Sentry 2100 Microprocessor

Boiler Controller

Software Version C2.0 ONLY

For L or T versions, consult Trinity or Legacy manual

Installation & Operational Instructions

Never make electrical connects on or around Sentry 2100 while power is on, electrical arching can damage unit, voiding warranty.

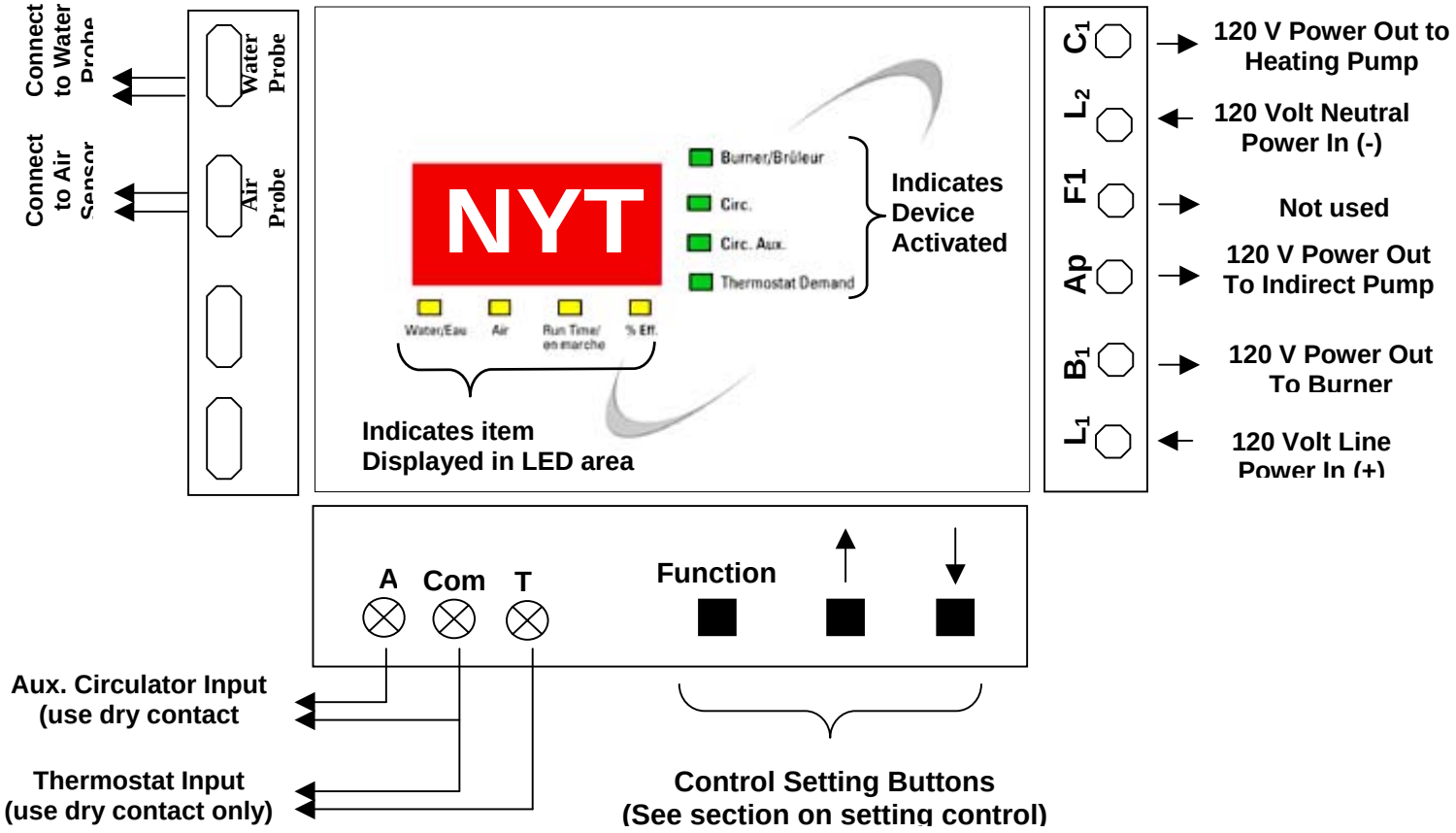
Caution: ***All Sentry inputs are DC voltage. DO NOT ground, or provide any AC voltage to the Sensors or thermostat inputs, this will result in serious damage to the Sentry 2100 voiding the warranty.***
For terminals A C T use dry contacts only to switch signal.

