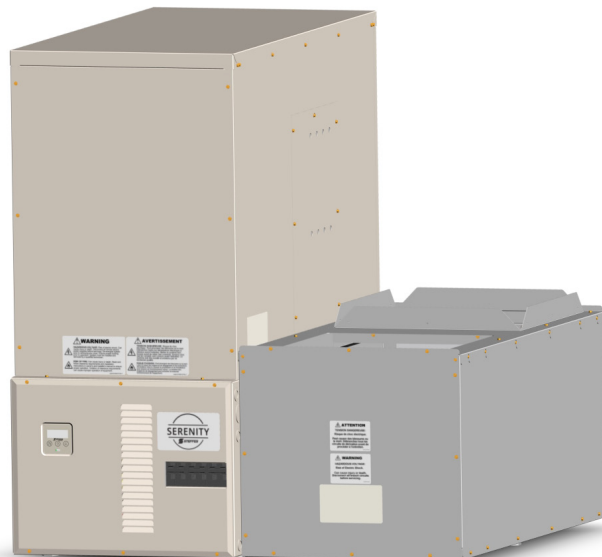


# OWNER'S AND INSTALLER'S MANUAL



**Model:  
4210**

***Applicable to Software Version 010 or greater***

U.S. Pat. #5201024, #5086493  
Can. Pat. #2059158, #2060881



# IMPORTANT

- The equipment described herein is intended for installation by a qualified technician in compliance with applicable local, state, and national codes and requirements.
- To ensure proper installation and operation of this product, completely read all instructions prior to assembling, installing, operating, maintaining, or repairing this product. Upon unpacking of Serenity, inspect all parts for damage prior to installation and start-up.
- This manual should be retained by the owner upon completion of the installation and made available to qualified technicians as required.
- This appliance is not to be used by persons (including children) with reduced physical, sensory, or mental capabilities or lack of experience and knowledge, unless they have been given supervision and instruction on the safe use of the appliance and the hazards involved. Children shall not play with the appliance.
- Disclaimer: In compiling this manual, Steffes has used its best judgment based upon information available, but disclaims any responsibility or liability for any errors or miscalculations contained herein, or any revisions hereof, or which result, in whole or in part, from the use of this manual or any revisions hereof.

Steffes disclaims any responsibility or liability for mold or mildew growth and/or any damages that occur after the heating system is installed. We strongly recommend that the user follow the moisture, mold, and mildew prevention guidelines of the Environmental Protection Agency (EPA), available at <http://www.epa.gov>. If you are unable to find information and have concerns, contact Steffes.

## For Customer Use

Please record the serial number of the Serenity Heating System (4210 Series) and Air Handler below. This number is found on the identification labels located on either side of the Serenity system and on either end of the Air Handler. Retain this information for future reference.

**4210 Series:** \_\_\_\_\_

**Air Handler:** \_\_\_\_\_





## RECOGNIZE THESE SYMBOLS AS SAFETY PRECAUTIONS

It is important, both for your personal safety and to avoid possible damage to the equipment and your property, that you observe the safety instructions given following these symbols.


SAFETY PRECAUTIONS

- 1. Install all ceramic bricks and completely assemble the heating system before energizing to avoid damage to Serenity.
- 2. DO NOT use or store materials that can produce explosive or flammable gases near this heating system
- 3. Maintain all placement and clearance requirements as specified in this manual to ensure proper operation and safety.
- 4. Keep the top of the heating system free of debris and other objects.
- 5. Disconnect power to all circuits before servicing. This heating system may be connected to more than one branch circuit.
- 6. Installation of and/or service to this heating system should be performed by a qualified technician in compliance with information contained herein and with national, state, and local codes and requirements.
- 7. If the control panel displays a repeated message of “CORE FAIL”, contact a qualified technician for service.

**WARNING**



Hazardous Voltage: Risk of electric shock. Can cause injury or death. This heater may be connected to more than one branch circuit. Disconnect power to all circuits before installing or servicing. Installation of and/or service to this equipment **MUST** be performed by a qualified technician.



Risk of fire. Can cause injury or death. Violation of the clearance requirements can cause improper operation of the equipment. Maintain the placement and clearance requirements specified.

BUILT-IN SAFETY DEVICES

Serenity incorporates safety devices to ensure normal operating temperatures are maintained. The chart below describes these safety devices.

| DEVICE NAME                                    | FUNCTION  | LOCATION ON SYSTEM  |
|--|---|---|
| Core Charging High Limit Switches (Auto Reset) | These limit switches monitor brick core charging and interrupt power to the heating elements if the normal operating temperature is exceeded: 240°F/143°C (nominal).                                    | In the limit bar panel on both sides of the brick storage cavity. |
| Core Blower Limit Switch (Auto Reset)          | This limit switch monitors the discharge air temperature and interrupts power to the core blowers if the normal operating temperature is exceeded:160°F/71°C (nominal).                                 | On the supply air blower assembly in the air handler.             |
| Supply Air Blower Limit Switch (Manual Reset)  | This limit switch monitors the discharge air temperature and interrupts power to both the supply air blower and the core blowers if the normal operating temperature is exceeded: 190°F/88°C (nominal). | On the supply air blower assembly in the air handler.             |
| Base Temperature Limit Switch (Auto Reset)     | This limit switch monitors the temperature in the base of Serenity and interrupts power to the core blowers if the normal operating temperature is exceeded: 160°F/71°C (nominal).                      | In the base of Serenity between and behind the core blowers.      |



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## Warranty

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# 1

## Operations

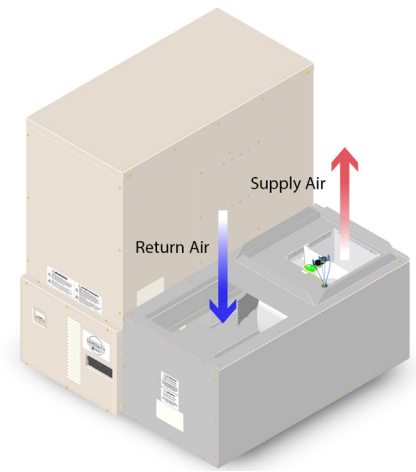
### GENERAL OPERATION

Serenity stores off-peak electricity in the form of heat. Off-peak electricity is available during times of the day or night when electricity is plentiful and the power company can supply it at a lower cost.

Serenity operates automatically. During off-peak hours, Serenity converts electricity to heat and stores it in its ceramic brick core. The amount of heat stored in the brick core varies in relation to outdoor temperature, owner preference, power company peak conditions, and the heating requirements.

A heat call from the room thermostat energizes the blowers in Serenity. The variable speed core blowers automatically adjust speed to circulate room air through the brick core. The supply air blower then delivers this heated air into the desired area through the duct system to maintain a constant, comfortable room temperature.

The versatility of Serenity allows it to fit many applications. Serenity is designed for use as either the sole heating source (a “stand-alone” furnace) or as a supplement to ducted heating systems such as heat pumps.



### SYSTEM USE DURING CONSTRUCTION PHASE

Steffes strongly recommends that a temporary construction heating unit be used during the construction phase of a new home instead of the permanent heating system. Use of a permanent heating system during the construction phase may contaminate the duct system and/or internal areas of the heating system. This can cause poor indoor air quality issues, systems reliability problems, and/or improper system operation once home construction is completed.

### SYSTEM START-UP

When Serenity is used the first time after installation or after an extended period of inactivity, it can emit an odor related to the dust that has accumulated in the system. Allow Serenity to charge to its maximum brick core charge level to expel these odors quickly.

As with most heating systems, airborne particles and odors in the room can be drawn into Serenity and oxidized. Odors can be amplified; thus, Steffes does not recommend operating Serenity if odors such as those from paints, varnishes, or chemicals are present in the air. Airborne particles that have been oxidized are expelled back into the room and can accumulate on air vents or other surfaces. Over time, these particles may appear as a black residue (“soot”). High concentrations of airborne particles from aerosols, dust, candles, incense, pet hair, smoke, or cooking can contribute to poor indoor air quality and accelerate the sooting process.

During operation, Serenity may produce minor expansion noises. These noises are normal and the result of the internal components reacting to temperature changes.

### TURNING SYSTEM "OFF" AND "ON"

Serenity element (charging) circuits can be turned “OFF” by switching all of the 60 AMP breakers located on the front of the electrical panel to the DOWN position. To turn the element circuits “ON”, switch all of the 60 AMP breakers to the UP position.

**NOTE:** The 15 AMP breaker **MUST** remain “ON” to operate controls in the system if using Serenity in conjunction with a heat pump or air conditioner.

## CONTROL PANEL

Serenity operates automatically. Operational function settings are stored in a microprocessor on the processor control board. These settings can be modified, if necessary, through the Configuration Menu as described on Pages 3.14-3.16. In most applications, Serenity is configured upon installation and no further changes are required.

### Four-Digit LED Display

The four-digit LED displays specific operating information. During the configuration process, the configuration number and the values set in these configurations are displayed for viewing and adjusting purposes.



CONTROL PANEL

### AM and PM Indicator Lights

The AM and PM indicator lights are only utilized if the optional Steffes Time Clock Module is installed and using the 12-hour time display. The light flashes next to the active designator/symbol. Serenity can be configured to display military time, in which case, both the AM and PM lights illuminate.

### (M) Mode (Edit) Button

Used to access menus on Serenity (i.e. Help Menu or Configuration Menu) and to allow modifying of configuration settings.

### ⬆ Up and ⬇ Down Arrow Buttons

Used to scroll up or down when viewing or modifying operating functions.

### 🔌 Interface Port

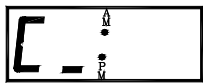
Allows qualified technician external access for advanced operating modes, updating software, and troubleshooting.

## IMPORTANT

Editing configuration information may alter performance and operation of Serenity.

## OPERATING STATUS

The four-digit LED will display various operating information as described below. Press and release the up arrow to view this data.



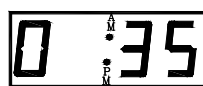
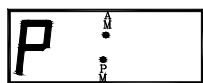
**Operating Mode** - Indicates Serenity's current operating mode.

C = Off-Peak (Charge) Time

P = On-Peak (Control) Time

A = Anticipated Peak Time

**NOTE:** A bar illuminates on the lower portion of the display's second digit whenever the heating elements are energized.



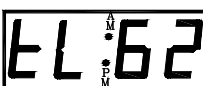
**Outdoor Temperature** - "O", followed by a number, indicates current outdoor temperature.



**Heat Call Status** - Indicates the current heat call status being received from the room thermostat. Refer to Low Voltage Electrical Connections - Room Thermostat for more information.



**Brick Core Charge Level** - "CL" (charge level) followed by a number, indicates the current percentage of heat stored in the brick core. "CL:\_" represents a core temperature lower than the minimum core temperature and "CL: F" represents a full core charge level.



**Targeted Brick Core Charge Level** - "tL" (target level) followed by a number, indicates the current percentage of brick core charge being targeted by the Serenity. A display of "tL:\_" indicates that Serenity will not maintain any heat in the brick core and "tL: F" indicates a full core charge target level.

## ROOM TEMPERATURE CONTROL

The room temperature set point is adjusted at the wall thermostat. If room temperature drops below the thermostat set point, the thermostat initiates a heat call and energizes the blowers in Serenity. The variable speed core blowers automatically adjust speed in relation to brick core temperature and duct temperature to circulate room air through the brick core. The supply air blower then delivers the heated air into the living area through the duct system to satisfy heating requirements. When the thermostat senses a demand greater than the output, another stage of heating is initiated.

When used to supplement heat pump systems, Serenity replaces the resistance strip heat, which is typically required as a supplement or back-up to the heat pump system. A duct sensor monitors the discharge air temperature. If the demand for heat is at a point where the heat pump alone cannot maintain the desired duct temperature, stored heat is used to supplement the heat pump and satisfy the heating requirements.

## BRICK CORE CHARGE CONTROL

The amount of heat stored in Serenity's brick core is regulated automatically in relation to outdoor temperature and the heating requirements. Serenity's outdoor sensor monitors outdoor temperature and provides this information to Serenity. As the outdoor temperature decreases, heating requirements increase and Serenity stores more heat accordingly.

## CHARGE CONTROL OVERRIDE

Serenity is equipped with a charge control override feature that allows the user to force the system to target a full core charge level. This override can be initiated or canceled at any time. If an override is initiated, Serenity targets a full core charge level during the next off-peak period. Serenity continues to charge during off-peak hours until it achieves full (maximum) core charge or until the override is canceled. Once full charge is achieved or the override is canceled, Serenity charges according to the standard configuration.

**NOTE:** *This feature will not turn elements on during a peak period and will cancel if power is interrupted.*

### Initiating the Override Feature

**Step 1** Press and hold the **M**, the up arrow, and the down arrow buttons at the same time.

**Step 2** The control panel will flash "FULL" and "ON". Continue to hold all three buttons until "ON" displays continuously.

**Step 3** Release the buttons. The override is now enabled. The control panel will return to displaying its standard operating mode.

### Manual Cancellation of the Override Feature

**Step 1** Press and hold the **M**, the up arrow, and the down arrow buttons at the same time.

**Step 2** The control panel will flash "FULL" and "OFF". Continue to hold all three buttons until "OFF" displays continuously.

**Step 3** Release the buttons. The override is now canceled. The control panel will return to displaying its standard operating mode.

## MAINTENANCE AND CLEANING

Serenity is easy to maintain. The air filter in the return air duct of Serenity should be replaced on a regular basis to ensure proper operation and to maintain overall efficiencies. Steffes recommends changing filters every 90 days. No additional routine maintenance is required.

