

— AIR HANDLING EQUIPMENT —

SECTION #6

INSTALLATION, OPERATION AND  
MAINTENANCE INFORMATION  
FOR:  
DIRECT DRIVE FAN COIL UNITS  
HORIZONTAL & VERTICAL

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# SECTION ONE

## RECEIPT & INITIAL INSTALLATION

# UNPACKING & INSPECTION

## PREFACE

USA Coil Fan/Coils represent a prudent investment which can, with proper installation, operation, and regular maintenance, give trouble-free operation and long service.

**Your equipment is initially protected under the manufacturer's standard warranty, however this warranty is provided under the condition that the steps outlined in this manual for initial inspection, proper installation, regular periodic maintenance, and everyday operation of the equipment be followed in detail. This manual should be fully reviewed in advance of any actual work being done on the equipment. Should any questions arise, please contact your local Sales Representative or the factory BEFORE proceeding.**

The equipment covered by this manual is available with a vast variety of options and accessories. Consult the approved unit submittals, order acknowledgement, and other manuals for details on the options and accessories provided with the equipment on each project.

**NO ATTEMPT SHOULD BE MADE TO HANDLE, INSTALL, OR SERVICE ANY UNIT WITHOUT FOLLOWING SAFE PRACTICES REGARDING MECHANICAL EQUIPMENT.**

**Equipment must always be properly supported. Temporary supports used during installation or service must be adequate to hold equipment securely.**

**All power must be disconnected before any installation or service should be attempted. More than one power source may be supplied to a unit. Power to remote mounted control devices may not be supplied through the unit.**

**Never wear bulky or loose fitting clothing when working on any mechanical equipment. Gloves should only be worn when required for proper protection from heat or other possible injury. Safety glasses or goggles should always be worn when drilling, cutting, or working with chemicals such as refrigerants or lubricants.**

**Never pressurize any equipment beyond specified test pressures. Always pressure test with some inert fluid or gas such as clear water or dry nitrogen to avoid possible damage or injury in the event of a leak or component failure during testing.**

**Always protect adjacent flammable material when welding or soldering. Use a suitable heat shield material to contain sparks or drops of solder. Have a fire extinguisher readily available.**

The manufacturer assumes no responsibility for personal injury or property damage resulting from improper or unsafe practices during the handling, installation, service, or operation of any equipment.

All units are carefully inspected at the factory throughout the manufacturing process under a strict detailed quality assurance program, and, where possible, ALL major components and sub-assemblies are carefully tested for proper operation and verified to be in full compliance with the factory manufacturing documents. The only exception to this being the operational testing of some customer furnished components such as pneumatic control valves and switches.

Each unit is then carefully packaged for shipment to avoid damage during normal transport and handling. The equipment should always be stored in a dry place in the proper orientation as marked on the carton.

All shipments are made F.O.B. factory and it is the responsibility of the receiving party to inspect the equipment upon arrival. Any obvious damage to the carton and/or its contents should be recorded on the bill of lading and a claim should be filed with the freight carrier.

After determining the condition of the carton exterior, carefully remove each unit from the carton and inspect for hidden damage. At this time check to make sure that "furnished only" items such as switches, thermostats, etc. are accounted for. Any hidden damage should be recorded and immediately reported to the carrier and a claim filed as before. In the event a claim for shipping damage is filed, the unit, shipping carton, and all packing must be retained for physical inspection by the freight carrier. All equipment should be stored in the factory shipping carton with internal packing in place until installation.

At the time of receipt, the equipment type and arrangement should be verified against the order documents. Should any discrepancy be found, the local Sales Representative should be notified immediately so that the proper action may be instituted. Should any question arise concerning warranty repairs, the factory must be notified **BEFORE** any corrective action is taken. Where local repairs or alterations can be accomplished, the factory must be fully informed as to the extent and expected cost of those repairs before work is begun. Where factory operations are required, the factory must be contacted for authorization to return equipment and a Return Authorization Number will be issued. Unauthorized return shipments of equipment and shipments not marked with an authorization number will be refused. In addition, any claims for unauthorized expenses will not be accepted by the manufacturer.

