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MaxAir™ 50(e), 70(e), 100(e) Mini Ducted Fan Coil Systems

Combination Heating/Cooling Equipment

Design, Installation and Maintenance Instructions

AirMax Technologies Mini Ducted MaxAir(e)™ fan coil systems

Important: Read and save these instructions.

Install in accordance with CEC and NEC; All wiring shall conform to CEC, NEC, and local building and electrical codes.

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INTRODUCTION

The **MaxAir**™ line of combo air handlers is specifically designed for use in residential and commercial combination space and water heating systems (Combo Systems). Combo heating systems use the home's water heater or boiler to provide both the space heating and domestic hot water, eliminating the need for a furnace.

Combo heating systems are ideally suited for single family homes, townhouses and apartments where the cost of a furnace does not make sense or space requirements are limited. They are also great for additions, renovation and finished basements as a replacement for, or in addition to the existing heating system. Our air handlers are the smallest units available in their capacity range.

The **MaxAir**™ line of air handlers are designed to take the guess work out of system sizing and installation. Matched specifically to common water heater and boiler sizes, our air handlers can be quickly sized using the quick sizing information in our ***Equipment Sizing Manual***. For applications requiring special consideration, our detailed sizing method gives you the ability to size the air handler to ANY operating condition. Call for answers to any questions related to sizing, installation or trouble-shooting for any of our air handlers or water heaters. We will even do the sizing for you. Just call us with the information and we can fax back the proper selection for any application.

We provide you with the quietest operating air handler available. By using large capacity, high output heating coils, our product delivers more heating per volume of air than any of our competitors, which means warmer delivered air temperatures. Our blower fans are also the widest available in their size range, which translates into slower fan speeds to deliver the same amount of air. All these features add up to warmer, more comfortable air, quiet operation, and a satisfied customer.

Water heaters or boilers can be purchased from a wholesale supplier, rented from your Gas Utility, or purchased from **AirMax Technologies** as part of a complete heating package.

Benefits of the MaxAir™ Mini Ducted *systems* are:

- Vents can be located in low traffic areas on the floor, walls, or ceiling, or in a kick space.
- A non-skilled individual can install a system using these design and installation instructions.
- Small diameter supply ducts eliminate the need for large sheet metal ducting and allows smaller bulkheads.
- Can be installed in existing structures with minimal structural changes.
- Provides a quiet, draft free environment.

MaxAir™ Mini Ducted *systems* applications:

- Retrofit construction to add heating, cooling, humidification, or filtration to a building.
- New construction to deliver air throughout the entire building envelope (eg. services 3 story townhouses more effectively than conventional furnaces).
- New and retrofit construction to reduce bulkhead sizes required for duct work.

PRODUCT DESCRIPTION .

cabinet

All cabinet panels are insulated and have a tough, durable low maintenance Galvanized finish inside and out for extra long life.

The air handler should be suspended with 4 resilient hanging straps. Hanging straps can be attached at all corners, using existing screw locations without fear of damaging internal components.

Cabinet dimensions are designed to provide maximum installation flexibility. Refer to installation requirements for more details.

heating coils

All heating coils are potable water grade copper suitable for use in plumbing systems. No lead solder is used in any component construction. All coils and internal piping conform to ASTM B68 or ASTM B88 standards.

High density aluminum fins provide maximum heat transfer for small coil surface. Lower air flow and higher fin density equals warmer, more comfortable air with much less fan noise than other air handlers.

cooling coils

All cooling coils are shipped with the liquid and suction lines piped to the exterior of the unit casing. A TX valve is included, shipped installed.

High density aluminum fins provide maximum heat transfer for minimal coil surface. Coils are sized for low face velocities to prevent carry over and the galvanized unit drain pans are below the entire coil including the return bends and suction header.

fan

All fans are wide body dynamically balanced for extra quiet operation.

Three speed motors allow for separate speeds for heating, cooling, and continuous run, providing the installer or home owner maximum choice of options.

Multi-directional sleeve bearing motors allow mounting in any direction for maximum installation flexibility.

off-season circulation

An off-season circulation cycle is included on the air handler to provide periodic circulation of water through the space heating loop during periods of infrequent use.

water heater

Any properly sized gas, propane, or oil fired water heater will work in a combo heating system. Make sure the water heater being used is approved for combo applications. (Most manufacturer's heaters are approved.) Warranties are not affected by using a water heater in combo applications.

boiler

All **AirMax Technologies** combo air handlers are compatible for use with boilers or instantaneous water heaters. Contact your AirMax Technologies representative for sizing and installation details.

ACCESSORIES

check valve

Check valves serve two purposes:

- protect against back-flow of water to avoid short circuiting around the water heater during domestic water use.
- protect against thermal siphoning.

Thermal siphoning is flow of water through the space heating circuit while the circulating pump is not operating due to hot water rising by natural convection. This phenomenon is of little consequence during winter months, but during the summer this will cause overheating, interfere with air conditioning, and waste energy.
The check valve can be supplied as a stand alone item or as an integral part of the circulating pump.

circulating pump

The circulating pump is matched for maximum performance for combo use. Air handlers can come with external, field installed pumps, for flexibility and service.

flow control valve

An adjustable flow control valve is required to optimize system performance and ensure that the output from the water heater is stable. Any throttling type valve may be used, but for convenience, **AirMax** can include a valve, at additional cost, with each air handler for field installation.

Combo heating systems function poorly if the temperature drop through the air handler's coil is not maintained between 20-30°F (11-17°C). The only way to adjust the water temperature drop through the coil to match the rated output conditions of the coil is to adjust the flow of water.

The performance relationship between the air handler and the water heater is ignored by most manufacturers. The **MaxAir**™ combo fan coil system has been specifically designed to optimize the output of the water heater to which the air handler is attached.

- If the temperature drop is less than 20°F (11°C), the system has an excessive flow rate. This will cause turbulent mixing within the water heater storage tank, reducing the domestic water capacity, and creating large fluctuations in delivered water temperature.
- If the temperature drop across the heating circuit is greater than 30-40°F (17-22°C) there is inadequate flow. This will cause poor heating performance of the air handler and can cause stacking of the water heater leading to unsafe water delivery temperatures for domestic use.

EQUIPMENT SELECTION AND SIZING .

This section of the manual is to assist the designer of the **MaxAir**™ Mini Ducted Combo fan Coil System in the quantity and placement of outlets, the size and location of the supply duct, and the size and location of the fan coil. To size a **MaxAir**™ system for a residence, it is necessary to have an accurate heat loss/gain done for the structure in order to eliminate improper sizing.

After completing the room by room load calculations, select the **MaxAir**™ model unit that will properly meet the load requirements.

selecting the number of diffusers

From the recommended number of diffusers indicated in Table 1, determine the number of diffusers needed. It is recommended that you ***design for the median number of diffusers***. This will yield favorable system noise levels and minimize potential nuisance equipment failures. ***If a cooling coil is to be included always design for at least the median number of diffusers***.

Table 1 Recommended Number of Diffusers

Model	MaxAir 50 (e)	MaxAir 70 (e)	MaxAir 100 (e)
Btuh Heating @180F E.W.T.	55,649	77,981	98,593
Btuh Heating @170F E.W.T.	49,971	69,804	89,630
Btuh Heating @160F E.W.T.	44,700	58,902	80,666
Btuh Heating @150F E.W.T.	39,086	50,519	71,704
Btuh Heating @140F E.W.T.	35,195	46,278	62,741
Btuh Heating @130F E.W.T.	30,250	41,000	53,500
DX Cooling (Tons) (1)	1 to 2	2 to 2 ½	2 ½ to 3
C.F.M. @ 1.5" E.S.P.	580	750	950
HP-RPM	1/2-1,625	3/4-1,625	3/4-1,625
Amps @ 120/1/60	6.2	8.7	8.7
G.P.M. Flow rating	5	7	8
Fan Coil Size (L/W/H)	30"x14"x18 1/2"	36"x19 1/2"x18"	36"x25 1/2"x18"
Supply Air Size	8"	8"	10"
Return Air Size Required	12" x 14" min.	16" x 15" min.	16" x 16" min.
Minimum Outlets (2)	13 (3)	16(3)	19(3)
Maximum Outlets	21	24	29

(1) Smaller condensers maybe matched to fan coil when required (match TXV to condenser size)
(2) The median number of outlets should be used to achieve maximum DX cooling capacity for each model size. Eg. If 2 ½ tons are required in a Max 70 system you must use minimum 20 outlets. Heating capacity based on 70°F return air, high speed, 10' duct length per branch and no cooling.
(3) Contact factory for minimum number of outlets if using less than maximum DX cooling capacity.

Divide the chosen number of diffusers into the building load and this will give the capacity per diffuser. Referring back to the building heat loss you can divide the total heat load per zone by the capacity per diffuser, giving you the quantity of outlets needed per room.

example

Fan coil model: MaxAir 50 with 180° water
Building heat loss: 51,000 BTUH
Building heat gain: 18,000 BTUH
Number of outlets: 17
Cooling coil: 1.5 tons
Heating coil: 55,649 BTUH

Calculation:

55,649 btuh/17= 3,273 btuh/outlet (heating)

and

18,000 btuh/17= 1,058 btuh/outlet (cooling)

If a room has a heat loss of 4,500 btuh and a heat gain of 2,400 btuh, 3 diffusers are required.

difference in number of diffuserers needed for heating and cooling

There may be cases in which the number of outlets needed for heating may be significantly different than the amount needed to meet the cooling load for the room. If this happens, then you will have to take the greater number of outlets to provide both heating and cooling for the room. If there is a large difference in the number of diffusers required for heating and cooling, then vents can be opened or closed to provide summer/winter adjustment.

diffuser design notes

Unlike conventional systems it is not necessary to locate **MaxAir**™ diffusers above/below windows or to center diffusers along an exterior wall length. Diffusers can be located on interior walls if necessary but if possible keep them closer to exterior walls for maximum occupant comfort.

Air from the diffuser is introduced into the room at a high velocity. This creates a venturi effect at the diffuser. This negative pressure draws room air into the conditioned air stream and mixes and distributes both air streams together. This phenomenon constantly stirs the room air and prevents stratification and stale air accumulation.

It is preferential to locate the diffusers in low traffic areas of the room to be conditioning. Diffusers should be located at least 8 inches (to center of diffuser from finished surface) from walls and should not be located near curtains or wall coverings that will be affected by the high velocity air stream. The diffusers should not be located under furniture or near obstructions that will nullify the mixing effect that the diffusers are designed to accomplish. In kitchens or bathrooms where it may not be desirable to locate a diffuser on the floor the diffusers can be located in a kick space or on the wall and discharge the air horizontally. In a kick space the diffuser may have to be trimmed to fit properly. In the bathroom do not locate in an area that will cause a draft on people entering or leaving a bath or shower.

trunk duct design notes

The location of the main trunk duct will be determined by the structural design of the building. One of the main goals in laying out the trunk duct is to achieve a self-balancing system.

A common location for the horizontal trunk duct is along the main structural support beam, at the center of the building in the basement, and at right angles to the floor joists. This will yield the shortest and most equidistant 2 ½” branch runs as possible. Utilizing this layout will provide a self-balancing system for the main floor and basement.

A common location for the vertical trunk duct on a two storey building is in a closet or furred wall as close to the building center as possible. This will allow the second floor horizontal trunk duct, (located in the attic) run at the building center line, to be divided 50/50, front to back, with equidistant branch run lengths, to again be self balancing for the second floor. Where the **MaxAir**™ fan coil unit has two trunk ducts ensure the trunk ducts are as close as possible in equivalent

length.

For trunk duct runs it is recommended that the duct be insulated to prevent supply air temperature losses/gains. Where the trunk duct is run through unconditioned spaces the duct must be insulated and provided with a vapor barrier. In unheated attics the trunk duct should be laid on the ceiling joists, insulated and provided with vapor barrier, then the attic insulation should be laid over top of the duct to further reduce duct losses/gains. In conditioned spaces and if the trunk duct is less than 25% of the maximum allowable trunk duct length (Table 2) the duct can be left un-insulated.

If the trunk duct approaches the maximum allowable length additional branch ducts may be necessary to compensate for main duct pressure and temperature losses/gains.

Connection sizes for the different cabinet sizes are 8 & 10". The MaxAir 50, 70 cabinets have an 8” connection and the MaxAir 100 cabinet has a 10” connection. It is recommended that the trunk duct be started at 8" or 10” diameter minimum even if a smaller diameter duct will handle the design number of outlets. After 30' in length the duct can be reduced in size if required (reduce at a rate of one size per 10' length maximum).

Table 2 Maximum Allowable Trunk Duct Length

Duct Size	Maximum Length	No. of Take Offs
4"	20'	2
5"	30'	4
6"	50'	10
7"	60'	16
8"	70'	24
10"	100'	29

elbow and tee design notes

Avoid immediate disturbances in the airflow for at least 18" from the unit discharge. If possible allow 24" before installing any elbow, tee, or saddle. Saddles should not be installed within 18" from the unit discharge unless all saddles are to be located within close proximity to the unit. When using elbows always use adjustable type elbows, designed specifically for **MaxAir**™ systems. When utilizing tees that deflect both air steams at 90° angles maintain a 50/50 split on the air stream. When using tees that deflect one air stream at 90° maintain a 70% straight through to 30% at right angle ratio. These are approximate ratios plus/minus 10%.

branch duct design notes

Branch duct runs should ideally be kept at the same length and around 10' long. Adjustable dampers are included with the diffusers to compensate for different duct lengths. The minimum branch duct run is 5' and the maximum is 15'. When longer runs are utilized the airflow is reduced and the BTU delivery is reduced. In an attempt to compensate for long duct lengths use Table 3 to determine the correction factor for losses on long branch duct lengths.

Table 3 Branch Duct Correction Factors

Branch duct length	10'	15'
Correction multiplier (insulated)	0	.90

To the btuh capacity per diffuser determined earlier and based on the length of branch duct required between the trunk duct and the diffuser apply the above multiplier to determine the corrected btuh capacity per diffuser. This correction applies to both heating and cooling capacities. If more branch ducts are required in certain zones add them. ***Do not run un-insulated duct in unconditioned spaces.***

selecting the fan coil

Once you know the heat load, and the corrected number of outlets required for the job you can then finalize the model of the

MaxAir™ fan coil(s) you need.

return air duct design notes

The return air is to be sized as per local building codes and good practices. Take note of the reduced CFM of the units, compared to standard heating and cooling equipment, and also that the return air is to be sized on a 0.15" w.g. as compared to 0.10" w.g. on conventional air systems. It is good design practice to line the return air duct with a sound acoustic insulation for five feet away from the unit. This will reduce the chances of sound transfer, and reduce the operating sound levels. The maximum length for an individual return air duct is fifty feet.

It is recommended to install a grill that is 10-20 percent larger than the return duct area to ensure that there is adequate free area and no velocity noise at the grill. Where allowed by local codes, a single return air grill may be used. When using flexible duct for return air, use one size larger duct due to the higher friction loss.

For areas that require fresh air make-up (either direct or through an ERV or HRV), a small intake may have to be installed. If there is a requirement for fresh air, then install an INSULATED fresh air intake, and tie it into your return air ductwork. Remember, if you install too large of a duct, then the excess fresh air will increase the system operating cost. It is recommended to install a 6" insulated flex duct, with a well fitted damper, into the return air plenum. The damper can then be adjusted to supply the exact amount of fresh air needed to meet local building codes. Optionally, a smaller diameter fresh air duct can be used when sized on a 0.15" w.g.

indoor air quality

The main factors of indoor air quality are air filtration, humidity control, and fresh air make-up. All of these factors can best be achieved with a continuous run fan system. It is important to have a good quality air filter for your **MaxAir**™ fan coil system. Maintaining a clean air filter will increase the unit life span, allow the unit to operate effectively, and will provide clean air for the occupants.

Humidity control is also an important factor to indoor air quality. Too much humidity can result in problems with bacteria, fungi, and mites. Too little humidity can result in respiratory problems, allergies, and asthma. An RH level of 35 - 45% is recommended. When a drum, power mist, or curtain flow type humidifier is used, the humidifier can be mounted on the return air duct, and then a 2 ½” branch duct can be run from the supply duct and transitioned to the proper size at the humidifier. Do not use larger than 2 ½ ", or too much airflow will result.

Even in areas where there is no building code requirement for fresh air make-up, it is recommended to install a fresh air duct. In airtight buildings, the off-gassing of VOC's (volatile organic compounds) from building materials can be detrimental to the indoor air quality.

combination MaxAir™ and hydronic heating

One of the benefits of using a hydronic system is the versatility that you have when designing the heating system. Radiant underfloor heating is an excellent system, but it does have limitations. You cannot have cooling, air filtration, and humidification with a radiant heating system. Similarly, a **MaxAir**™ system may not be an option for a house with high localized heat losses/gains.

For example a room in a house with a lot of glass and very little insulation. Retrofitted radiant floor heating may be unable to meet the BTU requirements to heat the room. With a **MaxAir**™ combo fan coil we can heat this room, but would have an excessive number of outlets in a small area.

It is in rooms such as this that a hybrid system of both radiant heating and a

MaxAir™ fan coil would be the optimum system to provide comfort conditioning. This will provide the homeowner with good indoor air quality, and warm floor comfort.