Verify that there is NO EXTERNAL VOLTAGE between these wires prior to connection.

Verify that there is NO EXTERNAL VOLTAGE to ground and these wires prior to connection.

Sentry 2100 Microprocessor
Boiler Controller

The Sentry 2100 microprocessor boiler controller is designed to give superior control of boiler operations while ensuring a high degree of safety and reliability. The sentry 2100 Controller a proprietary designs of NY Thermal and is intended only for use in specified NY Thermal boilers.



Control Input Voltage (L_1L_2) = 120 VAC.
Provide 15 Amp, time delay Fuse protection.
Maximum Ambient Condition = 150°F.

Contact Output FLA B_1 = 3 Amps, C_1 & A_P = 3 Amps.
Contact Output FLA F_1 = 3 Amps, (optional contact).
Install ONLY as specified by NY Thermal.

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For terminals A C T use dry contacts only to switch signal.

Verify that there is NO EXTERNAL VOLTAGE between these wires prior to connection.
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FEATURES

- Control is fully enclosed in impact resistant enclosure.
- Multi-functional LED display system.
- Digital set point for unmatched accuracy.
- Provides all safety and operational functions.
- Operates Burner, Heating pump, and Auxiliary indirect pump or valve.
- Provided with outdoor sensor for automatic burner temperature reset.
- All connections are quick socket connections
- Automatically detect presence of additional sensors.
- Optional stack sensor provides continuous combustion efficiency display.
- Pump exerciser routine, activates pump for 5 second, every 72 hours preventing seizing.
- Optional fan modulation output.
- Records burner run time, for energy utilization calculations.
- Internal diagnostic system, continuous monitors for errors.
- Designed to withstand power dips and spikes.

DISPLAY

Burner/Brûleur – indicates that the burner has been activated.
Circ. – Indicates the heating circulator has been activated
Circ. Aux. – Indicates that the **A-Com** input has been closed, and the contact for the Auxiliary or Indirect circulating pump or valve has been activated.
Thermostat Demand- Indicates that the **T-Com** input has been closed, and that a "Call for Heat" has been requested.

Water/Eau – When this light is activated, the LED panel is displaying the Water temperature inside the boiler.
Air – This function works only when the outdoor probe is being used, and has been detected by the controller. When this light is activated, the LED panel is displaying the Outdoor Air temperature.
Gas Input Value or Run Time/en marche – When this light is activated, the LED panel displays the accumulated hours that the burner has been energized. This value can be reset to zero. See the section of Control Programming.
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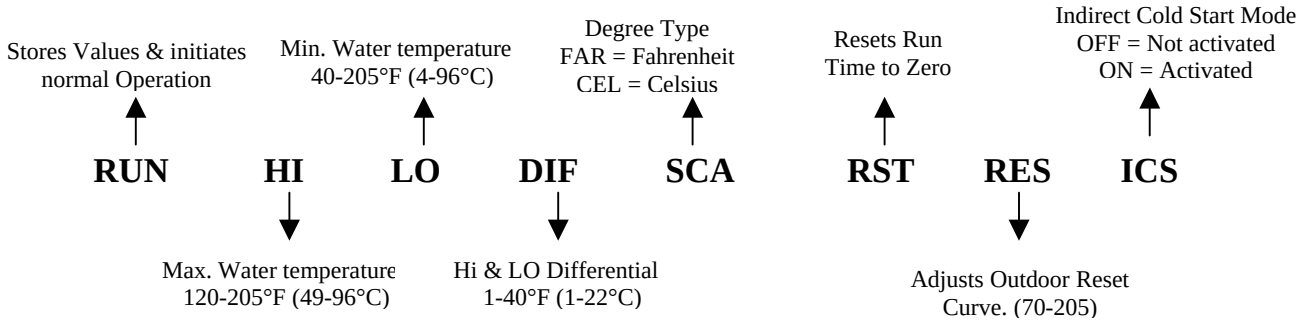
Control Programming

