



"Manufactured in North America"

OWNER'S AND INSTALLER'S MANUAL



for

COMFORT PLUS

Forced Air Heating Systems

Equipped with Variable Speed



**Models: 4120,
4130, & 4140**

Applicable to Software Version 2.00-2.19

*This manual applies to heating systems
built after 01/01/2011.*

U.S. Pat. #5201024, #5086493 C
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 insure proper installation and operation of this product, completely read all instructions prior to attempting to assemble, install, operate, maintain or repair this product. Upon unpacking of the system, 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 service personnel as required.
- ♦ **Disclaimer:** In compiling this manual, Steffes has used its best judgement 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/mildew growth and/or any damages caused by either which 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 your model and serial number below. This number is found on the identification label located on the lower left side of the 4100 series base. Retain this information for future reference.

Model No. _____

Serial No. _____



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 brick and completely assemble the heating system before energizing the system to avoid damage to the heating system.
2. DO NOT use or store materials that may 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. A repeated message of “CORE FAIL” indicates a need for service by a qualified technician.



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

The Comfort Plus heating system 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.	In the limit bar panel on the left side 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 blower(s) if the normal operating temperature is exceeded: 160°F (nominal)	On the supply air blower assembly.
Supply Air Blower Limit Switch	This limit switch monitors the discharge air temperature and interrupts power to both the supply air blower and the core blower(s) if the normal operating temperature is exceeded: 190°F (nominal) Manual Reset	On the supply air blower assembly.
Base Temperature Limit Switch (Auto Reset)	This limit switch monitors the temperature in the base of the Comfort Plus and interrupts power to the core blower(s) if the normal operating temperature is exceeded.	In the base of the system near the core blower(s).



Table of Contents

Operation

General Operation	1.01
System Use During Construction Phase	1.01
System Start-Up	1.01
Turning System "OFF" and "ON"	1.01
Control Panel	1.02
Operating Status	1.02
Room Temperature Control	1.03
Brick Core Charge Control	1.03
Charge Control Override	1.03
Maintenance and Cleaning	1.03

Optional Accessories

Single Electrical Feed Kit	2.01
Comfort Plus Stand	2.01
Down Flow Kit	2.01
Return Air Plenum	2.01

Installation

Shipping and Packaging	3.01
Placement and Clearance Requirements	3.02-3.03
Initial Set-up	3.03
Brick Loading	3.04
Heating Element and Air Channel Installation	3.04-3.05
Brick Core Temperature Sensor Installation	3.05
Ducting & Airflow	3.06-3.07
Air Conditioner/Heat Pump Interface	3.07
Line Voltage Electrical Connections	3.07-3.08
Peak Control Connections	3.09-3.10
Low Voltage Electrical Connections	
Outdoor Temperature Sensor	3.10
Room Thermostat	3.10-3.12
Auxiliary Load Control	3.12
Humidifier/Electronic Filter Installation	3.12
Configuration Menu	3.13-3.14
Installer's Final Check-Out Procedure	3.15

Appendix

Specifications	A.01
Disassembling	A.02
Parts Diagram	A.03
Parts List	A.04-A.05
Internal System Wiring Diagrams - Line Voltage	A.06-A.08
Internal System Wiring Diagram - Low Voltage	A.09
Help Menu	A.10
Error Codes	A.10-A.11
Glossary	A.12

Warranty

1

Operation

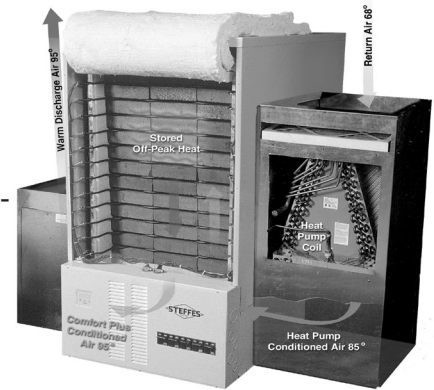
GENERAL OPERATION

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

Operation of the Comfort Plus heating system is automatic. When off-peak hours are available, the system converts electricity to heat which is then stored in its ceramic brick core. The amount of heat stored in the brick core varies in relation to outdoor temperature, owner preference, utility peak conditions, and the heating requirements.

A heat call from the room thermostat energizes the blowers in the Comfort Plus system. The variable speed core blower(s) automatically adjust its 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 this system allows it to fit many applications. The Comfort Plus is designed for use as either the sole heating source ("stand alone" furnace) or as a supplement to ducted heating systems such as heat pumps.



SYSTEM USE DURING CONSTRUCTION PHASE

Like most heating equipment manufacturers, Steffes strongly recommends that "Construction Heating Units" be used instead of the permanent heating system during the construction phase of a new home. Use of the permanent heating system during this phase may contaminate the duct system and/or internal areas of the heating system. This may cause poor indoor air quality issues, systems reliability problems, and/or improper system operation once the home is completed.

SYSTEM START-UP

On start-up of the Comfort Plus system, odors relating to first time operation of the heating components may be experienced. Also, if not used for an extended period of time, dust may accumulate in the system. Allow the Comfort Plus heating system to charge to its maximum brick core charge level to expel odors in a timely manner.

As with most heating systems, air borne particles and odors in the room may be drawn into the Comfort Plus and oxidized. **Odors can be amplified; thus, it is not recommended to operate the system if odors such as those from paints, varnishes, or chemicals are present in the air.** Air borne particles, which have been oxidized, are expelled back into the room and may accumulate on air vents or other surfaces. Over time, these particles may appear as a black residue, commonly referred to as soot. High concentrations of air borne 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, the Comfort Plus heating system may produce minor expansion noises. These noises are the result of the internal components reacting to temperature changes.

TURNING SYSTEM "OFF" AND "ON"

The Comfort Plus element (charging) circuits may 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.



The 15 AMP breaker **MUST** remain "ON" to operate controls in the system if:

- ♦ using the Comfort Plus in conjunction with a heat pump or air conditioner.
- ♦ using the Comfort Plus to control other loads.
- ♦ using the optional Steffes Time Clock Module.

CONTROL PANEL

Operation of the Comfort Plus heating system is automatic. Operational function settings are stored in a microprocessor on the processor control board. These settings are modified, if necessary, through the Configuration Menu as described on Pages 3.13-3.14. In most applications, the system is configured upon installation and no further changes are required.



CONTROL PANEL

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.

AM and PM Indicator Lights

The AM and PM indicator lights are only utilized if the Steffes Time Clock Module is being installed and using 12 hour time display. With this module installed, the system displays time on AM/PM intervals. The light flashes next to the active designator/symbol. The system 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 the system (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

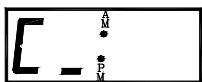
Allows technician external access for advanced operating modes, updating software, and troubleshooting.

IMPORTANT

Editing configuration information may alter the performance and operation of the system.

OPERATING STATUS

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

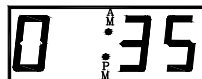
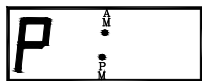


Operating Mode - Indicates the current operating mode of the Comfort Plus system.

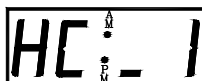
C = Off-Peak (Charge) Time
P = On-Peak (Control) Time
A = Anticipated Peak Time



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 Comfort Plus. A display of "tL:_" indicates that the system 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 the Comfort Plus heating system. The variable speed core blower(s) 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, the Comfort Plus 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 the brick core of the Comfort Plus system is regulated automatically in relation to outdoor temperature and the heating requirements. The outdoor sensor, supplied with the system, monitors outdoor temperature and provides this information to the Comfort Plus. As the outdoor temperature decreases, heating requirements increase and the system stores more heat accordingly.

CHARGE CONTROL OVERRIDE

The Comfort Plus 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 cancelled at any time. If an override is initiated, the system targets a full core charge level during the next off-peak period. It continues to charge during off-peak hours until the system achieves full (maximum) core charge or until the override is cancelled. Once full charge is achieved or the override is cancelled, the system charges according to the standard configuration.

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 faceplate 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 faceplate 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 faceplate will flash “FULL” and “OFF”. Continue to hold all three buttons until “OFF” displays continuously.
- Step 3** Release the buttons. The override is now cancelled. The faceplate will return to displaying its standard operating mode.



- This feature will not turn elements on during a peak period.
- This feature will cancel if power is interrupted.

MAINTENANCE AND CLEANING

The Comfort Plus heating system is easily maintained. The air filter in the return air duct of the system should be replaced on a regular basis to ensure proper operation and to maintain overall efficiencies. No additional routine maintenance is required.

If utilizing a heat pump or air conditioning system with the Comfort Plus, 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

SINGLE ELECTRICAL FEED KIT

The Steffes Comfort Plus systems have built-in circuit breakers. They are factory configured to be field connected to multiple line voltage circuits. If single feed to the element and blowers/control circuits is desired, the single feed kit is available to allow the system to be powered with a one, larger line voltage circuit.



MODEL	PART #
4120	1301572
4130/4140	1301570

COMFORT PLUS STAND



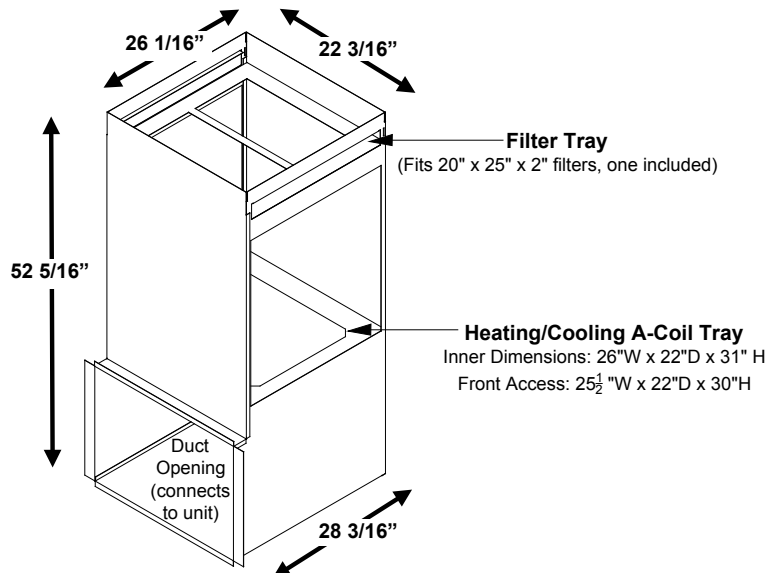
Order Item #1301585

Some applications (such as garages) may require that the heating appliance be elevated in order to meet building codes. The Steffes Comfort Plus stand elevates the system 18". This stand is shipped as a kit and requires field assembly.

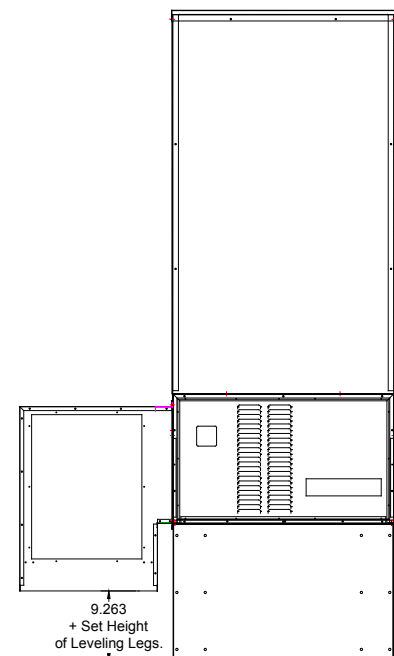
DOWN FLOW KIT Order Item #1301578

The 4100 Series forced air systems are designed for upflow supply air discharge. In applications where downflow air discharge is desired, Steffes offers a kit that provides the ability to connect the supply air plenum in a manner that directs the air downward.