One of the most common approaches to heating with a hybrid system is using the **MaxAir**™ fan coil to provide the comfort conditioning for the main floor (and second floor if applicable) and radiant tubing in the basement and tile areas. A few vents into the basement is also recommended to provide air circulation, and supplementary heating if required.

low water temperature systems (combo systems with conventional hot water tanks)

When running **MaxAir**™ fan coils from a low temperature system, care must be taken when designing and installing the system. Due to the lower air temperatures, when running the ductwork in an unconditioned space, extra insulation is required in order to maintain a reasonable leaving air temperature at the vents. The main plenum must be insulated and provided with a vapor barrier, and then ALL of the duct work must be covered with another 6" of insulation. Due to the fact that with lower water temperatures you get a lower supply air temperature, it is imperative that the water temperature is known at the design stage. If possible, a higher tank setting should be used, and an anti-scald valve be installed for the domestic use. The higher water temperature will increase system efficiencies, and the anti-scald valve will reduce the risk of scalding. Since some areas have specific regulations regarding combo systems, please check your local building code for details on water tank temperatures, tempering valves, and pump timers.

cooling coil capacities

Possible cooling coil capacities are given in the Table 1.

INSTALLATION

The installer must adhere strictly to all local and national code requirements pertaining to the installation of this equipment.

Detailed instructions are shipped with all accessory items and should also be followed in detail.

air handler mounting

The **MaxAir**™ combo air handler can be installed in most directions. Some precautions must be observed for some of the possible mounting positions.

For installations where the access door faces up or down ensure the external pump is not mounted with its shaft vertical. The pump shaft must be mounted horizontally to avoid damage during operation.

The air handler can be hung by securing straps through any of the existing screw holes in the cabinet. When the existing screw is too short for securing a mounting strap, a longer screw can be used, provided care is taken not to damage any internal components.
When fastening straps using screws, special care should be taken in the vicinity of the coil to avoid tube puncture.

The cabinet is designed so that the return air can be located on either side of the cabinet, through the bottom of the cabinet, or from the back. Position the filter rack so that the filter is readily accessible.

Install the air handler with the door firmly screwed in place to make sure the cabinet is hung without racking.

Provide at least 2 feet (0.75 metres) of access clearance in front of the access panel of the air handler. Zero clearance is acceptable on all other faces.

domestic water piping

Install a 1/2”(12mm) sediment faucet for use as a drain/purge valve. The drain valve must be located downstream of the pump and check valve, and upstream of the isolation valve (if isolation valve is present). With this arrangement, any air trapped in the system can easily be flushed out following the instructions in the *Start-up* & *Troubleshooting* sections.

Install a throttling valve in the heating loop. The isolation valves installed in the system shall not be used as a throttling valve.

Isolation valves are recommended, but not required. Installing isolation valves facilitates easy servicing and ensures positive purging of the system during start-up.

All joints in copper pipe must be lead free solder. All piping must be suitable for potable water use. All pipe & pipe connections shall comply with local building codes.

When soldering care should be taken to not overheat the water connections on the unit. Use a wet rag or heat absorption compound to prevent excessive heat buildup.

Maximum pipe lengths for all **MaxAir**™ combo air handlers can be calculated using the information in the Design Manual.

When both top and side connections are provided on the water heater, the side connections should be used for the space heating loop.

When the space heating loop connections are made to the domestic water connections:

- the heating loop connections should be positioned horizontally in a vertical section of the domestic water line for both inlet and outlet. Refer to the piping schematic for details.
- connect the heating loop to the domestic water connections as close to the water heater as possible.

Avoid sections of pipe in the heating loop that can trap air where possible.

It is usually impossible to install a system without having at least one part of the system or heating coil able to trap air. This will not be a problem if the connection to the domestic water lines is made properly, and the system is properly purged on set-up:

- The circulating pump is capable of removing small amounts of entrained air from the heating loop.
- Following the flushing procedures in the *Start-up* section will ensure that there is no air in the system after initial set-up.
- Proper connections between the domestic water lines and the heating loop will ensure that any gas that collects in the water tank, does not make its way into the heating loop.

Air bleed valves at high points of the heating system are not required and NOT recommended.

anti-scald valve

Anti-scald valves are not required for normal operation, but may be used for installations where local codes dictate a lower domestic water temperature. It is not recommended that anti-scald valves be installed unless required by the local building codes. If an anti-scald device is to be installed, it must comply with ASSE standards no. 1016 and 1017.

cooling coil & TX valve

The cooling coil is shipped loose. A factory installed TX valve is shipped with the cooling coil. The TX valve is installed onto the distributor and an external equalizing line is piped into the suction line. Detailed instructions on the TX valve and the location of the external equalizing line and sensing bulb are available from your **MaxAir**™ dealer.

When soldering care should be taken to not overheat the connections on the unit. Use a

wet rag or heat absorption compound to prevent excessive heat buildup.

After welding the connections apply a silicone sealant to the distributor where it passes through the rubber grommet. This will prevent air leaks and air noise.

The **MaxAir**™ fan coils with the external cooling coil option are a draw through design. The drain pans have to be trapped to avoid air losses. The proper height of the trap is 2 times the internal static in the unit casing. For most applications a trap height of 3" is acceptable. This is the minimum distance between the trap outlet and the bottom of the trap. The trap inlet should be higher than the outlet to allow for proper drainage.
Important*:* Fill trap with water before running the unit.

water heater/boiler

Follow the water heater manufacturer's instructions for installation and start-up of the water heater. Make sure the water heater is turned off during air handler installation and service. Ensure the water heater has been refilled, and all air is purged from the system before turning on the water heater.

duct work

To minimize fan noise in the living space, it is recommended that the first five feet of return air duct be lined with acoustic insulation.

Return and supply air duct work should be the same size as the air handler openings up to the first branch, fitting or transition.

Warning! Special care should be taken in the vicinity of the coil to avoid tube puncture. Screw into opening flange instead of top of cabinet when fastening the supply air duct.

Duct design is based on a nominal external static pressure of 1.5" wc.

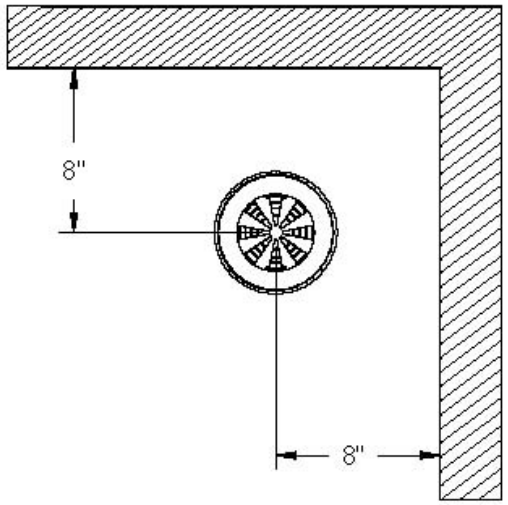
diffuser location

Please refer to the duct layout that has been done for the installation. This layout has been designed to provide you with the maximum benefit from your system. Small deviations may be necessary due to existing construction. However, if large deviations must be made, for example:

- Elimination of a diffuser from a room
- Moving a diffuser more than 10 feet from its specified location
- Re-routing the main plenum

Contact your system designer before proceeding.

Locate the diffusers at least 8" on center from finished walls or corners and away from drapes or other wall coverings and mark the hole center.



Use a hole saw to cut the vent hole through the floor or ceiling.

fan coil placement

The **MaxAir**™ fan coil unit is to be placed according to the layout supplied by the engineer. If a change in location is required, the person responsible for the design is to be consulted. The fan coil unit can be located in a horizontal or vertical position.

The location of the fan coil is not as critical as it is with conventional low velocity systems. Location of the fan coil unit will depend on:

- Minimizing all duct runs.

- Maximizing usable floor space.
- Reducing structural changes.
- Serviceability and access to the unit.
- Location of heat/cool source to fan coil.
- Available space in mechanical room.

When suspending the unit from the ceiling, it is recommended to use spring vibration isolators at each corner of the fan coil unit. This will provide a secure means of hanging the unit, and will also eliminate any transfer of vibration into the building structure. Another common means of suspending the fan coil is with angle iron, sheet metal channel, or uni-strut placed underneath the unit, and supported by threaded rod. If this method is used, rubber isolators must be placed between the fan coil unit, and the platform.

Ensure that the hanging method does not hinder any piping, electrical runs, filter access, or blower access.

trunk duct

Inspect the location for the trunk duct as per the duct layout for the home or building. An important consideration in placement of the main supply plenum is that the fan coil unit must be connected to the main supply plenum. Therefore, it is necessary to have a clear path from the fan coil unit to the main supply plenum.

trunk duct connections

There are five types of connections that may need to be made in this stage of installation. These include couplings, block ends, reducers, elbows (90° and 45°), and tee's.

Place the fittings inside the plenum you intend to connect. Push the supply plenum over the fitting as tight as possible. Use four screws on each side of the connector. Locate the screws at 90° to one another. After securing the connector with the screws, be sure to ***tape or seal all joints*** to eliminate any air leaks.

elbow and tee placement

Placement of elbows, tees, and saddles should be a minimum of 18" from the fan coil unit outlet to allow for correct airflow. If possible, run the main plenum for 18" before using elbows or tees. Saddles should not be installed within 18" from the unit discharge unless all saddles are to be located within close proximity to the unit.

For best performance of the system, keep the number of elbows and tees to a minimum. When using elbows always use adjustable type elbows, designed specifically for **MaxAir**™ systems. When utilizing tees that deflect both air steams at 90° angles try to maintain a 50/50 split on the air stream. When using tees that deflect one air stream at 90° try to maintain a 70% straight through to 30% at right angle ratio. These are approximate ratios plus/minus 10%.

connecting the ducts to the fan coils

After the main plenum duct and the fan coil is in place, they can be fitted together, but not permanently fastened yet, as you may have to rotate the plenum in order to make your branch take-off connections. Ensure that there is a minimum of 18 inches of straight duct before any elbows, tees, or saddles are used. After all branch take-off's are completed, you can mechanically fasten and then seal the plenum to the fan coil.

Occasionally, the use of flexible duct is much easier to connect two runs of main supply plenum. It is not recommended.

When the ductwork is being hung in the basement between the joists, please use sheet metal strapping (by installer) and secure to the joists. When located in attics, the ductwork may be laid upon ceiling joists. In attics, run the ductwork low so that it can be covered with the ceiling insulation. Running the duct high in the attic increases the duct losses or gains.

branch ductwork

After the floor and ceiling holes have all been located and drilled, it is time to install all the 2 ½" branch ducts. Try to run the 2 ½" duct parallel to the joists whenever possible as this takes less space. The 2 ½" duct can then be fastened to the joist with strapping material. If the 2 ½" duct is in an unconditioned space, then all connections must be taped to ensure a continuous vapor seal. Try not to damage the vapor barrier on the 2 ½" duct. If it is damaged, the holes must be taped (foil tape). If possible, try to run the 2 ½" duct between the insulation and the vapor barrier.

The minimum length of 2 ½" branch duct is 5', and the maximum is 15'. If a run is shorter than 10', then the 2 ½" duct can be coiled around to get at least 10' of duct. Remember: the minimum bend radius is 4". When installing the branch duct with a minimum radius ensure the duct is extended fully to allow full airflow through the elbow.

Please do not abuse the 2 ½" flex as the helix will crush and unravel.

When connecting the 2 ½" duct to the 2 ½" saddle or click extension, attach the fitting into the inner core of the 2 ½" duct with two evenly spaced TEK screws and tape with foil duct tape. Ensure the head of the TEK screw is on the wire helix as the core will tear. Now pull the insulation and vapor barrier over the inner core and secure around the outside of the vapor barrier with a cable tie. Tighten the cable tie securely around the connector tube, inner core, insulation, and vapor barrier.

When installing the 2 ½" flex duct in areas in which you must run counter to the direction of solid joists, some drilling may be required. It is recommended to drill the smallest hole possible, in order to maintain structural integrity. If possible, run the flex duct under the joists and avoid drilling any holes.

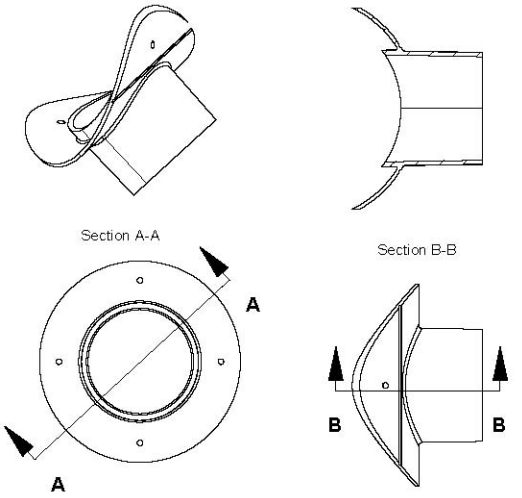
Ensure that it is allowable to drill holes through the joists before proceeding.

Remove the insulation from the 2 ½" duct and cut the insulation into lengths that correspond to your joist spacing. Drill a 2 ¾" hole in the joists that must be penetrated to allow for the 2 ½" duct. As you slide the 2 ½" duct through the holes, the pre-cut insulation will now be installed at each joist space you pass through. If a T-Bar ceiling is going to be installed, it is far easier to run the 2 ½" duct in that space, rather than drilling through several joists.

If the supply run required is longer than 10' it will be necessary to joint 2 pieces of duct. To do this use a short piece of field supplied 2" ABS as a coupling. Use two evenly spaced TEK screws to secure the core on either side of the joint and the tape the core connection with foil tape. Pull together and overlap the insulation and vapor barrier and tie wrap the vapor barriers together ensuring no air will be able to leak.

connecting the 2 ½" flexible branch duct to the trunk duct

The 2 ½" flexible duct is used to connect the main supply plenum to the vent locations. The trunk duct is usually located centrally in the structure allowing both sides to be serviced from the same plenum. When drilling snap lock duct, try to locate the 2 ½" saddles between the seams on the main plenum so as not to affect the structural integrity of the duct. When drilling snap lock duct, avoid locating the 2 ½" saddles near the longitudinal seam on the main plenum so as not to affect the structural integrity of the duct. Determine the positioning of the 2 ½" saddle connections onto the main plenum and mark these joining spots. Repeat this for all duct runs so the full length of the main plenum can be rotated and drilled all at once. A slight upward angle of the branch connection is required to keep the bend in the branch duct as gentle as possible (2:00 and 10:00 positions).



NOTE: Installations done with the main plenum resting on trusses (e.g. In attic space) will require reversing of the angles so the 2 ½" duct comes off pointing slightly downward (4:00 and 8:00 positions).

As noted earlier, it is necessary to be able to rotate the main plenum so the holes can be properly drilled. Drill all the holes in the main plenum using a heavy duty drill with a 2 ¾" hole saw. After all the holes have been drilled in the main plenum, install the saddles. Place the saddles over the 2 ¾" holes with the neoprene side toward the main plenum. Ensure that the saddle plate mounting plate is fully over the hole that you drilled. Push the top of the plate tight against the main plenum and screw the plate to the plenum with 2 - 3/4" self tapping sheet metal screws opposite each other. Form the plate to the curvature of the main duct and screw the saddle plate flat with 2 more 3/4" self tapping screws at 90° angles to one another.

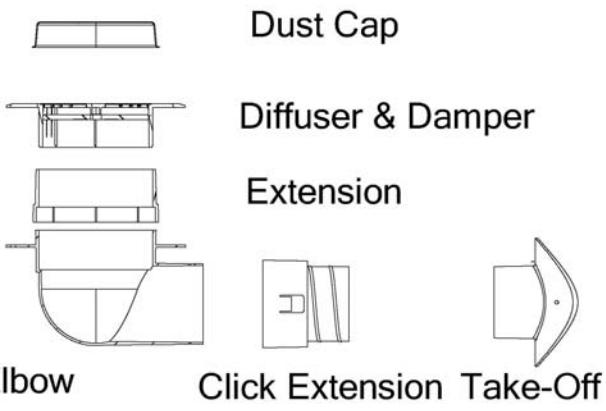
branch duct termination

The flex duct vapor barrier must not be penetrated. The flexible ductwork must be installed in a gentle bend through the floor or ceiling. The maximum bend radius of the flexible ductwork is 4".

To complete the installation, install the diffuser elbow. The flex duct is factory connected to the click extension, just push the click extension onto the elbow until a click is heard. No additional sealant, tape or screws are necessary.

installing the diffusers

The rough in kit is shipped in 3 pieces, the take-off, the elbow, and the dust cap. The diffuser and damper and extension are shipped separately.



Install the branch duct as described above. Ensure the duct cap is installed to keep construction debris out of the duct.

After the surface is finished remove the dust cap and install the friction fit diffuser & damper. An extension is available if the finished surface is too thick (eg. tile or hardwood flooring) to allow the diffuser to fit properly into the elbow.

