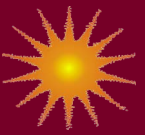


CONTROL UNIT INSTALLATION



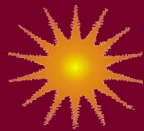
INSTALLATION OF CBX6 OR CBX23 SERIES CONTROL UNIT SYSTEMS PAGE 4-2 TO 4-5



INSTALLATION OF CBX7 CONTROL UNIT SYSTEM PAGE 4-6 TO 4-8



INSTALLATION OF RADIANT 8 SERIES CONTROL UNIT SYSTEMS PAGE 4-9 TO 4-13



Installation of Control Unit- CBX6, CBX6T, CBX23, & CBX23T

The Control Unit is the brains of the Heatizon System and contains all of the system safeties and provides for a soft start to the Transformer. Make sure the primary power to the Control Unit is still off before proceeding with Control Unit Installation.

Locate Power Supply and Thermostat Wire.

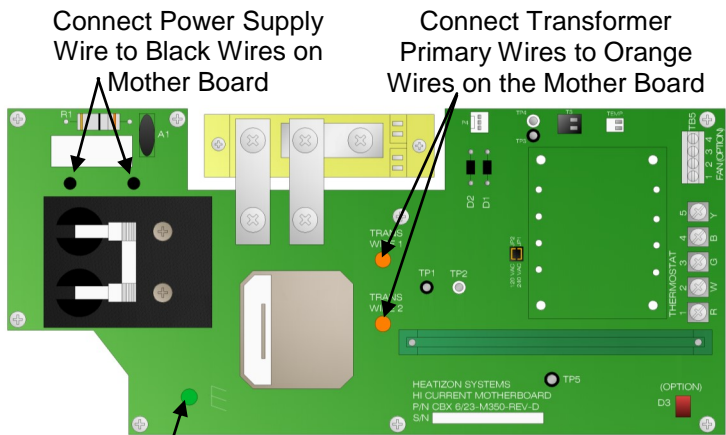
Run the power supply conductor through the round hole in the upper left corner of the Control Unit. Run the Thermostat Wire through the round hole in the lower center of the Control Unit.

Mount Control Unit.

The Control Unit will mount on the left side of the Back Plate. Rotate the Control Unit so that the switch is at the top. Make certain that the power supply conductor and Thermostat Wire pass through access holes in the Control Unit and are not behind it. Carefully slide the Control Unit back over the bushing around the power supply line. Mount the Control Unit to the Back Plate using two (2) #6-32x3/8" screws provided in the Hardware Kit.

Connect Power Supply to Control Unit.

Once again, verify that the primary power at the circuit breaker is in the "Off" position. Cut the primary power wires that come from the service panel to the desired length. Strip 1/2 inch of insulation from the end of each wire. Using the Primary Power Supply tables below, connect the power supply wires to the black wires from the Control Unit. Connect the Primary Power Supply Ground Wire to the Green Wire on the Control Unit Mother Board. Locate power supply wire locations on the Mother Board of the Control Unit, see diagram to the right. Use a #10 insulated Butt Splice Connectors or the provided wire nuts to connect the power supply conductors to the appropriate wire on the mother board.



CBX6 and CBX23 Series Mother Board

Note: The Transformer wiring diagram is attached to each transformer. Wiring configuration will change with Transformer size and supply voltage.

Primary Power Supply Voltage Connections

Two Hots with Ground	208VAC
Two Hots with Ground	240VAC
Hot & Neutral Hot with Ground	277VAC

Primary Power Supply Connections

White (Common) and Red	208VAC
White (Common) and Black	240VAC
White (Common) and Yellow	277VAC

Installation of Control Unit- CBX6, CBX6T, CBX23, & CBX23T

Connect Transformer to Control Unit. Once the primary Transformer wires are installed through the Control Unit side plate, strip 1/2" of wire insulation off of the end of each wire, and connect each one of the two primary wires of the Transformer to one of the two orange wires in the Control Unit using #10 insulated Butt Splice connectors or the provided wire nuts. It is not necessary to observe polarity when making this connection. Use the label information on the transformer to select the proper wiring for the supply voltage used. Cap off all unused wires individually with a provided wire nut.



Connect Thermostat Wire. Cut the Thermostat Wire to desired length. Strip about 2" of outer jacket from end of cable. **USE CAUTION WHEN STRIPPING OUTER JACKET. DO NOT CUT OR NICK INDIVIDUAL WIRES.** Strip 3/4 inch of insulation from each of the Red, White, and Green wires in the cable and connect them to the terminals labeled R, W, and G located in the lower left-hand section of the Control Unit Mother Board. Place the wire under the left hand side of the terminal screw, and tighten in the clockwise direction.



If you have a CBX6T or CBX23T and use an Activation Device that requires 24VAC power, strip 3/4" from the Blue and Yellow wires, and connect them to the terminals labeled B and Y. Place wire under the left hand side of the terminal and tighten in a clockwise direction.

WARNING: Anytime the Blue and Yellow wires are connected to the B and Y terminals, and the Control Unit is energized, the other ends of the Blue and Yellow wires must be insulated (isolated) from one another and all other conductive material in order to avoid damage to the CBX6T or CBX23T Control Unit Mother Board.



