4100 SERIES INSTALL GUIDE COMFORT PLUS FORCED AIR HEATING SYSTEMS

Models: 4120, 4130, & 4140

1 PERSONAL SAFETY INSTRUCTIONS

SAFETY ALERT SYMBOLS

Electrical

Mechanical

Fire

Hot Surface

Heavy Lifting

Explosion

SIGNAL WORDS

Carefully read and understand the instructions before you continue. Signal words that appear next to safety alert symbols are:

- **DANGER:** Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
- **WARNING:** Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
- **CAUTION:** Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

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 attempting to assemble, install, operate, maintain or repair this product. Upon unpackaging of the system, inspect all parts for damage prior to installation and start-up.
- 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.
- 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 the construction phase may contaminate the duct system and/or internal areas of the heating system. This may cause poor indoor air quality issues and/or improper system operation once the home is completed. A suitable alternative heating system should be used during the construction phase.
- **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.

  After the heating system is installed, Steffes disclaims any responsibility or liability for mold/mildew growth and/or any damages caused by either. 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.

2 SAFETY PRECAUTIONS

1. Install all ceramic heat storage bricks before energizing the system. Failure to do so can result in equipment damage.
2. Keep combustible materials away from this system. Storing explosive or flammable materials near this heating system can result in an explosion or fire.
3. Follow all placement and clearance requirements as specified in this Install Guide.
4. Make sure nothing is placed or stored on top of this system.
5. Disconnect power to all circuits before servicing as this system can be connected to more than one branch circuit.
6. Installation of and/or service to this system should be performed by a qualified technician in compliance with information contained herein and with local, state, and national codes and requirements.
7. A repeated message display 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.

3 SHIPPING AND PACKAGING

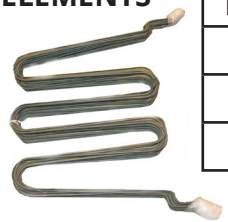
The Comfort Plus heating system should always be transported in an upright position to avoid damage to internal components and insulation materials. The information below describes the items shipped with each system:

CAUTION

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

① INFORMATION PACKAGE

② HEATING ELEMENTS



Model	Elements
4120	8
4130	12
4140	16

③ ELEMENT SCREW KIT

(shipped inside the electrical panel)

④ OUTDOOR TEMPERATURE SENSOR

(shipped inside the electrical panel)

⑤ SUPPLY AIR BLOWER ASSEMBLY

(ordered and shipped separately)

⑥ CERAMIC BRICK

(shipped separately)

Model	Full Brick	Half Brick
4120	105	6
4130	150	12
4140	198	12

4 PLACEMENT AND CLEARANCE REQUIREMENTS

The physical dimensions (Figure 1) of the heating system along with the clearances required (Figure 2) MUST be taken into consideration when choosing its location within a structure.

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°F/29°C.

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 system to minimize heat build-up in the room. This register must be installed in a manner that ensures the air drawn into the heating system passes through the filter first (see Figure 1).

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

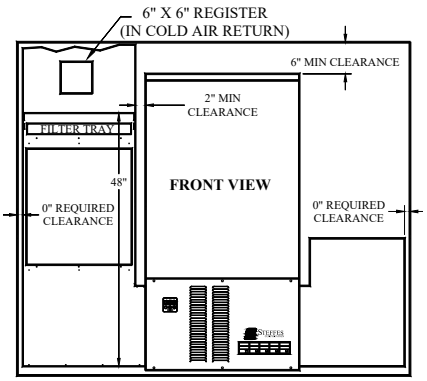
WARNING

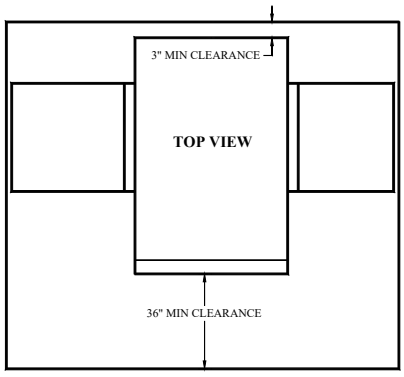
Risk of fire. Can cause injury or death.

- **Violation of the clearance requirements 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/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 the system after install may result in equipment damage. Do NOT move system from original installed location.**

NOTE: Special requirements need to 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" stand (Order Item #1301585) is available to elevate the system.

