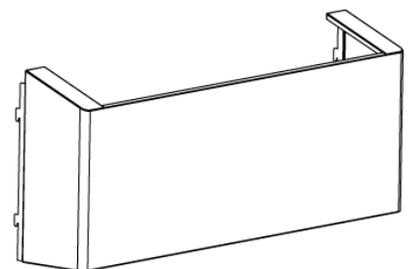
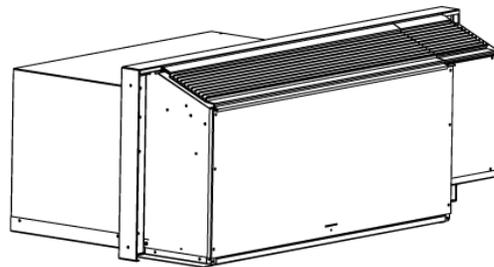
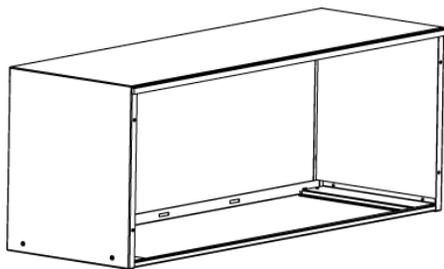
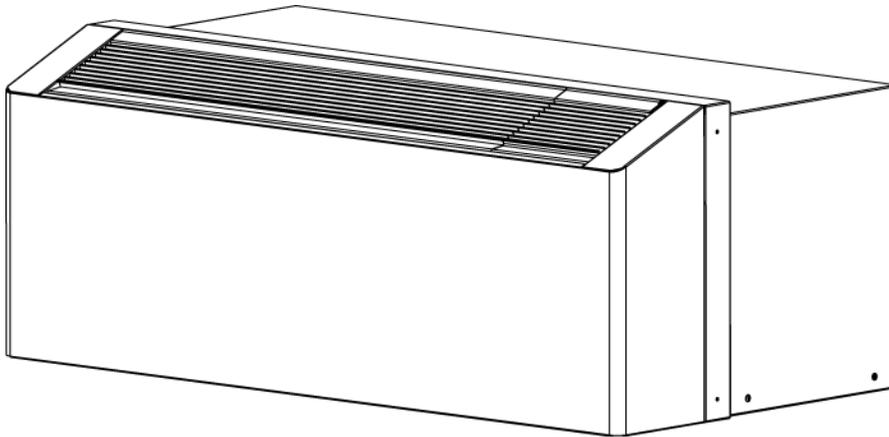


NAWC SERIES UPFLOW PACKAGED TERMINAL AIR CONDITIONER (PTAC)

Cooling with Hot Water or Steam Heating

INSTALLATION & OPERATION MANUAL



IMPORTANT:

READ AND SAVE THESE INSTRUCTIONS. INSTALLATION AND WIRING MUST BE IN ACCORDANCE WITH CEC, NEC AND LOCAL ELECTRICAL CODES.

GENERAL INFORMATION

This model NAWC Applied Comfort PTAC is designed and built for through-the-wall installation in either new or existing buildings. The self contained compressor and refrigerant system delivers the cooling, and the tube-and-fin heat exchanger in the subbase provides the heating by hot water or steam sources.

WARNING: To avoid property damage, bodily injury or death, ensure power is disconnected before any service is attempted. Repairs should be made by qualified service personnel only. The chassis must be installed in accordance with the Authority Having Jurisdiction, and all Local and National Codes, including the National Electrical Code, and the Canadian Electrical Code, as applicable.

FOR EFFICIENT OPERATION

Air Filter

The washable air filter is not shipped with the chassis – it is shipped installed in the heating sub-base. Operating the unit without an air filter will void the warranty. Keep air filter clean. The air filter can be removed and cleaned with soap and water. Inspect and clean the filter a least once a month or more often as conditions dictate. Replace as necessary. A dirty, clogged filter reduces the efficiency of the system. It can also cause erratic performance of controls and can result in damage to the motor and compressor.

