

**Sierra Monitor Corporation**  
**1991 Tarob Court, Milpitas, CA 95035**  
**(408) 262-6611**  
**(800) 727-4377**  
**(408) 262-9042 - Fax**  
**E-mail: sierra@sierramonitor.com**  
**Web Site: www.sierramonitor.com**

**Model 2430**  
**Electronic Lead/Lag**  
**Controller**

**Version 1.0**

**APPLICABILITY & EFFECTIVITY**

**Effective for all Model 2430 systems manufactured after February, 2002.**

**Instruction Manual Part Number**

**T10021, Rev. B1**

**Sierra Monitor Corporation  
1991 Tarob Court  
Milpitas, CA 95035  
Tel 408-262-6611  
Tel 800-727-4377  
Fax 408-262-9042  
Email: [sierra@sierramonitor.com](mailto:sierra@sierramonitor.com)**

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## 1 Product Description

### 1.1 General

The Model 2430 Electronic Lead/Lag Controller provides electronic, microprocessor based sensing and control of heating, ventilation and air conditioning (HVAC) and other environmental conditions in remote, above ground telecommunications structures. Specialized software is used to collect data from sensor inputs and make continuous, real time, control and alarm logic decisions. The results of the logic are used to operate control outputs, send alarms to network operations centers, and display status and alarm conditions in the front panel display of the controller.

### 1.2 Controller Configuration

The Model 2430 is a standalone, full function, lead/lag controller with front panel LCD display and keypad, and provision for 8 digital inputs, 9 control outputs and 10 alarm outputs. Operator interface is through the front panel display and keypad. The controller uses an internal temperature sensor to determine structure internal temperature and initiate the necessary HVAC controls and temperature alarms. Factory default set points are programmed for HVAC controls and alarms. Changes to default set points may be made by the user to meet his specific requirements and instructions to do so are contained in this manual.



**Figure 1-1**  
**Model 2430**  
**Electronic Lead/Lag Controller**

#### 1.2.1 Option – Model SPK33043 Relative Humidity Sensor

The relative humidity sensor is a factory or field installed option. It enables monitoring and display of structure relative humidity and a high humidity alarm. It also enables the controller to implement dehumidification logic and control. THIS OPTION AND THE ASSOCIATED LOGIC ARE DESCRIBED IN THIS MANUAL.

#### 1.2.2 Option – Model SPK22087 External Temperature Sensor

The external temperature sensor is supplied loose and installed and wired to the controller in the field. It enables monitoring and display of outside air temperature. In conjunction with the optional relative humidity sensor, it also enables the controller to implement economizer cooling logic and control. THIS OPTION AND THE ASSOCIATED LOGIC ARE DESCRIBED IN THIS MANUAL.

## **2 Installation**

### **2.1 Controller Mounting**

Installation location of the controller is determined by the structure design. The controller may be installed on any inside vertical surface, protected from moisture and excessive dust, where there is easy access by the operator and good circulation to ensure that the internal sensor(s) is exposed to a representative sample of ambient air. The internal temperature and relative humidity sensors are located on the base PCB in close proximity to vent slots located on the side of the enclosure. Do not tightly surround the controller with other equipment that might limit exposure to ambient air at representative temperature. Also, do not locate the controller directly in the path of air from the HVAC system.

Knockouts for conduit hubs are located on the bottom and sides of the base of the controller enclosure. The controller should be located to enable easy access to these knockouts for conduit entrance.

Two mounting brackets are provided with the controller. The brackets are to be affixed to the back of the base of the enclosure in either a horizontal orientation at the top and bottom of the enclosure or in a vertical orientation at the sides of the enclosure (The controller is shipped from the factory with the brackets mounted on the sides of the enclosure). Use two screws to attach each of the two brackets to the enclosure and two size 10 screws to attach each of the two brackets to the wall. See Figure 2-1. When properly installed, there should be a “breathing” space of approximately 1/8” between the base of the enclosure and the wall of the structure.

### **2.2 Customer Wiring**

Two knockouts are provided on each of the two sides of the base of the enclosure and on the bottom of the base. Each pair of knockouts is sized for 1/2” and 3/4” conduit hubs. Wiring connections must be made in accordance with the National Electrical Code and local ordinances, and wires must be sized based upon the maximum calculated loads.

