INTRODUCTION:
The FHP console water source heat pumps are designed for use as decentralized room terminals that are field connected to a closed-circuit piping loop within a structure. Typically these units are installed in perimeter zones and are ideal for installations where ducted systems are impractical.

All FHP Console Series units are designed for boiler/tower systems geothermal closed loop applications and can operate with fluid temperatures as low as 25°F in heating and as high as 110°F in cooling. Units are available in 3/4, 1, 1-1/4 and 1-1/2 tons nominal capacity in cooling. Refer to the unit specification sheet for precise performance figures at various entering air and water conditions.

NOTE: Console units are designed for indoor installation in the conditioned space only. Do not install outdoors, in attics or in any other location that would subject the unit to extreme temperature or humidity or to corrosive environments. Doing so will inhibit performance, reliability and service life of the unit.

SAFETY CONSIDERATIONS:

CAUTION: Console Series CA contain refrigerant R-410A. R-410A systems operate at higher pressures than standard R-22 systems. Do not use R-22 service equipment or components on R-410A equipment.

Installation and servicing of this system can be hazardous due to system pressure, electrical components and moving parts. Only trained and qualified service personnel should install and service this equipment. Untrained personnel can perform basic maintenance such as cleaning coils/cabinet or replacing filters.

WARNING: Before performing service or maintenance operations on system, turn off main power to unit. On units with unit mounted controls, the On/Off switch DOES NOT disconnect the unit from main power. High voltage components or moving parts can cause injury or death.

When working on this equipment, always observe precautions described in the literature, tags and labels attached to the unit. Follow all safety codes. Wear safety glasses and work gloves. Use a quenching cloth for brazing operations and place a fire extinguisher close to the work area.

This unit is designed to be operated with the cabinet, subbase and filter in place. Never operate unit without the cabinet and filter in place or with open access panels. Doing so can expose the operator to hazardous voltage and moving parts and can damage the equipment.

INITIAL INSPECTION, MOVING AND STORAGE:
Inspect the carton or packaging of each console unit as it is received at the job site and before signing the freight bill. Note any damage or shortage on all copies of the freight bill. Concealed damage must be reported to the carrier within 24 hours of receipt.

Unit wiring diagrams and Installation/Operation manuals are provided with each unit. Read these manuals prior to start up to become familiar with the unit and its operation.

Note that an Installation/start-up checklist is provided at the end of this manual to encourage thorough unit check-out at start-up.

Take care when moving the unit as most of the unit’s weight is located on the left (compressor) end. Always store and move unit in an upright position. Take care to protect the unit cabinet and subbase when moving or storing. Never move or lift unit by its water connections.

If the equipment is not needed for immediate installation, it should be stored in its original packaging in a clean, dry area. Units must be moved and stored in an upright position, never lay the unit on it's side. When storing, do not stack units.

INSTALLATION:

Before installing the unit, examine each pipe, fitting and valve; remove any dirt or debris found on or in these components. Use care when installing the system components to avoid damage to the cabinet finish or chassis.

1. After removing the console unit from its packaging remove the cabinet by removing the cabinet screws on either side of the unit and lifting the cabinet off the chassis. Set the cabinet aside and cover it (the console unit’s packaging can be used for this purpose).

2. Position the sub base directly on the finished floor. Make sure the sub base is level (use shims if necessary). The sub base has a frame that supports the cabinet and may be secured to wall.

3. Position the chassis onto the sub base. Check and align electrical, water and condensate connections and secure to the sub base with 4 screws.

4. Before connecting the unit to water, make sure that the loop has been properly flushed. After flushing the system, connect piping or hoses to the proper supply, return and condensate connections. Refer to the piping section of this manual for more information.

5. Make all necessary electrical connections to the unit. Refer to the unit wiring diagram and the Electrical section of this manual.

CAUTION: When making electrical connections to the unit make sure that the power is disconnected. Failure to do disconnect power before connecting power wiring to the unit can result in serious injury or death and damage to the unit.

6. Make sure the unit’s washable filter is clean and installed in the subbase. Also make sure that the filter clip is in place.

7. Reinstall the unit cabinet via locating pins at the top of the chassis and two screws in the unit subbase.
PIPING:

SUPPLY AND RETURN PIPING:
The following items should be adhered to in addition to applicable piping codes.

- A drain valve at the base of each riser to enable proper flushing of the system at startup and during servicing.
- Shut-off/Isolation ball valves at the supply and return connections and unions at each unit to permit proper flow balancing and unit servicing.
- Strainers at the inlet of each circulating pump.
- Use of teflon tape on threaded pipe fittings to eliminate water leaks and insure against air entering the system.
- Flexible hose connections between the unit and the rigid system to eliminate the possibility of vibration transmission through the piping.
- Insulation is not normally required on supply and return piping for boiler tower installations except in unheated sections or outdoor runs.
- Insulation is required for closed-loop geo-thermal installations as loop temperatures may fall below the dew point and can even fall below the freezing point of water during heating season.