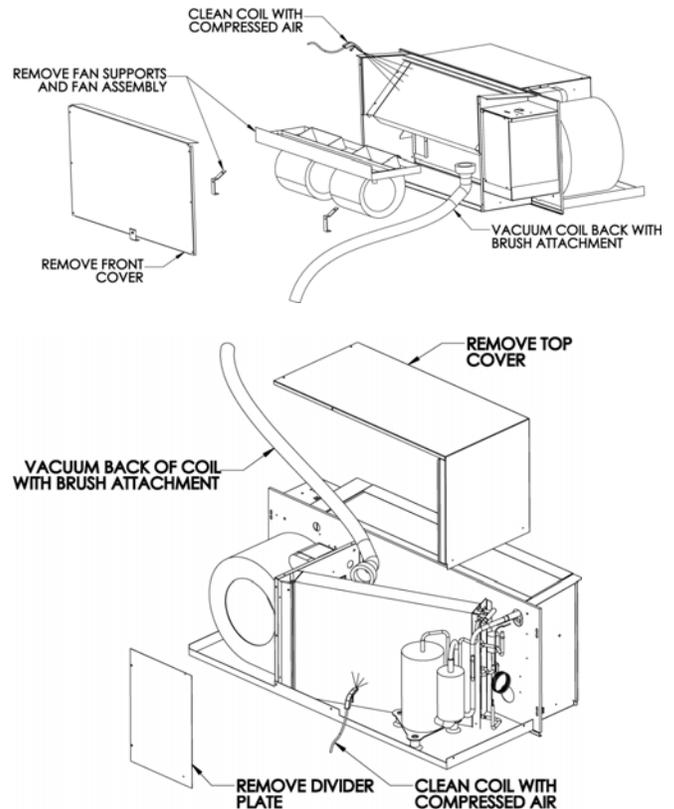
ATTENTION: An improperly maintained air filter or not using an air filter at all will void the warranty. The unit must not be used for temporary heating or cooling during the building's construction stage.

To access the air filter, first remove the grille cover from the heating subbase by rotating the two ¼ turn finger and thumb fasteners until the grille cover releases. The unit front panel need not be removed. The air filter is located directly below the heat exchange coil and slides out freely. Always replace the grille cover after re-inserting the filter.

CAUTION: Risk of bodily injury. Be aware that the heating coil, valve, and piping may be extremely hot and can potentially cause burns even if the unit is not in operation, due to residual heat. Always replace the grille cover after re-inserting the filter before operating the unit.

Clean Coils

As part of regular servicing, clean the condenser coil, and evaporator coil at least annually, or more often as dictated by the severity of the particulates and pollutants circulating in the outdoor and indoor operating environments. One suggested method is as follows:



Unimpeded Outdoor Airflow

Do not block off the outside air flow to the unit. The condenser air inlet and outlet must be free of obstructions and of any external influence that would cause the hot discharged condenser air to be re-circulated back into the outdoor blower intake. Outdoor air is drawn into the outdoor blower on the left side of the rear grill (viewing grille). Hot condenser air is forced sideways out of the right hand portion of the rear grill, minimizing air re-circulation back into the blower intake. Paper, leaves, dirt, or other material blocking airflow, or fouling the condenser coil surface, can impair efficiency and cause serious damage to the compressor.

Oiling

The motors are permanently lubricated; no re-oiling.

Unimpeded Indoor Airflow

Ensure that drapes, bed, bedspread, and furniture etc. do not block the indoor air discharge and intake air openings, causing a restricted air flow through the indoor air handling section of the unit. Do not place articles on discharge grille – especially liquids.

Reducing Load

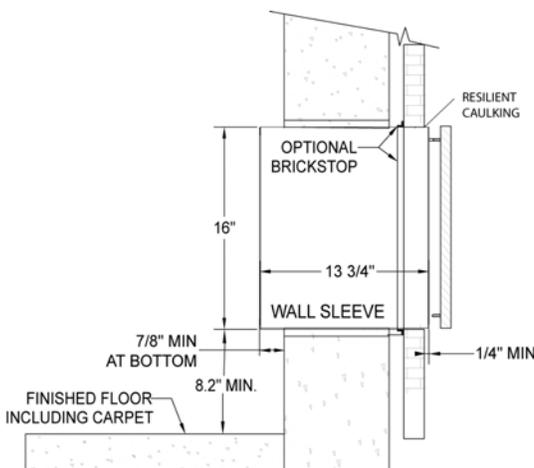
To reduce the cooling load, draw drapes or blinds in the summer, to reflect direct rays from the sun.

To reduce the cooling and heating load, keep windows and doors closed when operating the unit.