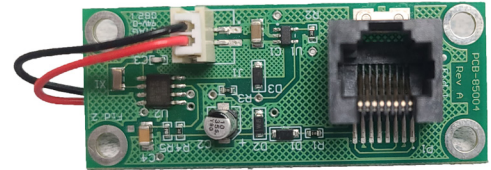
If utilizing a heat pump or air conditioning system with Serenity, the indoor coil of the device should be cleaned periodically as dirt accumulation may reduce system efficiency. It is important to follow the manufacturer's maintenance and cleaning recommendations for these devices.

# 2

## Optional Accessories

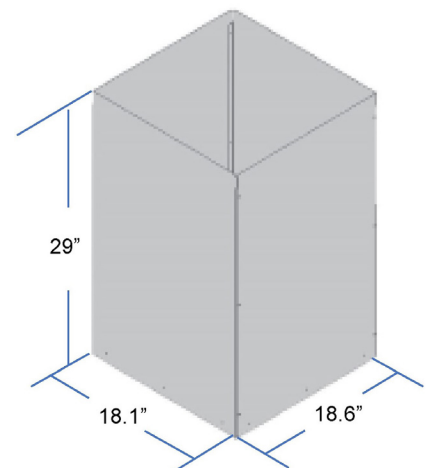
### TIME CLOCK MODULE WITH BATTERY BACKUP

The Steffes Time Clock Module with battery backup (Order Item #1301009) is an optional accessory that can be used to provide a peak control signal to Serenity. The optional time clock module mounts inside the electrical compartment and is connected to the low voltage expansion board via an interface cable. Peak control times **MUST** be programmed into Serenity once the module is installed to enable the time clock feature. Refer to the instructions provided with the Time Clock Module with battery backup for more information on the installation and operation of this device.



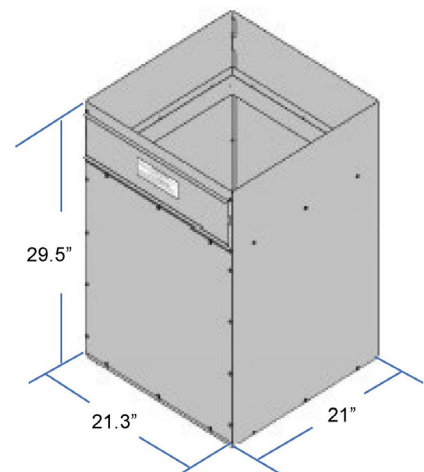
### SUPPLY AIR PLENUM

An optional supply air plenum is available for Serenity (Order Item #1302107). This plenum connects directly to the Serenity air handler as shown in the Ducting and Air Flow section on Page 3.06.



### RETURN AIR PLENUM

An optional return air plenum is available for Serenity (Order Item #1302106). This plenum incorporates a filter tray and a tray for placement of a heating/cooling coil that must be set in the return ductwork when interfaced to a heat pump. The return air plenum connects directly to the Serenity air handler as shown in the Ducting and Air Flow section on Page 3.06.



# 3

## Installation



### CAUTION

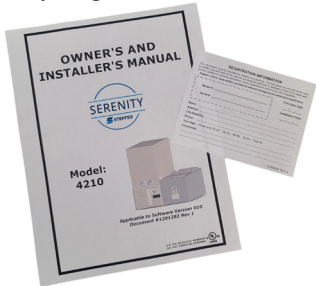
Risk of sharp edges. Can cause personal injury. Use caution when installing and/or servicing equipment.

### SHIPPING AND PACKAGING

Serenity should always be transported in an upright position to avoid damage to internal components and insulation materials. The information below describes the items shipped with each system.

#### 1 INFORMATION PACKAGE

Includes Owner's Manual and Warranty Registration Card



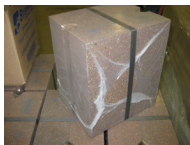
Adhered to outer side of shipping box.

#### 2 ELEMENT SCREW KIT



Shipped inside the electrical compartment.

#### 3 CERAMIC BRICK

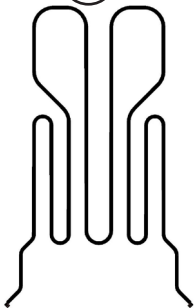


##### Full Brick

Shipped separately and packaged 2 bricks per package.

| MODEL | FULL BRICK |
|-------|------------|
| 4210  | 72         |

#### 4 HEATING ELEMENTS



| MODEL | ELEMENTS |
|-------|----------|
| 4210  | 8        |

Shipped in brick core.

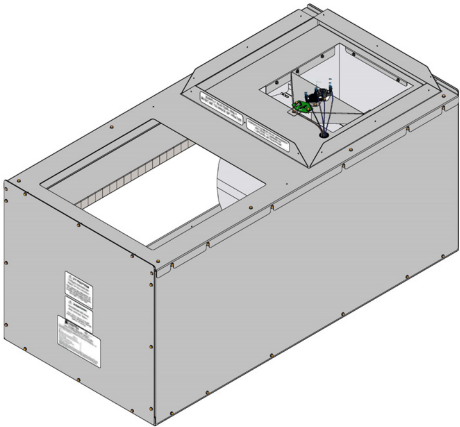
#### 5 OUTDOOR TEMPERATURE SENSOR



Shipped inside painted front panel.

#### 6 AIR HANDLER

Shipped separately.



## PLACEMENT AND CLEARANCE REQUIREMENTS

Serenity's physical dimensions and required clearances **MUST** be taken into consideration when choosing its installation location. (See Figures 1 and 2 for clearance requirements and dimensions.)

The best installation location is in a space that requires heat so some amount of the heating requirements can be satisfied through static dissipation from the warm outer panels. If Serenity is not installed in an area it is intended to heat (e.g. storage closet), it is important to account for the heat lost through static dissipation by making proper adjustments when sizing the system. Standby heat dissipation of up to 1.6kW can be experienced in normal operation. Room air should be maintained at less than 85°F/29°C.

If ventilation is needed, it can be provided by installing a 24" x 24" opening into the area where Serenity is located. In addition, a 6" x 6" non-closing type register can be cut into the return air duct of the system to minimize heat build-up in the room. This register must be installed so that the air drawn into Serenity passes through the filter first.

The weight of Serenity must also be taken into consideration when selecting the installation surface. Refer to Page A.01 for system weight and dimensions. A level concrete floor is the best installation surface to place Serenity, but most well-supported surfaces are acceptable. If unsure of your floor's load capacity, consult a building contractor or architect.

**NOTE:** *Special requirements must be considered if placing Serenity in a garage or other area where combustible vapors may be present. Consult local, state, and national codes and regulations to ensure proper installation.*

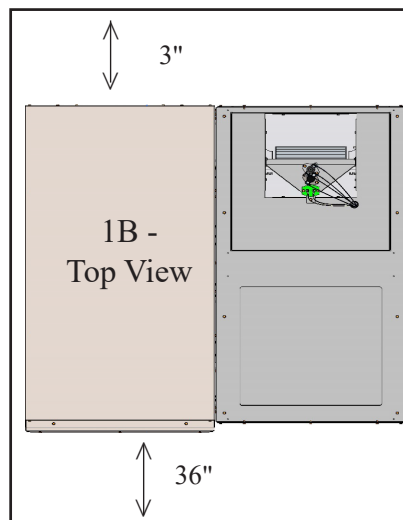
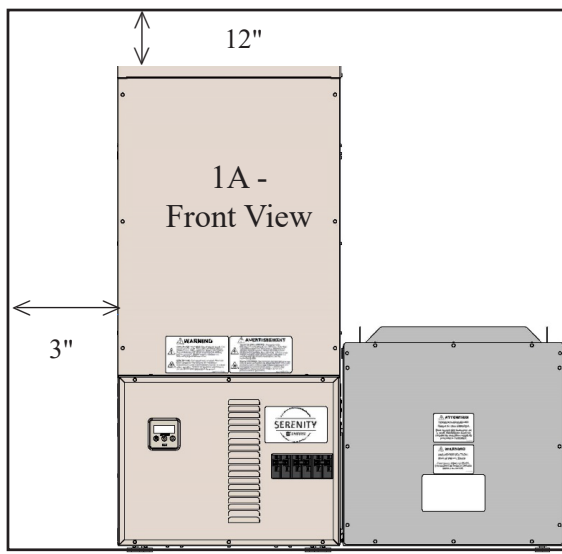


### WARNING

**Risk of fire. Can cause injury or death.**

- **Violation of the clearance requirements and/or failure to provide proper ventilation can cause improper operation of Serenity. Maintain the placement and clearance requirements as specified and provide ventilation as necessary.**
- **Failure to maintain room temperature in the mechanical room of 85°F/29°C or less may result in equipment damage. Thermostatically controlled ventilation should be provided if the temperature in this area exceeds 85°F/29°C.**
- **Moving Serenity after install can result in equipment damage. Do NOT move system from original installed location.**

**FIGURE 1  
MINIMUM CLEARANCE REQUIREMENTS**

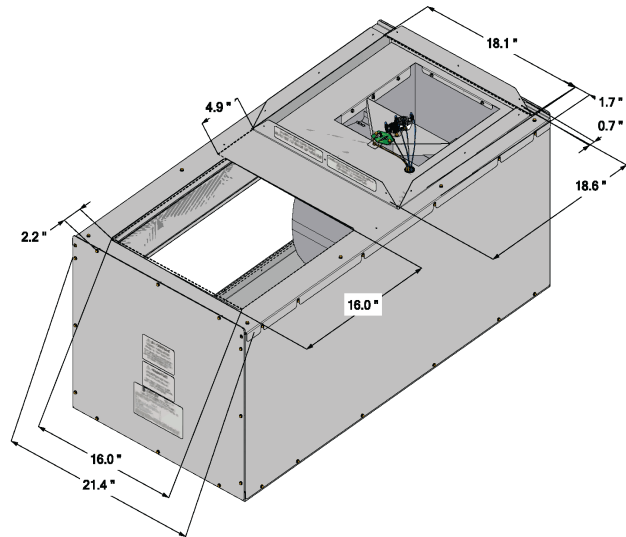
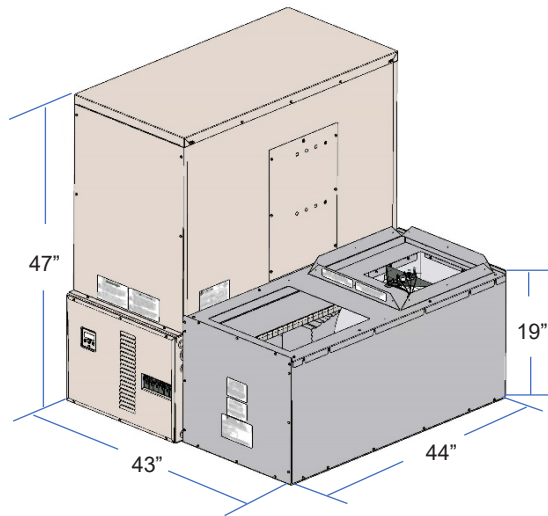


- Back = 3" (from combustible material)
- Sides = 3" (from combustible material) *or* 12" for servicing.
- Bottom = 1/2" (from combustible material)
- Top = 12" (from combustible material)
- Front = 36" (for ease in servicing)
- Between duct and side of system = 1.5"
- Outer sides of system ducts (return and supply) = 0"

**NOTE:** *Minimum clearance requirements may NOT account for required working space for electrical connections and/or part replacement.*



**FIGURE 2  
DIMENSIONS**



## INITIAL SET-UP

- Step 1** Remove the Information Package from the outside of the shipping box and unpackage Serenity.
- Step 2** Move Serenity into its installation location. Serenity can fit through a 30" doorway (minimum) without disassembling.
- Step 3** Once in place, adjust the leveling legs on the bottom of Serenity as necessary to prevent rocking. If not placed properly the system may bend or twist during the brick loading process, making element and brick core temperature sensor installation difficult. Leveling legs should be extended no more than one inch (1").
- Step 4** Remove the electrical panel cover by removing the screws along the edges. Locate the element screw kit.
- Step 5** Remove the painted front panel of the brick storage cabinet by removing the sheet metal screws along the bottom and sides of the panel. Detach by pulling the bottom of the panel forward and down.
- Step 6** Locate the outdoor temperature sensor, the element wiring harnesses, and the brick core temperature sensor behind the painted front panel. Set the outdoor temperature sensor aside. Disconnect the wiring harnesses and the brick core temperature sensor from their shipping positions and carefully position them to avoid damage during brick loading.
- Step 7** Remove the galvanized front panel and set it aside.
- Step 8** Starting at the bottom, carefully lift the two insulation blankets, one at a time, and drape them over the top of Serenity.
- NOTE:** *Use face mask, gloves, and long sleeved garments when handling insulation materials in compliance with generally accepted safety practices.*
- Step 9** Remove the heating elements and the cardboard packaging from inside the brick core of Serenity.
- Step 10** Remove the front air channel and set aside.

## IMPORTANT

**Risk of improper operation or equipment damage. Read and follow installation instructions carefully.**

- Remove Serenity from its shipping pallet before installing.
- Leveling legs should be extended no more than one inch.
- DO use and follow generally accepted safety practices when handling insulation material.
- DO have equipment installed by a qualified technician in compliance with all applicable local, state, and national codes and regulations.

## BRICK LOADING

Load the bricks by starting at the back of the brick core and working forward. Make sure the bricks are placed so the grooved side is facing up and the ridges are on the left and right.

### Brick Installation Tips:

- Install bricks carefully to avoid damage to the insulation panels.
- Remove loose brick debris to prevent uneven stacking of brick, as this can make installation of the elements and the brick core temperature sensor difficult.
- Brick rows **MUST** line up front to back and side to side. (Figure 4)
- Alternate the direction of the brick's indicator (Figure 3) in every other brick row. (Figure 5)
- Keep bricks tight to center.

