

**-- BROCHURE SUPPLEMENT -- Model RF207, 207M --  
Temperature Averaging Steam Heating Control with Wireless Remote Sensors.**

*The R&D Electronics model RF207 offers the latest in spread spectrum frequency hopping technology for controlling commercial and multifamily steam heated buildings. Remote room temperature sensors are powered by lithium batteries with a life expectancy of three or more years.*

The R&D Electronics Model RF207 consists of a main panel with a 32 character LCD display, up to 7 wireless remote indoor sensors (*up to 3 sensors may be hard wired along with 4 wireless sensors*), and an outdoor override sensor. The panel has 19 LED's which indicate the status of all the important ON/OFF conditions. The display is operated by a three position SET, READ, and RUN switch which separates the three main user menus for easy operation. Three key switches are used to read, select and modify settings. The *next* key will scroll through the menu lists. The *increase* and *decrease* keys will change setpoint values. Pressing both the increase and decrease keys together will display the hidden system configuration menu.

A built-in time clock mounted on the front panel programs the Day/Night setpoint schedule. The second or alternate time clock can be programmed either as an evening or morning boost, or a mid-day setback. When the alternate time clock is ON, the alternate clock schedule overrides the Day/Night schedule, activating a third temperature setpoint. If the average building temperature falls below the building setpoint shown in the RUN menu, two heat call circuits will close. After steam builds, and the average temperature of the building rises the amount of the SET menu temperature rise, the heat call circuit will open. The Outdoor Override setting (typically 55 F.) programs the warm weather shutdown. A hardware option ("M" version) is available to additionally control (1) two additional boilers, one of which can be a lead lag boiler, (2) a vacuum pump and (3) a combustion air damper.

The setpoint can be programmed to gradually increase (weather anticipation) as outdoor temperature decreases. At 70 F. outdoors, the building setpoint is equal to the programmed value in the SET menu. For example, a weather anticipation setting of 1.5 F., will increase the setpoint by .75 F. at 30 deg. F. outdoors, and by 1.5 deg. F. at -10 deg. F. outdoors. Mini rocker switches can disable a sensor from being included in the building average temperature. An open or shorted sensor wire or a non-transmitting RF sensor is automatically considered out of range and excluded from the average building temperature. Individual sensor fault LED's indicate which sensors are excluded from the average.

A manual bypass switch located on the front panel will allow operation of the boiler from an external back-up device in the unlikely event of a control failure.

### OPERATOR ADJUSTMENT MENU

#### SET

*1 DAY TEMPERATURE SETPOINT: {72}*

The RF207 will set the average building temperature, although the maximum or minimum worst case room temperatures may vary greatly. Usually, the average day temperature must be set between 70 and 75 degrees to assure that all building locations will receive sufficient heat. The more closely a building is balanced, the lower you may set the average day temperature. Keep in mind that air infiltration may cause floors to be 2-4 degrees colder than temperatures measured 5 feet above the floor where the heat sensors should be mounted.

*2 NIGHT TEMPERATURE SETPOINT: {68}*

The amount of night setback is a compromise between fuel savings, and comfort. During an 8 hour night setback period, a setback of 3 and 7 degrees will save nearly as much fuel as a 10 degree setback, and cause less discomfort.

*3 ALTERNATE TEMPERATURE SETPOINT: {70 to 74}*

The two most common schedules are a Monday thru Friday setback from 9AM to 3PM, or a 7-day boost from 4PM to 9PM.

*4 OUTDOOR CUTOFF: {55}*

50 F. to 60 F. works well in most buildings. Also known as Warm Weather Shutdown.

*5 HEATING CYCLE LENGTH: {1.2}*

A typical setting is 1.0 deg. F. To determine the most efficient T Rise setting, you will need to experiment. If your setting is too low, short cycling will result. The boiler will turn off too soon, leaving radiators at the far end of the building less than full of steam. If your setting is too high, an unnecessary temperature overshoot will result, and there will be excessive time delays between heating cycles.

6 COLD WEATHER BOOST:

{1.0}

The cold weather boost will proportionally increase the building setpoint a small amount as outdoor temperature decreases. At 70 deg. F. outdoors, the building setpoint is equal to the day temperature setpoint. As outdoor temperature decreases and reaches 30F., the building setpoint will increase .75 deg. F., and at -10 deg. F. outdoors the setpoint will increase 1.5 deg. F. Buildings which loose heat fast will be more comfortable with a higher Cold Weather Boost setpoint than buildings which are well insulated and more air tight.

PANEL MINI ROCKER SWITCHES:

Selects the room sensors that are to be included in the average building temperature calculation.

READ

Place the OPERATOR slide switch in READ. Press VIEW NEXT. The READ menu will display the 8 room zone sensors and the outdoor temperature.

RUN

**The RUN menu displays all the important operating conditions for the computer.** (1) the average building temperature, (2) the calculated building setpoint determined by the present time schedule and outdoor temperature, (3) Output relay "ON" status and setback timer schedule, (4) indicates which RF sensors are in low battery condition (see also field service section on low battery indicator), (5-7) boiler runtime history for the last 2 days and the 14 day average, (8) zone data logging for 2 hrs. in six 20 minute intervals, (9-D) zone data logging for 12 hrs. in six 2 hr. intervals for a total of 48 hrs. Data logs read oldest first (upper left) and most recent last (lower right) (Also see SYSTEM: Line 3), (E) sensor digital addresses for registered RF sensors 1 thru 4, (F) RF sensor digital addresses 5 thru 8, (G) Transmit Test Counts Zone 1-8. During a period of 2.66 days, the computer counts the number of missed signal receptions for each sensor. The eight digit is the running count. "A" is equivalent to "10" counts while "F" is equivalent to the maximum count or hexadecimal "16". At any given moment during the 2.66 day refresh period, *a weaker sensor will display a higher test count than test counts recorded for the stronger sensors.* To remove a sensor from the test count it is necessary to go through the procedure for removing the sensor from system ID registration (see setup menu item 7).