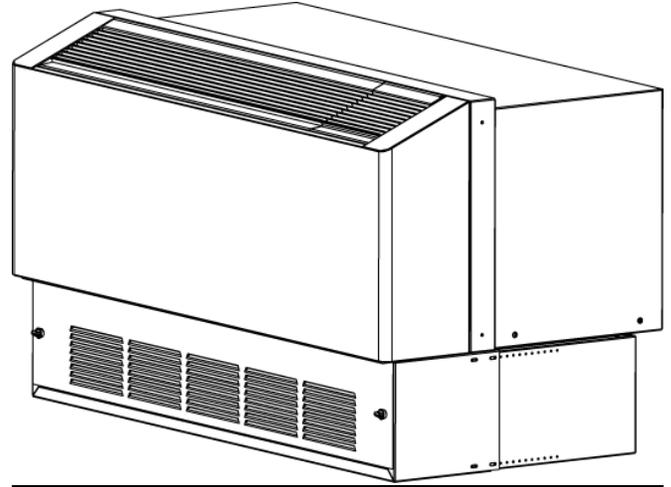
WALL SLEEVE CONSIDERATIONS:

The wall sleeve must be installed in strict accordance with the wall sleeve installation instructions, supplied with the wall sleeve. For compatibility with the heating sub-base, the bottom front edge of the wall sleeve must penetrate into the room by at least 0.875 inches past the finished wall surface, and the bottom of the sleeve must be between 8.2 and 9.2 inches off the finished floor.

IMPORTANT: The wall sleeve must be installed so that the bottom of the sleeve has a 1/8" per foot slope downward toward the outside to ensure proper water drainage out the back edge of the sleeve during overflow conditions. The specified slope corresponds to a 1/8 bubble on a carpenter's level. The wall sleeve must also be level from side-to-side.

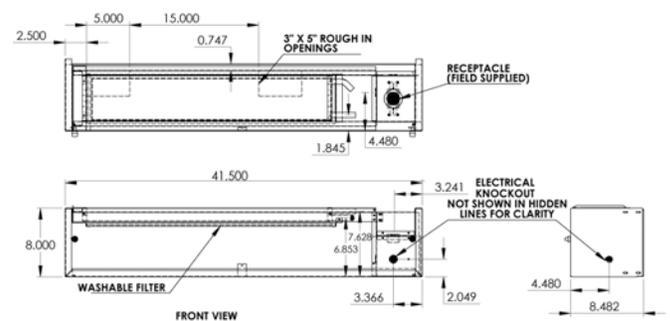


HEATING SUB-BASE



The heating subbase contains a tube-and-fin heat exchanger that is configured for the use with hot water or steam as the heating medium. The subbase also houses the field-supplied electrical receptacle and provides mechanical protection for the cord and plug. The subbase measures 8" high without leveling feet, and with the leveling feet allows adjustability from 8.2 to 9.2" high off the finished floor surface.

Electrical and plumbing rough-in can be done either through the back of the heating sub-base or through the openings provided in the bottom of the sub-base.

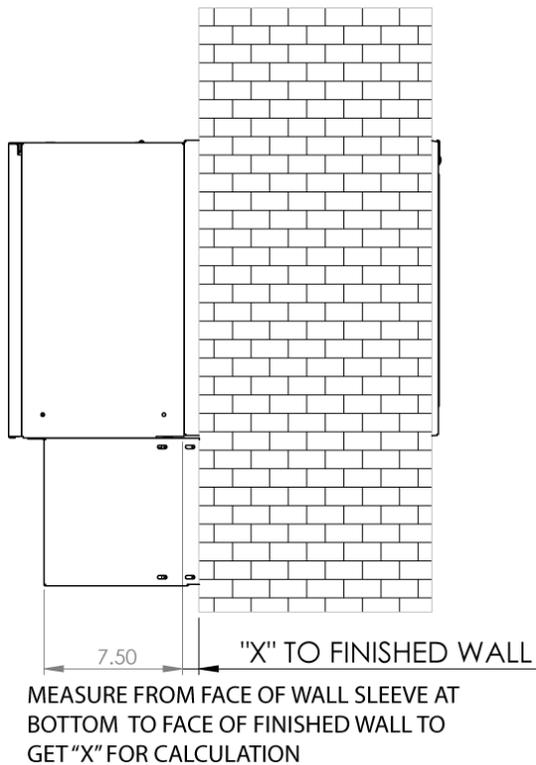


Telescoping Side Channels

Telescoping side channels close in the gap between the subbase and the wall. The further the wall sleeve penetrates into the room, the larger the gap to fill will be. The side channels have slotted holes and are reversible to enable practically infinite adjustability within the range from zero to 10.75 inches of gap fill, without having to cut or break off any sections.

Adjust the side flanges as follows:

Measure the penetration of the **bottom** of the wall sleeve into the room relative to the finished wall surface, and record as "x". Remove the grille cover from the heating subbase by rotating the two ¼ turn finger and thumb fasteners until the grille cover releases. The total side length of the heating subbase (cover removed) plus side channel closure is calculated as 7.5 + "x". Insert the side channels and secure with the screws provided, set at the total side length calculated. Center the subbase under the wall sleeve opening and adjust the levelling feet to the anticipated correct height. Final height adjustment can be made after the wall sleeve is permanently installed. At that point, the flanges of the side channels can be screwed to the finished wall from inside the sub-base if desired, to anchor the entire heating sub-base assembly in place. The bottom of the wall sleeve will end up overlapping the sub-base by about 0.875 inches.



