Section 2.5
Setting up Boilers

The Network System supports several options for systems that use boilers to supply hot water for space heating and domestic hot water (DHW) production. The Network System is flexible, accommodating multiple boiler types and modes of operation, including the following:

· Up to five on/off boilers

· Up to five modulating boilers

· Up to two dual-stage boilers

· One modulating-condensing (mod-con) boiler with high-fire priority

This section covers the following topics:

· Accessing the boiler setup screens

· Selecting the number of boilers

· Setting boiler-staging intervals

· Defining boiler type

· Setting boiler limits

· Setting boiler-modulation options

· Monitoring boiler runtime

Before proceeding, make sure the following steps are complete:

❑ All Uponor Configuration Tool (UCT) software (A9090000) components are installed (**Section 1.5**).

❑ The computer is correctly connected to the Network System (**Section 1.6**).

Accessing the Boiler Setup Screen

To access the boiler setup screens, click the **Boiler** button on the **Main Menu**, shown in **Figure 2.5-1** which will bring up the Boilers screen shown in **Figure 2.5-2**.

Setting the Number of Boilers

You must set the number of boilers available to the Network System to meet heat demands. The default is one. Refer to the following steps to set the number of boilers.

1. On the Boilers screen, enter the number of boilers in the Number of Boilers field. See #1 in **Figure 2.5-2**.
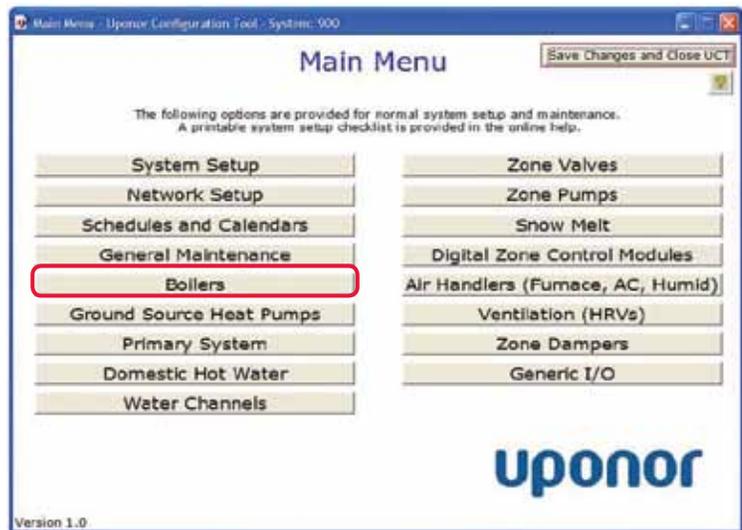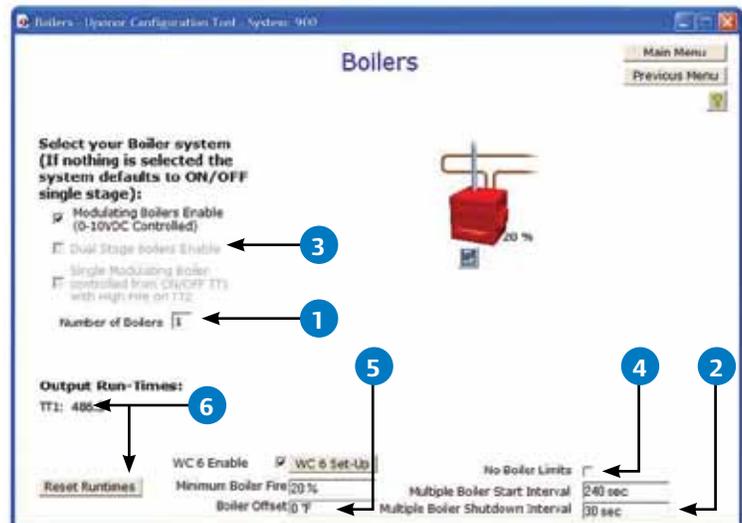

Figure 2.5-1: Main Menu Screen

1. Setting the Number of Boilers
2. Setting Boiler-staging Intervals
3. Setting the Boiler Type
4. Setting Boiler Limits
5. Setting Boiler-modulation Options
6. Monitoring Boiler Runtime

Figure 2.5-2: Boilers Screen

2. After entering the number of boilers, the Boilers screen should now display the updated number of boiler icons. For example, **Figure 2.5-3** shows five boiler icons on the screen because the user entered five in the Number of Boilers field.