If too much air is being supplied by a diffuser the diffuser balancing damper can be adjusted.

airflow

When all of the ducts are installed, the airflow from the vents should be checked. If you have vents that are not blowing strongly, there are a few things to check. Make sure that the 2 ½" duct is not crushed, crimped, kinked, or torn. At this point, check for air leaks in the ducts, and seal all leaks with tape or duct sealant, as per local codes. If some vents are still not blowing strongly, perform

an airflow troubleshooting check.

return air duct

The return air duct is not supplied as part of the **MaxAir**™ fan coil package. It is to be supplied and installed by the installing contractor. The return air and fresh air make-up ducts are to be installed as per local building code specifications and good design practices. The first five feet of the return air duct from the air handling units is recommended to be acoustically lined for sound absorption.

condensation

On units supplied with an external cooling coil, a drain connection is provided on the cooling coil. A drain line, with a trap must be installed (the size of the trap is discussed in the previous section). For cooling installations where the fan coil unit is installed in hot, humid areas, condensate might form on the outer cabinet of the unit. When this potential exists, a secondary drain pan must be installed under the entire unit. This pan should also extend under the piping connections and TX valve. This is especially critical in attic installations where condensate can cause damage to the ceiling. When in this condition, all supply ducts must be completely sealed, insulated, and provided with a vapor barrier (as per local building codes).

DX refrigerant cooling

When installing the fan coil, either in the horizontal or vertical position, make sure that the unit is installed level in order to handle condensate drainage. The condensate drain should be trapped, and the drain line sloped toward the drain at a 1/4" per foot slope. Ensure that no screws puncture the drain pan. The refrigerant coil must be installed in a vertical position (horizontal airflow through the coil) or condensate drainage problems will result.

Some building codes call for a secondary drain pan under the entire unit. Check local codes for more information. Any installation that has the potential of property damage due to condensate must have a secondary drain pan installed. If the unit is installed in a high heat and/or humidity location, extra insulation around the unit casing may be required to prevent excessive condensate from forming on the outer surface of the casing. Install the unit so that there is adequate clearance on all sides for service and for piping runs.

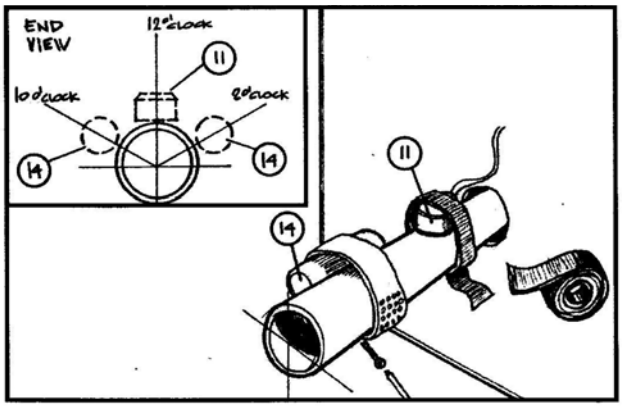
When connecting the refrigerant lines to the cooling coil, it is recommended that you install a site glass and filter/drier at the condensing unit, as well as both high and low side access ports. This is useful for both the system setup, and for future trouble shooting.

condensing unit

Locate the outdoor unit in a suitable location, as close as possible to the fan coil. Maintain the clearances recommended by the condensing unit manufacturer's installation manual to ensure proper airflow. The outdoor unit must be installed in a level, properly supported location. A sight glass and liquid line filter/drier is recommended but not mandatory.

freezestat and TX valve

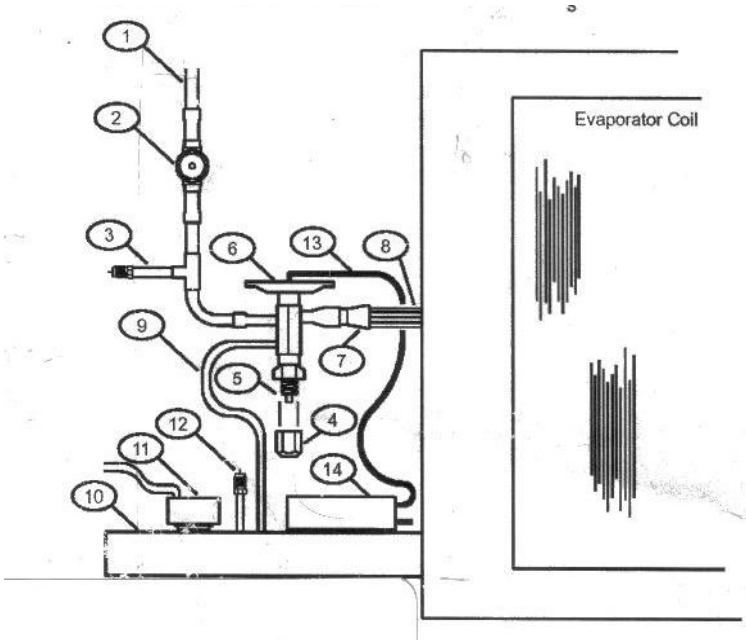
MaxAir™ DX evaporator coils come with an anti-ice control frost thermostat installed on the suction line. Ensure that the TX valve bulb and the frost thermostat control are



fastened securely and are well insulated. DO NOT use a self-tightening clamp on the frost thermostat as excessive tightening may damage the thermostat.

The remote sensing bulb for the TX valve should be located on a clean, horizontal section of the suction line. It should be mounted on the top half of the pipe in the 2 o'clock or 10 o'clock position.

evaporator coil assembly



1) Liquid line
2) Site glass (not Supplied)
3) High side access port
4) Adjustment stem cap (not applicable)
5) Superheat adjustment stem (not applicable)
6) Thermal expansion valve(TXV)
7) Refrigerant distributor
8) Distributor tubes
9) External equalizer line
10) Suction line
11) Anti-ice control (Frost thermostat)
12) Low side access port
13) TX capillary tube
14) TX sensing bulb

refrigeration piping

Use only refrigerant grade pipe and fittings. Plumbing fittings may contain wax or other contaminants which are detrimental to the proper operation of the system. Insulate the suction line with 3/8" insulation such as Armaflex. In high heat areas, 1/2" insulation may be needed. If the lines are run in an area where temperatures could exceed 120 deg. F, then the liquid line may need to be insulated as well.

Install the pipes as per local codes and good piping practices, supporting the pipe every 5 feet. Run the pipes in the most direct route possible, taking into account structural integrity and building finishing details. If the evaporator is located above the condenser, slope any horizontal runs toward the condenser and provide a trap at the evaporator to prevent liquid migration during the off cycle. If the condenser is located above the evaporator, a trap must be installed in the suction line at the bottom of the vertical riser. For long vertical risers, additional traps must be installed for every twenty feet. For lines running over 50', a suction line accumulator must be installed. Lines running over 100' are not recommended.

Flow nitrogen at a low pressure through the piping when welding to prevent oxidation.

condensing unit wiring

Make all connections to the outdoor unit with liquid tight conduit and fittings. Most building codes require a rain tight disconnect switch at the outdoor unit as well. Run the proper size wire to the unit, and connect as per the manufacturers recommendations. Ensure that the unit is setup for a TX valve system. If not, a hard start kit may be required.

evacuating and charging

After the piping is installed, and all components connected, pressurize the system and check for leaks. The use of an

electronic leak detector is recommended, as it is more sensitive to small leaks under the low pressures commonly used for initial leak detection.

Fill the system with nitrogen to 100 psig and test for leaks. Using a good, quality vacuum pump, evacuate the system from both the low and high side of the system to 500 microns and ensure that the system holds at the vacuum pressure. If not, check for leaks and evacuate again. If the vacuum is maintained, add refrigerant to raise the pressure to 2 psig, and either open the service valves (suction first) on pre-charged condensing units, or add refrigerant to the system until the proper operating charge is obtained.

ELECTRICAL

Warning! - Make sure unit is properly grounded. Locate air handler on a separate electric circuit.

All air handlers operate on 115v/1ph/60hz line voltage. All control circuits are 24 volt.

thermostat

The **MaxAir**™ series air handlers are compatible with any standard heat/cool, heat pump, “electric heat”, “gas heat”, set-back or electronic thermostat.

Thermostat Heat Anticipator Setting	**0.04 amps**

Thermostats without cooling: do not connect the yellow wire at the air handler.

Thermostats without continuous run switch: do not connect the green wire at the air handler.

electrical information

Air handler wiring diagrams are located inside of the main access panel on the control panel door for easy reference during installation.

Nameplate data is located on the unit exterior.

For other electrical details and schematics, please contact your **MaxAir**™ representative.

NOTE: Total accessory amp draw must not exceed 1.0 Amp per CSA 236, C.I. 36.12.

connection locations

A terminal strip inside the electrical box is provided for the following electrical connections:

- power connection
- circulation pump
- thermostat
- condensing unit
- heating accessory
- cooling accessory

changing motor speed settings

MaxAir™ air handlers are equipped with three speed motors.

Factory settings are:
Cooling speed = high
Heating speed = high
Continuous run = high or low

Motor speeds for cooling, heating or continuous run are all field selectable, in any combination.
Changes to motor speeds are made at the function relay in the electric module.

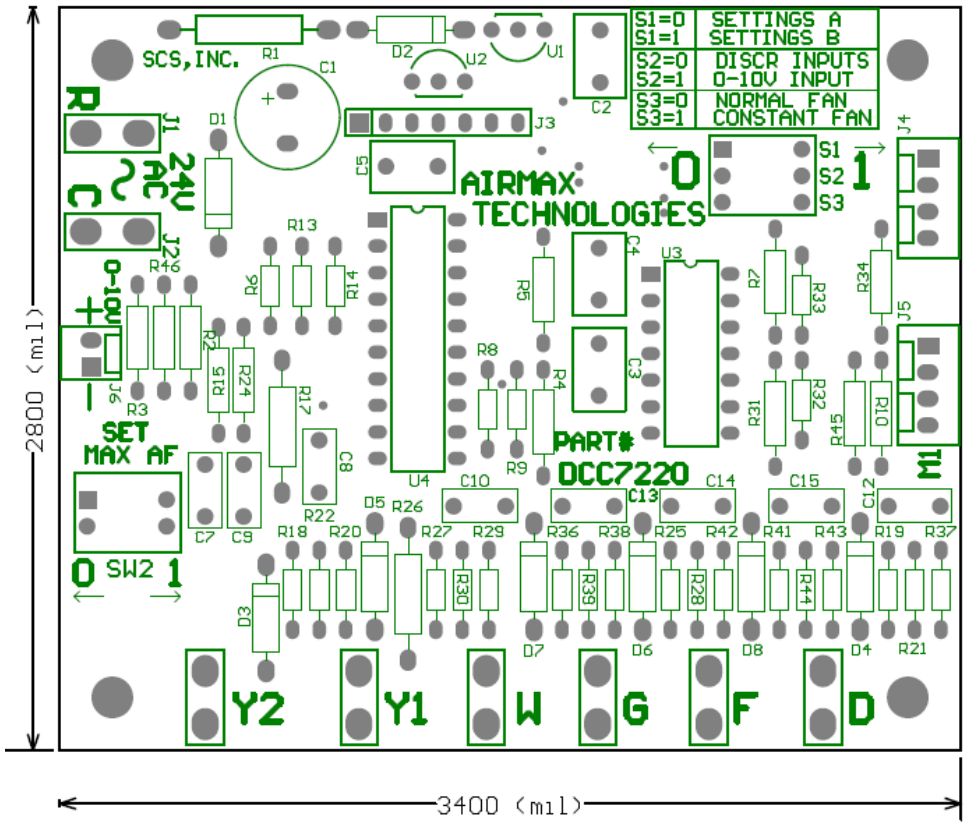
Warning! All connections are clearly marked. It is acceptable to put two or more fan relay connections under one terminal lug. (The unit comes factory set with both the continuous run and heating speed relay connections under the motor low speed terminal lug.) Do not use jumpers between terminal lugs! Connecting two or more motor taps together will result in immediate motor failure and possible fire hazard.

Figure 1 - Connection Locations

ELECTRICAL (MAXe UNITS) .

The DCC7220 series is microcontroller-based electronic controls for brushless dc motor-driven fan coils, furnaces or other blowers. They command discrete blower speeds, torques or airflow in heating, cooling and other operating modes from inputs provided from a conventional thermostat whose 24VAC signal outputs activate the operating mode. The discrete output values can be scaled using a dip-switch table so that the controller can be used with several different products of different capacities. An on-board dip-switch optionally selects a 0-10V input for proportional output control. This document defines the input and output requirements and operation from a 0-10V output modulating thermostat, 24VAC switched output thermostat or other control switch.

1. DCC7220 LAYOUT AND CONNECTIONS



2. POWER INPUT:

24Vac (nominal) between terminals J1 (“24VAC LINE”) and J2 (“24VAC RET”):
18Vac Minimum, 30Vac Maximum,
Current: <50ma (All outputs ON)

SUPPLY POWER FROM THE SECONDARY OF AN NEC CLASS-2 TRANSFORMER ONLY.

3. CONTROL SYSTEM INPUTS

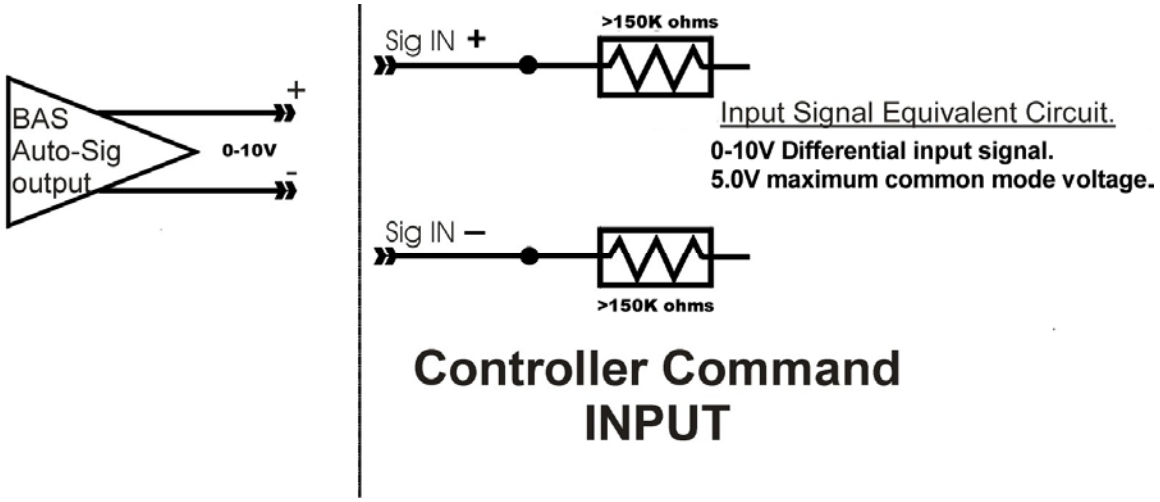
a.) 0-10vdc Modulating Command — A 0 VDC to 10 VDC command to J6 between Vin+ and Vin– produces a PWM output of 0% through 100% when S2 is set to “1”. The polarity marked on the PCB must be observed. See Fig 3:

Differential Input Voltage: 0 V to 10 VDC represent 0 to 100% of PWM range
Minimum Input V dc: - 0.4 Vdc
Maximum Input V dc: +10.2 Vdc
Common Mode Voltage: - 0.2 V max negative, +5 V max positive
Signal (differential) Input impedance: >150K Ohm (Vin+ to Vin-)

Common mode impedance: > 150K Ohm to COM

Maximum Common Mode Voltage: 5.0Vdc

ON/OFF: ON = input VDC > 0.5VDC +/- 0.1V
OFF = input VDC <0.4VDC +/- 0.1V



b.) Switched 24VAC inputs: (see para. 5)

Y – HIGH COOL MODE	W – HEAT MODE
Y1 – LOW COOL MODE	G – Fan Only MODE
F – Defrost MODE	D – Dehumidification MODE

Y and Y1

Input Load Resistance: ~1K ohm from each terminal and 24VAC return.
Minimum acceptable cooling anticipator resistance: 3.3K Ohms Connected from 24Vac to Y or Y1

All other inputs:

Input Load Resistance: >10K Ohms from each terminal and 24VAC return.

Load Current All Inputs: Positive Half-Wave (with respect to 24VAC RTN)

Signals ACTIVE: 24VAC nominal (with respect to 24VAC RTN); 12VAC minimum; 30VAC Maximum; Current: <15ma @30VAC.

Signals INACTIVE at <4VAC (Current through any signal source, switch and/or snubbers must hold any input to < 4VAC or DC)

NOTE: DO NOT CONNECT THE SWITCHED-24VAC INPUT FUNCTIONS FROM A SOURCE THAT IS ELECTRICALLY ISOLATED FROM THE 24VAC SOURCE SUPPLYING POWER TO THIS CONTROL UNLESS THE TRANSFORMER SUPPLYING THIS CONTROL AND THE 2ND TRANSFORMER ARE PHASED PROPERLY WITH THEIR COMMONS CONNECTED.

4. OUTPUTS

Pin-outs on J4 (model DCC7210-4 only) (SEE FIG 1):

J5/J4–pin-1: START/STOP: During normal operation after power-up this output is the motor enable (use if needed).
0 – 24VDC (nom), 10ma maximum sourced current.

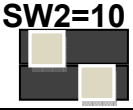
J5/J4–pin-2: COM (1-pin) Outputs Common (to isolated common input(s) to motor/drive)

J5/J4–pin-3: PWM signal Motor Command: 0% to 100% duty-cycle.
0Vdc (min) OFF; 24VDC (max) ON, 10 ma max sourced current.

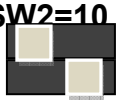
J5/J4–pin-4: no connection.

A. <u>OUTPUTS with DIP-SWITCH 1 OPTIONS SELECTIONS:</u> Each Discrete Input or combination of inputs activates a pre-programmed, customer-specified PWM duty-cycle output. Two output table sets are available, each selected by the position of SW1. Each table has 4 "scaled" settings that can be used to select maximum output values/airflow for different equipment capacities. The table values are programmed into the DCC7220 controller.