Plumbing Connections:

The heating coil is supplied with 5/8" O.D. (actual diameter) copper tubing connections. Hot water heating typically requires a Normally Open (NO) water valve, and steam usually requires a Normally Closed (NC) steam valve. The NFWC unit 24 VAC control output to the valve is factory set for NC but can be field-converted to NO duty as described in Section *Heating/Cooling Chassis Installation*.

Remove the cover plate on the right hand side of the heating coil to provide better access to the copper connection tubes. Always pipe the valve to the supply connection. If the heating medium is hot water, connect the valve "outlet" (Supply) to the lower connection and the Return water to the upper connection. If the heating medium is steam, connect the valve "outlet" (Supply) to the upper connection and the Return to the lower connection. Route the steam or water source to the valve's "inlet" connection.

Install the piping, valve, and accessories (as specified by the design engineer) in the space available under the heating coil.

ELECTRICAL WIRING AND RECEPTACLE

Wire Sizing

A single outlet branch circuit from the main electrical panel to the receptacle in the subbase should be used. Wire sizing shall be in accordance with the minimum circuit ampacity as declared on the unit Rating Plate for the specific chassis. Wire sizing must also take into account any distance from fuse box or breaker panel to receptacle to prevent excessive voltage drop in undersized wires.

IMPORTANT: Low voltage to the unit will cause compressor starting problems and decrease the performance and reliability of the compressor.

Branch Circuit Protection

The Current Rating of branch circuit protection using a Time Delay Fuse or HACR circuit breaker should also be as declared on the unit Rating Plate for the specific chassis being installed.

Plug and Receptacle

All 230-208 Volt units are normally furnished with a NEMA 6-20P, 20 Amp non-locking plug, and hence will require a NEMA 6-20R receptacle to be installed in the heating subbase.

All 115 Volt units are furnished with a NEMA 5-15P, or 5-20P non-locking plug as applicable. The respective plug will require a NEMA 5-15R or combination 5-20R receptacle to be installed in the heating subbase.

All 277 Volt units are furnished with a NEMA 7-20P, 20 Amp non-locking plug, and hence will require a NEMA 7-20R receptacle to be installed in the heating subbase.

NOTE: These installations are not “cord connected” units; they are permanently connected per the National Electrical Code. The plug and cord are considered to be a “connector of convenience” in order to facilitate easy removal of the chassis for servicing. The plug and cord are suitably protected within the heating subbase.

WARNING: To avoid property damage, bodily injury or death, the unit must be used on a grounded power supply only. The unit will be grounded through the service cord plug and matching receptacle as long as the branch circuit remains grounded.

DO NOT:

- Change the length of the cord.
- Bend the connector blades or otherwise alter service cord plug configuration.
- Use extension cords.

Wiring to Subbase

Remove the junction box cover plate. Punch out the appropriate knock-out and anchor the electrical supply conduit to the junction box. Connect the power supply wires to the receptacle. Be sure to properly ground the electrical supply to the subbase and the receptacle using the two *Green with Yellow Stripe* ground leads provided. Mount the receptacle with the designated screws and re-install the junction box cover plate.

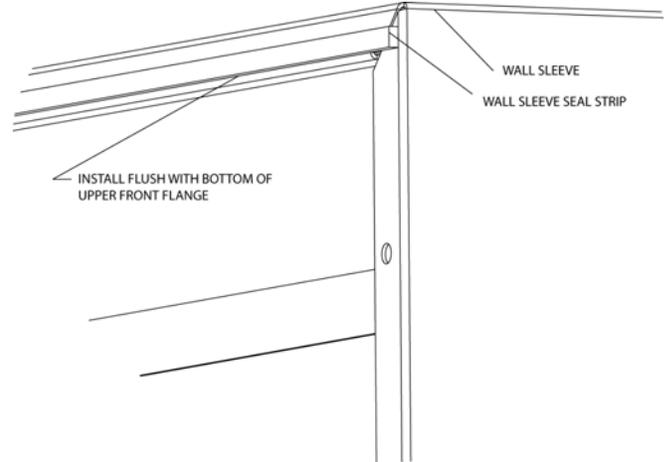
CHASSIS INSTALLATION

Unpack heat/cool chassis from shipping carton. Check for any shipping damage. Spin the fan wheels manually to confirm free rotation. Inspect refrigerant piping to ensure there is no damage or potential chafing. Report any shipping damage to the carrier immediately.

Check the interior of the installed wall sleeve. Clean out any dirt or debris that may have accumulated. Replace any air seals that are damaged or missing, if applicable.