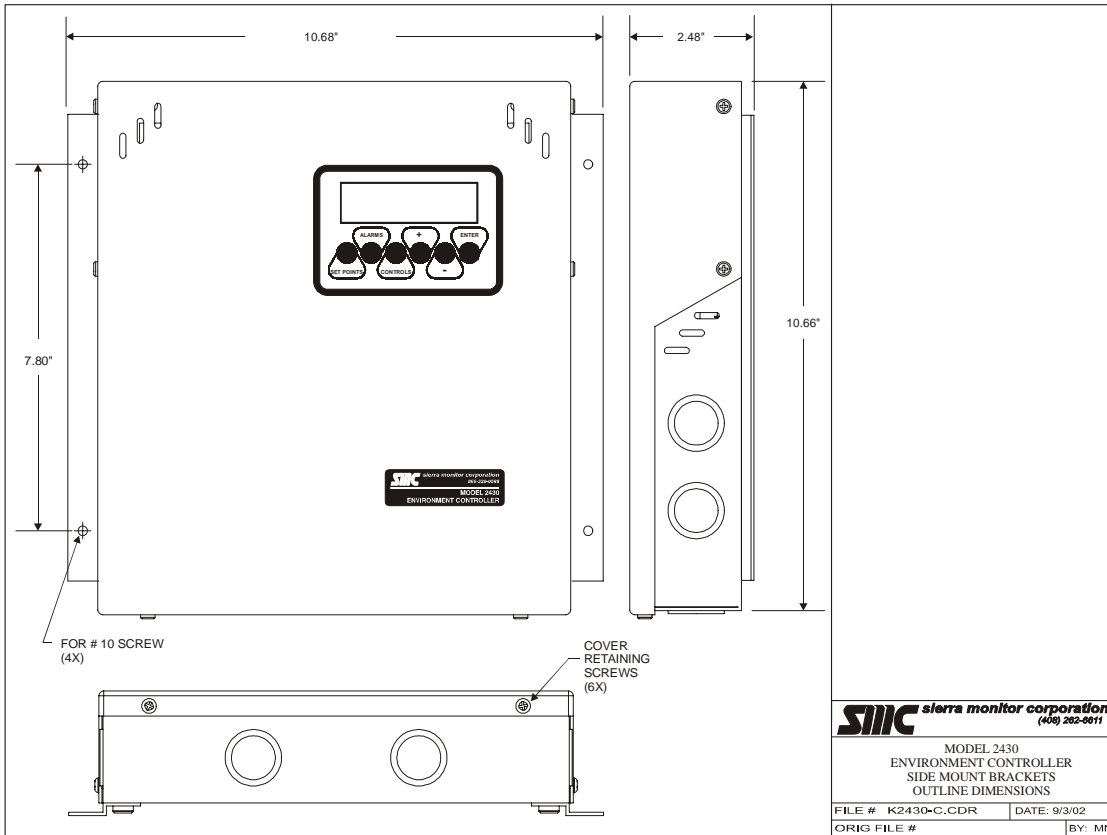


Figure 2-1A

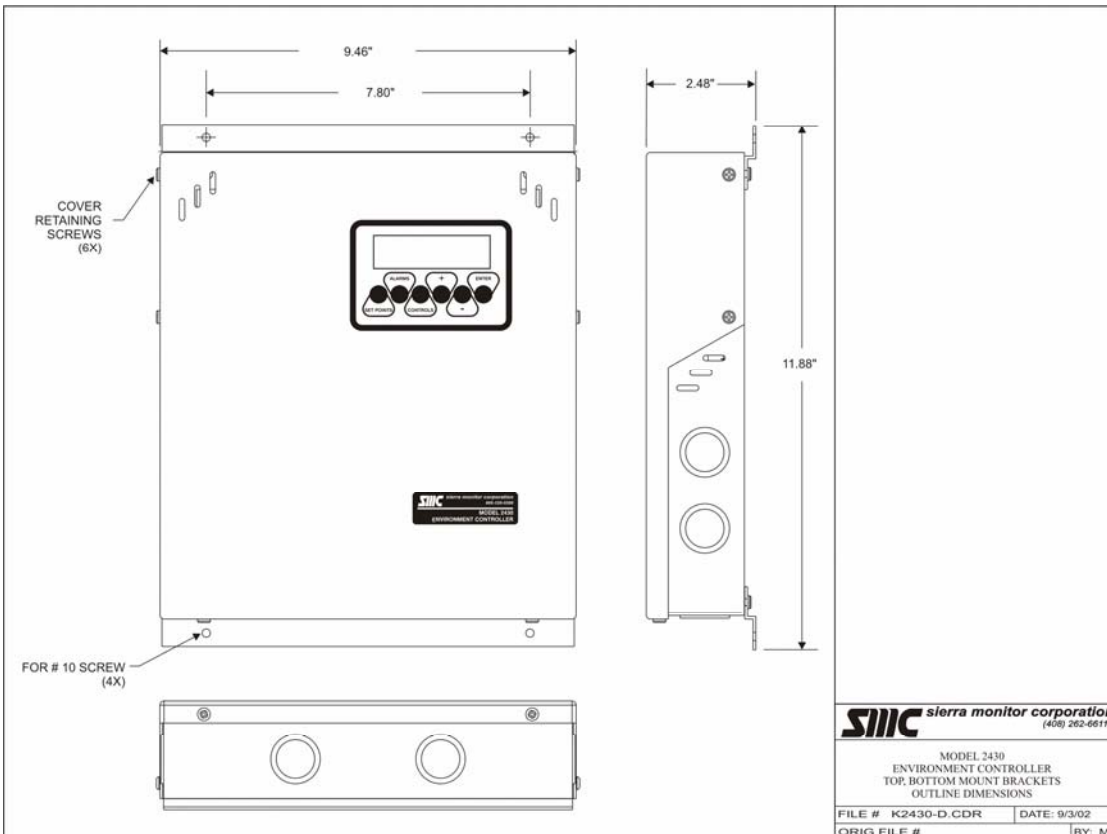


Figure 2-1B

### 2.2.1 Wiring Connections

Remove the cover of the enclosure by removing two screws on each side of the cover and on the bottom of the cover. Note: Removing the cover exposes all controller electronics and care must be taken to avoid exposure to moisture and dust. Three rows of terminals are located on the lower half of the base PCB. Digital inputs, external temperature and AC power are wired to the top row, TB3. Alarm output wiring connections are made to the middle row, TB1, and control wiring and DC power connections are made to the bottom row, TB2. Digital inputs are dry contacts, alarm relays are SPST, 0.5 Amp and control relays are SPDT, 5 Amp, 24 VAC. See Figure 2-2 and Table 2-1 for details of specific wiring terminals.

**Note:** The 9 control relays are fused (F1 – F8, F10, 2 Amp). The fuses are socket mounted on the base PCB directly below their respective relays. The fuses are factory installed for Normally Open relay operation, socket positions Common and NO. For Normally Closed operation, remove the fuses and re-insert in the Common and NC socket positions.

### 2.2.2 External Temperature Sensor

If the optional external temperature sensor is used, see Figure 2-2 and Table 2-1 for specific wiring terminals. The sensor itself should be physically installed in a location where temperature is representative of outside ambient air. Do not install in a location where it will be directly exposed to sunlight.

### 2.2.3 Power

The controller may be powered from one of three supplies:

- 120 VAC, 50/60 Hz
- 220 VAC, 50/60 Hz
- 12-50 VDC

See Figure 2-2 and Table 2-1 for specific details of power wiring connections.

