Operation / Installation Guide
For TPC-FI SoloNet™
Hydronic Mechanical Room Control

Sep 7, 2008
Revision 1.0

FCC Part 15.21 – 15.105(b)

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. Such modifications could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by on or more of the following measures: reorient or relocate the receiving antenna. Increase the separation between the equipment and receiver. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected. Consult the dealer or an experienced radio/TV technician for help.

RSS-Gen 7.1.4 – 7.1.5

This device has been designed to operate with the antennas listed below, and having a maximum gain of 2.0 dB. Antennas not included in this list or having a gain greater than 2.0 dB are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

Listed antenna is a -- Pulse W1030

NOTE: To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication.

NOTE: Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

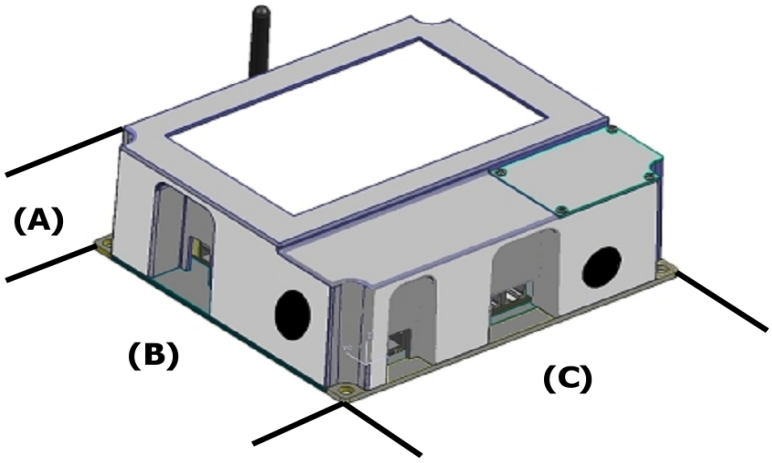
Warning: The TPC-FI SoloNet™ hydronic mechanical room control system is a staging and modulation control designed for use in hydronic heating systems. THIS IS NOT A SAFTEY OR LIMIT CONTROL. All boilers connected to this control for staging and modulation must have all required safety limits and controls required by all applicable codes and jurisdictions. This control must be installed by a qualified electrician. Further, Thermodynamic Process Control reserves the right to upgrade functionality or features of the control at any time without prior notice. For more information visit www.flowintel.com.

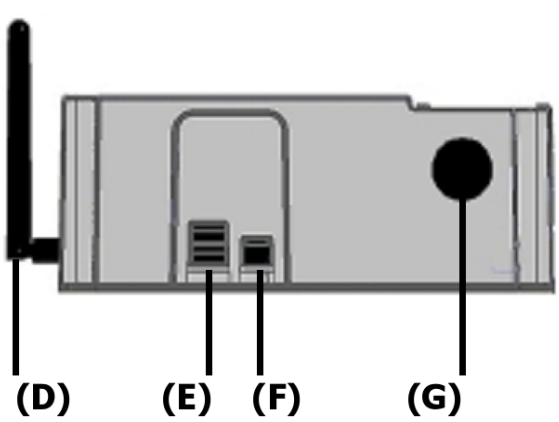
Table of Contents

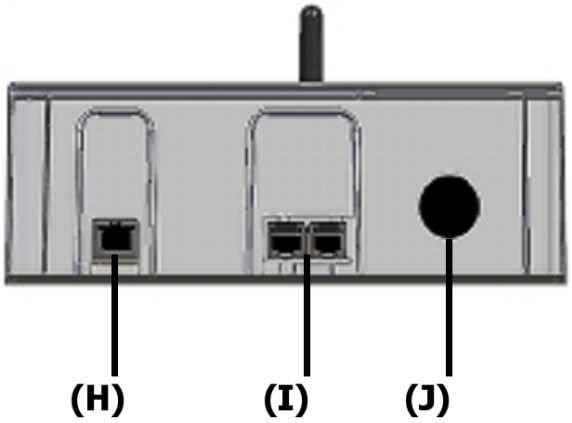
Shock Hazard – Only to be installed by qualified electrician.

Warranty – The TPC-FI SoloNet is warranted for defects due to workmanship one year from installation or 18 months from shipment whichever is lesser. TPC will, at its discretion, either repair or replace defective parts.

TPC-FI-SoloNet™ System Administrator Hardware Overview







Dimensions: A=7.25", B=8.00", C=1.25" (4.25 extended), D=2.75"

F = USB-B

I = RJ-11 Port (6 wire) for hard wire LiveFire Connect communication protocol
Enclosure: ABS Plastic / Aluminum mounting flanges

Power: ___ 24 Vdc ___ 120 Vac

Maximum Network Size: 64 appliances

Communication: LiveFire ConnectTM, Wireless-802.15.4

D = Antenna
E = USB-A

H = Ethernet

J = 1/2" NPT opening for power wiring

G = Power On / Off switch

Screen: 7" full color high resolution LCD touchscreen

Environmental: Operation Temperature 0-70C (32-158F)
Wired communication: - 4wire RS485, Two (2) (6/2RJ-12) for LiveFire Connect protocol

TPC-FI-SoloNetTM System Administrator Software Overview

- **Selects Stages and modulates up to 16 boilers**
- **Modulates all equipment with acceleration modulation control (AMC)**
- **Controls Main system pumps including Lead/Lag and modulation**
- **Controls Secondary Boiler pumps including Delta T control for boilers**
- **Controls Combustion Air Make-up devices (Dampers, Mechanical Air, Mechanical Draft)**

Accessories

Supply & Return Thermistors – Provided by third party Mamac Systems Type 12 – Please see instructions provided in their packaging.
Stack PT1000 RTDs - Provided by third party Thermalogic – Please see instructions provided in their packaging.
OA Thermistors – Provided by third party Mamac Systems Type 12 – Please read and follow instructions provided in their packaging.
Flow Device - Provided by third party Seametrics TX201 – Please read and follow instructions provided in their packaging.

Power Up and Discovery

1. Powering up the Field Device (FD)

1.1 Ensure the Field Device (FD) is wired properly for the appliance the device is controlling.
1.2 Turn the power switch to the "On" position. The power switch is located on the upper left-hand corner of the FD, and is shown in the above diagram as "A".
1.3 When this is done the power light on the bottom right hand side of the FD should light up. It is shown in the above diagram as "D".

2. Turning on the radio signal

2.1 Ensure that the FD is wired properly and that the power switch is turned on.
2.2 Turn the radio switch to the "On" position. The Radio on/off switch is located on the upper right-hand side of the FD and is shown in the above diagram as "B".
2.3 When this is done the "Link" light should light up. It is shown in the above diagram as "C".

3. Accepting a Field Device into the system.

3.1 As soon as a field device is powered on and has its radio switch turned to the "On" position it will immediately start transmitting a signal to the Administrator.
3.2 When the Administrator receives the signal it will ask if you wish to accept this device. If you accept it that FD will only report to that administrator. If one or more TPC-FI SoloNet□

administrators are being used in this network or throughout the building make sure that you desire this FD to report to this administrator.

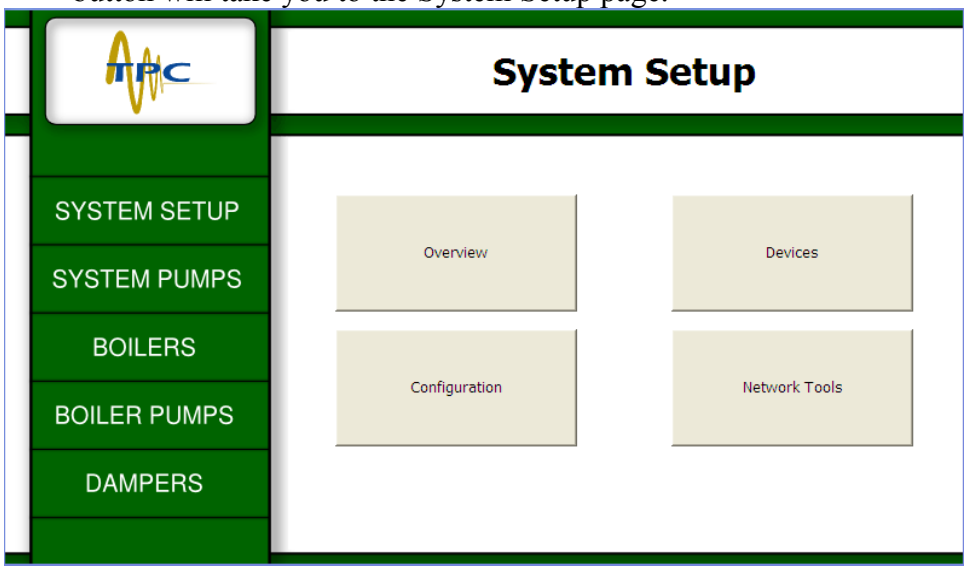
3.3 Upon acceptance of a device you will be asked to configure it in the system. Some devices may read on the administrator as an "Unknown Device". If this occurs call your local representative for an upgrade of functionality to the Administrator. To configure devices look for the appropriate section of this document that corresponds with the appliance you are attempting to control.

3.4 All TPC-FI SoloNet Field Devices can control two appliances that either modulate or be controlled in an on/off state. **HOWEVER, IT IS NEVER PERMISSABLE TO ATTEMPT TO CONTROL TWO (2) BOILERS ON ONE FIELD DEVICE.** Further, no TPC-FI SoloNet Administrator may have more than 64 appliances controlled on the network regardless of the number of Field Devices. An appliance is defined as a piece of equipment controlled by a field device. Temperature sensors and flow meters do not count as appliances.

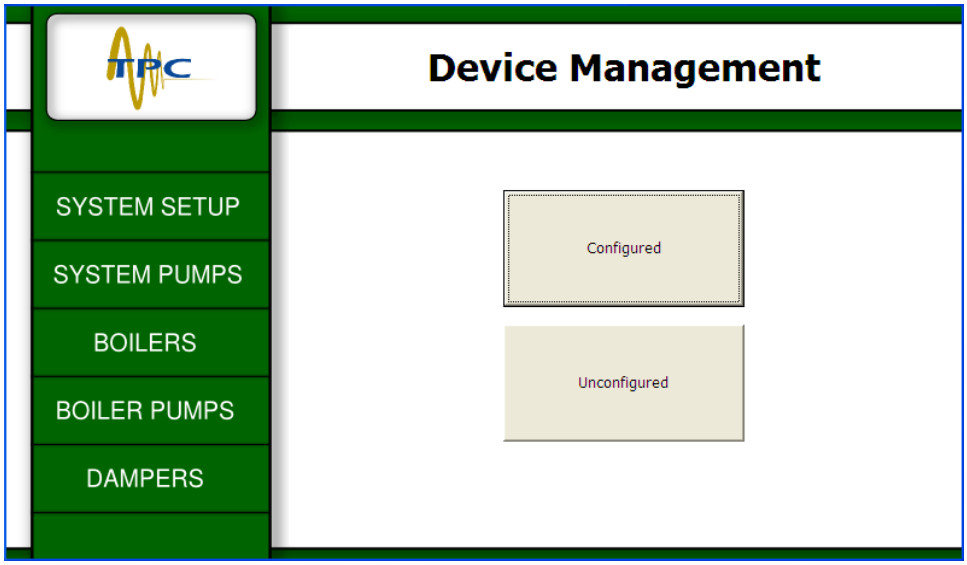
3.5 Discovering Devices on the Network.

