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Beacon II™

REFRIGERATION SYSTEM

You need a refrigeration system that arrives pre-assembled, preset and ready to install.

- A refrigeration system that is easy to monitor or change settings and conditions, and even alerts you when something is wrong.
- A refrigeration system that is so reliable and dependable that you don't have to think about it.

Beacon II™
REFRIGERATION SYSTEM

The patented Beacon II refrigeration system is an electronic based refrigeration control system for commercial applications.

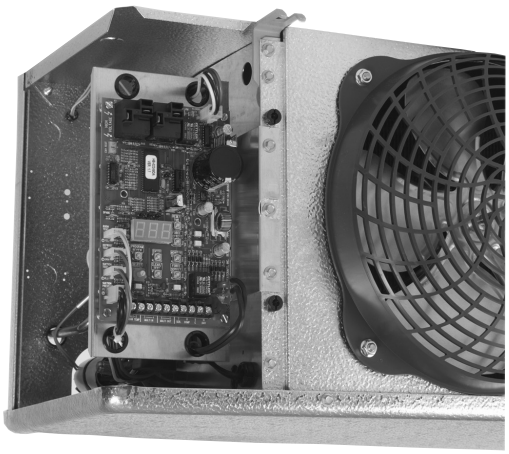
The technology behind Beacon II led to the production of the Beacon II Smart Controller, which made the Beacon II system even more convenient. Following the introduction of the Smart Controller new technology led to the incorporation of the Beacon II Smart Defrost, allowing the Beacon II system to defrost only when necessary.

Beacon II provides convenience, product reliability and cost savings over conventional refrigeration systems.

The Beacon II™ Refrigeration System

A Brilliant Approach to Refrigeration Control Systems

The Beacon II refrigeration system is pre-assembled with factory tested and mounted components, featuring an integrated microcomputer-based electronic control board, preset for common industry settings. The installed cost of a Beacon II system is less than that of conventional refrigeration systems due to substantial reductions in system installation time.



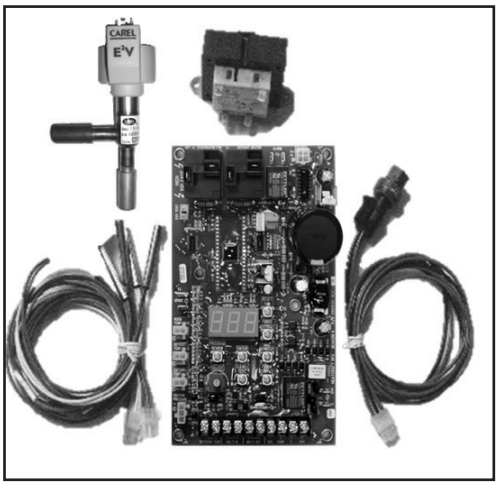
The Beacon II Controls Technology is patented (U.S. Patent Nos. 5,551,248; 6,138,464; 5,970,726)