Setting control

Programming is accomplished by a series of three push buttons located on the bottom side of the control. (***Function*** ↑ and ↓). To enter the programming mode, press the function key once. To scroll through the various menu options depress ↑ until the menu is displayed. To alter the value press ***Function*** once, and the current value will be displayed, then use the ↑ for up, and ↓ for down, until the desire value is obtained. To enter the selected value press ***Function***, which will return to the menus. When all desired values are inputted, scroll to the RUN menu, and press Function, which exits the Programming Mode and initiates normal operation. A safety feature has been added to ensure that the control is not left in the Program Mode, the unit will flash all lights and display "OFF", which means the unit was left in the program mode for more the 10 seconds without receiving an input. Press ***Function*** once to continue programming.

MENU



To start the control operation, you must return to RUN on the menu, and press Function. Normal operation will begin.

Example to change LO Default from 180°F to 140°F

Step	Press Button	Display Shows
1		Normal Cycling
2	Function	Run
3	↓	Hi
4	↓	LO
5	Function	180
6	↓ 40 times	140
7	Function	LO
8	↓ 4 times	RUN
9	Function	Normal Cycling

Important Note:

FLASHING OFF – Indicates that the control was left unattended in program mode. Pressing Function, ↑ , or ↓ will resume programming.

ICS – Not all NY Thermal boiler are compatible with this operation, ensure unit is rated for Cold Start.

AIR – The AIR temperature will only be displayed if the outdoor air sensor is installed, and is detected by the controller.

Operation

The control function to three different modes of operation based upon the number of sensors used, or by the mode selected. The following is a brief explanation of the various modes:

Conventional Mode – Standard configuration **(Outdoor Sensor not Detected) –** This operation is very similar to a conventional Triple Aquastat. Upon a call for heat (T-C Jumpered) the boiler maintains the Hi setpoint less the differential setting. The circulator activates at the low temperature, and deactivates if the water temperature falls 10°F below the Lo Setting (This establishes a priority for domestic hot water). When there is no call for heat (T-C Open) the burner maintains the Lo Setting cycling between 10°F below the Lo setting and the diF setting. If the Dif setting is higher than 10° the burner turns off at ((Lo +(Dif –10)).

Reset Mode – Standard configuration **(Outdoor Sensor Detected) –** This operation is very similar to Conventional Mode Except that the control automatically reduces the Hi setpoint based upon the outdoor Air temperature. Upon a call for heat (T-C Jumpered) the boiler maintains the calculated theoretical Hi setpoint less the differential setting. If the theoretical Hi setpoint is lower than the Lo setpoint, then the controller will ignore the theoretical Hi setpoint and the burner will operate to the Lo setting. The circulator activates at the Lo setting, and deactivates if the water temperature falls 10°F below the Lo Setting (This establishes a priority for domestic hot water). When there is no call for heat (T-C Open) the burner maintains the Lo Setting cycling between 10°F below the Lo setting and the Dif setting. If the Dif setting is higher than 10° the burner turns off at ((Lo +(Dif –10)).

ICS Mode – **Indirect Cold Start** *(Caution: This feature is for selected "cold start" boilers only).*
Activated by Menu option ICS, select ON to activate. - This operation is very similar to Conventional Mode or Reset mode depending upon the use of the outdoor sensor. The major difference for ICS Mode is that the burner only fires, when there is a call for heat or a call for domestic (via an indirect water heater). Upon a call for heat (T-C Jumpered) the circulator immediately activates, and the burner maintains the theoretical Hi setpoint less the differential setting. Upon a call for domestic (A-C Jumpered) 120V is switched to A_p wire to activate an indirect circulator or valve. The burner maintains the Lo Setting, cycling between 10°F below the Lo setting and the (Lo + Dif setting). If the water is or falls 10°F below the Lo Setting the heating pump deactivates, establishing a priority for the domestic hot water.

Conventional Mode

	Input State: T-C Open	Input State: T-C Closed
Condition	Domestic Standby	Heating
Burner On	LO-10	HI-Dif
Burner Off	LO+(Dif-10)	HI
Heat Circ. ON	-	LO
Heat Circ. Off	-	LO-10

Closing A-C terminals, activates Aux. Circ. and provides 120V out to A_P.