3.5.1. Ensure all Field Devices are installed properly, powered on, and are sending radio communication. If turned on the FD power/status light will be on, and if the radio is on the blue link light will be on.

3.5.2.From the Main page select the button labeled "System Setup". Pressing this button will take you to the System Setup page.



3.5.3. From this page press the button that reads "Devices". The TPC-FI SoloNet™ will then analyze the network. While doing this the control will display a progress bar as it connects to the individual field devices. Pressing this button will advance you to the "Device Management" page.



3.5.4. From the "Device Management" page press the "Unconfigured" button. This will take you to a page that will show you all the unconfigured devices on the network.

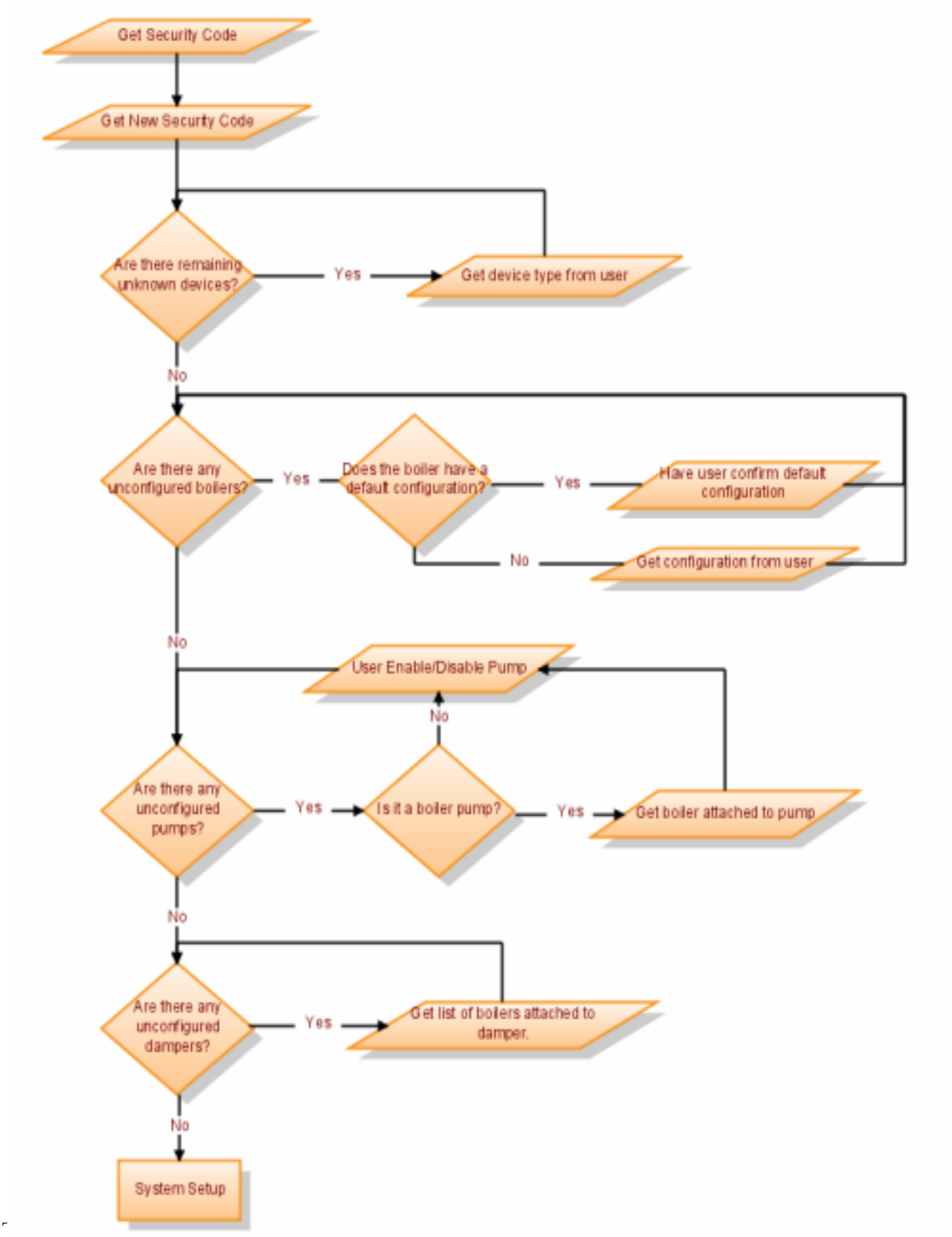
3.5.4.1. There are a maximum of three devices shown per screen, so you may not see all of the devices attached on the first screen. To see more devices simply press the large arrows on either side of the screen to advance to other screens to configure all devices.

3.5.4.2. There are two buttons to push for every uncofigured device. The first is "Identify" and the second is "Accept".

3.5.4.2.1. When you press the "Identify" button the FD that is associated with that button will start blinking all of its lights and LCD screen. When you have physically confirmed which device you are working with press "OK" on the screen.

3.5.4.2.2. Now press the "Accept" button to the right of the "Identify" button. This will take you to the setup for that particular device. For detailed explanation of that process find the appropriate section in the setup guide.

For a further explanation of discovery please see chart on the following page.


Get Security Code
Get New Security Code
Are there remaining unknown devices?
Yes
Get device type from user
No
Are there any unconfigured boilers?
Yes
Does the boiler have a default configuration?
Yes
Have user confirm default configuration
No
Get configuration from user
No
User Enable/Disable Pump
No
Are there any unconfigured pumps?
Yes
Is it a boiler pump?
Yes
Get boiler attached to pump
No
Are there any unconfigured dampers?
Yes
Get list of boilers attached to damper.
No
System Setup

START OF SYSTEM AND FIRST BOILER ON NETWORK:

On a call for winter heat (**remote enable** closed) with an outdoor air reading below a user defined **winter heat set-point** the TPC control shall be capable of enabling 1 to 16 main system pumps or zone pumps. While the main pumps are running and during the user defined "**system pump delay**" a flow device in the main hydronic loop will constantly read and report system flow in GPM. Then comparing the outdoor air temperature to the temperature driven **switch-points** for reheat, condensing or non-condensing modes a **reset loop** will be selected for service. Based on the **calculated reset** temperature of the supply water (**system set-point**) it shall be determined if the conditions exist to enable a boiler (remote enable closed, outdoor air is in a range that calls for a mode of heat, supply and return water temperature is less than the calculated minimum hysteresis). When true, these conditions turn "**heat enable**" to on. If conditions exist (**heat enable** is on) and the "**system pump delay**" has expired then a boiler shall be selected for service using the Thermodynamic Process Control unique patent pending **selection process**. After the **selection process** has selected a boiler, the control will then simultaneously close the circuit to enable the boiler secondary pump (if any), close the circuit to enable the combustion air make-up damper (if-any). After prove of the combustion air damper (if any) the control shall send the signal to close the circuit to enable the boiler, and send the modulation signal corresponding to the boiler"s individual **ignition set-point**. If the control is outfitted with boiler delta T control, the output for the boiler secondary pump modulation output will be ramped to 100%. After the **fire delay** expires the boiler selected will be driven to low fire (minimum modulation signal) and continue at low fire output for a **low fire hold** delay. At the end of the fire delay the boiler secondary pump modulation output will then be released to modulation in order to match the user definable delta T across the inlet and outlet of the boiler as described above. After the **low fire hold** delay has expired a continuously updated real time load will be calculated for the building and applied to the boiler load modulation routine.

START OF OTHER BOILERS ON NETWORK:

After the delay linked to the start of the system pumps (**system pump delay**) the control will begin timing the **initial delay**. This delay is designed to work at system start-up (when **heat enable** has transitioned from off to on). After this delay has expired, the only delay linked to enabling the next boiler from being fired is the **next stage** delay. This delay will begin timing whenever conditions exist to enable **another** boiler meaning that there is already a boiler enabled. At the end of the **initial delay** if conditions exist to enable another boiler, those conditions must persist throughout the entire **next stage** delay before another stage of heat or boiler is enabled. The process of stage selection, enabling, modulation and delay continues as long as the conditions that exist for a stage of heat to be enabled continue uninterrupted.

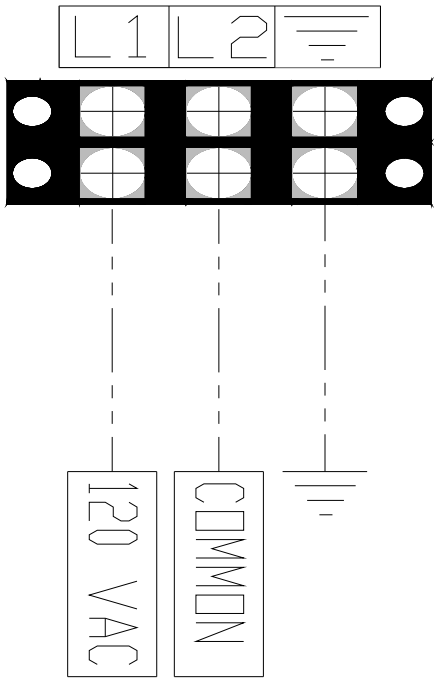
The network of controllers will constantly monitor all conditions. If the real time load causes the output to remain above a user defined output percentage for a given time period (selectable 5-60 minutes) then another boiler will be selected for operation. At this time the controller for all boilers of the current firing sequence will be driven to their new set-points through Thermodynamic Process Control's Intelligent Load Sharing process, and the firing sequence for the next boiler will commence. After firing the selected boiler will experience low fire hold and then be released to modulation. The controller shall continue to split the real time load between, each according to their capacity. As the load increases this pattern of sequencing will continue until all boilers have been enabled (if necessary). If there are both condensing and non-condensing boilers on the system and a non-

condensing boiler has been selected for operation during condensing operations, hydronic reset loop two (2) (non-condensing) will be applied to the system. As the load increases the non-condensing boilers will follow the same control logic described above to enable and control additional boilers, combustion make-up air dampers, and boiler pumps.

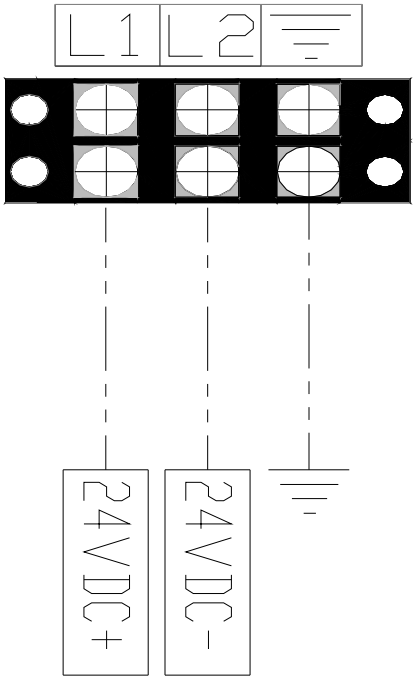
As the outdoor air temperature increases and the real time load is reduced the boilers will drive to low fire as a response to the reduction in load. As the building uses progressively less heat, the temperature in the heating loop will begin to increase and the building load shall decrease. The control shall then begin to calculate a negative load balance. Once the load balance reaches an acceptable overshoot and more than one boiler is enabled, a boiler will be shutdown based on the selection process. As the load continues to overshoot boilers will be shut down according to the timing and selection processes in order to meet the changing load conditions. As with enabling boilers all timers linked to shutting down boilers are reset to zero if the conditions for shut-down are not persistent. When the system is reduced to the point that only one boiler is enabled, the temperature driven shut-down of this final boiler **Max hysteresis** is used to disable this stage. If the outdoor air temperature crosses the heat enable set-point plus a dead-band or remote enable input is off (open) all remaining running boilers will experience soft shutdown. If a boiler exceeds it's maximum cycle time it shall experience a soft shut-down as described above. There shall be no special selection to replace this stage, the control shall simply wait until persistent conditions exist as described above or as in the case of zero stages enabled, wait until the end of the secondary pump purge (if any) or 1 minute whichever is greater before beginning the selection process again. The control shall then attempt to cover the load with the remaining firing boilers. If at any time during this process the load on the building increases then the process reverses and boilers begin to modulate to higher output rates to meet the real time load. If the trend continues and conditions exist as described above then all processes for selecting boilers to be enabled will begin again. The control shall continue to enable, modulate, and disable as described above in an effort to match the real time building load.

