TOP VIEW

SIDE VIEW

Figure #1

General Description

ACI's mesh network Series 2000 RC2100 wireless heating system controller utilizes reliable Spread Spectrum Radio technology. Together with other existing ACI WT2630A wireless space sensors and OST2630 wireless outside air temperature (OSA) sensors, the RC2100 controller will control the boiler system based on the average space temperature (up to 12 zones) and wireless outside air temperature. If the OSA temperature is below OSA set point and the average temperature is lower than the average space temperature set point, the heating system will be activated after a preset time delay (adjustable) by a relay output from the RC2100 controller to the boiler control system. The RC2100 provides maximum flexibility with extensive system adjustability, sensor selectability, alarms and reliable wireless sensor capability.

The maximum radio transmission distance is dependent on the building type. The maximum open air transmission distance is one mile. In a typical commercial building with steel I-Beam construction, concrete floors with reinforcing rod, and metal stud walls, it can be expected that transmissions will penetrate vertically through floors and horizontally through 200 to 500 feet of walls, furniture and air.

Generally a wireless system will cover at least three floors – one floor above and one floor below the receiver location. In some buildings with a favorable transmission characteristics, the system may cover more floors.

Installation

The RC2100 Series 2000 Controller is compatible with different ACI wireless sensors. Each wireless sensor will have a unique individual address (or ID) and the RC2100 Controller is preconfigured to work with each wireless sensor's unique address at the factory or distributor location.

Wireless sensor transmitters should be installed within 200 to 500 feet of the RC2100 Controller.

RR2552 signal repeaters can be installed as needed to increase transmission distance between sensors and receivers. The network number of the repeater has to be set to the same network number of the RC2100 controller for the system to operate correctly. Please refer to the RR2552 repeater instruction.

⚠ PRECAUTIONS

SENSORS, REPEATERS AND RECEIVERS SHOULD **NOT** BE INSTALLED IN THE FOLLOWING AREAS:

- **INSIDE METAL ENCLOSURE / PANEL**

- **INSIDE OR IMMEDIATELY NEXT TO ELEVATOR SHAFT / ELEVATOR BANKS**

- **IN FRONT OF OR IMMEDIATELY NEXT TO LARGE TREES OR LARGE BODY OF WATER**

    TRANSMISSION DISTANCE AND PERFORMANCE WILL BE DRASTICALLY REDUCED.

Mounting
The RC2100 controller should be mounted using four #8 screws (Mounting dimension see figure 1). The controller shall be oriented in an vertical position with the conduit connection at the bottom.
The controller will be pre-configured by the factory or the distributor and the configuration will be recorded on the lower part of the operation display label located inside the cover.

Power Wiring
Connect 24 V 60 Hz to the input terminals using 18AWG wire.

⚠ **CAUTION**

DISCONNECT POWER BEFORE INSTALLATION TO PREVENT ELECTICAL SHOCK OR EQUIPMENT DAMAGE.

⚠ **CAUTION**

DO NOT USE THIS PRODUCT IN ANY SAFETY RELATED APPLICATIONS WHERE HUMAN LIFE MAY BE AFFECTED.

For WT2630 wireless temperature sensor, OST2630 wireless compact OSA sensor, and RR2552 Signal Repeater, please refer to the respective product specifications for installation information.
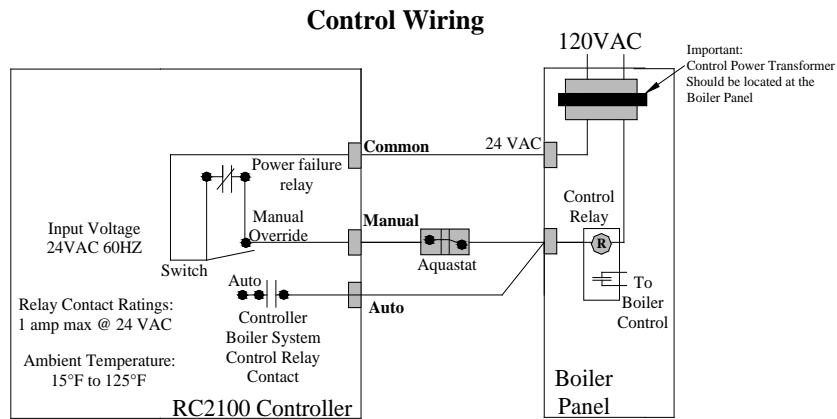
Control Wiring