FIGURE 3

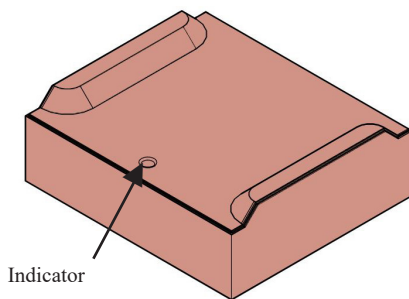
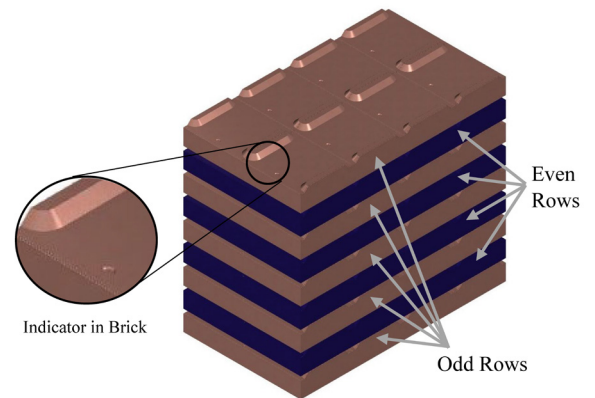


FIGURE 4



FIGURE 5



## HEATING ELEMENT AND AIR CHANNEL INSTALLATION

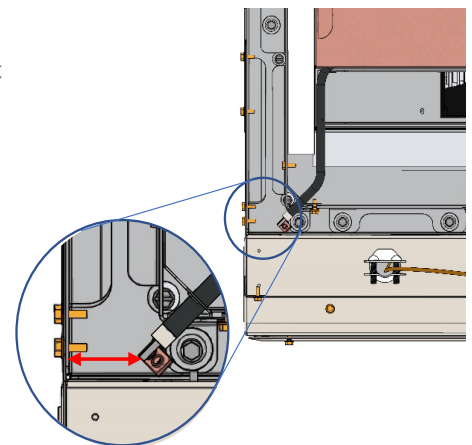
**Step 1** After all brick are loaded, insert the heating elements between the brick layers, sliding them in until the element ends embed into the side cutouts of the brick cavity.

Be sure the elements are slid into the brick core properly to ensure correct clearance between the terminal connections and any surfaces within Serenity. (Figure 6)

**Step 2** Install the front air channel with the air deflectors opening facing inward. Place bottom portion in first as shown in Figure 8.

**Step 3** Lower the insulation blankets back into position, one at a time. Carefully tuck the insulation behind the brick tray front bracket (Figure 7) and press into the edges, corners, and around the exposed portions of the heating elements to ensure maximum efficiency.

FIGURE 6  
ELEMENT  
INSTALLATION



Required clearance between element termination and metal panel is  $\frac{1}{2}$ " ( $\frac{3}{4}$ " nominal)



## WARNING

**HAZARDOUS VOLTAGE: Risk of electric shock. Can cause injury or death.**

- **DO NOT** remove the electrical panel cover while system is energized.
- Position elements properly to avoid short circuiting them against metal surfaces.
- Protect element lead wires from front panel screws and any field installed screws to avoid short circuit.



- Step 4** Reinstall the galvanized front panel, behind the brick tray front bracket, and secure it to Serenity using the screws that were originally removed. Slide the bottom of this panel inside the lower lip of the brick cavity. The top rests on the outside of the cavity.
- Step 5** Carefully route wiring harnesses and connect them to the heating elements using the element screws provided in the hardware package. Make connections with screw heads to flat, front side element tab (Figure 9). Element screws should be tightened securely as Serenity runs large loads for long periods of time.

**FIGURE 7  
BRICK TRAY  
FRONT BRACKET**



**FIGURE 8  
AIR CHANNEL  
PLACEMENT**



**FIGURE 9  
ELEMENT  
CONNECTIONS**



## BRICK CORE TEMPERATURE SENSOR INSTALLATION

- Step 1** Remove the screws by the brick core temperature sensor hole in the galvanized front panel.
- Step 2** Insert the brick core temperature sensor through the hole in the galvanized front panel. The sensor must pass through the blanket insulation and into the brick core. The hole has not been pre-drilled through the insulation. Use the sensor to aid in making a passageway by rotating the sensor side-to-side while gently pushing inward.
- Step 3** Once the brick core sensor is installed, put the screws back into position in the galvanized front panel to hold the sensor in position and to provide the electrical ground.
- Step 4** Check the non-insulated element terminations to make sure they do not come within 1/2" of any surface area on the system.
- Step 5** Reinstall painted front panel, using previously removed screws.



### CAUTION

**Risk of improper operation. Proper installation of the brick core temperature sensor is critical to the operation of the Serenity heating system. Read and follow installation instructions carefully.**

## DUCTING AND AIR FLOW

Serenity is equipped with a variable speed supply air blower for air delivery. When interfacing with a heat pump, the A-Coil MUST be placed on the return air side. Static pressure should not exceed 0.75 inches water column.

Serenity is factory configured for a right side air handler configuration but can also be installed with the air handler on the left. In either airflow direction, the house blower must be installed at the rear of the air handler assembly.

**Step 1** Unbox the air handler assembly.

**Step 2** Determine which side of Serenity the air handler will be installed - to the left or the right of the heating system.

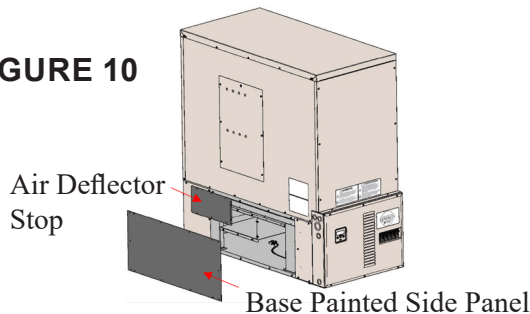
- The air handler is configured from the factory for right side. If the air handler is to be installed on the right side, proceed to Step 12.
- If the air handler is to be installed on the left side of Serenity, proceed to Step 3 to swap right and left side air channel components.

**Step 3** Remove the left base painted side panel and galvanized air channel stop (Figure 10).

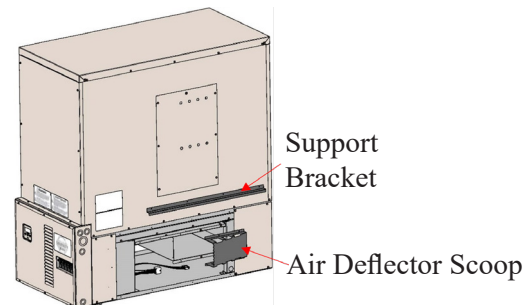
**Step 4** Move the air handler support bracket and air deflector scoop (Figure 11) from the right side to the left side.

**Step 5** Secure the galvanized air channel stop and base painted side panel to the right side of Serenity.

**FIGURE 10**



**FIGURE 11**



**Step 6** Remove the screws holding the top panel of the air handler in place.

**Step 7** Remove the supply air blower extension bracket (Figure 12) by removing the two screws which secure the bracket to the supply blower assembly.

**Step 8** Position the air handler so the inner side panel is facing the left side of Serenity.

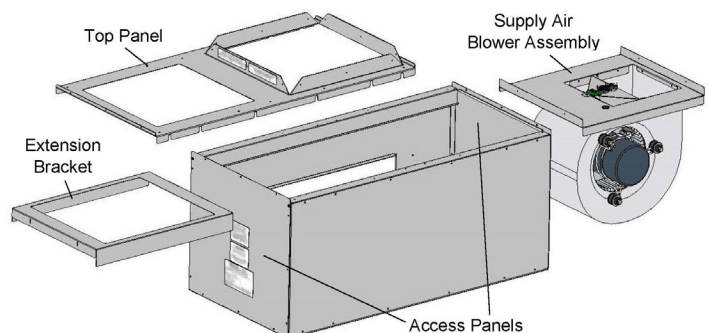
**Step 9** Slide supply air blower assembly to the back of the air handler.

**NOTE:** *The supply air blower MUST be placed to the rear of the heating system with the blower motor facing away from Serenity. If the supply air blower is installed incorrectly, it will cause improper air flow.*

**Step 10** Reinstall the supply blower extension bracket in front of the supply air blower assembly.

**Step 11** Attach the top panel of the air handler, flanged side up and to the back of the air handler, and secure with screws previously removed.

**FIGURE 12**



## WARNING

**HAZARDOUS VOLTAGE:** Risk of electric shock. Can cause injury or death.

- Do install ducting before energizing Serenity.
- Do NOT operate Serenity without ducting installed to both the air inlet and outlet.
- Proper duct design and air flow are critical to achieve optimum system performance. A poorly designed duct system and/or improper air flow can cause system inefficiencies, air noise, and condensate drain problems. In applications where poor air flow conditions exist along with high humidity, it may be necessary to install a secondary condensate drain pan.

**Step 12** Remove front air handler access panel.

**Step 13** Slide the supply air blower assembly and extension bracket out of the air handler and set aside.

**Step 14** Locate the supply air blower harnesses in the base of Serenity and move them to the side of Serenity the air handler will be installed on.

**Step 15** Position air handler to the side of Serenity.

**Step 16** Attach the air handler to the heating system by sliding the flanged edges (sides and bottom) of the air handler into the base of Serenity as shown in Figure 13.

**NOTE:** *Verify the air handler is pushed back to secure the back flange to Serenity. This secures the gasketing around the duct opening. If the supply air blower is installed incorrectly, it will cause improper air flow.*

**Step 17** Adjust leveling leg (Figure 14) as needed.

**Step 18** Slide the drive cleat into place as shown in Figure 15.

**Step 19** Secure the front of the air handler to the heating system using the two (2) screws provided.

**Step 20** Reinstall the supply air blower and extension bracket by sliding them back into the air handler.

**NOTE:** *The supply air blower MUST be placed to the rear of the heating system with the blower motor facing away from Serenity.*

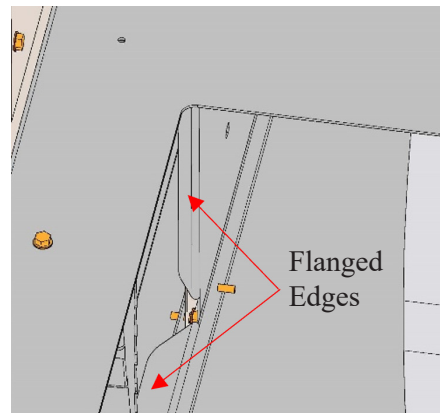
**Step 21** Attach the 16-pin wiring harness to the bottom of the blower motor. Slide motor forward for easier access to connections.

**Step 22** Secure the 9-pin harness from the system to the 9-pin connector towards the back of the motor.

**Step 23** Verify the supply air blower is positioned to the rear of the air handler taking care that no wires have been pinched.

**Step 24** Reinstall the front access panel of the air handler.

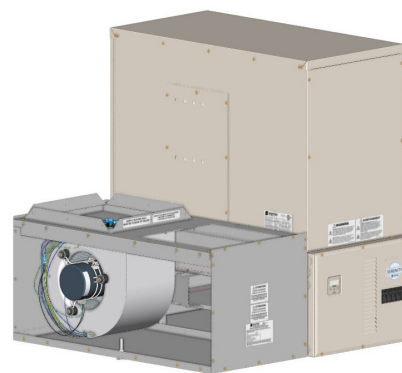
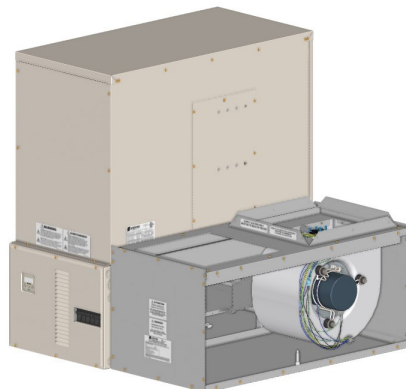
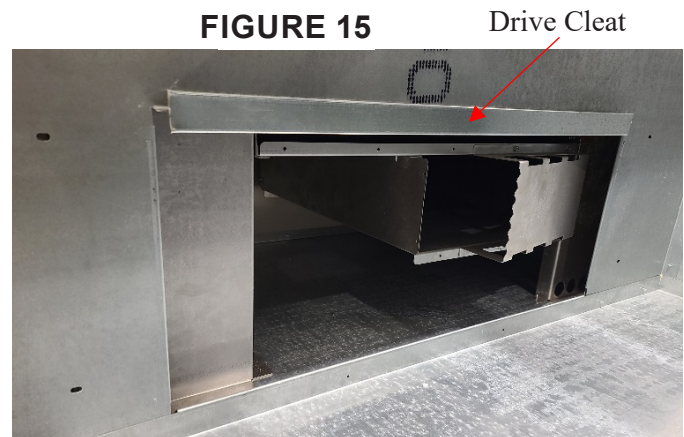
**FIGURE 13**



**FIGURE 14**



**FIGURE 15**



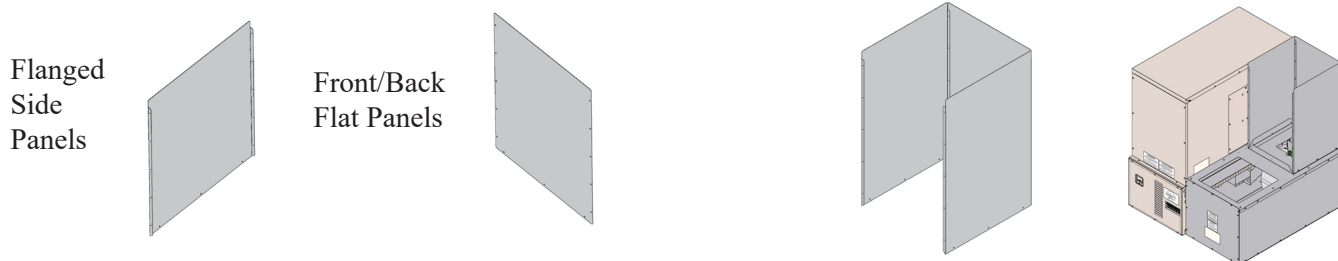
**NOTE:** *Open view for reference only.*