SYSTEM ADMINISTRATOR: GRAPHICAL USER INTERFACE DEVICE

WIRING THE ADMINISTRATOR GRAPHICAL USER INTERFACE (120 Vac):



WIRING THE ADMINISTRATOR GRAPHICAL USER INTERFACE (24 Vdc):



Installation Instructions for the TPC SoloNet™ Administrator (Graphical User Interface) and associated equipment:

- Mount administrator:
  - Find a suitable location that is a safe distance from heat and cold (operating 0-70°C)

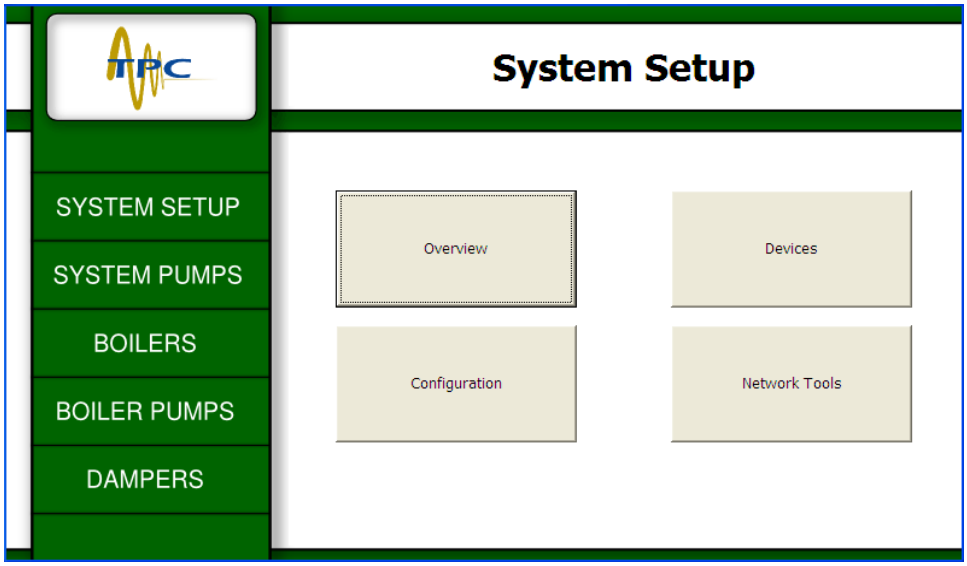
- The location should be in an area where the Graphical User Interface will not suffer "washout" from the Sun or other bright lights.
- The mounting surface should be flat (on the same vertical plane)
- The mounting surface should be "strong" enough to handle the weight load of the Graphical User Interface
- Dimension or otherwise mark the holes for mounting.
- Using # 10 screws mount administrator to wall or stand-off bracket through the holes provided in the aluminum mounting flanges. (Caution: Do not over tighten screws used to mount the administrator graphical user interface.)

- Wire power to administrator:
  - Using a 1/2" NPT conduit fitting connect to Administrator Device and wire for appropriate power according to model number (120Vac or 24Vdc)
- Install Hydronic Thermistors with Thermo-well:
  - Thermistors are used for measuring hydronic process temperatures. First the 3/4" NPT X 1/2" NPT well (included) must be installed into the piping at the appropriate place for the temperature to be measured, the insertion depth of the well must be at least 1" depth into the piping for accurate temperature measurement. Install the thermistors into the well and wire to the Field Devices as shown on the wiring diagrams.
- Install Outdoor Air Temperature Thermistor:
  - Using the 1/2" conduit fitting provided with the outdoor air thermistor, mount the thermistor in a location outdoors appropriate for measuring outdoor temperatures. This location should be shielded from the Sun surfaces subject to heat gain from the Sun and other heating sources such as boiler flues, building exhaust.
- Install Flue Gas Temperature PT1000 RTD's (if any)
  - Using the 1/4" NPT connector provided, install the flue gas temperature sensor(s) (if any) into the boiler stack. The installation should be within four (4) feet of the boiler flue outlet. The temperature sensor should protrude at least 2" into the diameter of the stack.
  - Wire PT1000 RTD's to the appropriate terminals according to the wiring diagrams
- Install Flow device:
  - To install the flow device first start by installing a 2" NPT half coupling or weldolet.
  - Second, into the Weldolet or Half Coupling install a Two (2) inch X close nipple
  - Third, onto the 2" X close nipple install a Two (2) inch Full Port Ball Valve.
  - Forth, into the 2" Full Port Ball Valve install a Two (2) inch X One and one-half (1 1/2") inch reducing bushing
  - Fifth into the bushing install the one and one-half inch (1 1/2") Hot Tap (provided)
- Set the flow meter position and depth
  - Consult TX201 installation guide (tx100.pdf) for proper installation (included)
- Install the antennae:
  - Find the antenna in the TPC-FI System Administrator box in which it was shipped.
  - Locate the antenna threaded female receptacle on the top of the System Administrator and thread the antenna into the receptacle until tight. DO NOT OVER-TIGHTEN!

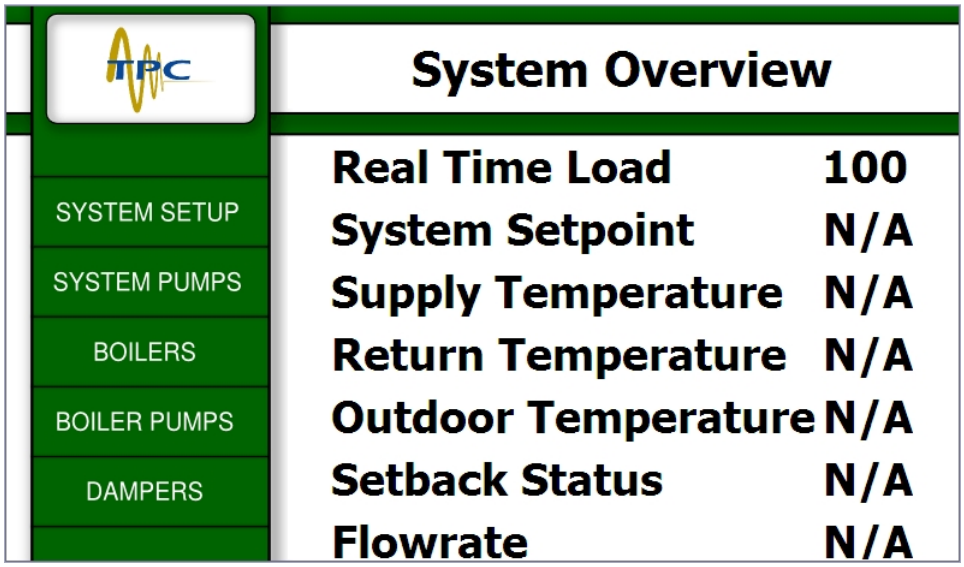
Configuration Instructions for the TPC SoloNet™ Administrator and Field Devices:

Thermodynamic process control's TPC-FI SoloNet™ mechanical room controller is a wireless network of devices that work together to control boilers and associated equipment. The practical minimum network size is three devices. Those devices are: Network Administrator graphical user interface (GUI), System Information Field Device, and a Boiler Field Device. The maximum Network size is 65 devices including the Network Administrator GUI.

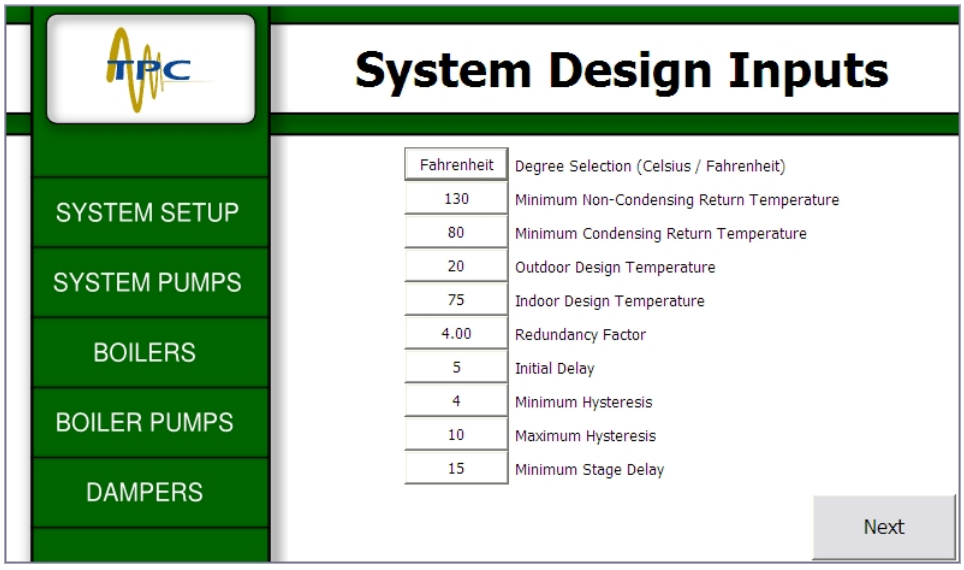
The parameterization process happens for the most part at the GUI. Data inputted at the GUI will be "pushed out" wirelessly to the individual Field Devices on the network for there proper selection and on-board operations. The user will be able to discern the device being parameterized through the **Identify Me** function on the GUI. When configuring a Field Device if there is any doubt about which device on the network is currently being accessed, depressing the **Identify Me** button will cause a "light show" to take place on that device. The light show is a series of blinks, read outs, and color changes of all visual indicators on the Field Device. The user can then verify that the device being configured is the one physically attached or wired to the equipment to be controlled by the system. The data that is requested can then be inputted from information plates on the equipment, equipment data sheets or owners manuals.



- **System Setup** – The System Setup screen is the primary navigation tool that allows you to access information and configure the "System Parameters". To view more information about any of the items listed simply touch the screen on that item an you will be taken to a screen for that item.