Figure #2

Configuration

The RC2100 Series 2000 controller is preconfigured at the factory or the distributor location. If reconfiguration is needed, please refer to the software configuration manual or call your local distributor.
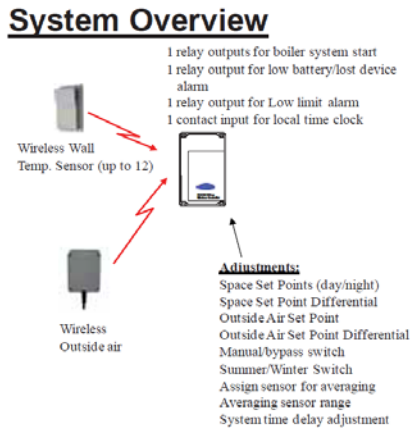
System Overview

Figure #3

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Description/Operation

Display

A four digit display and 8 user interface keys are used to display system information and field adjustment of setpoints and field parameters (see Figure 1).

The display of the RC2100 is organized in a tabular format. By using the four scrolling keys (Columns <, >, Rows ∧, ∨) and the select key, The user can view the stored information/parameters.

The Right (>) or Left (<) keys are used to move from column to column. The Up (∧) and Down (∨) keys are used to move within a specific column. Pressing the "SELECT" key will display the value.

For example:
Using the Up (∧) and Down (∨) keys, the display can be scrolled to display "oAt" (Outside Air Temperature). Then press the (SELECT) key to display the actual outside air temperature.

The Plus (+) and Minus (-) and ENTER keys can be used for changing set points, control differentials, time delays, sensor limit range, clock settings, and day/night schedules.

For example:
Using the Up (∧) and Down (∨) keys, the display can be scrolled to display "dSP" (day set point). Then press the (SELECT) key to display the actual day set point temperature. To change the set point, press the Plus (+) or Minus (-) keys to reach the desired temperature and press the ENTER key to store the new setpoint value.

Display Table

System Parameters	System Settings	Internal Clock	Error List
Ast Average Space Temperature	**dSP** Day Set Point	**CLOC** Time Clock	**trbl** Trouble Alarms
OAt Outside Air Temperature	**nSB** Night Setback Offset	**dAY** Day Schedule Start Time	**nonE** No Errors
S 1 Space Temp (1)	**diFF** Space Setpoint Differential	**nite** Night Schedule Start Time	**lOSt** Lost Sensor Alarm
S 2 Space Temp (2)	**dLAY** Output Time Delay	**inPt** Clock Input External (tb) Internal (int)	**S1-S12 OAt**
S 3 Space Temp (3)	**SLr** Sensor Limit Range		**bAtt** Low Battery Alarm
S 4 Space Temp (4)	**oAC** Outside Air Cutoff Set Point		**S1-S12 OAt**
S 5 Space Temp (5)	**oAD** Outside Air Differential		
S 6 Space Temp (6)		Select Column < >	
S 7 Space Temp (7)			
S 8 Space Temp (8)		∧ ∨ Scroll Up/Down	
S 9 Space Temp (9)			
S 10 Space Temp (10)		SELECT Display Value	
S 11 Space Temp (11)		+ - Change Value	
S 12 Space Temp (12)		ENTER Enter Value	

Figure #4

The Right(>) or Left(<) keys are used to move from column to column. The Up(∧) and Down(∨) keys are used to move within a specific column.

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Space Temperature and Outside Air Temperature

The basic RC2100YA-2K can support up to 4 zones (one sensor per zone). RC2100YB-2K can support up to 8 zones and RC2100YC-2K can support up to 12 zones.

The RC2100 controller is located next to the boiler control panel. The wireless room sensors will transmit space temperature information to the controller every minute and the controller will calculate the average space temperature (based on up to 12 space sensors).

If any one of the space sensors is out of Temperature Limit Range (SLr), that particular sensor will be removed from the average temperature calculation. The sensor will be included again for the calculation when the value returns to the limit range. The sensor Temperature Limit Range is defined as degrees from set point. The default value is 10 degrees F above or below Day/Night Set Point.