The controller is factory configured for 120 VAC and/or 12-50 VDC operation. In this configuration, two fuses are located in positions 1 and 2, and 3 and 4 on JP2 on the base PCB. For 220 VAC operation, remove the two fuses and re-insert one fuse in positions 2 and 3 on JP2. Wiring connections are made to TB3 as follows:

- L1 to TB3 H
- L2 to TB3 N
- N to TB3 G

#### 2.2.3.1 Power Up

When all connections are made to the controller, check the interior of the enclosure to ensure that the base PCB and all electronics are free of dust and any other materials. Replace the cover. Complete and inspect all wiring to controlled devices.

When power is turned on, the controller will immediately display structure internal temperature, AUTO mode of operation and the number of active alarms. Sensor inputs will be processed and control logic will be implemented in accordance with factory default set points.

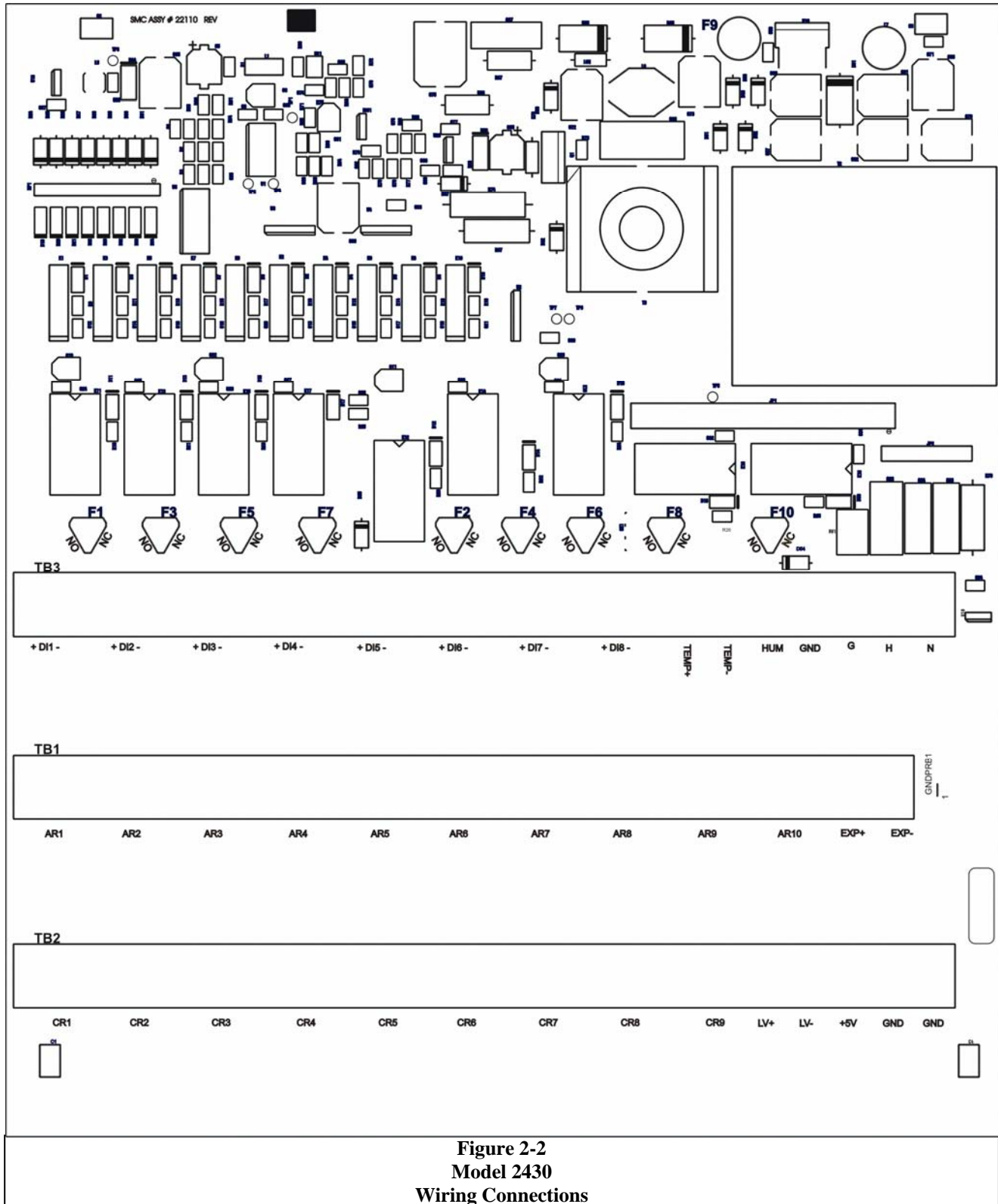
The controller may be configured to display information in a non-English language. If so, when power is turned on, the display will be in the non-English language. To display in English, press and hold the **ENTER** key when applying power.

2.2.3.2 Power Down

All set point and configuration data are stored in EEPROM. Therefore, no data are lost due to a power interruption or extended power outage. The use of EEPROM also eliminates the need for periodic battery replacement.

Termination Legend – TB3 Digital Inputs, Analog Inputs, Power		Termination Legend – TB2 Control Outputs		Termination Legend – TB1 Alarm Relay Outputs	
DI 1	Intrusion	CR 1	Cooling 1	AR 1	High Temperature
DI 2	Smoke Alarm	CR 2	Blower 1	AR 2	Low Temperature
DI 3	A/C 1 fail	CR 3	Heater 1	AR 3	Intrusion
DI 4	A/C 2 Fail	CR 4	Economizer 1	AR 4	Smoke
DI 5	Commercial Power Loss	CR 5	Cooling 2	AR 5	A/C 1 Fail
DI 6	Spare	CR 6	Blower 2	AR 6	A/C 2 Fail
DI 7	Spare	CR 7	Heater 2	AR 7	Commercial Power Fail
DI 8	Spare	CR 8	Economizer 2	AR 8	High Humidity
TEMP +	External Temperature	CR 9	Ventilation	AR 9	Spare
TEMP –	External Temperature	LV +	DC Power Input +	AR 10	Spare
HUM	Not Used	LV –	DC Power Input -	Exp +	Not Used
GND	Ext. Temp. Shield	+ 5V	+ 5 VDC Output	Exp -	Not Used
		GND	DC Common		
G	110 VAC Input Ground				
H	110 VAC Input Hot				
N	110 VAC Input Neutral				