## HANDLING & INSTALLATION

While all equipment is designed and fabricated of sturdy construction and may present a rugged appearance, great care must be taken to assure that no force or pressure be applied to the coil, piping or drain stub-outs during handling. Also, depending on the options and accessories, some units could contain delicate components that may be damaged by improper handling. Wherever possible, all units should be maintained in an upright position and handled by the chassis or plenum sections as close as possible to the mounting point locations. In the case of a full cabinet unit, the unit must obviously be handled by the exterior casing. This is acceptable providing the unit is again maintained in an upright position and no

impact forces are applied that may damage internal components or painted surfaces.

The equipment covered in this manual **IS NOT** suitable for outdoor installations. The equipment should never be stored or installed where it may be subjected to a hostile environment such as rain, snow, or extreme temperatures.

During and after installation, special care must be taken to prevent foreign material such as paint, plaster, and drywall dust from being deposited in the drain pan or on the motor or blower wheels. Failure to do so may have serious adverse effects on unit operation and in the case of the motor and blower assembly, may result in immediate or premature failure. All manufacturer's warranties are void if foreign material is allowed to be deposited on the motor or blower wheels of any unit. Some units and/or job conditions may require some form of temporary covering during construction.

While the manufacturer does not become involved in the design and selection of support methods and components, it should be noted that unacceptable system operating characteristics and/or performance may result from improper or inadequate unit structural support. In addition, adequate clearance must be provided for service and removal of the equipment and its' accessory components. Anchoring the equipment in place is accomplished by using the mounting points provided and positioning the unit to maintain the drain pan on a LEVEL plane. Care must be taken to insure that the unit drain pan does not slope away from the outlet connection. Horizontal open coil units may be mounted using the neoprene grommets provided. Plenum type units may be mounted using the four grommets in the coil section or the rear coil section grommets may be moved to the plenum hanger brackets. Hi-Performance cabinet units must be mounted using the slotted hanger rails provided (grommets are not furnished from the factory).

Other field furnished mounting devices such as rubber-in-shear or spring type vibration isolators may be substituted for the factory grommets and should be used where factory grommets are not provided.

Vertical units are designed to be floor mounted or otherwise supported from below and bolted to the wall structure through the mounting holes provided in the chassis. These units may be wall hung only when originally ordered from the factory for wall mounting application. Hi-Performance Vertical closet units are designed to be floor mounted or otherwise supported from below and may be anchored directly through the cabinet floor or the optional 6" legs.

The type of mounting device is a matter of choice, however the mounting point should always be that provided in the chassis, plenum, or cabinet. Refer to the unit product drawings for mounting hole location and sizes.

After mounting the unit, it is then ready for the various service connections such as water, drain and electrical. At this time it should be verified that the proper types of service are actually provided to the unit. On those units requiring chilled water and/or hot water, the proper line size and water temperature should be available to the unit. In the case of refrigerant cooling, the proper line size and refrigerant type should be available at the unit. On units with steam heating coils, the proper line sizing and routing should be verified

and the maximum steam pressure applied to the unit should never exceed 10 psig. The drain piping and steam trap should be sized and routed to allow for proper condensate flow. The electrical service to the unit should be compared to the unit nameplate to verify compatibility. The routing and sizing of all piping, and the type and sizing of all wiring and other electrical components such as circuit breakers, disconnect switches, etc. should be determined by the individual job requirements and should not be based on the size and/or type of connection provided on the equipment. All installations should be made in compliance with all governing codes and ordinances. **Compliance with all codes is the responsibility of the installing contractor.**

On certain units shipping screws or braces must be removed after the unit is installed. Be sure to check all tags on the unit to determine which, if any, of these devices must be removed.

## COOLING/HEATING MEDIUM CONNECTIONS

**CAUTION: Toxic residues and loose particles resulting from manufacturing and field piping techniques such as joint compounds, soldering flux, and metal shavings may be present in the unit and the piping system. Special consideration must be given to system cleanliness when connecting to solar, domestic or potable water systems.**

Submittals and Product Catalogs detailing unit operation, controls, and connections should be thoroughly reviewed **BEFORE** beginning the connection of the various cooling and/or heating mediums to the unit.

