

NextEnergy 3 Series

Installation, Operation and Maintenance

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Safety Notification

Warnings, cautions and notices appear throughout this manual. Read these items carefully before attempting any installation, service, or troubleshooting of the equipment.

DANGER

Indicates an immediate hazardous situation which if not avoided will result in serious injury or death.

WARNING

Indicates an immediate hazardous situation which if not avoided could result in death or serious injury.

Caution

CAUTION: Indicates a potentially hazardous situation or an unsafe practice, which if not avoided could result in minor or moderate injury or product or property damage.

Notice

Notification of installation, operation or maintenance information, which is important, but which is not hazard related.

Installation Instructions

NextEnergy 3-Series System Installation

The system consists of:

- a) **NextEnergy 3-Series** System unit
- b) A conventional domestic hot water tank
- c) Circulating pump, connection hoses, service valves, etc. to circulate water and an antifreeze solution through the heat pump and earth loop exchanger
- d) Supply and return air duct system
- e) Air filter assembly.

Wall Penetration

Foundation wall penetration is accomplished by, inserting the supply and return lines through two sleeves (usually plastic). This protects the incoming lines from damage caused by chaffing of the plastic pipe and the surrounding building material (usually the concrete of basement walls). The next step is the resealing of the wall penetration to maintain the original watertight integrity of the wall. This is a requirement for every installation. Provisions must also be made so that settling in the vicinity of the wall does not damage the pipe. It is recommended that pea gravel be used at the foundation wall to prevent this from occurring. The supply and return lines must run perpendicular to the wall penetration for at least 10ft. This prevents any

Caution

The supply and return lines must run perpendicular to the wall penetration for at least 10ft. This prevents any damage to the basement wall from localized freezing. This practice must be STRICTLY adhered too. Failure to do so could cause the freezing action of the soil to buckle basement walls.

damage to the basement wall from localized freezing.

Inside Piping

All inside piping must be of adequate size to transfer the heat exchange medium with the least amount of pressure drop. For most residential installations 1 ¼" polyethylene is adequate up to 5 tons (15 gpm). Between 5 and 7 tons, 1 ¼" pipe may be used for short distances.

NextEnergy 3-Series System Location

When ever possible locate unit in a area that allows for easy servicing. It is recommended to allow 3 feet in front of the unit and 3 feet on either side for service access. Make sure that the filter access and unit access panels are easily accessible. Provide sufficient room to make all liquid source, refrigeration, DHW and electrical connections. If the unit is placed in a closet, make provision for adequate return airflow to the unit. The unit must be located in a conditioned space and not subjected to excessive humidity.

Condensate Considerations

Make provision for a condensate drain connection. Some installations require a condensate pump to take the condensate to a suitable drain. All NextEnergy 3-Series systems have a negative pressure on the condensate drain so a p-trap is required on all systems. A vent is only necessary if possible double p-trap conditions apply. Double p-trap is commonly caused by unlevel drain piping that allows standing water to create a second p-trap condition. If the system has two or more p-traps an air lock will occur and the system will not drain. The vent should only be installed downstream of the p-trap at the unit. Never install a vent between the unit and the p-trap for this will cancel the purpose of the p-trap.

NextEnergy 3-Series System Noise and Vibration Isolation

A quality installation should be one where noise is not a complaint. A number of inexpensive features can be added to reduce noise and also aid in installation and maintenance. Flexible hose kits to the hot water loop will make for easy connection to the heat pump and the hot water tank and also reduce any noise being transmitted from the heat pump to the indoor plumbing. Next the heat pump should be installed on a shock-absorbing pad to isolate the heat pump from a hard surface floor. This pad will help stop the possibility of the cabinet being rusted out by trapped moisture under the unit. Flexible duct connections help to stop noise from the heat pump being transmitted through the ductwork. This collar also makes the connection of the heat pump to the ductwork a much simpler task. It is not recommended to hang the **NextEnergy 3-Series** unit from the floor joist, but if this becomes necessary adequate isolation **MUST** be provide to reduce unit noise and vibration from being transmitted to rest of the building.

Water Connection to NextEnergy 3-Series System

Loop Pumps

The pumping system integrates the loop pump (or pumps), valves for isolation and system purging and charging, etc. It can be mounted either on the wall near the earth loop pipe entrance, or near the heat pump.

NextEnergy 3-Series System To Water Tank

Heat pumps which provide partial water heating, as a by-product, may require 0.5 to 2.0 gpm flow between the water tank and the heat pump desuperheater. Those, which provide total water heating on demand, may require up to 3gpm per ton. The pipe sizing is critical to obtain the required flow with a small recirculator

pump (65 to 256 Watts). This recirculation loop can be exposed to very high temperatures during periods when the heat pump runs many hours for space heating. Only copper tubing should be utilized. Select suitable insulation (Armaflex) to prevent excessive heat loss over the 60 to 160°F operating temperature range. For the same reason a well-insulated water tank with insulating blanket is also recommended.

Notice

Never install a hot water circulating system to provide instant hot water. The heat loss of the piping is much too great. Instead install additional hot water tanks closer to the area needed.

Electrical Connections

Power to the **NextEnergy 3-Series** System and back-up electric heater must be separate. Each power connection must have its own power disconnect. The electrical installation must be performed by a licensed electrician, except for the low voltage wiring (Class 2)(i.e. T-Stat) which can be done by the heat pump contractor. Note: High voltage can be taken from disconnect to the unit by the mechanical contractor.

Air Filtering

To maintain good indoor air quality in a tight house the air distribution system should have a high-efficiency filter. To ensure proper unit operation, be sure to inform the building owner of the importance of proper maintenance and the maintenance schedule for the filter installed.

Special Requirements

- The **NextEnergy 3-Series** shall not to be used for construction heat. Drywall and hardwood flooring dust will seriously clog up the heat exchanger. **THIS PRACTICE MAY VOID THE UNIT WARRANTY.**

- A clean filter must be installed at final check
- A licensed refrigeration mechanic must perform all refrigeration modifications
- NextEnergy 3-Series Corp must approve all modifications.

Safety Concerns

Hazardous conditions occur during the installation of Geothermal Systems. High Pressures, temperature and electrical voltage require the expertise of trained and qualified personnel only.

When working on Geothermal Systems, turn off the compressor and auxiliary heat power supplies. Follow instructions on all precautionary tags and labels attached to the unit. Take all other safety precaution that may apply.

Follow all safety codes. Have a fire extinguisher available when brazing or soldering. Untrained personnel can perform basic maintenance functions of coil and filter cleaning.

Transportation & Storage

Move units in an upright position. Do not stack units.

Inspect shipment for shipping damage and check packing slip for accuracy. Any equipment or cartons in question should be removed from the packing and physically inspected further. If any damage is detected, the carrier should make a note on the delivery slip acknowledging the damage.

During freezing conditions special consideration should be made to prevent unit damage. If a unit is taken to the job site or put in storage anti-freeze will need to be pumped into the water coils to prevent freezing. Failure to do this will void warranty.

Installation Practices

Fig. 3.14 illustrates the inside portion of a typical closed loop installation and Fig. 3.19 illustrates the inside portion of a typical open loop installation, including energy saving practices such as DHW tank placement on an insulated base, preventing heat loss to the basement floor. Maintenance features such as DHW tank isolation valves, purge valves and vibration absorbers are also shown on the hot water lines.

In some areas, these techniques are part of the building code, check your local codes.

Ductwork Considerations

Important Note: If ductwork is installed in an attic area it needs to be built "low profile" and laid directly on the ceiling joist. After being installed and insulated with R6 insulation it must be covered with six to eight inches of cellulose. If the attic ductwork is not covered with cellulose it can lose 40 to 50% of its cooling capacity!!

Inadequate ductwork will cause poor system performance and customer dissatisfaction. In the USA ductwork sizing methods should follow ACCA "Manual D".

Install ductwork with the conditioned space of the building to minimize duct heat loss or gain, wherever possible. To minimize air velocity noise transferring to the air supply grills, flex duct should be installed from the supply grill back six feet.

Low speed operation may result in low supply air pressure if ductwork is not sized appropriately. It is recommended that a low speed and a high speed ductwork pressure/friction loss calculation by performed. Ductwork should be sized so that low speed main trunk velocities are not less than 300 feet per minute (fpm). High speed main trunk velocities should not exceed 900 fpm, if possible to prevent velocity noise.

Notice

Always check register CFM requirements against register manufacturer's data for register performance.

It is extremely important to ensure that duct system return air is NOT undersized. Undersized return air can cause poor system performance and in some cases can cause the ductwork to pulse. Further, it is also important to provide adequate sized supply air plenums. Make all turns as smooth as possible avoiding any restrictions.

When ductwork is designed the target static pressure should be not greater than 0.3".

Caution

Observe the location where your ductwork is being attached to the unit. Ensure that drilling and screws do not damage the air coil.

Zone Damper Systems

Designing a zoned duct system doesn't have to be intimidating. Normally the people that dislike zone systems are those that don't truly understand how they work. Learn the basics, and you'll be well on your way to meeting a host of new business opportunities.

Too many contractors shy away from offering forced air zoning systems because they aren't quite sure how to properly size the duct systems. Although this fear may seem legitimate, with a little bit of knowledge about the controls and practice, designing a quality zoned system can easily become second nature.

More importantly, if you want to keep up with the competition, you need to offer zoning options. It's a fact: consumers are becoming increasingly aware that they don't have to live in uncomfortable environments. If an informed potential customer approaches you and wants to know more about zoning options, you have to know what you're talking about. Additionally, once you're adept at installing these systems,

you have a whole new marketing weapon at your disposal.

Zone systems along with programmable thermostats can save the homeowner money. For example why condition the master bedroom all day? Program the thermostat to set back a few degrees in the morning then go back to normal set point a couple of hours before bedtime. Why condition the main living space during bedtime? Program the thermostat to set back a few degrees when everyone goes to bed then go back to normal set point a couple of hours before everyone gets up in the morning.

When designing a zone damper system always consider the worst case (smallest zone) area. The NextEnergy 3-Series controller will allow smaller zones to limit the stage the system will run in (for Dual compressor systems). Smaller zones can be limited to run in stage one or stage two only. This will insure the system never runs in high speed if a small zone is the only zone calling. Install all zone dampers so that the motors can be serviced. Mark all wires at both ends for servicing ease. Check damper movement when done to insure damper is opening and closing correctly when the thermostat from that zone is calling. Keep in mind that if all thermostats are off that doesn't always mean all dampers will close. Often the NextEnergy 3-Series controller will leave the last zone damper calling open when that zone satisfies.