## SUPPLY AIR PLENUM (ORDER #1302107)

**NOTE:** *If using the Steffes Supply and Return Air Plenums, attach ducting to the supply air side of the air handler before attaching the return air plenum.*

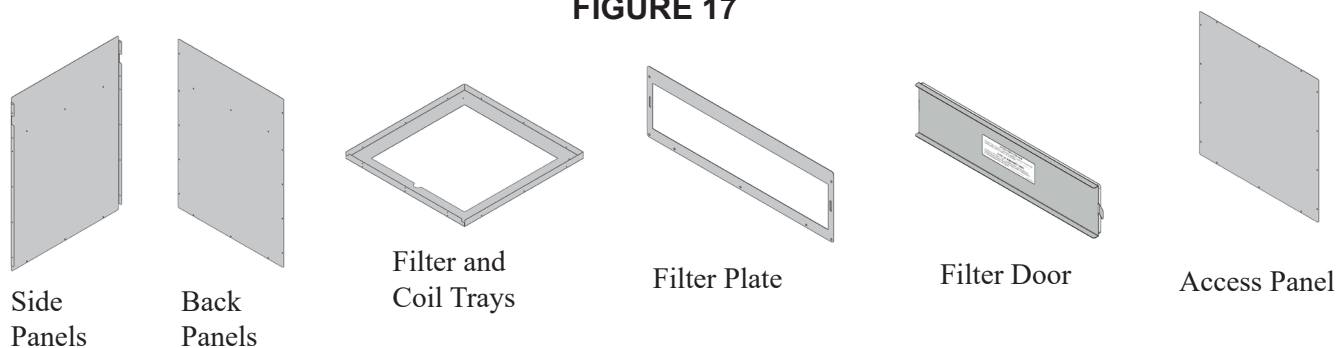
- Step 1** Attach side panels to a flat panel (Figure 16). Holes along the short side of all panels **MUST** be on the bottom of the assembly. Bent sides of the side panels **MUST** be to the inside of the flat panel.
- Step 2** Secure assembly to the back top flanges on the air handler as shown in Figure 16.
- Step 3** Secure front panel to supply air plenum.

**FIGURE 16**



## RETURN AIR PLENUM (ORDER #1302106)

**FIGURE 17**

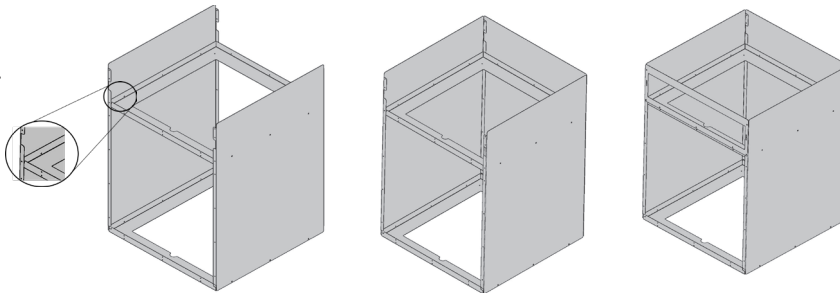


- Step 1** Attach side panels to the filter and coil trays with screws provided (Figure 18).

**NOTE:** *Side panels **MUST** be notch ends up and on the outside of the square trays. Trays **MUST** be installed with bent sides up and notch toward the front of the return air plenum.*

**FIGURE 18**

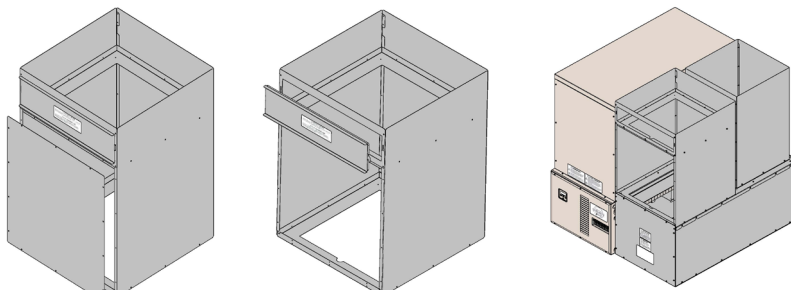
- Step 2** Attach back panel to the back side of the plenum assembly (Figure 18).
- Step 3** Attach the filter plate to the assembly using the top row of holes on the filter tray (Figure 18).



- Step 4** Attach the coil tray of the assembly to the front top opening of the air handler as shown in Figure 19.

**FIGURE 19**

- Step 5** Insert the filter and install filter door to the assembly (Figure 19).
- Step 6** Attach the access panel to the front of the assembly (Figure 19).





AIR CONDITIONER/HEAT PUMP INTERFACE

When interfacing Serenity with a heat pump, the indoor coil **MUST** be placed in the return in a position that will provide even air flow across the coil. If using the optional Steffes return air plenum, the plenum is configured to be the housing for the coil. Reference the Ducting and Air Flow section on Page 3.06 for installation information. If not using the optional return air plenum, the installer will need to make provisions in the return air plenum to accommodate the coil and the air filter.

When interfacing Serenity with an air conditioner, Steffes recommends the indoor coil be installed in the return air plenum for ease of service and installation.

In a heat pump or air conditioner installation, the condensate drain trap should be designed for the vacuum in which the system is operating. Typically, taller traps are better suited for these types of applications.

Refer to the Room Thermostat Connections diagrams for more information in interfacing Serenity with a heat pump or air conditioner.

LINE VOLTAGE ELECTRICAL CONNECTIONS


Serenity is factory configured for 240V single feed to allow it to be powered with a one, larger line voltage circuit. If multiple circuits are desired, the single feed kit can be removed (Figure 21). When using multiple circuit feeds, the 60-amp breakers feed the core charging (element) circuits. The 15-amp breaker feeds the blower and control circuit.

Refer to Serenity’s identification label (Figure 20) located on either side panel of the heating system and the System Specifications (Page A.01).

Route all line voltage wires through a knockout and into the electrical panel. Make proper field wiring connections. Refer to the Line Voltage Wiring Diagram (Page A.05) for more information on these connections.

**WARNING**

**Risk of fire. Any one ducting system **MUST NOT** contain more than one air handling (blower) system.**

**WARNING**

**HAZARDOUS VOLTAGE: Risk of electric shock. Can cause injury or death.**

- **Do NOT energize Serenity until installation is complete.**
- **System contains oversize protective earthing (grounding) terminal, which shall be properly connected.**
- **To ensure proper operation and safety, all line voltage circuits must be segregated from low voltage wiring in Serenity.**
- **To reduce electromagnetic fields associated with electrical circuits and to avoid induced voltage on sensors and electronic devices, the circuit phases **MUST** be alternated as shown in Circuit Phasing Connections (Figure 21)**

FIGURE 20

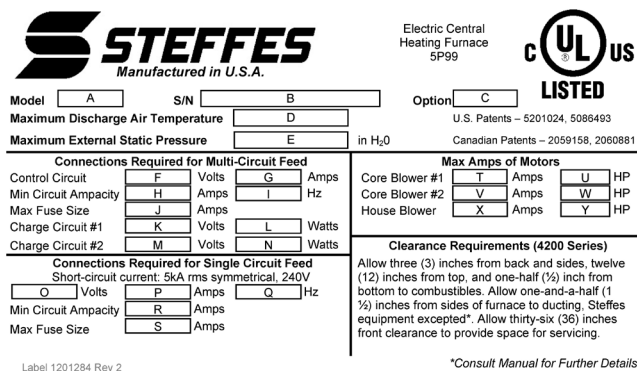
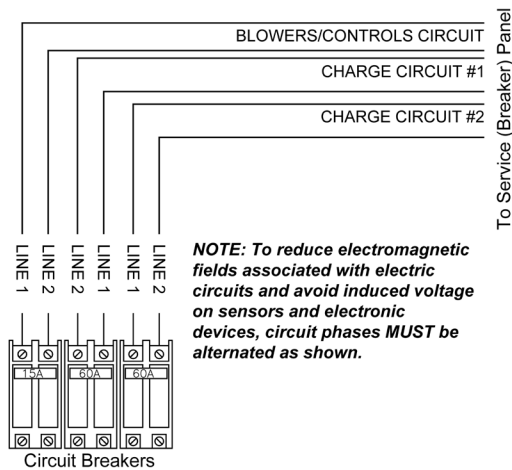


FIGURE 21  
CIRCUIT PHASING CONNECTIONS



## PEAK CONTROL CONNECTIONS

Steffes ETS heating equipment can be controlled by the power company via a peak control signal. This signal can be sent to the equipment using a Steffes Power Line Carrier control system, low voltage wiring, a Steffes Time Clock Module, or line voltage wiring. In applications utilizing automatic charge control, outdoor temperature information is required and can be received via an outdoor sensor or power line carrier control system.

### IMPORTANT

**Never install any wiring in a line voltage compartment of Serenity unless it is rated for line voltage.**

## POWER LINE CARRIER (PLC) PEAK CONTROL

The Steffes Power Line Carrier (PLC) control system has the ability to communicate with Serenity through the existing electrical circuits in the structure. With the power line carrier option, direct wired low voltage connections from the power company's peak signaling switch connect directly to the transmitting device. The switch signals peak control times to the transceiver, the transceiver sends the signals to Serenity, which receives this information and responds accordingly.

In addition to providing peak control signals, the transceiver also provides outdoor temperature information for automatic charge control and anticipated peak utility control signals (if applicable).

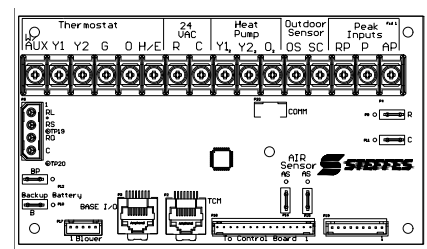
The PLC system is optional and must be ordered separately. If utilizing a PLC system, an Owner's and Installer's manual will accompany the transmitting device. Refer to this manual for information on the installation and operation of the power line carrier control system.

## LOW VOLTAGE (DIRECT WIRED) PEAK CONTROL

If using the low voltage peak control option, Serenity is direct wired to the power company's peak control switch. Field connections from the peak control switch are made to the low voltage terminal block through a low voltage knockout located on either side of electrical panel.

- Step 1** Route a low voltage circuit from the power company's load control or peak signaling device to the terminal block inside the electrical compartment of Serenity.
- Step 2** Connect the field wiring to positions "RP" and "P" on the terminal block as shown in Figure 22.

**FIGURE 22  
PEAK CONTROL  
TERMINAL CONNECTIONS**



### Terminal Block Coding

RP = Peak Control Input Common

P = Peak Control Input

AP = Anticipated Peak (Pre-Peak) Control Input

## TIME CLOCK MODULE PEAK CONTROL

The Steffes Time Clock Module is another option for providing a peak control signal to Serenity. The optional time clock module mounts inside the electrical compartment and interfaces with the low voltage expansion board via an interface cable. Peak control times **MUST** be programmed into Serenity once the module is installed to enable the time clock feature. Refer to the instructions provided with the time clock module for more information on the installation and operation of this device.

## LINE VOLTAGE PEAK CONTROL

Line voltage control is also an option, but is not the preferred method of control as it is usually more complex and expensive. If line voltage control is utilized, the controls circuit must be powered with an uninterrupted circuit. An external switching device, such as a relay panel, is necessary to directly control the heating element charging circuits. If relying on this method of control, the display on Serenity must continuously display a brick core operating mode of "C" (charge) regardless of whether it is an off-peak or on-peak period.

**NOTE:** This option is not recommended with single feed applications.

## LOW VOLTAGE ELECTRICAL CONNECTIONS - OUTDOOR TEMPERATURE SENSOR (RECOMMENDED)

**Installation Methods:** A) Hard wired to system to the "OS" and "SC" terminals  
(See Figure 22)

**OR**

B) Connected to Power Line Carrier (PLC)

**Theory of Operation:** The outdoor sensor monitors outdoor temperature and provides this information to Serenity. Serenity responds by automatically storing heat in its brick core according to outdoor temperature and the heating requirements.

**Location of:** The outdoor sensor must be placed in a location where it can accurately sense outdoor temperature and is not affected by direct sunlight or other sources of heat or cool.

**Wiring:**

- Route low voltage wire from the outdoor sensor to the electrical compartment through one of the low voltage wire knockouts.
- Connect to the two terminals labeled "outdoor sensor".
- If the sensor wiring is routed through an external wall, the opening through which the wire is routed **MUST** be sealed. Failure to do so may affect the accuracy of the outdoor temperature sensor.
- The outdoor sensor is supplied with a lead length of 40 ft. If a greater wire length is needed, it can be extended to a total of 250 ft.
- No other loads can be controlled or supplied through this cable. It is for connection of the outdoor sensor **ONLY**.
- This low voltage cable **MUST** not enter any line voltage enclosure.
- Unshielded Class II (thermostat) wire can be used as extension wire provided it is segregated from any line voltage cabling.