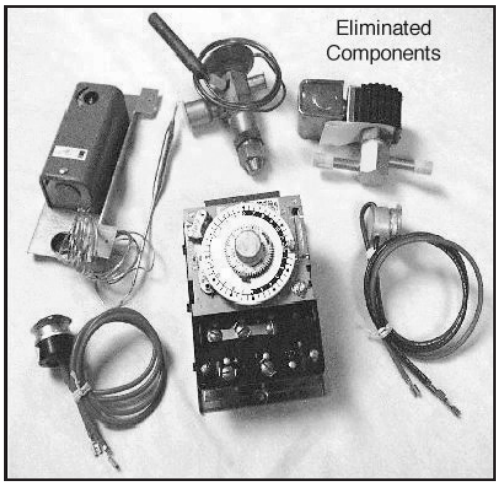
Compare

		Beacon II System	Conventional System
Performance	Pressure transducer and temperature sensor for better evaporator superheat adjustments	Standard	Not Available
	Bipolar stepper motor valve for better control	Standard	Not Available
	Anti-short cycling - 4 minutes hold off and 2 minutes hold on	Standard	Option
	Head pressure controls: 100 psig on Scroll® compressor models, 170 psig on Discus® and other compressors models	Standard	Option
	Box temperature set-point set with a push button and a rotary adjustment in 1°F increments	Standard	Not Available
	Defrost schedule settings are never lost. Keeps defrost schedule and elapsed time in memory. If power is lost, defrost schedule is not lost	Standard	Standard
	Superheat selectable in 1°F increments from 4°F to 20°F.	Standard	Not Available
	Defrost end temperature selectable in 1°F increments from 40°F to 100°F	Standard	Not Available
	High and low box temperature alarm and alarm time is adjustable	Standard	Option
	Low pressure switch time delay factory set at 1 minute	Standard	Option
	Programmable delay time for start of defrost schedule	Standard	Not Available
	Spare sensor input provided. Can be used to monitor product temperature	Standard	Not Available
	Board settings can be locked	Standard	Not Available
Servicing	Alphanumeric 3 character LED displays mode, alarms and errors. Shows box temperature when running	Standard	Not Available
	Push-button switches and rotary selector used to program board	Standard	Not Available
	Board is completely programmable	Standard	Not Available
	Beacon II can be programmed to 1-6, 8, 10, or 12 defrosts per day	Standard	Not Available
	Test mode runs three times then stops automatically	Standard	Not Available
	Can monitor suction pressure from Beacon II board	Standard	Not Available
	Service mode shuts system down from the evaporator	Standard	Not Available
	Electric Expansion Valve automatically closes on loss of power	Standard	Standard
	Monitors outdoor temp	Standard	Not Available
	3-Year parts warranty on the new Beacon II components	Standard	Option
Beacon II Smart Controller	Beacon II Smart Controller shows alarms and errors while sounding a buzzer for alarms	Standard	Not Available
	Beacon II Smart Controller controls up to 4 separate systems	Standard	Not Available
	Beacon II Smart Controller has data logging capability. Up to 30 days for 1 system: mode, box temperature, superheat, evaporator suction pressure, spare aux. temperature, and accumulated compressor cycles since midnight	Standard	Not Available
	All parameters can be programmed and monitored from the web with optional RRC feature*	Option	Not Available
	Beacon II Smart Defrost for energy savings	Standard	Not Available
	Smart Controller settings are lockable	Standard	Not Available
	Powerful new software for data logging, changes and monitoring remotely	Option	Not Available

** RRC normally connects to all DHCP IP internet connections. If your site is Static IP, Mohave, or is highly secure, IT personnel may be required to be on site.*

Beacon II Main Control Functions





Components That Are Eliminated With Beacon II Control System

- Liquid line solenoid valve
- Room thermostat
- Couple of braze joints
- Defrost time clock
- Defrost heater contactor
- Evaporator fan contactor
- Defrost termination/fan delay thermostat
- Thermal expansion valve(s)

New Components - All Factory Installed

- Beacon II control board with easy to read alphanumeric LED display (1 per evaporator)
- Program settings can be locked and unlocked on Beacon II board
- Solid state temperature sensors (3 per evaporator; 1 per condensing unit)
- Electric expansion valve that closes automatically on loss of power
- 24-volt transformer (1 per evaporator)
- Low pressure time delay switch
- Suction pressure transducer
- Uses 24-volt coil compressor contactor coil

Box Temperature

- Adjustable from -30°F to 70°F with onboard thermostat
- Alphanumeric LED displays box temperature
- Precise room temperature control
- Built in minimum compressor on/off times

Evaporator Superheat

- Fully selectable from 4°F to 20°F (factory set at 8°F)
- Liquid line solenoid valve is eliminated by the use of a reliable stepper motor type electric expansion valve
- Actual superheat is caculated with use of suction pressure transducer and suction sensor

Beacon II Main Control Functions
(continued)

Initiates and Terminates Defrost
- Time-initiated, temperature or time-terminated
- Number of defrosts is programmable from one per day to 12 per day
- Initial defrost can be delayed in 1/2 hour increments up to 23.5 hours
- Defrost schedule and elapsed time are kept in memory. Schedule is not affected by short power loss
- Fail-safe time is selectable from 10 minutes to 200 minutes
- Termination temperature is adjustable from 40°F to 100°F
- Fan delay and residual water drain down at end of defrost
- For multiple evaporator systems, one evaporator is designated as “master” and controls defrost initialization, “fail-safe time” termination and room temperature

Condenser Fan Cycling
- Fan cycling control is based on condensing pressure on multiple fan units only

BEACON II SYSTEM
ALARM CODES

A1 - HIGH ROOM Temperature
A2 - LOW ROOM Temperature
A3 - SYSTEM START-UP FAILURE
A4 - INPUT FAULT

ERROR CODES

E1 - ROOM TEMPERATURE SENSOR SHORTED, OPEN OR NOT INSTALLED
E2 - DEFROST TEMPERATURE SENSOR SHORTED, OPEN OR NOT INSTALLED