Sizing Zoned Duct Systems

The main objective of sizing a zoned system is to maintain a constant volume of air through the HVAC system when only one zone calls for conditioning, yet still provide sufficient airflow when all zones call. Various manufacturers offer their own recommendations as to the best way to accomplish this objective. Most of them involve some form of over sizing the duct system, as well as the use of a static pressure regulating damper (or by-pass damper, as some people call it).

The NextEnergy 3 Series is designed to reduce many of the obstacles involved in zoning. If

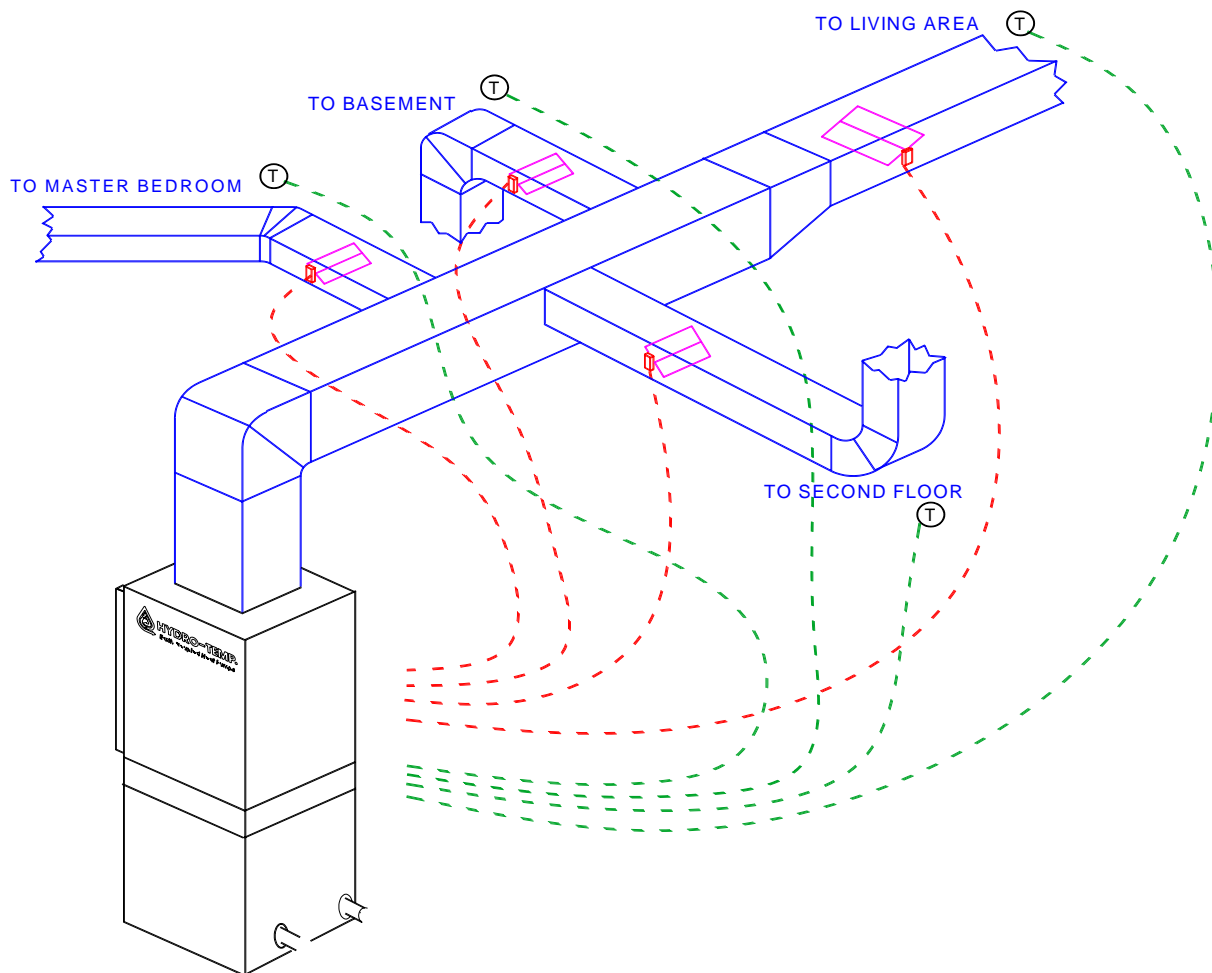
most cases inefficient by-pass dampers are not needed.

NextEnergy 3-Series has incorporated a 4 zone controller. This controller is located inside the electrical box of the system and controls the operation of the system as well as zoning of 4 independent zones. All 4 zone thermostats and all 4 zone dampers hook directly to his controller. This controller has been strategically designed to work with smaller zones and works best if the system is a dual compressor system. In your basic home you will almost always have one or two zones that will be too small to allow running by themselves in high speed. For example a partial basement or master bedroom may only be able to handle ½ of the units total CFM if running in high speed. These zones can be wired to zone 3 or zone 4 inputs on the controller. Zone 3 input will never

be allowed to stage up the system past stage 2. Zone 4 input will never be allowed to stage up the system past stage 1. If these two zones are calling in conjunction with stage one or two then they are allowed to stage up. Zones one and two should always be your largest zones for they will allow the unit to stage all the way up into its highest speed.

It is always best to **size the ductwork into the two largest zones so as it can handle 60 – 70% of the system total CFM.** This will allow the system to run in that zone without the use of a by-pass damper.

A new installation -- where you have complete control of the sizing and fabrication of the duct system -- offers the most flexibility in terms of accommodating the special needs of a zone control system.



Some retrofit systems may require some trial and error to work out static pressure issues. You will still be able to limit the stage the smaller zones will run in but you may have excessive static when one of the two big zones are calling by itself. Often times this can be resolved by setting the stops on the dampers. All NextEnergy 3-Series dampers have stops that can be set so the damper can not shut all the way off. You can set the larger zones to allow a small amount of bypass air into that zone all the time to alleviate static pressure problems. This is normally not a problem due to the larger zones run most of the time anyway.

Static Pressure Regulating damper (By-pass damper)

With the use of the NextEnergy 3-Series 4 zone controller and the NextEnergy 3-Series zone dampers it is very rare to have to use a by-pass damper. If one is needed we feel you should know how it works and the best place to install the damper.

Static pressure regulating damper is most commonly a barometric damper on residential and light commercial systems (2,000 CFM or less). The increase in static pressure opens the damper; the decrease in static pressure allows it to close. When you install a differential static pressure switch in the supply duct of a larger commercial system (more than 2,000 CFM), it will measure increases in static pressure. Any increase in static pressure forces the electronic damper open to relieve excess static pressure. As the static pressure decreases, the differential static pressure switch allows the static pressure regulating damper to modulate to the closed position.

The excess static pressure relieved through the static pressure regulating damper can be ducted in many different ways. The simplest and best way is to duct the by-passed air to a non-critical temperature area such as a hallway, entrance foyer, basement, or mechanical room. This keeps the heated or cooled air within the conditioned space. Don't by-pass the air to attics or crawl spaces, because this can create

negative pressure in the house, wasting energy and possibly causing condensation problems.

The static pressure regulating damper can also be ducted into the return. In some duct configurations, this can be done in such a way that the by-passed air mixes with other return air and returns to the HVAC system at close-to room temperature (avoiding any chance of coil freeze-up or equipment overheating).

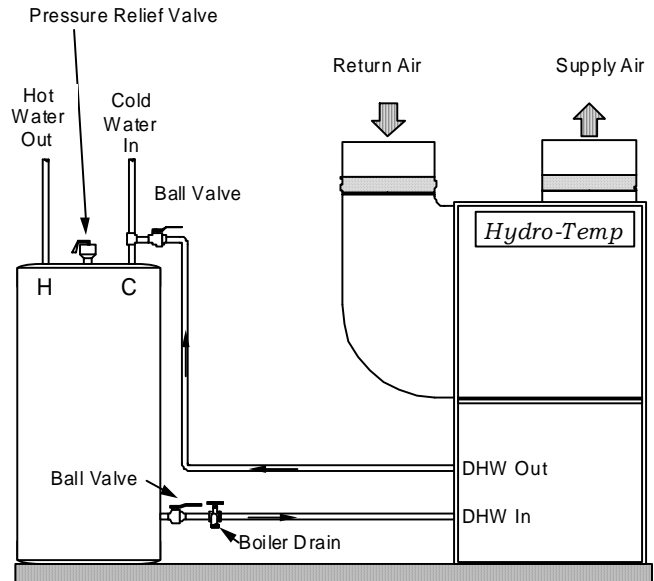
If you have to by-pass air directly into the return and right back into the HVAC system, install controls to protect the equipment. For example, install a thermostat or leaving-air temperature-sensor that cycles the compressor or burners on-and-off to prevent the system from freeze up or overheating.

Domestic Hot Water Heating

DHW Tank Preparation

If a hot water heating option is to be installed, electric domestic hot water (DHW) tanks are regularly used, although other fuel types are acceptable.

Turn off the power supply or the fuel supply to the DHW tank. Close the cold water supply valve to the DHW tank. Attach water hose to the tank drain connection and empty the tank to a drain or outside. Open a tap or faucet nearby to relieve pressure inside the water system to speed up the draining process. After the tank has been drained disconnect the hose and remove the DHW tank drain fitting.

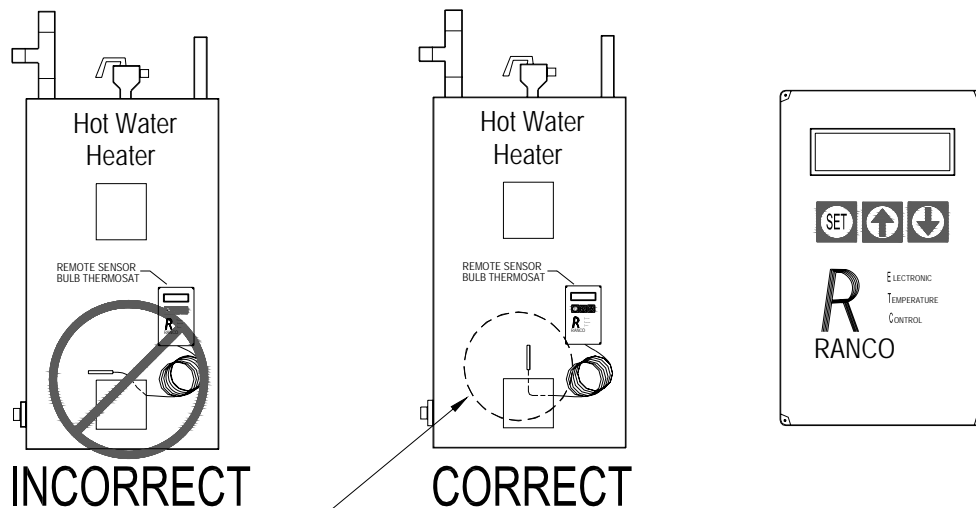


shown in the figures on the following page. Include isolation valves and a boiler valve for tank draining and DHW system purging. Valves allow for pump service without draining the DHW tank. Use 1/2" copper may be used for desuperheating applications with up to 30' tank

Desuperheater/Priority Installation

Install the domestic hot water circuit similar as

Proper Alignment and Settings for Remote Bulb Thermostat



NOTE: REMOTE PROBE IS MOUNTED JUST INSIDE THE BOTTOM ELEMENT COVER BETWEEN THE TANK INSULATION AND THE STEEL PART OF THE TANK.