Heating/Cooling Chassis Installation

1. **Locate the wall sleeve seal shipped with the unit and apply it to the top front flange of the wall sleeve, running even with the bottom edge of the flange (see illustration).**

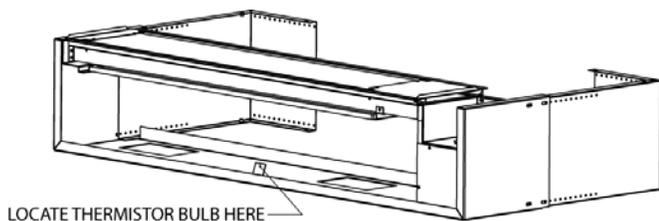


2. The chassis must be level from side-to-side and sloped toward the outdoors from front-to-rear in the order of 1/8 inch per foot, once the chassis side flanges are drawn up tight to the wall sleeve using the four flange screws. A chassis slope downward (backward toward the room) from outdoor-to-indoor side is not permissible and must be corrected before the unit is operated.
3. There are vertical air seals at the rear of the unit that surround the condenser outlet that will engage and “seal” against the rear grille. However, in some cases, such as when an extra deep wall sleeve is used, or some other variation is encountered that prevents the air deflectors from sealing against the outdoor grille, then steps must be taken to add anti-recirculation baffles to prevent hot condenser air from short-circuiting back into the air intake/outdoor blower inlet via the void space created in behind the outdoor grill.
4. With the front panel removed, position the chassis in the wall sleeve cabinet and slide into place. Keep the chassis level, square, and centered to prevent binding. Push from the ends of the front cover where they attach to the coils support, **DO NOT** push from the electrical box cover or the middle of the front cover. The chassis must be pushed into the wall sleeve until the side flange seals of the chassis engage the sleeve. Alternately tighten each of the four draw screws until the chassis is drawn snugly into the sleeve. Do not over-tighten the draw screws.

5. Locate the 24 Volt wiring harness either coiled beneath the control box or shipped loose with the unit. The harness is used to make connections to the aquastat. It is also employed if a remote 24 Volt AC wall thermostat will be used. Connect the multi-wire 24 volt wiring harness to the mating plug protruding beneath the control box, as applicable, and follow the detailed instructions on the wiring diagram affixed to the specific unit being installed. Insulated crimp-on connectors are provided at the end of every connection lead to facilitate connections/insulation. **If an aquastat will be not be used, you must connect the ends (blue/orange) of the aquastat leads together to permanently complete the aquastat circuit.**
6. A 24 VAC water or steam valve output connector is also provided under the control box. A mating connector and 3 feet of wire leads are supplied to connect to a 24 VAC valve. The units can accommodate a normally-open NO or a normally-closed NC valve. The NO/NC switch is located in the high voltage wiring compartment as a DIP switch on the electronic control board, and is factory set to NC. The setting can be changed to NO in the field by qualified service personnel.

WARNING: The NO/NC conversion procedure involves exposure to high voltage electrical circuits in the control box in order to make the necessary change to the DIP switch, and must be performed by qualified service personnel. Failure to do so could result in property damage, personal injury or death. Disconnect electric power to the unit before servicing.

7. Locate the indoor air thermistor bulb at the end of the black thermistor wire with clamp coiled beneath the control box. The bulb and clamp must be relocated to the thermistor holder in the bottom of the heating subbase so it is sure to sense true return air temperature, and not air that has been heated by the heating coil. Use the clamp provided to secure the bulb in place.



IMPORTANT: To avoid damaging the indoor thermistor wire, always remove the thermistor from the clamp holder before removing the chassis for service.

IMPORTANT: Operating the unit without the filter in place can damage the unit, and void the warranty. Always remember to re-install the filter after servicing the chassis, or replacing/cleaning the filters.

8. Wipe unit cabinet/wall sleeve to remove dirt, etc.
9. Lock the front panel on by inserting the tabs into the corresponding slot and sliding the front cover down until it seats.
10. The unit is now ready for operation, when supplied with power from the distribution panel and wired to a remote thermostat (if applicable).

START-UP CHECKLIST

Note: Once the unit is installed, it should be checked for proper function by qualified service personnel before turning it over to the User.

- Circuit breakers, wire size, and electrical connections tight and correct
- Filter clean and properly in place
- Condenser air inlet and outlet free of obstructions and no short-circuiting of condenser air
- Unit operated for 20 minutes to prove stability
- Controls operation OK
- Unit installed in compliance with all codes and ordinances
- All panels in place and secured with required fasteners
- Mylar overlay applied to cover up touch pad for 24 Volt Remote Thermostat installations.
- Work area clean and free of debris
- Owner or operator instructed on control operation and routine maintenance.