RETURN AIR PLENUM Order Item #1301550



A factory built return air plenum is available for the 4100 series systems and is ordered as a separate accessory. This plenum incorporates a tray for placement of a heating/cooling coil which must get set in the return ductwork when interfaced to a heat pump. The return air plenum connects directly to the 4100 series systems for either a right-to-left or left-to-right airflow pattern.



3

Installation



CAUTION

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

SHIPPING AND PACKAGING

The Comfort Plus system 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)



Half Brick
(shipped with brick and
packaged in a white box
consisting of 6 half brick
and 1 full brick)

MODEL	FULL BRICK	1/2 BRICK
4120	105	6
4130	150	12
4140	198	12

④ HEATING ELEMENTS



MODEL	ELEMENTS
4120	8
4130	12
4140	16

(shipped inside the base of
the Comfort Plus)

⑤ OUTDOOR TEMPERATURE SENSOR



(shipped inside the
electrical compartment)

⑥ SUPPLY AIR BLOWER ASSEMBLY

(Ordered and shipped separately)



PLACEMENT AND CLEARANCE REQUIREMENTS

The physical dimensions of the Comfort Plus, along with the clearances required, **MUST** be taken into consideration when choosing its location within a structure. (See Figures 1 and 2 for clearance requirements and system dimensions.)

The best installation location for this system is in a space requiring heat so some amount of the heating requirements can be satisfied through static dissipation from the warm outer panels. In situations where the Comfort Plus is not installed in an area it is intended to heat (i.e. 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 2.5kW can be experienced in normal operation. Room air should be maintained at less than 85° Fahrenheit.

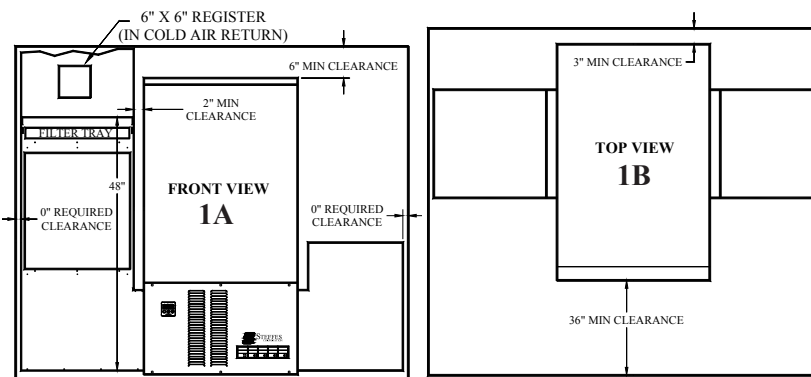
If ventilation is needed, it can be provided by installing a 24" x 24" opening into the area where the Comfort Plus is located. In addition, a 6" x 6" non-closing type register can be cut into the return air duct of the furnace to minimize heat build-up in the room. This register must be installed in a manner that ensures the air drawn into the Comfort Plus passes through the filter first (see Figure 1A).

In addition to the physical space requirements, the weight of the Comfort Plus must be taken into consideration when selecting the installation surface. A level concrete floor is the best installation surface on which to place the system, but most well supported surfaces are acceptable. If unsure of floor load capacity, consult a building contractor or architect.



Special requirements must be considered if placing the system in a garage or other area where combustible vapors may be present. Consult local, state, and national codes and regulations to ensure proper installation. An 18" pedestal (Order Item #1301585) is available to elevate the system.

**FIGURE 1
CLEARANCES**



- ♦ Back and Sides = 3 inches (from combustible material)
- ♦ Bottom = 0 clearance
- ♦ Top = 6 inches (from combustible material)
- ♦ Front = 36 inches (for ease in servicing)
- ♦ Between Duct and Left Side of System = 2 inches
- ♦ Between Duct and Right Side of System = 0 clearance
- ♦ Outer Sides of System Ducts (Return and Supply) = 0 clearance



Minimum clearance requirements may NOT account for required working space for electrical connections.

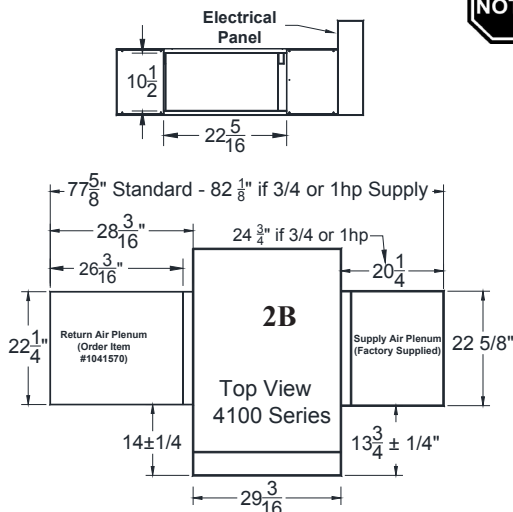
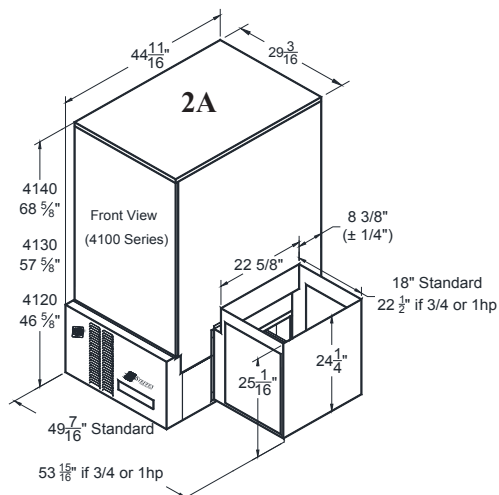


WARNING

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 the system. 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 or less may result in equipment damage. Thermostatically controlled ventilation should be provided if the temperature in this area exceeds 85°F.**
- ♦ **Moving the system after install may result in equipment damage. Do NOT move system from original installed location.**

**FIGURE 2
DIMENSIONS**



IMPORTANT:
Return air duct
MUST NOT enter
from the front or
back of the furnace.
Upflow, downflow,
or straight return
ducting only.

INITIAL SET-UP

- Step 1** Remove the Information Package from the outside of the shipping box and unpackage the Comfort Plus heating system.
- Step 2** Remove the heating elements from inside the base of the system.
- Step 3** Move the system into its installation location. The Comfort Plus is capable of fitting through a 30" doorway (minimum) without disassembling. If necessary, the system can be disassembled for ease in moving. Refer to the disassembly instructions (Page A.02) for more information.
- Step 4** Once in place, adjust the leveling legs on the bottom of the system 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 (1) inch.
- Step 5** Remove the painted front panel of the electrical compartment by removing the screws along the edges. Locate the element screw kit and the outdoor sensor.
- Step 6** Remove the painted front panel of the brick storage cabinet by removing the sheet metal screws along the top, bottom, and sides of the panel. Detach by pulling the bottom of the panel forward and down.
- Step 7** Locate the element wiring harnesses behind the front painted panel. Carefully position them to avoid damage during the brick loading and wiring processes.
- Step 8** Locate the brick core temperature sensor(s) behind the front panel and disconnect them from their shipping position. Carefully position the sensor(s) to avoid damage during brick loading and wiring.



Models 4130 and 4140 have two brick core temperature sensors.

- Step 9** Remove the galvanized front panel and set it aside.
- Step 10** Starting at the bottom, carefully lift the two insulation blankets, one at a time, and drape them over the top of the system.



Use face mask, gloves, and long sleeved garments when handling insulation materials in compliance with generally accepted safety practices.

- Step 11** Remove the front air channel by pulling out on the top of the air channel.

IMPORTANT

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

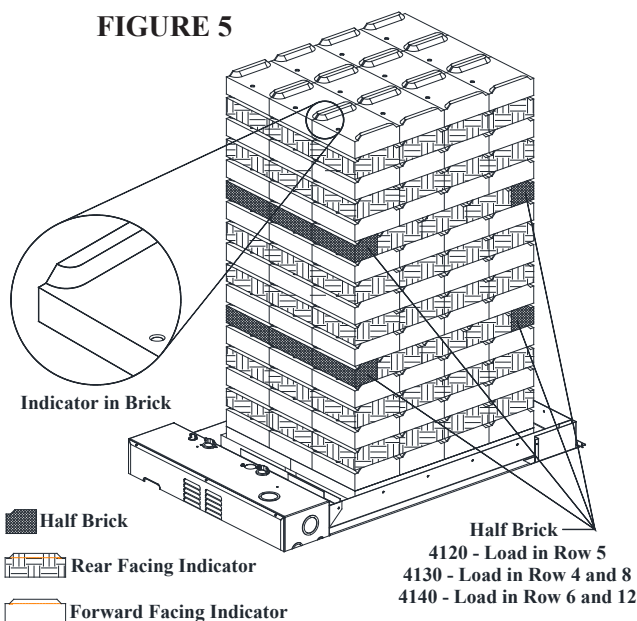
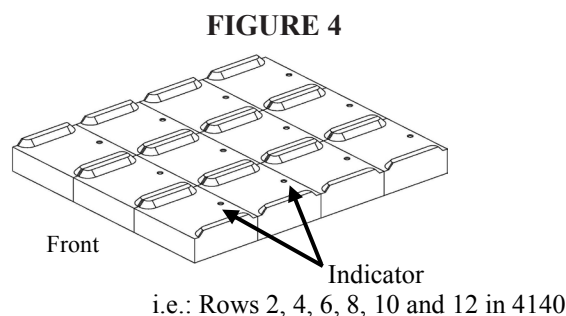
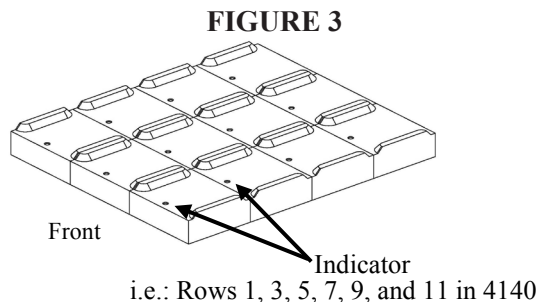
- ♦ Remove the Comfort Plus system from its shipping pallet before installing.
- ♦ Leveling legs should be extended no more than one inch.
- ♦ DO use and follow generally accepted safety practices when handling insulation material.
- ♦ DO have equipment installed by a qualified technician in compliance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

BRICK LOADING

Load the brick, one row at a time, using a left side, right side, center pattern. Start at the back of the brick core and work forward. Make sure the brick are placed so the grooved side is facing up and the ridges are on the left and right. (See Figure 5.)