HYDRO-TEMP®
DWG NAME: PROPER ALIGN OF RBT
DATE: 5/96 SCALE: H000146A TLK

distance. Over 30' adapt up to 3/4" pipe for lower DHW pressure drop. Priority heating will require larger pipe diameters.

Remove existing drain port from the hot water tank and insert a standard fitting (Thread in the male end of the fitting into the water heater drain port using a P. T. F. E. based thread sealer.) and continue with installation as shown. Insulate all desuperheater circuit piping with 1/2" pipe insulation.

Dual tank Preheat method Hot water loop hookup

Referring to the figure on the next page, the preheat tank is not powered and is heated to 116 degree solely by the NextEnergy 3-Series unit. The second tank is powered but receives "heated" water from the preheat tank. The second tank will only turn on occasionally to replace its heat loss.

Priority Hot Water Option Installation

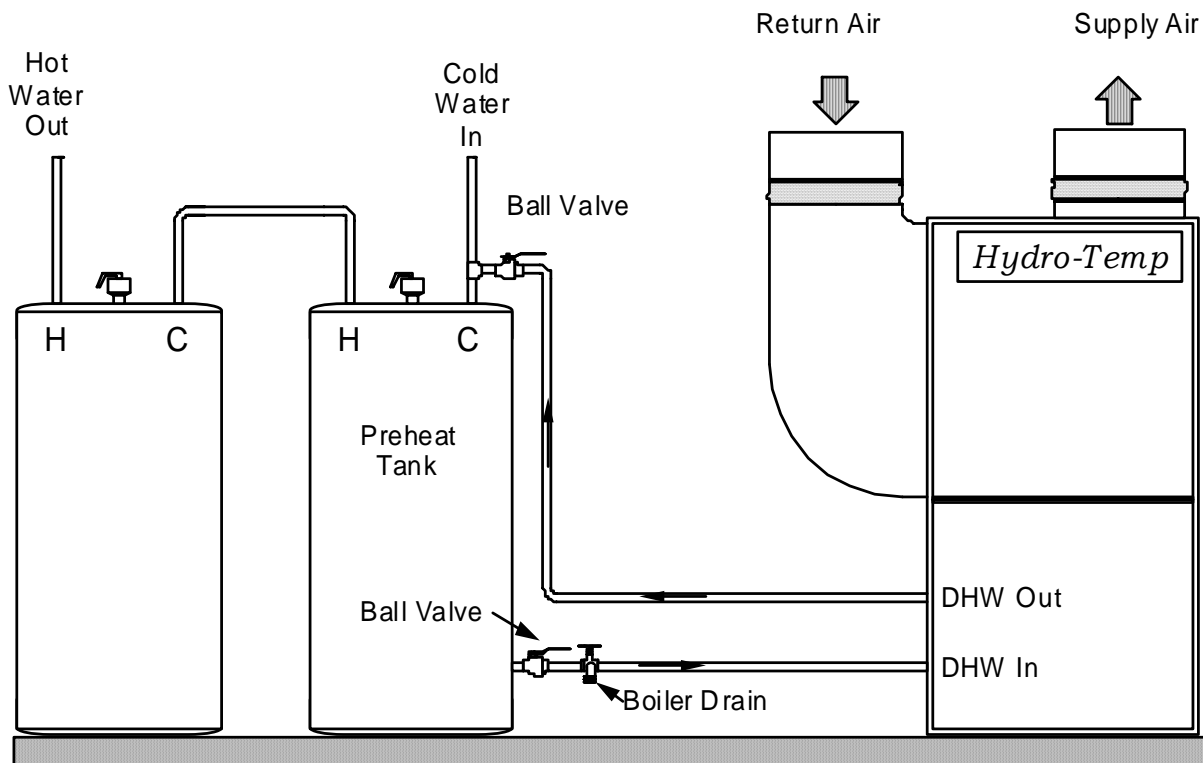
Install the priority hot water circuit similar to the desuperheater circuit. Upsize the copper pipe to 7/8" up to 10' tank distance and 1" if over 10'. Purge and insulate the pipes as discussed.

Install the hot water sensor or a remote bulb thermostat on the hot water tank to turn on and off the NextEnergy 3-Series system as needed to heat the hot water tank. The sensor or remote bulb thermostat should be installed in a thermal well, or near the bottom element between the steel tank and the insulation as shown in the drawing below. The sensor / bulb must be tight, use silicone to insure a tight installation. Make appropriate wiring connections to the NextEnergy 3-Series system.

Hot Water Connections

The proper connections to the hot water tank are as follows:

Never use PVC pipe to plumb this system. Insert a threaded fitting into the drain port of the hot water tank. Ensure that adequate



provision is made to drain the tank if needed. Tee from this point and feed into the inlet port of the NextEnergy 3-Series DHW lines. Hot water return from the unit should be made into the cold water inlet port of the hot water tank. It is a good installation practice to provide shut off valves on the leaving and entering ports to the NextEnergy 3-Series and a boiler drain to purge air out of the hot water lines.

Purge air from the system and make sure that the system has continuous line pressure. This will ensure that the pump does not cavitate, and pump damage does not occur.

Purging DHW System

Filling the Hot Water Tank

Fill the DHW Tank: Close boiler drain valve at bottom of tank and close the isolation valves to the NextEnergy 3-Series™ system. Open the cold water supply to fill the DHW tank. Open a hot water tap in the building and allow air to bleed out of tank. Depress lever on the tank relief valve to remove air trapped in the tank. Once the building plumbing is purged it is important to purge the air that is remaining in the NextEnergy 3-Series™ system. Purging the building plumbing even with the isolation valves open to the NextEnergy 3-Series™ system will not purge the air from the NextEnergy 3-Series™ system.

Purging The NextEnergy 3-Series Hot Water Loop

Attach a hose to the boiler drain located between the isolation valves and the NextEnergy 3-Series™ system and run the hose to a drain. Close the isolation valve at the bottom of the DHW tank drain fitting. Open the isolation valve at the cold-water inlet on the DHW tank and allow the water to flow through the unit and out the hose. Allow the water to run for approximately 5 to 10 minutes while checking for air leaving the drain hose. Once all of the air has been purged, close the cold-water isolation valve and open the isolation valve at the bottom

of the DHW tank. Allow the water to run for approximately 5 to 10 minutes while checking for air leaving the drain hose. This will purge the air out of the rest of the DHW lines. Now that all the air has been removed while purging both ways open both isolation valves and allow to run for approximately a minute. Once purging is complete, close boiler drain valve, remove hose and ensure the both isolation valves are open. Wiring to the DHW pump is normally left unwired in the NextEnergy 3-Series's electrical box and tagged with the proper reconnection location. This wire should only be hooked up after the system is properly purged to prevent pump damage.

Setting Hot Water Temperature

Desuperheater Temperature Set-up

Adjust the lower element thermostat on the DHW tank to its lowest setting, and adjust the top element thermostat to 120° F. (The highest temperature recommended for safety). Some plumbing codes require higher stored water temperatures. This may dictate a dual tank system and the use of anti-scald valve. Always follow your applicable plumbing codes.

Priority System Temperature Set-up

Adjust the Auto priority start and auto priority stop temperature in your PDA under the Hot water screen this is described in the following section. By default these settings are set at the factory to kick on at 112 °F and kick off at 116 °F. This sensor is also used for a couple of other smart desuperheater functions. If you chose to disable this feature you would need to then use the Ranco aquastat. Setup instructions for the Ranco can be found in a future section.

NextEnergy 3-Series Electrical Installation

Low Voltage Wiring

Low voltage wiring requires the connection of the thermostats to the control board, the dampers to the control board, and the priority thermostat to the control board. All other low voltage connections are wired internally to their respective relays and components.

Use 8 conductor 18 or 22 awg. minimum thermostat wire for low voltage connections.

Mounting the Thermostat

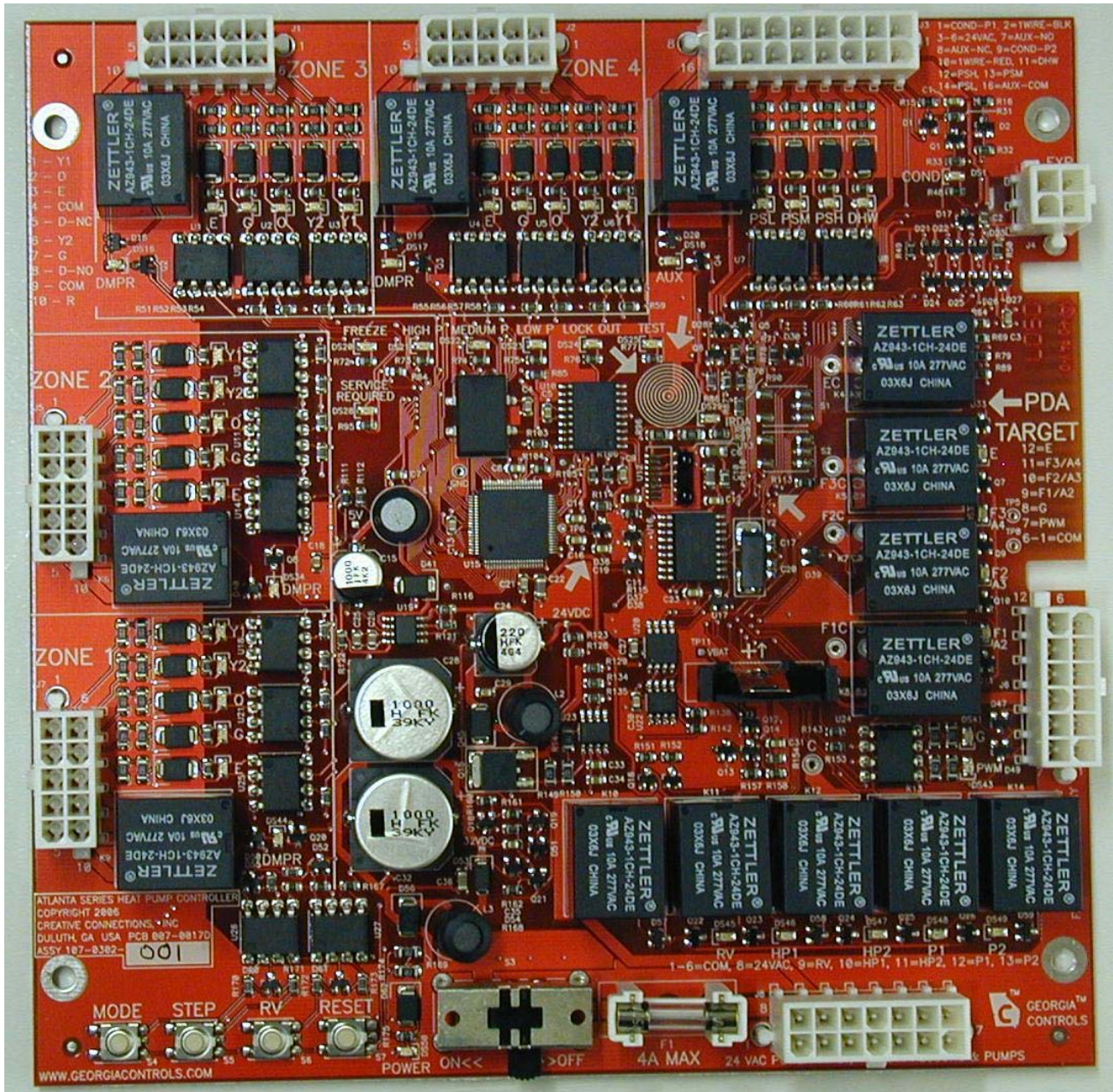
Mount the thermostat on a piece of Rubatex™ or similar foam tape, to seal around the wire penetration. This prevents drafts from affecting the thermistor, and thus helps prevent short cycling of the equipment from errant air movement.