All accessory valve packages should be installed as required, and all service valves should be checked for proper operation.

If coil and valve package connections are to be made with a "sweat" or solder joint, care should be taken to assure that no components in the valve package are subjected to a high temperature which may damage seals or other materials. Many two-position electric control valves, depending on valve operation, are provided with a manual opening lever. This lever should be placed in the "open" position during all soldering or brazing operations.

If the valve package connection at the coil is made with a union, the coil side of the union must be prevented from twisting ("backed up") during tightening to prevent damage to the coil tubing. over-tightening must be avoided to prevent distorting ("egg shaping") the union seal surface and destroying the union.

The supply and return connections are marked on the coil stub-outs and the valve package, with "S" meaning supply or inlet and "R" meaning return or outlet indicating flow direction to and from the coil. Blue letters mark the chilled water connections and red letters mark the hot water or steam connections. In the case of field installed valves and piping, the chilled water valve cluster (or expansion valve on DX units) should be installed in such a way that any dripping or sweating is contained in the drain pan or other device such as an optional extended drain pan or factory drip lip. Factory drip lips are field installed and may be packaged separate from the unit. Factory supplied cooling coil valve packages will be arranged to locate as much of the package as possible over a standard drip lip.

If none of the above factory accessories have been provided with the units, some simple flashing may be used to carry moisture into the unit drain pan.

After the connections are completed, the system should then be tested for leaks. Since some components are not designed to hold pressure with a gas, hydronic systems should be tested with water.

Caution: All water coils must be protected from freezing after initial filling with water. Even if the system is drained, unit coils may still hold enough water to cause damage when exposed to temperatures below freezing.

Refrigerant systems should be tested with dry nitrogen rather than air to prevent the introduction of moisture into the system. In the event that leaking or defective components are discovered, the Sales Representative must be notified **BEFORE** any repairs are attempted. All leaks should be repaired before proceeding with the installation.

After system integrity has been established, the piping should be insulated in accordance with the project specifications. ALL chilled water piping and valves or refrigerant suction piping not located over drain pans or drip lips must be insulated to prevent damage from sweating. This includes factory and field piping inside the unit cabinet.

The drain should always be connected and piped to an acceptable disposal point. For proper moisture carry-off, the drain piping should be sloped away from the unit at least 1/8" per foot. A drain trap may be required by local codes and it is strongly recommended for odor containment. When furnished, the optional 5/8" secondary or "tell tale" connection must be piped to some location where an indication of drain flow restriction may be readily observed. Units furnished with a "tell tale" connection should be sloped very slightly towards the drain outlets. To insure proper operation, a drain trap must be installed on all Belt Drive units. **The differential height of the trap inlet to outlet must be a minimum of one inch greater than the total static pressure on the unit. The height from the drain outlet to the bottom of the trap must not be less than the total static pressure.**

## DUCTWORK CONNECTIONS

All duct-work and/or supply and return grilles should be installed in accordance with the project plans and specifications. If not included on the unit or furnished from the factory, supply and return grilles should be provided as recommended in the product catalog.

For units with no return air duct-work, check local code requirements for possible application restrictions. All units must be installed in non-combustible areas.

Some models are designed to be connected to duct-work with a MINIMUM amount of external static pressure. These units may be damaged by operation without the proper duct-work connected. Consult the approved submittals and the product catalog for unit external static pressure limitations.

**Belt Drive units may not have the fan drive adjusted to match specific design operating conditions. See the section on start-up before energizing any units.**

Units provided with outside air for ventilation should have some form of low temperature protection to prevent coil freeze-up. This protection may be any of several methods such as a low temperature thermostat to close the outside air damper or a preheat coil to temper the outside air before it reaches the unit.

It should be noted that none of these methods will adequately protect a coil in the event of power failure. The safest method of freeze protection is to use glycol in the proper percent solution for the coldest expected air temperature.