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(s) difficult.
- Brick rows **MUST** line up front to back and side to side.
- Half brick makes brick loading easier by evening out the stacks. Use HALF BRICK (white boxes) in the proper rows and positions as indicated in Figure 5.
- Alternate the direction of the brick's indicator in every other brick row. See Figures 3 and 4.
- All bricks in odd numbered rows (1, 3, 5, 7, 9, and 11) must have the indicator facing forward as shown in Figure 3.
- All bricks in even numbered rows will have indicator facing back. See Figure 4.



WARNING

Risk of fire. Can cause personal injury or death. DO NOT operate the system if damage to the insulation panels on the inner sides of the brick core occurs.

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.

The elements MUST be installed so their threaded screw tabs on the wire connection terminals point forward and down. If they are installed with the screw tabs pointing upward, element-to-wiring harness connections (Figure 6) will be difficult. Be sure the elements are slid into the brick core properly to ensure correct clearance between the terminal connections and any surfaces within the system as shown in Figure 6.

Step 2 Install the front air channel with the air deflectors (arrow shaped pieces) facing inward and with the narrow ends of the deflectors pointing up.

Place bottom portion in first. See Figure 7.



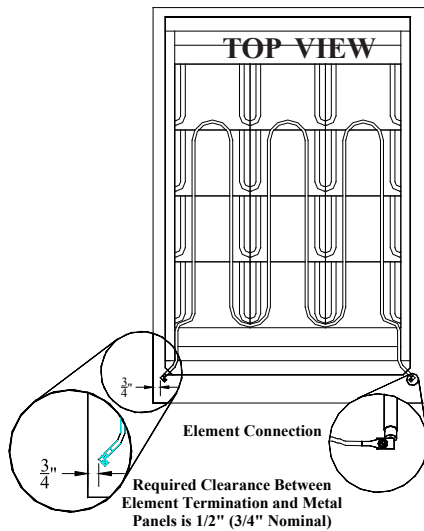
WARNING

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

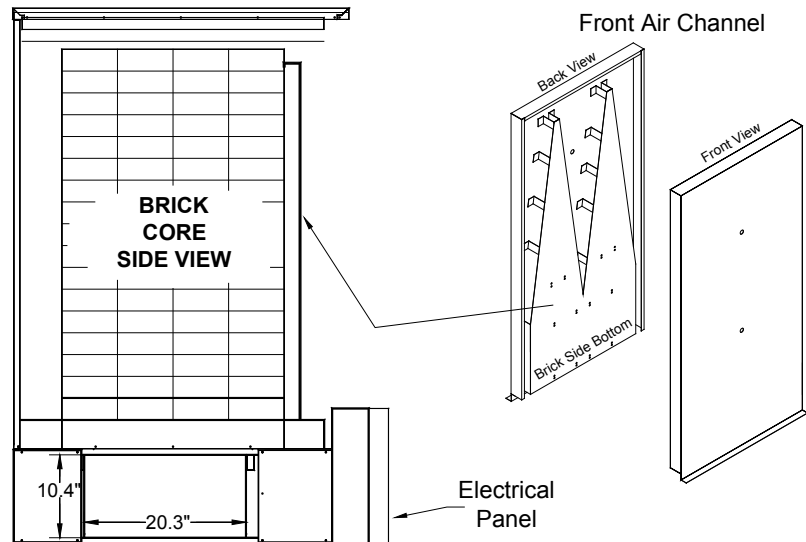
- ♦ **DO NOT** remove the electrical panel cover while system is energized.
- ♦ **Position** elements properly to avoid short circuiting them against metal surfaces.
- ♦ **Protect** element lead wires from front panel screws and any field installed screws to avoid short circuit.

- Step 3** Lower the insulation blankets back into position, one at a time. Carefully tuck the sides of the insulation into the edges, corners, and around the exposed portions of the heating elements to ensure maximum efficiency.
- Step 4** Reinstall the galvanized front panel and secure it to the Comfort Plus system 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 screws provided in the hardware package. Make connections with screw heads up and threads pointing down. Element screws should be tightened to 30 inch lbs. Refer to Element Connection (Figure 6) for proper positioning.

**ELEMENT INSTALLATION
FIGURE 6**



**AIR CHANNEL PLACEMENT
FIGURE 7**



BRICK CORE TEMPERATURE SENSOR INSTALLATION

- Step 1** Remove the screw(s) by the brick core temperature sensor hole(s) in the galvanized front panel.



Models 4130 and 4140 have an upper and a lower brick core temperature sensor.

- Step 2** Insert the brick core temperature sensor(s) through the hole(s) in the galvanized front panel. If installing a system with two sensors, be sure the one marked "upper" is installed in the upper opening and the one marked "lower" is installed in the lower opening. The sensor(s) must pass through the blanket insulation and into the brick core. Holes have not been predrilled through the insulation. Use the sensor(s) to aid in making a passageway by rotating the sensor(s) side-to-side while gently pushing inward.
- Step 3** Once the brick core sensor(s) is installed, put the screw(s) back into position in the galvanized front panel to hold the sensor(s) 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** Re-install painted front panel, using previously removed screws.



CAUTION

Risk of improper operation. Proper installation of the brick core temperature sensor(s) is critical to the operation of the Comfort Plus heating system. Read and follow installation instructions carefully.

DUCTING & AIR FLOW

For air delivery, the Comfort Plus is equipped with a variable speed supply air blower. When interfacing with a heat pump, the A-Coil **MUST** be placed on the return air side.

To maintain a room temperature of 85°F or less in the mechanical room, a 24" x 24" opening can be installed in the area or a 6" x 6" non-closing register can be cut into the return air duct. Refer to Placement and Clearance Requirements (Page 3.02) for more information.

The 4100 series is factory configured for a left-to-right or right-to-left airflow. In either airflow direction, the holes directly above the air outlet on the right side of the 4100 Series **MUST** be contained in the duct system. (See Figure 8 for reference to these air holes.)

If a down flow configuration is desired, a down flow kit must be ordered from the factory (Order Item #1301578) and the system **MUST** be raised a minimum of 10" off the ground. An 18" pedestal is available (Order Item #1301585) to elevate the Comfort Plus.

- Step 1** Unbox the supply air blower plenum assembly.
- Step 2** Remove and discard metal plate securing supply air blower to plenum assembly.
- Step 3** Locate the plenum support bracket shipped in the plenum box. Attach the bracket to the supply air side using the blunt tip screws supplied in the plenum assembly hardware package. Refer to Figure 8 for proper positioning of the plenum support bracket.
- Step 4** Attach the supply blower wiring harness located in the base of the system to the blower. Be sure to place any excess wiring in the base of the system below the radiant heat shield (Figure 8).
- Step 5** Verify that the blower is installed in the plenum with the motor facing away from the system (Figure 9).
- Step 6** Attach the supply air blower plenum to the Comfort Plus by drilling two 1/8" holes per edge and using the self tapping screws supplied in the hardware package.
- Step 7** Connect both the return air and supply air ducting systems in the structure to the Comfort Plus system. Be sure the air holes just above the air outlet on the right side are contained in the duct system. (See Figure 8 for reference to the location of these holes.)



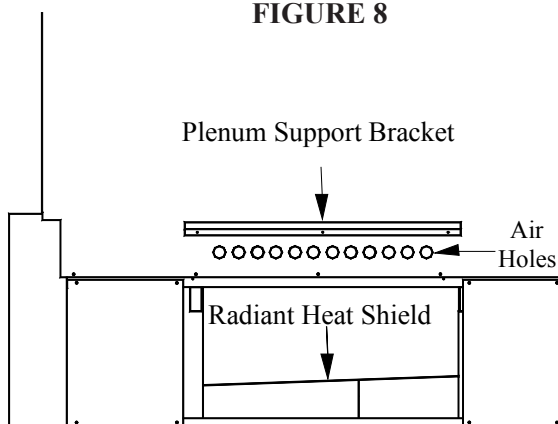
WARNING

HAZARDOUS VOLTAGE:

Risk of electric shock. Can cause injury or death.

- ♦ Do install ducting before energizing the system.
- ♦ Do **NOT** operate the Comfort Plus 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.

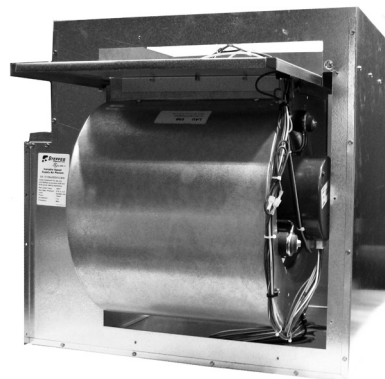
**SUPPLY AIR PLENUM ATTACHMENT
FIGURE 8**



CAUTION

When routing the harness to the supply air blower, the harness must route to the side of the air deflector in the bottom of the supply air blower housing.

FIGURE 9



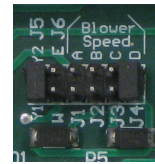
Step 8 Connect the supply air duct in the structure directly to the system's air outlet located on the top panel.

Step 9 Adjust the CFM setting at the variable speed low voltage circuit board as shown in Figure 10.

Step 10 The W/E jumper (Figure 10) **MUST** be in the ON position or the blower will not operate with an E call from the thermostat.

FIGURE 10

Jumper	½ HP Variable Speed CFM	1 HP Variable Speed CFM
A	1000	1200
B	1200	1400
C	1400	1600
D	1600	2000



External static pressure should not exceed .75 inches water column.

NOTE: With 2 stage Heat Pump, a Stage 1 heat call results in 70% of selected CFM.

AIR CONDITIONER/HEAT PUMP INTERFACE

When interfacing the Comfort Plus system with a heat pump, the indoor coil **MUST** be placed on the return side of the Comfort Plus system in a position that will provide even air flow through the coil. If using a factory supplied return air plenum, the plenum is configured to be the housing for the indoor coil. Remove the screws to the plenum's access cover and slide the coil into place inside the plenum. If not using a Steffes supplied return air plenum, the installer will need to make provisions in the plenum to accommodate the coil and air filter.

When interfacing a Comfort Plus system with an air conditioner, the indoor coil can be placed on either the supply air or the return air side of the system.

The condensate drain trap, in a heat pump or air conditioner installation, 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 (Figures 14, 15 and 16) for more information on interfacing the Comfort Plus with a heat pump or air conditioner.

LINE VOLTAGE ELECTRICAL CONNECTIONS

In standard configuration, the Comfort Plus is wired for connection to 240V, however, the element circuits can also be connected to 208V. A 208V connection derates the charging input of the system by 25%. If a system rated specifically for 208V or 277V is required, contact the factory. The controls circuit in the Comfort Plus system **MUST** be connected to 240V/208V.

The 60 amp breakers located in the electrical compartment on the Comfort Plus feed the core charging (element) circuits. The 15 amp breaker feeds the controls and blowers circuit.

If single feed to the element and blowers/control circuits is desired, the single feed kit is available to allow the system to be powered with a one, larger line voltage circuit.



All Comfort Plus systems are factory configured to be field connected to multiple line voltage circuits. If a single feed line voltage circuit is desired, an optional single feed kit is available.