E3 - SUCTION TEMPERATURE SENSOR SHORTED, OPEN OR NOT INSTALLED

E4 - SUCTION PRESSURE TRANSDUCER SHORTED OPEN OR NOT INSTALLED

E5 - OUTDOOR TEMPERATURE SENSOR SHORTED
E6 - LOW SUPERHEAT DURING COOLING
E7 - COMPRESSOR SHUTDOWN (HIGH OR LOW REFRIGERANT PRESSURE OR LOW OIL PRESSURE)

E9 - MULTI-IN/MULTI-OUT WIRING ERROR

Beacon II has error and alarm codes to help you quickly diagnose system problems

Alarm
- Alarm contacts provided on control board
- Alarm activates on power failure
- Alarm activates if room temperature is above or below set-point range for a specified time
- Alarm activates for system failure to restart after 4 attempts
- Alarm activates for input failure from suction transducer, suction sensor or room sensor

Status Indication
- Box temperature
- Operation mode
- Failure indication mode/codes
- Error code will indicate if communication wiring is broken after being properly installed
- Alarm conditions/codes

Remote Adjustments/Monitoring/Data Logging
- Beacon II Smart Controller allows for remote adjustments and monitoring of up to four systems with the optional RRC feature

The Heatcraft Remote Refrigeration Control (RRC) is an internet-based controls system that allows users to connect to and manage their refrigeration systems using any web-browser. The Remote Refrigeration Control allows you to not only monitor a walk-in cooler, but also allows you to control functions remotely. The RRC offers the user piece of mind to focus on problems that can occur outside of their refrigeration system.

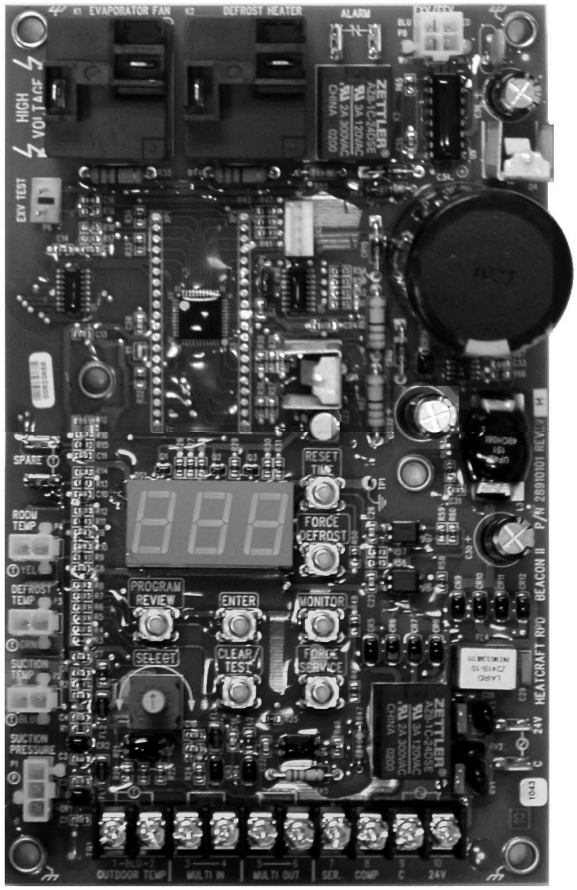
RRC normally connects to all DHCP IP internet connections. If your site is Static IP, Mohave, or is highly secure, IT personnel may be required to be on site.

Beacon II Yields Time and Cost Savings through Simplified Installation

Because the Beacon II refrigeration system is completely installed, adjusted and tested at the factory, field assembly and fine tuning at the job site are substantially reduced. With Beacon II, the installing contractor needs only to mount, pipe, wire and leak check the new system. Superheat is factory preset, so installation is much quicker than with conventional systems.

Beacon II's simplified installation process results in a far more reliable and efficient refrigeration system with far fewer callbacks and dramatically reduced system down time. The 24-volt control wiring is also safer, easier and less expensive to install. All of Beacon II's installation efficiencies mean substantially lower installation costs for contractors and end users.

Beacon II's electric expansion valve more accurately controls the flow of refrigerant into and out of the system. It replaces traditional expansion and solenoid valves



Beacon II's control board and electric expansion valve are factory installed for dramatically reduced field assembly time and minimal adjustments on the job site

Control and Monitor Beacon II Outside the Box!