S1 = 0: SETTINGS A DISCRETE OUTPUT VALUE

SET MAX AIRFLOW (Dip-SW 2)	Settings A Discrete Input States					
	G	Y2 & G	Y1 & G	W	D & Not F (& Not G & Not Y1 & Not Y2)	D & F (& Not G & Not Y1 & Not Y2)
SW2=00 	35%	100%	12%	50%	100%	60%
SW2=01 	29%	83%	12%	42%	83%	50%
SW2=10 	23%	66%	12%	33%	66%	40%
SW2=11 	18%	50%	12%	25%	50%	30%

S1 = 1: SETTINGS B DISCRETE OUTPUT VALUE

SET MAX AIRFLOW Dip-SW 2)	Settings B Discrete Input States					
	G	Y2 & G	Y1 & G	W	D & Not F (& Not G & Not Y1 & Not Y2)	D & F (& Not G & Not Y1 & Not Y2)
SW2=00 	25%	100%	15%	100%	100%	60%
SW2=01 	21%	83%	15%	83%	83%	50%
SW2=10 	17%	66%	15%	66%	66%	40%
SW2=11 	13%	50%	15%	50%	50%	30%

B. S2 0-10V VARIABLE or DISCRETE OUTPUTS COMMAND MODE SELECTION

1. S2 = 0: Control from Discrete Switched 24VAC inputs (Per SW 1 Tables above)

2. S2 = 1: Control from 0-10Vdc input as follows:

SET MAX AIRFLOW (DIP-SW2)	COMMAND INPUT RANGE	COMMAND OUTPUT RANGE
SW2=00 	0-10V	0-100%
SW2=01 	0-10V	0-83%
SW2=10 	0-10V	0-66%
SW2=11 	0-10V	0-50%

C. S3 CONSTANT FAN SELECTION:

1. Position 3 = 0: Fan cycles off with equipment during an off-cycle.
2. Position 3 = 1: Fan Remains on ("CONSTANT FAN MODE") at approximately 13% output during equipment off-cycle.

START-UP PROCEDURES .

Do not start the air handler or water heater until ALL air has been purged!

1. Fill the water heater, and/or boiler, and/or storage tank with water, but do not start it.
2. Purge all air for the domestic water lines by opening faucets at the remote parts of the plumbing system.
3. Purge all air from the space heating loop by closing the isolation valve on the return leg of the loop and open the drain to purge air. Open the return leg isolation valve and then close the drain valve. If no isolation valves are installed, open drain fully to purge air and let run for at least 30 seconds.
4. Start the water heater according to the manufacturer's instructions. Set the desired water temperature (140F/60C) and wait for the tank to shut off.
5. Turn on the power to the air handler and set the room thermostat for heat to energize the fan and pump. If a gurgling sound is present, it should subside within one minute. If noise is still present after one minute, repeat step 3 to purge air as necessary.
6. Check pipes for heating to make sure there is flow and feel the pump motor to see if it is running hot.
7. With the air handler running, adjust the water flow through the circulation loop to obtain 20-30F (11-17C) temperature drop through the air handler with an entering water temperature between 135-180F (57-82C).

HINT: The temperature drop across the air handler can easily be measured with a probe type pocket thermometer. Just rap a rag or piece of insulation around the inlet and outlet to the air handler and insert the thermometer probe between the insulation and the pipe to take the reading. Wait at least two minutes to take each reading (longer for systems with a storage tank). Make sure to take both

readings one immediately after the other. At high flow rates the temperature in the tank may drift, causing error in the calculated temperature difference, if readings are taken more than 4 minutes apart.

Ensure that all electrical connections are tight, and that any packing or shipping restraints are removed from both the fan coil, and the condensing unit. With the power to the condensing unit off, check the thermostat for normal operation, and again check that there is proper airflow from all the vents. Ensure that no branch ducts were damaged or bent sharply. Do not run the fan coil without a filter in place.

DO **NOT** LEAVE THE SYSTEM UNATTENDED UNTIL NORMAL OPERATING CONDITIONS ARE OBTAINED.

Observe the system pressures during the initial start-up and charging of the system. Check the voltage and amp draw of both the fan coil, and the outdoor unit. The voltages must be within 10% of the rating plate data. If more than 10 % is noted, contact your local electrical company. Check that the amp draws of both units are within the information printed on the unit rating plates. Set the system charge and adjust the TX valve.

DO NOT USE THE FAN COIL FOR TEMPORARY HEAT DURING CONSTRUCTION. THIS WILL VOID ALL UNIT WARRANTIES

SEQUENCE OF OPERATION

Refer to Ladder Diagram and Wiring Schematic for relay locations.
Note: **MaxAir**™ air handlers are equipped with 3 speed fan motors (high, medium, low). Speeds for heating, cooling and continuous run are all field selectable. Refer to *Electrical* section for description.

Heating Cycle

1. Thermostat calls for heat, connection is made between the (“R” terminal) red and “W” terminal) white thermostat wires.
2. Heating relay is energized; closes providing power to the heating speed motor tap; opens, interrupting power to continuous run motor tap. Pump relay is energized; A1 to A3 closes.
3. When room temperature is satisfied, thermostat breaks connection between red and white wires.
4. Relays are de-energized; pump stops, fan shuts off (or switches to continuous run speed when continuous run employed).

Cooling Cycle

1. Thermostat calls for cooling, connection is made between (“R” terminal) red and (“Y” terminal) yellow thermostat wires.
2. Cooling condenser circuit energized provided field supplied freeze thermostat is closed.
3. Connection is made between (“G” terminal) green and (“R” terminal) red thermostat wire.
4. When thermostat satisfied, connection between red and yellow broken at thermostat.
5. Cooling condenser circuit is de-energized. Fan shuts off (or switches to continuous run speed when continuous run employed).

Continuous Run Cycle (off thermostat)

1. Connection is made between (“G” terminal) green and (“R” terminal) red thermostat wire.
2. Continuous run relay is energized; fan operates on continuous run speed. (factory set to high speed).

Continuous Run Cycle (full time)

1. Connection is made between F1 and F2 terminals on the board.
2. Fan operates on continuous run speed. (factory set to low speed).

SERVICE AND MAINTENANCE .

filter

The **MaxAir**™ series air handlers are not provided with a filter. A good quality filter should be provided and should be inspected monthly and removed and vacuumed or rinsed as required. For washable filters use water only to clean the filter.

A CLOGGED OR INADEQUATE FILTER MAY VOID PRODUCT WARRANTY.

duct cleaning

If proper filter maintenance is adhered to, duct cleaning will not be required for the life of the equipment.

coils

Air conditioning and heating coils should not require cleaning if the filter maintenance schedule is adhered to. If a filter is damaged or collapses from plugging, the coils may get fouled by dust. If this happens, replace the filter and carefully vacuum the coils. The fan may need to be removed to gain access to the face of the heating coil.

air conditioning coil

At the start of each cooling season, check the drain connection to the cooling coil to ensure it is free of debris. An easy way to do this is to blow into the tube to see if there is any obstruction. If a plugged air conditioning coil is suspected, call a service technician for testing and cleaning.

fan and motor

Check fan for dust once a year. If dirty, vacuum or wash to remove dust. Keeping the fan blades clean will reduce noise and improve the capacity and efficiency of the heating system. Take care to avoid wetting the motor! Remove the motor if required.

external pump

The circulating pump is water lubricated and should require no regular maintenance. If the pump fails to start at the beginning of the heating season, follow the instructions in the *Trouble Shooting* section of this manual below.

RUNNING THE PUMP WITH THE ISOLATION VALVES CLOSED OR WITH NO WATER IN THE SYSTEM WILL DAMAGE THE PUMP

NOTE: THE MAXAIR™ FAN COILS ARE NOT TO BE USED FOR TEMPORARY HEAT DURING CONSTRUCTION. USE FOR THIS PURPOSE WILL VOID EQUIPMENT WARRANTY.

TROUBLESHOOTING .

external pump does not run

In areas where hard water is present the pump may “stick” and fail to run after long idle periods. Often this can be freed by closing the isolation valve on the return leg and opening the drain port so full city water pressure flows through the pump. If this fails to free the pump, removal for cleaning or replacement is necessary.

external pump is noisy at start-up

Air is present in heating loop. If sound has not diminished within 1 minute, purge air in accordance with the *Start-Up* procedures. Check to make sure branch connections for heating loop are horizontal.

water heater T&P is weeping

A check valve or back-flow preventor has been installed in the system. Some form of pressure relief may be required.

Options are:

- Install expansion tank.
- Install pressure relief valve; locate outlet over laundry tub or floor drain.

Install combination toilet tank/pressure relief valve

insufficient or no heat

- Plugged air filter or coil. Refer to *Maintenance* section for filter care and coil cleaning.
- Air in heating loop; purge system.
- Inlet and outlet connections to air handler backwards; reverse connections.
- Restricted or improperly installed supply tube in water heater; check and replace.
- Water heater thermostat set too low or not calibrated properly; check water temperature at a faucet. If the temperature has been set low because of homeowner preference, an anti-scald valve may be needed to provide the homeowner with the means of turning the domestic hot water down without affecting the heating output.
- Restriction in heating loop; remove restriction, check valve stuck or closed valve.

cold water at hot faucet

The most probable cause is reverse flow through the heating loop from a stuck check valve; repair or replace valve.

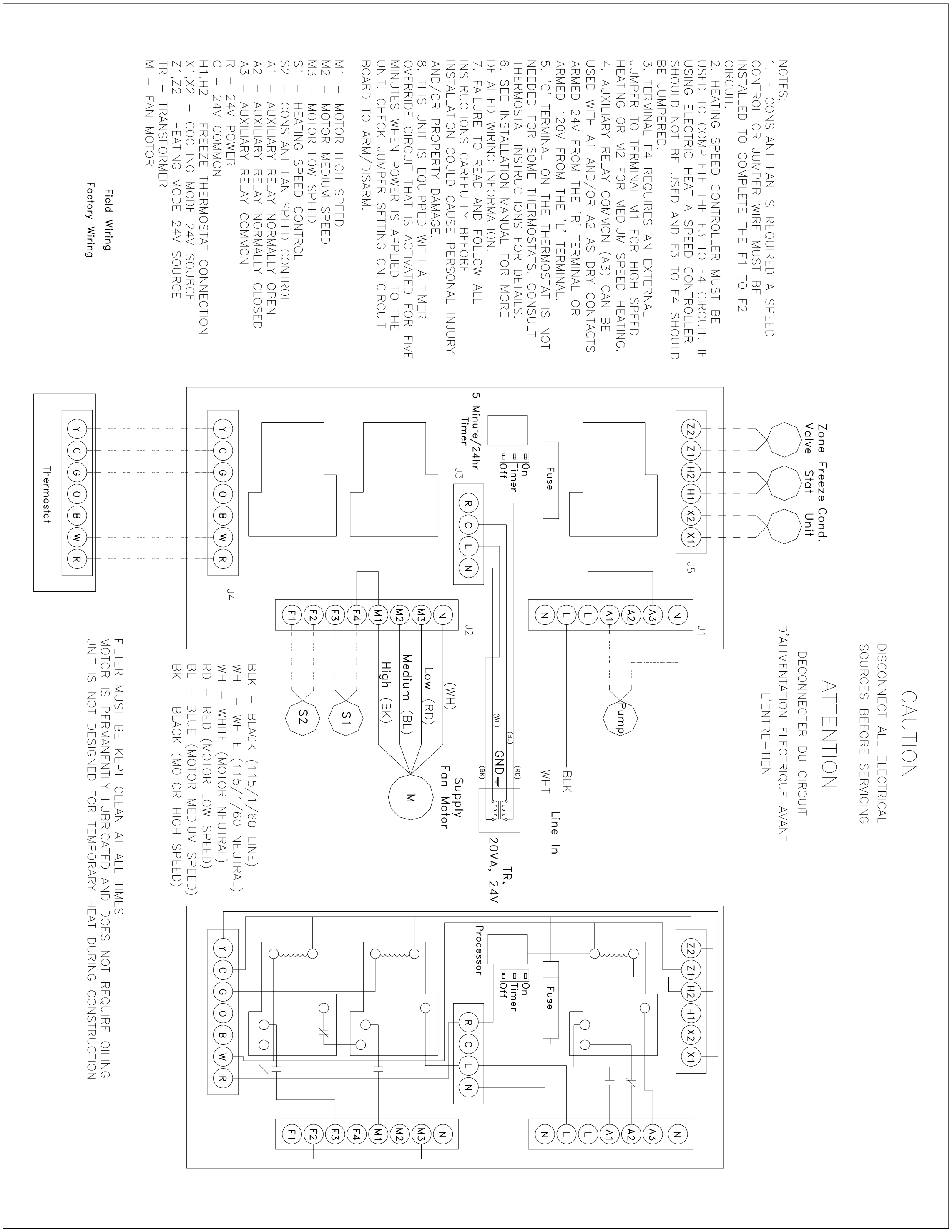
fan runs for cooling but not heating

Thermostat may be connected improperly. Refer to *Electrical* section for proper installation.

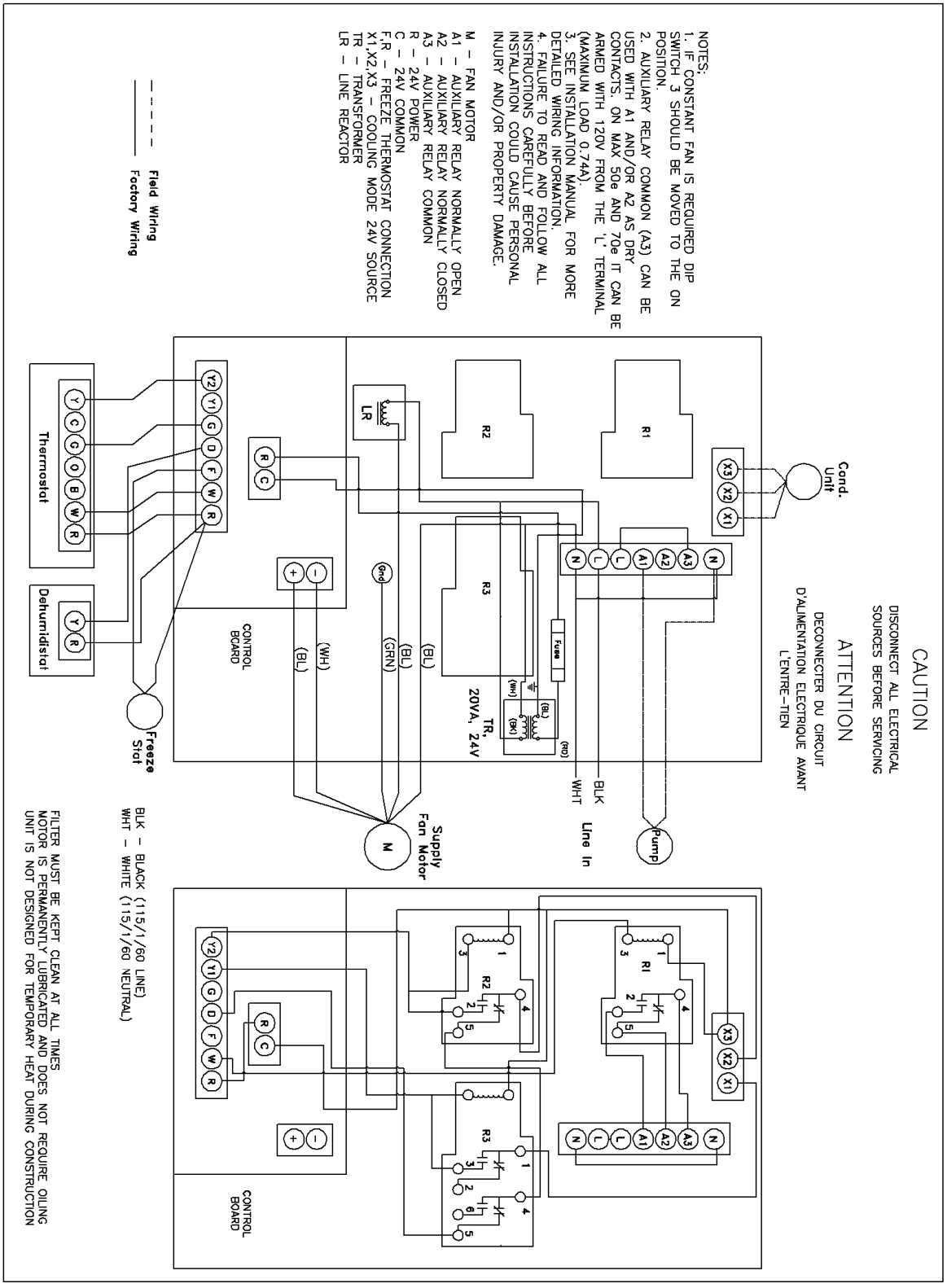
heating during off cycle

Probable cause is thermal siphoning. See check valve description for details; repair or replace check valve. Check elevation of air handler above water heater to see if motorized valve required for positive shut-off.