Setting Boiler-staging Intervals

Depending on the type or size of boilers in a system, it may be helpful to set the intervals at which the Network System will start the next stage. You may also wish to define the minimum period that a boiler will run to ensure it burns off condensation prior to shutting down a stage.
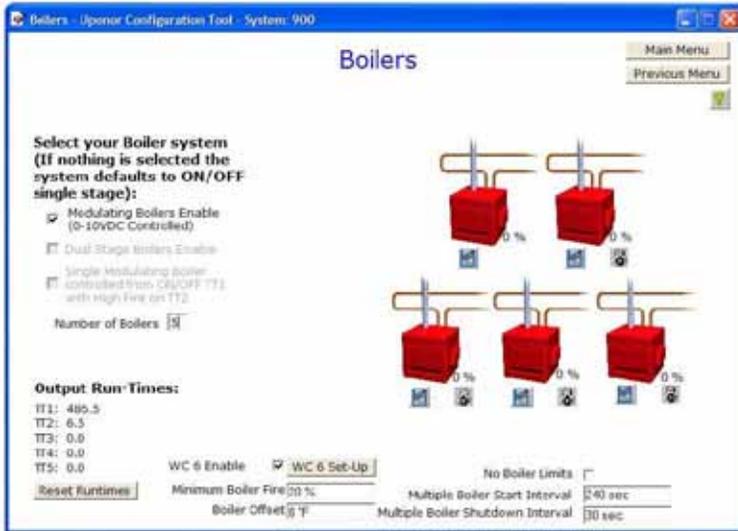

Figure 2.5-3: Multiple Boiler Screen

Figure 2.5-4: Dual Stage Option Screen

Set start and shutdown intervals using the Multiple Boiler Start Interval and Multiple Boiler Shutdown Interval fields. See #2 in **Figure 2.5-2**.

Note: Only use these settings when the "Number of Boilers" setting is greater than one or the Dual Stage Boilers Enable box is checked.

Multiple Boiler Start Interval

This setting defines the shortest duration between multiple boiler starts. Generally, this is the time given for the next boiler to fire, heat and contribute to the primary system temperature. Enter all times in seconds (e.g., if the Start Interval is set to 180 and the number of stages is four, it will take nine minutes for all four boiler stages to turn on).

Multiple Boiler Shutdown Interval

This setting defines the minimum amount of time a boiler stage will run after it starts (to prevent short cycling and eliminate condensation concerns). Enter all times in seconds. When a heat demand ends, the boilers will shut down and ignore the Shutdown Interval.

Setting the Boiler Type

The Boilers screen can also set the type of boiler(s) in a Network System. See #3 in **Figure 2.5-2**.

On/Off Boiler

On/Off is the default setting for the boiler type. For this option, the Network System closes a contact to start a boiler and opens a contact to turn a boiler off. Each on/off boiler requires a Boiler Relay, On-Off (A9012010). See **Appendix A.4: Application Schematics** for wiring information.

Modulating Boiler (0-10VDC)

Check the Modulating Boilers Enable box if the system uses one or more modulating boilers. Checking this box will control the boiler fire rate by a 0-10VDC signal. Each modulating boiler requires a Boiler Relay, Modulating 0-10VDC (A9012020). See **Appendix A.4: Application Schematics** for wiring information.

Mod-con boilers commonly use a modulating control signal. While many boiler manufacturers offer separate, standalone modulating and staging controls, the Network System conveniently integrates control of mod-con boilers within a single control system.

> **Note:** Some boilers require an interface module and setting changes to accept a modulating signal. Refer to the boiler manufacturer's requirements.

Dual-stage Boilers

Check the Dual Stage Boilers Enable box, shown in **Figure 2.5-4**, when the system uses a boiler with a two-stage gas valve. With dual-stage control, the Network System will always turn on the "A" contact first; the typical fire rate is 40% for first stage but varies from manufacturer to manufacturer. The Network System calculates an internal target and monitors the temperature change on the Supply and Return Sensor (A9013001) connected to the primary pump or port. If the temperature change is small or not increasing quickly enough, the Network System will activate the second stage at 100%. Each dual-stage boiler requires a Boiler Relay, On-Off (A9012010). See **Appendix A.4: Application Schematics** for wiring information.

