# USER'S GUIDE

## For YA and YL Series Air Conditioners

MANUAL 2100-463
SUPERSEDES

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# GENERAL INFORMATION

This manual is generic in nature and covers a wide range of heating and cooling products. It is intended to be a general guide for care and operation of typical systems and covers the most important features you should be aware of and are responsible for as the user of the equipment.

Because our product offerings are so varied and can be equipped with many features and options, it is not possible to cover all aspects of what your specific system may be configured for. Some systems may be quite simple in features to provide basic cooling and possibly heating, while others may also incorporate various ventilation technologies, dehumidification circuits, and many different internal controls as well as room temperature controls. Therefore, you should request a detailed operation sequence and explanation of any special features from your installer and/or Service Company, and also have them instruct you as to any routine maintenance procedures you are responsible for.

This manual will address the basic items that should apply to all systems, and will then be separated into specific types of products to cover things unique to those product types.

## AIR FILTERS

Keeping clean air filter(s) is the single most important responsibility of the user of the equipment. Each type of system must be equipped with an air filter(s) in the indoor circulating air system to clean the air, to keep the system itself clean for peak efficiency and capacity, and to prolong the useful life of the equipment. DO NOT operate the system without the proper air filters.

Filters should be inspected at least monthly, and replaced or cleaned (depending on type) as needed. The useful life of an air filter can vary widely depending upon application and use of the equipment, and it is critical to monitor filter condition and establish an acceptable maintenance schedule. Failure to do so will increase operating and repair costs, decrease capacity and efficiency, and shorten the service life of the equipment. A common symptom of a dirty filter in the cooling mode is a freeze-up of the indoor coil.

The air filters used may be a disposable (throw-away) type or may be a cleanable type that can be thoroughly cleaned, rinsed and reused many times. It is important to make sure that the correct filter size and type for your system is always used. If there is any question as to acceptable filter size or type, review the Installation Instructions for the specific equipment involved, if available. Otherwise, consult with your installing dealer or Service Company.

Most equipment can have the filters inspected and serviced by the user with no problems. In some instances, because of equipment design or specific installation conditions, it may be necessary to have this procedure done by a qualified service company. Have your installer or service company show you where the filter(s) are and demonstrate the service procedure or make arrangements for them to provide this service on an as needed basis.

## OUTDOOR COIL

The outdoor coil must be kept clean and free of any airborne debris, which can accumulate over time. Large volumes of air are circulated over the coil, and airborne debris such as lint, dust, materials shed from trees, paper or other types of airborne material that can become airborne can collect on the entering coil surface.

The outdoor coil must dissipate heat during the cooling mode, and for a heat pump must also absorb heat during the heating mode. If the coil is dirty and matted with debris, the airflow across the coil will be reduced causing poor performance, increased operating runtime and associated utility bills, and in extreme conditions can shorten the useful life of the equipment.

Depending on the specific equipment involved, the surface that can accumulate debris can be on the opposite side that is exposed to view when standing in front of the machine. Closely review the machine when operating to see which direction or path that the airflow moves through the machine, and if the air inlet side of the coil is hidden, try to observe the back (hidden) side by looking into the side grilles, using flashlight if necessary.

While the user of the equipment needs to be aware of the potential of clogging of the outdoor coil surface, actual cleaning of the outdoor coil should not be attempted under most circumstances. If the user should attempt this procedure on their own, never do so without first having the installing dealer or Service Company instruct you in the proper procedure and technique.

**WARNING: Do not open or enter the equipment without first turning off the electrical service disconnect. Failure to do so can result in personal injury due to moving parts and/or electric shock hazard resulting in death.**

Other conditions that can cause reduction of airflow across the outdoor coil are flowers, shrubbery or other growth too near the outdoor coil air inlet and outlet openings. These living things, especially as they mature and grow, will be just as effective in blocking the airflow and create the same problems as will stacking things against the equipment. These conditions can be easily managed and controlled by the user, as they do not require actually entering into the equipment enclosure, which should only be done by qualified service technicians.

See section on Air-to-Air Heat Pumps for additional information concerning blockage due to heavy snow conditions, if applicable.

### ROUTINE EQUIPMENT OUTDOOR MAINTENANCE

1. Avoid having any lawn sprinkler spray directly on the equipment, especially if from a brackish water source.
2. In coastal areas locate equipment the furthest distance away from the coastline as feasible.
3. Frequent cleaning and waxing of the cabinet using a good automobile polish will help extend its original appearance.