FIGURE 2
REQUIRED CLEARANCES



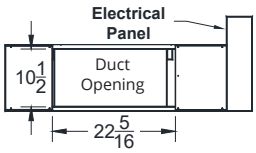


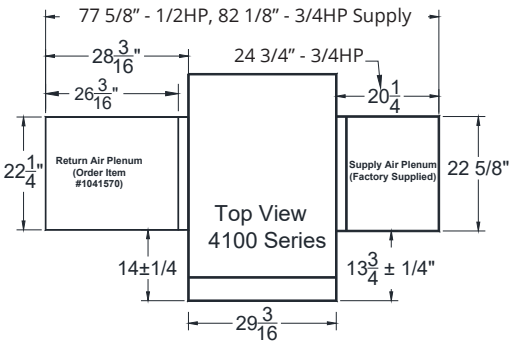
CLEARANCE REQUIREMENTS

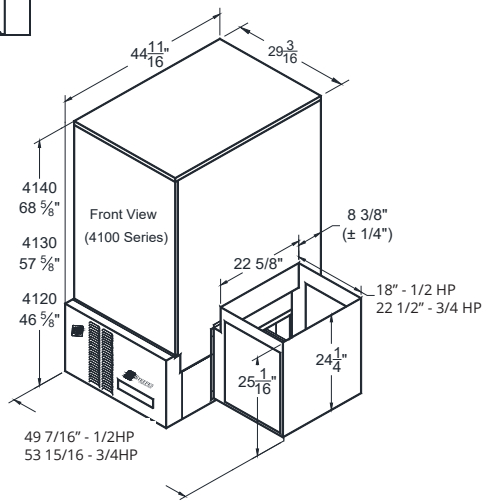
Three inches (3") from back, six inches (6") from top, and two inches (2") from left side to ducting. Allow thirty-six inches (36") from front for servicing. No clearances are required from ducting, right side to ducting, or to floor surfaces. Combustible materials must remain at least three inches (3") from sides, front, and back.

NOTE: Clearance requirements do NOT account for required working space for electrical connections.

FIGURE 1
DIMENSIONS







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

5 INITIAL SETUP

1. Remove the Information Package from the outside of the shipping box and unpackage the Comfort Plus heating system.
2. Move the system into its installation location. The system fits through a 30" doorway (minimum) without disassembling. If it is necessary to disassemble, refer to the disassembly instructions on page 13.
3. Once in place, adjust leveling legs on the bottom of the system to prevent rocking. If not placed properly the system may bend or twist during brick loading, making element and brick core temperature sensor installation difficult.
4. 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.
5. Locate the element wiring harnesses and brick core temperature sensor(s) behind the front panel and disconnect from the shipping position. Carefully position to avoid damage during brick loading.
   NOTE: Models 4130 and 4140 have two brick core temperature sensors.
6. Remove the galvanized front panel and set it aside.
7. Carefully lift the two insulation blankets, one at a time starting at the bottom, and drape them over the top of the system.
   NOTE: Use face mask, gloves, and long sleeved garments when handling insulation materials in compliance with generally accepted safety practices.
8. Remove the front air channel and set aside.

IMPORTANT

To ensure proper operation, 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.**

6 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.

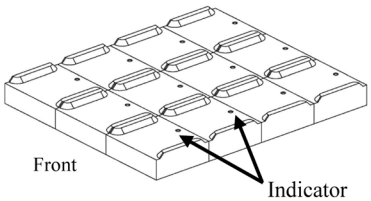
BRICK INSTALLATION TIPS:

- 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 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.

WARNING

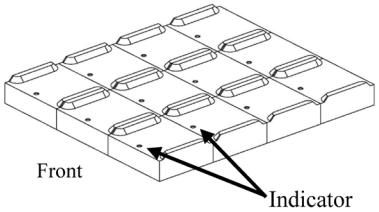
Risk of fire. Can cause personal injury or death. DO NOT operate the system if damage to the insulation panel(s) on the inner sides of the brick core occurs.

FIGURE 4



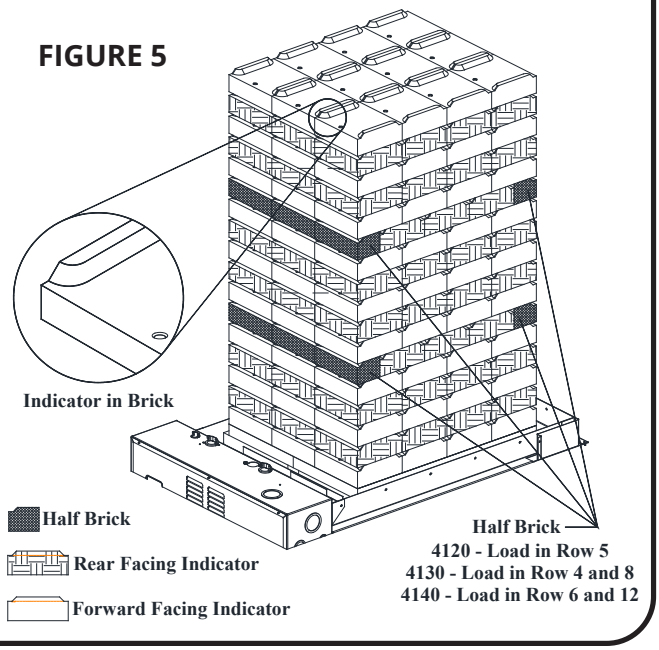
i.e.: Rows 2, 4, 6, 8, 10 and 12 in 4140

FIGURE 3



i.e.: Rows 1, 3, 5, 7, 9, and 11 in 4140

FIGURE 5



7 HEATING ELEMENT AND AIR CHANNEL INSTALLATION

1. After all bricks 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. Elements MUST be installed with the threaded screw tabs on the wire connection terminals pointing forward and down to ease the installation of the element-to-wiring harness. Note the required clearance (Figure 6.)
2. Install the front air channel by placing the bottom in first, with the air deflectors (arrow shaped pieces) facing inward. Refer to the Air Channel Placement (Figure 7) for proper placement and installation of the front air channel.
3. Lower the insulation blankets back into position, one at a time. Carefully tuck the sides of this insulation into the edges, corners, and around the exposed portions of the heating elements to ensure maximum efficiency.
4. Reinstall the galvanized front panel by sliding the bottom of the panel inside the lower lip of the brick cavity and resting the top of the panel on the outside of the brick cavity. Secure it to the system using the screws that were originally removed.