**Table 2-1  
Termination Legend**



**Figure 2-2**  
**Model 2430**  
**Wiring Connections**

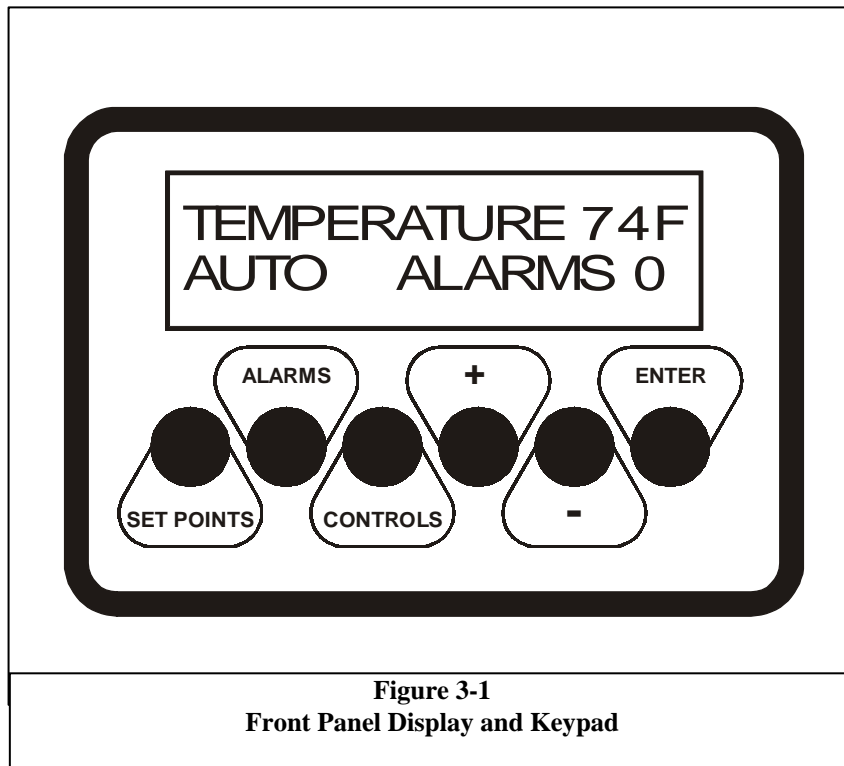
### 3 Operation

#### 3.1 Introduction

The Model 2430 Electronic Lead/Lag Controller provides continuous, automatic control of environmental conditions within the structure and initiates alarms when abnormal conditions cannot be corrected. Lead/lag and demand logic control two air conditioning units for cooling and heating. Lead air conditioner cycle period, lead and lag set points and short cycle delay are all fully adjustable.

When equipped with the optional internal relative humidity sensor, the controller also implements dehumidification logic and control. When equipped with both internal relative humidity sensor and optional external temperature sensor, the controller implements economizer cooling logic and control.

The front panel (Figure 3-1) contains an LCD display (2 rows x 16 characters) and a keypad containing 6 push-button keys. The data normally displayed are structure internal temperature (Fahrenheit or Celsius), automatic or manual control status and number of active alarms. Using the 6 keys, the operator is able to view and change set points, view alarms, view and change controls status and view and change system management functions. Operator interface through the display and keypad is described in the following sections.



### 3.2 Front Panel Display

The front panel display (Figure 3-1) is an LCD , 2 rows x 16 characters. Default data in the display are:

- Temperature:** Structure internal temperature in degrees Fahrenheit or Celsius
- AUTO or MAN:** **AUTO** indicates that HVAC control logic is being implemented automatically by the controller. **MAN** indicates that manual controls have been selected via the front panel keypad and On/Off status of controls is selected manually.
- Alarms #:** Indicates the number of currently active alarms

Pressing a key will cause requested data to be displayed and changes to variables may be made using the ( + ), ( - ) and **ENTER** keys. Following a change, the display will return to default data. Also, during keypad activity, if there is a period of inactivity of 10 seconds, the display will return to default data.

If the controller is equipped with either the optional relative humidity sensor or the optional external temperature sensor, data from these sensors may be viewed by pressing the ( - ) key while in default display mode. Data displayed are:

- Extern Temp:** External (outside air) temperature in degrees Fahrenheit or Celsius
- Internal RH:** Structure internal relative humidity

Default data will be returned to the display after the keypad inactivity period of 10 seconds or by pressing the **ENTER** key.

### 3.3 Front Panel Keypad

The front panel keypad (Figure 3-1) consists of 6 push-button keys labeled:

**SET POINTS ALARMS CONTROLS ( + ) ( - ) ENTER**

The following sections describe the functions of these keys. The keystroke sequences to enable scrolling through these functions and making changes to set points and configuration parameters are described in Table 3-1.

#### 3.3.1 SET POINTS

Following are descriptions of the set points that may be displayed and changed. All temperatures may be in degrees Fahrenheit or Celsius. Also shown are factory default set points.