Dip switches (on-off) located on the controller can be used to manually remove a specific space sensor from the averaging calculation. The LEDs below the dip switches indicate all sensors that are currently included in the averaging calculation (Refer to Figure 5).

When a specific sensor is removed automatically or manually from the averaging calculation, the associated LED indication on the controller will be de-energized (Refer to Figure 5).

The wireless outside air sensor should be located somewhere on the outside of the building close to the boiler room. The ACI OST2630 Outside Air Sensor can be used.

On rare occasions when all of the space sensors are out of the Temperature Limit Range (such as building start up after an extended shut down), the average temperature of all the sensors will be used until one of the sensor's temperature returns to within the Temperature Limit Range. The controller will then revert to normal temperature averaging calculation as describe above.

All sensor values can be read by user through the keyboard/LED Display panel.
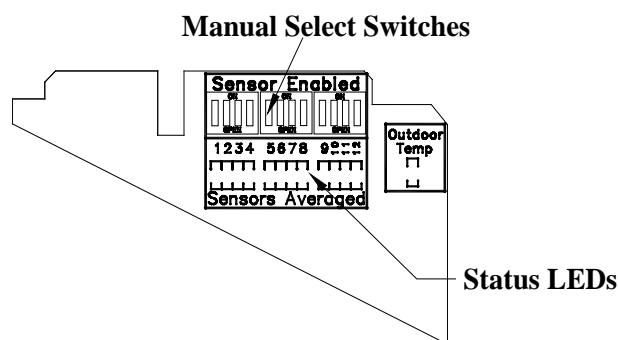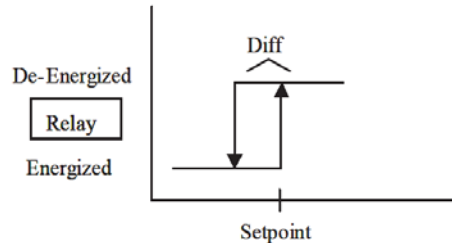

Figure #5

Boiler System Control/Enable

If the OSA temperature is below Outside Air Cutoff set point (oAC) and the average temperature is lower than the average space temperature set point (dSP), the heating systems will be activated (after a preset time delay of 5 min. to 30 min) by a relay output from the RC2100 controller to the boiler control system.

The heating system output time delay (dLAy) can be adjusted by the user using keyboard.

On a rise in average space temperature (above set point) or outside air temperature (above set point plus differential), the heating relay from the RC2100 will be deenergized (Refer to Figure 6). On a drop in average temperature (below set point plus differential), the heating relay will be energized.
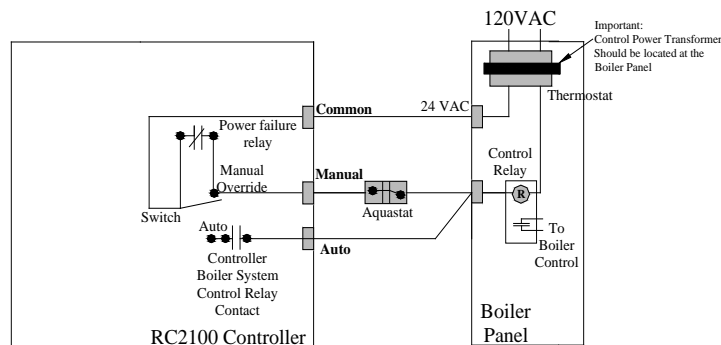

Figure #6

If the OSA sensor fails to report to the controller for more than 15 minutes and the Lost Transmitter Alarm LED/relay are energized, the controller will continue to control the heating systems based on the average space temperature only.

The average space temperature set point (dSP and nSb), average space temperature set point differential (dIFF), OSA temperature cutoff set point (oAC), OSA temperature set point differential (oAd) can be displayed and adjusted using the keyboard/display panel on the RC2100.

Automatic/Manual override and Power Failure Mode

An automatic – Manual Override switch at the controller will provide by-pass operation. When the switch is in Automatic mode, the RC2100 controller will control the heating systems as described above. When the switch is put in Manual Override mode, the RC2100 output will be bypassed and an optional external aquastat should be used to take over the control of the boiler system.

