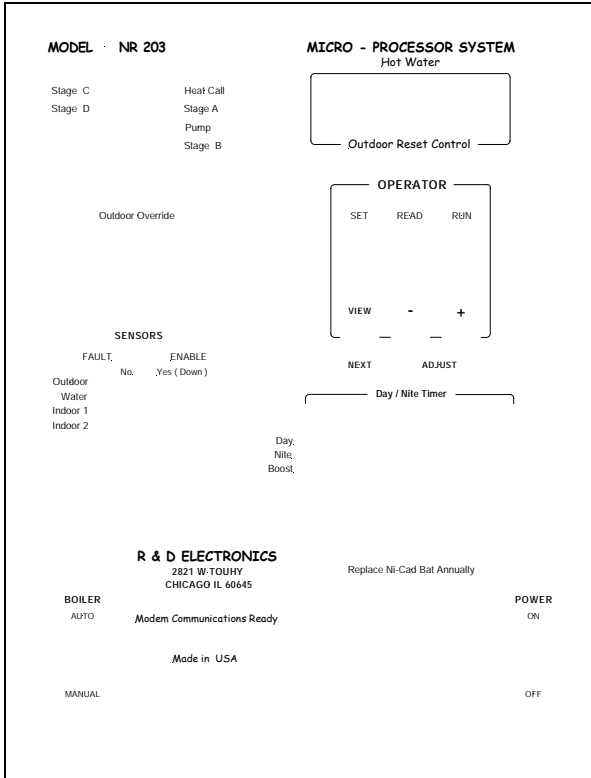


OWNERS MANUAL- Model NR203, 203-4 - Hot Water Outdoor Reset Control -- bs_Nr203Hw1.doc



The R&D Electronics Model NR203 using HW1C software consists of a main panel, a boiler water temp. sensor, an outdoor sensor, and up to 2 optional indoor sensors. The main panel has 17 LED's which indicate all important ON/OFF operating conditions, including heat call, pump and air damper, sensor faults, outdoor override, and the present time schedule. A simple 3 position slide switch labeled SET, READ, and RUN controls the 32 character LCD display. SET contains a list of (5) preliminary adjustments and (2) main adjustments for the regulation of boiler water temperature

The computed water setpoint varies from the operator Initial Temperature setting at +70F. to the Final Temperature at -10F. If the boiler water temperature falls below the computed setpoint by 1/2 the amount of the differential, ry1 - combustion air, and ry3 - boiler stage A circuits will close. If the boiler water temperature falls an additional lag differential, ry4 - boiler stage B circuit will close. The Outdoor Override setting (typically 55 F.) programs the warm weather shutdown, turning off pump relay ry2. The 4 fault indicating LED's show defective outdoor, water, or room zone sensors.

The amount of night water temperature setback will proportionally decrease as outdoor temperature decreases. At 70 F. outdoors, the setback is equal to the value shown in the SET menu. At 30 F.

outdoors, the setback will have decreased to 1/2 the amount of the SET value. At -10 F. outdoors, the setback equals zero. This patented method of varying night setback eliminates the possibility of tenant discomfort or building freeze-up during cold weather.

At the beginning of the DAY set period (when the setback timer first changes to ON), a morning BOOST period begins. For 60 minutes, the water temperature will be increased the amount of the night setback.

WARM WEATHER SHUTDOWN or outdoor cutoff prevents the boiler and pump from operating when the outdoor temperature exceeds the programmed value.

OPERATOR ADJUSTMENT

SET

Place OPERATOR switch in SET. Press VIEW NEXT. Press + or - to change.

1 INITIAL TEMP. {90}

For most hot water heating systems, the INITIAL temperature will be set between 80 and 100 F. An increase in INITIAL temperature will not, contrary most other systems, increase the computed water temperature setpoint at the final temperature (-10F. outdoors). In this product, the initial temperature is not a parallel shift, the slope of the reset curve changes with the

initial or final temperatures. If it is cold indoors during warm weather, increase the INITIAL temp. 2 deg. F. for every 1 deg. F. you would like to increase the indoor room temperatures. Wait 24 hours after readjustments to allow the indoor temperature to stabilize at the new setpoint.

3 NIGHT WATER TEMPERATURE SETBACK {40}

The displayed value represents the setback only at 70 deg. F. outdoors, and can be thought of as the *initial water temperature setback*. The computed water temperature setback decreases as outdoor temperature decreases. At 30 deg. F. outdoors, the water temperature setback is 1/2 the initial value. At -10 F. outdoors, the water temperature setback is zero.

2 FINAL TEMP. {200}

Increasing the final temperature will increase the computed water temperature setpoint most during cold and least during warm weather. Increase the final temperature approximately 2 deg. F. for every 1 deg. F. you would like to increase the indoor room temperatures when it is cold outside.