WIRING DIAGRAM

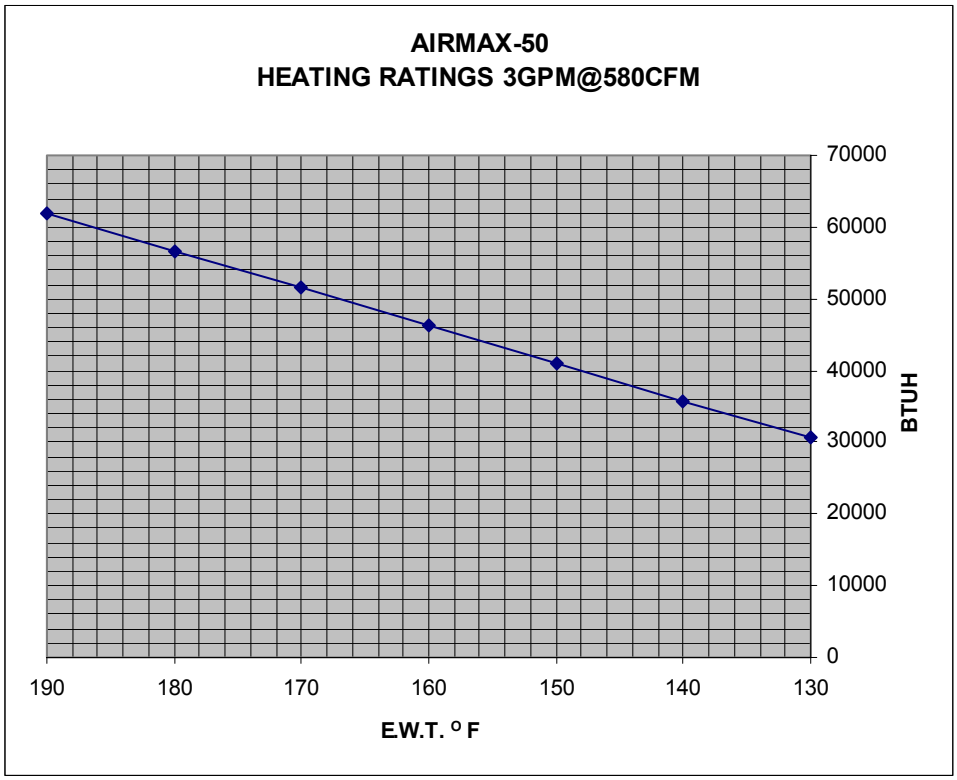


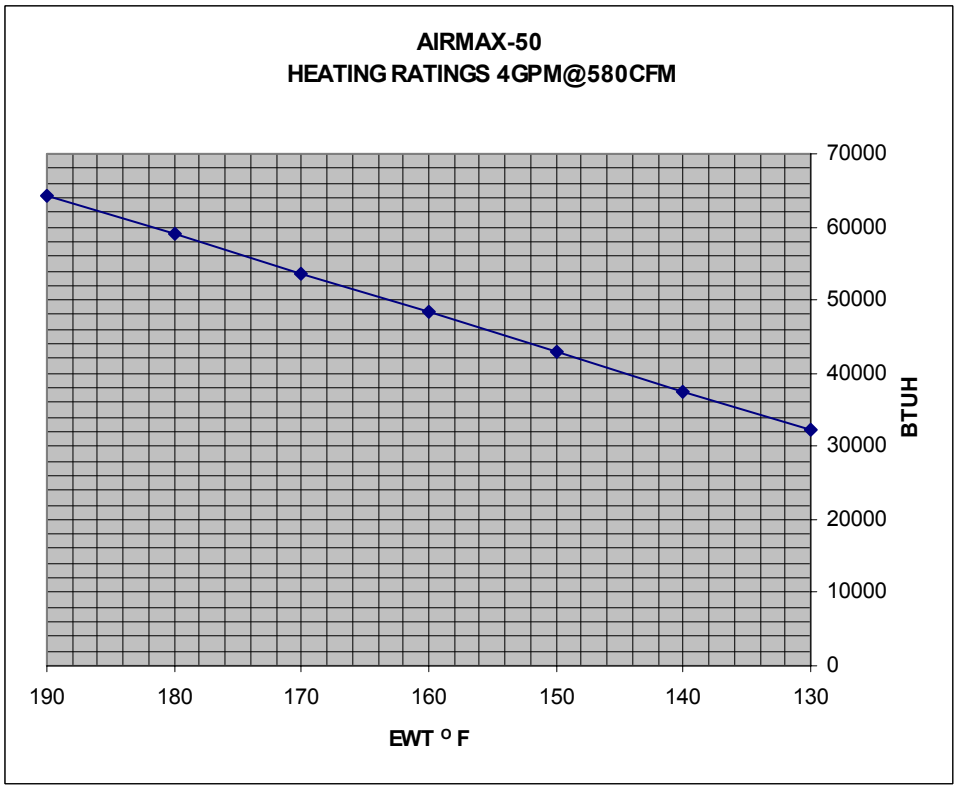
WIRING DIAGRAM (MAXe UNITS)

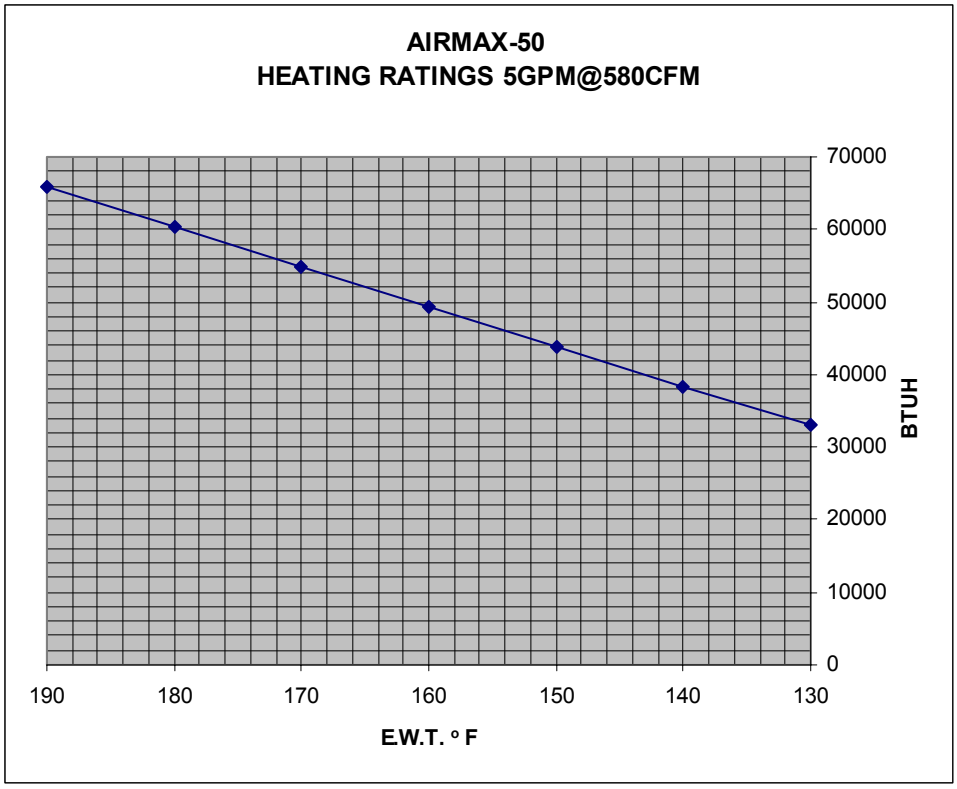


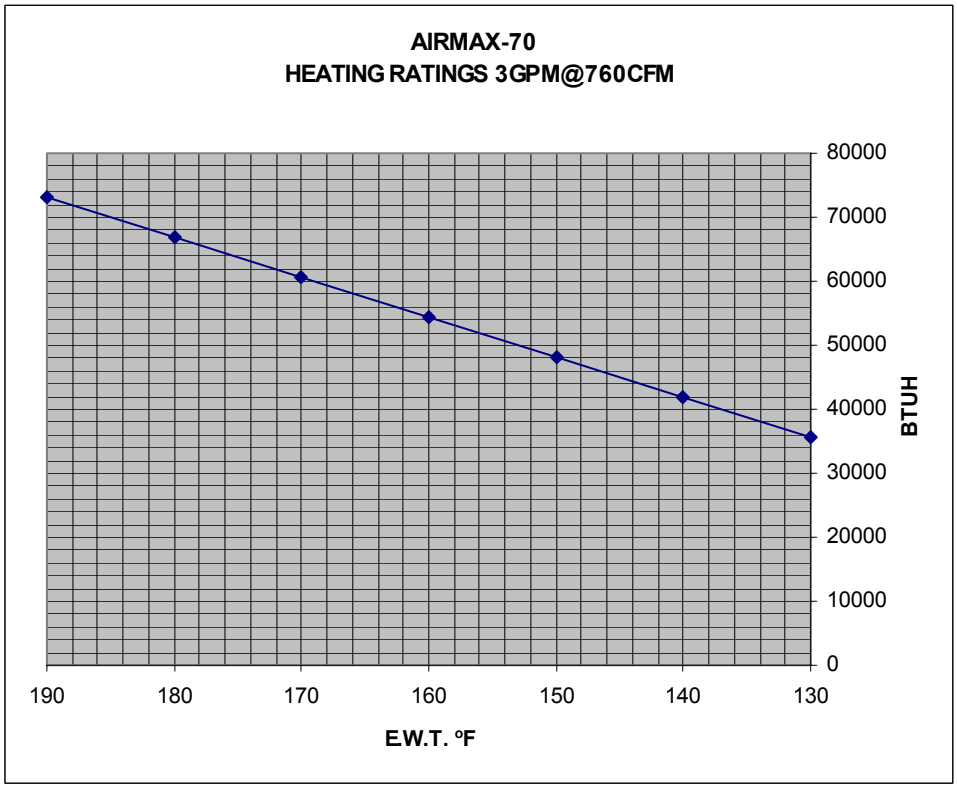
APPENDIX A .