Horizontal plenum type Quick Ship units may be shipped with bottom return air inlet. These units may be converted to rear return by removing the bottom inlet filter retainer clips and filter, then removing the plenum rear panel. The rear panel must then be moved to the bottom of the unit and reversed so that the top edge (when rear mounted) is toward the supply end of the unit and re-installed on the bottom of the plenum. The panel should be positioned towards the drain pan to expose the one inch wide filter slot for unit mounted filters. The panel should be positioned against the rear bottom brace completely covering the bottom of the plenum on units with remote filters.

High Performance plenum type Short Ship Time (SST) units may be shipped with bottom return air inlet. These units may be converted to rear return by simply exchanging the bottom and rear plenum panels.

Flexible duct connections should be used on all air handling equipment. All duct-work and insulation should be installed to allow proper access to all components for service and repair such as filters, motor/blower assemblies, etc.

**The manufacturer assumes no responsibility for undesirable system operation due to improper design, equipment or component selection, and/or installation of duct-work, grilles, and other related components.**

## ELECTRICAL CONNECTIONS

The unit serial plate lists the unit electrical characteristics such as the required supply voltage, fan and heater amperage and required circuit ampacities. The unit wiring diagram shows all unit and field wiring. Since each project is different and each unit on a project may be different, the installer must be familiar with the wiring diagram and serial plate on the unit **BEFORE** beginning any wiring.

**Belt Drive units require field wiring for proper voltage and fan rotation at time of installation. Caution: Motors of identical horsepower and voltage may require different wiring schemes. Verify wiring with wiring diagram on each individual motor.**

All components furnished for field installation, by either the factory or the controls contractor should be located and checked for proper function and compatibility. All internal components should be checked for shipping damage and any loose connections should be tightened to minimize problems during start-up.

Any devices such as fan switches or thermostats that have been furnished from the factory for field installation must be wired in strict accordance with the wiring diagram that appears on the unit. Failure

to do so could result in personal injury or damage to components and will void all manufacturer's warranties.

The fan motor(s) should never be controlled by any wiring or device other than the factory furnished switch or thermostat/switch combination, without factory authorization. Fan motor(s) may be temporarily wired for use during construction only with prior factory approval in strict accordance with the instructions issued at that time.

Units with optional factory furnished and installed aquastats may be shipped with the aquastats mounted on a coil stub-out. If so mounted for shipment, remove the aquastat before installation of a valve package. Consult the factory piping diagram in the approved submittals for proper location when reinstalling the aquastats. If the valve package is field furnished, the aquastat must be installed in a location where it will sense the water temperature regardless of control valve position. A bleed bypass may be required to guarantee proper aquastat operation.

All field wiring should be done in accordance with governing codes and ordinances. Any modification of the unit wiring without factory authorization will result in voiding of all factory warranties and will nullify any agency listings.

The manufacturer assumes no responsibility for any damages and/or injuries resulting from improperly field installed or wired components.

## **EXPOSED UNIT TOUCHUP & REPAINTING**

Exposed cabinet units may be furnished with a baked enamel finish. Small scratches in this finish may be repaired with touch-up paint available from the factory. Some colors of touch-up paint are available in aerosol containers and all touch-up paint is available in pint, quart, and gallon cans. Contact the factory for availability.

Proper safety procedures should be followed regarding ventilation and safety equipment and the manufacturer's directions should be followed for the products being used.

To re-paint the factory baked enamel, the finish should be prepared by light sanding with #280 grit sand paper or, #000 or #0000 fine steel wool. Or the surface may be wiped with a liquid surface etch cleaning product such as "No Sand" or "Pasceo". These items should be available at most paint product stores. It should be noted that the more conscientiously this preparation is done, the more effective it will be.

After this preparation is accomplished, the factory finish should provide excellent adhesion for a variety of air dried top coats. Enamel will give a more durable, higher gloss finish, while latex will not adhere as well and will give a dull, softer finish. Top coats involving an exothermic chemical process between two components, such as epoxies and urethanes, should be avoided.

Factory aerosol touch-up paint may require a number of light "dust coats" to isolate the factory baked enamel finish from the quick drying touch-up paint.

