# GUARDIAN

## Electronic Refrigeration Controller



## FEATURES

- **True Superheat Control**
- **Novel Compressor Protection Provisions**
- **Digital Temperature Control**
- **Conventional and Advanced Defrost Routines**
- **Process Monitoring and Reporting (HACCP)**
- **Versatility and User-Friendliness**
- **Scalability**
- **NAFEM Protocal Compliant**
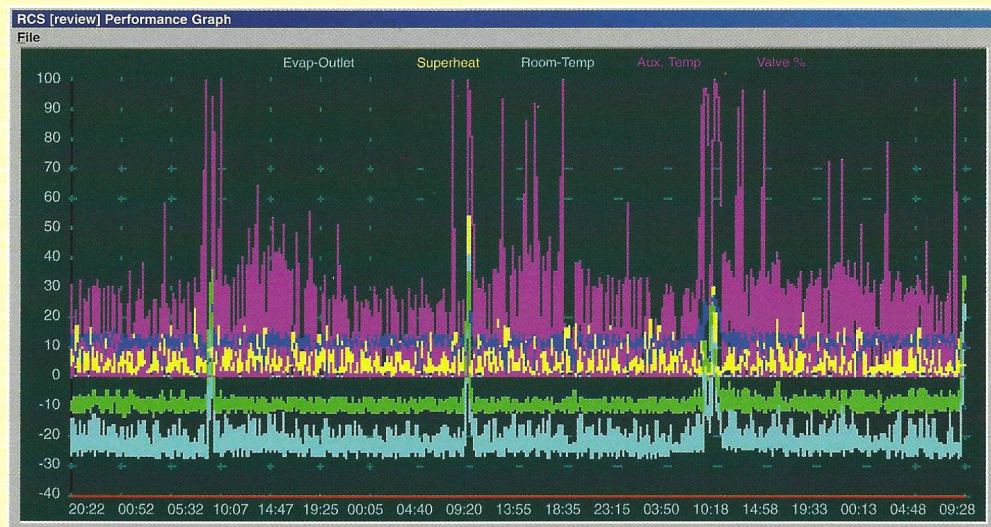- **Local and Internet Access**
- **Patent Pending**

# Guardian

**True Superheat Control** - Combination of suction pressure transducer, suction temperature sensor, and a pressure-temperature database for R404a, R22, and R134A are used to calculate true superheat

**Compressor Protection Algorithms** – Guardian has a compressor patented compressor protection algorithm that can set to 3 levels to ensure protection against flood back damage.

**Digital Temperature Control** - Latest electronic technology marries chip technology, to refrigeration control with unparalled features and contingency algorithms to offer a trouble free system right from the start.

**Electronic Defrost** - Time Initiated – Temperature Terminated defrost

**Adaptive Defrost (Pending)** – Adaptive defrost feature that provides defrosting when needed and not forcing a minimum number of defrost every 24 hours.

**Expanded Temp/Press Ranges** – Down to –30°F room temperature.

**Power / Sensor Failure Alarms** – Guardian has alarms and contingency algorithms for failed sensors, and power fluctuations.

**Stand-Alone** – Guardian can function as a stand alone unit, or work in a master slave configuration with unlimited number of slave units.

**Universal EXV Compatibility** – The Guardian can operate any electronic or electric expansion valve. These include the Sporlan SIE & SER bi-polar stepper valve, Parker 625 electric valve, Alco ESVB Bi-polar stepper valve, Parker HP/HF Pulse Width valve, etc.

**Scalability – Modularity** – The Guardian is built with serviceability and modularity in mind. The fan, heater, and solenoid relays can be easily detached from the circuit board and replaced without having to replace the entire circuit board, eliminating the need to reprogram the board, and reduce replacement costs. Also, the relay section and display sections can be removed and located away from the main board for added design flexibility.

**Valve Response Settings** – Guardian has the ability to allow the user to set valve error rates (PID) in order to fine tune valve response to the system.

**Process Alarms** – Alarms can be high and low events can be set along with time delay settings to eliminate false alarms. Board contains a 10 Amps alarm relay for connection to an external audible alarm.

**RF and Electrical Noise Protection** – Guardian is fully filtered to isolate the controller from RF, as well as voltage spikes and sags. An auto reset feature will automatically restart board should a disturbance occur.