USER CONTROLS - GENERAL

NAWC series is available with advanced-function electronic controls with membrane switch type keypad.

ELECTRONIC CONTROLS

The chassis incorporating electronic controls is factory-shipped with an active keypad control and display mounted directly to the control panel. The unit functions are controlled by the user by pressing the keys on the keypad, and reading the display. However, the unit also has the latent ability to be field-converted by qualified service personnel for use with a field-supplied 24 volt AC wall thermostat. These instructions will address both unit-mounted control operation, and remote 24 volt AC wall thermostat operation.

CONTROL AT THE UNIT, KEYPAD/DISPLAY

THE KEYPAD CONTROL

Become familiar with the keypad keys as shown in Figure 1.

Display

Red light emitting diodes (LEDs) display the actual temperature of the air entering the unit at floor level. The display can also be used to indicate the desired set point temperature for room comfort. It is important to remember that the temperature displayed is the temperature sensed at the unit's indoor air inlet and can be significantly different from the bulk room temperature at a distance from the unit.

On/Off Key

Each press of the key toggles the unit from an OFF state to an ON state or from an ON state to an OFF state. Heating and cooling functions, as well as the display, and all indicating LEDs except for the fan indicators, are enabled or disabled with this key. When toggled OFF, the control preserves only two modes active; fan-only, and room freeze protection.

Fan Key

Each press of the Fan Key cycles the fan through three modes of operation; Low Speed, High Speed and Auto. Small green LEDs will indicate the mode. The On/Off key need not be ON to operate the fan and set fan speeds. Auto Mode will cycle the fan on and off, and determine the fan speed, in conjunction with the heating or cooling demand.

Warmer Key

Pressing the Warmer Key will cause the display to show the set point temperature for 3 seconds, and then increases room temperature by 1 degree for every subsequent press of the key.

Cooler Key

Pressing the Cooler Key will cause the display to show set point temperature for 3 seconds, and then decreases room temperature by 1 degree for every subsequent press of the key

°F/°C Key

This key toggles the display between Fahrenheit and Celsius temperature modes, and affects all displayed temperatures.

Heat Key

The Heat Key toggles the unit in and out of heating mode for every press of the key, provided the On/Off Key is ON.

Cool Key

The Cool Key toggles the unit in and out of cooling mode for every press of the key, provided the On/Off Key is ON.

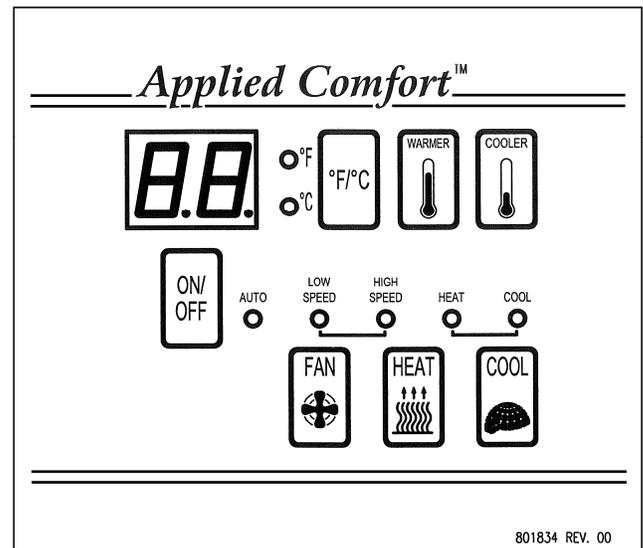


Figure 1

OPERATION USING KEYPAD

When the unit is first plugged in, or when recovering from a power outage, there will be a random 5 to 15 second delay before the electronic control powers up. This minimizes the large electrical surge that would otherwise occur if all units in a building started up at the same time.

To Initiate Heating or Cooling Mode

Press On/Off Key to turn on the LED display and commence full functionality. Push the °F/°C Key to obtain the desired temperature scale. Press the Heat or Cool key as applicable, and the current indoor temperature will be shown on the display.

Set Desired Temperature

Press Cooler or Warmer key as applicable. Each push of the key increases or decreases the set point temperature by 1 degree, as applicable.

Set Fan Mode

Press Fan key to cycle through the fan settings as indicated by the small green circular LEDs. Select continuous High Speed fan, continuous Low Speed fan, or Intermittent Fan by selecting Auto. Auto cycles the fan on and off with the calls for heating or cooling. Auto also sets fan speed according to the amount of heating or cooling demanded. In Auto mode, the fan will start up periodically to establish airflow; air temperature will be sampled, and then the fan will shut off again if there is no demand.