Note: For a priority system, NEVER install the T-Stat over the return air grill. Installing the T-Stat in this position can cause erratic system operation.

Thermostat operating instructions and wiring options are enclosed with the thermostat and should be left with the customer after instructing about the operation of their system.

The standard NextEnergy 3-Series thermostat is the NE-32-2000. This is a two heat + aux heat and two cool heat-pump thermostat. It should be wired as shown in the section on zoning. The 3 series can also handle any heatpump thermostat and most conventional thermostats.

3 Series Controls: GEORGIA CONTROLS ATLANTA SERIES



Get the latest updates online at: http://www.Hydro-Temp.com/Georgia_Controls/

Programming the NextEnergy 3-Series / Georgia Controls control board

The NextEnergy 3-Series/Georgia Controls control board requires a PDA to adjust the system run parameters, zone parameters and basic system program. There are 4 programs to be installed on the PDA to program and monitor the GC control board. These 4 programs and updates should be installed using your palm software Quick Install function. Please follow the PDA instructions that came with your PDA on how to install the software.

The ability to transfer settings, logs, and toolbox data from PDA to PDA is available by clicking on the top menu area and selecting export to PDA. This is available in all four PDA programs.

The four PDA programs needed are: Firmware, Toolbox, Setup and Logs. Each has a separate function.

Notice

Always power up the controller with the battery in place. Wait at least 20 seconds before trying to communicate with the controller. Any time the palm is communicating with the controller an amber light will illuminate on the controller. If for some reason the communication is interrupted or not started the palm will display an error. If no error messages are given during or after the communication you can believe your data was sent.

Firmware Program

This is used to update the firmware in a controller. The most current firmware version will be installed in the controller before shipping from NextEnergy 3-Series. If you are instructed to update the firmware you will need to download and install the firmware Program and the firmware from our website. (This is included with the basic download pack) The update will need to be installed on your PDA from the Palm Desktop software. When you open the firmware manager program after a hotsync/update from the computer it checks for new programs and checks the integrity of the firmware. It is recommended to open the firmware manager after hotsync to insure a good install from the computer to the PDA. Next Click on and highlight the update "Atlanta Type: ** Rev **.**" and press the green up arrow icon at the bottom of the screen and aim the palm towards the receiver on the controller you wish to update. This will start the update process which takes around three – five minutes to export depending on your palm transmit speed. When all the lights have flashed rapidly then shut off the update is done. If the transmission is interrupted in the middle you will need to turn the controller off and back on and try again. The firmware is not burned into the controller memory until a successful download and verify of download integrity has completed.

Toolbox Program

This is used to view the real time reading / status of the controller. All information downloaded can be stored in the palm for future retrieval or transfer to other PDA's. There are 3 security levels in the ATL Toolbox. User area – for general home owner, Technician area for installing dealer and Factory level for factory personal. Each level can be changed by clicking on the U, T, or F on the bottom right of the screen, then selecting the desired security level. For the password to change between levels call your Hydro Temp tech support representative. The Technician and Factory levels are the same for the ATL toolbox and listed below in blue print.

To start click on the Toolbox Icon. This will bring up a list of stored data saved by "Date, serial number". To view an existing toolbox data log highlight the data and click the open folder at the bottom of the screen. To create a new download press the download icon at the bottom of the screen. This will start a download from the controller. (Aim the palm towards the receiver on the control board.) When finished you will be taken to the System info page.

You can now press the left arrow key to return to the main menu, which shows the:

- System Info (serial number, software version & board time. Board time can be set by pressing the clock next to the Device time.)
- Statistics (Hours of run time and cycles per comp, pump, Fan & Strips)
- If the service required light is on, why and what to do to repair the issue.
- Temperature Sensors (Real time readout of each sensor attached)

At the bottom of the screen you can press the Play button to update the temperatures every 5 seconds.

- System Test (Allows you to bypass the thermostats and run the system from the Palm, including opening and closing each damper and turning on and off pumps.)
 - *Run mode: **Normal** = system operation given to thermostats. **Test** = Test mode*
 - *Make allows for switching from heat to cool. Stage: sets the compressor stage to test. Fan speed will adjust automatically as the compressor speeds are incremented. If compressors are left off the fan speeds can be set manually to test air flow. Dampers, pumps and strips can be turned on /off by placing a check mark next to the item you want on.*
 - *PSL Ignore – If this is checked the Low pressure switch **will be ignored** while in test mode.*
 - *Timer – This is an exit test mode timer. Defaults to 30 Minutes, so after 30 minutes of test the system will revert back to normal run. If set to OFF the system will run in test mode continuously.*
- Find Sensors (Use this command to find all sensors attached)

Logs Program

This lists system critical events, system setting changes and event date / time. Logs can be downloaded by pressing the down arrow key. Click on the plus sign next to the date and time to see details concerning each event. Each log file can be saved for future viewing. Logs will be saved on the PDA formatted "system name" @ date&time. Logs can not be deleted from the controller and are permanently burnt into the controller memory.

Setup Program

This is the main palm program used to setup the control board and tell the board what accessories you have hooked to the board. Open program Setup. Just like the toolbox program the setup program has three levels of security. Please call for the passwords to change between levels. The settings accessible to the general user are shown below in black, settings to technicians are shown in blue.

- **Open Program to be edited:**
 - **Import / download the Control Program into your palm for editing:** You should always start out by importing the control program into the memory of your palm. This insures you have the latest setup from that unit. Do this by clicking on the down arrow icon at the bottom of the screen. Next aim the palm towards the receiver of the controller. If the unit had been downloaded before by this palm a small window will pop up asking you if you wish to overwrite or rename the one you just downloaded. When completed you will see the program listed in the window for editing. The program is normally named the same as the unit's serial number. Next open the program as described below for an existing program.
 - **Open an existing program for editing.** Point to the program you wish to open and highlight the program. Next click on the open folder icon at the bottom of the screen. This will open the program for editing.
 - **Edit the program and Export back into the controller.** Once you have finished with the next several pages the changes must then be exported back into the controller. Do this by aiming the palm towards the receiver of the controller and press the green up arrow icon on the bottom of the screen.

Navigation between screens can be done by pressing the up or down arrow at the bottom right of the screen or by pressing the screen name in the bottom of the screen and selecting the one you want.

The next few screens will describe the settings on each screen.

General Screen:

Notes: This will be the Unit serial number or common Program name.
Notes can only be changed in technician level or factory level.

System Priority: This sets which zone has system priority if a heat and a cool call is made from two different zones at the same time.

Options include: *Heat, Cool, Zone*

(If Zone is selected then zone1 has top priority, zone2 second and so on.)

[Default = Heat]

Stage Capacity: This sets the max stage each zone can call for. They are settable from 1–3

The system will add two or more zones together if more than one calls at a time.

For example if Zone 4 is set to one and it is the only zone calling then the system will stay in stage one no matter what the thermostat stages up to. If zone 3 is set to 2 and it is the only

zone calling then it can stage up to stage 2 but no higher. If both call at the same time then the system can stage all the way up to stage 3. This is important when sizing the duct to smaller zones. These can be set in increments of one tenth. So if you have a zone you never want to be able to bring on the system by itself you could set it to .5 then it would have to add in with another zone only, or two zones set at .5 could add up to 1 which if they both called at the same time could turn on the system in stage one.

[Defaults are Zone 1 = 3, Zone 2 = 3, Zone 3 = 2, Zone 4 = 1]

Stage Capacity can only be changed in technician level or factory level.

T-stat Type: *HP or Reg.* HP = heat pump thermostat. Reg = Non heat pump thermostat. [Default = HP] *T-stat Type can only be changed in technician level or factory level.*

Heat pump thermostats refer to thermostats that have the following:

G terminal for blower

Y or Y1 terminal for stage one compressor

Y2 terminal for stage two compressor

O terminal for reversing valve (heat / cool switching)

Reg or Non heat pump thermostats refer to thermostats that have the following:

G terminal for blower

Y terminal for cooling call

W terminal for heating call

The difference between the two:

Short of the wiring differences the Reg thermostat stages up on an adjustable time delay in the controller between stage one and two then another time delay between stage two and stage three. The Heat pump thermostat stages up between stage one and two from a call from the thermostat then an adjustable time delay in the controller between stage two and stage three.

Cooling Screen:

Fan Blower Speeds for each compressor stage. Displayed in CFM. If dual blowers this setting should be half of desired CFM. [Set by Factory @ approx 350-375 CFM/Ton]

A lower blower speed in cooling is always recommended for dehumidification.

Blower speeds can only be changed in technician level or factory level.

Desuperheat into DHW: Set to allow desuperheating of the hotwater tank during cooling mode. (Yes or No) [Default = Yes]

Desuperheat into AHW: Set to allow desuperheating of the auxiliary water tank during cooling mode. (Yes or No) *Only available if Aux water heating is enabled.*

[Default = No]

Dehumidification: (If humidity sensor is present)

Target Percent: + or – to increase or turn off. This target setting will slow down the fan as much as 25% to increase the dehumidification in cooling if the space humidity is higher than set point. If humidity is lower than set point the fan will speed up to increase the sensible cooling. [Default = Off]

Heating Screen:

Fan Blower Speeds for each compressor stage. Displayed in CFM. If dual blowers this setting should be half of desired CFM. [Set by Factory @ approx 400 CFM/Ton]

Blower speeds can only be changed in technician level or factory level.