- A/C Lead SP:** Set point temperature at which the controller will turn on the lead air conditioner. Default = 75 F
- A/C Lag SP:** Set point temperature at which the controller will turn on the lag air conditioner. Default = 80 F
- HTR Lead SP:** Set point temperature at which the controller will turn on the lead heater. Default = 60 F
- HTR Lag SP:** Set point temperature at which the controller will turn on the lag heater. Default = 55 F

**Int Temp Min:** Minimum structure internal temperature at which the controller will implement economizer cooling. This is one of three conditions which must be satisfied to implement economizer cooling. The other two are external temperature and internal relative humidity. Note that these two sensors are optional and the controller must be equipped with both for economizer cooling. Default = 70 F

**Int RH Max\*:** Maximum structure internal relative humidity at which the controller will implement economizer cooling. Default = 65%

**Ext Temp Max\*:** Maximum external (outside air) temperature at which the controller will implement economizer cooling. Default = 65 F

**HT Alarm SP:** Set point temperature at which the controller will generate a high temperature alarm. Default = 90 F

**LT Alarm SP:** Set point temperature at which the controller will generate a low temperature alarm. Default = 45 F

**HT Vent SP:** Set point temperature at which the controller will turn on the auxiliary ventilation fan (if the structure is so equipped). Default = 90 F

**HiHu Alm SP\*:** Set point relative humidity at which the controller will generate a high humidity alarm. Default = 70%

**DeHu On SP\*:** Set point relative humidity at which the controller will implement dehumidification logic and control. Default = 50%

**DeHu Off SP\*:** Set point relative humidity at which the controller will turn off dehumidification control. Default = 35%

**\*Requires optional relative humidity sensor or external temperature sensor.**

### 3.3.2 ALARMS

Following are descriptions of the alarms that may be displayed. Next to the description of the alarm is the status: **On** or **Off**.

**HighTemp Alm:** Structure internal temperature is greater than the High Temperature Alarm Set Point.

**Low Temp Alm:** Structure internal temperature is less than the Low Temperature Alarm Set Point.

**Intrusion:** The door of the structure has been opened and intrusion has not been acknowledged.

**Smoke Alarm:** Smoke alarm. All HVAC equipment is turned off.

**AC1 Fail Alarm:** Air conditioner 1 has failed. Air conditioner 2 only is used for cooling.

**AC2 Fail Alarm:** Air conditioner 2 has failed. Air conditioner 1 only is used for cooling. If both air conditioners have failed, Blowers 1 and 2 are called.

**ComPwr Fail:** Primary AC power is lost.

**Hi Humid Alm:** Structure internal relative humidity is greater than the High Humidity Alarm Set Point.

### 3.3.3 CONTROLS

Following are descriptions of the controls whose On/Off status may be viewed when in AUTO (automatic) mode or viewed and changed when in MAN (manual) mode.

**Cooling 1:** Air Conditioner 1

**Blower 1:** Blower 1

**Heater 1:** Heater 1

**Economizer 1:** Air Damper on Air Conditioner 1

**Cooling 2:** Air Conditioner 2

**Blower 2:** Blower 2

**Heater 2:** Heater 2

**Economizer 2:** Air Damper on Air Conditioner 2

**Vent:** Auxiliary Ventilation Fan (if the structure is so equipped)

### 3.3.4 (-), (+)

These keys are used to scroll through set points, alarms, controls and system management functions and to decrease/increase values for changes.

If the controller is equipped with either the optional relative humidity sensor or the optional external temperature sensor, when in the default display mode, press the ( - ) to display data from these sensors.

### 3.3.5 ENTER

The **ENTER** key is used to execute changes and/or return to the default display mode. It is also used to access System Management Functions. These are largely configuration functions which are set when initially commissioning the controller for operation. Following are descriptions of those functions.

#### 3.3.5.1 SYSTEM MANAGEMENT FUNCTIONS

**Select A/C Lead:** Selects either Air Conditioner 1 or 2 as the lead air conditioner.

**Lead Xchg Period:** Selects the lead exchange period, in days, from 0 to 30, during which the selected air conditioner, 1 or 2, will be called as the lead. At the expiration of the period, the alternate air conditioner will be called as the lead. If 0 is selected, lead exchange is disabled and the selected air conditioner, 1 or 2, is the lead constantly.

**MANUAL Timeout:** Selects the MANUAL mode timeout period, in hours, from 1 to 24. If MANUAL mode is selected, when this period of time expires, the controller will revert to AUTO mode. This is a safeguard against controlled devices being turned on manually and inadvertently left to run indefinitely.

**Shrt Cycle Delay:** Selects the short cycle delay, in minutes, from 1 to 5. When either air conditioner is turned off, this delay period commences. The air conditioner will not be called again until the expiration of the delay period to prevent compressor short cycling.

**Temp Differential:** Selects the temperature differential, in degrees Fahrenheit or Celsius, from 1 to 5. This is a negative differential for cooling and a positive differential for heating and represents a dead band below or above set point to turn off cooling or heating, respectively.

**Enbl Cont Blower:** If this function is enabled, the lead blower runs continuously. If the function is disabled, the lead blower is called as required for HVAC functions in the sequence of operation.

**Alrm Relay Deflt:** This function allows each of the 10 alarm relays to be set for contacts open/safe, closed alarm, or closed/safe, open/alarm.

**Enable Ext Temp:** If the optional external temperature sensor is used, this function is enabled. If not, the function is disabled.

**Enable Int RH:** If the optional relative humidity sensor is used, this function is enabled. If not, the function is disabled.

**Sens Calibration:** Enables calibration of the internal temperature sensor, external temperature sensor and internal relative humidity sensor. An offset is applied to match the reading of the sensor being calibrated to that of an independent, calibrated measurement device.

**Set User PIN:** Enables entry of a factory programmed Master PIN, which in turn enables entry of a User PIN if password security is desired for making set point, AUTO/MANUAL and configuration changes. Security is discussed in Section 3.4 below.

**Version V####:** Indicates the version of firmware and logic programmed into the controller. This is factory programmed firmware, not subject to change by the operator.

**Restore deflt SP:** When this function is executed, all set points and configuration parameters are restored to factory default values.

**Select Temp Unit:** Selects temperature units for display in degrees Fahrenheit or Celsius.

### 3.4 Security PIN Codes

The Model 2430 is factory configured for open access to all functions. The user has the option to enforce PIN code security to prevent unauthorized set point, AUTO/MANUAL status or configuration changes. To implement PIN code security:

1. Enter System Management Functions and scroll to **Set User PIN**.
2. Press the **ENTER** key and use the ( + ), ( - ) and **ENTER** keys to enter the Master PIN: **1 2 3 4**. The Master PIN is factory programmed and cannot be changed.
3. Following entry of the Master PIN, a prompt is displayed to enter a User PIN. Enter a 4-digit User PIN. The factory default User PIN is **0 0 0 0**, which disables security protection. Entry of any other 4-digit PIN will automatically enforce security.