### IMPORTANT

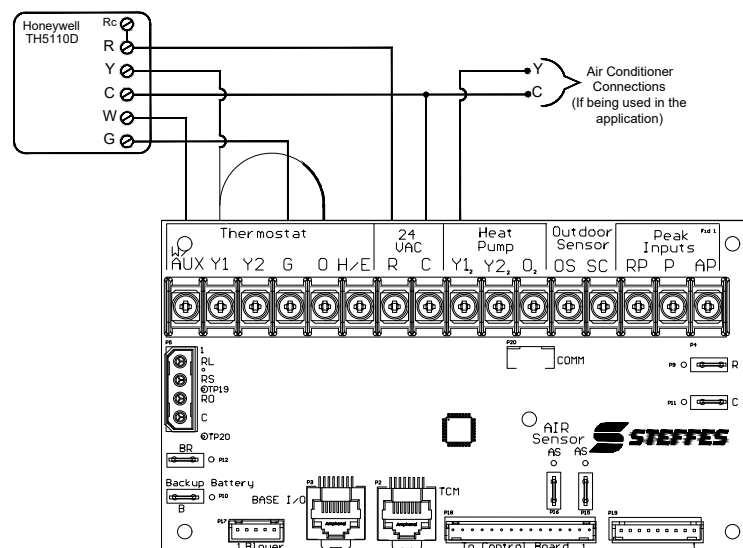
**If connecting to the Steffes power line carrier (PLC) system, follow the installation instructions in the PLC systems Owner's and Installer's manual.**

## LOW VOLTAGE ELECTRICAL CONNECTIONS – ROOM THERMOSTAT

A low voltage (24 VAC) room thermostat is required for room temperature control with Serenity. Steffes recommends using a digital thermostat. If utilizing a mechanical thermostat, a load resistor may be necessary due to the low current draw (.01 amps) on the heat call input circuit of Serenity.

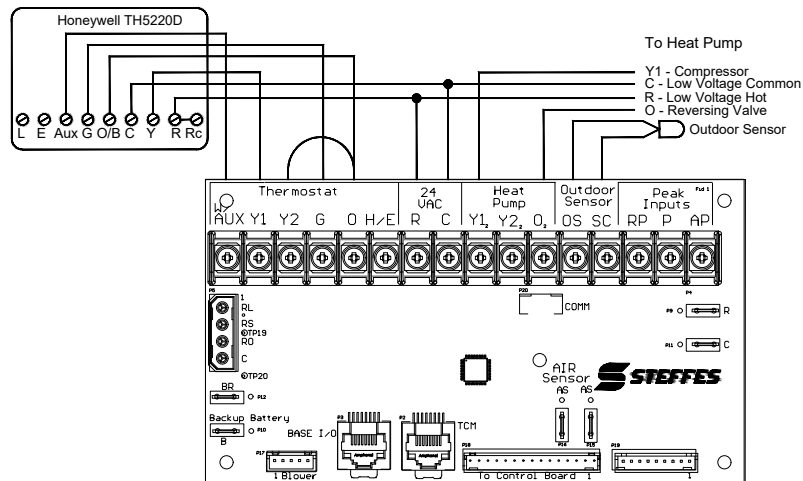
**FIGURE 23**

### STAND ALONE FURNACE APPLICATION WITH VARIABLE SPEED BLOWER CONNECTIONS SHOWN FOR SINGLE STAGE HEATING / SINGLE STAGE COOLING (UNCONTROLLED AIR CONDITIONING)



**FIGURE 24**  
**SINGLE STAGE HEAT PUMP APPLICATION WITH VARIABLE SPEED BLOWER**

**SINGLE STAGE HEAT PUMP APPLICATION**



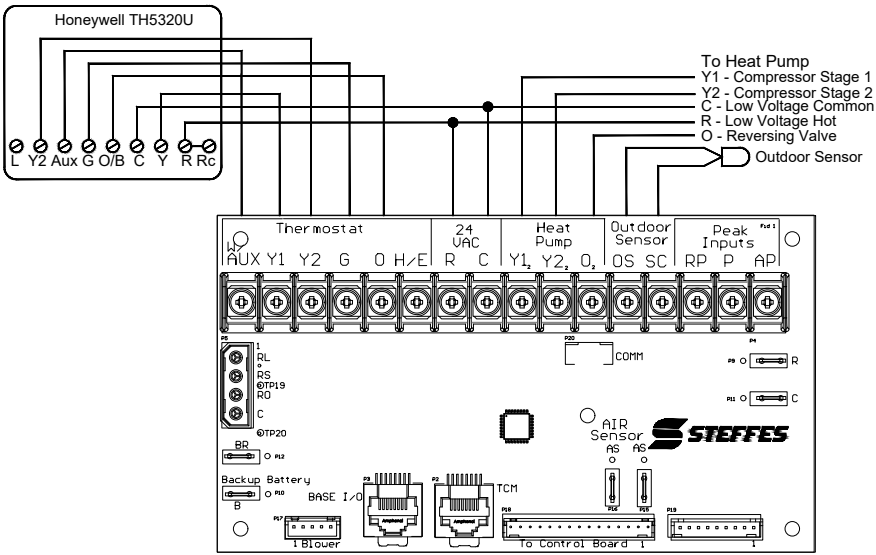
| SINGLE STAGE HEAT PUMP ** |                   |                 |      |                                      |                                  |
|---------------------------|-------------------|-----------------|------|--------------------------------------|----------------------------------|
| Thermostat Stage          | Thermostat Output | Heat Pump Stage | CFM  | Heat Call Status on Digital Display* | Discharge Air Temperature Target |
| 1                         | Y1/G              | 1               | L058 | HC1                                  | L048                             |
| 2                         | Aux/Y1/G          | 1               | L059 | HC3                                  | L049                             |
| Fan                       | G                 | 0               | L057 | HCF                                  | N/A                              |
| Cool                      | Y1/G/O            | 1               | L059 | COOL                                 | N/A                              |
| Emergency                 | H/E               | 0               | L059 | HC3                                  | L049                             |
| Contractor Use Only       |                   |                 |      |                                      |                                  |

\* If multiple inputs are active, system will display highest Heat Call values.

\*\* Thermostat must be programmed to energize reversing valve for cooling. If outdoor unit used requires the reversing valve be energized for heating, see Configuration Menu on pages 3.14-3.16.



**FIGURE 25**  
**TWO-STAGE HEAT PUMP APPLICATION**



| TWO STAGE HEAT PUMP** |                   |                 |      |                                      |                                  |
|-----------------------|-------------------|-----------------|------|--------------------------------------|----------------------------------|
| Thermostat Stage      | Thermostat Output | Heat Pump Stage | CFM  | Heat Call Status on Digital Display* | Discharge Air Temperature Target |
| 1                     | Y1/G              | 1               | L058 | HC1                                  | L048                             |
| 2                     | Y1/Y2/G           | 2               | L059 | HC2                                  | L048                             |
| 3                     | Aux/Y1/Y2/G       | 2               | L059 | HC3                                  | L049                             |
| Fan                   | G                 | 0               | L057 | HCF                                  | N/A                              |
| Cool 1                | Y1/G/O            | 1               | L058 | COOL                                 | N/A                              |
| Cool 2                | Y1/Y2/G/O         | 2               | L059 | COOL                                 | N/A                              |
| Emergency             | H/E               | 0               | L059 | HC3                                  | L049                             |
| Contractor Use Only   |                   |                 |      |                                      |                                  |

\* If multiple inputs are active, system will display highest Heat Call values.

\*\* Thermostat must be programmed to energize reversing valve for cooling. If outdoor unit used requires the reversing valve be energized for heating, see Configuration Menu on Pages 3.14-3.16.

## CONFIGURATION MENU

Serenity has a Configuration Menu that allows it to be customized to the power company and consumer's needs. This menu can be accessed on start-up and allows configuration settings to be easily adjusted.

To access the Configuration Menu:

- Step 1** Energize Serenity. Access to the Configuration Menu is allowed for the first two (2) minutes of operation. If Serenity has been energized for more than two (2) minutes, the 15 amp circuit breaker must be powered off and back on to gain access to this menu.
- Step 2** Press and release the **M** button until the control panel displays "CONF".
- Step 3** Press the up arrow once and the control panel will display "C000". The control panel will flash between "C000" and the corresponding configuration value.
- Step 4** If necessary, edit the configuration value by pressing and holding the **M** button while using the up or the down arrow button to change the value.
- Step 5** Once the value is correct, release the buttons and press the up arrow button to go to the next configuration (C001, C002, etc).
- Step 6** Repeat steps 4 through 5 until all configuration settings have been adjusted to the desired values.
- Step 7** Once configured, use the down arrow to leave the Configuration Menu.

### IMPORTANT

**If access to Configuration Menu times out, the 15 amp circuit breaker must be powered off and back on to re-enter the menu.**

## CONFIGURATION MENU

| Serenity               |                                       |  |     |                               |                                |   |   |                           |   |                   |   |
|------------------------|---------------------------------------|--|-----|-------------------------------|--------------------------------|---|---|---------------------------|---|-------------------|---|
| Method of Peak Control |                                       |  |     |                               |                                |   |   |                           |   |                   |   |
| Configuration Number   | Power Line Carrier (PLC) Peak Control | Low Voltage Direct Wire Peak Control   |     |                               | Time Clock Module Peak Control |   |   | Line Voltage Peak Control |   |                   |   |
|                        |                                       | Peak Switch Closed for Charging  |     | Peak Switch Open for Charging | Outdoor Sensor                 |   | No Outdoor Sensor                                 | Outdoor Sensor            |   | No Outdoor Sensor |   |
| C000                   | 5                                     | 5  | 6   | 5                             | 5                              | 6 | 6   | 5                         | 5 | 6                 | 6 |
| C001                   |                                       |  |     |                               |                                |   |   |                           |   |                   |   |
| C002                   |                                       |  |     |                               |                                |   |   |                           |   |                   |   |
| C003                   | Match to the Channel Selected at PLC  |  | 0   |                               |                                |   | 0   |                           |   | 0                 |   |
| C004                   | 8                                     | 9  | 8   | 9                             | 9                              | 8 | 12  | 13                        | 9 | 8                 | 8 |
| C005                   | 0                                     | 1  |     | 0                             |                                |   | 0   |                           |   | 0                 |   |
| C006                   |                                       | Heat Pump with Reversing Valve Energizing for Cooling - 2<br>Heat Pump with Reversing Valve Energizing for Heating - 130<br>No Heat Pump - 2 |     |                               |                                |   |   |                           |   |                   |   |
| C007                   |                                       |  |     | 30                            |                                |   |   |                           |   |                   |   |
| C008**                 |                                       |  |     | 5°F/ -15°C                    |                                |   |   |                           |   |                   |   |
| C009**                 |                                       |  |     | 5°F/ -15°C                    |                                |   |   |                           |   |                   |   |
| C010                   |                                       |  |     | 90°F/ 32°C                    |                                |   |   |                           |   |                   |   |
| C011                   |                                       |  |     | 70°F/ 21°C                    |                                |   |   |                           |   |                   |   |
| C012                   |                                       |  |     | 60°F/ 16°C                    |                                |   |   |                           |   |                   |   |
| C013 - C021            | N/A                                   |  | N/A |                               |                                |   | Refer to the Time Clock Installation Instructions |                           |   | N/A               |   |
| C022                   |                                       | APPLICATION DEPENDENT  |     |                               |                                |   |   |                           |   |                   |   |
| C023                   |                                       | APPLICATION DEPENDENT  |     |                               |                                |   |   |                           |   |                   |   |
| C024                   |                                       | APPLICATION DEPENDENT  |     |                               |                                |   |   |                           |   |                   |   |

\*Factory Default is Low Voltage Direct Wire Peak Control Closed for Charging with Outdoor Sensor.

\*\*Power Company controls vary from one area to another. Check with the power provider for the proper settings.

## CONFIGURATION DESCRIPTIONS

In most applications only a few, if any, configuration changes will be necessary. Determine which method of peak control is being utilized and configure as follows:

- C000 Off-Peak Method of Charge Control** - Sets the method of brick core charging to be used during off-peak (charge) periods.
- C001 Start Brick Core Charge Set Point** - If utilizing automatic charge control as set in C000, this value indicates the outdoor temperature at which Serenity starts charging.
- C002 Full Brick Core Charge Set Point** - If utilizing automatic charge control as set in C000, this value indicates the outdoor temperature at which Serenity targets a full core charge.
- C003 Power Line Carrier (PLC) Channel Selection** - This value must match the channel selected at the Steffes PLC transmitting device. A value of zero indicates PLC communication is disabled.
- C004 Optional Controls Configuration** - Tells the heater what controls are being used.
- C005 Control Switch Configuration** - If utilizing power line carrier control, the Steffes Time Clock Module, or line voltage peak control this value **MUST** be zero.
- C006 Output Control Configuration** - Configures the output controls of Serenity. To determine the value, check the options desired from the list below. Then, add the numbers from the “Value” column and enter the sum into this location.

| <u>Value</u> | <u>Option Selected</u>   |
|--------------|--|
| 2            | All Serenity Systems.  |
| 8            | Enables compressor control if there is a “COOL” call during a peak (control) time.   |
| 32           | If it is a peak (control) period and Serenity receives a cooling call, the compressor will turn off and on in 20 minute intervals (off 20 minutes, on 20 minutes, off 20 minutes, etc.). |
| 128          | Interfaces Serenity with a heat pump that has a reversing valve which is energized for heating.  |

- C007 Charge Factor** - This configuration should be set to a value of 30.

**NOTE:** *C008 through C009 configurations are only applicable if Serenity is being used in conjunction with a heat pump.*

- C008 Heat Pump Compressor Outdoor Lock-Out Temperature for Off-Peak or Anticipated Peak Modes-** Indicates the outdoor temperature at which the heat pump’s compressor is locked out and not allowed to operate during an off-peak or anticipated peak period.
- C009 Heat Pump Compressor Outdoor Lock-Out Temperature for On-Peak Mode** - Indicates the outdoor temperature at which the heat pump’s compressor is locked out and not allowed to operate during an on-peak period.
- C010 Minimum Discharge Air Temperature** - Sets the minimum discharge air temperature Serenity targets during a Stage 1 heat call.
- C013-C021 Time Clock Module Configuration** - These configuration settings are used to configure the peak control times when utilizing the optional Steffes Time Clock Module. Refer to the installation and configuration instructions included with the module for more information.
- C022 CFM setting for Fan Only Call from thermostat** - The default value from the factory is 400 CFM.
- C023 CFM setting for Stage 1 Heat Call or a Stage 1 COOL call from thermostat** - The default value from the factory is 1200 CFM.
- C024 CFM setting for Stage 2 or Stage 3 Heat Call or a Stage 2 COOL call from thermostat** - The default value from the factory is 1200 CFM.