Desuperheat into DHW: Set to allow desuperheating of the hotwater tank during heating mode. (Yes or No) [Default = Yes]

Desuperheat into AHW: Set to allow desuperheating of the auxiliary water tank during heating mode. (Yes or No) *Only available if Aux water heating is enabled.*

[Default = No]

Humidification: (If humidity sensor is present)

Target Percent: + or – to adjust or turn off. (Used to turn on or off and external humidifier via aux relay.)

Strip Assist: *Enabled or Disabled* [Default = Enabled]

Enabled – Strips will come on as needed via E call if thermostat is set to Hp or time delay if Reg. Will also come on immediately if a limit it tripped.

Disabled – Disables strip heat from being able to come on unless there is an Emergency heat call. Will also come on immediately if a limit it tripped.

Comfort Mode Target: + or – to adjust or turn off. Sets the discharge air temp you wish to achieve by lowering the CFM. Adjustable from 70°F – 111°F or off [Default = Off]

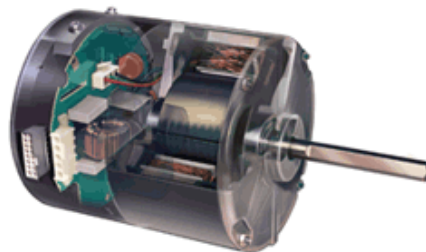
98 – 100 works best if used. This will also take into account the return air temperature so as not to slow the fan down too slow causing the system to kick the high pressure switch.

Blower Screen:

Fan blower speeds for each zone, if dual blowers this setting should be half of desired CFM.

[Default = 200 per zone]

Each zone can be adjusted to the CFM the blower will blow if the fan is set to on, or better known as fan circulation mode. **These will add together if more than one zone is calling for fan circulation.**



The controller uses the most common blower output, a two wire PW signal to the ECM blower motor. NextEnergy 3-Series redefines comfort and efficiency by incorporating GE ECM™ Blower Motor Technology in our equipment. These systems feature: more even temperatures, better indoor air quality, precise humidity control, quieter operation and lower utility bills.

The blower motor hub monitors the output of the control board to regulate the blower speed.

If a different kind of blower motor is to be used this setting can be changed in the Hardware screen to accommodate multi-speed PSC blower motors or variable speed VFD controllers.

Staging Screen:

Stage Type:

Timers – *Stage Time:* Compressors and blowers will stage on by t-stat. If using heat pump t-stat it will stage up to stage two from t-stat call. Staging from stage two to stage 3 is done by this time delay. [Default = 30 Minutes]

Strip heat: Strip heat will come on as auxiliary heat only after high speed of compressor has ran for this time delay and a strip heat call is made by the t-stat. Emergency heat is not effected by this time delay [Default = 30 Minutes]

Advanced – Staging of the system will be done by calculating the temperature change of the return air. When this option is selected two adjustable bars will show up below, one for the temperature change per hour for cool and one for heat. These bars allow you to adjust the minimum degrees per hour allowed before the system will stage up. For example if the system is on in cooling and the Cool/Hr is set to 1°F and the controller calculates that the return air is not dropping at a rate of 1°F per hour the system will stage up after 25 minutes of run time. (25 minutes run time needed to make calculation) *This setting requires that the return air to the system is a good representation of the actual space temperature. The return temperature can not be affected by any unconditioned areas.*

Stage type can only be changed in technician level or factory level.

Hotwater Screen:

In the hotwater screen you will be able to toggle between two different screens by clicking the drop down box that will appear between the Hot water and up arrow at the bottom of the screen. This is where you will setup your DHW (domestic hot water) and AHW (Aux hot water) or also referred to as second priority. To use the AHW you must have sensor 29 to on the buffer tank or pool line and it also requires the Aux Relay Mode in the [Special screen] to be set to "Aux Water". The settings in both screens will react the same, but will not always be set the same. In this manual we will describe the settings once.

Max Temp: This sets the max temp the HW pump will run while desuperheating. This is strictly a safety setting. It should always be set higher then all other settings on this page. [Default = 130°F]

Max Temp can only be changed in technician level or factory level.

Auto DHW (AD) in Cooling: This check box is used if HW sensor is present on the tank and the system is running in cooling this will allow the ground loop pump to shut down when the sensor temp is 1 deg below the AD/AP stop temp to keep the tank topped off. This should be unchecked if not priority. [Default = Checked]

Auto DHW can only be changed in technician level or factory level.

Auto Priority (AP): This check box will run priority from the sensor mounted on the tank. Uncheck if using aqua stat or if system in not a priority system. If using AP with the sensor the Aqua stat light will not come on when running in priority [Default = Checked]

Auto Priority can only be changed in technician level or factory level.

AP Max Stage: Selects the max stage the system will run in while making hot water on demand. If the system is running in priority and heating the house the controller will override this setting and run in high speed heat. If a single speed unit this must be changed to 1. If a twin single this must be set to 2. [Default = 3]

AP Max Stage can only be changed in technician level or factory level.

Stage Degree: + or – next to AP Max Stage: This is used for staging the priority hot water heating. This is the temp the water tank has to drop below the AP start temp before stage two compressor will come on in priority. Other wise stage one compressor only will heat the water tank. [Default = 4°F]

Stage Degree can only be changed in technician level or factory level.

AP Start: Adjustable from 50- 132°F. Low setting for hot water tank temp. The temperature the system will come on and start making hot water. [Default = 112°F]

AD / AP Stop: Adjustable from 50 – 132°F. High setting for hot water tank temp. The temperature the system will shut off in priority. The system can desuperheat beyond this setting. If the system runs long enough it could reach the Max Temp and then stop desuperheating. [Default = 116°F]

Pump Cycle Every: + or – to adjust or never. This setting is normally left on never. It always best to mount the sensor on the tank to get real time temperature readings. Used to turn on the DHW pump on a timed cycle to read an external aqua-stat. [Default = Never]

If a setting is set for 5 minutes or above the **Pump Run Time** adjustment will appear. This allows you to tell the system for how long to run the pump before the controller samples the sensor temperature. *If the pump cycle every routine is used the sensor will only show the temperature after the last pump cycle when probed in the ATL setup program.*

Freeze Cop Screen:

FreezeCop: The freeze cop incorporates a refrigerant sensor reading the temperature of the refrigerant line exiting the water coil. If there is a lack of water flow and this reading drops below set freeze cop temperature the system will defrost. On systems that chill water two sensors may be present. The controller will defrost on the temperature of the reading off the lowest read sensor. *If the system is running in heat and a defrost is needed the system will switch to cooling. If the system is running in cool and a defrost is needed the system will switch to heating.*

Caution

The FreezeCop is a safety and should never be disabled. It is required that an antifreeze be used any time the loop temperature is expected to drop below 41°F. If this safety is tripped, the system will enter into a defrost cycle then lockout.

Hardware Screen:

Compressors: Options of one or two compressors. [Set by Factory]

Compressor setting can only be changed in technician level or factory level.

Max Stage: Options of one, two or three stages, depending on comp. selection.

Max Stage setting can only be changed in technician level or factory level.

If one compressor the max stage would be: [Set by Factory]

One – Single compressor setup

Two – Twin single compressor (*One comp. that runs at two speeds*)

If two compressors the max stage would be: [Set by Factory]

Two – Used for a two speed system (*both compressors the same size*)

Three – Three speed unit. *Staging small comp, then big comp. then both.*

Fan Type: Variable / Multi-speed [Default = Variable]

Fan Type setting can only be changed in technician level or factory level.

If Fan type is Variable then [Set by Factory]

Blower CFM: Select blower motor HP. / Max CFM of Blower motor.

Frequency: 60 / 50 [Default = 60]

Both settings can only be changed in technician level or factory level.

If Fan Type is Multispeed then

Blower Speeds: Selectable from 1 – 3

Multispeed Type: Cumulative (F1 + F2 + F3)

Exclusive (F1 only) (F2 only) (F3 only)

Special Screen:

Aux Relay Mode: This allows use of the Aux relay. The Aux relay is a floating dry contact. Common on the relay must be hooked to the power supply. (Selections include: None, Aux water, Humidifier, Stage 1, Stage2, Stage3, Freeze LED, Service LED, Low Pressure, High Pressure, High/Low pressure, Lockout LED, RV Opposite, Attention Required, blower on, Heating on and Cooling on.) If system is a double priority system Aux water should be selected then the aux relay can be used to turn on and off the second priority pump. [Default = Service LED]

Aux. Relay Mode can only be changed in technician level or factory level.

If Fan Type is set to Variable then the next settings normally used for PSC motors can be used for the various options: (Selections include: None, Humidifier, Stage 1, Stage2, Stage3, Freeze LED, Service LED, Low Pressure, High Pressure, High/Low pressure, Lockout LED, RV Opposite, Attention Required, blower on, Heating on and Cooling on.)

Relay Mode setting can only be changed in technician level or factory level.

F1 Relay Mode: [Default = Stage 1]

F2 Relay Mode: [Default = Stage 2]

F3 Relay Mode: [Default = Lockout LED]

Notice

The F3 Relay has been factory set to the Lockout LED. Use this connection to communicate a fault condition to the primary thermostat on Zone #1.

External DHW Input Makes: This is set only if a third party aqua-stat is used. You may also use this input when using a third party infloor heat control to tell the NextEnergy 3-Series system when to start and stop making hot water. Use this feature to tell the board which priority is using the aqua-stat/controls. Options include DHW or AHW.

[Default = DHW]

External DHW Input makes can only be changed in technician level or factory level.

Factory Screen:

Damper Close Delay: Time before damper output will de-energize after zone is satisfied. [Default 4 Seconds]

Loop Pre-flow: Loop pumps will run for this amount of time before compressors will be allowed to come on. [Default = 5 seconds] Should be set to 45 seconds if belimo or any slow open or close water valve is used.

Hi & Low Pressure Lock out settings:

Max Faults: Number of faults allowed with in fault window before lockout.

[Default 5]

Fault Lockout: Time the system will lockout if Max Faults are reached during fault window.