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.**

5. Remove the painted front panel of the electrical compartment by removing the screws along the edges. Locate the installation hardware package that is shipped in this compartment.
6. Carefully route element wiring harnesses and connect them to the heating elements, using the screws provided in the hardware package. Connections should be made with the screw heads up and the threads pointing down. Element screws should be tightened to 30 inch lbs. Refer to Figure 6 for proper positioning.

FIGURE 6
ELEMENT INSTALLATION

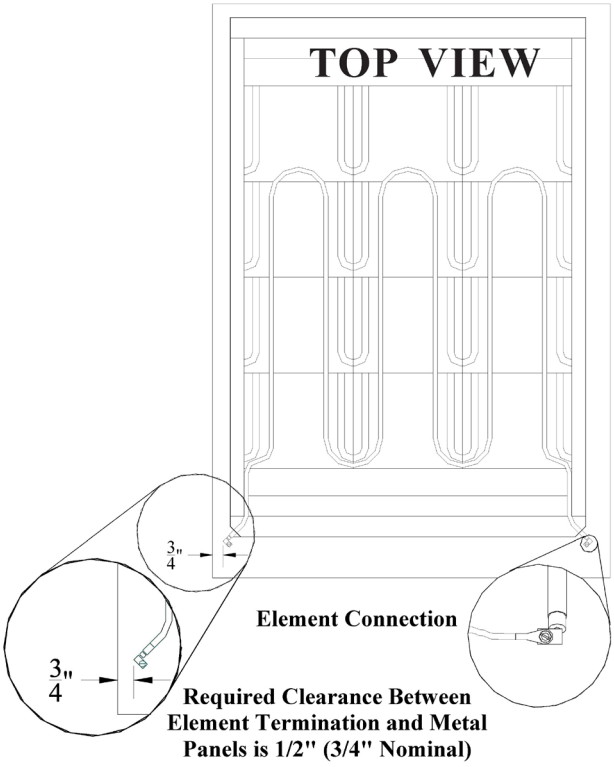
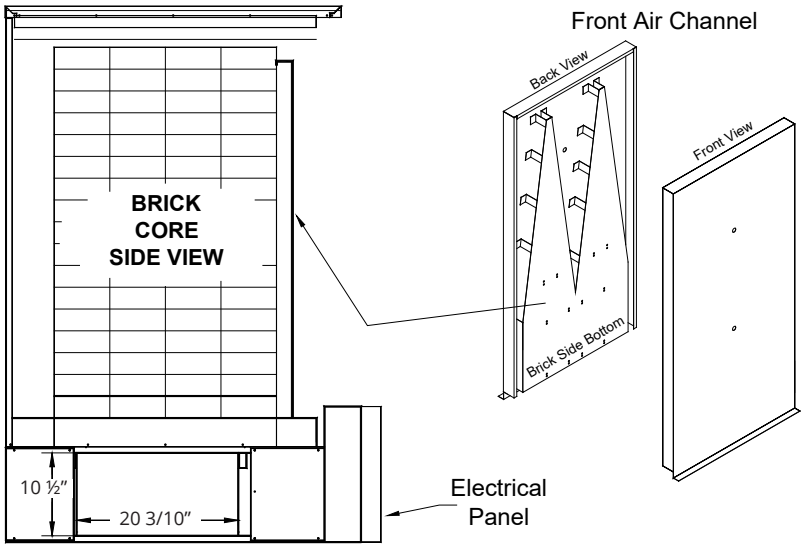


FIGURE 7
AIR CHANNEL PLACEMENT



8 BRICK CORE SENSOR INSTALLATION

1. Remove the screw(s) around the brick core sensor hole(s) in the galvanized front panel.
   NOTE: Models 4130 and 4140 have an upper and a lower brick core sensor.
2. Insert the brick core sensor(s) through the hole(s) in the galvanized front panel.
   NOTES:
   - ***If installing a system with two sensors, install the one marked "upper" in the upper position and the one marked "lower" in the lower position***
   - ***Sensor(s) must pass through the blanket insulation, into the brick core.***
   - ***Holes are not pre-drilled through the insulation.***
   - ***Sensor(s) can aid in making a passageway by rotating the sensor(s) side-to-side while gently pushing inward***
3. Use the screws to secure the sensor(s) in place and provide the electrical ground.
4. Verify the non-insulated element terminations do not come within 1/2" of any surface area on the system.
5. Reinstall the painted front panel, using the previously removed screws.

CAUTION

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

9 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.

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. There are special installation requirements that MUST be performed in an application such as this.

10 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 / 29° C 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) 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.)