# SECTION TWO

## STARTUP

### GENERAL

Before beginning any start-up operation, the start-up personnel should familiarize themselves with the unit, options and accessories, and control sequence to understand the proper system operation. All personnel should have a good working knowledge of general start-up procedures and have the appropriate start-up and balancing guides available for consultation.

The building must be completely finished including doors, windows, and insulation. All internal walls and doors should be in place and in the normal position. In some cases the interior decorations and furniture may influence overall system performance. The entire building should be as complete as possible before beginning any system balancing.

The initial step in any start-up operation should be a final visual inspection. All equipment, plenums, duct-work, and piping should be inspected to verify that all systems are complete and properly installed and mounted, and that no debris or foreign articles such as paper or drink cans are left in the units or other areas.

Each unit should be checked for loose wires, free blower wheel operation, and loose or missing access panels or doors. Except as required during start-up and balancing operations, no fan coil units should be operated without all the proper duct-work attached, supply and return grilles in place, and all access doors and panels in place and secure. A clean filter of the proper size and type must also be installed. Failure to do so could result in damage to the equipment or building and furnishings, and/or void all manufacturer's warranties.

### COOLING/HEATING SYSTEM

Prior to the water system start-up and balancing, the chilled/hot water systems should be flushed to clean out dirt and debris which may have collected in the piping during construction. During this procedure, all unit service valves must be in the closed position. This prevents foreign matter from entering the unit and clogging the valves and metering devices. Strainers should be installed in the piping mains to prevent this material from entering the units during normal operation.

During system filling, air venting from the unit is accomplished by the use of the standard manual, or optional automatic, air vent fitting installed on the coil. In the case of the manual air vent fitting, the screw should be turned counterclockwise no more than 1 1/2 turns to open the air vent. Automatic air vents may be unscrewed one turn counterclockwise to speed initial venting but should be screwed in for automatic venting after start-up operations.

**CAUTION: The air vent provided on the unit is not intended to replace the main system air vents and may not release air trapped in other parts of the system. Inspect the entire system for potential air traps and vent those areas as required, independently. In addition, some systems may require repeated venting over a period of time to properly eliminate air from the system.**

## AIR SYSTEM BALANCING

All duct-work must be complete and connected, and all grilles, filters, and access doors and panels must be properly installed to establish actual system operating conditions **BEFORE** beginning air balancing operations.

Each individual unit and attached duct-work is a unique system with its' own operating characteristics. For this reason, air balancing is normally done by balance specialists who are familiar with all procedures required to properly establish air distribution and fan system operating conditions. These procedures should not be attempted by unqualified personnel.

Exposed units with no duct-work do not require air balancing other than selecting the desired fan speed.

Belt Drive fan drives are not factory set for design operating conditions.

When adjusting the HB (Belt Drive) unit fan driven speed, care must be taken to maintain proper drive belt alignment and tension. The drive belt should be tensioned to allow one-half to three-quarters inches movement at the midpoint between the pulleys with moderate pressure. Since new drive belts will stretch during their initial period of use, belt tension should be checked after approximately five days of operation and readjusted as required. While pulley alignment is more critical than belt tension, failure to use proper tension and align the blower drive may result in excessive operating noise and premature belt and /or bearing failure.

Some Belt Drive units may be shipped with two blower sheaves. These will accommodate a wider range of operating CFM and total static pressures. These units may require a blower sheave change to achieve the design operating conditions.

After the proper system operation is established, the actual unit air delivery and the actual fan motor amperage draw for each unit should be recorded in a convenient place for future reference such as the Inspection, Installation, & Start-up Check Sheet, a copy of which is provided on the back of this manual. Contact the Sales Representative or the factory for additional copies of this sheet.

## WATER SYSTEM BALANCING

A complete knowledge of the hydronic system, its' components, and controls is essential to proper water system balancing and this procedure should not be attempted by unqualified personnel. The system must be complete and all components must be in operating condition **BEFORE** beginning water system balancing operations.

Each hydronic system has different operating characteristics depending on the devices and controls in the system. The actual balancing technique may vary from one system to another.