When security is enforced, initial keypad activity to make a set point change, AUTO/MANUAL status change or configuration change in system management functions will prompt a User PIN entry. When a valid PIN has been entered, it will remain in force until such time that there is no keypad activity for a period of 15 minutes. Thereafter, the PIN will have to be re-entered.

MODEL 2430 KEY STROKE SEQUENCES		
Key	DISPLAY/FUNCTIONS	SEQUENCE
	Internal Temperature Control Mode: Auto or Manual Number of Active Alarms	Default Display Inactivity timeout of 10 seconds to return to Default Display
SET POINTS	Display /Change Set Points: A/C Lead Set Point A/C Lag Set Point Heater Lead Set Point Heater Lag Set Point Internal Temperature Minimum* Internal Relative Humidity Maximum* External Temperature Maximum* High Temp Alarm Set Point Low Temp Alarm Set Point High Temp Ventilation Set Point High Humidity Alarm Set Point Dehumidifier On Set Point Dehumidifier Off Set Point * Economizer Operation	Press <b>SET POINTS</b> Press <b>+/-</b> to scroll through set points Press <b>ENTER</b> to select set point Press <b>+/-</b> to increase/decrease value Press <b>ENTER</b> to confirm
<b>Table 3 –1</b> <b>Model 2430 Keystroke Sequences</b>		

<b>MODEL 2430 KEY STROKE SEQUENCES</b>		
Key	DISPLAY/FUNCTIONS	SEQUENCE
ALARMS	Display Alarms and Status, Active or Clear: High Temperature Low Temperature Intrusion Smoke A/C 1 Fail A/C 2 Fail Commercial Power Fail High Humidity	Press <b>ALARMS</b> Press <b>+/-</b> to scroll through alarms Press <b>ENTER</b> to return to default display
CONTROLS	Select Control Mode, Auto or Manual Display On/Off Status of Controls: Cooling 1 Blower 1 Heater 1 Economizer 1 Cooling 2 Blower 2 Heater 2 Economizer 2 Ventilation	Press <b>CONTROLS</b> Select Control Mode: Press <b>+</b> for Auto Press <b>-</b> for Manual Press <b>ENTER</b> If Auto, Press <b>+/-</b> to scroll through status of controls Press <b>ENTER</b> to return to default display If Manual, Press <b>+/-</b> to scroll through status of controls Press <b>ENTER</b> to manually turn control on or off
ENTER	Display/Change System Management Functions: Select A/C Lead Lead Exchange Period Manual Time Out Short Cycle Delay Temperature Differential Enable Continuous Blower Alarm Relay Default Enable External Temperature Enable Internal Relative Humidity Sensor Calibration Set User PIN Software Version Restore Default Set Points Select Temperature Units	With display in default Press <b>ENTER</b> Press <b>+/-</b> to scroll through system management functions Press <b>ENTER</b> to change Press <b>+/-</b> to increase/decrease values Press <b>ENTER</b> to confirm  For Alarm Relay Default only, after pressing <b>ENTER</b> to select the function, Press <b>+/-</b> to scroll through alarms. Press <b>ALARMS</b> to toggle open or closed. Press <b>ENTER</b> to confirm
(-)	Display External Temperature and/or Internal Relative Humidity	With display in default, Press <b>-</b> External Temperature and/or Internal Relative Humidity are displayed when functions are enabled in System Management Functions Press <b>ENTER</b> to return to default display

**Table 3 –1  
Model 2430 Keystroke Sequences**

## 4 SEQUENCE OF OPERATION

### 4.1 DESCRIPTION

Table 4-1 describes the automatic sequence of operation of the Model 2430 Electronic Lead/Lag Controller. To operate to this sequence, the controller must be in AUTO mode of operation. Certain sequences require the optional relative humidity and external temperature sensors.

**Note:** In this sequence of operation, the lead blower runs continuously (the Continuous Blower function in System Management Functions has been enabled).

**COOLING:** Automatic control of 2 air conditioners using lead/lag and demand logic.

**ECONOMIZER COOLING:** Automatic economizer cooling using the blower and air damper of the lead air conditioner.

**Note:** This requires both the optional relative humidity and external temperature sensors.

**Note:** The air conditioning system need not be equipped with an economizer option; however, both units must be equipped with motorized fresh air dampers.

**Heating:** Automatic control of 2 heaters using lead/lag and demand logic.

**High Temperature Ventilation:** Automatic control of an auxiliary ventilation fan which is not part of the air conditioning system.

**Dehumidification:** Automatic control of the lag air conditioner and lead heater for dehumidification.

**Note:** This requires the optional relative humidity sensor.

<b>SEQUENCE OF OPERATION</b>		
<b>Table 4-1A</b>		
<b>COOLING</b>		
<b>Control</b>	<b>Data Display</b>	<b>Description</b>
Lead Air Conditioner On Lead Blower On	Cooling 1 or 2 Blower 1 or 2	Calls Lead Air Conditioner and Blower when internal temperature exceeds A/C Lead Set Point.
Lag Air Conditioner On Lag Blower On	Cooling 1 and 2 Blower 1 and 2	Calls Lag Air Conditioner and Blower if Lead Air Conditioner is on and internal temperature exceeds A/C Lag Set Point.
		<b>Note:</b> In the sequence above, lead/lag logic determines which air conditioner, 1 or 2, is turned on first. The lead blower runs continuously.
Lead Air Conditioner Off Lead Blower On	Cooling 1 or 2 Blower 1 or 2	Lead Air Conditioner is turned off : When internal temperature drops below the A/C Lead Set Point minus the Temperature Differential. If a smoke alarm occurs.
Lag Air Conditioner Off Lag Blower Off	Cooling 1 and 2 Blower 1 or 2	Lag Air Conditioner and Blower are turned off : When internal temperature drops below the A/C Lead Set Point minus the Temperature Differential. If a smoke alarm occurs.
		<b>Note:</b> If a smoke alarm occurs, the Lead Blower is also turned off.