CONDENSATE PIPING:
Console units are designed with a blow-through configuration in the are handling section. This means that there is positive pressure at the unit drain pan and thus trapping is not required. Condensate is routed from the drain pan via a 5/8" non-pressure rated vinyl hose that is located below the supply and return water connections.

Though horizontal runs of condensate piping are usually too short to pose problems, horizontal runs should be pitched at least 1 inch for every 10 feet of piping. Avoid low spots or unpitched piping, as these areas can collect sediment and eventually block condensate flow.

Always inspect both internal and external condensate piping for kinks that could block condensate flow.

HOSE KITS:
When using optional hose kits follow the manufacturer's recommendations for installation. Never stretch or twist hoses and never use hoses that show external wear or damage or are suspected of having damage. Never exceed the manufacturer’s maximum working pressure recommendations.

ELECTRICAL:

CAUTION: Use only copper conductors for field installed electrical wiring. Always make sure that the power disconnect is open before performing service on the unit’s electrical circuits.

Field wiring must comply with local and national fire, safety and electrical codes. Power to the unit must be within the operating voltage range indicated on the unit chassis nameplate or the performance data sheet.

Properly sized fuses or HACR breakers must be installed for branch circuit protection. See unit chassis name plate for maximum size.

Each chassis is supplied with a 2 x 4 junction box for power connection. Inside this box there are 2 pigtail leads for power wiring. The field ground is to be connected to the ground connection on the junction box.

On remote thermostat and master/slave units there are also 5 position terminal blocks for low voltage thermostat or slave unit connection. On remote thermostat units, connect the thermostat wires to the low voltage terminal block. On master/slave units connect the thermostat to the “Master” terminal block of the lead unit and the “Slave” terminal block to the “Master” terminal block of the next unit, daisy chaining the units together as required. Note that there is no limit to the number of units that can be connected together in this manner as each unit provides it’s own low voltage power supply.

NOTE: All 208/230 volt (-1 voltage code) units are factory wired to 230 volts unless ordered otherwise. In 208 voltage applications the transformer wiring may need to be switched from the 230 volt tap to the 208 volt tap. Cap all unused leads.

COOLING TOWER/BOILER APPLICATIONS:
The cooling tower and boiler water loop temperature is usually maintained between 50°F and 100°F to assure adequate cooling and heating performance.

In the cooling mode, heat is rejected from the console unit into the water loop. A cooling tower provides evaporative cooling to the loop water thus maintaining a constant supply water temperature to the unit. When utilizing open cooling towers chemical water treatment is mandatory to ensure the water is free from corrosive elements. A secondary heat exchanger may also be used between the unit and the cooling tower water. In closed loop systems such as this it is imperative that all air be removed from the closed side of the system to insure against fouling of the heat pump water-to-refrigerant heat exchanger.

In the heating mode, heat is absorbed from the loop by the console unit. A boiler may be used to maintain the loop at the desired temperature.

No unit should be connected to the supply or return piping until the water system has been completely cleaned and flushed to remove any dirt, piping chips or other foreign material. Supply and return hoses should be connected.
together during this process to ensure the entire system is properly flushed. After the cleaning and flushing has taken place the unit may be connected to the water loop and should have all valves wide open.

EARTH COUPLED SYSTEMS:
Closed loop and pond applications require specialized design knowledge. No attempt at these installations should be made unless the contractor has received specialized training.

Anti freeze solutions are utilized when low evaporating conditions are expected to occur (I.E.: low loop temperatures in heating). Typical temperatures are 30°F fluid temperature in heating and 100°F in cooling.

MAINTENANCE:
1) Filter changes or cleanings are required at regular intervals. The time period between filter changes will depend upon type of environment the equipment is used in. In a single family home, that is not under construction, changing or cleaning the filter every 60 days is sufficient. In other applications, such as motels, where daily vacuuming procedures a large amount of lint, filter changes may need to be as frequent as biweekly.

2) An annual “checkup” is recommended by a licensed refrigeration mechanic. Recording the performance measurements of volts,amps, and water temperature differences (both heating and cooling) is recommended. This data should be compared to the information on the unit’s data plate and the data taken at the original startup of the equipment.

3) Lubrication of the blower motor is not required.

4) The condensate drain should be checked annually by cleaning or flushing to insure proper drainage.

5) Periodic lockouts almost always are caused by air or water flow problems. The lockout (shut down) of the unit is a normal protective measure in the design of the equipment. If continual lockouts occur call a mechanic immediately and have them check for: water flow problems, water temperature problems, air flow problems or air temperature problems. Use of the pressure and temperature charts for the unit may be required to properly determine the cause.