Disable Heating or Cooling, but Initiate Fan-Only

Press On/Off key to turn off LED display. Press Fan key to cycle through the fan settings as indicated by the small circular LEDs. Select continuous High or Low speed. Do not select Auto, as it will turn the fan off.

CONTROL AT THE WALL THERMOSTAT

CONVERSION TO 24V REMOTE THERMOSTAT

Except for the wall thermostat and thermostat cable, everything is included with the unit to field convert a keypad-operated unit to 24 Volt AC wall thermostat operation by qualified service personnel. Specific conversion instructions are detailed on the wiring diagram affixed to each particular unit to be converted. Conversion involves accessing the high voltage wiring compartment and changing a DIP switch setting on the electronic board. Once the DIP switch setting has been

changed, operation will be in remote thermostat mode as soon as power is restored to the control.

WARNING: The conversion procedure involves exposure to high voltage electrical circuits in the control box in order to make the necessary change to the DIP switch, and must be performed by qualified service personnel. Failure to do so could result in property damage, personal injury or death. Disconnect electric power to the unit before servicing.

A factory-supplied 24 Volt wiring harness is provided with every unit to facilitate connection to the wall thermostat wiring. One end has a multi-pin connector which mates with a connector exiting the unit. The other end has preinstalled butt splice connectors, which play a dual role in insulating any unused connectors, and can also be used to make the wire connections for wires that are used.

The final step is to apply the masking label provided, to cover up the keypad. The keypad and display will be disabled and no longer be available for control. The masking label markings instruct the user to go to the wall thermostat for controlling the unit.

COMPATIBLE THERMOSTATS

The features of the 24 VAC wall thermostat chosen will dictate the extent of the features available from the unit.

Electric Heat / Cool units can accommodate the following thermostats in either manual or automatic changeover:

- Single Stage Heat/Cool, Single Speed Fan
- Single Stage Heat/Cool, Two Speed Fan

Note: The thermostat selection must be verified to ensure its control logic will always energize a Fan output (G) on a call for heat – also known as an Electric Heat Type Thermostat.

General:

All the above can have single speed or two speed fan control.

The wiring diagrams affixed to the units will guide the specific connection strategies for the particular thermostats used.

THERMOSTAT LOCATION:

Proper functioning of the thermostat depends on accurate room temperature sensing. Be conscious of locating the thermostat where temperatures near the thermostat are not representative of room temperature. For example, do not install the thermostat where it is subjected to direct sunlight, other sources of heat, or to cold drafts, including air discharged from a supply air register. A common error is forgetting to seal the hole in the wall where the thermostat cable passes through, directly behind the thermostat body. Air bleeding from behind the wall can drastically affect the temperature sensed by the thermostat.

REMOTE THERMOSTAT OPERATION

When the unit is first plugged in, or when recovering from a power outage, there will be a random 5 to 15 second delay before the electronic control powers up. The keypad will be totally disabled once the DIP switch has been set for remote mode. The unit will obey the commands from the thermostat only.

The thermostat will automatically maintain the temperature in the room, based on the setting pre-set by the user. If the thermostat has only single fan speed capability, a decision will need to be made as to whether the fan will always run in high speed or low speed, and then the appropriate fan speed wiring connection can be made at the unit.

All the internal control features of the electronic board remain active, except for keyboard and display interface functions and room temperature sampling. Room temperature is detected at the location of the wall thermostat, and is usually a much more accurate representation of bulk room temperature. The thermostat used may have advanced features beyond the basic functions described below. Consult your thermostat Installation and Operating Instructions for further information.

In addition to controlling room temperature, the room thermostat is also used to select whether the unit is to be in heating mode, or cooling mode, or in automatic changeover between the modes. It also determines whether the system is to be ON or OFF, and whether the fan is to run continuously, or to cycle with heating or cooling demand.

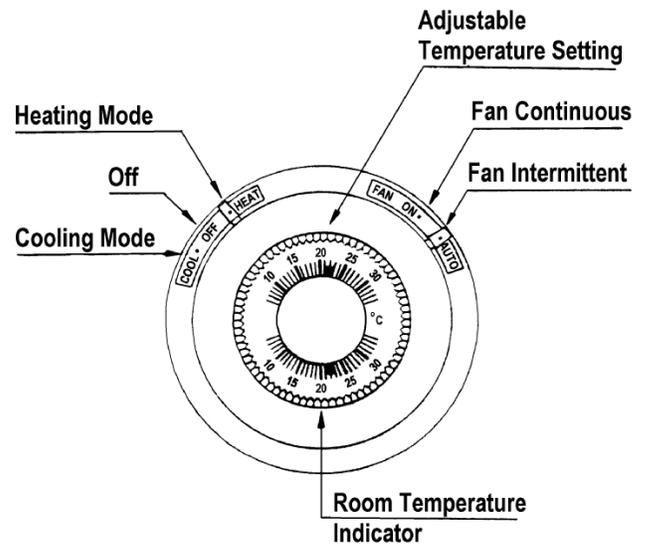


Figure 2

Once a comfortable temperature setting is established, no other adjustments are necessary, except for fan speed, which may or may not be adjustable on your particular thermostat.