<b>SEQUENCE OF OPERATION</b> <b>Table 4-1B</b>		
<b>ECONOMIZER COOLING</b>		
<b>Control</b>	<b>Data Display</b>	<b>Description</b>
Lead Air Damper Open  Lead Blower On	Economizer 1 or 2  Blower 1 or 2	The lead Air Damper is opened to cool the structure using outside air when the following conditions exist: Internal Temperature $\geq$ Internal Temperature Minimum Set Point External Temperature $\leq$ External Temperature Maximum Set Point Internal Humidity $\leq$ Internal RH Maximum Set Point
Lead Air Damper Closed  Lead Blower On	Economizer 1 or 2  Blower 1 or 2	The Lead Air Damper is closed: When internal temperature drops below Internal Temperature Minimum Set Point minus the Temperature Differential. If the external temperature rises above the External Temperature Maximum Set Point. If the internal humidity rises above the Internal RH Maximum Set Point. If a smoke alarm occurs.  Note: If a smoke alarm occurs, the Lead Blower is also turned off.

<b>SEQUENCE OF OPERATION</b> <b>Table 4-1C</b>		
<b>HEATING</b>		
<b>Control</b>	<b>Data Display</b>	<b>Description</b>
Lead Heater On  Lead Blower On	Heater 1 or 2  Blower 1 or 2	Calls Lead Heater and Blower when internal temperature drops below Heater Lead Set Point.
Lag Heater On  Lag Blower On	Heater 1 and 2  Blower 1 and 2	Calls Lag Heater and Blower if Lead Heater is on and internal temperature drops below Heater Lag Set Point.
Lead Heater Off  Lead Blower On	Heater 1 or 2  Blower 1 or 2	Lead Heater is turned off: When internal temperature rises above Heater Lead Set Point plus the Temperature Differential. If a smoke alarm occurs.
Lag Heater Off  Lag Blower Off	Heater 1 and 2  Blower 1 or 2	Lag Heater and Blower are turned off: When the internal temperature rises above Heater Lead Set Point plus the Temperature Differential. If a smoke alarm occurs.
		Note: If a smoke alarm occurs, the Lead Blower is also turned off.

<b>SEQUENCE OF OPERATION</b> <b>Table 4-1D</b>		
<b>HIGH TEMPERATURE VENTILATION</b>		
<b>Control</b>	<b>Data Display</b>	<b>Description</b>
Ventilation Fan On  Air Conditioners 1 and 2 On  Blowers 1 and 2 On	Ventilation  Cooling 1 and 2  Blowers 1 and 2	The Ventilation Fan is turned on when internal temperature exceeds the High Temperature Ventilation Set Point
Ventilation Fan Off  Air Conditioners 1 and 2 On  Blowers 1 and 2 On	Ventilation  Cooling 1 and 2  Blowers 1 and 2	The Ventilation Fan is turned off: When the internal temperature drops below the High Temperature Ventilation Set Point minus the Temperature Differential. If a smoke alarm occurs.  Note: If a smoke alarm occurs, air conditioners and blowers are also turned off.

<b>SEQUENCE OF OPERATION</b> <b>Table 4-1E</b>		
<b>DEHUMIDIFICATION</b>		
<b>Control</b>	<b>Data Display</b>	<b>Description</b>
Lag Air Conditioner On  Lag Blower On	Cooling 1 or 2  Blower 1 or 2	Calls Lag Air Conditioner and Blower when internal relative humidity exceeds Dehumidifier On Set Point.
Lead Heater On  Lag Air Conditioner On  Blowers 1 and 2 On	Heater 1 or 2  Cooling 1 or 2  Blowers 1 and 2	Calls Lead Heater if internal relative humidity has not dropped below Dehumidifier Off Set Point and internal temperature drops below Heater Lead Set Point.  Note: Lag Heater logic is disabled during Dehumidification.
Lead Heater On  Lag Air Conditioner Off  Lead Blower On	Heater 1 or 2  Cooling 1 or 2  Blower 1 or 2	The Lag Air Conditioner is turned off: When the internal relative humidity drops below the Dehumidification Off Set Point. If a smoke alarm occurs.  Note: If a smoke alarm occurs, the Lead Heater and Blower are also turned off.

SEQUENCE OF OPERATION Table 4-1F		
ALARMS		
Alarm Condition	Control	Description
High Temperature	Air Conditioners 1 and 2 On Blowers 1 and 2 On	Internal temperature is greater than the High Temperature Alarm Set Point. If the internal temperature is also greater than the High Temperature Ventilation Set Point, the Ventilation Fan is also turned on.
Low Temperature	Heaters 1 and 2 On Blowers 1 and 2 On	Internal temperature is less than the Low Temperature Alarm Set Point.
High Humidity	Lag Air Conditioner On	Internal relative humidity is greater than High Humidity Alarm Set Point.
Intrusion		The door of the structure has been opened and intrusion has not been acknowledged.
Smoke	All HVAC Off	Smoke alarm. All HVAC equipment is turned off.
A/C 1 Fail	Air Conditioner 1 Off	Air Conditioner 1 has failed. Air Conditioner 2 only is used for cooling.
A/C 2 Fail	Air Conditioner 2 Off	Air Conditioner 2 has failed. Air Conditioner 1 only is used for cooling. If both air conditioners have failed, Blowers 1 and 2 are called.
Commercial Power Fail		Primary AC power is lost.