Beacon II Smart Controller: Superior Technology at Your Fingertips

How did Heatcraft Engineers improve upon the Beacon II Refrigeration System? They made advances with the Beacon II Smart Controller, making Beacon II even easier to monitor and adjust. The Beacon II Smart Controller is an optional Beacon II system monitoring and programming control device, and it has already made traditional refrigeration monitoring and programing systems obsolete. It allows for adjustments to be made at the push of a button from a conveniently mounted location. In addition, you can monitor one or more systems and make system changes via internet connection from anywhere in the world with the optional RRC feature.*

Adjust or Inspect Your System From Anywhere In The World!

The Beacon II Smart Controller displays current settings, any changes in the system, and can tell you what adjustments need to be made. No more sending a technician to the roof or inside the walk-in cooler or freezer to make adjustments or monitor systems.

The Beacon II Smart Controller allows you to diagnose the system remotely. Adjustments can be made from the conveniently located controller or via internet with the optional RRC feature. Additionally, the system has a lockout feature, giving you control over who has access to make system adjustments. The Beacon II Smart Controller option can only be utilized with a Beacon II refrigeration system.

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Monitoring and Adjusting Your Beacon II System Using Beacon II Smart Controller

These Functions May Be Set Using the Beacon II Smart Controller

- Defrost Type (Electric or Air)
- Refrigerant Type (R-22, R-404A, R-507)
- Box Temperature (-30°F to 70°F) or (-34°C to 21°C)
  - Switch off cooling cycle manually
- Superheat Setting
  - From (4°F to 20°F) or (2°C to 11°C) (for all evaporators on the system)
- Defrost Cycle
  - Frequency (up to 12 defrosts per day)
  - Start Times (actual time of day)
  - Fail Safe Time (in minutes) (10-200)
  - Termination Temperature (40°F to 100°F) or (4°C to 38°C)
  - Force 'extra' defrost cycle manually
- Smart Defrost
  - On/off setting
  - Built-in logic to determine if a defrost is needed
  - Automatically programs at least 8 times for potential defrosts per day
  - Will automatically defrost at least once per 24 hours of compressor run time
- Alarm Set Points
  - High temperature (-40°F to 90°F) or (-40°C to 21°C)
  - Low temperature (-40°F to 90°F) or (-40°C to 21°C)
  - Fail-safe time that temperature exceeds set points (2 min. -120 min.)
  - Audible buzzer sounds on alarm
- Configuration Selection
  - Maximum of 4 systems with 4 boards each
  - Maximum of 2 systems with 8 boards each
- Temperature Readout units (in °F or °C)
- Clock/Date (time of day in 12H or 24H/ international format)
- Test - Puts all Beacon II components in test mode (use for diagnostics/troubleshooting)
- Service Mode (on or off) - To turn off for extended periods of time
- Programming Lockout (to prevent unauthorized changes)

Beacon II Smart Controller Allows You To Monitor These System Conditions

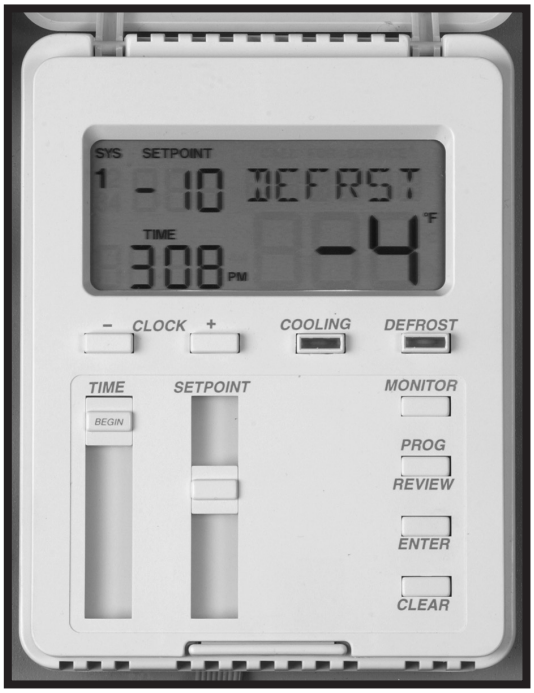
- Box Temperature
- Superheat Condition for each evaporator on the system
- Suction Temperature & Pressure at evaporator
- Electric Expansion Valve Position
- Outdoor Temperature (°F/°C)
- Compressor Run Time (in minutes/accumulation since midnight)
- Compressor Cycles (accumulation since midnight)
- Evaporator Coil Temperature
- Length of last Defrost Elapsed Time (in minutes/ accumulation since midnight)
- Operational Mode: On, Off, Cooling, Defrost, Service, Test
- Spare Sensor Temperature
- Versions of connected Beacon II boards
- Version of Smart Controller firmware