Connect Thermistor. The Overtemp Sensor, also known as a thermistor, senses the Transformer operating temperature and will turn off the system if the temperature exceeds the Transformer's rating. Connect the end of the thermistor to the P2 terminal on the Mother Board and then pass the black bulb of the thermistor through the bushing inside of the Control Unit panel and into the Transformer cavity. Insert the black bulb of the thermistor into the space between the laminations and the belly of the Transformer.

Connect Torroid. Pass the end of the torroid through the bottom opening in the Control Unit board mount plate, and connect it to the P3 terminal on the Control Unit Mother Board.

Check all Connections. Check all connections at this time for tightness and proper location. Check all wire nuts, and check all screws on the SCR; tighten as needed.

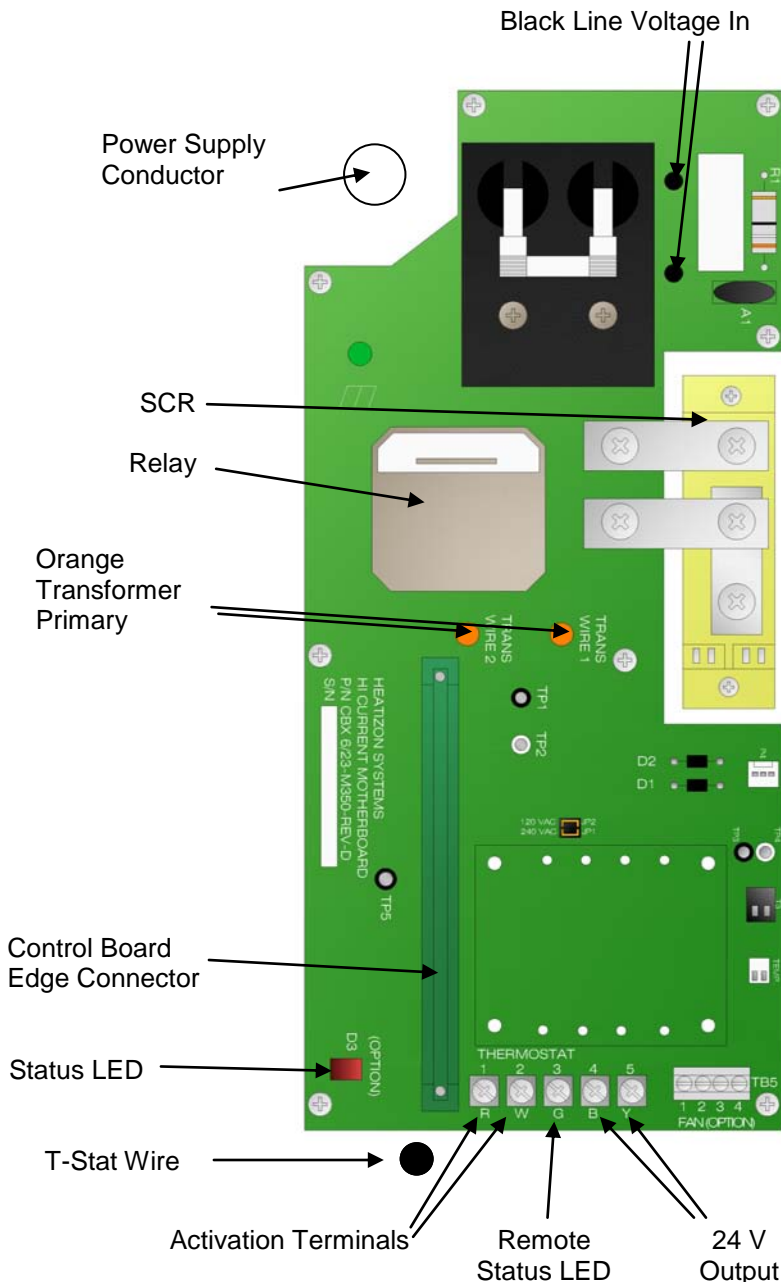


CONTROL UNIT

Installation of Control Unit- CBX6, CBX6T, CBX23, & CBX23T

NOTE: Any time CBX6T or CBX23T Control Units are operating at 120VAC, the Jumper on the Control Board connection JP1 (directly above 24vac transformer) must be moved to the JP2 position. For 208/240VAC powered CBX6T or CBX23T, leave the Jumper on connection JP1. See Control Board illustration. Do not use CBX6T or CBX23T with 277VAC power. If you require 24VAC and are using 277VAC power, Heatizon Part # M360 is available for purchase.

CBX6/23 MOTHER BOARD



NOTE: Control Units CBX6T or CBX23T are identical to the CBX6 and CBX23 Control Units in every respect except for one: The CBX6T and CBX23T Control Units are equipped with 24VAC to power an activation device that requires 24VAC power. Terminals for load are located in the lower portion of the Control Unit Mother Board and are labeled B and Y.

WARNING: DO NOT INSTALL OR REMOVE CONTROL BOARD WHEN THE CONTROL UNIT IS ENERGIZED. INSTALLING BOARD UNDER POWER WILL CAUSE SIGNIFICANT DAMAGE TO MOTHER BOARD AND/OR CONTROL BOARD.