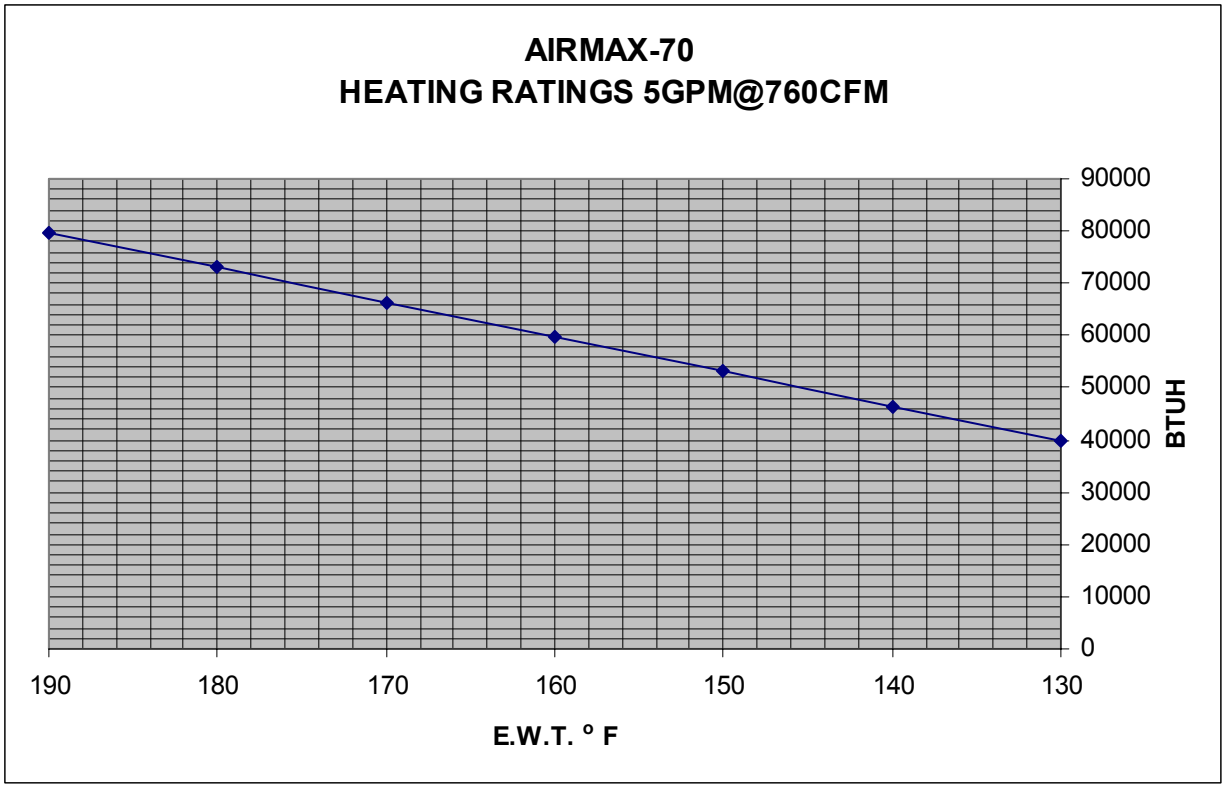
detailed unit heating capacities

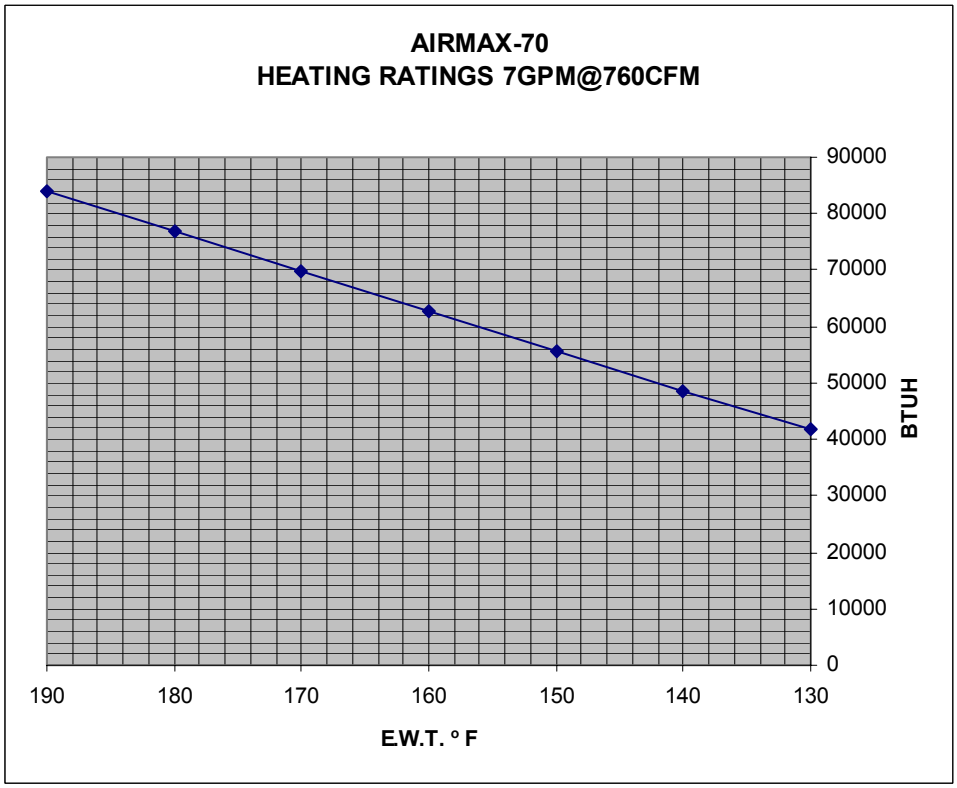


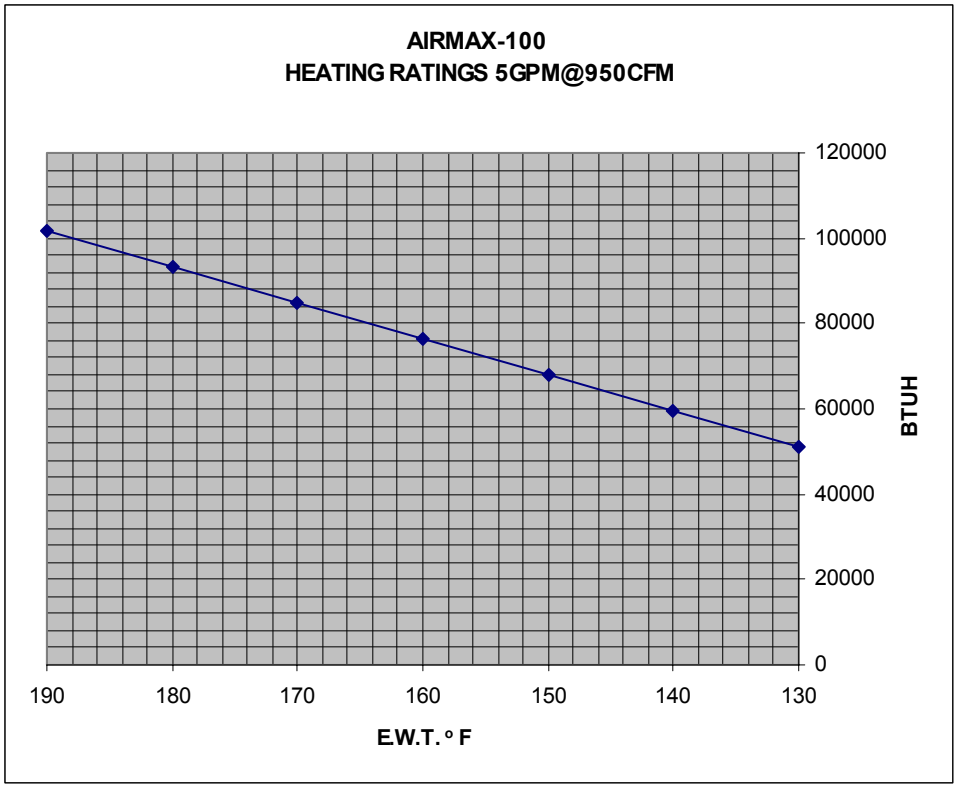


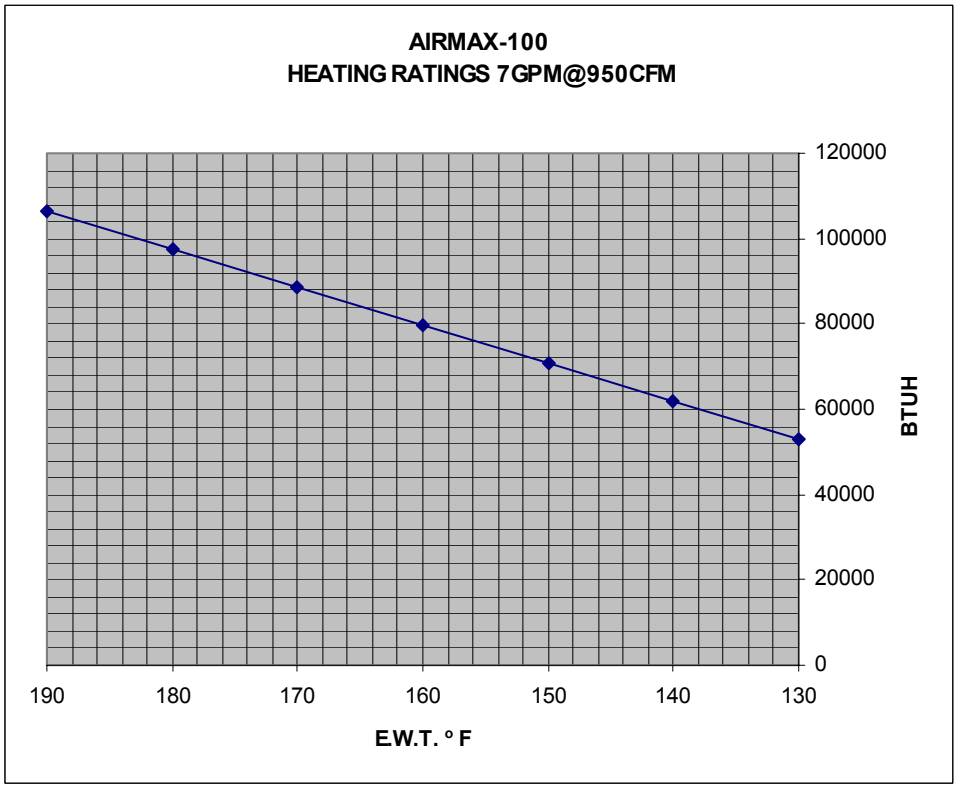

AIRMAX-50
HEATING RATINGS 5GPM@580CFM
70000
60000
50000
40000
30000
20000
10000
0
BTUH
190
180
170
160
150
140
130
E.W.T. ° F

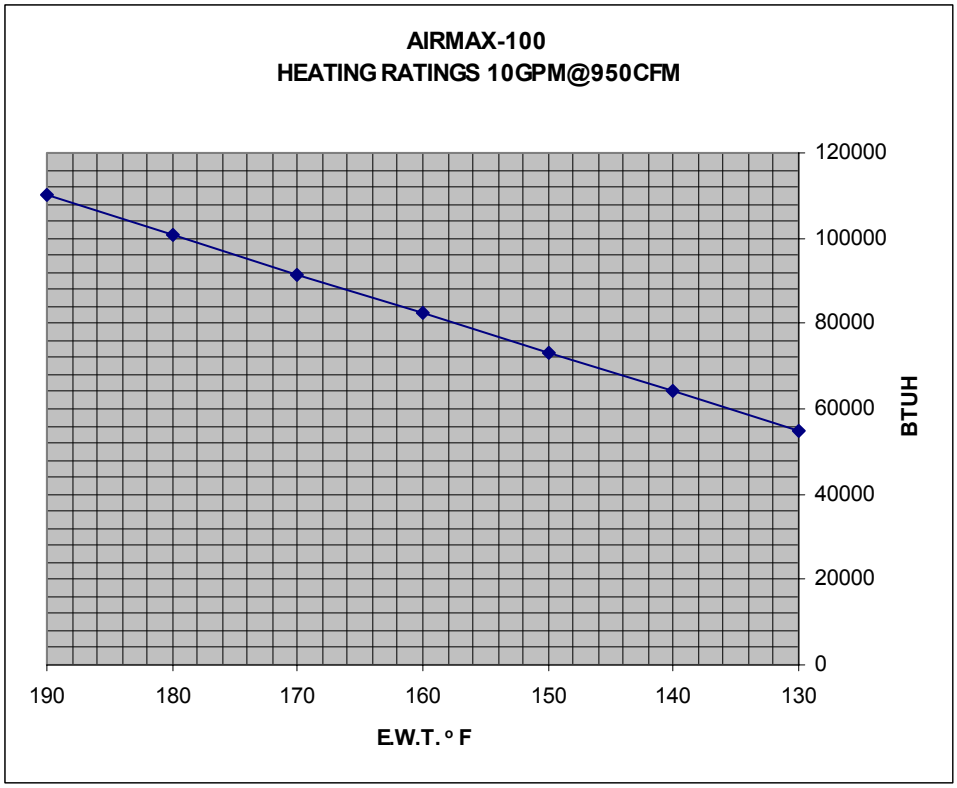

AIRMAX-70
HEATING RATINGS 3GPM@760CFM
80000
70000
60000
50000
40000
30000
20000
10000
0
BTUH
190
180
170
160
150
140
130
E.W.T. °F


AIRMAX-70
HEATING RATINGS 5GPM@760CFM
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
BTUH
190
180
170
160
150
140
130
E.W.T. ° F

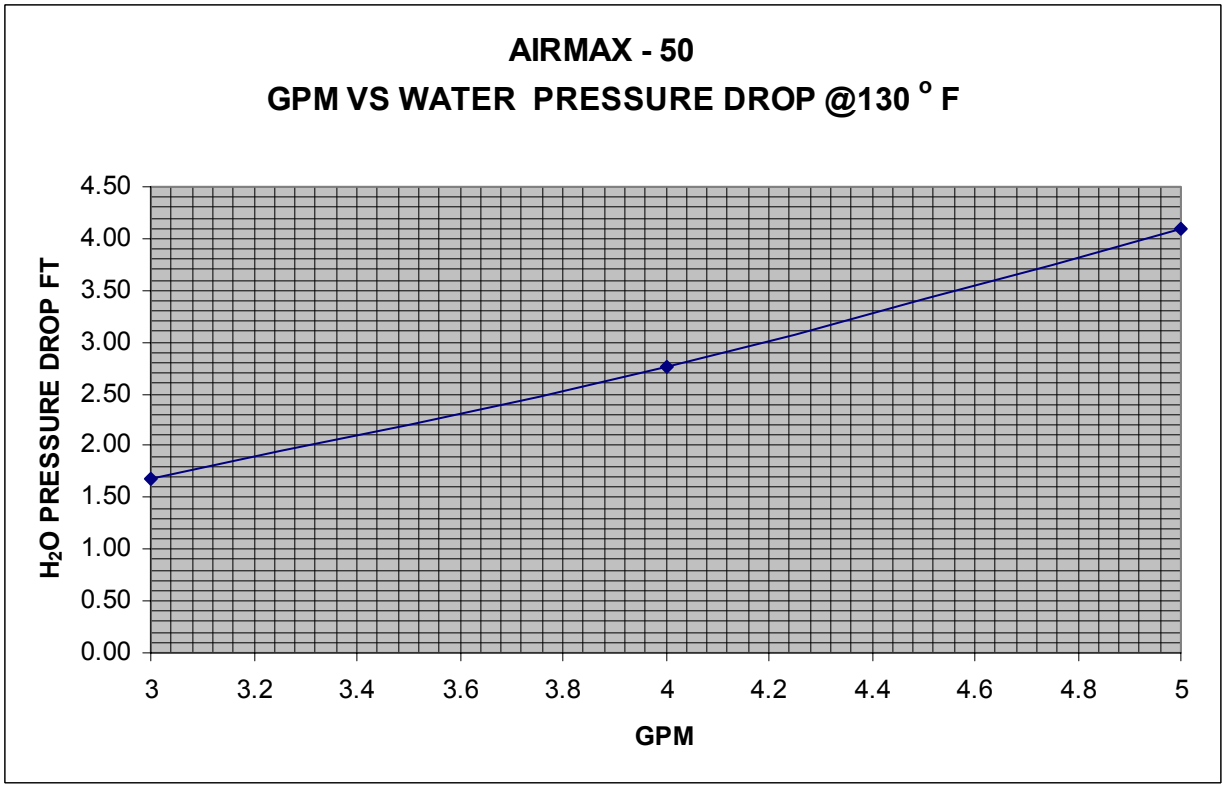

AIRMAX-70
HEATING RATINGS 7GPM@760CFM
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
BTUH
190
180
170
160
150
140
130
E.W.T. ° F

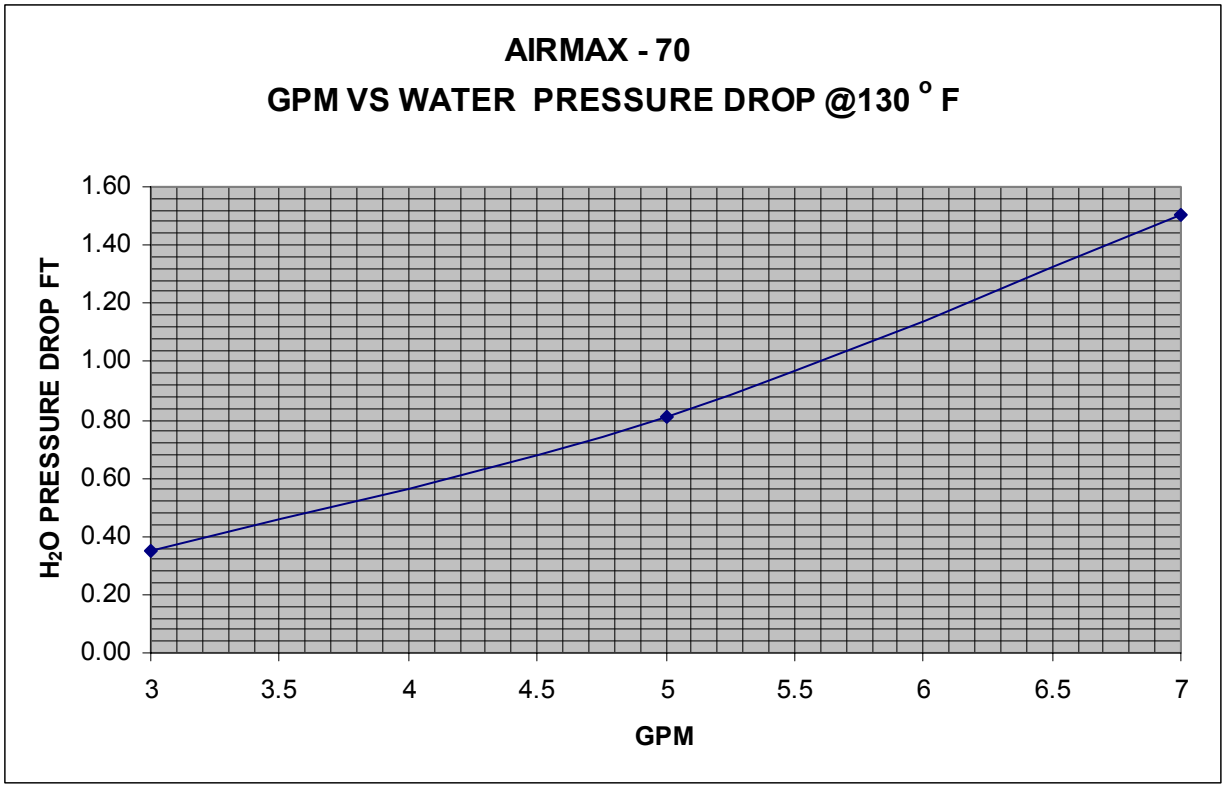

AIRMAX-100
HEATING RATINGS 5GPM@950CFM
120000
100000
80000
60000
40000
20000
0
BTUH
190
180
170
160
150
140
130
E.W.T. ° F

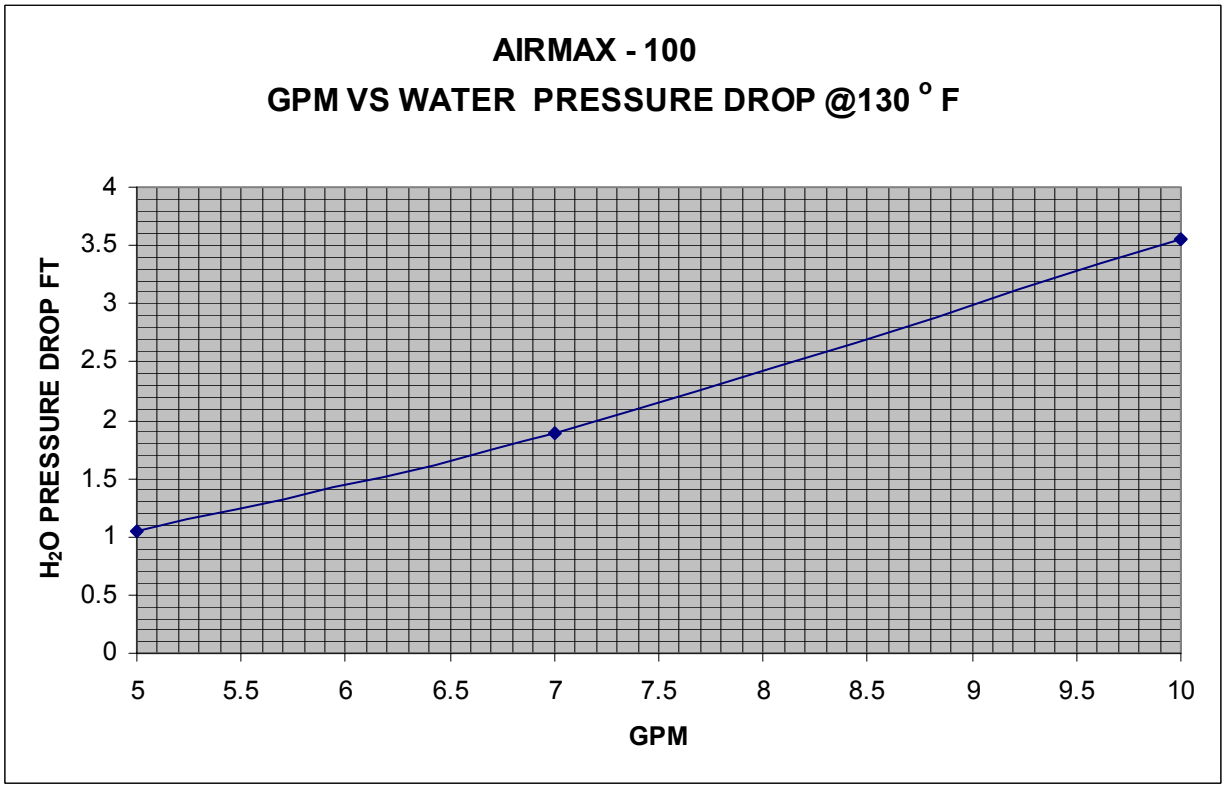

AIRMAX-100
HEATING RATINGS 7GPM@950CFM
120000
100000
80000
60000
40000
20000
0
BTUH
190
180
170
160
150
140
130
E.W.T. ° F