Single Modulating Boiler with High Fire

Only use this feature with a single mod-con boiler. When this feature is enabled, any space-heating call closes the "A" contact on the Boiler Relay, On/Off (A9012010). The closed contact starts the boiler, and the Network System determines the water temperature needed to meet the heating demand. If the feature is enabled and the system detects a DHW demand, the "B" contact closes. The boiler runs to the maximum temperature set on the internal boiler operating control. This type of boiler requires a Boiler Relay, On-Off (A9012010). See **Appendix A.4: Application Schematics** for wiring information.

> **Note:** Verify the boiler manufacturer allows a short across the DHW sensor terminals to put the boiler into high-fire mode. To date, Buderus does not allow this functionality on their GB series boilers.

Setting Boiler Limits

The Network System can manage minimum and maximum operating temperatures for boilers; however, boilers can also manage minimum and maximum operating temperatures through their own internal operating controls. Select the proper boiler limit control method through the No Boiler Limits checkbox; see #4 in **Figure 2.5-2**.

Uncheck the No Boiler Limit box for the Network System to control the minimum and maximum operating temperatures. Minimum and maximum temperatures are set through the Primary System screen, which is accessed through the Main Menu. See **Section 2.6: Primary Pump** for additional information about these settings.

Check the No Boiler Limit box if the boilers will control their own minimum and maximum operating temperatures. When this box is checked, the Network System will reset the maximum and minimum limits to 235°F (113°C) and 35°F (1.7°C), respectively. The Network System assumes the boilers have internal operating controls that will adjust the supply temperature based on outdoor conditions, overriding the need for the Network System to control these limits. This feature is common on mod-con boilers.

> **Note:** Uponor recommends checking the No Boiler Limits only for mod-con boilers.

Setting Boiler-modulation Options

When the Modulating Boilers Enable box is checked (#3 in **Figure 2.5-2**), additional setup options are available on the Boilers screen (#5 in **Figure 2.5-2**).

Minimum Boiler Fire

Some mod-con boilers have minimum fire rates, meaning they don't fire until the control signal reaches a minimum percentage. For example, a boiler may have a minimum fire rate of 25% (2.5VDC). The boiler is off until the signal reaches the minimum value, and supply water temperature (SWT) would not be controlled. Using the Minimum Boiler Fire setting allows the Network System to skip the steps between 0 and the minimum firing rate. For example, if the Minimum Boiler Fire field is set to 25%, the boiler will immediately go from off (0%) to 25% upon activation.

Boiler Offset

This setting is used in systems that use secondary water temperatures (mixing). If the channels are not reaching target water temperatures, the user can enter a value in the Boiler Offset field. The value adjusts internal calculations to boost boiler output. For example, if the target mix temperature is not met when the valve or pump is at 100% output, the user should increase the Boiler Offset value. Increasing this value will increase the water temperature the boiler supplies to help achieve the correct mix temperature for secondary loops.

WC 6 (Water Channel) Enable

WC 6 Enable provides another method for adjusting SWT. When the box is checked, the Boilers screen will display a WC 6 Setup button; see **Figure 2.5-5**. Clicking the button accesses additional settings which allow the user to set up boiler operation similar to a mixing device, such as a modulating valve or injection pump.

WC 6 Setup

Click on the WC 6 Setup button, shown in **Figure 2.5-5**, to access the WC 6 Modulating Boiler Water Channel Reset Settings screen, shown in **Figure 2.5-6**. From this screen, you can set the defaults to adjust how the Network System controls boiler modulation.

The WC 6 Modulating Boiler Water Channel Reset Settings screen displays the following settings.

- **Target Supply Return Average:** This read-only field is the calculated target based on the WC 6 settings. This field displays Off when there is not a heat demand.

- **Actual Supply Return Average:** This field displays the real-time average of the supply-and-return temperature sensors for the water channel.

- **Maximum Supply Water Temperature:** This field displays the protection limit for the SWT of the water channel. The water from this channel (or boilers) will never exceed this value.

- **Minimum Supply Water Temperature:** This field displays the minimum water temperature that this channel will produce (other than at cold start).

Figure 2.5-5: WC 6 Options

- **Design Outdoor Temperature:** This field displays the design-day outdoor temperature. Design day is the coldest day of the year, and the system is designed to meet the heating load on design day.

- **Design Mix Supply Temperature:** This field displays the temperature at which water must be supplied to a water channel's service area on design day to meet the heating load for that area.

- **Design Delta T:** This field displays the expected differential temperature (ΔT°F) of the water supplied to and returning from a water channel's service area on design day. The default value is 30°F.