WARNING: INSTALL CONTROL BOARD WITH COMPONENTS FACING LEFT, INSTALLING BOARD IMPROPERLY WILL CAUSE PERMANENT DAMAGE TO MOTHER BOARD AND/OR CONTROL BOARD.

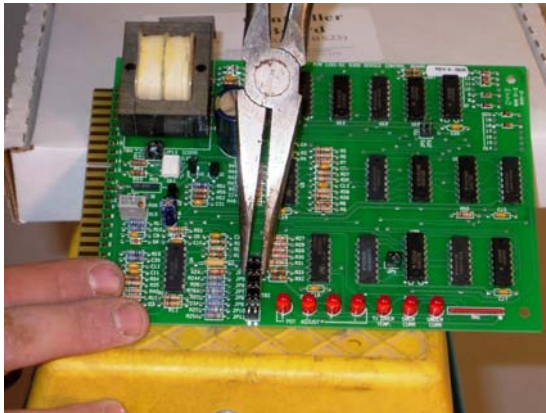
CONTROL UNIT

Set Up The CBX6T and CBX23T Control Board

- Verify that all jumpers are installed on the appropriate settings for your specific application before inserting Control Board into the Mother Board of the Control Unit.

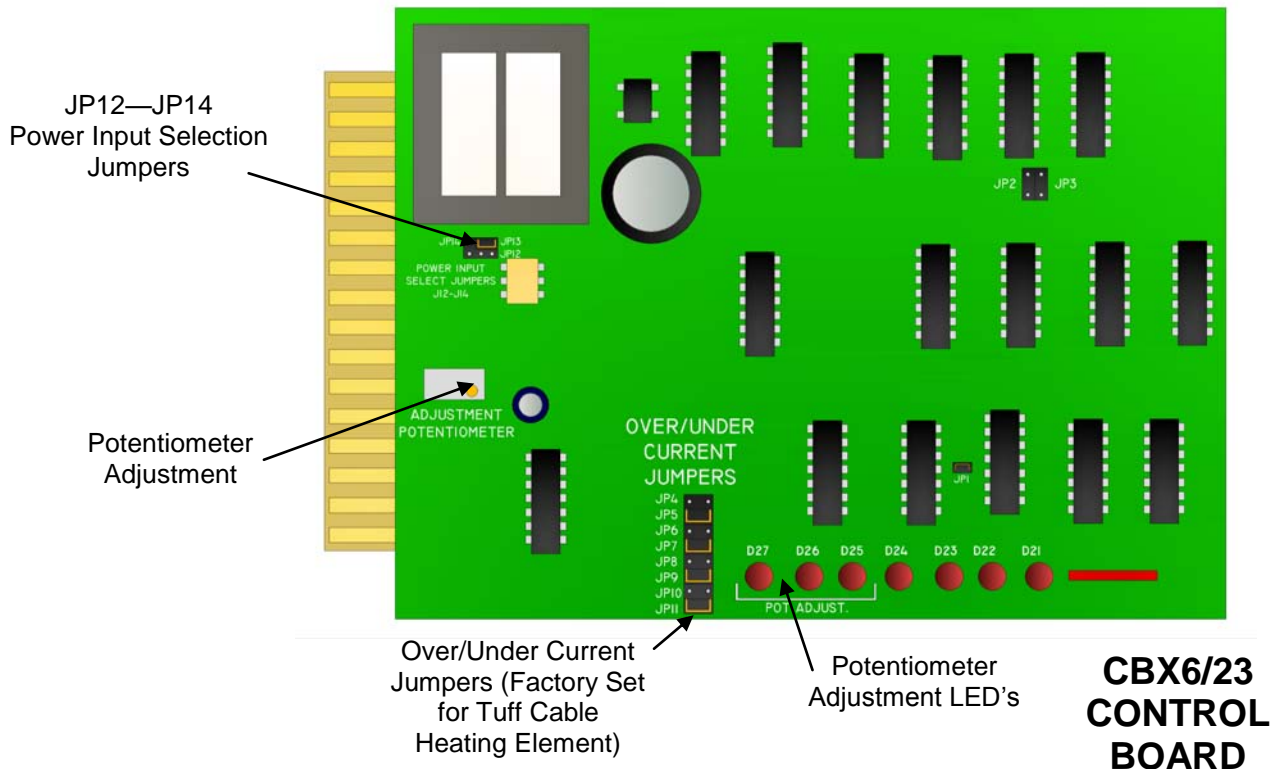
- Set the JP12, JP13, and JP14 jumper on the Control Board before installing Control Board into the Mother Board using the tables below. Refer to Input Voltage Select Table below for jumper locations on the Control Board.

- **Control Boards have been preset at the factory on the JP13 208/240V incoming power setting, and the JP5, JP7, JP9, and JP11 settings for Tuff Cable Heating Element or for ZMesh Heating Element when being used for snow melt and roof deicing applications.** If your application uses 120VAC or 277VAC incoming power and/or ZMesh Heating Element is being used for interior applications, the jumpers will need to be repositioned. If using 240VAC incoming power and Tuff Cable heating element, verify that the factory installed jumpers are on appropriate settings. See table below.