## 5 Maintenance, Calibration and Service

### 5.1 Periodic Maintenance

The only periodic maintenance required of the Model 2430 Controller is regular inspection of the controller for dust or dirt build-up. The cover and base of the controller enclosure have vent slots to enable internal circulation of ambient air past the internal temperature and relative humidity sensors. The vent slots are located on vertical surfaces to minimize ingress of dust and dirt. When the HVAC system is shut down for service, it is recommended that power be removed from the controller and the front cover removed to inspect for dust or dirt. Any build-up should be removed with a dry instrument such as compressed air or a small, dry paint brush.

### 5.2 Sensor Calibration

The internal temperature sensor and the optional internal relative humidity and external temperature sensors should be checked annually. This can be done by comparing their readings with those of an independent, calibrated measurement device. Agreement should be within +/- 1° F and +/- 2% RH. If calibration is required, the following procedure is used.

1. Note the current readings on the front panel display and the calibrated measurement device.
2. Enter System Management Functions and scroll to **Sens Calibration**.
3. Press the **ENTER** key and scroll to the appropriate entry:  
**Int Temp Offset**  
**External Temp Offset**  
**Int RH Offset**
4. Press the **ENTER** key to adjust the offset. Use the ( + ) key to apply positive offset to increase the front panel reading to match that of the calibrated device. Increments are 1° and 1% RH. Use the ( - ) key to apply negative offset.
5. Press the **ENTER** key to store the data.

### 5.3 Service

The Model 2430 Controller electronics consist of a base PCB and control PCB. The base PCB contains power supply, control relays, alarm relays, sensors and terminals for field wiring connections. The control PCB contains the microprocessor, display and keypad. The control PCB is mounted on the base PCB on 4 standoffs and electrical connections are made through a multi-pin connector at the bottom of the control PCB.

#### 5.3.1 Field Service-Replacement Parts

The following parts may be replaced by the user in the field

##### 5.3.1.1 Fuses

1. Sierra P/N SPK49088, F9, 2 Amp, Power Supply Circuit  
This fuse is located on the base PCB above the control PCB.
2. Sierra P/N SPK49174, F1 – F8, F10, JP2, 2 Amp, Control Relays, Power Input Circuit  
These fuses are located on the base PCB adjacent to and below the control relays. When replacing them, note that they can be inserted for either normally open or normally closed relay operation.

##### 5.3.1.2 Relative Humidity Sensor

Sierra P/N SPK33043, Relative Humidity Sensor

This sensor is located on the base PCB in socket SK1 between fuses F6 and F8.

##### 5.3.1.3 Base and Control PCB's

1. Sierra P/N SPK22110, Base PCB
2. Sierra P/N SPK22109, Control PCB

## 6 Product Specifications

**System:**

Power 120 VAC, 50/60 Hz  
220 VAC, 50/60 Hz  
12-50 VDC  
5 Watts nominal  
Microprocessor PIC Controller 16F877  
8 Kbytes EEPROM  
256 bytes EPROM

**Environmental:**

Temperature Operating Range  
32° to 122°F (0° to 50°C)  
Storage Range  
-40° to 122°F (-40° to 50°C)  
Humidity 0 - 95% RH

**Front Panel:**

Display LCD alphanumeric  
(2 rows x 16 characters)  
Keypad 6 keys for set points, alarms, controls

**Sensors:**

Temperature Range: 0°F to 120°F (-15°C to 49°C)  
Accuracy: +/- 1°F (from 50°-100°F)  
Humidity: Range: 0-100% Relative Humidity  
(Optional) Accuracy: +/- 2% Relative Humidity  
External  
Temperature: Range: 0°F to 120°F (-15°C to 49°C)  
(Optional) Accuracy: +/- 1°F (from 50°-100°F)

**Mechanical:**

Enclosure Sheet Metal Electrical Cabinet  
Brackets For Surface Mount  
  
Knockouts For 1/2 " and 3/4 " conduit connections  
Dimensions 10.5" x 9.3" x 2.15" (HWD)  
Weight 5 pounds (2.2 Kg.)

**Inputs:**

Integral Temperature  
Relative Humidity (Optional)  
  
External External Temperature (Optional)  
  
Digital Intrusion  
Commercial Power Loss  
Smoke Alarm  
A/C 1 Fail  
A/C 2 Fail  
Spares (Qty. 3)  
**Total Digital Inputs: 8**

**Outputs:**

Controls SPDT, 5 Amp, 24 VAC  
  
Cooling 1  
Blower 1  
Heater 1  
Economizer 1  
Cooling 2  
Blower 2  
Heater 2  
Economizer 2  
High Temperature Ventilation

**Total Control Relays: 9**

Alarms

SPST, 0.5 Amp  
High Temperature  
Low Temperature  
Intrusion  
Smoke  
A/C 1 Fail  
A/C 2 Fail  
Commercial Power Fail  
High Humidity  
Spares (Qty. 2)

**Total Alarms: 10**

## 7 Warranty

SIERRA MONITOR CORPORATION warrants its environment controller products to be free from defects in workmanship or material under normal use and service for two years after date of shipment. SMC will repair or replace, without charge, any equipment found to be defective during the warranty period. Final determination of the nature and responsibility for defective or damaged equipment will be made by SMC personnel.

All warranties thereunder are contingent upon proper use in the application for which the product was intended and do not cover products which have been modified or repaired without SMC approval or which have been subjected to accident, improper maintenance, installation or application, or on which original identification marks have been removed or altered. This Limited Warranty also will not apply to interconnecting cables or wires, consumables (i.e. calibration gases, batteries), nor to any damage resulting from battery leakage.

In all cases SMC's responsibility and liability under this warranty shall be limited to the cost of the equipment. The purchaser must obtain shipping instructions for the prepaid return of any item under this warranty provision and compliance with such instruction shall be a condition of this warranty.

Except for the express warranty stated above, SMC disclaims all warranties with regard to the products sold hereunder including all implied warranties of merchantability and fitness and the express warranties stated herein are in lieu of all obligations or liabilities on the part of SMC for damages including but not limited to consequential damages arising out of/or in connection with the use or performance of the product.