unit heating coil water pressure drops

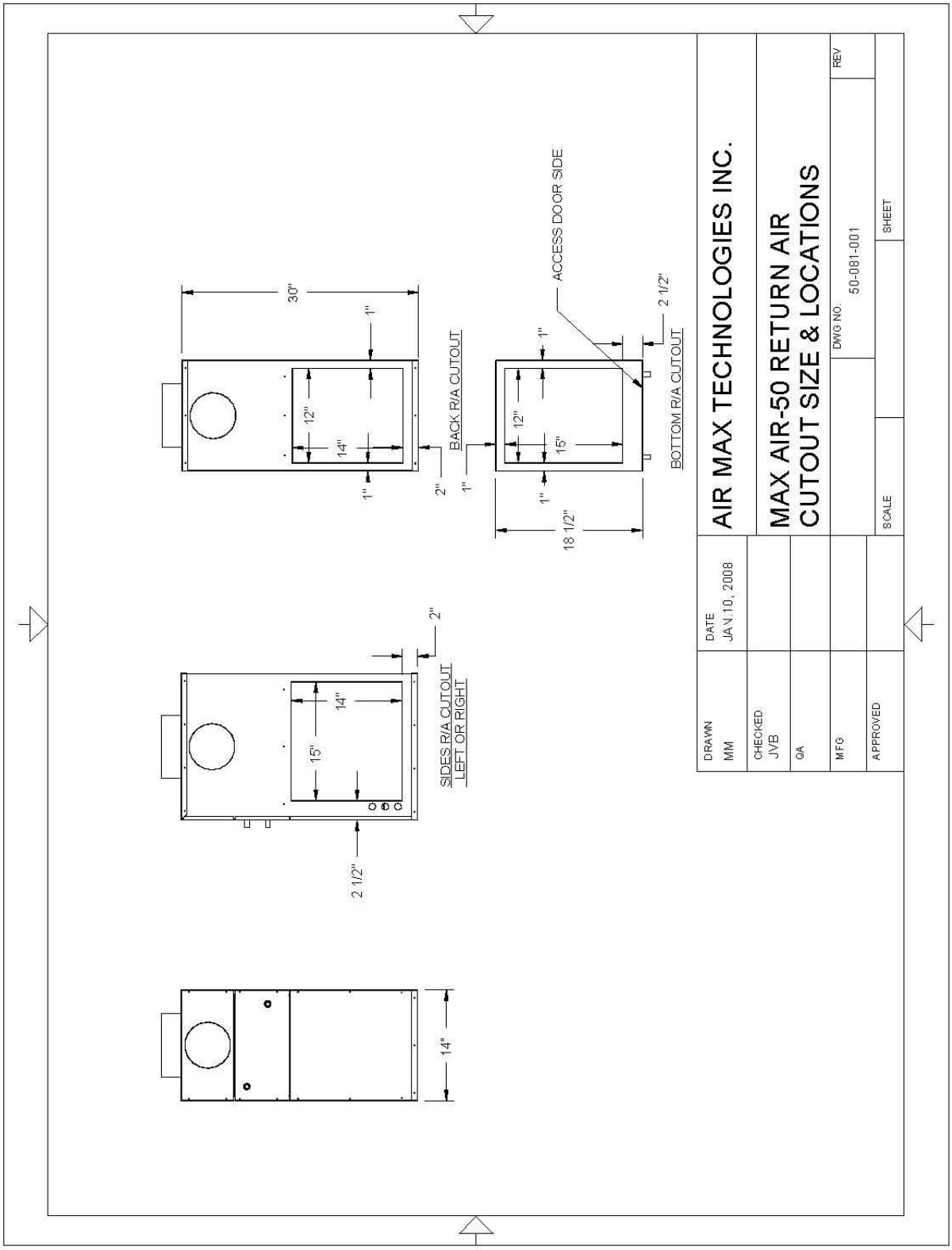


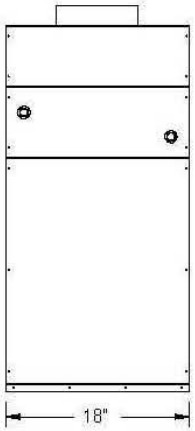

AIRMAX - 70
GPM VS WATER PRESSURE DROP @130 ° F
H2O PRESSURE DROP FT
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
3
3.5
4
4.5
5
5.5
6
6.5
7
GPM

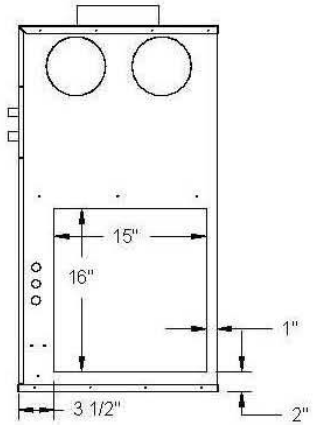

AIRMAX - 100
GPM VS WATER PRESSURE DROP @130 ° F
H2O PRESSURE DROP FT
4
3.5
3
2.5
2
1.5
1
0.5
0
5
5.5
6
6.5
7
7.5
8
8.5
9
9.5
10
GPM

APPENDIX B .

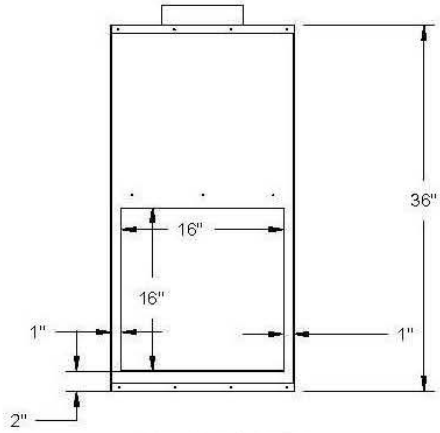
fan coil dimensions and return air size & location



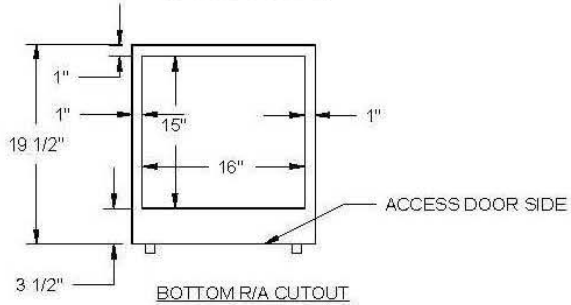




SIDES R/A CUTOUT
LEFT OR RIGHT

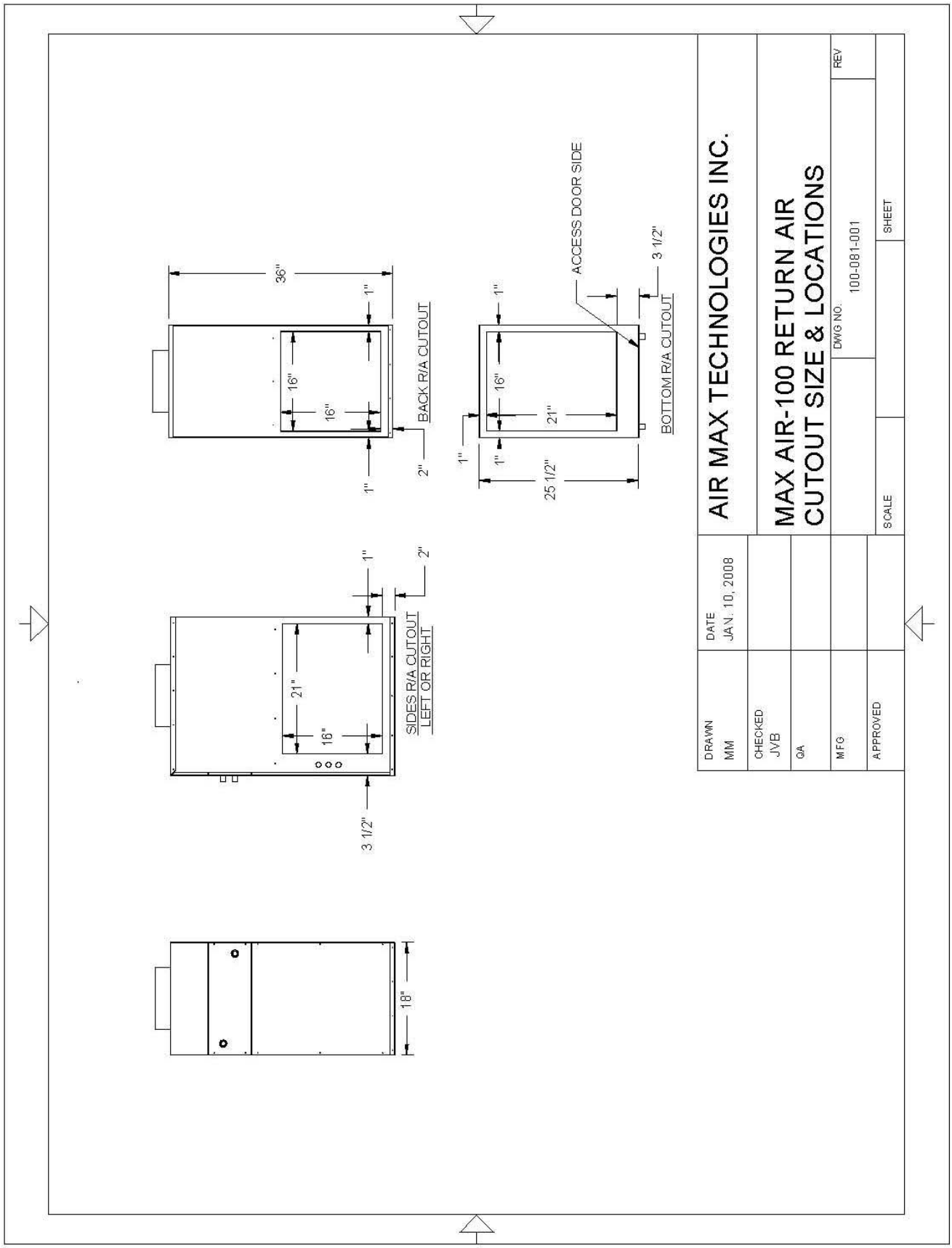


BACK R/A CUTOUT



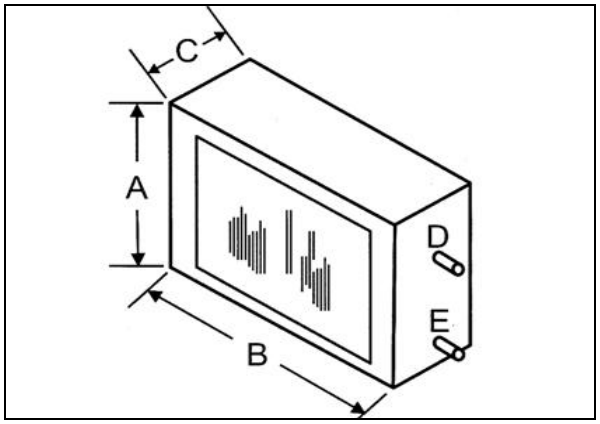
BOTTOM R/A CUTOUT

DRAWN MM	DATE JAN. 10, 2008	AIR MAX TECHNOLOGIES INC.
CHECKED JVB		MAX AIR-70 RETURN AIR CUTOUT SIZE & LOCATIONS
QA		
MFG		DWG NO. 70-081-001 REV
APPROVED		SCALE SHEET


AIR MAX TECHNOLOGIES INC.
MAX AIR-100 RETURN AIR
CUTOUT SIZE & LOCATIONS
DWG NO.
100-081-001
REV
SHEET
SCALE
DRAWN
MM
DATE
JAN. 10, 2008
CHECKED
JVB
QA
MFG
APPROVED
36"
16"
16"
1"
1"
2"
BACK R/A CUTOUT
21"
16"
1"
2"
SIDES R/A CUTOUT
LEFT OR RIGHT
3 1/2"
18"
16"
21"
1"
1"
1"
ACCESS DOOR SIDE
3 1/2"
25 1/2"
BOTTOM R/A CUTOUT

APPENDIX C .

evaporator coil sizes



The coil module comes with two thermal expansion valves, two access ports, and an external frost thermostat and must be installed in the vertical position on the return air side of the fan coil.

COIL SPECIFICATIONS:

Nominal Cooling Capacity	Model	Length (B)	Width (C)	Weight (lb)	Airflow for Nominal Cooling (cfm)	Depth (A)	Coil Size
1 T	MA24-50-1	19	4.5	15	400	18	11x16x2Rx10fpi
1 1/2T	MA18-50	19	4.5	12	600	18	11x16x3Rx10fpi
2T	MA24-50	19	4.5	15	800	18	11x16x4Rx10fpi
2 1/2T	MA30-70	23	4.5	20	1000	18	15x16x4Rx10fpi
3T	MA36-100	23.5	4.5	25	1200	18	19x16x4Rx10fpi

APPENDIX D

water pressure drop calculation

It is important to design and size the supply and return piping accurately to prevent under capacity problems. From the information above and the information included in the **MaxAir**™ capacity tables a proper piping selection can be completed. If you do not have the unit capacity tables ask your sales representative to provide you with the unit capacity and water side ∆T at your operating conditions. From this you can calculate the required water flow for your design.

Flow is calculated using the following formula Q = BTUH/(500 x ∆T) where;

Q = Flow rate (usgpm)
BTUH = Heating capacity of the fan coil at design conditions
∆T = Water temperature difference at design conditions

Once you know Q determine the required pump head.

Determine the required piping layout including the distance between the fan coil and the heat source and the required plumbing specialties.

Calculate the length of the piping to and from the fan coil. Calculate the equivalent length of the fittings and specialties. Add the two lengths together to come up with the total piping length. Choose the size of pipe. Add the coil (Appendix A) pressure drop. This will yield the required water pressure drop.

AirMax™ recommends the use of full port ball valves (Cv = 1) for isolation valves and a proper designed throttling valve for flow control. A globe valve can be included as a flow control device if a proper throttling valve is not available.

sample water pressure drop calculation

An application for a fan coil requires 43,000 BTUH heating capacity, 2 1/2 tons cooling capacity, and has 140° F water for a heat source. The water tank is located in the basement and the fan coil is located in the attic. Between the fan coil and the tank there is 40 ft of pipe required each way, 10-90° short radius elbows, 2 unions, 1 globe valve, and 2 full port ball valves.

From the **MaxAir**™ capacity tables the unit model is a **MaxAir 70** with an external DX cooling coil. The water flow is 5 usgpm, capacity is 46,000 BTUH, and the air flow is 750 cfm.

Flow rate (Q) = 46,000/(500 x ∆T)
∆T = 18.4° F

From Appendix A coil pressure drop 0.80 ft
From manufacturer check valve pressure drop 0.0762 x 2.307 = 0.176 ft

Assume 3/4" pipe:

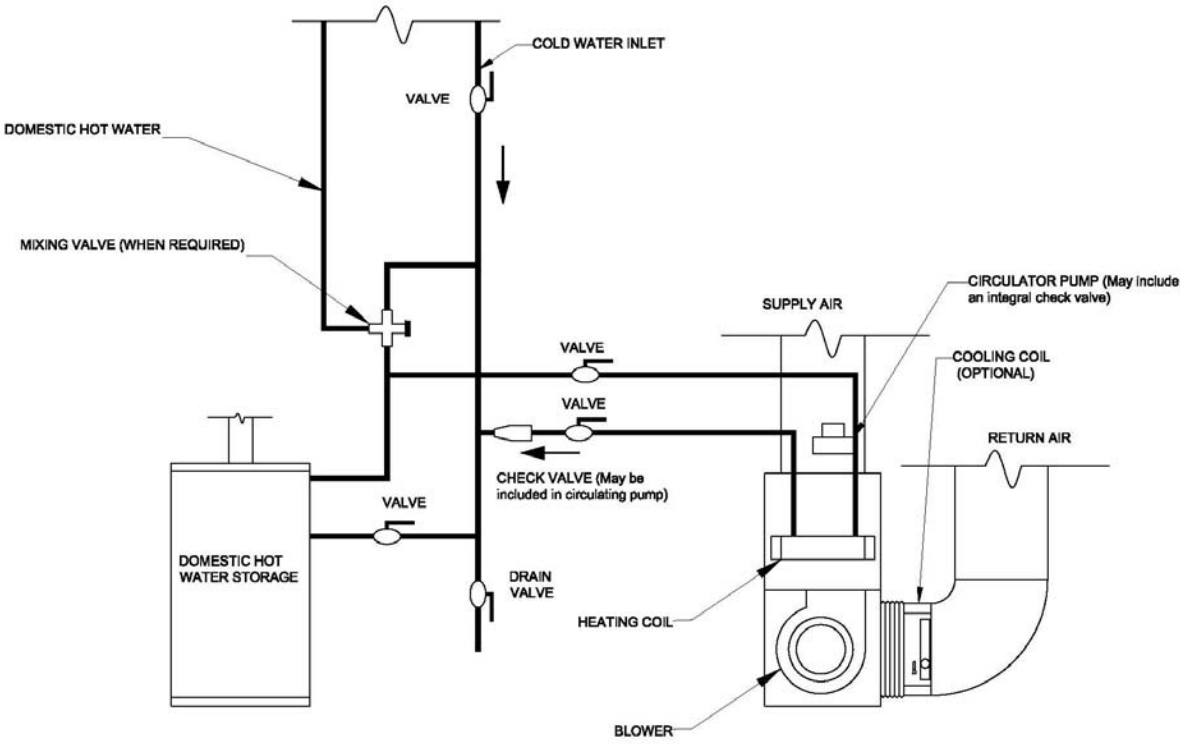
From engineering design data;
10-90° short radius elbows - 4.4 x 10 = 44 ft equivalent length
2-unions - 0.24 x 2 = 0.48 ft equivalent length
1-globe valve - 24 ft equivalent length
2-full port ball valves = 0 ft equivalent length

Total Pipe Length - 44+0.48+24+0+80 = 148.48 ft

From engineering design data;
Piping Pressure Drop = 6.05 ft/100ft or 8.98 ft

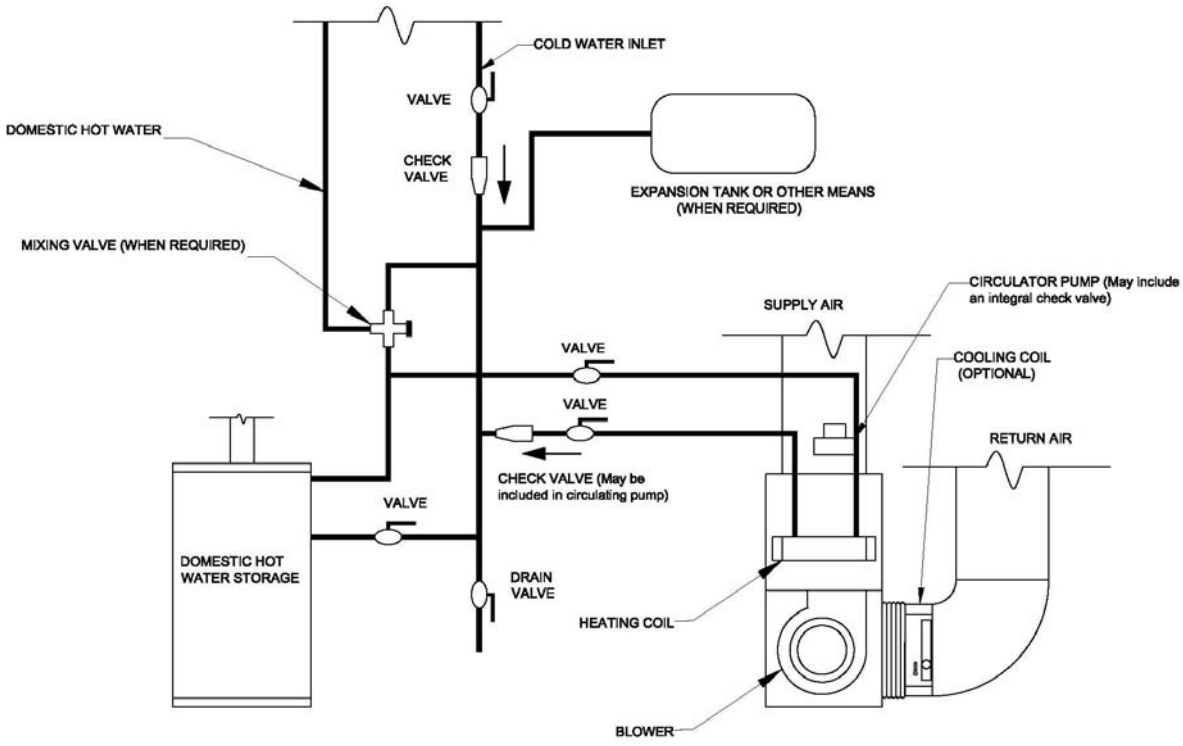
Total Pressure Drop = 8.98+0.80+0.176 = 9.96 ft
Pump Head Required = 13.6 ft

APPENDIX E .