Over/Under Current Settings				
ZMesh Interior	(5%/10%)	JP4	JP6	JP8 JP10
Tuff Cable	(10%/20%)	JP5	JP7	JP9 JP11
ZMesh Exterior	(10%/20%)	JP5	JP7	JP9 JP11

Input Voltage Select Table	
120VAC	JP12
208/240VAC	JP13
277VAC	JP14



Install the Control Board

Make certain that the primary power to the Control Unit is off, and then insert the Control Board fully into the edge connector, making certain that the components on the Control Board are facing left.

CONTROL UNIT

Installation of Control Unit- CBX7

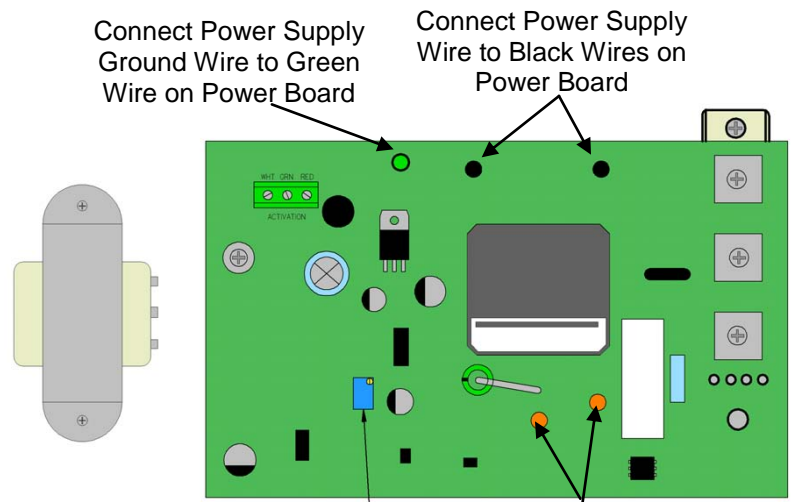
The Control Unit is the brains of the Heatizon System, and contains system safeties and provides for a soft start to the Transformer. Make sure the primary power to the Control Unit is still off before proceeding with Control Unit Installation.

Locate Power Supply and Thermostat Wire. Run the power supply conductor through the round hole in the upper left corner of the Control Unit. Run the Thermostat Wire through the round hole in the lower center of the Control Unit.

Mount Control Unit. The Control Unit will mount on the left side of the Back Plate. Make certain that the power supply conductor and Thermostat Wire pass through access holes in the Control Unit and are not behind it. Carefully slide the Control Unit back over the bushing around the power supply line. Mount the Control Unit to the Back Plate using two (2) #6-32x3/8" screws provided in Hardware Kit.

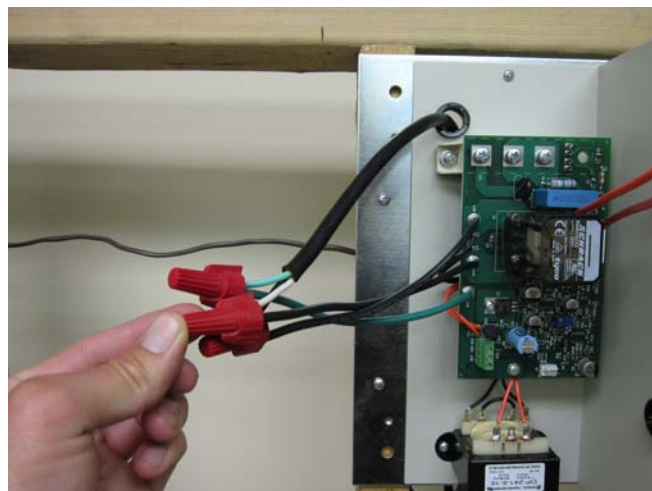
Connect Power Supply to Control Unit. Once again, verify that the primary power at the circuit breaker is in the "Off" position. Cut the primary power wires that come from the service panel to the desired length. Strip 1/2 inch of insulation from the end of each wire. Connect the power supply wires to the black wires from the Control Unit, using the Primary Power Supply tables below. Connect the Primary Power Supply Ground Wire to the Green Wire on the CBX7 Power Board. Locate power supply wire locations on the CBX7 Power Board with diagrams, right. Use #10 insulated Butt Splice Connectors or the provided wire nuts to make these connections.

NOTE: CBX7 Control Units are to be used to energize Tuff Cable Heating Element in snow melting applications in asphalt, concrete, and sandbed under pavers only.



CBX7 Power Board

Connect Transformer Primary Wires to Orange Wires on the Power Board



Note: The Transformer wiring diagram is attached to each transformer. Wiring configuration will change with Transformer size and supply voltage.