**Process Monitoring / Data Storage** – Process data can be viewed real time and from stored data. 1000 sample points are stored with and adjustable sampling rate that can be downloaded into a PC either on site or remotely via a modem, or the Internet

**PC Interface / Software** – Windows based software allows the user to monitor the system on site or remotely via a modem, or via the Internet using a Microgate embedded Internet server. In addition, each system's set point and alarms can be reset remotely

**Auto Tune Plug and Play** – Each Guardian is shipped pre-programmed for cooler or freezer application set points, so a plug and play option feature avoids having to program each controller at the site.

**Master Slave and Local Network Applications** – Up to 128 boards can be connected together, 10 in a master-slave combinations, and individual system using an RS 485 bus. This allows for simple easy communication access to any single Guardian controller with a single facility from one PC, either on-site or off-site via a modem or the Internet.

**Sleep Mode** – Optional sleep mode feature allows the system to will shut the evaporator off for 30 minutes when loading or servicing a freezer. This feature protects the freezer by automatically turning the system back on, and eliminating leaving it off for extended period of time.

## Windows™ Based User Interface Software

**Parker Electronic Refrigeration Control [PERC] V1.03g at California**

File  Disconnect  Com-Port  History-Log  Tools  Help

### Process Measurements

| | | | |
|---|---|---|---|
| Suction Pressure | 17 | Room Temp (°F) | -11° |
| Coil Outlet Temp (°F) | -7° | Def. Termination Temp. (°F) | -16° |
| Superheat (°F) | 12° | Auxiliary Temp. (°F) | -40° |
| Valve Percentage | 100% | Refrigerant Type | R-404A |
| PERC - Operating Status | REF | Alarms: | |

Transit   Receive

Status:  Displaying controller process variables.

Change Setpoints   Save Setpoints   Sync TOD   PERC Unitnumber  1

### Password

New Password  *****

### Control Setpoints

| | | |
|---|---|---|
| Superheat | 5 | °F |
| Room On Temp. | -8 | °F |
| Room Off Temp. | -12 | °F |
| Fan Temp. Delay | 28 | °F |

### Defrost Setpoints

| | | |
|---|---|---|
| Defrost Start | 7 | Hour |
| Defrost Start | 0 | Min. |
| Defrosts Per Day | 1 | Qty. |
| Defrost Failsafe | 60 | Min. |
| Defrost Termination | 54 | °F |
| Drain Time | 3 | Min. |

PC time: 16:09:42

This RCS is a Master and is controlling a Bipolar Stepper valve.

### Alarm Setpoints

| | | | Delay | |
|---|---|---|---|---|
| High Suction Press. | 100 | Psig | 30 | Min. |
| High Suction Press. | 0 | Psig | | |
| High Coil Outlet | 40 | °F | 60 | Min. |
| Low Coil Outlet | -39 | °F | | |
| High Room Temp. | 40 | °F | 60 | Min. |
| Low Room Temp. | -20 | °F | | |
| High Def. Term. Temp. | 60 | °F | | |
| Low Def. Term. Temp. | -36 | °F | | |
| High Aux. Temp. | 120 | °F | | |
| Low Aux. Temp. | -39 | °F | | |
| High Superheat | 30 | °F | | |
| Low Superheat | 1 | °F | | |

### Factory Setpoints

| | |
|---|---|
| Refrigerant | 1 |
| -P- | 20 |
| -I- | 65 |
| -D- | 20 |
| Refrigerant | 120 |
| Refrigerant | 100 |
| Refrigerant | 0 |
| Refrigerant | 16 |
| Refrigerant | 5 |
| Refrigerant | 1 |
| Refrigerant | 1 |

**Easy to use software allows local or remote access to monitor operation, or modify setpoint.**

**Multi-level password protection eliminates unauthorized setpoint changes.**

**Graphical data screen for easy visual analysis of system performance and operation. Guardian retains last 1000 sampling point on a "first-in first-out" sequence in a non-volatile memory.**

**RCS [review] Performance Graph**

File

Evap-Outlet   Superheat   Room-Temp   Aux. Temp   Valve %

100 90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40

20:22  00:52  05:32  10:07  14:47  19:25  00:05  04:40  09:20  13:55  18:35  23:15  03:50  10:18  14:58  19:33  00:13  04:48  09:28