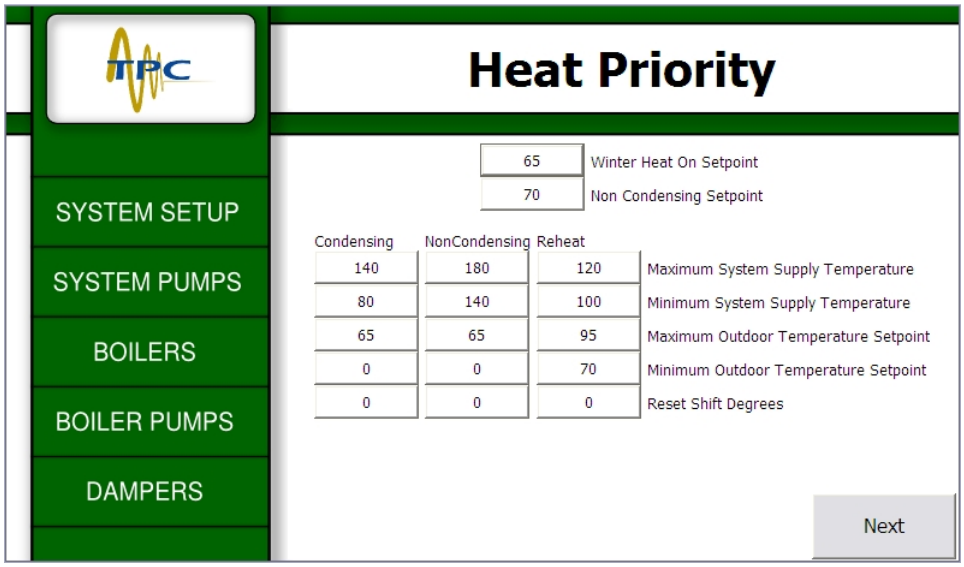


Overview – Touching the "Overview" button from the System Setup screen takes you to the "**System Overview**" screen. The data shown on this screen is: Real Time Load in MBH, System set-point in °F or °C, System Supply temperature in °F or °C, System Return temperature in °F or °C, Outdoor Air temperature in °F or °C, Night / Weekend setback On or Off, and the System Flow Rate in GPM or LPM. There is no touch screen interaction with any data on this screen.



System Configuration screen #1: From the **System Setup** screen, touch the Configuration button. This should take you to the first system configuration screen **System Design Inputs.** It is from this screen that the selections shown above can be made to parametrize the system.

Design Inputs			
Units	Fahrenheit, Celsius	Fahrenheit	Choose the convention in which you would like to display system information.
Outdoor Design Temperature	-40 - 40 F	0	Choose the outdoor air temperature this system was designed to overcome worst case. This will be the coldest temperatures you would expect to see in this climate.
Indoor Design Temperature	60 - 80 F	70	Choose the indoor temperature the building is designed to maintain under full-load conditions.
Redundancy Factor	1.00 - 10.00	4	Choose the factor by which the design MBH input (sum of boiler MBH inputs) is greater than the required MBH needed under maximum load conditions.
System Circulation Delay minutes	1 - 30 Min	10	Chose the delay time desired from the start of the system pumps until the selection and start of the first boiler stage.
Initial Delay Minutes	10 - 240 Min	60	Choose the number of minutes you desire to delay an additional boiler staging on when the outdoor air temperature has reached just reached the "Winter Heat On Set point". This delay is designed to allow a single boiler stage to gradually warm the system during light load times only. This delay is linked to the initial switching from off to on of a call for heat and will not affect control action as long as heat remains enabled.
Minimum Hysteresis	2 - 40 F	5	Chose the maximum number of degrees that you desire to allow the system temperature to drop below set point and sustain for the "Stage Delay Time" before enabling another stage of heat.
Maximum Hysteresis	5 - 80 F	15	Chose the maximum number of degrees that you desire to allow the system temperature to overshoot set-point before disabling all boilers on the system.
Minimum Stage Delay Minutes	1 - 60 Min	30	Choose the number of minutes conditions (load deficit) must persist before activating the next stage of heat. This delay will work between every stage selection except in the case of a heating emergency as defined in the O&M manual



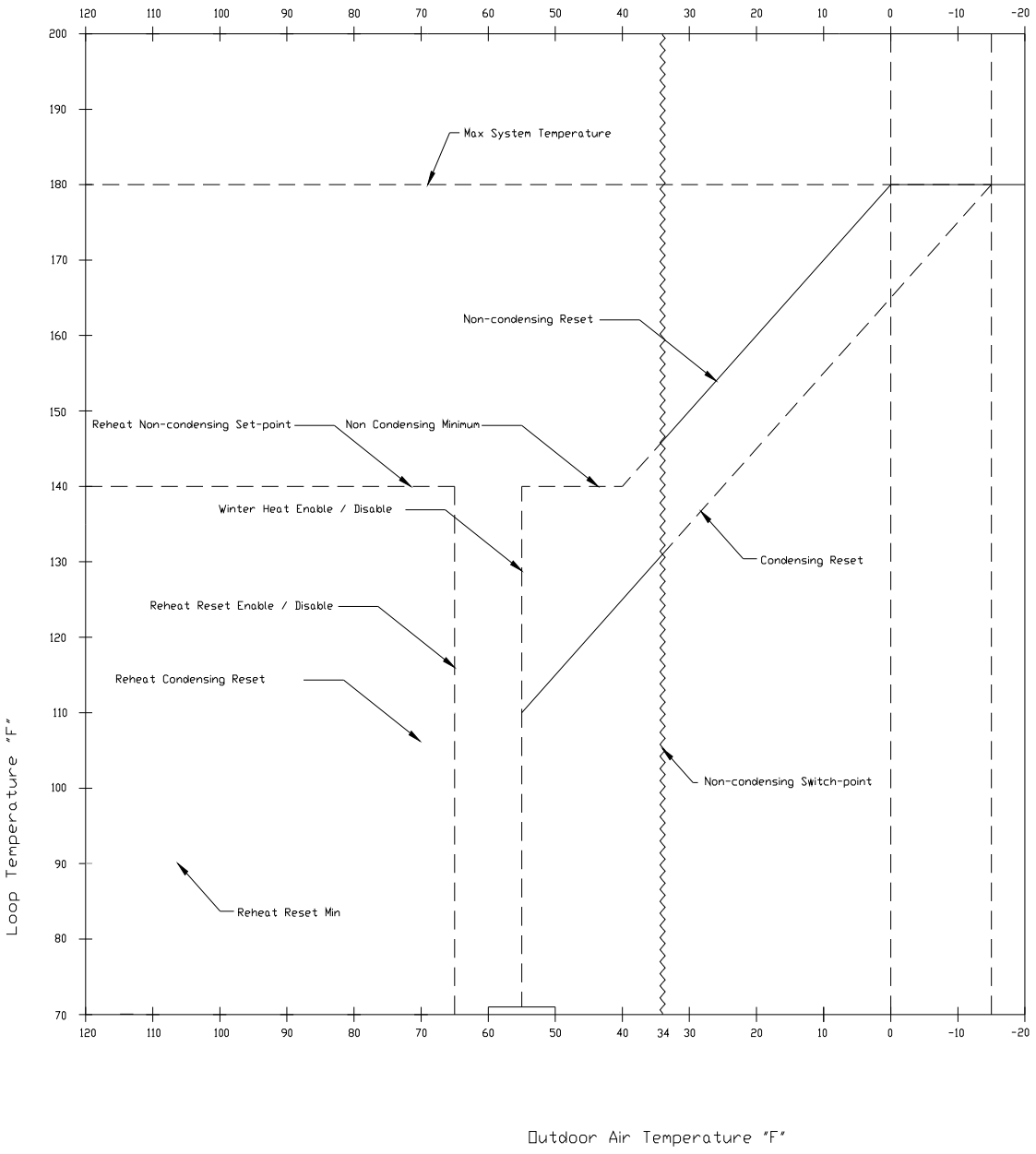
- **System Configuration screen #2:** From the **System Design Inputs** screen, touch the Next button. This should take you to the second system configuration screen **Heat Priority.** It is from this screen that the selections shown above can be made to parametrize the system.

Heat Priority			
Winter Heat On Set point	30 - 150 F	60	Choose the outdoor air temperature at which you desire to enable the heating plant.
NonCondensing Outdoor Set point	-20 - 80 F	0	Choose the outdoor air temperature at which you desire to begin utilizing the non-condensing control loop Reset 2.
Heat Reset 1 - Condensing			
Maximum System Supply Set point	60 - 210 F	120	Choose the maximum supply temperature allowed on this system while the condensing reset loop is active.
Minimum System Supply Set point	40 - 200 F	80	choose the minimum supply temperature allowed while the condensing reset loop is active.
Maximum Outdoor Temperature Set point	30 - 150 F	60	Choose the maximum outdoor air temperature which the condensing reset loop will use to calculate the Supply water temperature set-point.
Minimum Outdoor Temperature Set point	-40 - 40 F	0	Choose the minimum outdoor air temperature which the condensing reset loop will use to calculate the Supply water temperature set-point.
Reset Shift Degrees	0 - 40 F	0	After the system has been in operation you may further fine tune this reset loop by shifting the slope up or down. This is a linear function which means the entire reset slope will shift.
Heat Reset 2 -			

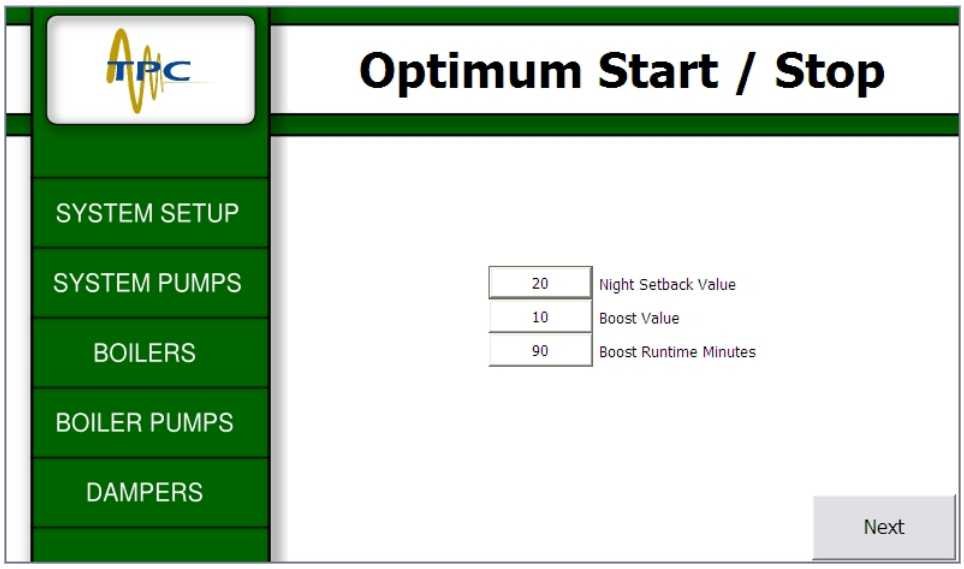
NonCondensing			
Maximum System Supply Set point	60 - 210 F	180	Choose the maximum supply temperature allowed on this system while the Non-condensing reset slope is active.
Minimum System Supply Set point	40 - 200 F	140	Choose the minimum supply temperature allowed while the Non-condensing reset slope is active.
Maximum Outdoor Temperature Set point	30 - 150 F	60	Choose the maximum outdoor air temperature which the Non-condensing reset loop will use to calculate the Supply water temperature set-point.
Minimum Outdoor Temperature Set point	-40 - 40 F	0	Choose the minimum outdoor air temperature which the Non-condensing reset loop will use to calculate the Supply water temperature set-point.
Reset Shift Degrees	0 - 40 F	0	After the system has been in operation you may further fine tune this reset loop by shifting the slope up or down. This is a linear function which means the entire reset slope will shift.
Heat Reset 3 - Reheat			
Maximum System Supply Set point	60 - 210 F	120	Choose the maximum supply temperature allowed on this system while the Reheat reset slope is active.
Minimum System Supply Set point	40 - 200 F	100	Choose the minimum supply temperature allowed while the Reheat reset slope is active.
Maximum Outdoor Temperature Set point	80 - 160 F	100	Choose the maximum outdoor air temperature which the Reheat reset slope will use to calculate the Supply water temperature set-point.
Minimum Outdoor Temperature Set point	40 - 100 F	70	Choose the minimum outdoor air temperature which the Reheat reset slope will use to calculate the Supply water temperature set-point.
Reset Shift Degrees	0 - 40 F	0	After the system has been in operation you may further fine tune this reset slope by shifting the line up or down. This is a linear function which means the entire reset slope will shift.