Figure #7

On power failure, the RC2100 will default to Manual Override mode as described above.

Low Limit Control

If any space temperature drops below 35 deg. F and the outside air temperature is below 32 degree F, the heating systems relay and the Low Limit Alarm LED (figure 9) will be activated.

On a rise of the space temperature (above 35 deg F plus differential) the heating system relay from the RC2100 will be de-energized. The alarm indication will also be turned off.

The space low limit protection set point of 35 deg F, space temperature differential of 4 degree and the OSA temperature set point of 32 degree F are non-adjustable by user.

If the OSA sensor fails to report to the controller for more than 15 minutes and the Lost Transmitter Alarm LED/relay are energized, this Low Limit Control feature will be disabled.

Summer/Winter Switch

A Summer/Winter switch (Figure 8) is also located inside the controller. When the switch is in the Winter mode, the controller will control the heating system normally as described previously. When the switch is in the Summer mode, the control output will not function. All display and adjustment features of the controller remain functional in Summer mode.
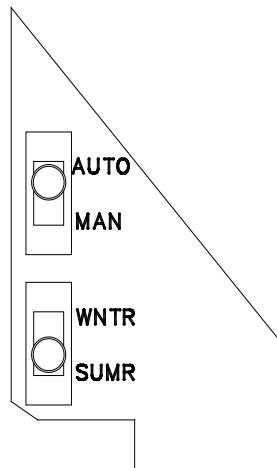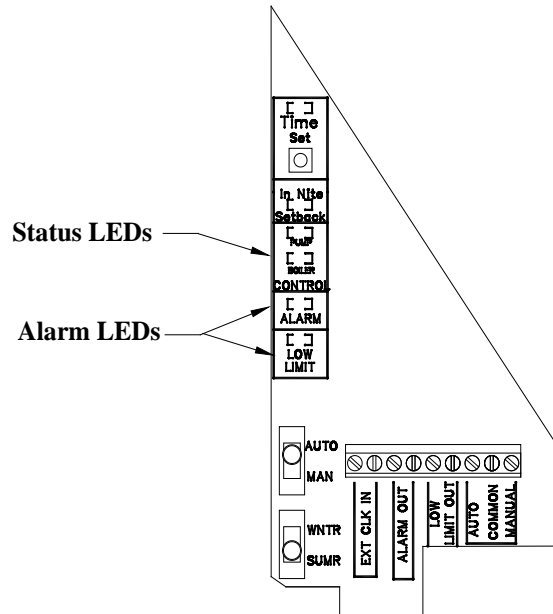

Figure #8

Day/Night Control, Local or Wireless Remote Clock Input

The RC2100 has day and night schedules (adjustable) for controlling the boiler system according to the day and night setpoints.

If selected, input terminals (Figure 9) for an external time clock input (contact closure) can also be used. When the external clock input is energized (contact closed), the RC2100 controller will control the heating system based on the daytime space temperature set point. When the external clock input is de-energized (contact open), the RC2100 controller will control the heating system based on the night space temperature set point (day setpoint dSP minus the night setback offset nSb). When the external clock input is used, the internal day/night schedules are disabled.

If selected and configured, an ACI RT2620 Digital Input Concentrator can be used with a remote clock (or remote Energy Management System) to wirelessly transmit day/night (or Occ/Un-Occ) inputs. Operation is similar to the on-board external clock inputs. When the RT2620 is used, the internal day/night schedules and external clock input are disabled.

The day and night set points can be displayed and adjusted using the keyboard/display panel. The night set point (nSb) will be entered as an offset of the day set point.

Status LEDs

Alarm LEDs

Figure #9

Alarm Indications

Low Battery/Lost Transmitter Alarm
If any of the wall or outside air sensors transmit a low battery alarm, the alarm LED and the Low Battery/Lost Transmitter relay will be energized.

If any of the wall or outside air sensors fail to report to the controller for 15 minutes, the alarm LED and the Low Battery/Lost Transmitter relay will be energized.

Low limit Protection Alarm – The Low limit Alarm LED will be energized if any of the space sensors drop below 35 degree F. If the Low Limit Control option is enabled, the Low Limit Alarm relay will also be energized.