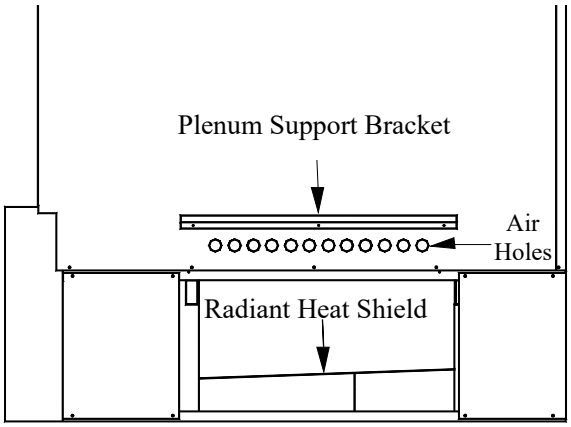
If a down flow configuration is desired, a down flow kit must be ordered from the factory (Order Item #1301578) and the system MUST be raised a minimum of 10" off the ground. An 18" pedestal is available (Order Item #1301585) to elevate the Comfort Plus.

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.**

FIGURE 8
SUPPLY AIR PLENUM ATTACHMENT

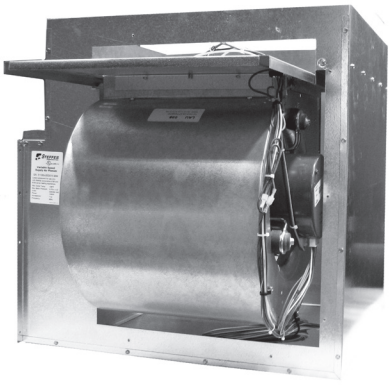


1. Unbox the supply air blower plenum assembly.
2. Remove and discard metal plate securing supply air blower to plenum assembly.
3. Locate the plenum support bracket shipped in the plenum box. Attach the bracket to the supply air side using the blunt tip screws supplied. Refer to Figure 8 for proper positioning of the plenum support bracket.
4. Attach the supply blower wiring harness located in the base of the system to the blower. Place any excess wiring in the base of the system below the radiant heat shield (Figure 8).
5. Verify that the blower is installed in the plenum with the motor facing away from the system (Figure 9).
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.
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.)
8. Connect the supply air duct in the structure directly to the system's air outlet located on the top panel.
9. Adjust the CFM setting at the variable speed low voltage circuit board as shown in Figure 10.
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.

CAUTION

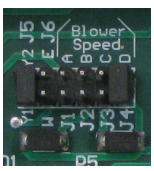
When routing the harness to the supply air blower, the harness must route to the side of the air deflector in the bottom of the supply air blower housing.

FIGURE 9



Jumper	½ HP Variable Speed CFM	¾ HP Variable Speed CFM
A	1000	1200
B	1200	1400
C	1400	1600
D	1600	2000

FIGURE 10



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

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

11 LINE VOLTAGE ELECTRICAL CONNECTIONS

In standard configuration, the system 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 is required, contact the factory. The controls circuit MUST be connected to 240V/208V.

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

To determine the correct wire size required for each circuit feeding the system, refer to the identification label (Figure 11) located on the lower left side of the system.

1. Route all line voltage wires through a knockout and into the electrical panel.
2. Make proper field wiring connections to the system's breakers. Refer to the Line Voltage Wiring Diagrams on the electrical panel cover for more information on these connections.

WARNING

HAZARDOUS VOLTAGE: Risk of electric shock. Can cause injury or death. System contains oversized protective earthing (grounding) terminal, which shall be properly connected.

- **Equipment must be installed by a qualified technician in compliance with all applicable local, state, and national codes and regulations.**
- **To ensure proper operation and safety, all line voltage circuits must be segregated from low voltage wiring in the Comfort Plus.**
- **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 Figure 12.**
- **DO NOT energize the system until installation is complete.**

FIGURE 11
SAMPLE SYSTEM IDENTIFICATION LABEL

STEFFES
Manufactured in U.S.A.

Electric Central Heating Furnace 5P99

c UL us LISTED

Model 1 S/N 2 Option 3

Maximum Discharge Air Temperature 4

Maximum External Static Pressure 5 in H_2O

U.S. Patents – 5201024, 5086493

Canadian Patents – 2059158, 2060881

Connections Required for Multi-Circuit Feed

Control Circuit	6	Volts	7	Amps	
Min Circuit Ampacity	8	Amps	9	Hz	
Max Fuse Size	10	Amps			
Charge Circuit #1	11	Volts	12	Watts	
Charge Circuit #2	13	Volts	14	Watts	
Charge Circuit #3	15	Volts	16	Watts	
Charge Circuit #4	17	Volts	18	Watts	

Connections Required for Single Circuit Feed
Short-circuit current: 5kA rms symmetrical, 240V