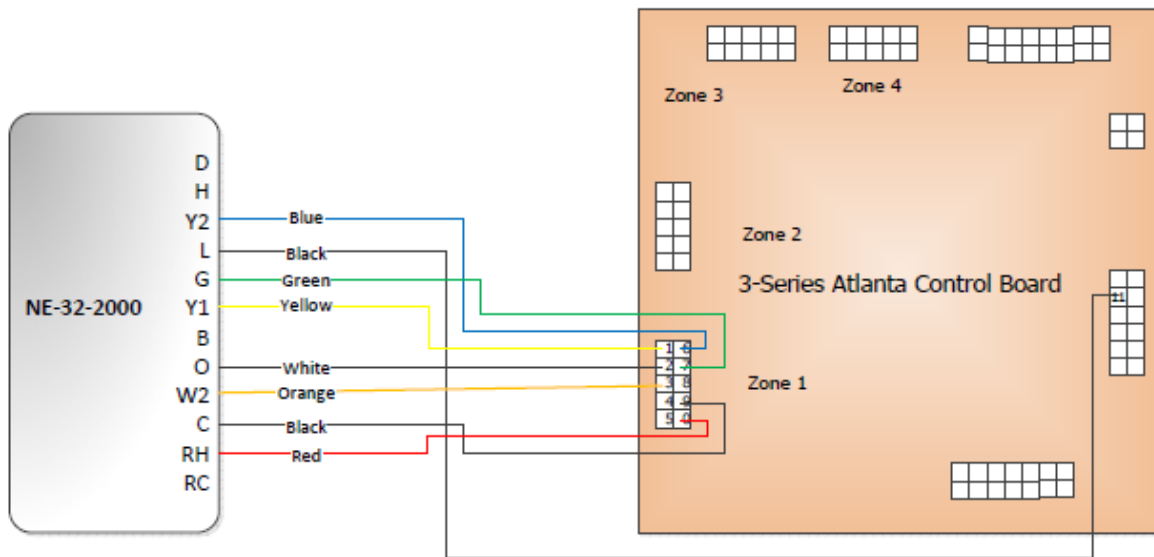
[Default 1 Hour]

Fault Window: Time to remember faults. [Default 45 Seconds]

Lock out settings can only be changed in factory level.

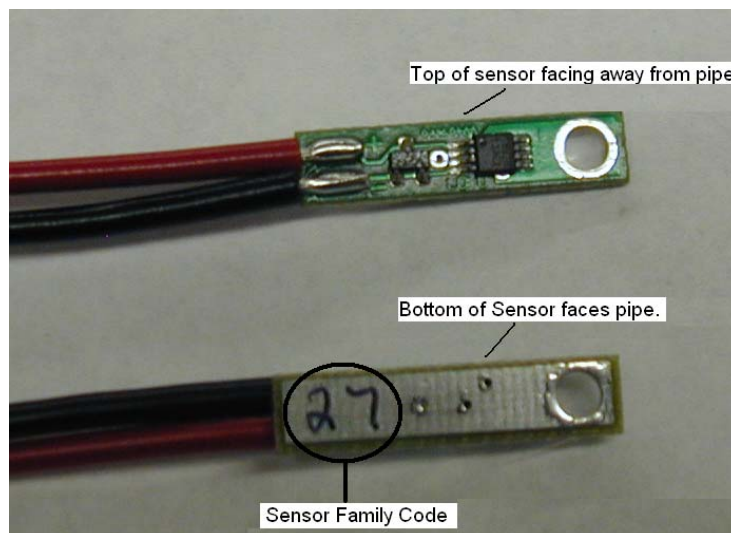
NE-32-2000 Thermostat connected to Controller

The NE-32-2000 thermostat can operate the 3-Series either by itself or in conjunction with multiple thermostats and zone dampers. The diagram below shows a single thermostat wired the controller:



Control board Sensor Identification

<u>Family Code</u>	<u>Description / Location</u>
20	Air Input (Return Air)
21	Air Output (Supply Air)
22	Compressor Suction Line Temp
23	Compressor Hot Gas Line Temp
24	Loop in to system temp
25	Loop out of system temp
26	Freeze Protection Sensor
27	Domestic Hot water Tank
28	Not Used / Free
29	Auxiliary Hot water / Infloor tank



All sensors except the DHW & AHW sensor hook together in a daisy chain to each other. Daisy chain should start with the control board pins #2 and pin 10. Then go through the system to the last sensor. The polarity has to be matched Black to black and red to red.

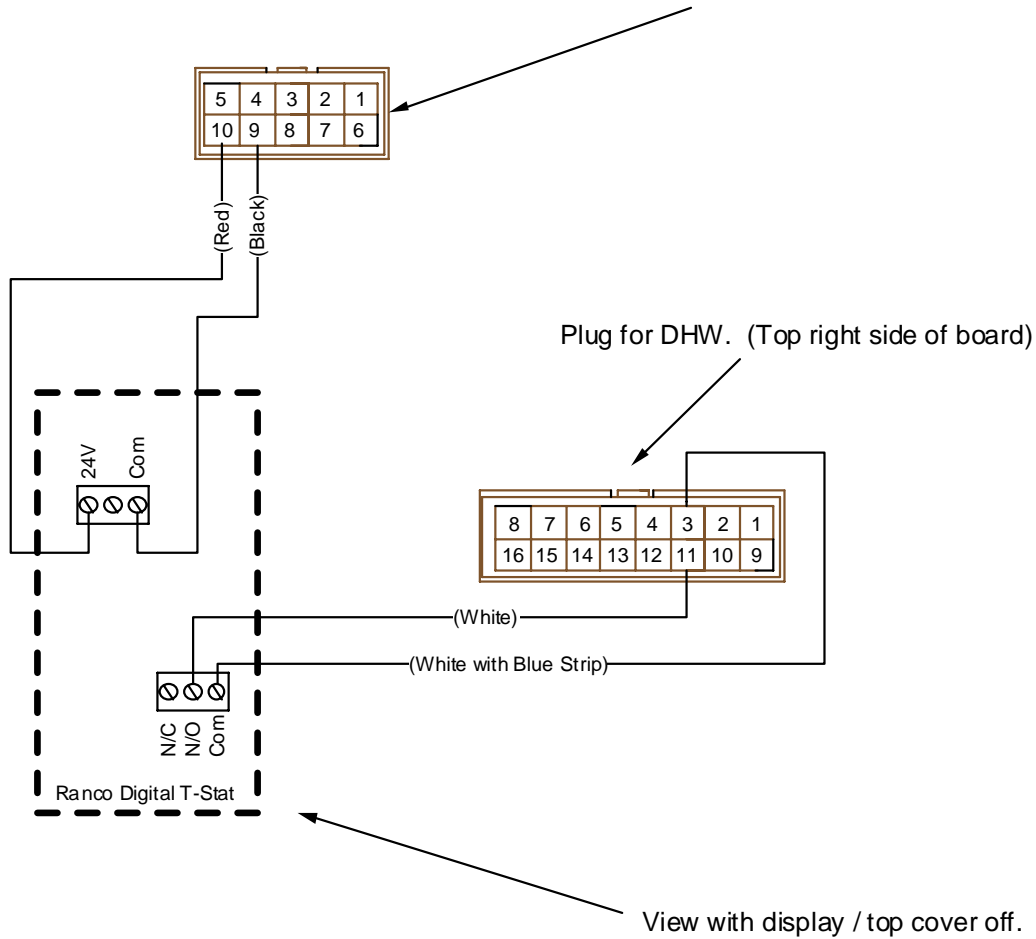
The DHW and / or AHW sensors hook at the start of the daisy chain directly behind the control board. They go through a resistor then a toggle switch to allow turning on and off of the priority. This wiring is done by the factory and brought out to the front of the electrical box to a terminal strip. The field wiring will start at the terminal strip. Polarity is important when hooking up all the sensors.

Find Sensor: *If a sensor is replaced it will not be recognized until a find sensor command is done. This can be done by holding down the RV button on the board. You will see 4 red lights come on indicating you are in find sensor mode. Then the center two red lights will come on and flash one time for each sensor found. After the flashing is complete you can release the RV button.*

On a new unit all the system sensors will be wired and found during test run at the factory. The DHW sensor needs to be properly placed on the water heater and hooked up to the terminal strip on the front of the unit. Insure the sensor is near the bottom element between the tank and insulation and secured.

Optional Ranco Aqua-Stat Hookup

Plug for zone 4. (Top Middle of board)
 If zone 4 is to be used wirenut on with wires to thermostat.
 (Using this plug to get 24 volts to power Ranco)



You may use either the Ranco Aqua-stat or the Georgia Controls Sensor.
 For a standard priority you would never use both.
 Sensor #27 for DHW
 Sensor #29 for AHW

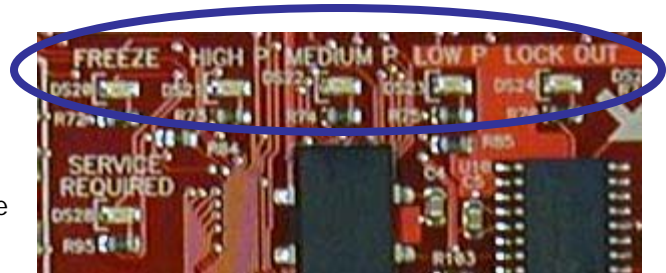
Control Board Status Light Identification

Monitoring the status of the system can be done with the status lights. You will notice two different color lights. Green lights indicate normal inputs and outputs on or off status. Red lights indicate system problem or attention needed.

The small picture on the right shows the bottom right of the control board where some of the system outputs are. Notice the 5 small lights, each indicate if the board is outputting for that device to be on. For example the first light shown is for the Reversing Valve, then HP1 or stage one compressor, and so on. Every input and every output has an indicator light.



The next picture on the left shows some of the system problem lights. These include: Freeze (Freeze condition detected in water coil) High pressure switch, medium pressure switch, low pressure switch, and system lock out. Knowing the location and purpose of the system lights makes service easier in the field.



Control Board Test Buttons

Test buttons can be used to bypass the thermostats and run the system from the unit. This should only be done for test run purposes and only by a qualified service technician.

To enter the test mode press the MODE button. (Located at the bottom left of the control board) This will switch the system into the test mode.

You may now press the RV button to switch from heat to cool.



The STEP button will step up the compressors. From stage one, up to stage three.

If a limit is tripped or a power up timer has the compressors locked out you can reset the timer by pressing the RESET button.

When finished press the MODE button to return control back to the thermostats. The time in test mode is limited to two hours. This is to protect the system from being left in test mode by accident. After two hours the system will automatically switch back to normal operation. You may also reset the power to the unit to remove the system from test mode.

Control Board Plug Identification



Notice on the picture above which is the top of the control board, the small numbers on the sides of the plug for zone 4 Thermostat and damper. These numbers indicate the pin number. The numbering on this plug starts on the top right and goes across then starts back on the bottom right with the number 6 all the way to ten on the bottom left. This is important in recognizing the proper wire on a plug. As you can see on the next plug the same numbering system is used with more pins.