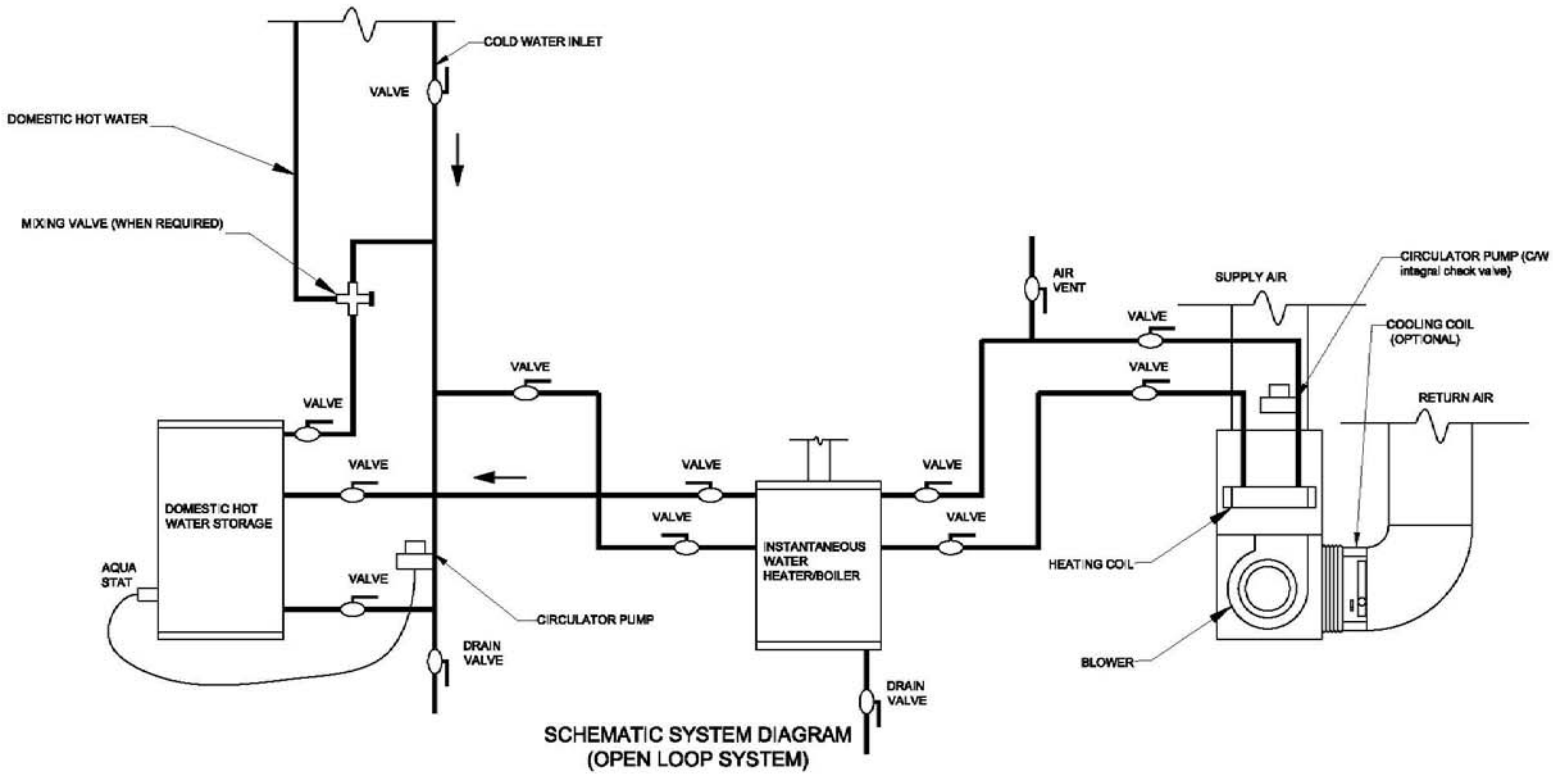
SCHEMATIC SYSTEM DIAGRAM
(OPEN LOOP SYSTEM)

1) AIR HANDLER MAYBE INSTALLED VERTICALLY (AS SHOWN) OR HORIZONTALLY.
2) PLUMBING COMPONENTS AND SYSTEM CONFIGRATION MAY VARY FROM THE DIAGRAM PORTRAYED. REFER TO PROVINCIAL CODES, LOCAL BYLAWS AND INSTALLATION MANUALS SUPPLIED WITH THE DOMESTIC HOT WATER HEATER AND AIR HANDLER BEFORE STARTING ANY INSTALLATION WORK
3) SUGGESTED LAYOUT ONLY. INSTALL IN ACCORDANCE WITH LOCAL CODES OR BODY HAVING LOCAL JURISTDICTION



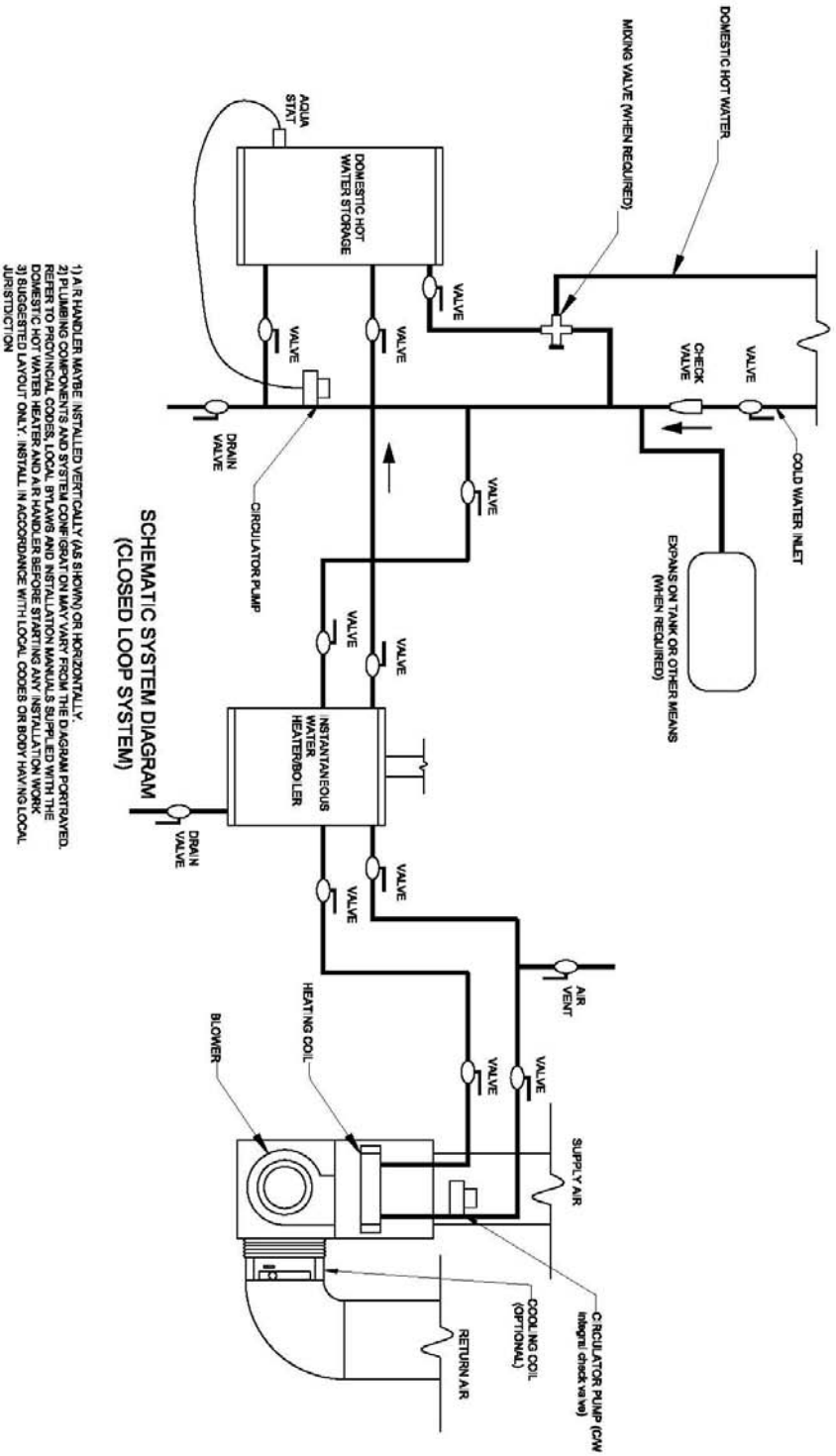
SCHEMATIC SYSTEM DIAGRAM
(CLOSED LOOP SYSTEM)

1) AIR HANDLER MAYBE INSTALLED VERTICALLY (AS SHOWN) OR HORIZONTALLY.
2) PLUMBING COMPONENTS AND SYSTEM CONFIGRATION MAY VARY FROM THE DIAGRAM PORTRAYED. REFER TO PROVINCIAL CODES, LOCAL BYLAWS AND INSTALLATION MANUALS SUPPLIED WITH THE DOMESTIC HOT WATER HEATER AND AIR HANDLER BEFORE STARTING ANY INSTALLATION WORK
3) SUGGESTED LAYOUT ONLY. INSTALL IN ACCORDANCE WITH LOCAL CODES OR BODY HAVING LOCAL JURISTDICTION



SCHEMATIC SYSTEM DIAGRAM
(OPEN LOOP SYSTEM)

1) AIR HANDLER MAYBE INSTALLED VERTICALLY (AS SHOWN) OR HORIZONTALLY.
2) PLUMBING COMPONENTS AND SYSTEM CONFIGRATION MAY VARY FROM THE DIAGRAM PORTRAYED. REFER TO PROVINCIAL CODES, LOCAL BYLAWS AND INSTALLATION MANUALS SUPPLIED WITH THE DOMESTIC HOT WATER HEATER AND AIR HANDLER BEFORE STARTING ANY INSTALLATION WORK
3) SUGGESTED LAYOUT ONLY. INSTALL IN ACCORDANCE WITH LOCAL CODES OR BODY HAVING LOCAL JURISTDICTION



SCHEMATIC SYSTEM DIAGRAM
(CLOSED LOOP SYSTEM)

1) A R HANDLER MAYBE INSTALLED VERTICALLY (AS SHOWN) OR HORIZONTALLY.
2) PLUMBING COMPONENTS AND SYSTEM CONFIGRATION MAY VARY FROM THE DIAGRAM PORTRAYED. REFER TO PROVINCIAL CODES, LOCAL BYLAWS AND INSTALLATION MANUALS SUPPLIED WITH THE DOMESTIC HOT WATER HEATER AND A R HANDLER BEFORE STARTING ANY INSTALLATION WORK.
3) SUGGESTED LAYOUT ONLY. INSTALL IN ACCORDANCE WITH LOCAL CODES OR BODY HAVING LOCAL JURISDICTION

APPENDIX F .

terms and conditions of sale

Terms and Conditions of Sale

E-mail: info@airmaxtechnologies.com
Web Site: www.airmaxtechnologies.com

Warranty:	Warranty period is twelve (12) months from date of purchase. Warranty includes parts and labor (check with AirMax Technologies Inc. for labor allowance rates). An extended twelve (12) month warranty is available, where applicable, at an additional cost, please consult AirMax Technologies Inc. Cost of returning the goods to AirMax Technologies Inc. is \by others. All warranty parts are to be prepaid by the customer. No warranty will be in effect until the equipment is paid for in full. Warranty on all equipment sold to customer may be suspended, at AirMax Technologies Inc.'s disgression, until the customers account is in good standing. Warranty covers defective components only. Normal wear and abuse is not covered. The customer's account will be credited only after the defective part has been examined by AirMax Technologies Inc. or the vendor and determined to be defective.
Claims:	Claims for damages and shortages must be made within two (2) days of receipt of goods. It is the responsibility of the receiving party to check count and condition of goods. The receiving party's signature on the shipping copy of the invoice or bill of lading absolves AirMax Technologies Inc. of responsibility for count and condition unless damage is concealed. In the case of damages or shortages, it is the responsibility of the receiving party to claim against the carrier if other than AirMax Technologies Inc.
Returns:	Written permission must be obtained for return of all goods. All returns will be subject to a 25% restocking charge. All returns are to be prepaid. When returning goods, please quote the invoice number on which the goods were purchased, product serial number, and the return goods number issued by AirMax Technologies. Special or custom order equipment may not be returned for credit. Any products or components must be returned to AirMax Technologies Inc. free and clear of liens or other encumbrances.
Limitations on Liability:	This warranty does not cover and no warranty is made with respect to; A. Failures not reported to AirMax Technologies within the time period specified above. B. Failures or damage due to misapplication, misuse, abuse, improper storage, improper installation, or handling, abnormal conditions of temperature, water, dirt, corrosive substances, or other contaminants. C. Products which have been repaired with parts or materials not furnished or approved by AirMax Technologies Inc. or by its authorized dealers or representatives, or products which have been in any way tampered with or altered. D. Products damaged in shipment or storage or otherwise without fault of AirMax Technologies Inc.. AirMax Technologies Inc.'s total responsibility for any claims, damages, losses, or liabilities related to the product covered hereunder shall not exceed the purchase price of such product. In no event shall AirMax Technologies Inc. be liable for any special, indirect, incidental, or consequential damages of any character, including but not limited to loss of productive facilities or equipment, delay of construction schedule, lost profits, property damage, transportation, installation or removal, lost production, or personal injury whether suffered by the purchaser or any third party. AirMax Technologies Inc. disclaims all liability for any and all costs, claims, demands, charges, expenses, or other damages, either direct or indirect, incidental to personal injury or property damage arising out of any cause of action based on strict liability.
Freight:	Prepaid and bill, FOB Factory
Payment Terms:	2% 10 days. Net 30 days (O.A.C.). 2% service charge will be applied to overdue accounts.
Taxes:	All taxes extra

All prices, terms, and conditions are subject to change without notice.

AIRMAX TECHNOLOGIES

Warranty Registration

E-mail: info@airmaxtechnologies.com
Web Site: www.airmaxtechnologies.com

PLEASE COMPLETE THE FOLLOWING INFORMATION AND RETURN WITHIN 30 DAYS OF THE UNIT START UP AND INCLUDE A COPY OF THE EQUIPMENT COMMISSION FORM FOR EACH PIECE OF EQUIPMENT.

Sold To:

Company Name _____

Contact Name _____

Address _____

City _____ State/Province _____ Zip/Postal Code _____

Phone No. _____ Fax _____

Item Purchased:

Unit Model _____ Serial No. _____

Date of Purchase _____ Date of Start up _____

Installer _____

Purchased From:

Company Name _____

Contact Name _____

Signature _____ Date _____

To insure your warranty protection, please complete and return this form to AirMax Technologies Inc. attention Product Registration.

Warranty Parts Request Form

E-mail: info@airmaxtechnologies.com
Web Site: www.airmaxtechnologies.com

Please complete the following information and return it with the part request

Sold To:			
Address			
Phone #		Fax #	

Item Requested	

Air Handler Model No.	
Air Handler Serial No.	

Date of Purchase	
Date of Start-Up	

Comments	

Credit will be issued upon receipt of completed form and inspection of defective part. Issues related to improper maintenance or installation are not considered to be warranty.