- SYSTEM SETUP -

**SYSTEM:** -- INITIAL SETUP: Set operator switch to RUN, then press the + plus and - minus keys together:

1 SENSOR LIMIT + Max Span:

{15}

2 SENSOR LIMIT - Min Span:

{15}

Sensors are excluded from the average when reading above the maximum or below the minimum span limits. The active day, night or alternate setpoint is the center reference point. It is normal for sensors to switch in or out of the average at the moment in time when the day/night or alternate timer period changes. If this is a concern, than it will be necessary to increase the sensor spam limit.

3 DISPLAY DATA LOGGING AND RF SENSOR ID ADDRESSES

{8}

Selects the number of data screens that will appear in the RUN menu list. Items 1 thru 8 allows viewing the 48 hours of indoor temperature data, items 9 thru 12 allows viewing of RF sensor digital addresses useful for troubleshooting RF sensor registration and sensor signal strengths.

4 ZONE LOG APT. # ZONE 1-7

{1}

Selects the zone which will be used for data logging.

5 VACUUM PUMP LEAD -- applies to RF207M only

{.5}

The vacuum pump relay closes on temperature fall before the boiler relay closes.

6 VACUUM PUMP OFF DELAY -- applies to RF207M only

{:30}

The vacuum pump remains ON after the main or lead boiler turns OFF for the above time delay, measured in minutes.

7 *BEGIN REGISTER SENSORS*

{NO}

RF sensors may be permanently added or removed from the system at any time. The RF sensors are registered by setting the READ menu to the desired wireless remote sensor number and pressing sensor test button.

8 *UNIT / ZONE PASS CODE*

{321}

First make a dial up connection through a modem. Enter "P" followed by this adjustable code number to gain access to the heating control.

9 *REFRESH RATE – HOURS*

{4.0}

In order to conserve battery life, the wireless sensors transmit multiple signals only when there is a 1 deg. F. change in room temperature. A single supervisory transmission is made every 15 minutes to let the receiver know that individual sensors are operative. A sensor is removed from the average after the refresh rate hours has expired. See run menu listing "G" for more information on the refresh rate and missed wireless sensor transmissions during the refresh period.

A *STAGE 2 EARLY SHUTDOWN (Model RF207M only)*

{50%}

Two boilers can be configured to turn on simultaneously while lag boiler turns off part way through the heating cycle temperature rise. Similarly a lo/hi/lo burner can be configured to allow the burner to return to lo fire part way through the heating cycle.

### SETBACK TIMER

"ON" corresponds to DAY and "OFF" to night. The timer can accommodate 16 on/off periods while only *two* are suggested for (P1) Day/Night and *one* for (P2) Alternate. Only one on/off group schedule for (MO thru FR) and one for (SA, SU) are needed. A third schedule is sometimes used to extend the Friday DAY schedule. The (P2) Alternate time period will override the Day/Night schedule. NOTE: More Detailed timer programming procedure is affixed to the control enclosure.

The backup battery is fully charge in 24-48 Hrs. and will maintain the setback timer for 4 mo. without power. The battery does not charge when the power switch is left OFF. Replace 1.5V Ni-Cad or NiMeH battery after 5 years.

**RF remote sensors:** 1) The 6 Vdc CR123A lithium batteries should be replaced every 3 to 5 years. 2) RUN menu four will warn of an impending battery failure. If a low battery warning is ignored and a sensor completely stops transmitting and by chance there is a momentary interruption of control power, the low battery indication data will be lost. In other words, it still may be necessary to retrieve sensors for battery testing. 3) Inside each sensor is a micro switch which can be used to force a transmission. The micro switch is also used to register sensor ID's. 4) Breathing on a sensor to increase its reading 2 deg. F. can also initiate a transmission.

Note: Sensor fault lights are ON whenever sensors are outside the range limits determined in the Advanced Setup menu. Sensor limits are "sliding" and will change along with the program schedule and when the operator changes the day, night and alternate setpoints.

**Analog Room Sensors:** Sensors 1 thru 3 may be hard wired to the wiring board, or wireless. If three hard wired sensors are installed, begin registering the wireless sensors at room sensor zone 4. A hard wired sensor can be used to "back up" a wireless sensor. See manual on how to de-register a wireless sensor in order that the hard wired backup sensor will function.

#### **Lead/lag or early shutdown for two boilers vs. a single Lo/Hi/Lo boiler**

For two separate boilers and lead lag early shutdown applications, the lag boiler is attached to terminals (RY5). For single lo/hi/lo fire boilers with power burners, either (RY1,2 or 4) may be used to activate lo fire. (RY5), since it opens first is to be connected to the burner hi fire contact. To maintain a minimum boiler water temperature during summer, connect the boiler aquastat in parallel with (RY5) and the burner low fire contacts.