Notice that located next to each plug will be a pin identification showing what pin goes where in abbreviated form. You can see on the picture below for the thermostat and damper plug the pin layout would be as follows:



- 1 = Y1 from the thermostat
- 2 = O from the thermostat
- 3 = E heat or strip heaters from thermostat.
- 4 = Thermostat common
- 5 = Damper Normally closed.
- 6 = Y2 From the thermostat.
- 7 = G from the thermostat.
- 8 = Damper normally open
- 9 = Damper common.
- 10 = R or 24 volts to the thermostat.

The next section describes each plug, number of pin connectors and general location on the board.

Control Board Pin Identification.

(ZONES 1, 2, 3, 4) J7, J5, J1, J2 10-pin connectors: <Left side and top>

Pin #	Name	Wire Colour	Termination
1	Y1	Yellow	T-Stat Y1 (Stage one comp.)
2	O	White	T-Stat O (RV)
3	E	Orange	T-Stat E&W2 (Strips)
4	24VAC COM	Gray	Damper Common
5	Damper NC (Powers to close damper)	White with Blue Stripe	Belimo Damper Terminal #3
6	Y2	Blue	T-Stat Y2 (Stage two Comp.)
7	G	Green	T-Stat G (Fan)
8	Damper NO (Powers to open damper)	White with Black Strip	Belimo Damper Terminal #2
9	24VAC COM	Black	T-Stat Common
10	24VAC (Hot)	Red	T-Stat R (24volt)

(LIMITS & DHW INPUTS) J3 – 16 pin connector: <Top right>

Pin #	Name	Wire Colour	Termination
1	Condensate Pin 1	White with Purple Stripe	Condensate Sensor
2	1 Wire Sensors	Black	1Wire Sensor Black
3	24VAC (Hot)	White with Blue Stripe	To <i>Optional</i> DHW <i>Ranco</i> stat
4	24VAC (Hot)	White with Brown Stripe	To High Limit
5	24VAC (Hot)	White with Black Stripe	To Medium Limit
6	24VAC (Hot)	White with Yellow Stripe	To Low Limit
7	AUX NO	Pink	Aux Relay N/O
8	AUX NC	White with Red Stripe	Aux Relay N/C
9	Condensate Pin 2	Purple	Condensate Sensor
10	1 Wire Sensors	Red	1Wire Sensor Red
11	DHW	White	From <i>Optional</i> DHW <i>Ranco</i> stat
12	PSH	Brown	From High Limit
13	PSM	Tan	From Medium Limit
14	PSL	Yellow	From Low Limit
15	Not Used		
16	AUX Relay Common (normally goes to 24V. Hot)	Red	Aux Relay Common (to 24v. Hot)

(BLOWER & STRIPS OUTPUTS) J6 – 12 pin connector: <Lower Right Side>

Pin #	Name	Wire Colour	Termination
1	24VAC COM	Gray	Pin 3 ECM 16 Pin Connector
2	2 – 6 = 24VAC COM	Gray	
7	FAN PWM	White with Purple Stripe	Pin 10 ECM 16 Pin Connector
8	FAN G	Green (12 vdc)	Pin 15 ECM 16 Pin Connector
9	F1	White with Blue Stripe	
10	F2	White	
11	F3	Black	(default to Lockout LED)
12	E	Orange	To strip heat Contactor

(COMPRESSOR, RV, & PUMPS OUTPUTS) J8 – 14 pin connector: <Bottom Right>

Pin #	Name	Wire Colour	Termination
1	24VAC COM	Gray	From 24 VAC Common
2	24VAC COM	Gray	From Reversing Valve
3	24VAC COM	Gray	From Comp. Contactor 1
4	24VAC COM	Gray	From Comp. Contactor 2
5	24VAC COM	Gray	From Loop Pump Relay
6	24VAC COM	Gray	From DHW Pump Relay
7	Not Used		
8	24VAC (Main Power Input to Controller)	Red	From 24 VAC Hot
9	RV	Black	To Reversing Valve
10	HP1	Orange	To Comp. Contactor 1
11	HP2	Blue	To Comp. Contactor 2
12	P1	Pink	To Loop Pump Relay
13	P2	Purple	To DHW Pump Relay
14	Not Used		

NextEnergy 3-Series/Georgia Controls Microprocessor Sequence of Operation

Using Heat Pump Thermostats (For example the NE-32-2000)

Heat pump refers to a thermostat that has a G call for blower, Y call for stage one compressor, Y2 for stage two compressor and O call for reversing valve.

A priority call is determined by placing a temperature sensor on the hot water tank. This temperature is read into the control board and priority is turned on and off internally in board.



HEATING MODE ALONE

- a. **Stage 1 heating call from zone1 house T-stat**
 - i. Reversing valve de-energized.
 - ii. Fan on low speed. (*Field adjustable*)
 - iii. Loop pump on.
 - iv. DHW pump on if hot gas temperature is hotter then DHW tank.
 - v. Stage one compressor on
 - vi. Stage two compressor off
- b. **Stage 1 and Stage 2 heating call from zone 1 house T-stat**
 - i. Reversing valve de-energized
 - ii. Fan on medium speed. (*Field adjustable*)
 - iii. Loop pump on
 - iv. DHW pump on if hot gas temperature is hotter then DHW tank.
 - v. Stage one compressor off
 - vi. Stage two compressor on
- c. **Stage 1 and Stage 2 heating call from zone 1 house T-stat after a 30 minute stage time delay. (*Stage time delay Field adjustable*)**
 - i. Reversing valve de-energized
 - ii. Fan on high speed. (*Field adjustable*)
 - iii. Loop pump on
 - iv. DHW pump on if hot gas temperature is hotter then DHW tank.
 - v. Stage one and Stage two compressors on.
- d. **Stage 1, Stage 2, and Aux heat Call from zone 1 house T-stat.**

- i. Auxiliary heat will only run after both compressors have ran for field selected time delay. This gives the compressor the opportunity to heat efficiently. Aux heat will run with both compressors.
- ii. Auxiliary heat will begin immediately if the high or low limit trips or only the aux and fan are called for from the t-stat. This would be referred to as emergency heat.
- iii. **Any time there is an Aux heat call the DHW pump will shut off to put 100% of the heat generated into the forced air. The only exception is if there is a priority call and an Aux heat call.**

HEATING MODE WITH PRIORITY HOT WATER CALL

- e. **Stage 1 heat call from zone 1 house T-stat and DHW tank temp below AP start setting.** (default AP start setting = 112)
 - i. Reversing valve de-energized
 - ii. Fan on low speed. (*Field adjustable*)
 - iii. Loop pump on
 - iv. DHW pump on
 - v. Stage one and Stage two compressors on.
- f. **Stage 1 and Stage 2 heat call from zone 1 house T-stat and DHW tank temp below AP start setting.** (default AP start setting = 112)
 - i. Reversing valve de-energized
 - ii. Fan on medium speed. (*Field adjustable*)
 - iii. Loop pump on
 - iv. DHW pump on
 - v. Stage one and Stage two compressors on.
- g. **Stage 1 and Stage 2 heating call from zone 1 house T-stat after a 30 minute stage time delay and DHW tank temp below AP start setting.**
(*Stage time delay Field adjustable*)
 - i. Reversing valve de-energized
 - ii. Fan on high speed. (*Field adjustable*)
 - iii. Loop pump on
 - iv. DHW pump on
 - v. Stage one and Stage two compressors on.

PRIORITY HOT WATER CALL ONLY

- h. **Hot water drops below field selectable AP Start temperature.**
 - i. Reversing valve de-energized
 - ii. Loop pump on

- iii. DHW pump on
- iv. Stage one compressor on.
- v. Stage two compressor off.

i. If Hot water Continues to drop another 4.5° below AP Start Temperature

(The 4.5° is field adjustable with the palm)

- i. Reversing valve de-energized
- ii. Loop Pump on
- iii. DHW pump on
- iv. If AP max stage = 1 then Stage one on and Stage two compressor off.
- v. If AP max stage = 2 then Stage one off and Stage two compressor on.
- vi. If AP max stage = 3 then Stage one and Stage two compressor on.

(The AP max Stage is a field adjustable setting with the palm)

COOLING MODE ALONE

a. Stage 1 cooling call from zone 1 house T-stat

- i. Reversing valve energized
- ii. Fan on low speed. (Field adjustable)
- iii. Loop pump on unless DHW temperature is less then AP Stop temp.
- iv. DHW pump on if hot gas temperature is hotter then DHW tank.
- v. Stage one compressor on
- vi. Stage two compressor off

b. Stage 1 and Stage 2 cooling call from zone 1 house T-stat

- i. Reversing valve energized
- ii. Fan on medium speed. (Field adjustable)
- iii. Loop pump on unless DHW temperature is less then AP Stop temp.
- iv. DHW pump on if hot gas temperature is hotter then DHW tank.
- v. Stage one compressor off.
- vi. Stage two compressor on.

c. Stage 1 and Stage 2 cooling call from zone 1 house T-stat after a 30 minute stage time delay. (Stage time delay Field adjustable)

- i. Reversing valve energized
- ii. Fan on High speed. (Field adjustable)
- iii. Loop pump on unless DHW temperature is less then AP Stop temp.
- iv. DHW pump on if hot gas temperature is hotter then DHW tank.
- v. Stage one and Stage two compressors on.

COOLING MODE WITH PRIORITY HOT WATER CALL

- d. **Stage 1 cooling call from zone 1 house T-stat and DHW tank temp below AP Start setting.** (*default AP start setting = 112*)
 - i. Reversing valve energized
 - i. Fan on low speed. (Field adjustable)
 - ii. Loop pump off until med limit trip or Priority satisfied.
 - iii. DHW pump on
 - iv. Stage one compressor on.
 - v. Stage two compressor off.
- e. **Stage 1 and Stage 2 cooling call from zone 1 house T-stat and DHW tank temp below AP Start setting.** (*default AP start setting = 112*)
 - i. Reversing valve energized
 - i. Fan on medium speed. (Field adjustable)
 - ii. Loop pump off until med limit trip or Priority satisfied.
 - iii. DHW pump on
 - iv. Stage one compressor off.
 - v. Stage two compressor on.
- f. **Stage 1 and Stage 2 cooling call from zone 1 house T-stat after a 30 minute stage time delay and DHW tank temp below AP Start setting.**
 - i. Reversing valve energized
 - vi. Fan on High speed. (Field adjustable)
 - vii. Loop pump off until med limit trip or Priority satisfied.
 - viii. DHW pump on.
 - ix. Stage one and Stage two compressors on.