SYSTEM CHECKOUT:
- After completing the installation, and before energizing the unit, the following system checks should be made:
  - Verify that the supply voltage to the heat pump is in accordance with the nameplate ratings.
  - Make sure that all electrical connections are tight and secure.
  - Check the electrical fusing and wiring for the correct size.

- Verify that the low voltage wiring between the thermostat and the unit is correct.
- Verify that the water piping is complete and correct.
- Check that the water flow is correct, and adjust if necessary.
- Check the blower for free rotation, and that it is secured to the shaft.
- Verify that vibration isolation has been provided.
- Unit is serviceable. Be certain that all access panels are secured in place.

UNIT START-UP:
1. Set the thermostat to the highest setting.
2. Set the thermostat system switch to "COOL", and the fan switch to the "AUTO" position. The reversing valve solenoid should energize. The compressor and fan should not run.
3. Reduce the thermostat setting approximately 5 degrees below the room temperature.
4. Verify the heat pump is operating in the cooling mode.
5. Turn the thermostat system switch to the "OFF" position. The unit should stop running and the reversing valve should deenergize.
6. Leave the unit off for approximately (5) minutes to allow for system equalization.
7. Turn the thermostat to the lowest setting.
8. Set the thermostat switch to "HEAT".
9. Increase the thermostat setting approximately 5 degrees above the room temperature.
10. Verify the heat pump is operating in the heating mode.
11. Set the thermostat to maintain the desired space temperature.
12. Check for vibrations, leaks, etc...
CA-CS CONSOLE SERIES

UNIT GROUND LUG

FAN MOTOR SPEED TAPS
UNIT HI LO CAPPED
009 BLU RED BLK
012 BLU RED BLK
015 BLU RED BLK
018 BLK RED BLK

FACTORY WIRE
FIELD WIRE

STANDARD COMPONENTS LEGEND:
BC - BLOWER MOTOR CAPACITOR
BM - BLOWER MOTOR
CAP - COMPRESSOR CAPACITOR
CC - COMPRESSOR CONTACTOR
EOVD - EXTERNAL OVERLOAD
HPS - HIGH PRESSURE SWITCH
LPS - LOW PRESSURE SWITCH
RV - REVERSING VALVE

OPTIONAL COMPONENTS LEGEND:
DCS - DISCONNECT SWITCH (NON-FUSED)
EMS - ENERGY MGMT SYSTEM
FS - FREEZE STAT (40 DEG F)
OAD - OUTSIDE AIR DAMPER INCLUDES
- DAMPER MTR (OAD)
- DAMPER SWITCH (DMS)

NOTES:
1. SEE UNIT NAME PLATE FOR ELECTRICAL RATING
2. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH N.E.C.-N.F.P.A. #70
3. 208/230V UNITS ARE FACTORY WIRED FOR 230V OPERATION. FOR 208V OPERATION, REMOVE ORG LEAD AND REPLACE WITH RED LEAD. CAP ALL UNUSED LEADS
4. FOR ALTERNATE EMS COIL VOLTAGES CONSULT FACTORY.
5. DO NOT OPERATE WITH ACCESS PANELS REMOVED OR CABINET OPEN.
6. UNIT INCLUDES BUILT IN: 30-60 SECOND RANDOM START
- 5 MINUTE DELAY ON BREAK
- 90 SECOND LOW PRESSURE BYPASS
7. SERVICE LIGHT WILL BLINK ONCE ON A HIGH PRESSURE LOCK OUT
8. SERVICE LIGHT WILL BLINK TWICE ON A LOW PRESSURE LOCK OUT
9. LOCK OUTS CAN BE RESET BY CYCLING THE CONTROLLER OFF WITH THE (MODE) BUTTON

PROGRAMMING INSTRUCTIONS:
TO PROGRAM THE CONTROLLER’S USER CONFIGURABLE FEATURES PRESS THE TEMPERATURE UP AND DOWN ARROW BUTTONS SIMULTANEOUSLY AND HOLD FOR 5 SECONDS. THIS WILL PUT THE CONTROLLER IN THE CONFIGURATION MODE.

USE THE (MODE) BUTTON TO SELECT THE FEATURE TO BE CONFIGURED:
FARENHEIT/CELCIUS (F/C), TEMPERATURE DIFFERENTIAL, TIME DELAY/NO TIME DELAY (de/nd), CYCLING FAN/CONSTANT FAN (CY/CO).

ONCE THE DESIRED FEATURE IS SELECTED, USE THE ARROW BUTTONS TO ADJUST IT. THE CONTROLLER WILL REVERT TO NORMAL OPERATION AFTER 5 SECONDS OF NO ACTIVITY.