After the proper system operation is established, the appropriate system operating conditions such as various water temperatures and flow rates should be recorded in a convenient place for future reference such as the Inspection, Installation, & Start-up Check Sheet, a copy of which is provided on the back of this manual. Contact the Sales Representative or the factory for additional copies of this sheet.

Before and during water system balancing, conditions may exist which can result in noticeable water noise or undesired valve operation due to incorrect system pressures. After the entire system is balanced, these conditions will not exist on properly designed systems.

## **CONTROLS OPERATION**

Before proper control operation can be verified, all other systems must be in proper operation. The correct water and air temperatures must be present for the control function being tested. Some controls and features are designed to not operate under certain conditions. One example of this is that, on a two-pipe cooling/heating system with auxiliary electric heat, the electric heater cannot be energized with hot water in the system.

A wide range of controls and electrical options and accessories may be used with the equipment covered in this manual. Consult the approved unit submittals, order acknowledgement, and other manuals for detailed information regarding each individual unit and its' controls. Since controls and features may vary from one unit to another, care should be taken to identify the controls to be used on each unit and their proper control sequence. Information provided by component manufacturers regarding installation, operation, and maintenance of their individual controls is available upon request.

# SECTION THREE

## NORMAL OPERATION & PERIODIC MAINTENANCE

### GENERAL

Each unit on a job will have its own unique operating environment and conditions which may dictate a maintenance schedule for that unit that is different from other equipment on the job. A formal schedule of regular maintenance and an individual unit log should be established and maintained. This will help to achieve the maximum performance and service life of each unit on the job.

**Information regarding safety precautions contained in the preface at the beginning of this manual should be followed during any service and maintenance operations.**

For more detailed information concerning service operations consult your Sales Representative or The Factory.

### MOTOR/BLOWER ASSEMBLY

The type of fan operation is determined by the control components and their method of wiring, and may vary from unit to unit. Refer to the wiring diagram that is attached to each unit for that unit's individual operating characteristics.

Motors provided with oiler tubes may be lubricated with a "name brand" 20 weight non-detergent oil. The frequency of lubrication is dependent upon the operating conditions of the motor. Frequent fan cycling and/or a dirty environment would require more attention than less severe operation. Motors should be lubricated at least once a year. Some motor designs do not require field lubrication.

**Caution:** Over oiling has been shown to reduce motor life. Consult the Sales Representative or the factory in cases of unusual motor operating conditions

Recommended periodic maintenance for the HB(Belt Drive) unit motor/blower assembly is lubrication of the motor and inspection of the drive belt for tension and wear. The blower shaft bearings and motor bearing are permanently lubricated and sealed and no attempt should be made to disassemble or lubricate these bearings.

Should the assembly require more extensive service, the motor/blower assembly may be removed from the unit to facilitate such operations as motor or blower wheel/housing replacement, etc.

Dirt and dust should not be allowed to accumulate on the blower wheel or housing. This can result in an unbalanced blower wheel condition which can damage a blower wheel or motor. The wheel and housing may be cleaned periodically using a vacuum cleaner and a brush taking care not to dislodge the factory balancing weights on the blower wheel blades.

### COIL

Coils may be cleaned by removing the motor/blower assemblies (except on Belt Drive units) and brushing the entering air face between fins with a stiff brush. Brushing should be followed by cleaning with a vacuum cleaner. If a compressed air source is available, the coil may also be cleaned by blowing air through the coil fins from the leaving air face. This should again be followed by vacuuming. Units provided with the proper type of air filters,

replaced regularly, will require less frequent coil cleaning.

### ELECTRIC RESISTANCE HEATER ASSEMBLY

Electric resistance heaters typically require no normal periodic maintenance when unit air filters are changed properly. The operation and service life may be affected by other conditions and equipment in the system. The two most important operating conditions for an electric heater are proper air flow and proper supply voltage. High supply voltage and/or poorly distributed or insufficient air flow over the element will result in element overheating. This condition may result in the heater cycling on the high limit thermal cutout. Sheath heaters have automatic reset switches only. Open strip heaters have an automatic reset switch with a back-up high limit thermal switch. Automatic reset switches are as the name implies, they reset automatically after the heater has cooled down. High limit thermal switches must be replaced once the circuit has been broken. The high limit thermal cutout device is a safety device only and is not intended for continuous operation. With proper unit application and operation, the high limit thermal cutout will not operate. This device only operates when some problem exists and **ANY** condition that causes high limit cutout **MUST** be corrected immediately. High supply voltage also causes excessive amperage draw and may result in tripping of the circuit breaker or blowing of the fuses on the incoming power supply.