Beacon II's Smart Controller Provides You with Ultimate Control

Beacon II Smart Controller Features

- Monitor one or more complete Beacon II refrigeration systems (up to 4 separate systems)
- Capability to program a variety of parameters for optimum performance of the Beacon II refrigeration system
- Beacon II Smart Defrost Capabilities
- May be placed apart from the system being controlled (500 - 1000 ft.)
- Locking feature to prevent unauthorized access to program settings
- Each Beacon II Smart Controller can control multiple boards on a system (up to 4 on 4 systems or up to 8 on 2 systems)
- Audible alarm buzzer
- Clock backup battery has a 10-years life
- Double E ROM Chip will maintain program settings indefinitely
- Large, easy to read Liquid Crystal Display (LCD) screen
- Easy to use function keys
  - Cooling mode toggle
  - Defrost mode toggle
  - Monitor mode switch
  - Programming mode switch
  - Slide switches for selecting settings

Beacon II's Smart Controller features an easy to read LCD screen and easy to adjust keys



Beacon II Smart Defrost

The Most Intelligent Approach to Refrigeration System Defrosting

How did Heatcraft Refrigeration Products' engineers make Beacon II Smart Controller even smarter? They developed Beacon II's Smart Defrost, a significant breakthrough in refrigeration technology, standard on all Beacon II Smart Controllers. When the Beacon II Smart Defrost mode is enabled, the system predicts frost accumulation and defrosts on an as-needed basis.

Why Defrost When You Don't Have To?

Variances in ambient conditions, product load, and humidity affect the amount of frost accumulation on evaporators. Conventional systems defrost at preset times of the day, whether the system needs to be defrosted or not. With Beacon II Smart Defrost, the system first checks to determine if frost buildup is significant enough to require a defrost.

Beacon II's Smart Defrost is the first system in the industry capable of predicting frost accumulation, and initiating defrost only when it is necessary.

How Does Beacon II Smart Defrost Work?

Beacon II Smart Defrost, an optional setting within every Beacon II Smart Controller, is enabled by initiating the defrost mode from the main menu. Simply program defrost times (at least eight a day), then set Beacon II Smart Defrost to on position. Now Beacon II Smart Defrost is working. At the user programmed defrost times, the system will determine if a defrost is necessary and, if so, defrost will begin. If not necessary, the system continues normal function until the next programmed defrost time occurs. The Beacon II Smart Controller will continue to monitor system performance at every programmed interval to determine a need for defrost, before actually defrosting. The system has a programmed default to run at least one defrost cycle per 24 hours of compressor run time. At any time, the system can be reset to conventional timed defrost.

Beacon II Smart Defrost is Efficient Defrost

Beacon II Smart Defrost provides improved efficiency due to overall defrost reductions, better product integrity, extended compressor life and a more consistent box temperature. Not only does the system save energy by not energizing heaters during unnecessary defrosts, it also saves energy by not expending energy to bring the room temperature back down after defrosting.

Proven Results in the Lab and on Your Energy Bill

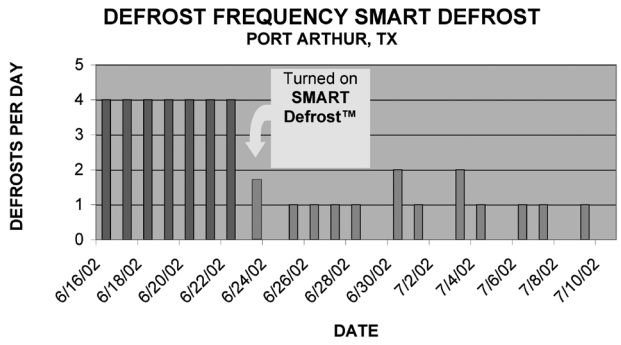
In laboratory and field tests, on a system with four programmed defrost times, Beacon II Smart Defrost eliminated an average of two defrost cycles per day, 180 days of the year. This adds up to substantial energy savings, especially for light frost load applications. At a rate of 7.5 cents per kW, annual cost savings amount to $115 per low profile evaporator.