# INSTALLER'S FINAL CHECK-OUT PROCEDURE

## De-energize Serenity and verify the following:

- System clearances have been met. See Placement and Clearance Requirements (Page 3.02).
- The air channel was installed before the insulation was lowered into place. See Heating Element and Air channel Installation (Pages 3.04-3.05).
- Element connections are tight. See Heating Element and Air channel Installation (Pages 3.04-3.05).
- Brick core temperature sensor is installed properly. See Brick Core Temperature Sensor Installation (Page 3.05).
- Supply air blower and plenum are to the back of the air handler. See Ducting and Air Flow (Page 3.06-3.07).
- The indoor coil is in the return air plenum if a heat pump or air conditioner is installed. See Air Conditioner/Heat Pump Interface (Page 3.09).

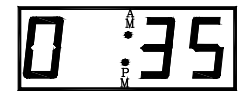
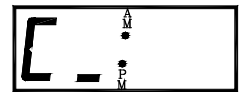


## WARNING

**HAZARDOUS VOLTAGE: Risk of electric shock. Can cause injury or death. System may be connected to more than one branch circuit. Disconnect power to all circuits before servicing. Equipment must be serviced by a qualified technician.**

## Energize Serenity and perform the following:

- Verify that the operating mode displayed on the control panel corresponds with the power company's peak control signal. Refer to the Operating Status section (Page 1.02) and Peak Control Connection sections (Page 3.10) for more information on the proper operating mode.
- Verify that the outdoor temperature is approximately the same as the current outdoor temperature. Refer to the Operating Status section (Page 1.02) and Low Voltage Electrical Connections (Page 3.11) for more information on the outdoor temperature display.
- Initiate a heat call from the room thermostat and verify that Serenity recognizes the heat call. Refer to the Operating Status section (Page 1.02) for more information on the various heat call status displays. The supply air blower should operate. In an application interfacing Serenity with an air conditioner or heat pump, verify that this device is operating appropriately.
- Initiate a cooling call from the room thermostat, if applicable, and verify that Serenity recognizes the "COOL" call. The supply air blower should operate. In an application interfacing Serenity with an air conditioner or heat pump, verify that this device is operating appropriately.
- With Serenity in an off-peak (charge) mode, initiate a charge control override (Page 1.03) Once initiated, the target level of Serenity should be 100 percent and the control panel should display "tL: F". All of the elements should be energized. With an amp meter, verify that the amperage of Serenity is correct for the installation. Refer to the System Identification Label on Serenity for information regarding the proper amperage.
- Place the system in a Peak mode. Verify that all elements in Serenity de-energize. Refer to the Charge Control Override section (Page 1.03) for instructions on canceling the charge control override.
- Verify programming is correct for the installation.
- In applications utilizing the Steffes Power Line Carrier control system, complete the Installer's Final Check-out Procedure in the Owner's and Installer's Manual provided with that device.



## Upon completion of checkout:

- Ensure operating mode displayed corresponds to power company's peak signal controls.
- Instruct the homeowner on how to operate their new heating system from the thermostat.
- Complete the manufacturer's warranty card and return promptly.



# Appendix

## SPECIFICATIONS

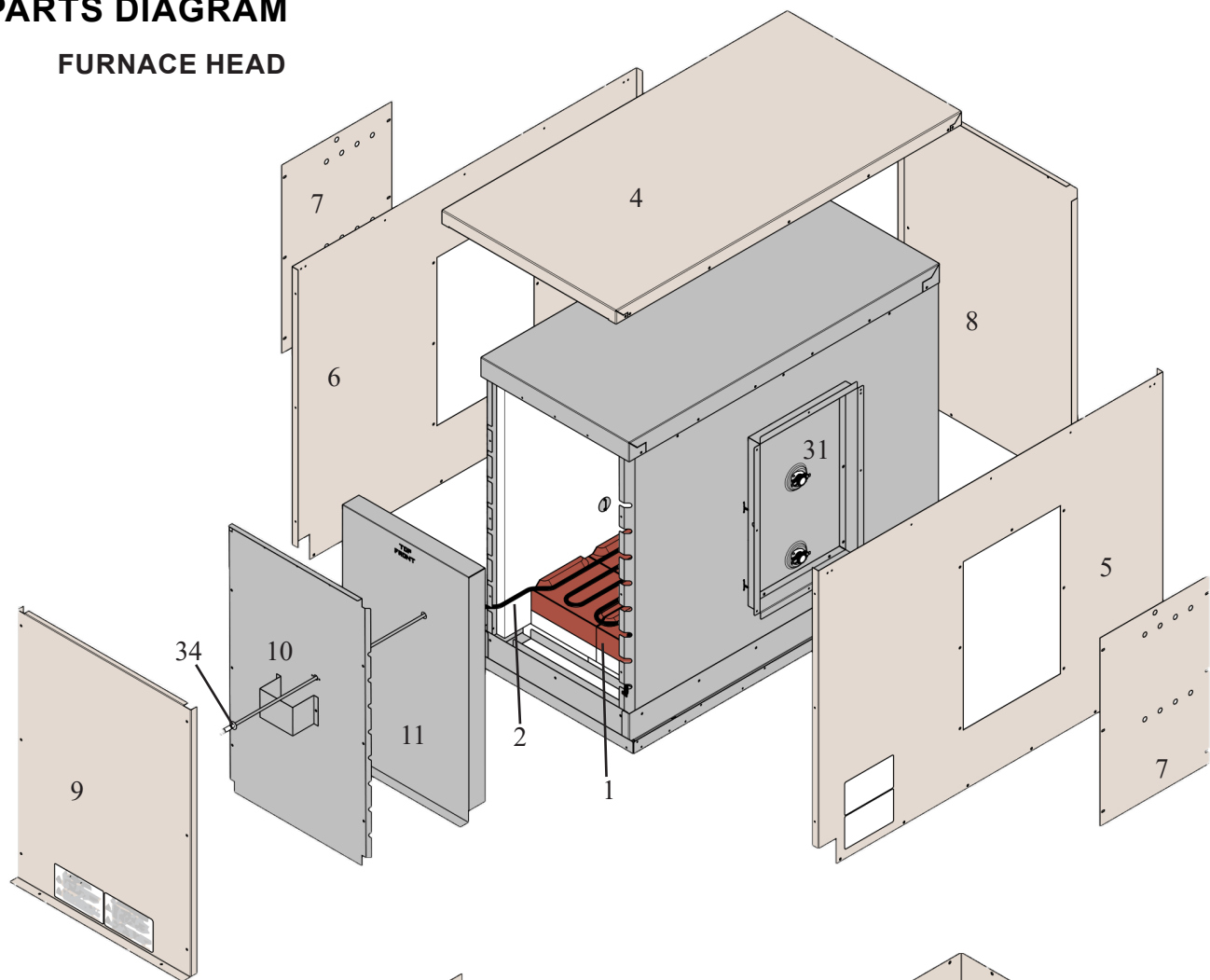
|   |   |
|---|---|
| <b>Model</b>  | <b>4210</b>                             |
| Charging Input (kW)   | 16.0                                    |
| Single Feed:<br>Minimum Circuit Ampacity (240V)<br>(includes 25% derate for continuous load)  | 92 AMP                                  |
| Charging Circuits Required (240V System - Multiple Feed)  | 2 – 50 AMP                              |
| Maximum Core and Supply Blower Load   | 7 AMP                                   |
| Element Voltage   | 240 V/60 Hz                             |
| Blowers/System Controls Voltage   | 240 V/60 Hz                             |
| Storage capacity<br>kWh<br>BTU  | 80<br>272, 960                          |
| Dimensions Including Air Handler<br>(W x D X H in inches)   | 43 x 44 x 47                            |
| Air Handler Duct Openings (inches)<br>Supply Air Outlet<br>Return Air Inlet   | 18.6 x 18.1<br>16 x 16*                 |
| Approximate Cabinet Weight  | 340 lbs                                 |
| Approximate Brick Weight  | 1,134 lbs                               |
| Approximate Air Handler Weight  | 95 lbs                                  |
| Approximate Installed Weight  | 1,569 lbs                               |
| Number of Elements  | 8                                       |
| Number of Bricks  | 72                                      |
| 1/2 HP Supply Blower Air Delivery   | 100 -1300 CFM                           |
| *Optional Return Air Plenum<br>**Maximum Indoor Coil:<br>Capacity<br>Front Access Dimensions (inches)<br>Inner Dimensions (W x D x H in inches) | 1 ½ to 3 Ton<br>20 x 20<br>21 x 21 x 22 |

\* A return air plenum can be ordered as an optional accessory with Serenity. The dimensions listed are those that the optional return air plenum can accommodate. For larger coils, the return air plenum must be installer supplied. If using an air conditioner or heat pump system, that system must include the indoor coil or the outdoor compressor system as standard equipment.

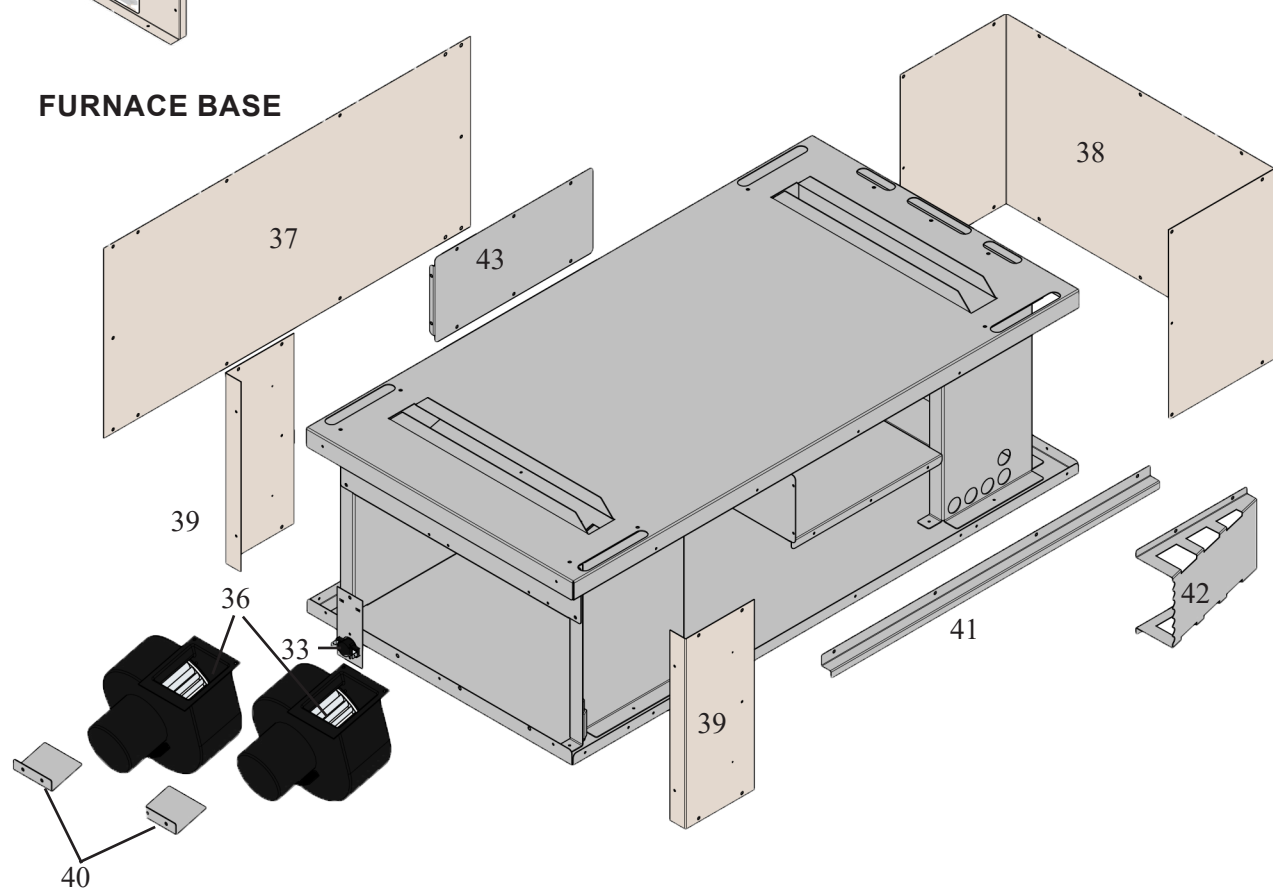
\*\* Serenity can accommodate most heat pump or air conditioner indoor coils, provided the heat pump or air conditioner is sized in accordance to supply air delivery rates of the system.