# BASIC OPERATING PRINCIPLES

### AIR CONDITIONERS

COOLING MODE

The cooling mode operates similar to a refrigerator, removing heat from inside the conditioned space and rejects it outside of the space being controlled. There are three main parts of the system:

1. The evaporator (indoor) coil where cold refrigerant absorbs heat from the air, which circulates from the conditioned space, through the machine, and is returned to the space at a lower temperature and with some of the humidity (moisture) removed. The moisture exits through a condensate drain system. A motor/blower assembly moves the indoor air through the system.
2. The compressor, which is a sealed pump that moves the refrigerant through the system.
3. The condenser (outdoor) coil where the heat that was absorbed from the indoor space is discharged to the outdoor environment. A motor/fan system moves the outdoor air across the condenser coil.

A properly sized air conditioner cannot cool a structure off rapidly, and instead will pull down the temperature slowly. It also will remove a certain amount of moisture (humidity) from the circulating air stream in

the process. It may take several hours to pull down a hot, moist building or structure on initial startup, or anytime the system has been turned off for a long period of time. It is generally best to set the thermostat at a comfortable temperature and let it control the system as needed, rather than turning it on and off.

Moisture (humidity) removal with a conventional air conditioner (cooling) unit, or heat pump when operating in the cooling mode, is not directly controlled and is a by-product of the unit operating to control temperature in response to the temperature (thermostat) control device. Oversized equipment can easily control temperature but will have short run-times, thus reducing its ability to remove moisture from the circulating air stream. There are also many additional influences that can affect humidity levels within the conditioned space such as laundry appliances, cooking, showers, exhaust fans, and any other items that can generate moisture or affect its removal from the space. Therefore, while operation of the air conditioning or heat pump system in the cooling mode will remove some amount of moisture as it reduces the air temperature, precise humidity regulation in the conditioned space cannot be assured and additional equipment such as a dedicated dehumidifier may be required.

## HEAT PUMP (Air-to-Air)

A heat pump is a refrigerant-based system that has additional components and controls that both heats and cools using a compressor for both modes of operation. Most heat pumps will also be equipped with some amount of electric heat to supplement the heating capacity of the compressor system on an as needed basis. This operation is entirely automatic and is controlled by the indoor thermostat, and possibly also an outdoor thermostat.

COOLING MODE

The cooling mode of a heat pump is exactly the same as that described for an Air Conditioner in the above section.

HEAT PUMP (HEATING MODE)

The system operates in reverse cycle, meaning that it absorbs and moves heat from the outdoors and transfers it indoors to be rejected into the circulating air stream. Even though it seems cold to humans, there is useable heat that can be extracted efficiently from the outdoor air down to 0 degrees F, although the colder the air is there is less heat to extract and the operating efficiency is diminished.

DEFROST CYCLE

When operating in the heating mode, the outdoor coil will be colder than the outdoor air that is forced over it by the fan system. When the outdoor air temperature is above approximately 40°F, moisture can accumulate on the coil and it will drain down and out the base of the unit. As the air temperature gets below approximately 40°F, the coil temperature will start to drop below 32°F, and frost or ice will begin to form on the coil.

An automatic defrost system keeps track of system runtime when the outdoor coil temperature is in the freezing zone, and will initiate a defrost cycle at the appropriate time. The unit continues to operate during the defrost cycle, but the outdoor fan motor will stop and the reversing valve will shift positions to flow hot refrigerant gas through the outdoor coil to melt the accumulated frost. Water will start to drain freely from the unit, and there may be steam emit from the unit.

The length of the defrost cycle will vary depending upon actual outdoor temperature, humidity levels and amount of accumulated frost. It could range from 1-2 minutes up to but not exceeding 10 minutes. When the defrost cycle terminates, the reversing valve will shift back to heating mode and the outdoor fan will restart. There is typically a large puff of steam emitted as the fan restarts.

When the heat pump shifts from cool to heating mode, from heating to cooling mode, and especially during defrost cycles, there will be a pressure transfer sound heard as the reversing valve redirects the flow of refrigerant. This is commonly described as a hissing noise and is a normal sound for this type equipment.

For air source heat pumps, it is important to keep heavy snow from accumulating around the machine to the point of blocking the inlet and outlet openings to the outdoor coil section. For wall mounted or other equipment that is elevated, this should not be a factor; but for equipment installed on or near the ground, this can be an issue in areas prone to heavy and/or blowing snow. The air source heat pump cannot operate effectively and efficiently when snowbound just as a car cannot function well in heavy snow conditions.