Smart Defrost Energy Savings	Low Profile Evaporator	Med. Profile Evaporator	Large Unit Cooler
Evaporator	12,000 BTUH	33,000 BTUH	144,000 BTUH
Cond. Unit @ 90°F cond. & -20°F suction	3 HP	7.5 HP	30 HP
Heater Watts	2.7 kW	7.8 kW	37.1 kW
Compressor Watts	2.7 kW	5.6 kW	18.3 kW
Defrost Per Day	1	1	2
Estimated Yearly Savings @ $0.08/kW	$163	$704	$2,053

Calculations for the Low Profile and the Medium Profile are based on actual data from systems running for our customers in the USA Data for the Large Unit Cooler is projected

Beacon II
Smart Controller Works Hard, So the Refrigeration System Doesn't

By eliminating unnecessary defrosts, the system does not work any harder than it should, thus eliminating excess wear on the equipment, extending product life, and maintaining a more consistent box temperature. This assures the most ideal environment for your refrigerated goods. Best of all, there is no cost added to the system, because Beacon II Smart Defrost is built into the Beacon II Smart Controller as one of the many programmable settings.



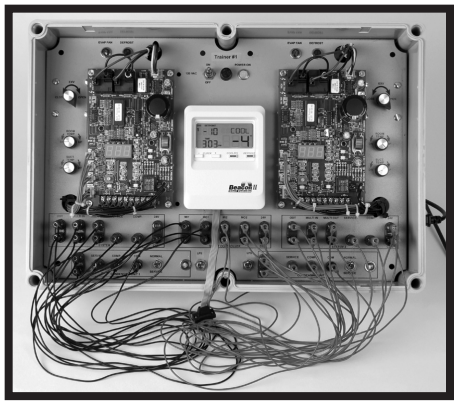
Standard Defrost
6/16/02 to 6/22/02
7 Days at 4/Day = 28 Defrost

Smart Defrost
6/26/02 to 7/02/02
7 Days = 7 Defrost

Beacon II Training

Heatcraft Refrigeration Products provides installation and troubleshooting training for Beacon II systems. Training focuses on the technical aspects of the Beacon II system, covering component overview, basic installation recommendations, setup and programming exercises, hands-on wiring simulator exercises, and troubleshooting tips and tricks. Visit Heatcraftrpd.com/training for more information.

Training Seminar Trainer



Heatcraft trains service technicians to provide you with superior service if you ever need service on your Beacon II Refrigeration System

Remote Refrigeration Control

What Is The Remote Refrigeration Control?

Heatcraft's Remote Refrigeration Control (RRC) is an internet-based controls system that allows users to connect to & manage their refrigeration systems using any web-browser, from anywhere in the world. Leveraging technology from Heatcraft's trusted refrigeration control systems such as the Beacon II™, the RRC continuously logs & displays critical system data for the life of the equipment, allowing users to manage the integrity of their stored product to increase product safety, energy efficiency, and garner operational cost savings.

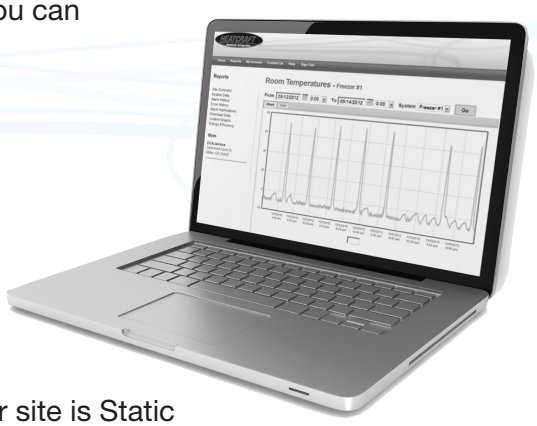
Monitor. Detect. Control. Relax.

The Refrigeration Remote Control allows you to not only monitor your cooler but also allows you to control functions remotely. The RRC allows the user to focus on problems that can happen outside of their walk-in.

- **Detect issues before they become a problem**
- **Pre-emptive alarm settings**
- **Fastest refrigeration diagnostics**
- **24/7 monitoring and control access**
- **Log over 300 data points per Beacon II**
- **Remotely change parameters**
  - **Box temperature**
  - **Superheat**
  - **Defrost Schedule**

The Most User Friendly Interface

You can access real time information on your unit cooler easier than ever with the Remote Refrigeration Control. Using any internet connection you can access a variety of statistics on your cooler at anytime.



- **Easily understood operating platform**
- **Available through any internet connection**
- **Online graphing**
- **Email and text alarms**
- **Manage multiple locations via one account**
- **Data download to spreadsheet**

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