Reset Mode

	Input State: T-C Open	Input State: T-C Closed
Condition	Domestic Standby	Heating
Burner On	LO-10	$HI_{Calc.}$ -Dif
Burner Off	LO+(Dif-10)	$HI_{Calc.}$
Heat Circ. ON	-	LO
Heat Circ. Off	-	LO-10

Closing A-C terminals activates Aux. Circ. and provides 120V out to A_P.

** Note: If the calculated HI Setting is less than the LO setting, the LO will be used in place of the HI setting.

Determining Reset Temperature HI_{Calc}

Once the control identifies the presence of a good outside sensor, the control will automatically reduce the HI setting, based upon the outdoor temperature. The calculated HI setpoint (**HI_{Calc}**) is calculated as follows:

Example: Hi=205, Air Temperature=32

RESET RATIO
= (High Setting - 70)/70
= (205 - 70) /70
= 1.92

RESET TEMPERATURE HI_{Calc}
=[(70-Outdoor Air) x Reset Ratio] + 70
=[(70-32) x 2.00] + 70
=[73] + 70
=143.00°F

ICS Mode

Condition	T-C & A-C Open	T-C Closed & A-C Open	T-C Closed & A-C Close	T-C Open & A-C Closed
Condition	Standby	Heating Only	Heating & Domestic	Domestic Only
Burner On	-	$HI_{Calc.}$ -Dif	**(HI Calc.–Dif) **Or** L0-10	LO-10
Burner Off	-	$HI_{Calc.}$	**(HI Calc.) **Or** L0+(Dif-10)	L0+(Dif-10)
Heat Circ. ON	-	T-C Close	LO	-
Heat Circ. Off	-	T-C Open	LO-10	-
Aux Circ. On	-	-	A-C Close	A-C Close
Aux. Circ. Off	-	-	A-C Open	A-C Open

**** Note: Burner cycles to the highest calculated temperature of either formula.**

Wiring

- Provide dedicated 120-volt power from house service to Sentry 2100 controller, utilizing a minimum of 14-gauge wiring.
- Provide adequate overload protection. A 15 Amp time-delay fuse, or 15-amp breaker is required.
- A service switch between the boiler and the room exit should be provided.
- Disconnect all power prior to working on the controller, burner thermostats, & pumps.
- During wiring discharge yourself of static electricity, by touching the boiler casing with your hand or screwdriver prior to touching the control.

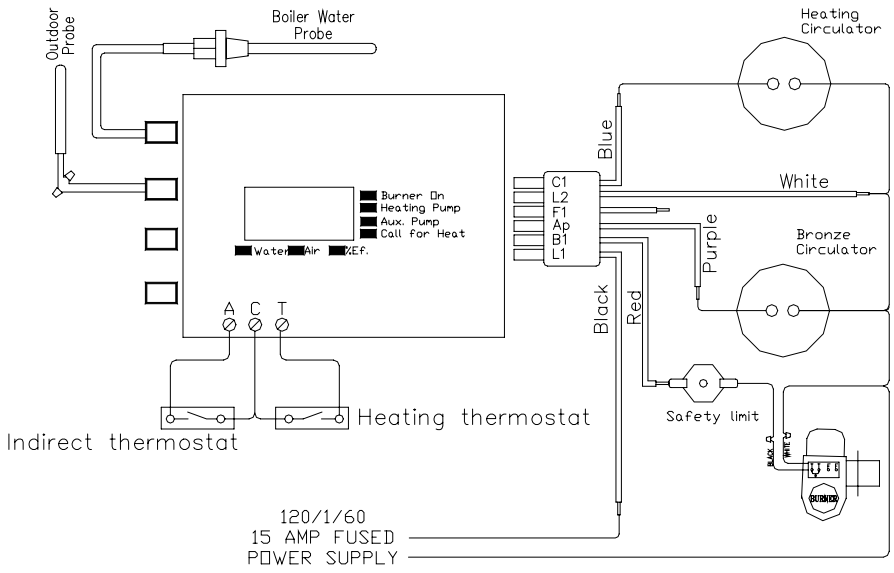
Warning!!! A bad installation could ruin the Sentry Board and void your warranty.