TYPICAL WIRING DIAGRAM
SINGLE PHASE – 115 – 230 VAC
CONSOLE
SOLID STATE UNIT MOUNTED CONTROLLER
## Operating Temperatures & Pressures Consoles

### OPERATING DATA R-22

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<tr>
<th>MODEL</th>
<th>ENTERING FLUID TEMP, °F</th>
<th>FLUID FLOW GPM</th>
<th>SUCTION PRESSURE PSIG</th>
<th>DISCHARGE PRESSURE PSIG</th>
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This chart shows approximate temperatures and pressures for a unit in good repair. The values shown are meant as a guide only and should not be used to estimate system charge. This chart assumes rated air flow and 80° d.b./67° w.b. entering air temperature in cooling, 70° d.b. entering air temperature in heating. Heating data at entering fluid temperatures below 50° assumes the use of antifreeze.
### Operating Temperatures & Pressures Consoles

#### OPERATING DATA R-22

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**CA-CS CONSOLE SERIES**

**Operating Temperatures & Pressures Consoles**

**OPERATING DATA R-22**

**COOLING**

**HEATING**

**OPERATING DATA R-410A**

**COOLING**

**HEATING**
## Operating Temperatures & Pressures Consoles

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<th>Fluid Flow GPM</th>
<th>Entering Fluid Temp, °F</th>
<th>Suction Pressure PSIG</th>
<th>Discharge Pressure PSIG</th>
<th>Fluid Temp Rise, °F</th>
<th>Air Temp Drop, °F</th>
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</table>

This chart shows approximate temperatures and pressures for a unit in good repair. The values shown are meant as a guide only and should not be used to estimate system charge. This chart assumes rated air flow and 80° d.b./67° w.b. entering air temperature in cooling, 70° d.b. entering air temperature in heating. Heating data at entering fluid temperatures below 50° assumes the use of antifreeze.

As a result of continuing research and development, specifications are subject to change without notice.
UNIT CHECK-OUT SHEET

Customer Data

Customer Name ____________________________________________ Date _________________________________
Address ___________________________________________________________________________
Phone ____________________________________________ Unit Number __________________________

Unit Nameplate Data

Unit Make ____________________________________________ Serial Number ____________________________
Model Number ____________________________________________ Refrigerant Charge (oz) _________
Compressor: RLA ___________ LRA ___________ Blower Motor: FLA (or NPA) ____________ HP ____________
Serial Number ____________________________________________ Maximum Fuse Size (Amps) ____________
Minimum Circuit Ampacity (Amps) __________________________

Operating Conditions

Entering / Leaving Air Temp ____________________________ / ____________________________
Entering Air Measured at: ____________________________ Leaving Air Measured at: ____________________________
Entering / Leaving Fluid Temp ____________________________ / ____________________________
Fluid Flow (gpm) ____________________________ / ____________________________
Fluid Side Pressure Drop ____________________________ / ____________________________
Suction / Discharge Pressure (psig) ____________________________ / ____________________________
Suction / Discharge Temp ____________________________ / ____________________________
Suction Superheat ____________________________ / ____________________________
Entering TXV / Cap Tube Temp ____________________________ / ____________________________
Liquid Subcooling ____________________________ / ____________________________
Compressor Volts / Amps ____________________________ / ____________________________
Blower Motor Volts / Amps ____________________________ / ____________________________

Auxiliary Heat

Unit Make ____________________________________________ Serial Number ____________________________
Model Number ____________________________________________ Max Fuse Size (Amps) ____________________________
Volts / Amps ____________________________ / ____________________________
Entering Air Temperature ____________________________ / ____________________________
Leaving Air Temperature ____________________________ / ____________________________
FHP introduces the latest in console solid state control technology. Designed to enhance the unit operation with more flexibility, accurate control and operating modes the CUC provides an increased level of comfort in the conditioned space together with solid state reliability and ease of operation.

The same functions of the proven UPM module are incorporated into the CUC for unit protection.

CUC controllers are standard on all FHP series CW console units except for remote and master/slave options.

- **Tactile touchpad** for temperature, fan and mode adjustment.
- **Digital display** of temperature in either degrees Fahrenheit or Celsius.
- **LED Display** provides indication for unit operating mode as well as fan speed and fault indication for high or low pressure lockout.
- **Adjustable Temperature Set point** from 60° F through 80° F (15.5° C through 26.7° C).
- **Adjustable Temperature Differential** between 1° F and 6° F (0.6° C and 3.3° C).
- Selectable options
  - Manual/Automatic changeover
  - Fan speed – High or Low
  - Fan operation constant fan or cycling with compressor
- **Additional features**
  - 5 minute anti short cycling delay
  - Random start
  - 90 second low pressure bypass timer prevents nuisance lockouts during cold winter start up
  - Brownout protection
  - Intelligent reset allows the unit to automatically restart after 5 minutes if a fault is no longer active