## HEAT PUMP (Water-to-Air)

These types of heat pumps are also commonly referred to as water source or geothermal systems. Just like the air source heat pump, they are refrigerant-based systems that both heats and cools using a compressor for both modes of operation. The primary difference is that the system uses water or antifreeze protected water solution instead of an air-cooled outdoor heat transfer coil, and there is no outdoor motor/fan system but instead a water pump to provide adequate water flow to the system.

COOLING MODE

The cooling mode of a water-to-air heat pump is exactly the same as that described for an air conditioner in the above section for Air Conditioners, except that the outdoor coil uses water instead of air for the heat transfer medium.

HEAT PUMP (HEATING MODE)

The system operates in reverse cycle, meaning that it acquires and moves heat from the water supply flowing through the water to refrigerant coil, and transfers it indoors to be rejected into the circulating air stream.

Most water-to-air heat pumps (but not all) will also be equipped with some amount of electric heat to supplement the heating capacity of the compressor system on an as needed basis. This operation is entirely automatic and is controlled by the indoor thermostat.

Because of the design of water-to-air heat pumps and the water temperatures involved, no defrost system is required as in air-to-air heat pumps.

WATER SUPPLY SYSTEMS

Depending upon type and application of the water-to-air heat pump, the water-side of the system could be one of the following:

1. Individual closed loop buried in a trench or vertical bore hole(s).
2. Individual loop submerged in a pond.
3. Water supplied from a well and discharged into pond, stream, ditch or another well.
4. Water supplied from a boiler/tower system, typically only in larger multi-unit installations.

## VENTILATION

Many systems have the capability of various ventilation packages available (either factory or field installed) directly into the basic system. These systems can be described as follows:

1. Barometric fresh air damper
2. Motorized fresh air damper
3. Commercial room ventilator
4. Economizer
5. Energy recovery ventilator

All of these ventilation systems, if installed, are different and are used for different reasons. They may also have different control strategies. Consult your installer and/or Service Company to determine if your installation has any of these devices, and for any instructions or maintenance requirements you should be aware of as the user.

## DEHUMIDIFICATION CIRCUITS

Many systems, typically those used in schools or other commercial applications, have a dedicated dehumidification capability by having a special additional refrigeration circuit (factory installed option only) in addition to the basic system. These special systems, sometimes also referred to as hot gas reheat, are designed to control humidity on demand from a humidity controller much the same as the basic cooling and/or heating system is controlled by a wall thermostat.

Consult your installer and/or Service Company to determine if your installation has any of these devices, and for any instructions or maintenance requirements you should be aware of as the user.

# AUTOMATIC CONTROL SYSTEMS

## THERMOSTATS

There are many types of thermostats available to properly control your system, and these can vary in features and some functions depending upon the type of system (air conditioner, heat pump, etc.) installed and any special options (ventilation, supplemental heat, etc.) that may be installed.

Approved compatible thermostats are available from York for all applications, and since these can vary in numerous features and functions, it is not possible to adequately discuss them all in this User's Guide. Many installers also install thermostats other than those offered by York, and must determine proper compatibility prior to installation.

In addition, many schools and similar institutions may utilize central energy management systems (EMS) or direct digital control (DDC) systems.

In all circumstances have your installer, Service Company or building administrator or maintenance department personnel instruct you as to proper operation of your specific thermostat or temperature control system.

## HUMIDISTATS (HUMIDITY CONTROLLERS)

All systems with dedicated dehumidification (hot gas reheat) circuits also require a humidity controller (also called humidistat or de-humidistat) in addition to a thermostat for proper control.

The devices may or may not be adjustable, and if adjustable should only be adjusted by the person(s) responsible for overall building control conditions. Normal settings would be somewhere between

50 and 60% Relative Humidity (RH) and typically affords acceptable human comfort conditions for most individuals, and under no circumstances should be set lower than 40% as overcooling of the conditioned space and/or freeze-ups of the indoor coil may occur.

## INSUFFICIENT COOLING OR HEATING

In extremely hot or cold weather your system will continue to deliver its normal supply of conditioned air. If the unit operates but fails to provide sufficient comfort, check the following before calling your Service Company:

1. Be sure the thermostat setting is correct.
2. Check the air filters, and replace or clean if dirty.
3. Make sure that air can circulate freely throughout the conditioned space, and that all supply registers and return air grilles are not blocked.
4. Make sure that the outdoor coil is not blocked with any foreign matter, or otherwise restricted with any growth or other items.