In addition to setting the enable set-point for enabling Winter Heat and choosing the non-condensing set-point for outdoor air temperature (for hybrid systems). This section allows the user to establish a linear relationship between outdoor air and system supply set-point temperature. The control can be configured to create one to three separate reset slopes for use at different outdoor air temperatures.

Below is an diagram depicting how one might utilize all three reset slopes in a control scenario that includes condensing operations, non-condensing operations and reheat operations.

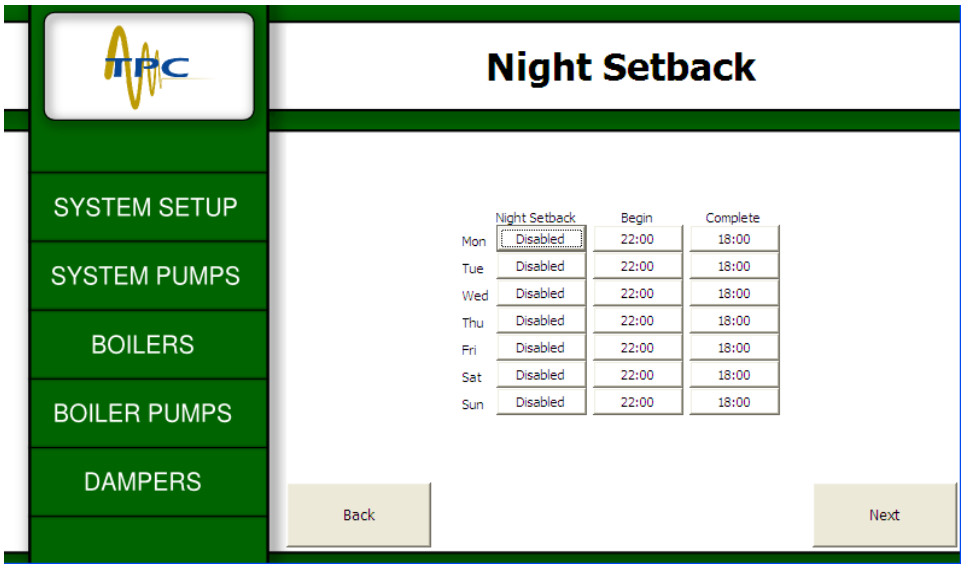


Graph Shows: Reset Slope 1 (Condensing), Reset Slope 2 (Non-condensing) and Reheat Reset (Condensing or Non-condensing) in a hybrid arangement. All Enable / Disable points on the graph have a two degree range to eliminate rapid on/off toggle.. System will operate assigned reset during a given temperature range unless conditions exist that require a boiler designated as non-condensing to operate in order to meet the heating needs.



- **System Configuration screen #3:** From the **Heat Priority** screen, touch the Next button. This should take you to the third system configuration screen **Optimum Start / Stop.** It is from this screen that the selections shown above can be made to parametrize the system for optimum stop and optimum start.

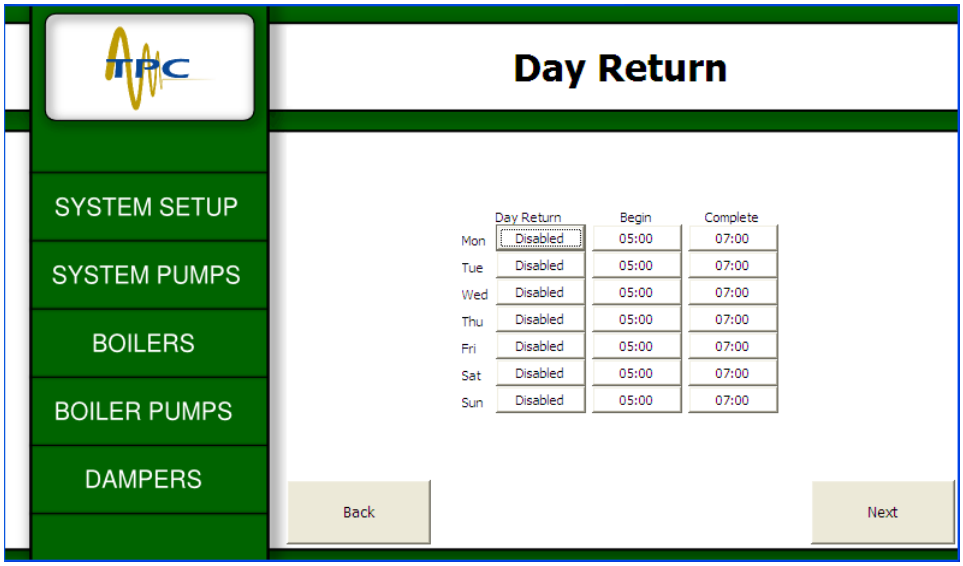
Optimum Stop / Start			
Night Setback Value	0 - 40 F	10	Choose the number of degrees you wish to let the system fall to under night setback conditions.
Boost Value	0 - 40 F	0	Choose the number of degrees you wish to allow the control to take the system above the set-point at morning warm up. A value greater than zero may or may not be required for optimum start.
Boost Runtime Minutes	0 - 120 Min	60	Choose the number of minutes you wish for boost above the active reset to operate before returning to the calculated reset value.



- **System Configuration screen #5:** From the **Optimum Start / Stop** screen, touch the Next button. This should take you to the forth system configuration screen **Night Setback.** It is from this screen that the selections shown above can be made to parametrize the system for the time of day to begin and complete set-back.

Monday			
Night Setback	Enable / Disable	Disable	Choose to enable or disable this operation.
Begin Setback Hour / Minute	0:00 - 23:59	0:00	Choose the time before the unoccupied period you wish to allow the control to begin a "controlled descent" to the unoccupied temperature.
Complete Setback Hour / Minute	0:00 - 23:59	0:00	Enter the time you expect the building to be unoccupied for this day of the week.
Tuesday			
Night Setback	Enable / Disable	Disable	Choose to enable or disable this operation.
Begin Setback Hour / Minute	0:00 - 23:59	0:00	Choose the time before the unoccupied period you wish to allow the control to begin a "controlled descent" to the unoccupied temperature.
Complete Setback Hour / Minute	0:00 - 23:59	0:00	Enter the time you expect the building to be unoccupied for this day of the week.
Wednesday			
Night Setback	Enable / Disable	Disable	Choose to enable or disable this operation.
Begin Setback Hour / Minute	0:00 - 23:59	0:00	Choose the time before the unoccupied period you wish to allow the control to begin a "controlled descent" to the unoccupied temperature.
Complete Setback Hour / Minute	0:00 - 23:59	0:00	Enter the time you expect the building to be unoccupied for this day of the week.
Thursday			
Night Setback	Enable / Disable	Disable	Choose to enable or disable this operation.

Begin Setback Hour / Minute	0:00 - 23:59	0:00	Choose the time before the unoccupied period you wish to allow the control to begin a "controlled descent" to the unoccupied temperature.
Complete Setback Hour / Minute	0:00 - 23:59	0:00	Enter the time you expect the building to be unoccupied for this day of the week.
Friday			
Night Setback	Enable / Disable	Disable	Choose to enable or disable this operation.
Begin Setback Hour / Minute	0:00 - 23:59	0:00	Choose the time before the unoccupied period you wish to allow the control to begin a "controlled descent" to the unoccupied temperature.
Complete Setback Hour / Minute	0:00 - 23:59	0:00	Enter the time you expect the building to be unoccupied for this day of the week.
Saturday			
Night Setback	Enable / Disable	Disable	Choose to enable or disable this operation.
Begin Setback Hour / Minute	0:00 - 23:59	0:00	Choose the time before the unoccupied period you wish to allow the control to begin a "controlled descent" to the unoccupied temperature.
Complete Setback Hour / Minute	0:00 - 23:59	0:00	Enter the time you expect the building to be unoccupied for this day of the week.
Sunday			
Night Setback	Enable / Disable	Disable	Choose to enable or disable this operation.
Begin Setback Hour / Minute	0:00 - 23:59	0:00	Choose the time before the unoccupied period you wish to allow the control to begin a "controlled descent" to the unoccupied temperature.
Complete Setback Hour / Minute	0:00 - 23:59	0:00	Enter the time you expect the building to be unoccupied for this day of the week.

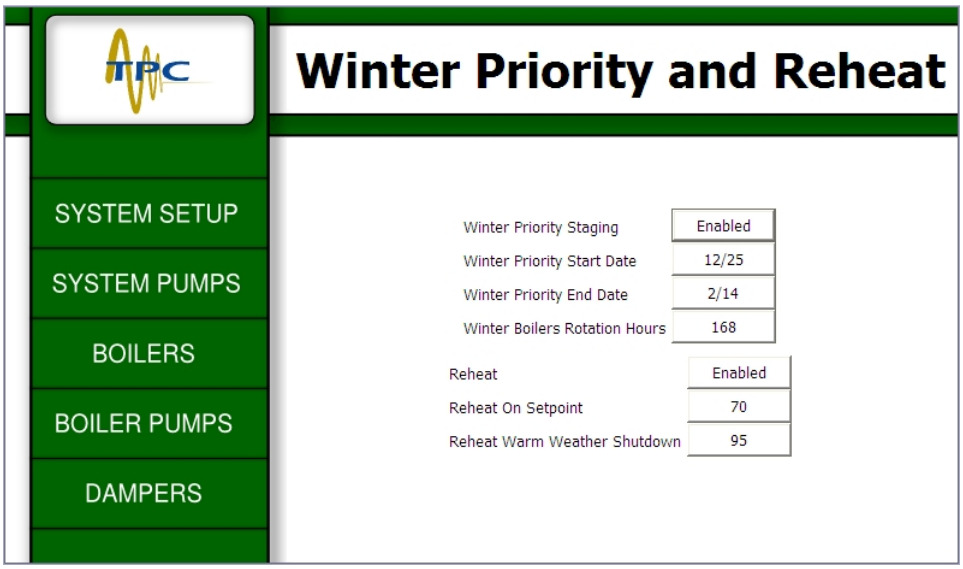


- **System Configuration screen #:** From **the Night Setback** screen, touch the Next button. This should take you to the forth system configuration screen **Day Return.** It is from this screen that the selections shown above can be made to parametrize the system for the time

of day to begin and complete Day Return.