WARNING

Risk of fire. Any one ducting system **MUST NOT contain more than one air handling (blower) system. If the application requires multiple Comfort Plus systems or it is necessary to have multiple air handlers share the same ductwork, you **MUST** contact Steffes Corporation. There are special installation requirements that **MUST** be performed in an application such as this.**



WARNING



HAZARDOUS VOLTAGE: Risk of electric shock. Can cause injury or death. Do not energize the system until installation is complete. Equipment **MUST be installed by a qualified technician in compliance with all applicable local, state, and national codes and regulations.**

To determine the correct wire size required for each circuit feeding the Comfort Plus, refer to the Specifications (Page A.01) and the system's identification label located on the lower left side of the system. (Reference Sample Label Figure 11.)

- Step 1** Remove the electrical panel cover.
- Step 2** Route all line voltage wires through a knockout and into the electrical panel of the Comfort Plus.
- Step 3** Make proper field wiring connections to the Comfort Plus breakers. Refer to the Line Voltage Wiring Diagrams (Pages A.06 - A.08) for more information on these connections.

SAMPLE SYSTEM IDENTIFICATION LABEL

FIGURE 11

Manufactured in U.S.A.  **STEFFES CORPORATION** Electric Central Heating Furnace 5P99  **LISTED**

Model S/N Option

Maximum Discharge Air Temperature U.S. Patents - 5201024, 5086493

Max External Static Pressure inches H₂O Canadian Patents - 2059158, 2060881

Connections Required for Multi-Circuit Feed

Control Circuit Volts Amps Hz

Min Circuit Ampacity Amps

Max Fuse or Circuit Breaker Size Amps

Charge Circuit #1 Volts Watts

Charge Circuit #2 Volts Watts

Charge Circuit #3 Volts Watts

Charge Circuit #4 Volts Watts

Connections Required for Single Circuit Feed

Volts Amps Hz

Min Circuit Ampacity Amps

Max Fuse or Circuit Breaker Size Amps

Max Amps of Motors Included in Unit

Core Blower #1 Amps HP

Core Blower #2 Amps HP

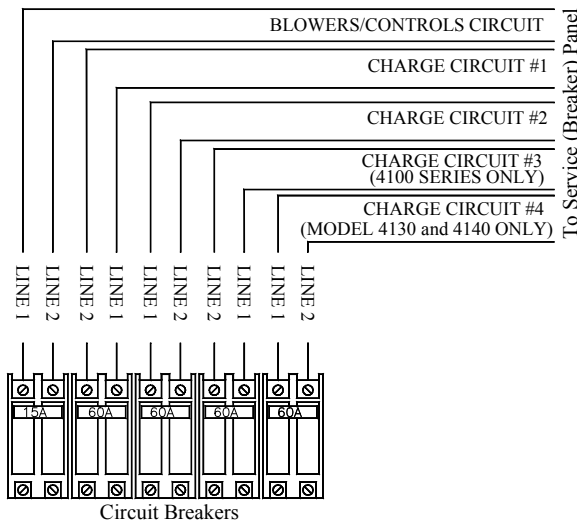
House Blower Amps HP

Unit Clearance Requirements (4100 series)

Allow three (3) inches from back and sides, six (6) inches from top of unit to combustibles, and two (2) inches from left side of unit to ducting. Allow thirty-six (36) inches front clearance to provide space for servicing. No clearances are required from ducting or to floor surfaces.

CIRCUIT PHASING CONNECTIONS

FIGURE 12



IMPORTANT

- ♦ To ensure proper operation and safety, all line voltage circuits must be segregated from low voltage wiring in the Comfort Plus.
- ♦ To reduce electro magnetic fields associated with electrical circuits and to avoid induced voltage on sensors and electronic devices, the circuit phases **MUST** be alternated as shown in Figure 12.

Full Load Current

(240VAC only - Circuit deration not included)

Model	Control Crct	Chrg Crct #1	Chrg Crct #2	Chrg Crct #3	Chrg Crct #4
4120 - 14.0kW	7.00	21.88	21.88	14.58	N/A
4120 - 19.2kW	7.00	30.00	30.00	20.00	N/A
4120 - 24.8kW	7.00	38.75	38.75	25.83	N/A
4130 - 28.8kW	7.00	30.00	30.00	30.00	30.00
4130 - 37.2kW	7.00	38.75	38.75	38.75	38.75
4140 - 38.4kW	7.00	40.00	40.00	40.00	40.00
4140 - 45.6kW	7.00	47.50	47.50	47.50	47.50



The 60 AMP breakers on the Comfort Plus are for internal component protection only. Sizing of the field wire and overcurrent protection **MUST** be in compliance with all applicable local, state, and national codes and regulations.

PEAK CONTROL CONNECTIONS

Steffes ETS heating equipment may 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.

The Comfort Plus heating system is factory configured for low voltage wire control and is set to charge when the utility peak control switch closes. Refer to the Configuration Menu (Pages 3.13-3.14) for information on configuring the system for the application.

LOW VOLTAGE (DIRECT WIRED) PEAK CONTROL

If using the low voltage peak control option, the Comfort Plus 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 the left 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 the Comfort Plus.

Step 2 Connect the field wiring to positions "RP" and "P" on the terminal block as shown in Figure 13.



To control other devices, refer to the Auxiliary Load Control on Page 3.12.

POWER LINE CARRIER (PLC) PEAK CONTROL

The Steffes Power Line Carrier (PLC) control system has the ability to communicate with the system 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 transmitter, the transmitter sends the signals to the Comfort Plus system, which receives this information and responds accordingly.

In addition to providing peak control signals, the transmitter also provides outdoor temperature information for automatic charge control, room temperature set back, 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.

TIME CLOCK MODULE PEAK CONTROL

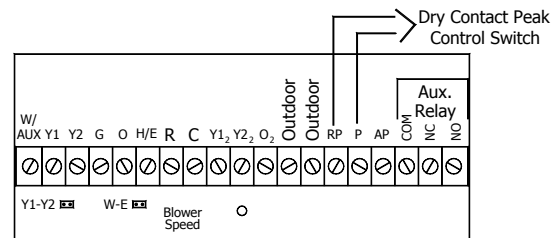
The Steffes Time Clock Module is another option for providing a peak control signal to the Comfort Plus. The optional time clock module mounts inside the line voltage electrical compartment and interfaces with the relay board via an interface cable. Peak control times **MUST** be programmed into the system 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.



IMPORTANT

Never install any wiring in a line voltage compartment of the Comfort Plus unless it is rated for line voltage.

**PEAK CONTROL
TERMINAL CONNECTIONS
FIGURE 13**



Terminal Block Coding

RP	=	Peak Control Input Common
P	=	Peak Control Input
AP	=	Anticipated Peak (Pre-Peak) Control Input
COM	=	Peak Control Output Common
NC	=	Peak Control Output (Normally Closed)
NO	=	Peak Control Output (Normally Open)

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 the system must continuously display a brick core operating mode of "C" (charge) regardless of whether it is an off-peak or on-peak period.

LOW VOLTAGE ELECTRICAL CONNECTIONS - OUTDOOR TEMPERATURE SENSOR (RECOMMENDED)

Installation Methods: A) Hard wired to system to the two "outdoor" terminals (default)
OR

B) Connected to Power Line Carrier (PLC)

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


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

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".
 - 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.

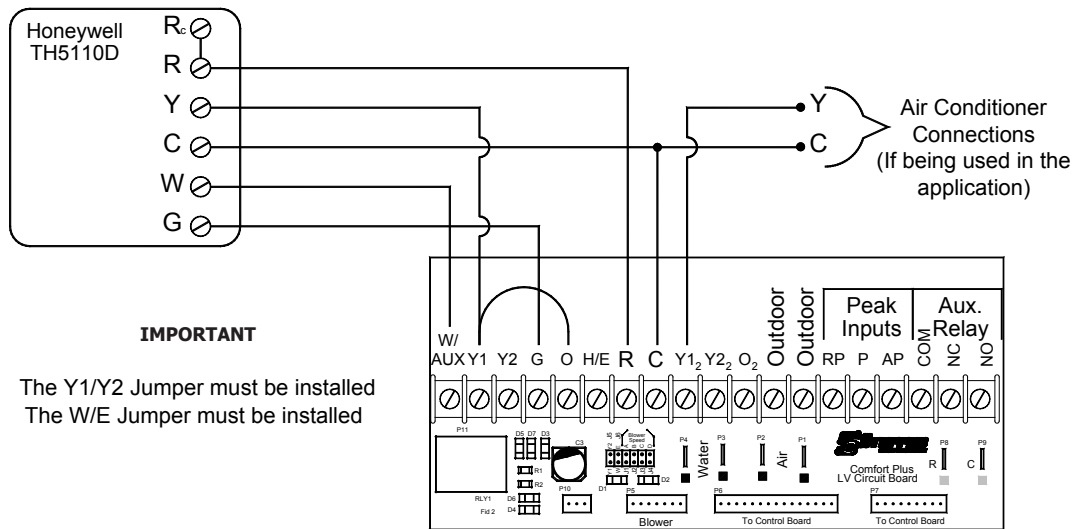
LOW VOLTAGE ELECTRICAL CONNECTIONS - ROOM THERMOSTAT

A low voltage (24VAC) room thermostat is required for room temperature control with the Comfort Plus Hydronic system. 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 the Comfort Plus system. Contact the factory for information on thermostats available from Steffes.

	IMPORTANT
Low voltage wires MUST never enter any line voltage enclosure.	

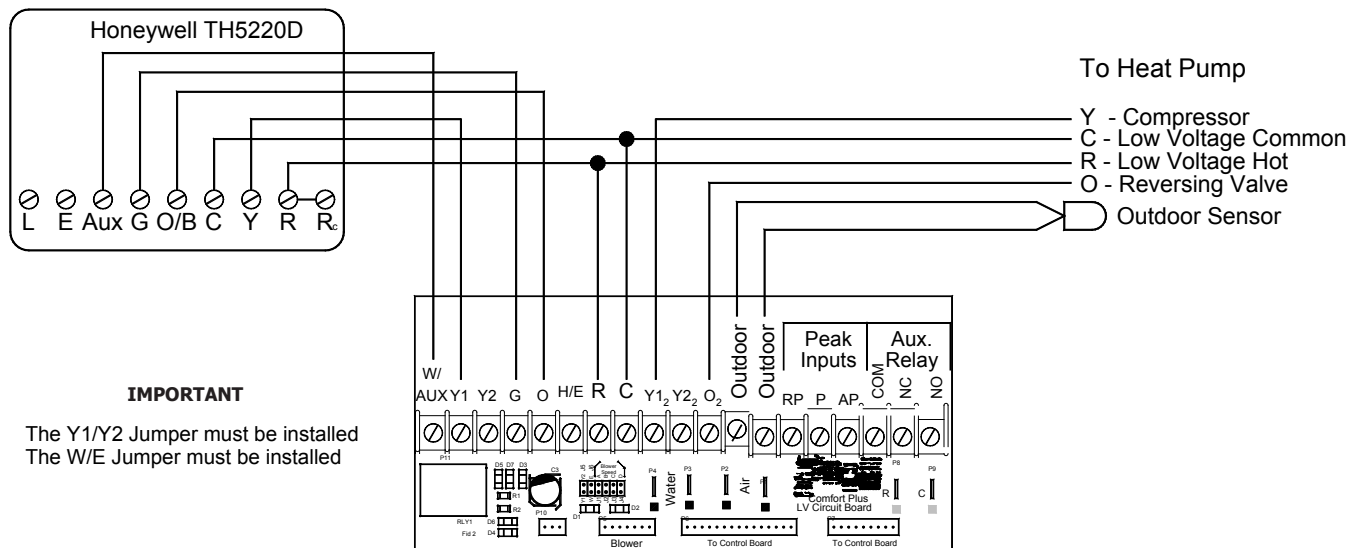
**STAND ALONE FURNACE APPLICATION WITH VARIABLE SPEED BLOWER
CONNECTIONS SHOWN FOR SINGLE STAGE HEATING / SINGLE STAGE COOLING
(UNCONTROLLED AIR CONDITIONING)**

FIGURE 14



If installing a mechanical thermostat or thermostat with anticipator, a resistor kit is required (Order Item #1190015).