- **Prior to connecting to A C T terminals, operate the thermostat system, and using a Multimeter, verify that these wires don't go to ground and have any voltage across the wires, or from the wires to ground.**
- **The A T C terminals are low voltage DC inputs. Do not provide any external power supply to these inputs.**
- **Thermostat and indirect contacts must be "A DRY CONTACT ONLY".**
- **DO NOT run thermostat or indirect wiring within conduits or around wiring containing AC power supplies.**
- **If the control doesn't operate properly, Contact NY Thermal immediately (before replacing it). If not your warranty could be voided.**

QUICK INSTALL STEPS

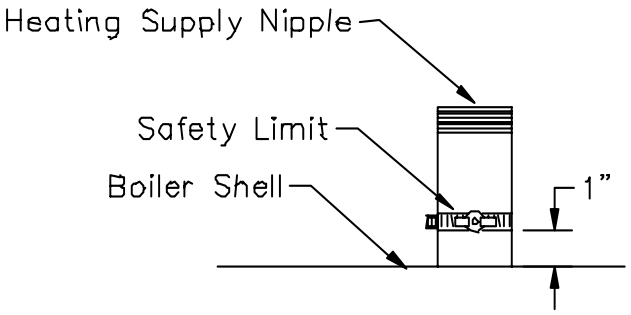
1. Ensure controller has dedicated fused power supply from the house service.
2. Ensure that there is a Disconnect switch for the controller within the boiler room.
3. Install the water probe into the ¼" NPT fitting provided.
4. Run wiring from outdoor sensor (if used), and splice to the connector provided.
5. Marrett the main 6 wire plug to the appropriate devices (as in the diagram).
6. Insert the water probe plug into the slot provided (barbed end up).
7. Complete wiring system to thermostat and indirect. Prior to connecting to A-C-T terminals, verify that there is no voltage on the lines while cycling the thermostats.
8. Turn power on, and immediately set the controls to the desired settings.
9. Verify that the display is scrolling, Water temp. - Air temp. (if connected) - Run Time.
10. Complete at least one complete burner cycle to ensure safe operation.

WIRING DIAGRAM FOR SENTRY 2100



SAFETY LIMIT SENSOR
(Not used on Odyssey boilers)

For added protection the Sentry 2100 comes with an additional Hi limit sensor, which is connected, to the supply nipple using the gear clamp configuration. Install the safety limit on the supply nipple approximately 1" from the base of the boiler. This is a manual reset control. If this safety switch has to be reset, reduce the Hi setting by 5ºF. If it persists, contact NY Thermal.



DO NOT OVER TIGHTEN THE GEAR CLAMP. Apply only enough pressure to secure the sensor in place.

TROUBLE SHOOTING

This section is intended to assist the service technician in detecting and correcting common errors. The Sentry 2100 is equipped with an internal diagnostic system that verifies control operation. The following series of error codes has been developed to aid in diagnosing control problems:

Problem	Detected Problem	Remedy
ER1 On Display **(Water probe)**	The Safety High Limit of 230° F, has been reached	Reduce limit setting, (and/or) ensure that there is proper water circulation in the system.
ER2 On Display **(Water probe)**	The water probe is transmitting an invalid signal. Closed circuit.	Check to determine is display temperature seems accurate. Check wiring
ER3 On Display	The water probe is not connected. Open circuit.	Check wiring
Board Resets	Infrequent resets are normal. Frequent resets are signs of poor voltage supply, or power going to ground.	Remove wire harness form Sentry, and check for grounding. Ensure the voltage supply is 120 volts at all times. Voltage dips below 105 volts will prevent operation.
Run time not accumulating	If the unit resets before the accumulation of one-hour run time is reached, the reading will reset the counting.	Not serious, however continuous resets can damage the board. See "Board Resets"
Run time has Reset to 0	If the unit was subject to a serious voltage situation (short circuit, or lightning strike, or power surge).	Unit is not damaged, however setting may be altered. Check setting to ensure desired operation.
Burner light on but no power to the ignition module	This unit is provided with an additional re-settable safety limit connected to the supply pipe on the inside of the casing.	Press the red reset button. Reduce setting slightly to avoid nuisance tripping.