25 Volts 26 Amps 27 Hz

Min Circuit Ampacity 28 Amps

Max Fuse Size 29 Amps

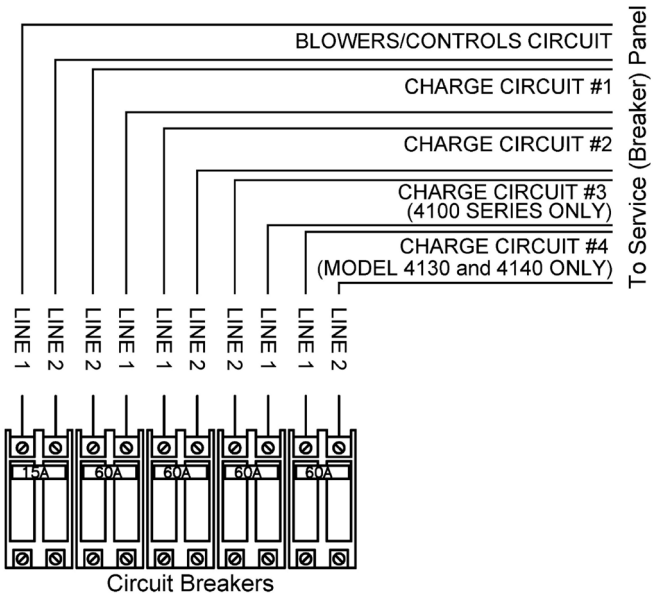
Max Amps of Motors

Core Blower #1	19	Amps	20	HP
Core Blower #2	21	Amps	22	HP
House Blower	23	Amps	24	HP

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.

Label 1200503 Rev 3

FIGURE 12
CIRCUIT PHASING CONNECTIONS



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.

12 LOW VOLTAGE ELECTRICAL CONNECTIONS - PEAK CONTROL

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 control. 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

Low voltage wires MUST never enter any line voltage enclosure.

The Comfort Plus system is factory configured for low voltage peak control and is set to charge when the utility peak control switch closes. Refer to the Configuration Menu (Pages 14-15) for information on configuring the system for the application.

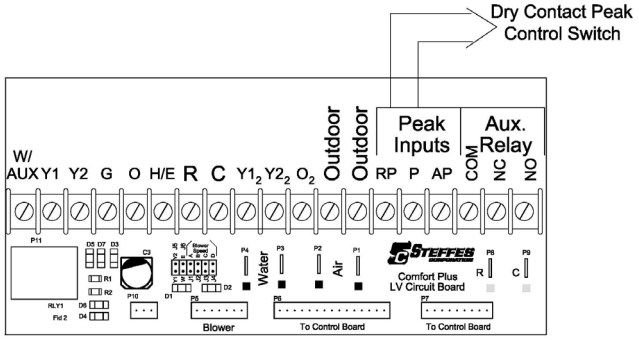
LOW VOLTAGE (HARD WIRED) PEAK CONTROL

Low voltage peak control is direct wired from the power company's peak control switch to the Comfort Plus. 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 the electrical panel.

1. Route a low voltage circuit from the power company's load control or peak signaling device to the low voltage terminal block inside the electrical compartment through one of the low voltage wire knockouts.
2. Connect the field wiring to positions "RP" and "P". See Figure 13.

NOTE: To control other devices, refer to Auxilary Load Control on page 12.

FIGURE 13
PEAK CONTROL TERMINAL CONNECTIONS



Low Voltage 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)

POWER LINE CARRIER (PLC) PEAK CONTROL

The Steffes Power Line Carrier (PLC) control has the ability to communicate with the heating system through the existing electrical circuits in the structure. If connecting to the Steffes PLC control, follow the installation instructions included with the PLC control.

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

The PLC control is optional and must be ordered separately.

TIME CLOCK MODULE PEAK CONTROL

The Steffes Time Clock Module is an option for providing a peak control signal to the heating system. It mounts inside the system's low voltage electrical compartment and interfaces with the relay expansion 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.

LINE VOLTAGE PEAK CONTROL

With line voltage control, the control 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 faceplate 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.

13 LOW VOLTAGE ELECTRICAL CONNECTIONS - OUTDOOR TEMPERATURE SENSOR (REQUIRED)

Installation Methods: **A)** Hard wired to system to the two "Outdoor" terminals (default)

OR

B) Connected to Power Line Carrier (PLC) Control

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.

Location: 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 abnormal temperature conditions.

Wiring:

- Route low voltage wire from the outdoor sensor to the electrical compartment through one of the low voltage wire knockouts.
- Connect to "Outdoor" terminals as shown in Figure 15.
- 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

Outdoor sensor wire MUST NEVER be combined with other control wiring in a multi-conductor cable.

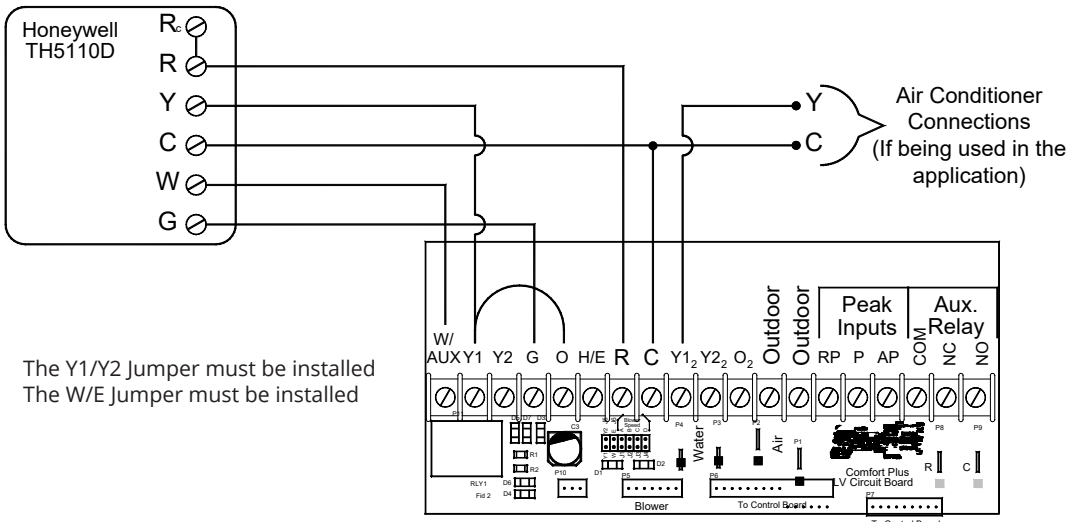
14 LOW VOLTAGE ELECTRICAL CONNECTIONS - ROOM THERMOSTAT

A low voltage (24VAC) room thermostat is required for room temperature control with the Comfort Plus 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.