**SINGLE STAGE HEAT PUMP APPLICATION WITH VARIABLE SPEED BLOWER
FIGURE 15**



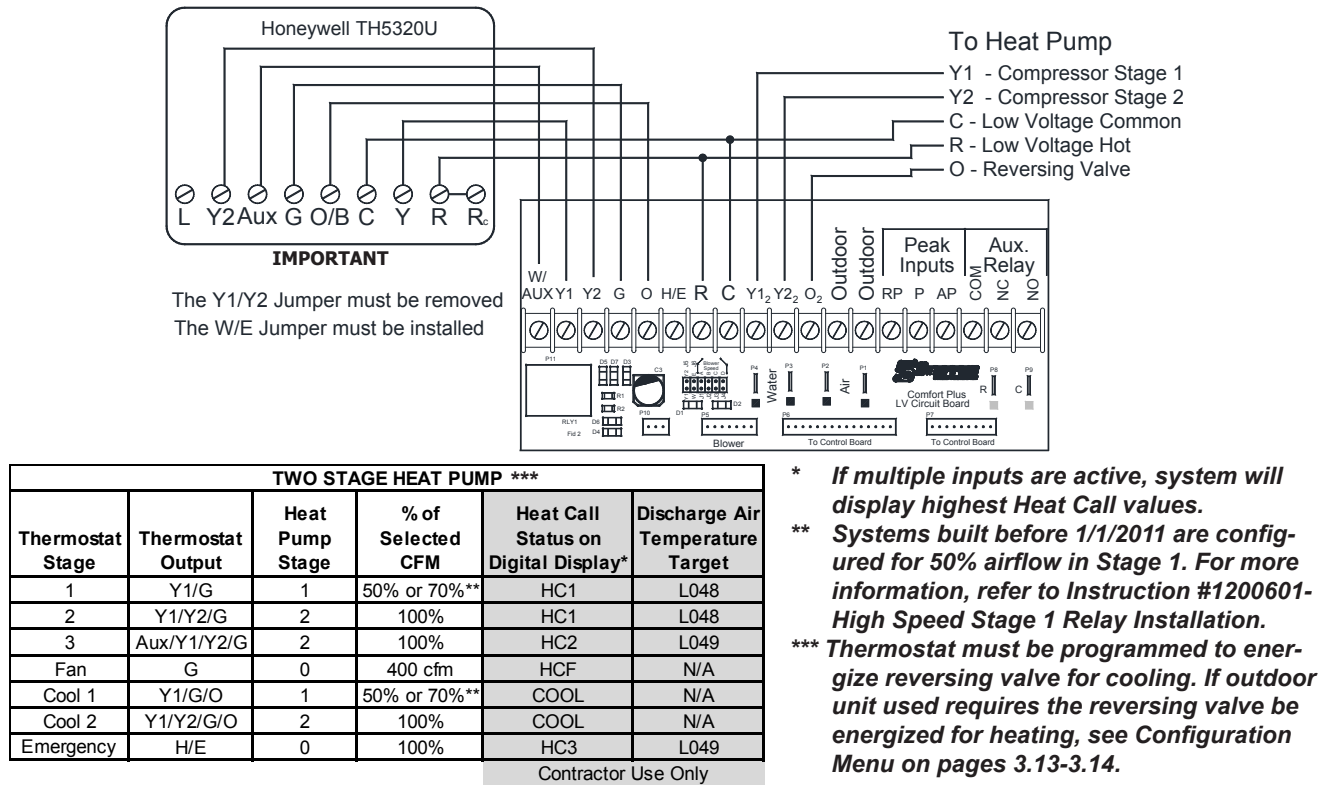
SINGLE STAGE HEAT PUMP **					
Thermostat Stage	Thermostat Output	Heat Pump Stage	% of Selected CFM	Heat Call Status on Digital Display*	Discharge Air Temperature Target
1	Y1/G	1	100%	HC1	L048
2	Aux/Y1/G	1	100%	HC2	L049
Fan	G	0	400 cfm	HCF	N/A
Cool	Y1/G/O	1	100%	COOL	N/A
Emergency	H/E	0	100%	HC3	L049
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 3.13-3.14.

TWO STAGE HEAT PUMP APPLICATION WITH VARIABLE SPEED BLOWER

FIGURE 16



AUXILIARY LOAD CONTROL

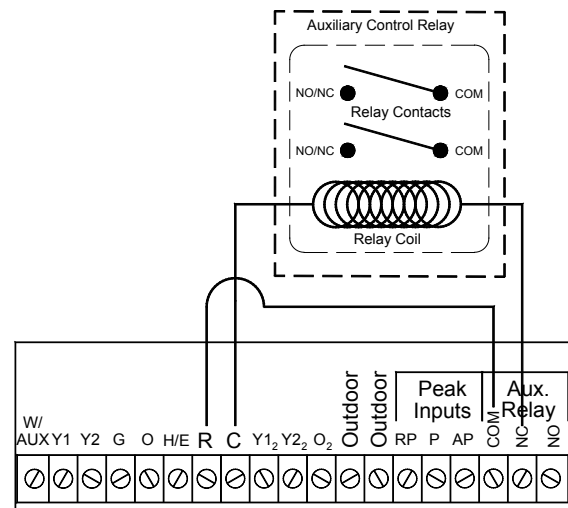
The Comfort Plus can be used to provide control signals to other loads in the application. To do so, connect low voltage control wires to the "COM" and "NC" or the "COM" and "NO" positions of the low voltage terminal block in the electrical compartment of the Comfort Plus system. (See Figure 17.) These contacts are rated for 30 volts, 3 amps maximum.

NOTE IMPORTANT

Maximum external load should not exceed 60 VA on the system's class II transformer.

TYPICAL AUXILIARY LOAD CONTROL

FIGURE 17



NOTE: During off-peak (charge) periods, the contact is closed between "COM" and "NC".

HUMIDIFIER/ELECTRONIC FILTER INSTALLATION

The Comfort Plus is capable of being connected to a humidifier and/or an electronic air filter. If installing either of these devices, connections to the Comfort Plus system are made to the bottom two relays on the base I/O relay board inside the system's electrical panel. Refer to the Line Voltage Wiring Diagrams (Page A.06-A.08) for the location of these relays.

If installing a humidifier, connect it to the "HEAT CALL" relay on the base I/O relay board. This relay closes during a heat call.

If installing an electronic air filter, connect it to the "FAN ON" relay on the base I/O relay board. This relay closes during a fan call. The maximum filter size if using a Steffes Return Air Plenum is 20" x 25" x 2.

CONFIGURATION MENU

The Steffes Comfort Plus heating system has a Configuration Menu, which allows the system 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 the system. Access to the Configuration Menu is allowed for the first two (2) minutes of operation. If the system 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 faceplate displays “CONF”.
- Step 3** Press the up arrow once and the faceplate will display “C000”. The faceplate 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.

NOTE

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.

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:

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 (Factory Default)	No Outdoor Sensor	Outdoor Sensor	No Outdoor Sensor	Outdoor Sensor	No Outdoor Sensor	Outdoor Sensor	No Outdoor Sensor
C000	5	5	6	5	6	5	6	5	6
C001	50°F	50°F	50°F	50°F	50°F	50°F	50°F	50°F	50°F
C002	10°F	10°F	10°F	10°F	10°F	10°F	10°F	10°F	10°F
C003	Match to the Channel Selected at PLC	0	0	0	0	0	0	0	0
C004	8	9	8	9	8	13	12	9	8
C005	0	1	1	0	0	0	0	0	0

- 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 the system 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 the system 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.

Configuration Number	Heat Pump		No Heat Pump
	Reversing Valve Energized for Cooling	Reversing Valve Energized for Heating	
C006	3	131	3
C007	30	30	30
C008	5°F	5°F	5°F
C009	5°F	5°F	5°F
C010	90°F	90°F	115°F
C011	70°F	70°F	70°F
C012	60°F	60°F	60°F
C013 - C021	Refer to the Time Clock Installation Instructions		

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

C006 Output Control Configuration - Configures the output controls of the Comfort Plus system. 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>
3	All 4100 Series 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 the Comfort Plus 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 Comfort Plus 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.



C008 through C009 configurations are only applicable if the Comfort Plus system 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 the system targets during a Stage 1 heat call.

C011 Currently not utilized.

C012 Currently not utilized.

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.

208V SYSTEMS ONLY:



In standard configuration, Steffes heaters are dual rated for 240V and 208V power connections. The heaters are factory configured for 240V. If the control circuit is operating on 208V power, the value in Location 28 (L028) must be changed to 5.

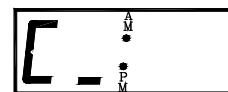
INSTALLER'S FINAL CHECK-OUT PROCEDURE



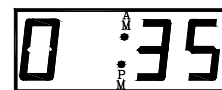
WARNING

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.

Step 1 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) for more information on the proper operating mode.



Step 2 Press the up arrow one time and verify that the outdoor temperature information displayed on the control panel is approximately the same as the current outdoor temperature. Refer to the Operating Status section (Page 1.02) for more information on the outdoor temperature display.



Step 3 Press the up arrow again and the current heat call status will be displayed on the control panel. Refer to the Operating Status section (Page 1.02) for more information on the heat call status display.



- Step 4** Initiate a heat call from the room thermostat and verify that the Comfort Plus system 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 the Comfort Plus system with an air conditioner or heat pump, verify that this device is operating appropriately.
- Step 5** Initiate a cooling call from the room thermostat, if applicable, and verify that the Comfort Plus system recognizes the "COOL" call. The supply air blower should operate. In an application interfacing the Comfort Plus system with an air conditioner or heat pump, verify that this device is operating appropriately.
- Step 6** Press the up arrow until the targeted brick core charge level is displayed on the control panel. With the system in an off-peak (charge) mode, initiate a charge control override (Page 1.03.) Once initiated, the target level of the Comfort Plus should be 100 percent and the control panel should display "tL: F". All of the elements should be energized.
- Step 7** With an amp meter, verify that the amperage of the system is correct for the installation. Refer to the System Identification Label on the Comfort Plus heating system for information regarding the proper amperage.
- Step 8** Cancel the charge control override and verify that all elements in the system de-energize. Refer to the Charge Control Override section (Page 1.03) for instructions on canceling the charge control override.
- Step 9** Verify, once again, that the Operating Mode displayed on the control panel corresponds with the power company's peak control signal.
- Step 10** 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.
- Step 11** Instruct the homeowner on how to operate their new heating system from the thermostat.
- Step 12** Complete the manufacturer's warranty card and return promptly.