ZONING CONTROL

- a. **Zone one T-stat calling for stage one cool and Zone two t-stat calling for stage one cool.**
 - i. System will start in stage one cool and blower in low speed.
 - ii. Zone one and Zone two damper will open
 - iii. Zone three and Zone four damper will close
- b. **Zone one T-stat calling for stage two cool and Zone two t-stat calling for stage one cool.**
 - i. System will stage up to stage two cool and blower in medium speed.
 - ii. Zone one and Zone two damper will open.

iii. Zone three and Zone four damper will close.

c. Zone one T-stat calling for cool & zone two T-stat calling for heat

- i. **NextEnergy 3-Series** system starts in field selected system priority mode.
- ii. If heat mode is system priority then zone one, zone three and zone four dampers will close and zone two damper will open
System priority selectable from Heat, Cool, or Zone #

ZONE STAGE CAPACITY / LIMITING

- a. The above sequence of operation assumed that all zones were set to a stage capacity of 3.
- b. Each zone can be set to a stage capacity which is the limit of what stage the compressor can run at for that zone. For example if Zone 1 is set to a stage capacity of 1 and it is the only zone calling the system could never stage up out of stage 1.
- c. If Zone 1 and Zone 2 are both set to a stage capacity of 1 and are both calling for heat the stage capacity will add together and the system would be allowed to stage up into a max stage of 2.
- d. Each zone is adjustable from 0 – 3 for its max stage capacity. A setting of .5 would not allow a zone to turn on a compressor if it was the only zone calling but would allow it to add with another zone if they both called for the same mode.

Zone Stage Capacity / Limiting is very useful for those small zones that do not have large enough duct to run the system in higher speeds.

Electrical Data

If unit has an auxiliary heater installed, two power supplies are required. One supply for the compressor section and the other for the auxiliary heat supply. Dual systems over 6 ton may have a third power supply run for second compressor. Match the power wire size to the breaker size.

Suggested wire and breaker sizes for various equipment size

UNIT SIZE	UNIT RATING	RATED VOLTAGE	FLA	BREAKER SIZE	SUPPLY WIRE SIZE	**BREAKER SIZE	**WIRE SIZE UP TO 100'
1 TON	1SP/1PH	208/230	10.1	20 AMP	#12/2 WG	-	-
1½ TON	1SP/1PH	208/230	12.9	20 AMP	#12/2 WG	-	-
2 TON	1SP/1PH	208/230	14.1	30 AMP	#10/2 WG	-	-
2½ TON	1SP/1PH	208/230	17.6	30 AMP	#10/2 WG	-	-
	1SP/1PH	208/230	21	40 AMP	#8/2 WG	-	-
3 TON	1SP/3PH	208/230	14	20 AMP	#12/2 WG	-	-
	3SP/1PH	208/230	21	40 AMP	#8/2 WG	-	-
	1SP/1PH	208/230	24	40 AMP	#8/2 WG	-	-
3½ TON	1SP/3PH	208/230	16.1	20 AMP	#12/2 WG	-	-
	3SP/1PH	208/230	20.4	40 AMP	#8/2 WG	-	-
	1SP/1PH	208/230	26	40 AMP	#8/2 WG	-	-
4 TON	1SP/3PH	208/230	17.8	20 AMP	#12/2 WG	-	-
	3SP/1PH	208/230	23.5	40 AMP	#8/2 WG	-	-
	1SP/1PH	208/230	30.8	50 AMP	#6/2 WG	-	-
4½ TON	1SP/3PH	208/230	19.1	30 AMP	#10/2 WG	-	-
	3SP/1PH	208/230	26.5	50 AMP	#6/2 WG	-	-
	1SP/1PH	208/230	35.8	50 AMP	#6/2 WG	-	-
5 TON	1SP/3PH	208/230	24.4	30 AMP	#10/2 WG	-	-
	3SP/1PH	208/230	30.4	50 AMP	#6/2 WG	-	-
6 TON D	3SP/1PH	208/230	14.1/26.0	*30/40	*#10/2-#8/2	50 AMP	# 8/2 WG
6½ TON D	3SP/1PH	208/230	17.6/26.0	*30/40	*#10/2-#8/2	50 AMP	# 8/2 WG
7 TON D	3SP/1PH	208/230	14.1/35.8	*40/50	*#8/2-#6/2	60 AMP	# 6/2 WG
8 TON D	3SP/1PH	208/230	21.0/35.8	*40/50	*#8/2-#6/2	70 AMP	# 6/2 WG
10 TON D	3SP/1PH	208/230	35.8/35.8	*50/50	*#6/2-#6/2	90 AMP	# 4/2 WG

NOTE: UNITS NOTED BY "D" INDICATES 2 ELECTRICAL CIRCUITS ARE USED.

* Based on providing a separate power supply for each compressor, or power supply from sub breaker to each compressor

** Based on providing a large single power supply to the sub breaker panel at unit where a separate power circuit (indicated in shaded area above) is ran to each compressor contactor. (Dual units only)

3-Series Start-Up Procedure

Connection Check List

- Main power to heat pump (and auxiliary heat, if applicable) is connected and all breakers labeled. Dual compressors 6 ton and above will require two power supplies for compressors.
- KWh meter installed to meter all usage except auxiliary heat.
- Thermostats connected and wired to proper zone.
- All dampers (if applicable) connected and wired to proper zone.
- Closed loop or well water supply connected with no leaks.
- Supply and return connected (using mastic) and filter installed.
- Condensate drain and P-trap connected and run to a drain.
- Hot water lines (if applicable) connected and insulated with no leaks

Start-Up Check List

- If closed loop system, make sure loop is purged and auto purge is filled to 3" from top of tank and all valves are open.
- If closed loop with multiple units on one loop, make sure check valves are installed on all units and makeup water is turned on or auto purge on highest unit is open.
- If open loop system, make sure well has pressure (20PSI – 50 PSI) and all valves are open. Make sure water stops when system is off.
- Make sure all air is purged from hot water loop lines. A dry pump will quickly burn up.
- Make sure all supply and return grills are installed and unrestricted.
- Make sure all service panels to air chamber are secured to unit.

Start Unit

- Turn on main power.
- Set thermostat and turn on.
- Check to ensure compressor is running (after power up time delay).
- Check that auxiliary heat (if applicable) is pulling proper amperage.
- Check for air flow.
- Check for water flow.
- Check hot water loop for water circulation.
- Install refrigerant gauges and check for proper refrigerant pressures.
- Check for proper superheat. As mentioned earlier in this manual.
- Check water flow:
 - If well water system, should be approximately one gallon a minute per ton if entering water is 55 – 60°F.

- If closed loop system, you will need to check the temperature of the water in and out. This should not exceed a 10° difference.
- If closed loop with 3 phase pump, insure correct pump rotation.
- Reinstall all panels.
- Set thermostat to desired temperature.

TroubleShooting

- Water around base of unit
 - Water line leaking
 - Find and repair water line leaking
 - Condensate from water coil or accumulator.
 - Insulate items sweating
 - Water around condensate pan
 - Check for algae. Blow out restriction in condensate pipe.
 - Check for hole in condensate pan
 - Air coil freezing.
 - Check for dirty air filter
 - Check for dirty air coil
 - Check system refrigerant.
- Noisy Operation
 - Normal after recharging unit or adjusting system
 - Check vibration absorbers under system.
 - Loose or defective fan motor.
 - Loose or defective blower housing
 - Foreign material in blower housing
 - Refrigerant line vibrating
 - Duct work leaking or loose duct work
 - Excessive water pressure on well causing a thumping noise (Well water systems only)
 - Reduce water pressure to 20 – 40 psi
 - Install 25 lbs pressure reducer on well water supply line.
 - Defective compressor (internal damage)
- Insufficient air flow
 - Leaks in duct work or duct collapsed.
 - Dampers and / or registers closed
 - Clogged air filter
 - Dirty air coil.
 - Blower motor speed too low. Speed up blower speed. (On single speed heat pumps only.)
- Too much air flow

- Filters not in place
- Registers or grills not installed
- Insufficient static pressure
- Blower motor speed too high. Slow down blower speed. (On single speed heat pumps only)
- Fan runs continuously, compressor inoperative
 - Thermostat fan selector turned to “Fan on” position
 - Defective fan relay
 - Defective thermostat or thermostat wiring.
- Unit inoperative
 - No power to unit. Check Breakers, fuses and disconnects to restore power.
 - No low voltage 24-volt power. Check Transformer.
 - Defective limit switch
 - Defective Control wiring or defective thermostat.
- Fan operates, but compressor inoperative. (Compressor has been off for more than five minutes.)
 - Thermostat not set properly.
 - Bad thermostat wiring or bad thermostat.
 - Defective compressor contactor.
 - Defective compressor capacitor
 - Defective compressor time delay
 - Defective relay on microprocessor. Replaced microprocessor
 - Defective compressor
 - Loose low voltage control wire in system
- Fan operates, compressor runs for only short amount of time then shuts off.
 - Operating pressures too high and / or high pressure limit tripping (Cooling)
 - Lack of water flow or water too hot.
 - System over charged.
 - Bad expansion valve.
 - Operating pressures too high and / or high pressure limit tripping (Heating)
 - Lack of airflow. Dirty air filter, dirty air coil, dampers or vents closed, duct collapsed or blower bad.
 - System over charged.
 - Bad expansion valve.
 - Operating pressure too low and / or low pressure limit tripping (Cooling)
 - Lack of air flow.

- System low on refrigerant.
 - Bad expansion valve.
 - Operating pressure too low and / or low pressure limit tripping (Heating)
 - Lack of water flow
 - System low on refrigerant
 - Bad expansion valve
 - Freeze switch activating (Well water systems only / Heating mode only)
 - Lack of water flow.
 - Water too cold
 - Freeze switch out of calibration or bad.
 - System low on refrigerant.
 - Compressor thermal overload tripping out. (Compressor very hot)
 - Limit switch bypassed
 - Reversing valve half switched.
 - Bad expansion valve.
 - Compressor defective. (Bad valves)
- Fan operates, compressor runs but no heating.
 - System iced up.
 - System not getting enough water or water too cold.
 - System low on refrigerant.
 - Reversing valve not switching all the way. Check the refrigerant temperatures entering and exiting the reversing valve.
 - Bad expansion valve.
- Fan operates, compressor runs but no cooling.
 - System iced up.
 - System not moving enough air or air is too cold.
 - System low on refrigerant.
 - Reversing valve not switching all the way. Check the refrigerant temperatures entering and exiting the reversing valve.
 - Bad expansion valve.
- Reversing valve will not switch
 - No voltage to solenoid. (cooling mode only) Check wiring and Thermostat
 - Bad reversing valve solenoid (cooling mode only)
 - Stuck valve. Tap on valve with hammer. If it still will not switch replace valve.