HEAT PUMP APPLICATIONS ONLY: 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 14-15.

FIGURE 14

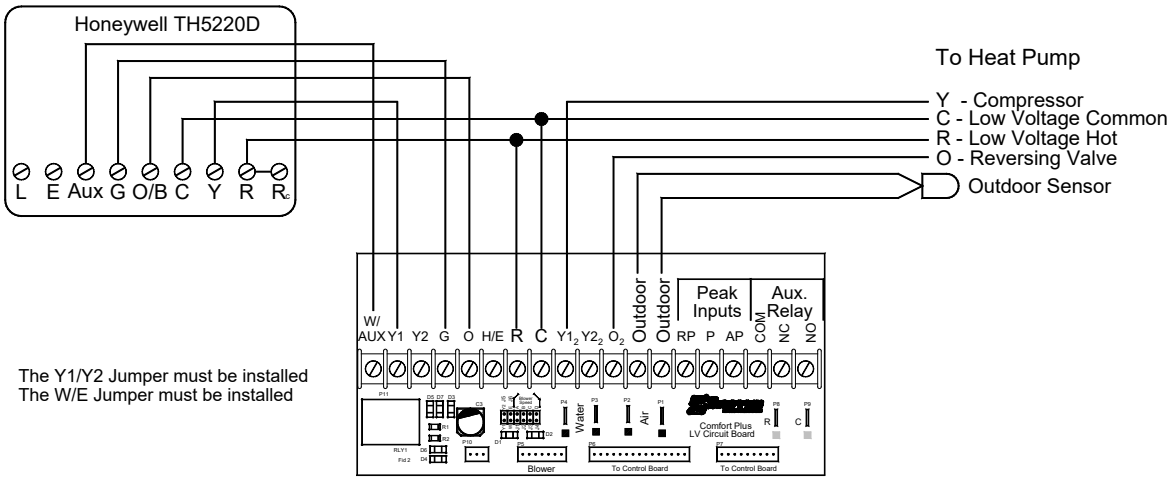
STAND ALONE FURNACE APPLICATION WITH VARIABLE SPEED BLOWER CONNECTIONS SHOWN FOR SINGLE STAGE HEATING / SINGLE STAGE COOLING (UNCONTROLLED AIR CONDITIONING)



CONTINUED on PAGE 11

LOW VOLTAGE ELECTRICAL CONNECTIONS - ROOM THERMOSTAT, CONT'D

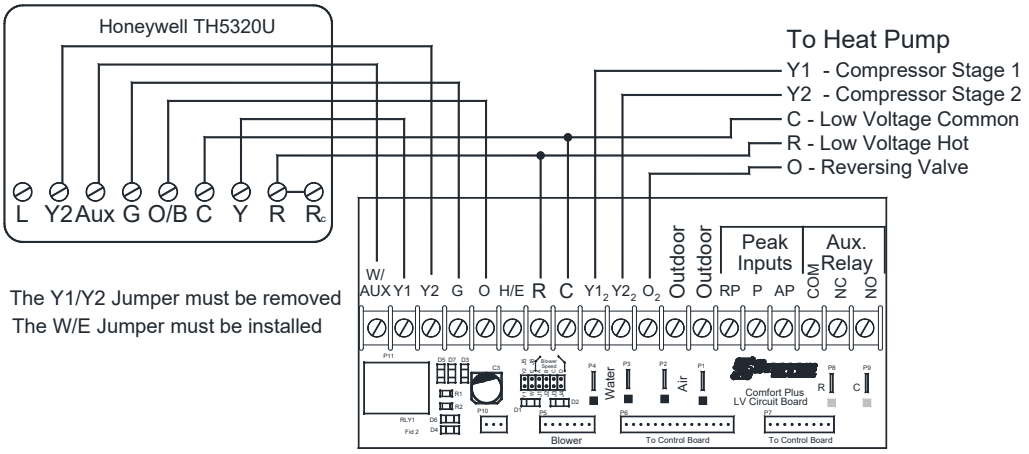
FIGURE 15
SINGLE STAGE HEAT PUMP APPLICATION WITH VARIABLE SPEED BLOWER



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 %	HC3	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.