Appendix

SPECIFICATIONS

Model	4120			4130		4140	
Charging Input (kW)	14.0	19.2	24.8	28.8	37.2	38.4	45.6
Single Feed: Minimum Circuit Ampacity (240V Systems) (Includes 25% Derate for Continuous Load)	81	109	138	159	203	209	247
Charging Circuits Required (240V Systems – Multiple Feed)	2 - 30AMP & 1 – 20AMP	1 - 30AMP & 2 – 40AMP	2 - 60AMP & 1 – 40AMP	4 - 40AMP	4 - 50AMP	4 - 50AMP	4 - 60AMP
Maximum Core and Supply Blower Load (240V Systems)	7 AMPS						
Element Voltage	240V Standard (208V and 277V optional as special factory order) Note: The 240V element circuits can be connected to 208V in standard configurations; however, the charging input of the system will be derated by 25%.						
Blowers/System Controls Voltage	240V/208V						
Storage Capacity kWh BTU	120 426,500			180 614,160		240 818,880	
Dimensions without ducting (W x D X H in inches)	29.2 x 44.7 x 46.6			29.2 x 44.7 x 57.6		29.2 x 44.7 x 68.6	
Duct Openings (inches) Supply Air Outlet Return Air Inlet	18 x 22.6 10.5 x 22.6***			18 x 22.6 10.5 x 22.6***		18 x 22.6 10.5 x 22.6***	
Approximate System Weight	485 lbs			565 lbs		625 lbs	
Approximate Brick Weight	1,782 lbs			2,574 lbs		3,366 lbs	
Approximate Installed Weight	2,267 lbs			3,139 lbs		3,991 lbs	
Number of Elements	8			12		16	
Number of Brick Whole Brick Half Brick	105 6			150 12		198 12	
*1/2 HP Maximum Coil Size Capacity Front Access Dimensions Inner Dimensions (W x D x H in inches)	1½ to 5 TON** 25.5 x 22 x 30 26 x 22 x 31			1½ to 5 TON** 25.5 x 22 x 30 26 x 22 x 31		1½ to 5 TON** 25.5 x 22 x 30 26 x 22 x 31	

* The return air plenum can be ordered as an optional piece with the 4100 series systems. The dimensions listed are those that the return air plenum can accommodate. For larger coils, the return air plenum must be installer supplied. If using an air conditioning or heat pump system with the Comfort Plus, the Comfort Plus does not include the indoor coil or the outdoor compressor system as standard equipment.

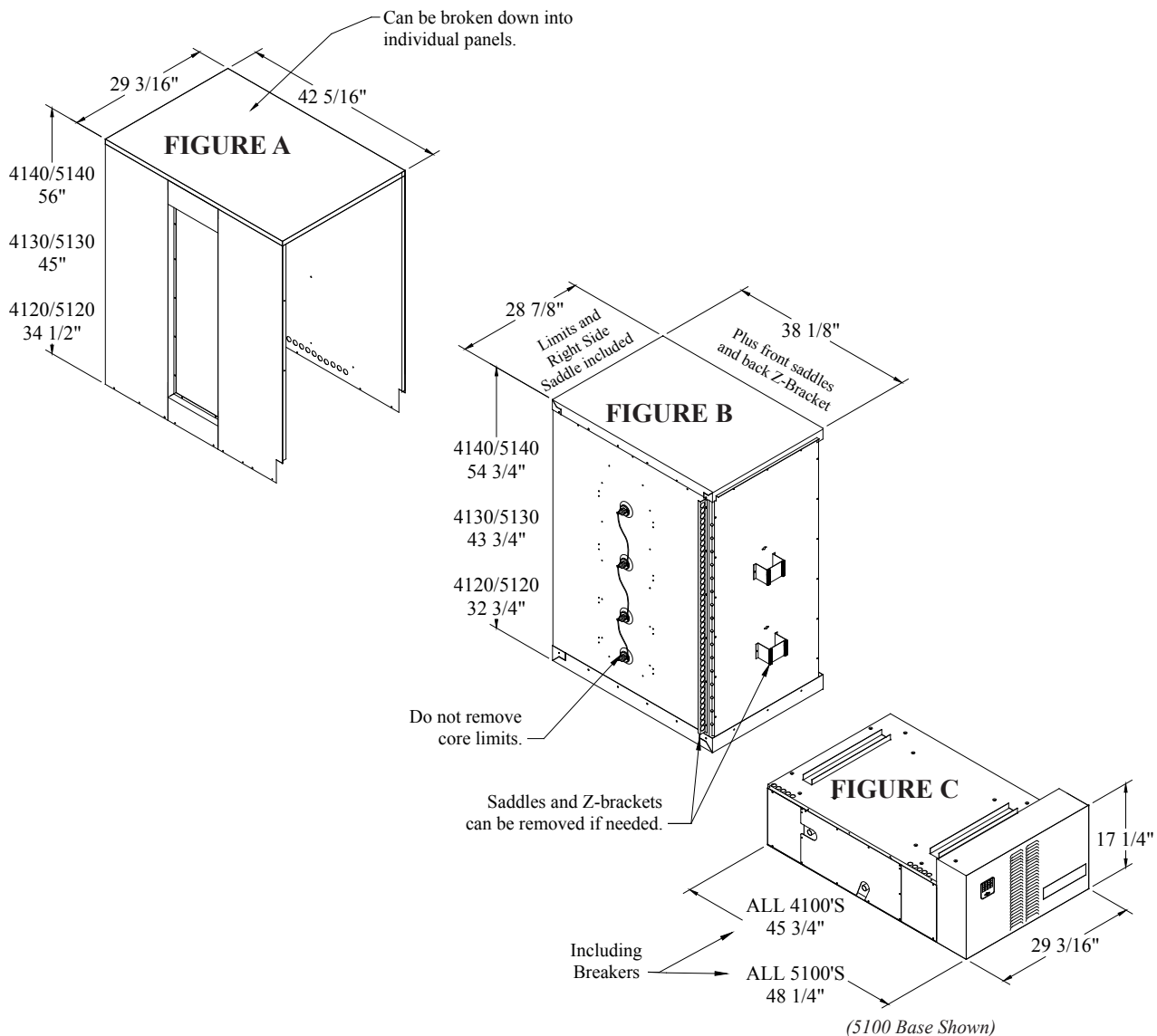
** The Comfort Plus system can accommodate most heat pump or air conditioner indoor coils provided the heat pump or air conditioner is sized in accordance to supply air delivery rates of the Comfort Plus system. Equipment modifications are required to fit larger coils.

- 1/2 HP variable speed accommodates most 1½ to 4 ton heating/cooling systems
- 3/4 or 1 HP variable speed accommodates most 3 to 5 ton heating/cooling systems

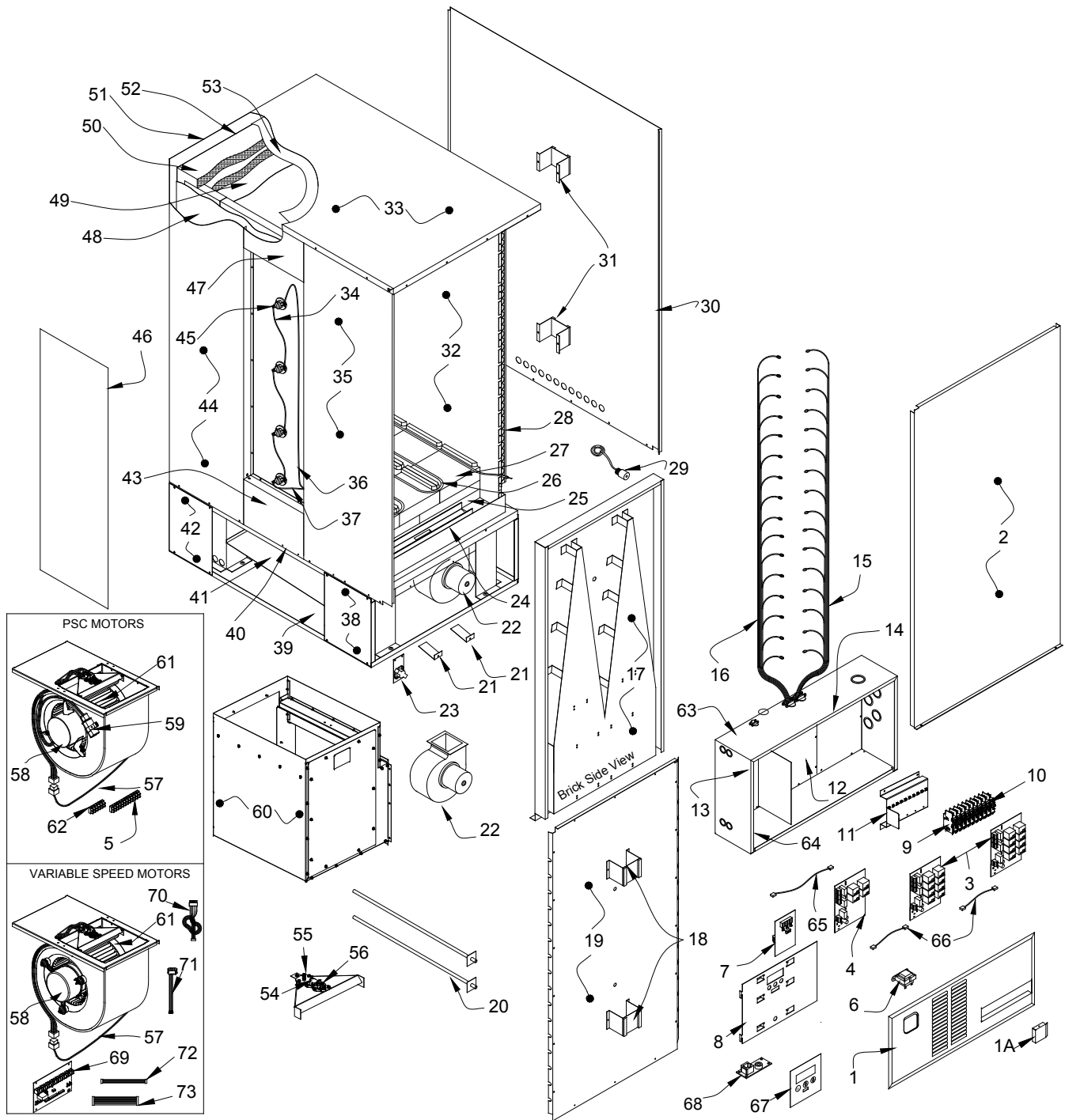
***Dimension does not include the return air plenum.

