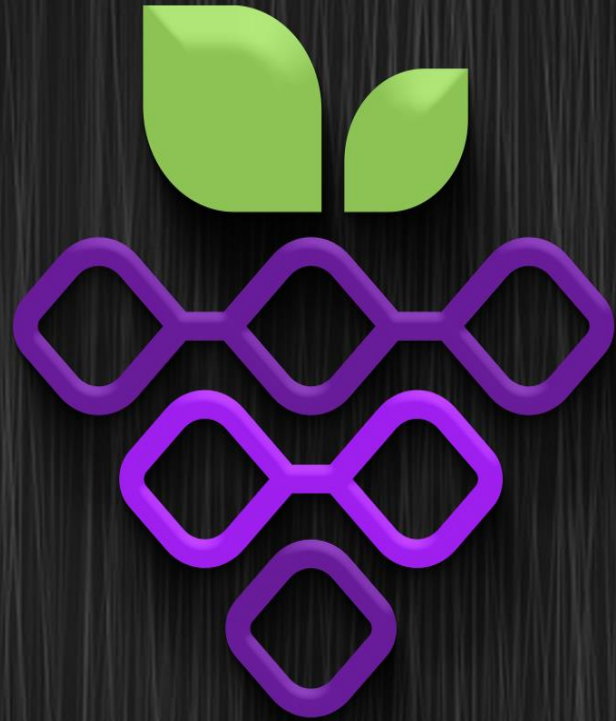


Hyperlinks for GRAPEVINE vendors and partners:



CAPTURE • CONDITION • CONSERVE





GRAPEVINE

Advanced Thermal Saturation Data Monitoring Controls,
Drives and Oil Polarization Energy Reduction Technologies

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