FIGURE 16
TWO STAGE HEAT PUMP APPLICATION WITH VARIABLE SPEED BLOWER



TWO 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	50 % or 70 %**	HC1	L048
2	Y1/Y2/G	2	100 %	HC1	L048
3	Aux/Y1/Y2/G	2	100 %	HC3	L049
Fan	G	0	400 cfm	HCF	N/A
Cool 1	Y1/G/O	1	50 % or 70 %**	COOL	N/A
Cool 2	Y1/Y2/G/O	2	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.***

** ***Systems built before 1/1/2011 are configured for 50% airflow in Stage 1. For more information, refer to Instruction #1200601- High Speed Stage 1 Relay Installation.***

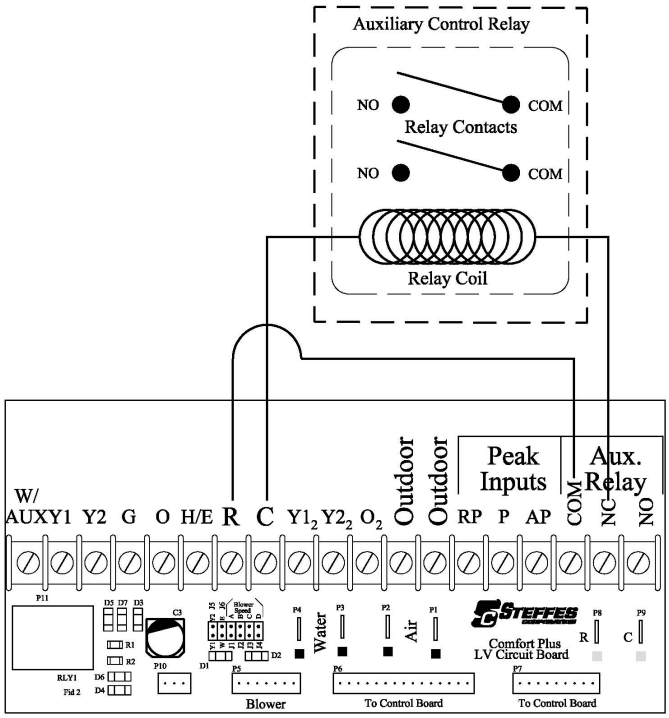
15 AUXILIARY LOAD CONTROL

The heating system 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 board in the electrical compartment (Figure 17). These contacts are rated for 30 volts, 3 amps maximum.

IMPORTANT

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

FIGURE 17
TYPICAL AUXILIARY LOAD CONTROL



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

16 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.

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".

17 DISASSEMBLING THE COMFORT PLUS SYSTEM

1. Remove the painted front panel of the brick storage cabinet. Detach by pulling the bottom of the panel forward and down.
2. Remove the limit zone cover.
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.
4. There are two white/black wires which route from the limit zone through a knockout. These wires route into the electrical panel through a romex connector. Loosen the romex connector
5. Remove the electrical panel cover and locate the point where the white/black wires connect to the black/yellow wires. Disconnect the white/black wires and route them up through the romex connector.
6. Remove the one to two screws in the center of the upper right side panel.
7. From the back of the system, lift and remove the painted panels. (See Figure 18.)
8. 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.
9. Carefully rock the brick core (Figure 19) to one side and lift top portion up and off the base (Figure 20.)
10. Move the heating system into the desired location, reassemble, and continue with the installation instructions in this Install Guide.

WARNING

HEAVY OBJECT

Can cause muscle strain or back injury.

Use assistance to lift or move this equipment.

Use lifting aids and proper lifting techniques when lifting or moving this equipment.

Keep all body parts and other objects clear of the system when lifting or moving.

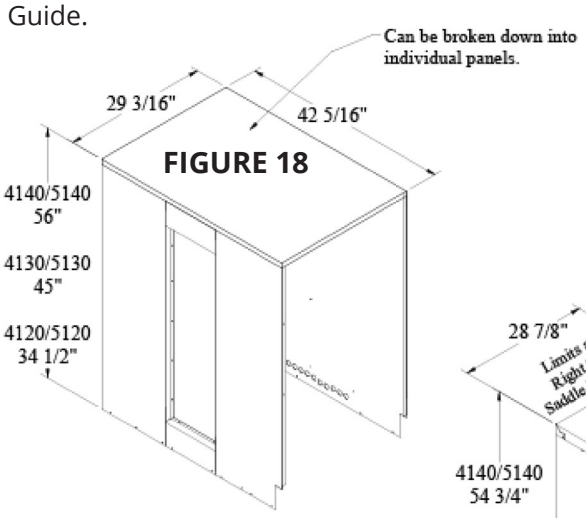


FIGURE 18

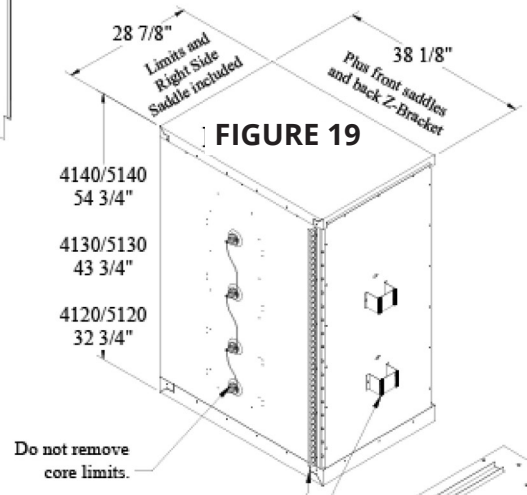


FIGURE 19

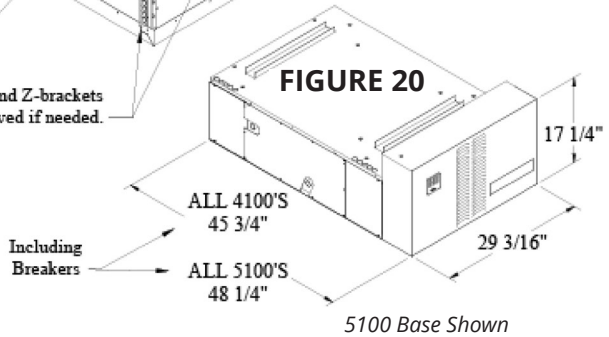


FIGURE 20

5100 Base Shown

18 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.