DISASSEMBLING THE COMFORT PLUS SYSTEM

- Step 1** Remove the painted front panel of the brick storage cabinet by removing the sheet metal screws along the top, bottom, and sides of the panel. Detach by pulling the bottom of the panel forward and down.
- Step 2** Remove the limit zone cover.
- Step 3** Remove the screws around the perimeter of the limit zone and around the bottom of the left side, right side, and back upper panels.
- Step 4** There are two white/blue wires which route from the limit zone through a knockout. These wires route into the electrical compartment through a romex connector. Loosen the romex connector.
- Step 5** Remove the electrical panel cover and locate the point where the white/blue wires connect to the black/yellow wires. Disconnect the white/blue wires and route them up through the romex connector.
- Step 6** Remove the one to two screws in the center of the upper right side panel. From the back of the system, lift and remove the painted panels (Figure A).
- Step 7** Locate the brick core temperature sensor(s) behind the front panel and disconnect them from their shipping position. Carefully lay the sensor(s) aside to avoid damaging them.
- Step 8** Rock the brick core (Figure B) to one side and lift top portion up and off the base (Figure C).
- Step 9** Move the Comfort Plus heating system into the desired location, reassemble, and continue with the installation instructions in this manual.



PARTS DIAGRAM



PARTS LIST



When ordering parts, please include the system model and serial numbers.

DWG. REF. NO.	DESCRIPTION	4120 ITEM NO.	4130 ITEM NO.	4140 ITEM NO.
1	Electrical Panel Cover	5940845	5940845	5940845
1A	Breaker Filler	5940846	N/A	N/A
2	Front Painted Panel	5940589	5940526	5940588
3	PCB Relay Expansion Board	1023067R	1023067R	1023067R
4	PCB Base I/O Relay Board	1023078R	1023078R	1023078R
5	Terminal Block 12 Position	1016040	1016040	1016040
6	Transformer 75VA	1017039	1017039	1017039
7	PCB Processor Control Board	1023065R	1023065R	1023065R
8	Processor Control Board Mounting Bracket	5940550	5940550	5940550
9	Breaker 15 Amp	1024000R	1024000R	1024000R
10	Breaker 60 Amp	1024002R	1024002R	1024002R
11	Breaker Standoff	5940034	5940034	5940034
12	Electrical Panel Insert Center	5940505	5940505	5940505
13	Electrical Panel Insert Left	5940504	5940504	5940504
14	Electrical Panel Insert Right	5940506	5940506	5940506
15	Harness, Breaker to Element Black	1041503	1041515	1041502
16	Harness, Relay to Element Red	1041501	1041513	1041500
17	Front Air Channel	5940515	5940521	5940514
18	Front Standoff	5940513	5940513	5940513
19	Front Galvanized Panel	5940579	5940524	5940578
20	Upper Brick Core Temperature Sensor	N/A	1041525	1041525
“	Lower Brick Core Temperature Sensor	1041525	1041525	1041525
21	Core Blower Spring	1159006	1159006	1159006
22	Core Blower	1021001R	1021001R	1021001R
23	Base Temperature Limit Switch	1012008R	1012008R	1012008R
24	Brick Tray	5940548	5940548	5940548
25	Insulation Block TR19	1052007	1052007	1052007
26	Heating Elements	*	*	*
27	Brick	5903025	5903025	5903025
28	Right Side Core	5940559	5940557	5940558
29	Outdoor Sensor – Knockout Style – 40’	1302044R	1302044R	1302044R
30	Right Side Painted Panel	5940587	5940525	5940586
31	Right Side Standoff	5940570	5940570	5940570
32	Micropore Insulation Panel	1050122	1050121	1050120
33	Top Painted Panel	5940590	5940590	5940590
34	Core Limit Jumper	1041710	1041710	1041710
35	Left Side Front Painted Panel	5940597	5940529	5940596
36	Limit Harness Top	1041504	1041505	1041505
37	Limit Harness Bottom	1041504	1041504	1041504
38	Left Side Front Base Panel	5940580	5940580	5940580

* Optional voltages are available. Contact factory with model number and serial number of the system for information.

PARTS LIST - CONTINUED



When ordering parts, please include the system model and serial numbers.

DWG. REF. NO.	DESCRIPTION	4120 ITEM NO.	4130 ITEM NO.	4140 ITEM NO.
39	Bottom Panel	5940568	5940568	5940568
40	Base Top Panel	5940566	5940566	5940566
41	Base Deflector Panel	5940502	5940502	5940502
42	Back Bottom Base Painted Panel	5940582	5940582	5940582
43	Left Side Bottom Painted Panel	5940594	5940594	5940594
44	Left Side Back Painted Panel	5940599	5940530	5940598
45	Core Limit Switch 290D	1012019R	1012019R	1012019R
46	Limit Zone Painted Cover	5940585	5940527	5940591
47	Left Side Top Painted Panel	5940584	5940584	5940584
48	Left Side Core Panel	5940561	5940565	5940560
49	Insulation Blanket Inner	1054130	1054134	1054140
50	Insulation Blanket Outer	1054132	1054136	1054142
51	Back Painted Panel	5940593	5940528	5940592
52	Galvanized Core Panel Back	5940563	5940567	5940562
53	Galvanized Core Panel Top	5940564	5940564	5940564
54	Core Blower Limit Switch 160D	1012008R	1012008R	1012008R
55	Discharge Air Sensor	1041536R	1041536R	1041536R
56	Supply Air Blower Limit Switch 190D	1012026R	1012026R	1012026R
57	Supply Air Blower Wiring Harness	1011701	1011701	1011701
58	PSC Motors with Capacitor			
“	Supply Air Blower ½ HP 1075 RMP	1040086	1040086	1040086
“	Supply Air Blower ¾ HP 1075 RMP	1040091	1040091	1040091
“	Variable Speed Motors			
“	Supply Air Blower ½ HP (Variable Speed)	1020007R	1020007R	1020007R
“	Supply Air Blower ¾ or 1 HP (Variable Speed)	1020014R	1020014R	1020014R
59	Supply Air Blower Capacitor	1018006R	1018006R	1018006R
60	Plenum Assembly	1022009	1022009	1022009
61	Blower Wheel	1021000	1021000	1021000
62	Terminal Block 6 Position	1016041	1016041	1016041
63	Electrical Panel, Main Body	5940556	5940556	5940556
64	Electrical Panel, Bottom	5940554	5940554	5940554
65	Interface Cable, 18”	1010014R	1010014R	1010014R
66	Interface Cable, 12”	1010012R	1010012R	1010012R
67	Faceplate Label	1159029	1159029	1159029
68	Time Clock Module (optional)	1301014	1301014	1301014
69	PCB ECM Motor Interface Variable Speed	1023082	1023082	1023082
70	Harness Motor ECM Low Voltage	1011703	1011703	1011703
71	Harness Line Voltage Variable Speed	1011702	1011702	1011702
72	Harness Process Output Variable Speed 9 Pin	1011705	1011705	1011705
73	Harness Process Input Variable Speed 15 Pin	1011704	1011704	1011704

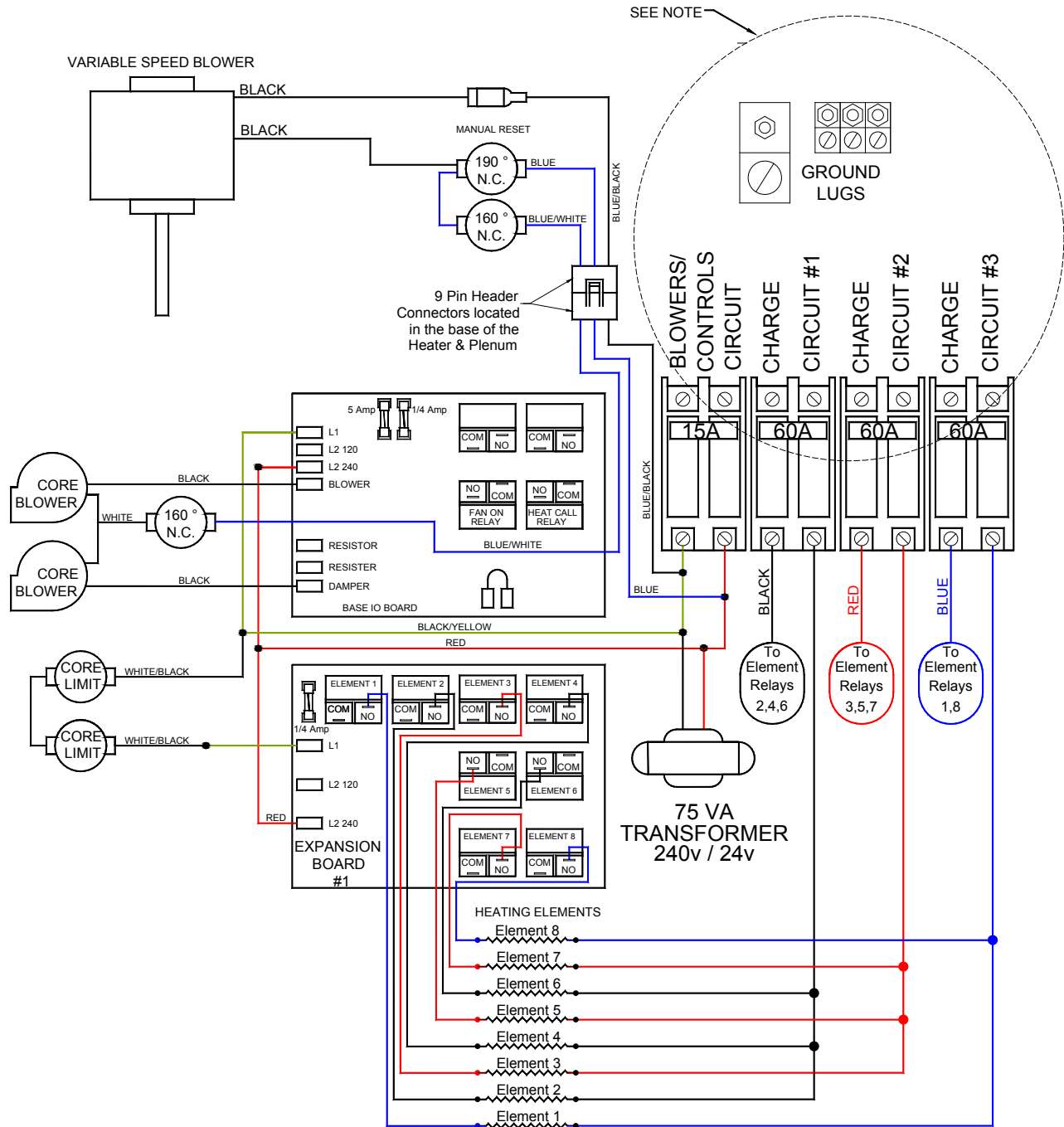
INTERNAL SYSTEM WIRING DIAGRAMS - LINE VOLTAGE

Line Voltage Wiring Diagram - Model 4120

240V OR 208V SYSTEMS ONLY



Use copper or aluminum conductors rated for 75°C or higher for field connection of this device.