Primary Power Supply Voltage Connections

Two Hots with Ground	208VAC
Two Hots with Ground	240VAC
Hot & Neutral Hot with Ground	277VAC

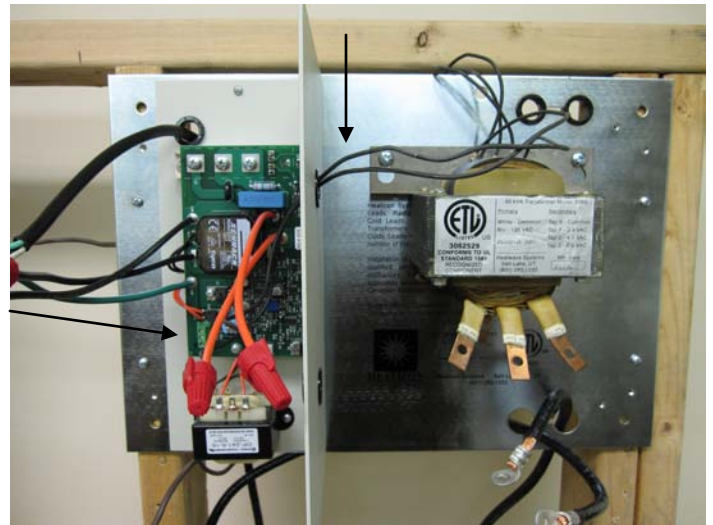
Primary Power Supply Connections

White (Common) and Red	208VAC
White (Common) and Black	240VAC
White (Common) and Yellow	277VAC

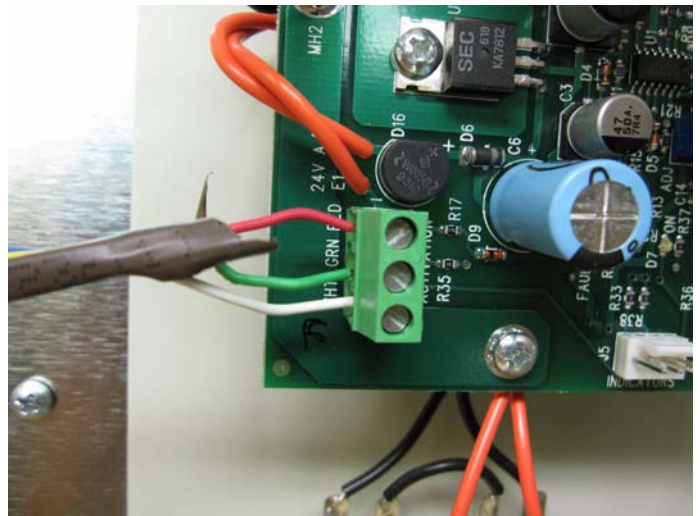
CONTROL UNIT

Installation of Control Unit- CBX7

Connect Transformer to Control Unit. Once the primary Transformer wires are installed through the Control Unit side plate, strip 1/2" of wire insulation off of the end of each wire, and connect each one of the two primary wires of the Transformer to one of the two orange wires in the Control Unit using #10 insulated Butt Splice connectors or the provided wire nuts. It is not necessary to observe polarity when making this connection. Use the label information on the transformer to select the proper wiring for the supply voltage used. Cap off all unused wires individually with a provided wire nut.



Connect Thermostat Wire. Cut the Thermostat Wire to desired length. Strip about 2" of outer jacket from end of cable. **USE CAUTION WHEN STRIPPING OUTER JACKET. DO NOT CUT OR NICK INDIVIDUAL WIRES.** Strip 3/4 inch of insulation from each of the Red, White, and Green wires in the cable and connect them to the terminals labeled RED, WHT, GRN on the J2 Activation Device connect on the CBX7 Power Board. Place the wire under the left hand side of the terminal screw, and tighten in the clockwise direction.