CAUTION: One side of the unit's 24-volt control system is grounded. When wiring the thermostat, care must be taken not to ground the wires, or drive a nail through the thermostat wire bundle, thereby potentially burning out the transformer.

WALL THERMOSTAT OPERATION	
Heat	Sets the unit into heating mode. Initiates heating when room temperature falls below set point.
Off	Disables heating and cooling modes, but allows control of fan.
Cool	Sets the unit into cooling mode. Initiates cooling when room temperature rises above set point.
Auto (not shown)	Found on automatic changeover thermostats only. Allows the thermostat to decide whether it should be in the heating or cooling mode. Usually a 4 F° differential or “deadband” will exist between heating and cooling set points to prevent inadvertent rapid switching between modes.
Temperature Setting	Establishes the “set point”, or desired room temperature.
Fan On	Synonymous with “Fan Continuous”. Fan will continue to run after the heating and cooling function has cycled off. Fan will continue to run even when mode switch is in Off position.
Fan Auto	Synonymous with “Fan Intermittent”. Fan will cycle on and off with the heating cycle or cooling cycle, and will not operate between cycles.

ADDITIONAL FEATURES:

Some additional features of the Electronic Control units are as follows:

Room Freeze Protection

This feature is enabled when the unit is shipped from the factory. The feature can be disabled by qualified service personnel. If power is available to the unit, and regardless of whether it is turned ON or OFF, the unit will automatically supply heat to the room with the fan running at low fan speed if the room temperature falls to 50°F (10°C). The heat will turn off when the room temperature reaches 55°F (13°C). For the feature to work, the unit must be configured with an electric heater. The feature is enabled whether the unit is configured for keypad or remote thermostat. The protection remains active when the unit is OFF, for

either keypad or remote thermostat application, as long as the unit is plugged in, power is available, and a heat source is configured in the unit and is working.

Compressor Short-Cycle Protection

If the electronic control shuts the compressor down for any reason, a 3 minute time delay will elapse before the compressor is allowed to re-start. This prevents compressor overload during re-start due to unequal system refrigerant pressures.

Indoor Coil Freeze Protection

Control of frost on the evaporator coil due to low indoor loads, or cold outdoor ambient temperatures, is provided.

Low Outdoor Temperature Lock-out

If the outdoor temperature is too low for proper compressor operation, cooling operation will be suspended until the outdoor temperature rises to an acceptable point, depending on the application.

Indoor Temperature Limiting (Keypad Control Only)

Using the keypad control and display, high and low temperature limits can be established to prevent the user from entering set point temperatures colder or warmer than what the property manager or hotel operator may desire. The temperature limit choices are as follows:

Configuration Code	Low Limit °F (°C)	High Limit °F (°C)
R1	63 (17)	86 (30)
R2	65 (18)	86 (30)
R3	65 (18)	90 (32)
R4	67 (19)	88 (31)
R5	67 (19)	92 (33)
R6	69 (20)	90 (32)
R7	69 (20)	72 (22)

The procedure to set the limits is as follows:

Depress the On/Off key, the °F/°C key, and the Warmer key simultaneously for 5 seconds to enter the limit setup mode. The Warmer and Cooler keys will scroll through the R-values indicated in the above table. Once the desired R-value has been obtained on the display, press the On/Off key to accept the change, and then press it again to effect the change and restore the normal display.

Automatic Powered Damper

NAWC models are available with or without provision for fresh air. However, if the units are configured to bring in fresh air, they must have an automatic powered fresh air damper that opens the fresh air door to bring outdoor air into the room only when the indoor blower is running. If the indoor fan shuts off, the damper automatically closes and interrupts the heating coil's potential exposure to possible extremely cold air when there is no blended air flow over the coil and/or no flow of the heating medium inside the coil. The factory default is fresh air with high speed fan operation only, but it can be changed to open with low speed fan operation only by having qualified service personnel re-wire the unit as shown on the specific wiring diagram affixed to the unit.

WARNING: The speed conversion procedure involves exposure to high voltage electrical circuits in the control box in order to make the necessary change to the damper action tied to motor speed, and must be performed by qualified service personnel. Failure to do so could result in property damage, personal injury or death. Disconnect electric power to the unit before servicing.