The computed water temperature setpoint will continue increasing beyond the final temperature as the outdoor falls below -10 F, but the hi limit safety control will prevent the water temperature from exceeding 220 deg. F. in most system. Most hot water systems have finned baseboards, requiring a final temperature of 200 deg. F. A low temperature hot water system with floor or wall mounted radiators may need a final temperature of only 170 F., while systems with fan coils, cast iron radiators, or floor radiation may require a final temperature of only 140 F. The optimum initial and final settings can best be determined by installing zone monitoring sensors and performing trials.

The higher the *initial setback* setting, the greater the fuel savings. Hot water systems take a long time to cool down, and boiler cycling can be reduced enormously during setback. Because setback is proportioned to outdoor temperature and recovery problems are eliminated, very large initial water temperature setbacks are practical. Chart 1 shows the computed amount of water temperature setback at various outdoor temperatures. Over a nominal setback period of 8 hours, and with outdoor temperatures in the range of 20 to 40 deg. F., and with an initial setback of 60 deg F.; indoor temperatures may only decline 3 to 5 F.

4 OUTDOOR CUTOFF (Warm Weather Shutdown) {56}

Set between 55 and 65 deg. F.

5 HEATING CYCLE LENGTH (Differential) {16}

A setting of 15 F. is correct for most hydronic systems. If the heating cycle length is not in the 4 to 8 minute range, then readjust the differential. Copper tube boilers will require higher settings, while cast iron boilers will require lower. Too low a differential setting will cause short cycling and fuel waste, and too high a setting may cause room temperatures to rise and fall excessively. If the heating cycle length is too short with an differential setting of 30 (most common with copper tube boilers), then the circulating sensor will have to be moved to the return water side of the boiler.

6 AUTO BOILER ROTATION {NO}

YES will allow the LEAD STAGE to advance each morning at the beginning of the boost period.

7 SELECT LEAD STAGE {1}

You may manually select the lead stage, or if auto rotation is ON, this number will automatically advance. The display shows 1 for stage A, and 8 for stage H.

READ

Place the OPERATOR slide switch in READ. Press the VIEW NEXT. The READ menu will display the present circulating water temp., the outdoor temperature, and the 2 room zone sensors readings.

RUN

The RUN menu will display (1) computed water setpoint determined by outdoor temp., schedule, and operator settings. (2) pump operation [1 in display]; combustion air or heat call [2 in display]; boiler stages in operation [ABCDEFGH in display]; and the time period. (3) zone data logging for 2 hrs. in six 20 minute measurements, (4-7) zone data logging for 12 hrs. in six 2 hr. measurements for a total of 48 hrs. Data Logs reads oldest first (upper left) and most recent measurement last (lower right). (Also see SYSTEM: Lines 3 and 4).

SYSTEM INITIAL SETUP

SYSTEM: (Press plus+ and minus- keys together).

1 MORNING BOOST MINUTES {1:00}

The boost period begins at moment the time clock switches from night to day. Use a 60 minute boost for an 8 hour setback, or a 30 minute boost for a 4 hr. setback period. To test boost function, you may set the morning boost time to 5 minutes. If you set the displayed value to zero, you can eliminate morning boost all together, without effecting auto rotation.

2 DATA LOGGING ITEMS {1-5}

Set for the number of data logging items desired in the RUN menu. You may set to zero if you do not want to show data logging items.

3 ZONELOG APT. # 1-2 {1}

Select room zone sensor 1 or 2 for 48 hrs. of data logging.

The following 4 items should be set by a qualified heating contractor:

4 INTER-STAGE LAG DIFFERENTIAL {2 to 6}

If the water temperature drops below the computed setpoint, minus ½ the heating cycle differential, minus the lag differential, the next boiler or stage will turn ON. This process continues until all the boilers or boiler stages are ON. The fewer the zone valves, the more stable the system, and the lower you may set the lag differential.

5 WATER ABSOLUTE MINIMUM TEMP. {50}

Flue gases may condense and cause a boiler to sweat under certain conditions. The condensate may appear on fire tubes, cast iron sections, or the burner itself, etc. Consult the boiler mfg. to determine if a particular model boiler requires a minimum temperature setting to protect it from corrosion. A minimum temperature setting of 130F will reduces boiler condensation, but may cause the building to overheat in warm weather. It may be necessary to install a piping system which includes a mixing valve to blend supply and return water.

6 NO. OF BOILER STAGES {1 to 8}

For lo/hi firing, this number will be twice the no. of boilers.

7 LO/HI ROTATION SEQUENCE {NO}

Set to YES if the each boiler has two burner control circuits, one for low (stage1), and the second for the hi (stage2) firing.