The Low Battery/Lost Transmitter and Low Limit alarm relay outputs should be wired to external alert system to notify building maintenance/service personnel.

Selecting Internal or External Clock

Using the Right (>) and Left (<) keys, the display can be scrolled to display "CLOC" (clock). Press the up (∧) and down (∨) keys. The display can be scrolled to display "inPt" (clock input selection).
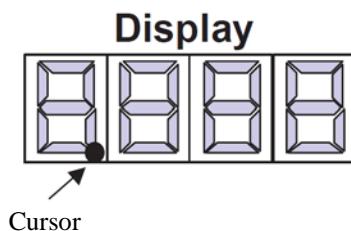
Press and hold the Time Set button until the Time Set LED is energized (refer to Figure 9). Press the "SELECT" key. The current clock selection will be displayed ("int" –internal clock or "tb" – external clock using terminal block).To change the selection, press the Plus (+) or Minus (-) keys to the desired clock option and press the ENTER key to set.

Press and hold the Time Set button until the Time Set LED is de-energized (refer to Figure 9). Press SELECT key to verify the setting has been changed.

Setting the Real Time Clock

Using the Right (>) and Left (<) keys, the display can be scrolled to display "CLOC" (clock).

Press and hold the Time Set button until the Time Set LED is energized (refer to Figure 9). Press the SELECT key. The time of the day will be displayed (in 24 hour format). To change the time, move the cursor (see figure 10) to the desired digit using the Right (>) and Left (<) keys and then press the Plus (+) or Minus (-) keys to change the value. After all the changes are completed, hit the ENTER key to set.

Cursor
Figure #10

Press and hold the Time Set button until the Time Set LED is de-energized (refer to Figure 9). Press "SELECT" key to verify the Clock setting has been changed.

Setting the Day and Night Schedule

Day Mode
Using the Right (>) and Left (<) keys, the display can be scrolled to display "CLOC" (clock). Press the up (∧) and down (∨) keys. The display can be scroll to display "dAy" (day start time).

Press and hold the Time Set button until the Time Set LED is energized (refer to Figure 9). Press the SELECT key. The time of the day will be displayed (in 24 hour format). To change the time, move the cursor (see figure 10) to the desired digit using the Right (>) and Left (<) keys and then press the Plus (+) or Minus (-) keys to change the value. After all the changes are completed, hit the ENTER key to set.

Press and hold the Time Set button until the Time Set LED is de-energized (refer to Figure 9). Press "SELECT" key to verify the day mode start time setting has been changed.

Night Mode
Using the Right (>) and Left (<) keys, the display can be scrolled to display "CLOC" (clock). Press the up ( ) and down ( ) keys. The display can be scroll to display "nitE" (night start time). Repeat the above procedure to set the night mode start time.

PRODUCT SPECIFICATIONS

Supply	Voltage	24VAC 60Hz
	Power Consumption	3VA Maximum
RF	Data Protocol	IEEE 802.15.4-2003/2006
	Operating Frequency	902-928 MHz
	Output Power	+11 dBm
	Receiver Sensitivity	-110 dBm
	Open Field Range	One mile (line of sight)
Sensor Indicating Ranges	Outside Air Sensor	-40 to 160°F (-40 to 71°C)
	Space Temperature	32 to 104°F (0 to 40°C)
	Accuracy	+/- 1°F
Boiler System	Control Output	3 terminals for heating system enable output
		(Common, Manual, & Auto) – SPST N.O.
		Pilot Duty (1 Amp max. at 24VAC)
Error Outputs	Low Battery/Lost Transmitter Alarm Output/ Low Limit Alarm Output	Pilot Duty Relay Contact (SPST N.O., 1 Amp max. at 24VAC)
Set Point	Adjustment Range	35 to 95°F
Enclosure	Material	Polycarbonate (Nema 4X)
	Rating	UL 94 HB (Nema 4X)
Environment	Operating Temperature	15 to 125°F (-9 to 51°C)
	Operating Humidity	5 to 95% RH (non-condensing)
Approvals		FCC

WARRANTY SPECIFICATION

The ACI Wireless Series is covered by ACI's Two (2) Year Limited Warranty, which is located in the front of ACI'S SENSORS & TRANSMITTERS CATALOG or can be found on ACI's web site: www.workaci.com.