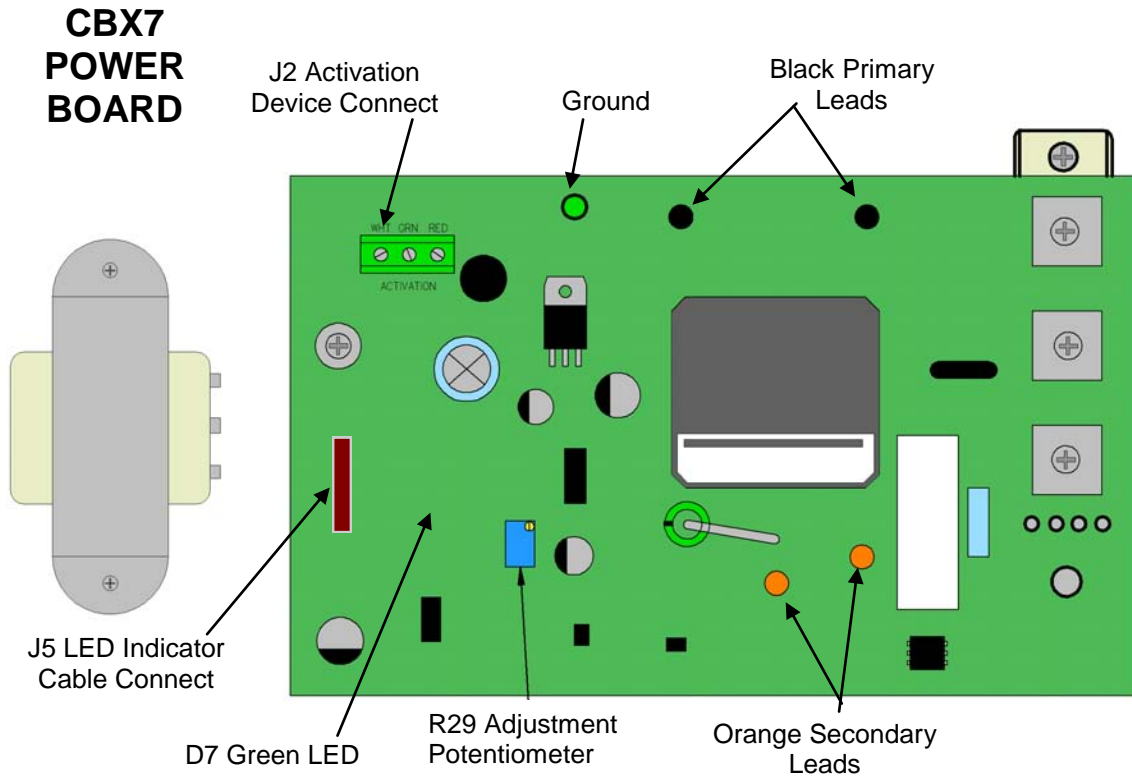


Check all Connections. Check all connections at this time for tightness and proper location. Check all wire nuts, and check all screws on the SCR; tighten as needed.

CONTROL UNIT

Installation of Control Unit- CBX7

Connect the chosen activation device to pins 1 and 3 on terminal J2 on the CBX7 Power Board. Connect the activation device to pin 2 on terminal J2 on the CBX7 Power Board if the selected activation device contains an LED Feature. The system will operate with any of Heatizon Systems activation devices.



NOTE: CBX7 Control Units are to be used to energize Tuff Cable Heating Element in snow melting applications in asphalt, concrete, and sandbed under pavers only.

NOTE: CBX7 Control Units have no over/under current protection and no transformer over temperature sensor.

Installation of Control Unit– Radiant 8

The Control Unit is the brains of the Heatizon System, contains system safeties, and provides for a soft start to the Transformer. Caution!!! Make certain that the circuit breaker connected to the primary power supply wire is in the “OFF” position.

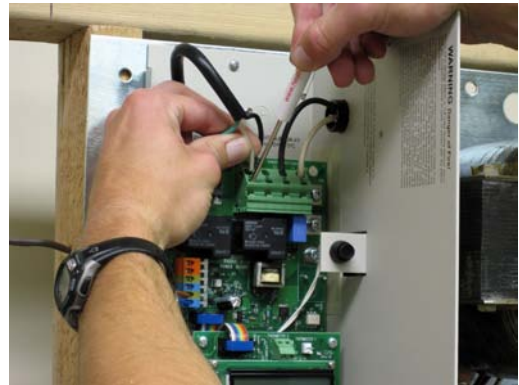
Locate Power Supply and Thermostat Wire. Run the power supply conductor through the round hole in the upper left corner of the Control Unit. Run the Thermostat Wire through the round hole in the lower center of the Control Unit.

Mount Control Unit. The Control Unit will mount on the left side of the Back Plate. Make certain that the power supply conductor and Thermostat Wire pass through access holes in the Control Unit and are not behind it. Carefully slide the Control Unit back over the bushing around the power supply line. Mount the Control Unit to the Back Plate using two (2) #6-32x3/8” screws provided in the Hardware Kit.

Connect the Primary Power Supply to Control Unit. Caution!!! Make certain that the circuit breaker connected to the primary power supply wire is in the “OFF” position. Trim the primary power wires to the desired length. Strip ½ inch of insulation from the end of each wire. Connect the power supply wires to the green terminal block TB3 marked “Line L1” and “Line L2” on the Power Board. Using the Heatizon supplied screwdriver insert the blade in the slot below where the wire is to be inserted, gently pull down, insert the appropriate wire and release and remove the screwdriver. Tug gently but firmly on each wire to verify that it is properly connected.

Connect the ground wire to the grounding stud using an appropriately sized ring terminal. Always crimp the ring terminal to the ground wire.

Connect the Transformer to the Control Unit. Strip ½ inch of insulation from the end of each wire. Connect the Transformer primary wires to the green terminal block TB3 section marked “Power Transformer” on the Power Board. Connect the white Transformer wire to T1 and either the red, black, or yellow wire to T2, based on the power supply voltage (see the labeling information on the Transformer to select the proper wiring for the supply voltage used, or see schedule “Transformer Connection to Control Unit” on next page).



Installation of Control Unit– Radiant 8

Using the Heatizon supplied screwdriver insert the blade in the slot below where the wire is to be inserted, gently pull down, insert the appropriate wire and release and remove the screwdriver. Once each wire is installed correctly in the appropriate slot the wire should stay in place. Tug gently but firmly on each wire to verify that it is properly connected. Cap off all unused power and Transformer wires individually with provided wire nuts.

Transformer Connection to Control Unit:

White (Common) to T1 Red to T2	208VAC
White (Common) to T1 Black to T2	240VAC
White (Common) to T1 Yellow to T2	277VAC

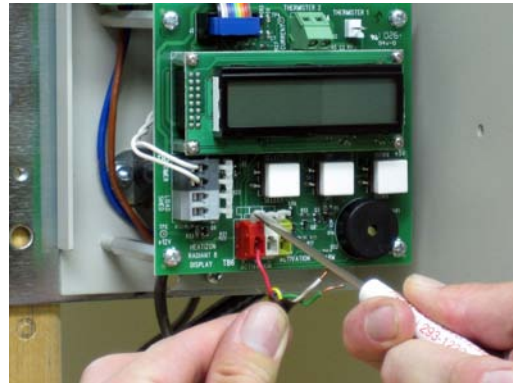
Connect Thermostat Wire.