# CONNECTIONS & COMMUNICATIONS

## Factory installed Components

Typical single evaporator hook-up. Master-slave configurations are easily configured. RS485 bus allows up to 128+ Guardian controllers to be connected to one single communication port.
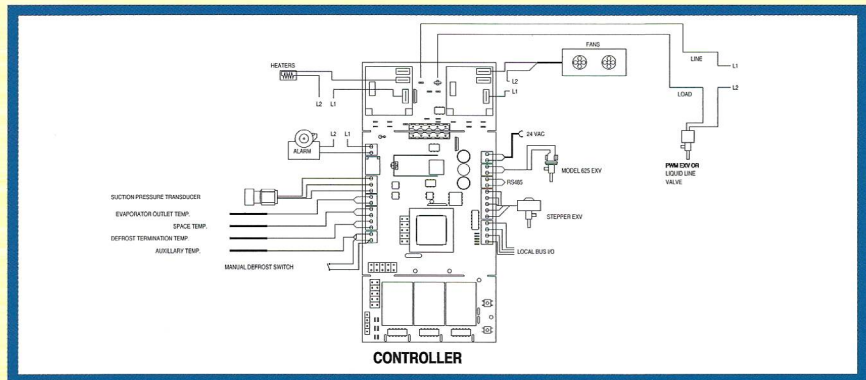


Typical Board Wiring

## 24 Hour On or Off Site Access

Systems can be monitored for alarms, performance, data history **(HACCP)**, set-point changes, from a PC located on-site, or via a modem and a phone line to an off-site location.
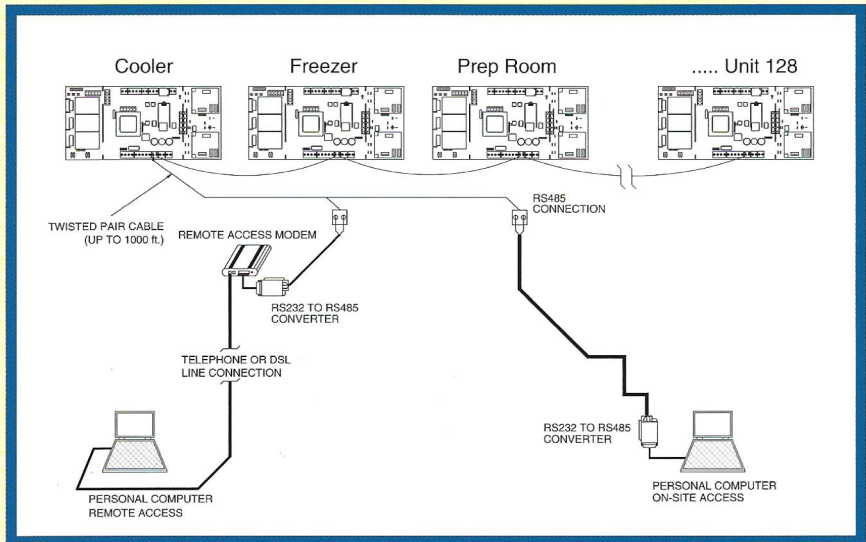


Remote Access to Each Site (up to 128 evaporator)

## NAFEM Communication Protocol

Systems can be monitored for alarms, performance, data history **(HACCP)**, set-point changes and, remotely con-troled via the Internet using an **e-Control Systems Microgate** embedded server.
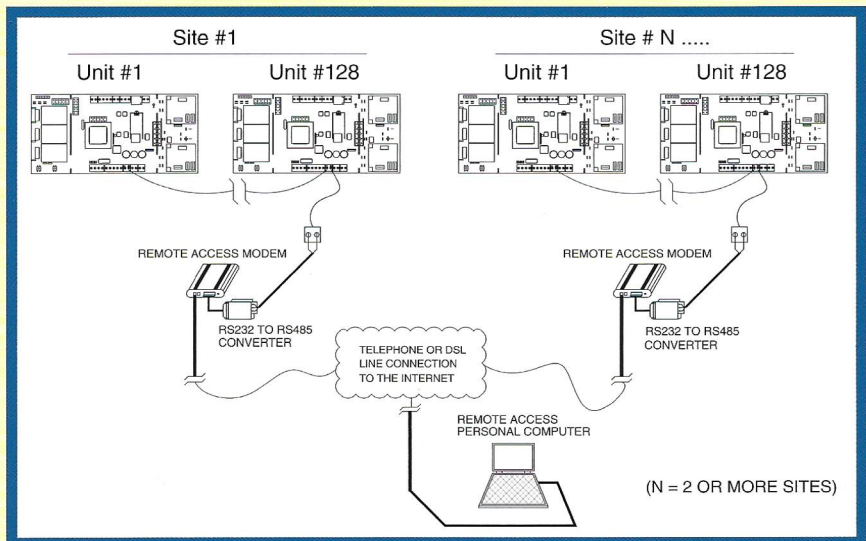


Romote Access to Multiple sites via Phone lines or the Internet