Monday			
Day Return	Enable / Disable	Disable	Choose to enable or disable this operation.
Begin Day Return Hour / Minute	0:00 - 23:59	0:00	Choose the time before the occupied period you wish to allow the control to begin a controlled ramp up to the occupied + boost temperature
Complete Day Return Hour / Minute	0:00 - 23:59	0:00	Enter the time you expect the building to be occupied for this day of the week.
Tuesday			
Day Return	Enable / Disable	Disable	Choose to enable or disable this operation.
Begin Day Return Hour / Minute	0:00 - 23:59	0:00	Choose the time before the occupied period you wish to allow the control to begin a controlled ramp up to the occupied + boost temperature
Complete Day Return Hour / Minute	0:00 - 23:59	0:00	Enter the time you expect the building to be occupied for this day of the week.
Wednesday			
Day Return	Enable / Disable	Disable	Choose to enable or disable this operation.
Begin Day Return Hour / Minute	0:00 - 23:59	0:00	Choose the time before the occupied period you wish to allow the control to begin a controlled ramp up to the occupied + boost temperature
Complete Day Return Hour / Minute	0:00 - 23:59	0:00	Enter the time you expect the building to be occupied for this day of the week.
Thursday			
Day Return	Enable / Disable	Disable	Choose to enable or disable this operation.
Begin Day Return Hour / Minute	0:00 - 23:59	0:00	Choose the time before the occupied period you wish to allow the control to begin a controlled ramp up to the occupied + boost temperature
Complete Day Return Hour / Minute	0:00 - 23:59	0:00	Enter the time you expect the building to be occupied for this day of the week.
Friday			
Day Return	Enable / Disable	Disable	Choose to enable or disable this operation.
Begin Day Return Hour / Minute	0:00 - 23:59	0:00	Choose the time before the occupied period you wish to allow the control to begin a controlled ramp up to the occupied + boost temperature
Complete Day Return Hour / Minute	0:00 - 23:59	0:00	Enter the time you expect the building to be occupied for this day of the week.
Saturday			
Day Return	Enable / Disable	Disable	Choose to enable or disable this operation.
Begin Day Return Hour / Minute	0:00 - 23:59	0:00	Choose the time before the occupied period you wish to allow the control to begin a controlled ramp up to the occupied + boost temperature
Complete Day Return Hour / Minute	0:00 - 23:59	0:00	Enter the time you expect the building to be occupied for this day of the week.
Sunday			
Day Return	Enable / Disable	Disable	Choose to enable or disable this operation.

Begin Day Return Hour / Minute	0:00 - 23:59	0:00	Choose the time before the occupied period you wish to allow the control to begin a controlled ramp up to the occupied + boost temperature
Complete Day Return Hour / Minute	0:00 - 23:59	0:00	Enter the time you expect the building to be occupied for this day of the week.



- **System Configuration screen #6:** From the **Day Return** scheduler screen, touch the Next button. This should take you to the fifth and final system configuration screen **Winter Priority and Reheat.** It is from this screen that the selections shown above can be made to parametrize the system for the date to enable and disable Winter Priority programming and an outdoor air temperature to enable Reheat reset slope #3 and a warm weather shutdown for reheat.

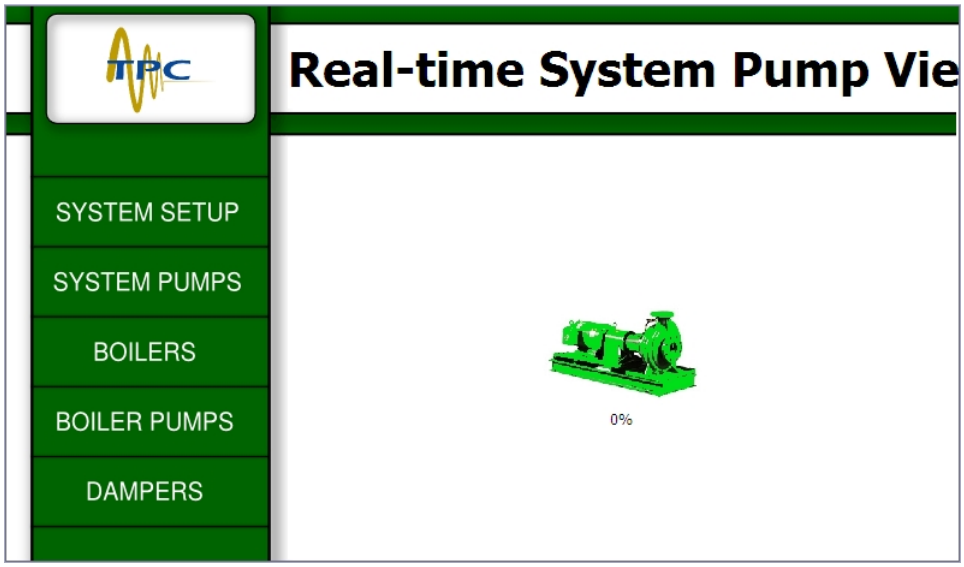
  - Winter priority is designed to allow for "exercise" of large mass boilers that may not otherwise be selected for operation during normal operations of the control scenario. This programming allows this boiler(s) to be selected and then operated for as long as deemed necessary. The rotation hours of the lead boiler in this scenario is fixed in an effort to allow these boilers to operate as designed. After heating and therefore expanding these large boilers they should be left in operation at lead for a while.

  - Reheat with warm weather shutdown. This third reset slope is designed for summer heating of areas of the building that are over-cooled due to humidity control. This too has a warm weather shut-down.

Winter Priority			

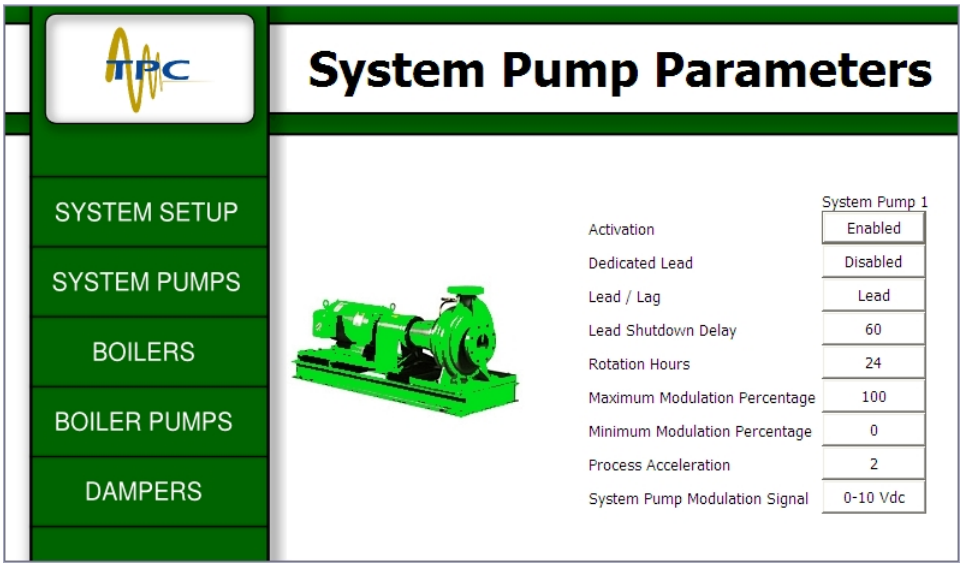
Winter Priority Staging	Enable / Disable	Disable	Choose to enable Winter Priority if you have a large mass boiler that you desire to put into the lead position for a portion of the heating season.
Winter Priority Start Date	mm/dd	12/25	Choose the date you would like to begin Winter Priority
Winter Priority Stop Date	mm/dd	2/14	Choose the date you would like to stop Winter Priority.
Winter Boilers Rotation Hours	24 - 720 Hours	168	If you have more than one large mass boiler that will be designated as Winter Priority choose the number of hours you would like for each boiler to be in the lead position.
Reheat			
Reheat	Enable / Disable	Disable	Choose to enable the reheat reset slope if you are using reheat in this application.
Reheat On Set-point	60 - 90 F	70	Choose the outdoor air temperature at which you desire the reheat reset slope to be enabled.
Reheat Warm Weather Shutdown	80 - 160 F	100	Choose the outdoor air temperature at which you desire the reheat to be disabled due to warm weather.

The configuration of the System Parameters is now complete. If at any time the values need to be changed these screens shall always be accessible to the user for “Tweaking” system performance.



To navigate to this screen simply locate the **SYSYEM PUMPS** tab on the left side of the screen. From this screen the user can view the status of all System pumps on the network. A green pump icon indicates the pump is on. The percentage just below the icon shows the real time output percent at which the pump is operating. Off state for the pump will show the icon in gray scale, and alarm will show the pump in red.

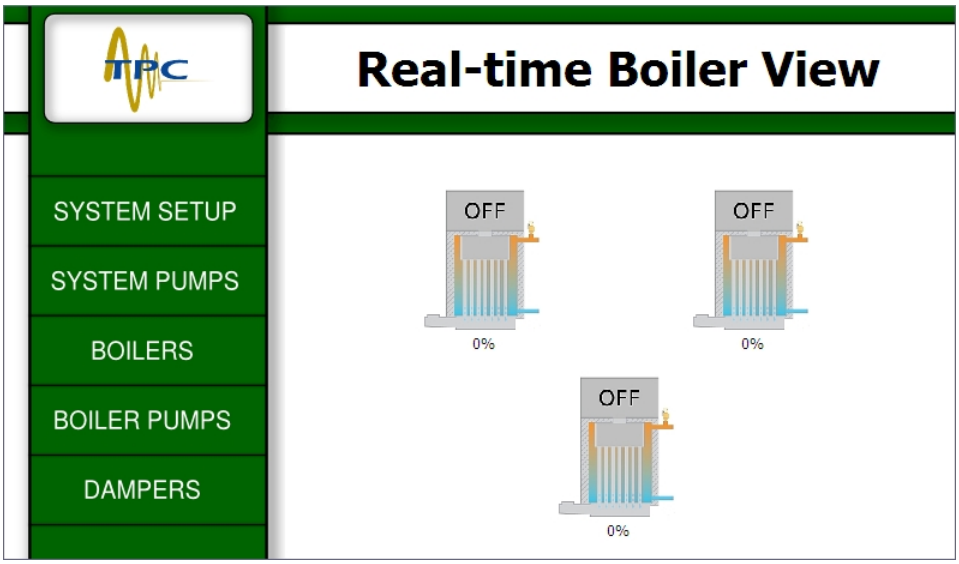
To configure a given pump simply touch the pump to navigate to the configuration screen for that pump (shown below)



- **System Pump configuration screen #1:** It is from this screen that the selections shown above can be made to parametrize a system pump for control and operation in the SoloNet network. The parameter table below give a description of what the given data point is and how it changes pump operation. Touching the button allows the user to make changes to the inputted data.