After proper air flow and supply power are assured, regular filter maintenance is important to provide clean air over the heater. Dirt that is allowed to deposit on the heating element will cause hot spots and eventual element burn-through. These hot spots will normally not be enough to trip the thermal high limit and may not be evident until actual heater element failure.

### ELECTRICAL WIRING & CONTROLS

The electrical operation of each unit is determined by the components and wiring of the unit and may vary from unit to unit. Consult the wiring diagram attached to the unit for the actual type and number of controls provided on each unit.

The integrity of all electrical connections should be verified at least twice during the first year of operation. Afterwards, all controls should be inspected regularly for proper operation. Some components may experience erratic operation or failure due to age. Wall thermostats may also become clogged with dust and lint and should be periodically inspected and cleaned to provide reliable operation.

When replacing any components such as fuses, contactors, or relays, use only the exact type, size and voltage component as furnished from the factory. Any deviation without factory authorization could result in personnel injury or damage to the unit and will void all factory warranties. All repair work should be done in such a manner as to maintain the equipment in compliance with governing codes and ordinances or testing agency listings.

More specific information regarding the use and operating characteristics of the standard controls offered by this manufacturer are contained in other manuals.



## VALVES & PIPING

No formal maintenance is required on the valve package components most commonly used with fan coil units other than a visual inspection for possible leaks in the course of other normal periodic maintenance. In the event that a valve should need replacement, the same precautions taken during the initial installation to protect the valve package from excessive heat should also be used during replacement.

## FILTERS, THROWAWAY

The type of throwaway filter most commonly used on fan coil units should be replaced on a regular basis. The time interval between each replacement should be established based on regular inspection of the filter and should be recorded in the log for each unit. Refer to the product catalog for the recommended filter size for each product type and size. If the replacement filters are not purchased from the factory, the filters used should be the same type and size as that furnished from or recommended by the factory. Pleated media or extended surface filters should not be used since the high air pressure drops encountered with these types of filters is not compatible with the type of fan coil unit covered in this manual. Consult the factory for applications using filter types other than the factory standard or optional product.

## FILTERS, PERMANENT

A maintenance schedule for permanent filters should be developed in the same manner as throwaway filters. Unlike throwaway filters, permanent filters may be cleaned and re-installed in the unit instead of being discarded when dirty. The optional factory permanent filter may be cleaned in hot soapy water to remove any trapped dirt. It should then be set aside on edge to dry.

Before replacing the filter in the unit, it should be recharged with some type of entrapment film such as "Film-Cor Recharging Oil". The filter should be sprayed on both sides or submerged in the film to assure complete coverage. The filter should not be allowed to soak in the film, but should be immediately removed and the excess film drained from the filter before re-installation in the unit. Consult a local filter supplier for types of available cleaning solutions and charging films.

It should be noted that permanent filters normally have less static pressure loss than throwaway filters. When substituting a permanent filter on Belt Drive units, the fan motor amperage must be checked to insure that the motor has not been put into an overload condition. It may be necessary to reduce the fan driven speed and/or re-balance the system.

## DRAIN

The drain should be checked before initial start-up and at the beginning of each cooling season to assure that the drain trap and line are clear. If it is clogged, steps should be taken to clear the debris so that condensate will flow easily.

Periodic checks of the drain should be made during the cooling season to maintain a free flowing condensate. Units provided with a secondary or "tell tale" drain connection will indicate a clogged main drain line by flow from the "tell tale" connection.

Should the growth of algae and/or bacteria be a concern, consult an air conditioning and refrigeration supply organization familiar with local conditions for chemicals available to control these agents.