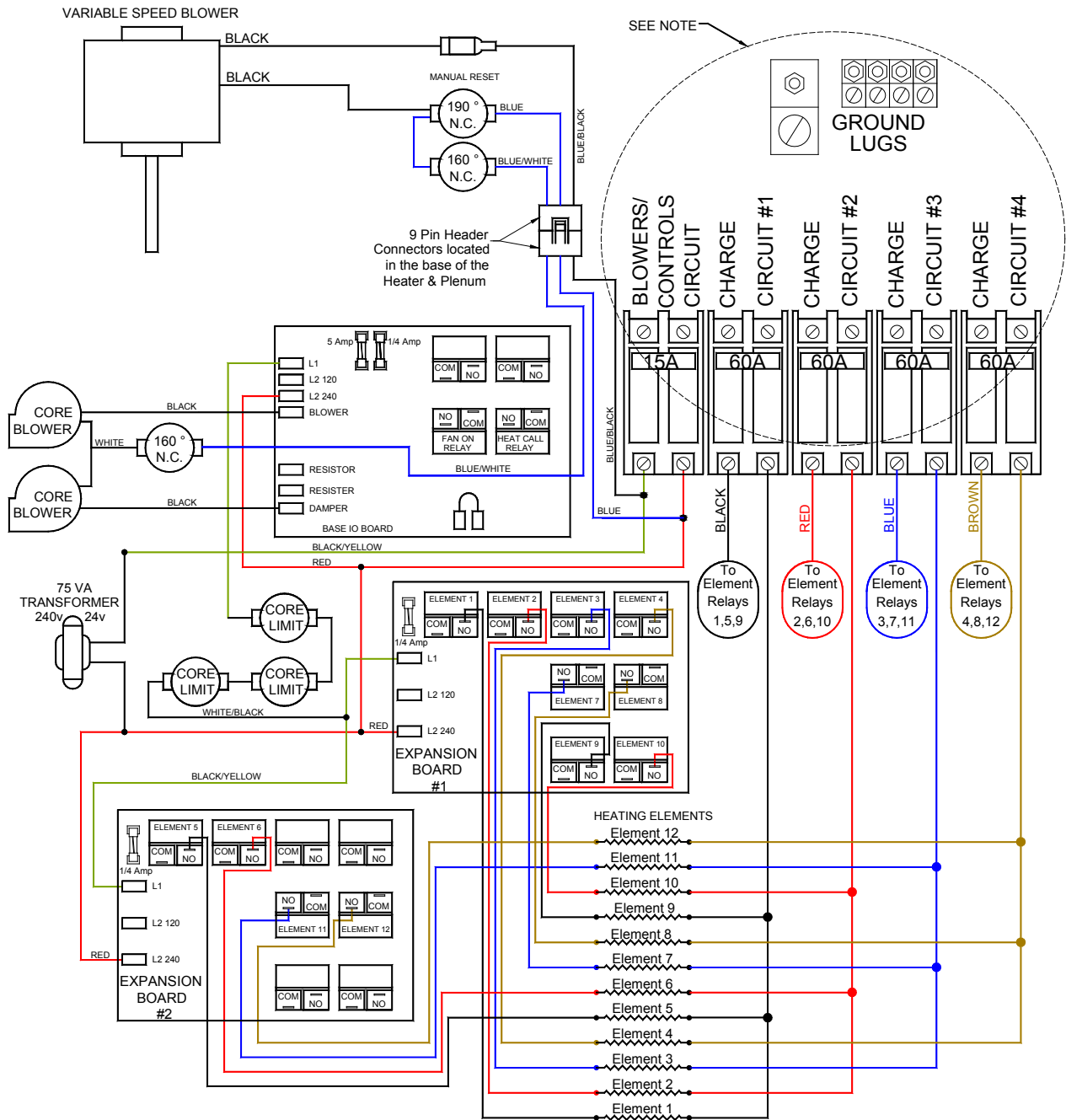
NOTE: Line Voltage Field Wiring Connections - See Figure 12 for information on circuit phasing connections.

Line Voltage Wiring Diagram - Model 4130

240V OR 208V SYSTEMS ONLY



Use copper or aluminum conductors rated for 75°C or higher for field connection of this device.



NOTE: Line Voltage Field Wiring Connections - See Figure 12 for information on circuit phasing connections.

240V OR 208V SYSTEMS ONLY



INTERNAL SYSTEM WIRING DIAGRAM - LOW VOLTAGE

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

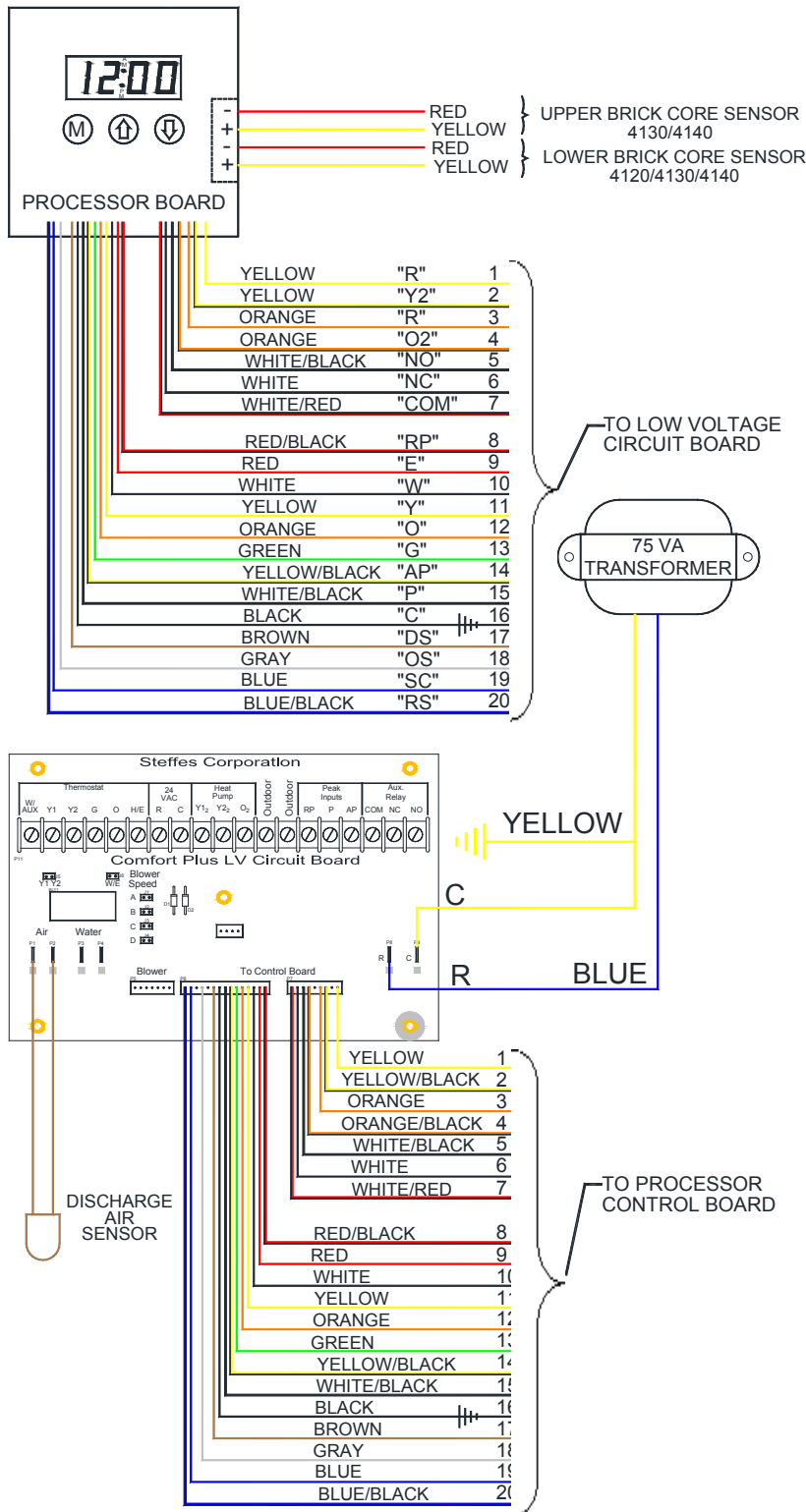


The "R" and "C" positions in the low voltage terminal strip may be used as a source of 24 VAC for powering external low voltage devices (60 VA maximum).



WARNING

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



HELP MENU

The Comfort Plus contains a Help Menu which may be accessed through the control panel. To access the Help Menu, press and release the **M** button until the faceplate displays "HELP". Scroll through the menu by pressing either the up or the down arrow button.

Display

<u>Reading</u>	<u>Description</u>
Fxxx	Firmware Version Number - Indicates the version of software installed.
O xx	Outdoor Temperature - Indicates current outdoor temperature as recognized by the system.
tL:xx	Target Level - Indicates the percentage of brick core charge level the system 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 Active - Indicates the total number of heating elements currently energized.
PC x	Power Line Carrier Channel - Indicates the channel on which the system 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 the system from the PLC transmitter system.
PS x	Indicates which Specialty Timer the system 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 amount of input being dissipated by the system.
A_xx	Target Discharge Air Temperature - Indicates the discharge air temperature that the system 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

The Comfort Plus 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 faceplate. 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 faceplate as "Er—" (i.e., Er05).

<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.
02	The upper core (Core B) thermocouple temperature is out of normal range. This can be caused by an open, shorted, or otherwise defective thermocouple or a circuit board which is out of calibration.
03	Room 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.
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.



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 techni-

<u>Error Code</u>	<u>Description</u>
05	Outdoor sensor (direct wired) 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 L035.
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.
08-09	Currently not utilized.
10	Discharge air temperature has exceeded maximum standard operating temperatures.
11-19	Contact a qualified service technician.
20	There is no communication occurring between the Base I/O board and the processor control board. This can be caused by a defective board interface cable or an unresponsive Base I/O board.
21	There is no communication occurring with the first relay expansion board. The interface cable may be defective or the first expansion board may be unresponsive.
22	There is no communication occurring with the second relay expansion board. The interface cable may be defective or the second expansion board may be unresponsive.
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.
25	Power line carrier system is active; however, no good data has been received.
26	Insufficient main control board memory. Contact a qualified service technician.
27	Insufficient permanent memory. Contact a qualified service technician.
28	Permanent memory change has been made. Press the M button to accept. This error message indicates a change has been made to the software program; therefore, it is important to verify that all location settings are correct for the application.
29	On-board communication system is not fully operable. Contact a qualified service technician.
30	Base I/O control board is in test mode. Check the jumper configuration on the circuit board.
31	Relay expansion board(s) are in test mode. Check the jumper configuration.
39	Indicates the value in Configuration 2 (C002) has been set to a value greater than the value in Configuration 1 (C001). The system will not charge until the value in C002 is set lower than C001.
40	Press and release the M button to clear the error. If the error code reappears, contact a qualified service technician.
41-44	Contact a qualified service technician.
Cold Core	The brick core temperature is below 40 degrees or the core sensing thermocouple may be open.
Core Fail	Core high limit switch may be open.
PLC Fail	The system 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.

Automatic Charge Control ~ Method of brick core charge regulation where a sensor monitors outdoor temperature to automatically adjust the brick core temperature. Indicated by an "A" on the system display.

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 faceplate 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 the system which 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. (The system will provide heat to satisfy comfort requirements during this time as well as 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. (The system 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 the Comfort Plus for automatic charge control.

Room Temperature Set Point ~ The targeted room temperature the system is to maintain. If the room thermostat senses a temperature below this point, the heater's blower will come on and extract heat from the brick core.



Warranty

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

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



3050 Hwy 22 North • Dickinson, ND 58601-9413 • www.steffes.com