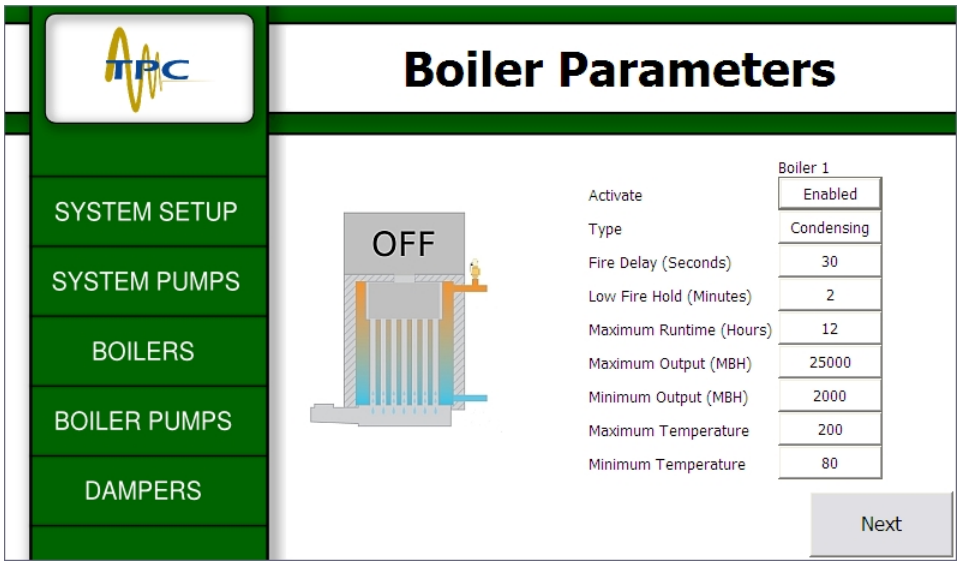
System Pump Parameters			
Activation	Enable / Disable	Enable	Choose Enable to activate this pump to be used in this system.
Dedicated Lead	Enable / Disable	Enable	Choose Enable to always use this pump as the lead pump in this system. Pump = on when heating operations are on
Lead-Lag / Lead-Help	Lead-Lag / Lead-Help	Lead-Lag	Choose "Lead/Lag" if this pump will be rotated into the lead position as an either or pumping scenario. For lead/lag switching + help when using variable speed pumping chose "Lead/Help" in order to meet flow requirements of the system based on Delta P or Delta T system needs.
Lead Shutdown Delay (for Lead-Lag)	10 - 120 Sec	30	Choose the number of seconds you would like to delay the shutdown of the lead pump in this system.
Lag Help Enable Output % (for Lead-Help)	51-100%	100	Choose the percentage of sustained pump output required to enable the lag pump.
Lag Help Disable Output % (for Lead-Help)	1-50%	40	Choose the percentage of sustained pump output required to disable the lag pump. (Must be less than the percentage selected above)

Lag Help Delay (for Lead-Help)	1 - 60 Min	30	Choose the number of minutes the conditions (Output %) for lag help Enable/Disable must be sustained before action is taken to Enable or Disable the lag pump
Rotation Hours (for Lead-Lag or Lead-Help)	12 - 720 Hrs	168	Choose the number of hours you desire this pump to stay in the lead position.
Heat Enable Shutdown Delay Time	1 - 120 Min	60	Choose the number of minutes you would like the pumps to continue to operate after the system has been shut down on outdoor air temperature.
System Pump Maximum Modulation Percentage	50 - 100 %	100	Choose the maximum modulation signal expressed as a percentage you desire to be sent to this pump.
System Pump Minimum Modulation Percentage	0 - 50 %	35	Choose the minimum modulation signal expressed as a percentage you desire to be sent to this pump.
System Pump Process Acceleration	0 - 100.0	20	Select the process acceleration speed. (Lower numbers cause faster response to changes)
System Pump Modulation Signal	0-10 Vdc, 4-20mA	0-10 Vdc	Choose the type of signal you desire to be sent to modulate this pump, 0-10 Vdc or 4-20mA. (also requires wiring to the correct terminal on the control)
System Pump Delta T Operations	Enable / Disable	Disable	Choose enable if you desire to modulate this pump based on the system Delta T.



To navigate to this screen simply locate the **BOILERS** tab on the left side of the screen. From this screen the user can view the status of all Boilers on the network. A green boiler icon indicates the boiler is on. The percentage just below the icon shows the real time output percent at which the boiler is operating. Off state for the boiler will show the icon in gray scale, and alarm will show the boiler in red.

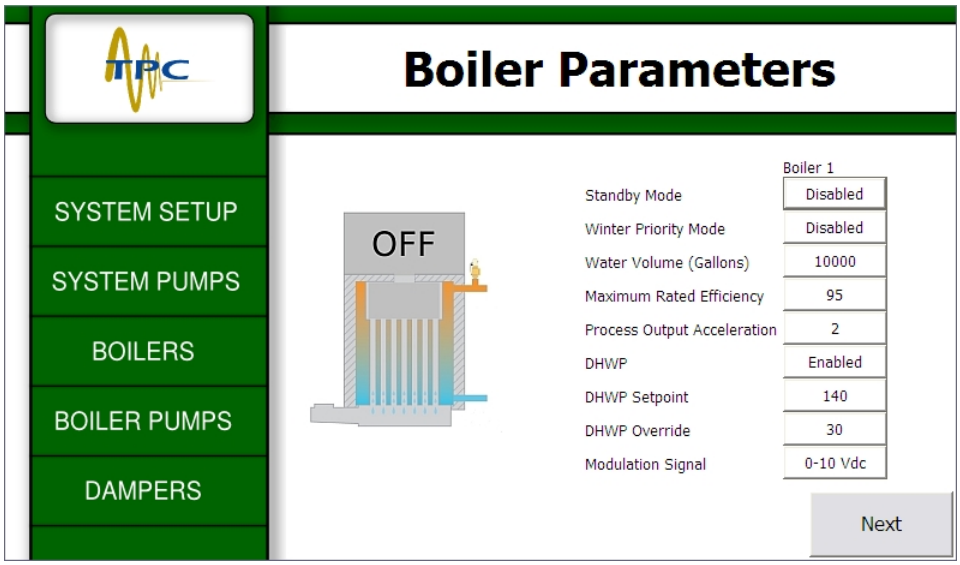
To configure a given boiler simply touch the boiler icon to navigate to the configuration screen for that boiler (shown below)



Boiler Parameters			
Activation	Enable / Disable	Enable	Choose enable to activate this boiler for use in this system.
Flow Sensitive	Yes/No	Yes	Choose Yes unless the boiler you are configuring is rated by its manufacturer as having no minimum flow requirements. Choosing "No" allows boiler secondary pump modulation off the boiler device. It allows another Field Device dedicated to boiler secondary pumping to control boiler pump modulation through wireless network traffic of boiler inlet and outlet temperatures. Choosing "Yes" forces boiler secondary pump modulation to occur local on the Boiler Field Device only.
Boiler Type - Cond / NonCond	Cond / NonCond	Cond	Choose Cond. For condensing boilers, Choose NonCond for non-condensing boilers
Boiler Fire Delay Seconds	30 - 300 Sec	90	Choose the number of seconds between when this boiler is enabled until it has established main flame.
Boiler Low Fire Hold Minutes	5 - 60 Min	15	Choose the number of minutes you desire for the control to keep this boiler in low fire at the beginning of every cycle
Boiler Maximum Runtime Hours	1 - 24 Hrs	12	Choose the maximum number of hours you desire for this boiler to run in any single cycle.
Maximum Boiler MBH Output	1 - 52,000 MBH	3000	Enter in MBH the maximum output of this boiler. (Mbh = Btu/1000)
Minimum Boiler MBH Output	1 - 26,000 MBH	1500	Enter in MBH the minimum output of this boiler. (Mbh = Btu/1000)
Maximum Boiler Outlet Temperature	160 - 210 F	180	Enter the maximum outlet water temperature allowed to be supplied by this boiler.

Minimum Boiler Inlet Temperature	20 - 150 F	130	Enter the minimum inlet water temperature allowed to be returned to this boiler.

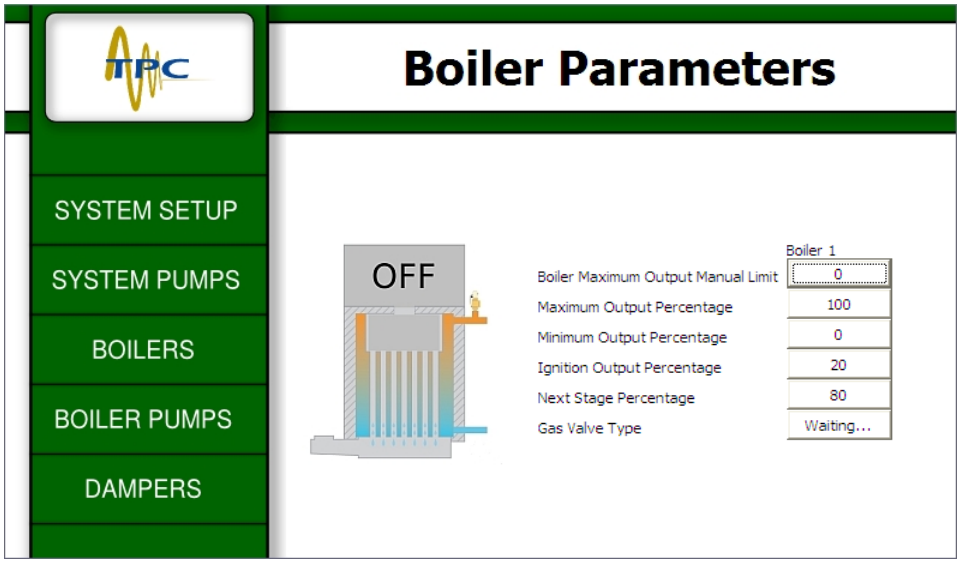
To continue to configure this boiler press the “Next” button at the bottom right hand corner of the screen.



Standby Mode	Enable / Disable	Disable	Choose enable if you desire this boiler to be used as a standby boiler. A standby boiler is the lowest priority for operation and will be selected if all other boilers on the network are failing to meet the load requirements
Winter Priority Mode	Enable / Disable	Disable	Choose enable if you desire this boiler to be a "Winter Priority" boiler. Note: You must have activated winter priority under system settings and chosen a date to put this boiler into priority to use this feature.
Boiler Water Volume Gallons	1 - 12,000 Gal	100	Enter the volume of water in this boiler.
Maximum Rated Efficiency	65 - 99 %	85	Enter the maximum rated efficiency for this boiler
Process Output Acceleration	1 - 100.0	30	Select the process acceleration speed. (Lower numbers cause faster response to changes)
DHWP (on-board or Network)	Enable / Disable	Disable	Select to enable this boiler for DHWP operations. This must be selected of either on board priority or Network priority
DHWP Set-point (on-board only)	110-240F	140F	Provide the outlet water temperature this boiler will be asked to provide when producing domestic hot water.