## REPLACEMENT PARTS

Factory replacement parts should be used wherever possible to maintain the unit performance and operating characteristics and the testing agency listings. Replacement parts may be purchased through the local Sales Representative.

Contact the local Sales Representative or the factory before attempting any unit modifications. Any modifications not authorized by the factory could result in personnel injury and damage to the unit and could void all factory warranties.

When ordering parts, the following information must be supplied to ensure proper part identification:

- (1) Complete unit model number
- (2) Unit serial number
- (3) Unit hand connection (right or left hand)  
While facing into the air stream
- (4) Complete part description including any numbers

On warranty replacements, in addition to the information previously listed, the unit shipping code which appears on the upper right hand corner of the serial plate is required. Contact the factory for authorization to return any parts such as defective parts replaced in warranty. All shipments returned to the factory must be marked with a Return Authorization Number which is provided by the factory.

All equipment and components sold through the Parts Department are warranted under the same conditions as the standard manufacturer's warranty with the exception that the warranty period is thirty (30) days unless the component is furnished as a warranty replacement. Parts furnished as warranty replacements are warranted for the remaining term of the original unit warranty or not less than thirty (30) days.

# INSPECTION, INSTALLATION, & START-UP CHECK LIST

<b>Receiving &amp; Inspection</b>	
1	Unit received undamaged
2	Unit received complete as ordered
3	"Furnish only" parts accounted for
4	Unit arrangement/hand correct
5	Unit structural support complete & correct

<b>Ductwork Connections</b>	
28	Install Ductwork, Fittings & Grilles As Req'd
29	Flexible Duct Connections At Unit
30	Proper Supply & Return Grille Type & Size Used
31	Control Outside Air For Freeze Protection
32	Insulate All Ductwork As Required

<b>Handling &amp; Installation</b>	
6	Mounting Grommets/Isolators Used
7	Unit Mounted Level & Square
8	Proper Access Provided For Unit & Accessories
9	Proper Electrical Service Provided
10	Proper Overcurrent Protection Provided
11	Proper Service Switch/Disconnect Provided
12	Proper Chilled Water Line Size To Unit
13	Proper Hot Water Line Size To Unit
14	Proper Refrigerant Line Sizes To Unit
15	Proper Steam Line Sizes To Unit
16	Proper Steam Condensate Trap On Return Line
17	Proper Steam Supply Pressure To Unit (10psi Max)
18	All Services To Unit In Code Compliance
19	All Shipping Screws & Braces Removed
20	Unit Protected From Dirt & Foreign Matter

<b>Electrical Connections</b>	
33	Refer To Unit Wiring Diagram
34	Connect Incoming Pwr Service Or Services
35	Install & Connect "Furnish Only" Parts
36	All Field Wiring In Code Compliance

<b>Unit Startup</b>	
37	General Visual Unit & System Inspection
38	Check For Proper Fan Belt Tension
39	Check For Proper Fan Rotation
40	Record Electrical Supply Voltage
41	Record Ambient Temperatures
42	Check All Wiring For Secure Connections
43	Close All Unit Isolation Valves
44	Flush Water Systems
45	Fill Systems With Water/Refrigerant
46	Vent Water Systems As Required
47	All Ductwork & Grilles In Place
48	All Unit Panels & Filters In Place
49	Start Fans, Pumps, Chillers, Etc.
50	Check For Overload Condition Of All Units
51	Check All Ductwork & Units For Air Leaks
52	Balance Air Systems As Required
53	Record All Final Settings For Future Use
54	Check Piping & Ductwork For Vibration
55	Check All Dampers For Proper Operation
56	Verify Proper Cooling Operation
57	Verify Proper Heating Operation
58	Reinstall All Covers & Access Panels

<b>Cooling/Heating Connections</b>	
21	Protect Valve Pkg Components From Heat
22	Mount Valve Packages
23	Connect Field Piping To Unit
24	Pressure Test All Piping For Leaks
25	Install Drain Line & Traps As Required
26	Insulate All Piping As Required
27	Install Drip Lip Under Piping As Required

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