**PARTS DIAGRAM**

**FURNACE HEAD**



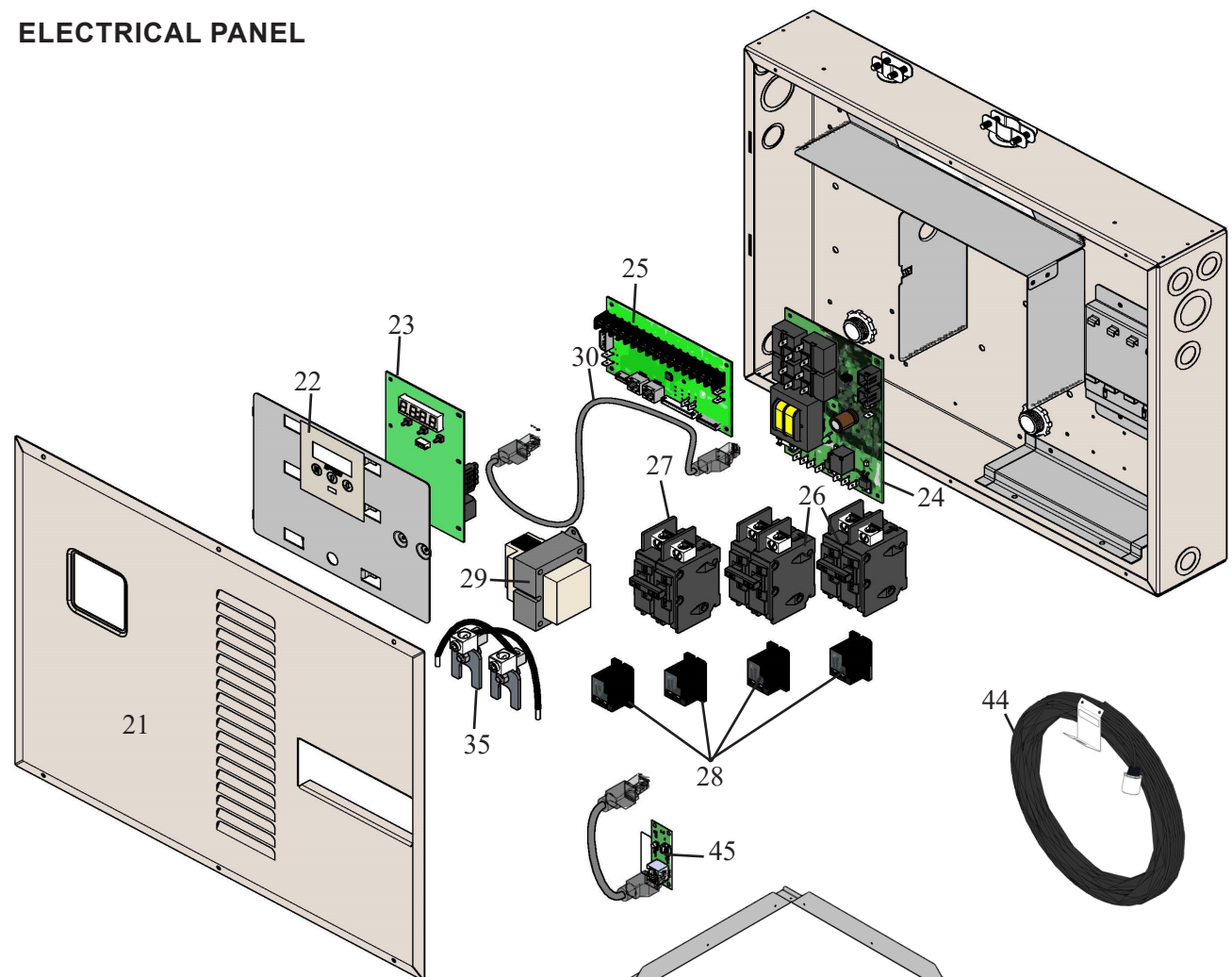
**FURNACE BASE**



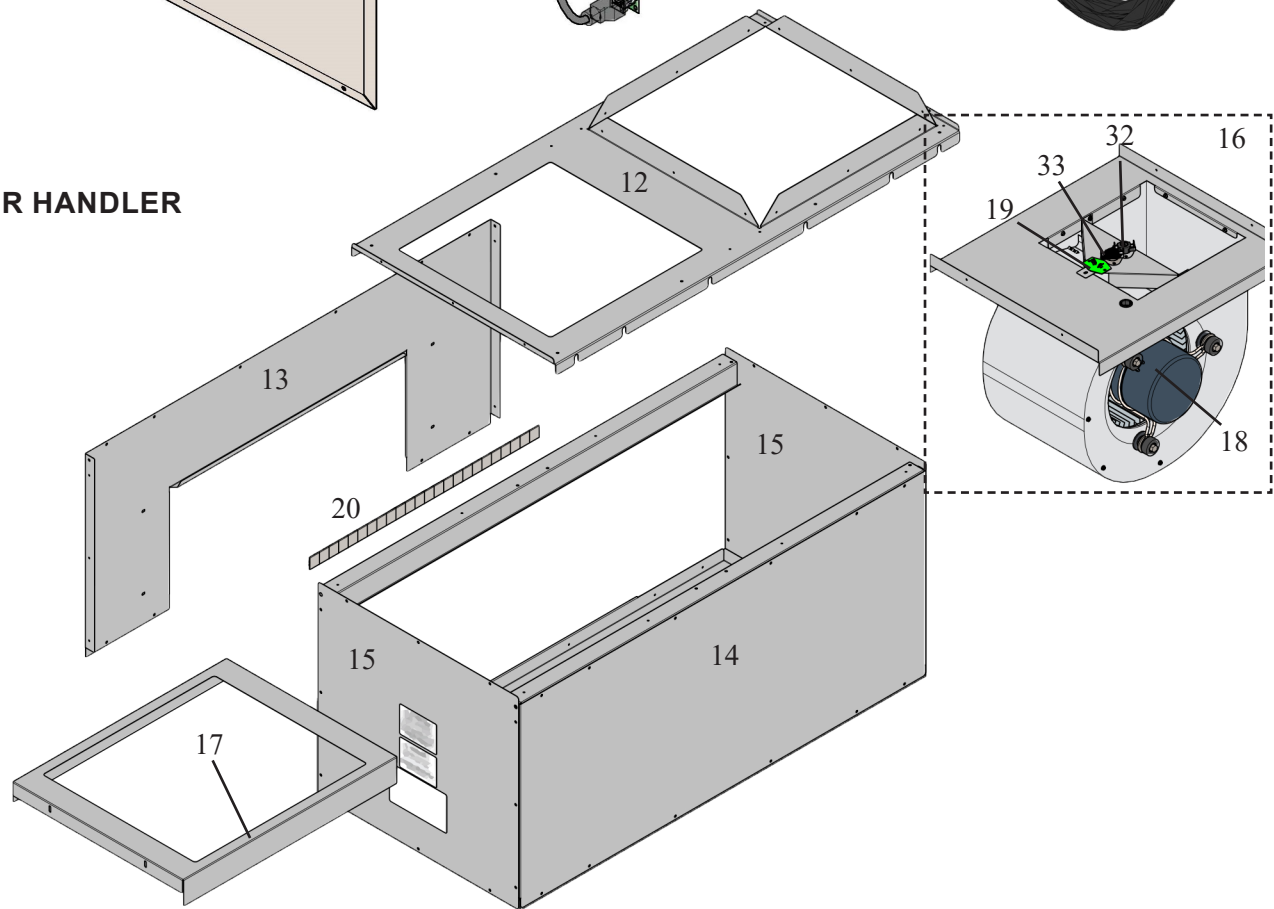


# PARTS DIAGRAM

## ELECTRICAL PANEL



## AIR HANDLER





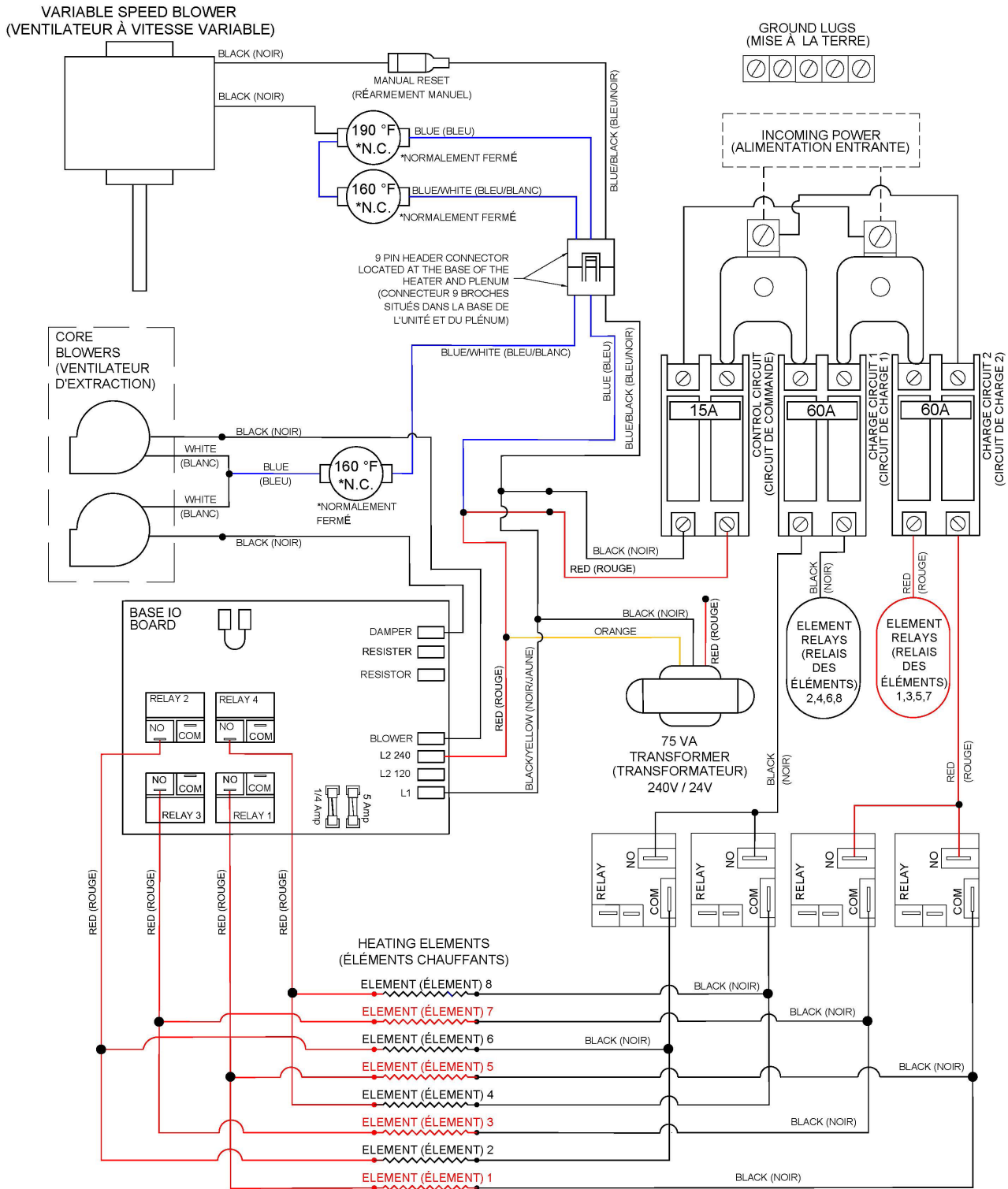
## PARTS LIST

| DWG.<br>REF. NO. | DESCRIPTION                              | 4210<br>ITEM NO. |
|------------------|--|------------------|
| 1                | Brick (package of 2)                     | 5903025          |
| 2                | Element 4210 240V 2000W                  | 1014000R         |
| 3                | Element Screw Kit                        | 1190060          |
| 4                | Top Painted Panel                        | 5940162-41       |
| 5                | Right Side Painted Panel                 | 5940161-41       |
| 6                | Left Side Painted Panel                  | 5940160-41       |
| 7                | Limit Zone Painted Panel                 | 5940204-41       |
| 8                | Back Painted Panel                       | 5940158-41       |
| 9                | Front Painted Panel                      | 5940159-41       |
| 10               | Front Galvanized Panel                   | 5940143          |
| 11               | Front Air Channel                        | 5940134          |
| 12               | AH Top Panel                             | 5940191          |
| 13               | AH Inner Side Panel                      | 5940184R         |
| 14               | AH Outer Side Panel                      | 5940185          |
| 15               | AH Access Panel                          | 5940183          |
| 16               | Supply Air Blower Assembly - ½ HP        | 1040433R         |
| 17               | Supply Air Blower Extension Bracket      | 5940181          |
| 18               | AH Blower Motor - ½ HP ECM               | 1040448R         |
| 19               | Discharge Air Sensor                     | 1041507R         |
| 20               | AH Drive Cleat                           | 5105020R         |
| 21               | Electrical Panel Cover                   | 5940171-41       |
| 22               | Faceplate Label                          | 1159029          |
| 23               | Processor Control Board                  | 1040447R         |
| 24               | Base I/O Universal                       | 1023078R         |
| 25               | Low Voltage Expansion Board              | 1023053R         |
| 26               | Breaker 60 AMP SIEMENS                   | 1024002R         |
| 27               | Breaker 15 AMP SIEMENS                   | 1024000R         |
| 28               | Core Temperature Safety Relay            | 1018086          |
| 29               | Transformer 240/24/75VA                  | 1017039          |
| 30               | Cable Base I/O CTL BD 18"                | 1010014R         |
| 31               | Core Charging High Limit 290D            | 1012019R         |
| 32               | Limit Switch 190D Manual Reset           | 1012026R         |
| 33               | Limit Switch 160D 25A                    | 1012008R         |
| 34               | Thermocouple Core 24X1/4 in.             | 1013037R         |
| 35               | Single Feed Kit                          | 1040445          |
| 36               | Core Blower 240V                         | 1021035R         |
| 37               | Base Painted Side Panel                  | 5940116-41       |
| 38               | Base Painted Back Panel                  | 5940115-41       |
| 39               | Base Painted Front Panel                 | 5940114-41       |
| 40               | Core Blower Mount Bracket                | 5940124          |
| 41               | AH Support Bracket                       | 5940519          |
| 42               | Air Deflector Scoop                      | 5940203          |
| 43               | Air Deflector Stop                       | 5940113          |
| 44               | Sensor Outdoor Knockout 40' REPL         | 1302044R         |
| 45               | Time Clock Module w/Battery (Optional)   | 1301009          |
| 46               | Return Air Plenum (Optional – not shown) | 1302106          |
| 47               | Supply Air Plenum (Optional – not shown) | 1302107          |
| 48               | Leveling Leg (not shown)                 | 5575010          |

# INTERNAL SYSTEM WIRING DIAGRAM – LINE VOLTAGE

## Line Voltage Wiring Diagram - Model 4210 240V SYSTEMS

**NOTE:** Use copper or aluminum conductors rated for 75°C/167°F or higher for field connection of this device.



**NOTE:** Line Voltage Field Wiring Connections - See Figure 21 for information on circuit phasing connections.

# INTERNAL SYSTEM WIRING DIAGRAM – LOW VOLTAGE

The outdoor temperature sensor, room thermostat, and peak control device are connected via low voltage wiring.