Cut the thermostat Wire to desired length. Strip about 2" of outer jacket from end of cable. USE CAUTION WHEN STRIPPING OUTER JACKET. DO NOT CUT OR NICK THE INDIVIDUAL WIRES OR THEIR INSULATORS. Strip 3/8 inch of insulation from each of the red, white, and green wires and connect them to the appropriate TB6 "Activation Device" terminal block on the Display Board of the Radiant 8 Control Unit.

Note: The only time the green wire will be used is when connecting to the M321 Thermostat or the M325D Timer.

Use the Heatizon screwdriver or your fingernail to gently push down on the white plastic clip above the red terminal, insert the red wire, and release the plastic clip and snap it back into place. Repeat for the white wire in the white terminal and the green wire in the green terminal. Once each wire is installed correctly in the appropriate slot the wire should stay in place. Tug gently but firmly on each wire to verify that it is properly connected.

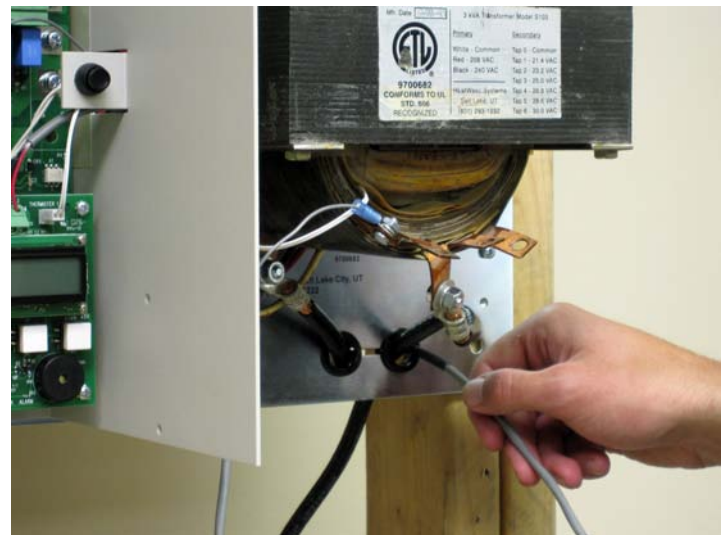
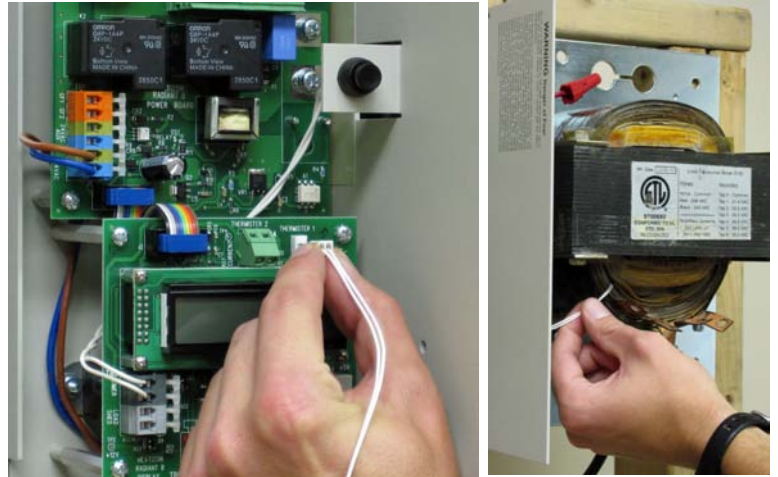
The blue and yellow thermostat wires are not used unless the selected activation device requires 24VAC power. If the selected activation device requires 24VAC, connect the blue wire to the blue terminal and the yellow wire to the light green terminal on terminal block TB1 labeled "24VAC AUX" on the Power Board of the Radiant 8 Control Unit.



Installation of Control Unit– Radiant 8

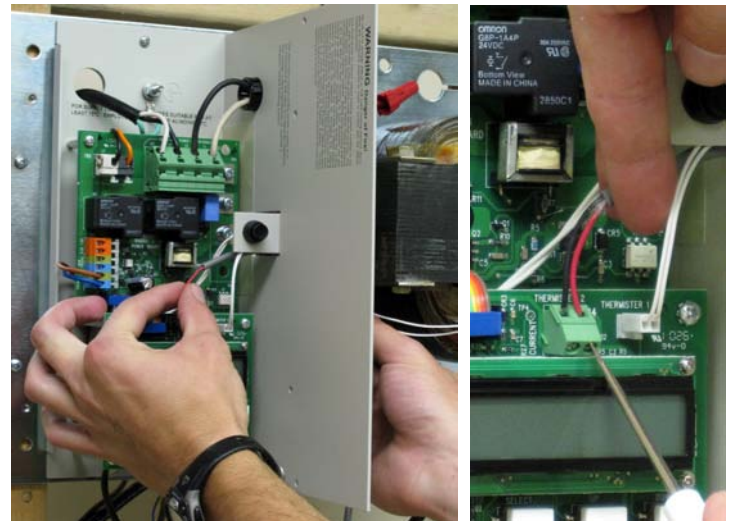
Connect Transformer Over Temp Thermistor (“Thermistor 1”)

The Over Temp Sensor, also known as “Thermistor 1”, senses the operating temperature of the Transformer and will turn the system off if the temperature exceeds the Transformer’s rating. Match the connector end of the thermistor to J4 terminal marked “Thermistor 1” on the Display Board and press into place. Pass the black bulb of the “Thermistor 1” through the hole in the side of the Radiant 8 Control Unit panel nearest the Transformer and into the Transformer cavity. Insert the black bulb of the Thermistor into a space between the laminations and the belly of the Transformer.