- **Warm Weather Outdoor Temperature:** This field displays the outdoor temperature where building heat is no longer required. The default is 68°F (20°C).

- **Warm Weather Mix Temperature:** This field displays the water temperature needed to meet the heat demand at the warm weather outdoor temperature. The default is 68°F (20°C). This factor is slightly different from the Minimum Supply Water Temperature and is used to customize the reset curve.

- **Design Indoor Temperature:** This field displays the indoor temperature target on design day. The default is 68°F (20°C).

Monitoring Boiler Runtime

The Boilers screen also displays how many hours each boiler has run in the Output Run Times field (see #6 in **Figure 2.5-2**). Different from other staging methodologies (e.g., first on/first off or lead-lag), the Network System approach is to maintain even amounts of running time for all boilers in the system. Users can also reset boiler runtimes to zero by pressing the Reset Runtime button in the lower-left portion of the screen.

> ⚠️ **Important:** After setting up boilers or changing any boiler settings, save the database for the Primary Equipment Control (PEC) (A9012000) to flash memory. Changes not saved to flash will be lost if the PEC loses power. See **Section 5.1: Save to and Load from Flash** for additional information.
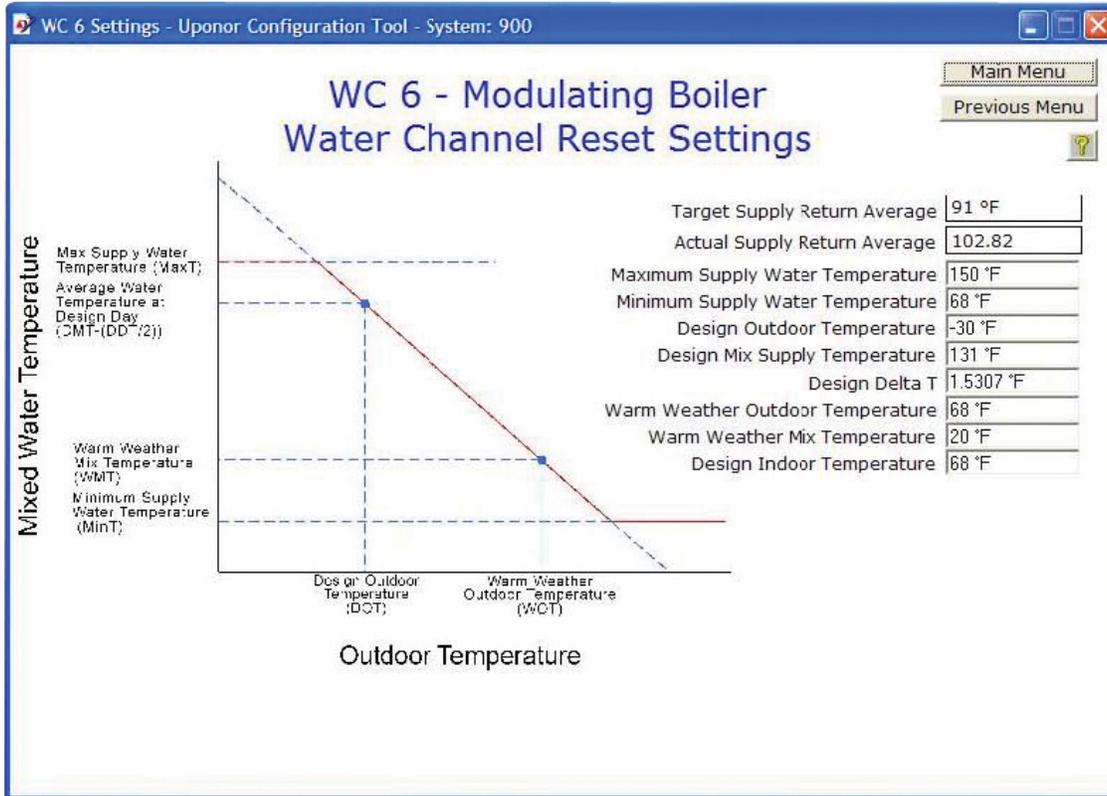
Figure 2.5-6: Modulation Boiler Settings

Note: To use WC 6 features with a system that does not use mixing on SWT control channels one through five, setup the thermostats as water channel six. See additional information in **Section 3.4: Thermostat Setup 2 Tab**.