## FAILURE TO OPERATE

Check the following before calling your Service Company:

1. Be sure the thermostat setting is correct.
2. Check the air filters, and replace or clean if dirty.
3. Make sure that the power supply, and gas or water supplies if applicable, are “On”.
4. Make sure that air can circulate freely throughout the conditioned space, and that all supply registers and return air grilles are not blocked.
5. Make sure that the outdoor coil is not blocked with any foreign matter, or otherwise restricted with any growth or other items.

## LUBRICATION REQUIREMENTS

All indoor and outdoor air-moving motors are permanently lubricated, and require no re-oiling. If an Energy Recovery Ventilator (ERV) is installed in your system, have your Service Company inspect annually and perform maintenance as outlined in the ERV Installation and Operating Instructions.

## PERIODIC MAINTENANCE

Periodic maintenance must be conducted on your system to insure maximum performance, especially during peak operating periods and conditions.

1. Keeping the air filters clean and recognizing the importance of a clean outdoor coil are key elements. These are user responsibilities, either all or at least in part, and if they cannot be fulfilled by the user, arrangements should be made with your Service Company.
2. There is a condensate drain system for all air conditioners and heat pumps, and this must be kept open and free to convey the condensate generated by the operation of the equipment to a suitable location, typically either an internal drain or outdoor location. Depending upon the specific installation, the user would at least be aware of the dram mechanism and know what to expect.
   If any questions, it should be reviewed and discussed with your installer and/or Service Company.

3. All heating and cooling systems should have periodic inspections made by a trained professional, who has the experience, knowledge, training, licensing, certifications, and the necessary tools and equipment required to do these tasks properly and in accordance with approved or mandated procedures.
4. The maintenance procedures and frequency of routine service can vary depending upon actual type of equipment in use, type of building or facility, and other factors that can impact how often a machine must be serviced.
5. Proper and routine maintenance and service will protect your investment and help extend the service life of the product, and also help ward off more extensive and expensive repairs.

# HELPFUL HINTS AND GOOD OPERATING PRACTICES

The following information will help you enjoy the full comfort and benefits of your Bard cooling and heating system, maximize the performance and efficiency, and help extend the life of your system:

1. Always keep the equipment in peak operating condition with routine scheduled maintenance, especially for the air filters and to assure clean outdoor coil.
2. For most efficient operation, set the thermostat at the temperature you prefer, and then let it take control. If any changes to the settings are required, they should be made in small adjustments and the system be allowed time to respond. Rapid changes either up or down should not be done.
3. Setting the thermostat very high does not make the system heat faster, and setting it very low does not make it cool faster.
4. It is not recommended to turn the system “Off” and then back “On” when you need it. This can allow temperature and humidity to build up in warm weather conditions and force the system to run continuously to try and catch up. If the building is to be unoccupied for a lengthy period, it is best to adjust the thermostat to a reasonable higher (or lower depending upon the season) setting rather than turning it completely off. Upon return, the inside conditions will not be totally out of control, and recovery time to desired conditions would be much shorter.
5. Keep all supply registers open and all returns free and unrestricted. The heating and cooling system is designed to have a certain amount of airflow for proper operation. Therefore, closing off registers, in unused rooms as an example, could reduce airflow below acceptable levels and should not be done without review by your Service Company who can access the overall situation and advise you accordingly.
6. Heat pumps, especially air-to-air heat pumps, may have the system (compressor) run continuously at lower outdoor temperatures, and this is normal. The heat pump (compressor) mode is controlled by the 1$^{st}$ stage of the thermostat, and delivers the most efficient heat. As the outdoor temperature drops off, the heat pump mode heat will also diminish (because there is less heat in the outdoor air to absorb), and must be supplemented by the 2$^{nd}$ stage electric heat, which is not as efficient as the heat pump. The thermostat automatically controls everything, and the backup electric heat will only operate on demand as needed to maintain the desired temperature.
7. The thermostat is the user’s primary connection to the system, so it is very important to have a thorough understanding of how it works and how to use it properly. Since there are many different types of controls available, and can vary depending upon what type of heating/cooling system you may have. Have your installer or Service Company explain and demonstrate proper operation of the controls.
8. Make sure you thoroughly understand how the heating and cooling system itself is intended to operate and what to expect from it. Have your installer or Service Company explain and demonstrate proper operation of the heating and cooling system.