Temperature Compensation Thermistor (“Thermistor 2”)

The resistance of Tuff Cable and ZMesh Heating Elements will change as their temperature changes. The Temperature Compensation Thermistor, or “Thermistor 2”, is designed to compensate for changes in the temperature of the Tuff Cable or ZMesh Heating Element and adjust the Over Current and Under Current faults as necessary. This Thermistor is used to sense the load temperature, and communicate that temperature to the Radiant 8 Control Unit. The Radiant 8 Control Unit utilizes this temperature to calculate the appropriate Over and Under Current fault levels. Connect the Temperature Compensation Thermistor wires to the TB4 terminal block marked “Thermistor 2” on the Display Board. There is no polarity on Thermistor wires.



Installation of Control Unit– Radiant 8

Ground fault:

To activate the Ground Fault feature of the Radiant 8 Control Unit for the Transformer, connect the Brown Ground Fault Hookup Wire from the TB1 orange terminal block labeled “GF1” on the Power Board, pass the ring terminal end of the wire through one of the holes in the metal separating the electronics from the Transformer, and connect it to the Number 1 Secondary Power Tap on the Transformer using the provided washer and nut. Only the S202 (2X2kVA) and the S203 (2X3kVA) Transformers require the Red Ground Fault Hookup Wire. If using an S202 (2x2kVA) or S203 (2x3kVA) Transformer, connect the Red Ground Fault Hookup Wire from the TB1 orange terminal block labeled “GF2” on the Power Board, pass the ring terminal end of the wire through one of the holes in the metal separating the electronics from the Transformer, and connect it to the other Number 1 Secondary Power Tap on the upper side of the Transformer using the provided washer and nut.

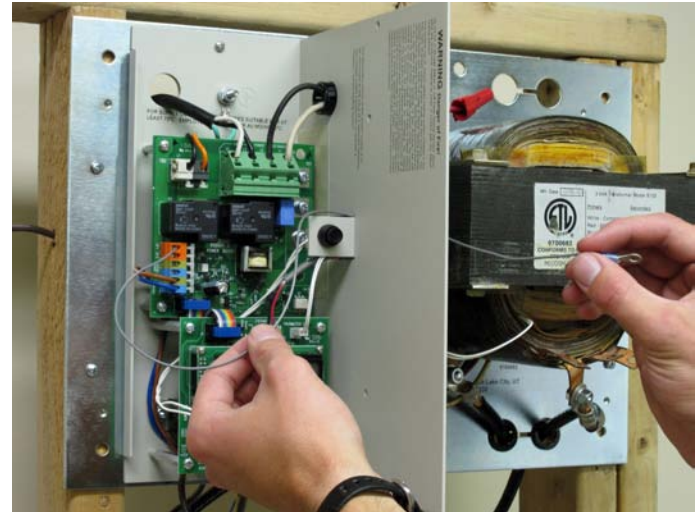
Load Shed

To activate the Load Shed feature of the Radiant 8 Control Unit, connect a two conductor cable from the TB5 gray terminals block labeled “Load Shed” located on the Display Board in the Radiant 8 Control Unit to a Peak Power Monitor (supplied by others), or any other normally open dry contact device that will turn the system off at the desired times.

Optional Energy Miser and Idle Modes

Energy Miser Mode. In this mode, the previously installed Temperature Compensation Thermistor 2 monitors the temperature in the area heated by Tuff Cable or ZMesh Heating Element to ensure that it does not exceed 42°F. When the heated area reaches 42°F (22180 ohms on the sensor), the Energy Miser turns the power to the Transformer off. If the snow sensor or other activation device is still active when the heated area cools to 34°F (26844 ohms), then the power to the Transformer will turn back on. The Energy Miser Mode is activated by an additional set-up menu item that allows for the Energy Miser Mode to be turned “on” or “off.”

Idle Mode. This mode is activated with an optional Idle Mode Switch connected to the “Load Shed” input on the Radiant 8 Display Board. When the Idle Mode Switch is in the “on” position, the Radiant 8 Control Unit heats the area to be heated by the Tuff Cable or ZMesh Heating Element to approximately 30°F (29683 ohms). Once the Idle Mode is activated, the Radiant 8 will cycle on and off with a one degree lag response to maintain approximately 30°F. This mode will time out in 24 hours, or will terminate when a system activation occurs. To use the Idle Mode, connect a two conductor cable from the load shed gray terminals located on the Radiant 8 Control Unit Display Board to an optional Idle Mode Switch. This switch may be mounted at a convenient location within 15 feet of the Radiant 8 Control Unit



RADIANT 8 POWER BOARD & DISPLAY BOARD