IMPORTANT

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

To access the Configuration Menu:

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.
2. Press and release the **M** button until the faceplate displays "CONF".
3. Press the up arrow once and the faceplate will display "C000". The faceplate will flash between "C000" and the corresponding configuration value.
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.
5. Once the value is correct, release the buttons and press the up arrow button to go to the next configuration (C001,C002, etc.)
6. Repeat steps 4 through 5 until all configuration settings have been adjusted to the desired values.
7. Once configured, use the down arrow to leave the Configuration Menu.

	Method of Peak Control								
	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					
Configuration Number		Outdoor Sensor *	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	
C002	10°F	10°F				10°F		10°F	
C003	Match to the Channel Selected at PLC	0				0		0	
C004	8	9	8	9	8	13	12	9	8
C005	0	1		0		0		0	
C006	3	3				3		3	
C007	30	30				30		30	
C008	5°F	5°F				5°F		5°F	
C009	5°F	5°F				5°F		5°F	
C010	90°F	90°F				90°F		90°F	
C011	70°F	70°F				70°F		70°F	
C012	60°F	60°F				60°F		60°F	
C013 - C021	N/A	N/A				Refer to the Time Clock Installation Instructions		N/A	

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

NOTE: 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.

CONTINUED on PAGE 15

CONFIGURATION MENU, CONT'D

In most applications only a few, if any, configuration changes will be necessary. The following is a description of the configuration settings and their function:

C000 **Off-Peak Method of Charge Control** - Sets the method of brick core charging to be used during off-peak (charge) periods. System is configured for automatic charge control which is a value of five (5).

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 will start 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 will target a full core charge.

C003 **Power Line Carrier (PLC) Channel Selection** - If using PLC communication, this setting must match the channel setting in the Steffes PLC control. A value of zero indicates PLC communication is disabled.

C004 **Optional Controls Configuration**

Value	Configuration Description
8	No Outdoor Sensor/No Time Clock Module
9	Outdoor Sensor/No Time Clock Module
12	No Outdoor Sensor/Time Clock Module (unlocks C013-C021)
13	Outdoor Sensor/Time Clock Module (unlocks C013-C021)

C005 **Control Switch Configuration** – If utilizing power line carrier control, the Steffes Time Clock Module, line voltage peak control, or the utility control switch opens for charging this value should be zero (0). For all other applications, this value should be one (1).

C006 **Output Control Configuration** - Configures the output controls of the Comfort Plus Hydronic 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.

Value	Option Selected
3	All 4100 Series Systems
8	Enables compressor control if there is a "COOL" call during a peak (control) time.
32	If 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.

EXAMPLE: *Steffes 4100 heating system with a heat pump that energizes the reversing valve for heating, add 3+128 for a value of 131.*

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

NOTE: C008 and C009 configurations are only applicable if installing 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.

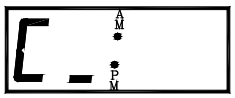
C013-C021 **Time Clock Module Configuration** - These configuration settings are used to configure the peak control times when utilizing the optional Steffes Time Clock Module. Refer to the installation and configuration instructions included with the module for more information.

19 INSTALLER'S FINAL CHECK-OUT PROCEDURE

WARNING

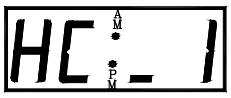
HAZARDOUS VOLTAGE: Risk of electric shock. Can cause injury or death. System may be connected to more than one branch circuit. Disconnect power to all circuits before servicing. Equipment must be serviced by a qualified technician.

1. Verify the operating mode shown on the display corresponds with the power company's peak control signal.



2. Press the up arrow one time and verify the outdoor temperature information shown on the display is approximately the same as the current outdoor temperature.

3. Initiate a heat call from the room thermostat and verify the heating system recognizes the heat 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.



4. 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.

5. Press the up arrow until the targeted brick core charge level is displayed. With the system in an off-peak (charge) mode, initiate a charge control override. Once initiated, the target level of the heating system should be 100 percent and the display should show "tL: F". All of the elements should be energized.

6. With an amp meter, verify that the amperage of the system is correct for the installation. Refer to the System Identification Label on the heating system for information regarding the proper amperage.
7. Cancel the charge control override and verify that all elements in the system de-energize.
8. Verify the Operating Mode on the display corresponds with the power company's peak control signal.
9. In applications utilizing the Steffes Power Line Carrier control system, complete the Installer's Final Check-out Procedure provided with that device.
10. Give the customer the User's Guide and Warranty Registration Card. The registration card must be submitted to ensure warranty coverage.

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

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