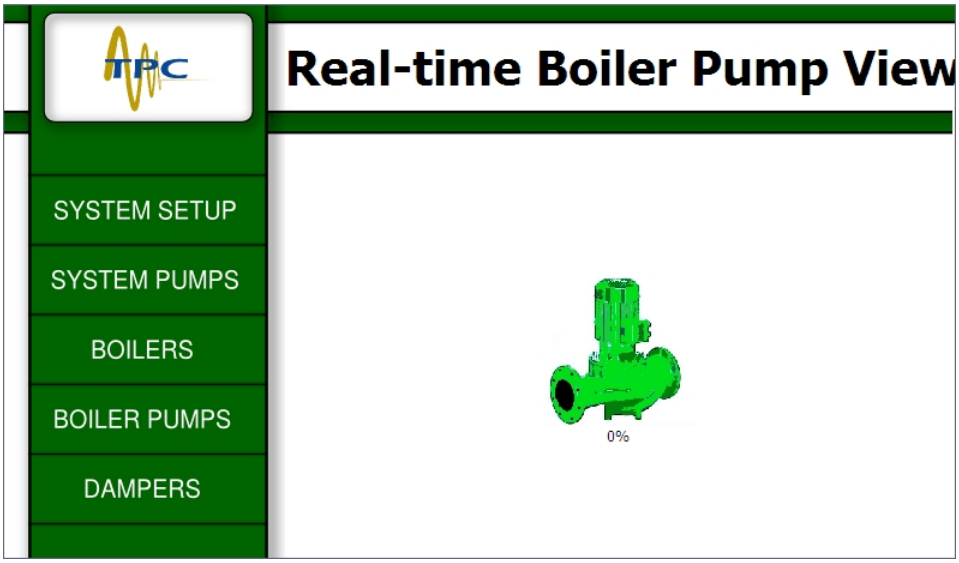
DHWP Maximum Hysteresis (on-board only)	5-30F	10F	This is the maximum allowable overshoot of the DHWP set-point for boiler water temperature. Outlet temperatures exceeding this value will cause the boiler to disable until the DHWP Minimum Hysteresis value has been reached
DHWP Minimum Hysteresis (on-board only)	3-20F	3F	This is the minimum allowable under-shoot of the DHWP set-point for boiler water temperature. Outlet temperatures less than or equal to this value will cause the boiler in priority to enable until the DHWP Maximum Hysteresis value has been reached or until the priority has ended
DHWP Override (on-board only)	15 - 181 Min	30	Choose the maximum number of minutes this boiler can be used to provide DHW when there is simultaneously a call for comfort heat.
Boiler Modulation Signal	0-10 Vdc, 4-20mA	0-10 Vdc	Choose the type of signal you desire to be sent to modulate this boiler, 0-10 Vdc or 4-20mA. (also requires wiring to the correct terminal on the control)

To continue to configure this boiler press the "Next" button at the bottom right hand corner of the screen.



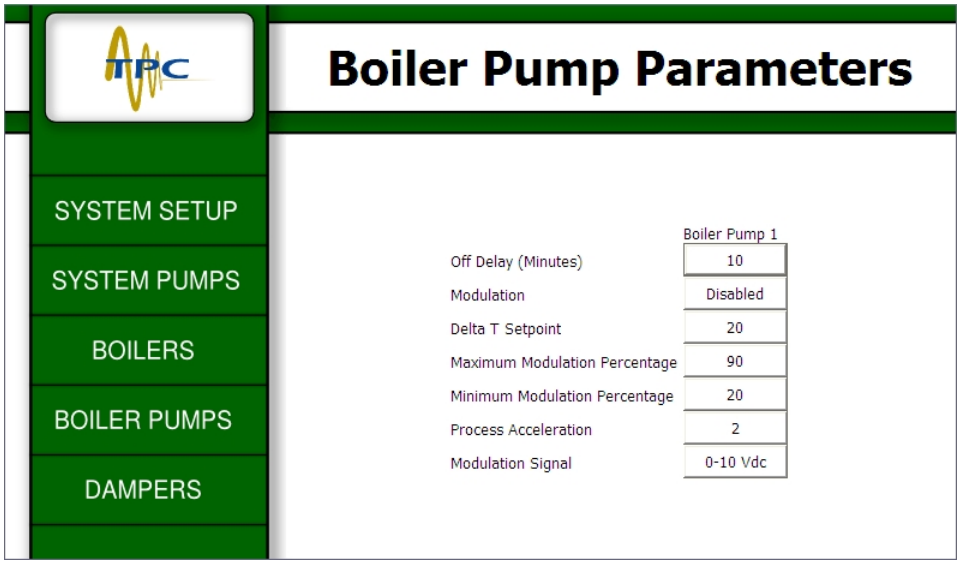
Boiler Maximum Output Manual Limit	50 - 100	100	Enter the maximum output modulation percentage this boiler is allowed to reach.
Maximum Boiler MBH Output	1 - 52,000 MBH	3000	Enter in MBH the maximum output of this boiler. (Mbh = Btu/1000)
Minimum Boiler MBH Output	1 - 26,000 MBH	1500	Enter in MBH the minimum output of this boiler. (Mbh = Btu/1000)
Boiler Ignition Output Percentage	0 - 50 %	0	Enter the output percentage at which main flame is ignited. Some boilers light off at greater than minimum signal. If light off of the boiler is 50% of output then enter 50%. This modulation signal will be sent to the boiler during the entire fire delay.
Boiler Next Stage Percentage	10 - 100 %	85	This is the percentage of boiler output that must be sustained for the entire "Stage Delay Time" before another boiler is enabled.

Flow Sensitive	Yes/No	Yes	Choose Yes unless the boiler you are configuring is rated by its manufacturer as having no minimum flow requirements. Choosing "No" allows boiler secondary pump modulation off the boiler device. It allows another Field Device dedicated to boiler secondary pumping to control boiler pump modulation through wireless network traffic of boiler inlet and outlet temperatures. Choosing "Yes" forces boiler secondary pump modulation to occur local on the Boiler Field Device only.
Gas Valve Type	Governed/Butterfly	Governed	Select the type of gas valve that is this burner is utilizing.



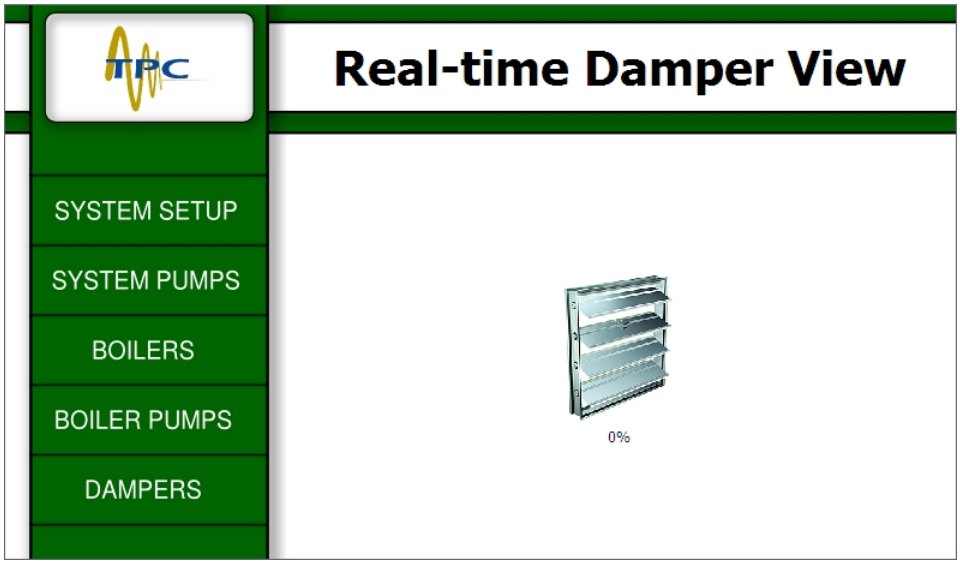
To navigate to this screen simply locate the **BOILER PUMPS** tab on the left side of the screen. From this screen the user can view the status of all Boiler Pumps on the network. A green boiler pump icon indicates the boiler pump is on. The percentage just below the icon shows the real time output percent at which the boiler pump is operating. Off state for the boiler pump will show the icon in gray scale, and alarm will show the boiler pump in red.

To configure a given boiler pump simply touch the boiler pump icon to navigate to the configuration screen for that boiler pump (shown below)



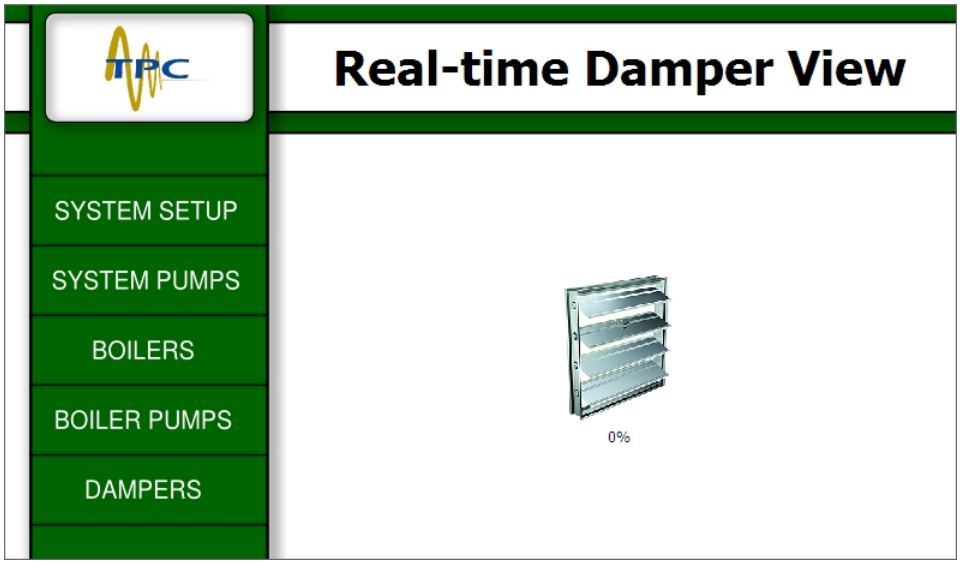
Boiler Pump Parameters			
Activation	Enable / Disable	Enable	Choose enable to activate this boiler pump for use in this system.

Pump control / Valve control	Pump / Valve	Pump	Choose the device that is being controlled
Boiler Pump Off Delay	1 - 15 Min	10	Enter the number of minutes you would like this pump to run after the boiler has finished a cycle.
Boiler Pump Modulation	Enable / Disable	Disable	Enter "enable" if this pump is connected to a frequency drive and you wish to modulate that drive based on boiler Delta T
Boiler Delta T Set point	0 - 158 F	20	Enter the Delta T that you desire across this boiler. This number needs to be less than or equal to the value chosen as the maximum operating Delta chosen under Boiler Parameters for the boiler assigned to this pump.
Boiler Pump Maximum Modulation Percentage	50 - 100 %	100	Choose the maximum modulation signal expressed as a percentage you desire to be sent to this pump.
Boiler Pump Minimum Modulation Percentage	0 - 50 %	30	Choose the minimum modulation signal expressed as a percentage you desire to be sent to this pump.
Boiler Pump Process Acceleration	1 - 100.0	30	Select the process acceleration speed. (Lower numbers cause faster response to changes)
Boiler Pump Modulation Signal	0-10 Vdc, 4-20mA	0-10 Vdc	Choose the type of signal you desire to be sent to modulate this pump, 0-10 Vdc or 4-20mA. (also requires wiring to the correct terminal on the control)



To navigate to this screen simply locate the **DAMPERS** tab on the left side of the screen. From this screen the user can view the status of all Dampers on the network. A green damper icon indicates the damper is open and proved. Off state for the damper will show the icon in gray scale, and alarm will show the damper in red.

To configure a given damper simply touch the damper icon to navigate to the configuration screen for that damper (shown below)



Damper Parameters			
Activation	Enable / Disable	Enable	Choose enable to allow this damper to be used in this system.
Boiler Association	1-1, 1-16 Range	(1 - 1)	Identify the boiler(s) that this damper will work with. Boilers must be in sequential order. For example: Inputting 1-3 will not enable the damper on just 1 and 3. If 1-3 is chosen then boiler 1,2 & 3 will enable this damper if any or all of these boilers are enabled.