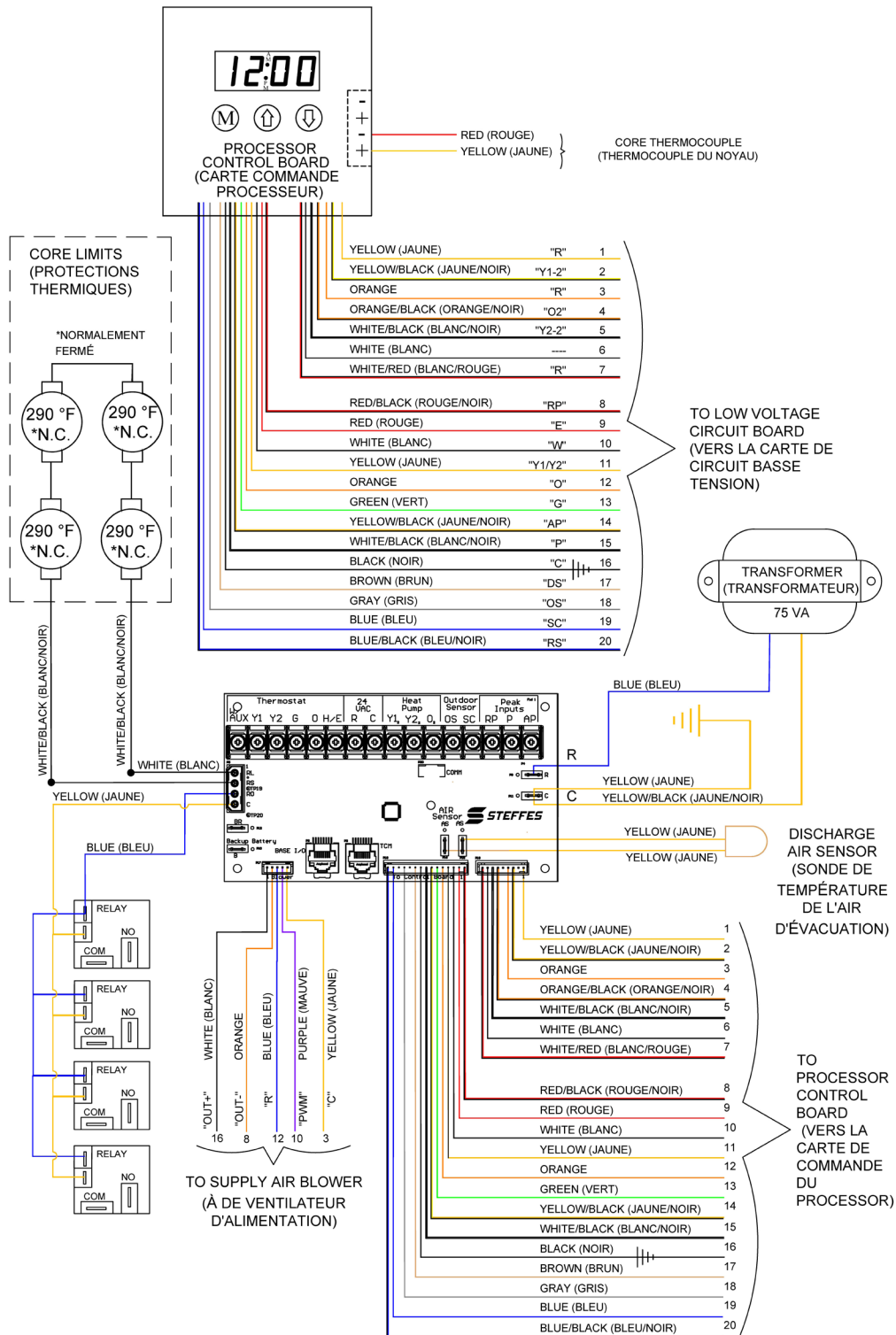
## System Low Voltage Wiring Diagram

- NOTES:**
- The "R" and "C" positions in the low voltage terminal strip may be used as a source of 24 VAC for powering external low voltage devices (60 VA maximum).
  - Thermostat connections are Class 2 wiring.



**WARNING**

**HAZARDOUS VOLTAGE:**  
Risk of electric shock. Can cause injury or death. All low voltage wiring must be segregated from line voltage circuits in Serenity.



## HELP MENU

Serenity contains a Help Menu that can be accessed through the control panel. To access the Help Menu, press and release the **M** button until the control panel displays “HELP”. Scroll through the menu by pressing either the up or the down arrow button.

### **Display**

| <b><u>Reading</u></b> | <b><u>Description</u></b>   |
|-----------------------|---|
| Fxxx                  | Firmware Version Number - Indicates the version of software installed.  |
| O xx                  | Outdoor Temperature - Indicates current outdoor temperature as recognized by Serenity.  |
| tL:xx                 | Target Level - Indicates the percentage of brick core charge level Serenity is targeting. During peak periods the value displays as "tL_".                  |
| CL:xx                 | Charge Level - Indicates the percentage of heat storage currently in the brick core.  |
| HE x                  | Heating Elements Relays Energized - Indicates the total number of heating element relays currently energized (closed).                                      |
| PC x                  | Power Line Carrier Channel - Indicates the channel on which Serenity is set to receive PLC communication signal.  |
| P x                   | Power Line Carrier Net Hit Rate Percentage - Indicates the percentage of "GOOD" communication packets received by Serenity from the PLC transmitter system. |
| PS x                  | Indicates which Specialty Timer Serenity is currently using. The value displayed will be zero if the Specialty Timer is not being utilized.                 |
| CC_x                  | Charge Mode Operation - Indicates the charge control method being utilized during off-peak periods.   |
| CA_x                  | A-Peak Mode Operation - Indicates the charge control method being utilized during anticipated peak periods.   |
| C1_x                  | Specialty Timer #1 Charge Mode - Specialty Applications Only.   |
| C2_x                  | Specialty Timer #2 Charge Mode - Specialty Applications Only.   |
| HUxx                  | Heat Usage - Indicates the percentage of the heating system output.   |
| A_xx                  | Target Discharge Air Temperature - Indicates the discharge air temperature that Serenity is targeting.  |
| cxxx                  | Compressor Output Relay Delay Timer - Indicates time remaining before heat pump compressor is energized. "c ON" indicates the heat pump is energized.       |

## ERROR CODES

Serenity has an on-board diagnostic system to monitor various operating conditions. If operating conditions move outside the normal operating range, an error code is displayed on the control panel. If there are multiple errors simultaneously, only the highest priority error code appears. Once corrected, the next highest priority code will be displayed on the control panel as “Er—” (e.g. Er05). If an error message appears, please contact a qualified technician.



### WARNING

**HAZARDOUS VOLTAGE:**  
**Risk of electric shock. Can cause injury or death. System may be connected to more than one branch circuit. Disconnect power to all circuits before servicing. Equipment must be serviced by a qualified technician.**

| <u>Error Code</u> | <u>Description</u>  |
|-------------------|---|
| 01                | The lower core (Core A) thermocouple temperature is out of normal range. An open, shorted, or otherwise defective thermocouple or a circuit board which is out of calibration can cause this.   |
| 04                | Discharge air sensor temperature is out of normal range. This can indicate an open thermistor, a short in the wiring, or a circuit board which is out of calibration.   |
| 05                | Direct-wired outdoor sensor temperature reading is out of normal range. The thermistor circuit may be open or shorted, the processor control board may be out of calibration, or there may be an incorrect value in Configuration 4 (C004). |
| 06                | Outdoor sensor temperature from the transmitting device (PLC system) is out of normal range. Check the outdoor sensor attached to the transmitting device and the transmitter for proper operation.   |
| 07                | Main processor control board temperature sensor is out of normal operating range. Verify that none of the clearances have been violated and inspect the condition of the processor control board.   |
| 20                | Press and release the <b>M</b> button to clear the error. If the error code reappears, contact a qualified technician.  |
| 23                | There is no communication occurring with the Steffes Time Clock Module.   |
| 24                | Temperature sensor offset/reference is out of range and indicates that one of the sensors or the core thermocouple may be shorted to ground or the processor control board may be out of calibration.                                       |
| 26                | Insufficient main control board memory.   |
| 27                | Insufficient permanent memory.  |
| 28                | Press and release the <b>M</b> button to clear the error. If the error code reappears, contact a qualified technician.  |
| 29                | On-board communication system is not fully operable. Contact a qualified technician.  |
| 30                | Base I/O control board is in test mode. Check the jumper configuration on the circuit board.  |
| 39                | Indicates the value in Configuration 2 (C002) has been set to a value greater than the value in Configuration 1 (C001). Serenity will not charge until the value in C002 is set lower than C001.  |
| 40                | Press and release the <b>M</b> button to clear the error. If the error code reappears, contact a qualified technician.  |
| 41-47             | Processor control board software errors.  |
| 48                | System is currently in battery backup mode.   |
| 49                | No communication with the low voltage expansion board.  |
| Cold Core         | The brick core temperature is below 40°F/4°C, or the core sensing thermocouple may be open.   |
| Core Fail         | Core high limit switch may be open.   |
| PLC Fail          | Serenity is configured for power line carrier control; however, is not receiving a valid power line carrier communication signal.   |

## GLOSSARY

**Anticipated Peak** - Used only by certain power companies as an alternative method of storing heat in the brick core. Indicated by an "A" on the system display.

**Automatic Charge Control** - Method of brick core charge regulation where a sensor monitors outdoor temperature to automatically adjust the brick core temperature.

**Brick Core Charge Level** - The amount of heat that is stored in the brick core.

**Charge Period** - Off-peak time in which the system is allowed to store heat in its brick core. Indicated by an "C" on the system display.

**Control Panel** - Contains the buttons to adjust and the display to indicate system functions.

**Control Period** - On-peak time in which the system is not allowed to store heat in its brick core. Indicated by an "P" on the system display.

**Edit Mode** - Process of changing or viewing the values in a microprocessor location. This is accomplished with the use of the **M** (mode) button, the  $\uparrow$  (up arrow) button, and the  $\downarrow$  (down arrow) button.

**Location (Function)** - Where the specific operating information of the system is stored. These locations are part of the system microprocessor and are accessed through the control panel. Displayed as an "L" on the control panel when in the edit mode.

**Location Value** - The specific information set and stored in a location on the microprocessor which defines system operation. A value for a specific location is accessed through the control panel.

**Manual Charge Control** - Method of brick core charge regulation where the owner must periodically adjust the brick core temperature setting in relation to the outdoor temperature.

**Microprocessor** - Device on the circuit board of Serenity that stores and processes the information for controlling the operation of the system.

**Off-peak** - The time during the day or night when the power company can supply electricity more economically and may offer a special incentive such as a reduced electric rate or billing credits for the electricity consumed during this time. Typically, electrical usage is not controlled during an off-peak time. (Serenity will provide heat to satisfy comfort requirements during this time and charge or store heat in its brick core.)

**On-peak** - The time during the day or night when the power company experiences a high demand for electricity. To limit demand, certain appliances are controlled to avoid usage by them and/or a premium for the electricity consumed during this time may be charged to discourage electrical usage. (Serenity is not allowed to charge or store heat in its brick core during peak periods. Heating requirements are satisfied by only the heat it has stored in its brick core.)

**Outdoor Sensor** - Device that senses outdoor air temperatures and communicates this information to Serenity for automatic charge control.







# Warranty

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Registering your purchase is an essential step to ensure warranty coverage. A Warranty Registration card is included with the Owner's Manual. Simply complete, detach the bottom portion, and return the card today. Retain the top portion of the card for your files.

## WARRANTY STATEMENT

Steffes Corporation ("Steffes") warrants that the Steffes ETS Electric Thermal Storage Heating Appliance is free from defects in materials and workmanship under normal use and service. Steffes' obligation under this Warranty is limited to the repair or replacement of the appliance or parts only which prove to be defective under normal use within **five (5) years** of the date of purchase, limited to seven (7) years from the date of manufacture, and which Steffes' examination of the returned appliance or part(s) shall verify to Steffes' satisfaction that it is defective. The user shall be responsible for any labor costs associated with the repair or replacement of the appliance or part(s), including the cost of returning the defective appliance or part(s) to Steffes Corporation.

This Warranty is void if the heating appliance is moved from the premises in which it was originally installed. This Warranty shall not apply to an appliance or part which has been altered in any respect, or improperly installed, serviced or used, or has been subject to accident, negligence, abuse or misuse.

**THE ABOVE WARRANTY BY STEFFES IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, WHETHER WRITTEN OR ORAL, EXPRESS OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.**

The buyer assumes all risk and liability whatsoever resulting from the use of this heating appliance. In no event shall Steffes be liable to purchaser for any indirect, special or consequential damages or lost profits.

This Limited Warranty contains the complete and exclusive statement of Steffes' obligations with respect to the heating appliance and any parts thereof. The provisions hereof may not be modified in any respect except in writing signed by a duly authorized officer of Steffes.

*Thank you for purchasing Steffes ETS heating equipment. We welcome your comments relating to Serenity and this manual. Enjoy your new purchase!*



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