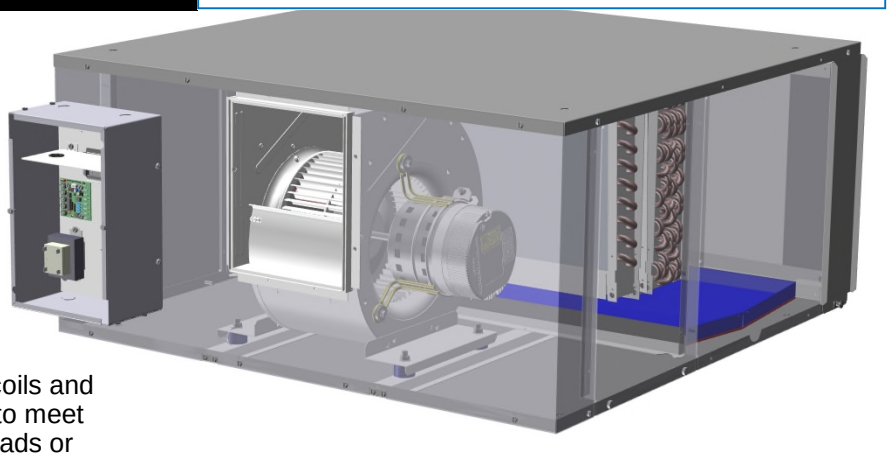
HCA Series Air Handler
Installation, Operation and Maintenance Manual



Magic Aire HCA Series units are direct drive High Efficiency Horizontal Air Handlers delivering nominal airflows of 400 to 4000cfm and nominal cooling capacities of 1/2 to 10 tons. Units may be specified with chilled water or DX cooling coils and hot water or steam heating coils to meet space cooling loads or heating loads or both.

How to Use this Manual:
This manual gives instructions regarding installation, operation and maintenance for the HCA Series air handling units. For more information refer to:

- **Catalog brochure** for unit dimensions, options, guide specifications and performance information.
- **New Magic 4** software for faster selection of new equipment.
- **Website** www.magicaire.com for replacement parts guide, software downloads, product data and contact info for your local Magic Aire representative.
- **Replacement Parts –** Identify parts needed using the replacement parts guide available at **www.magicaire.com.**

Use these instructions in conjunction with other appropriate instructions, including but not limited to those instructions supplied with the outdoor unit (if applicable). Installation must comply with all applicable local codes.

SAFETY WARNING:
Installer should pay particular attention to the following words:
NOTE–intended to clarify or make installation easier.
CAUTION–given to prevent equipment damage.
WARNING–to alert installer that personal injury and/or equipment damage may result if installation procedure is not properly followed.

GENERAL
Installation and maintenance are to be performed **only** by qualified personnel who are familiar with local codes and regulations and are experienced with HVAC equipment of this type.

WARNING: Sharp edges, coil surfaces and rotating fans are a potential injury hazard – avoid contact.

WARNING: Hazardous voltage – Disconnect and Lock Out all incoming power sources before servicing or installing unit. ELECTRIC SHOCK CAN CAUSE DEATH.

WARNING: This equipment may be installed well above finished floor—Use extreme caution when working at heights.

UNPACKING-CHECK FOR DAMAGE!

Immediately inspect each unit for damage upon receipt.

- Inspect units for external and concealed damage immediately.
- File any damage claims in accordance with Magic Aire Freight Damage Policy and Terms and Conditions (available at www.magicaire.com).
- Do not repair damaged units without written authorization.
- Protect stored units from damage.

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Installation, Start-Up and Service Instructions

Topic	Page
Warranty Registration Form	27
SAFETY CONSIDERATIONS	1,4
UNPACKING-Remove Shipping Screws	4
PREINSTALLATION	5
Rigging	5
Unit Weight Calculation	5
INSTALLATION	6-18
Unit Suspension	6-7
External Vibration Isolators	7
Ductwork	8
Electrical	9-11
Service Clearance	12
Condensate Drain	13
Steam Coil Piping Recommendations	14-16
Coil Freeze-Up Protection	16
Refrigerant Piping, Direct Expansion (DX) Coils	17-18
START-UP	19
SERVICE	20-23
Water Quality Guidelines	24
Physical Data	25
Dimensional Drawings	26

DANGER

NEVER enter an enclosed fan cabinet or reach into a unit while the fan is running.
LOCK OPEN AND TAG the fan motor power disconnect switch before working on a fan. Take fuses with you and note removal on tag. Electric shock can cause personal injury or death.
LOCK OPEN AND TAG the electric heat coil power disconnect switch before working on or near heaters.
Failure to follow these warnings could lead to personal injury or death.

UNPACKING-CAUTION!

After removing the outer packaging,

REMOVE RED BLOWER SHIPPING SCREWS

from the blower discharge flanges (Fig.1) and blower supports (Fig. 2). These screws stabilize the fan assembly during shipping and need to be removed.

CAUTION! Not removing red shipping screws can result in unsatisfactory vibration or blower noise.

WARNING

CHECK the assembly and component weights to be sure that the rigging equipment can handle them safely.
Note also, the centers of gravity and any specific rigging instructions.
CHECK for adequate ventilation so that fumes will not migrate through ductwork to occupied spaces when welding or cutting inside air-handling unit cabinet or plenum.
WHEN STEAM CLEANING COILS be sure that the area is clear of personnel.
DO NOT attempt to handle access covers and removable panels on outdoor units when winds are strong or gusting until you have sufficient help to control them. Make sure panels are properly secured while repairs are being made to a unit.
DO NOT remove access panel fasteners or open access doors until fan is completely stopped. Pressure developed by a moving fan can cause excessive force against the panel which can injure personnel.
DO NOT work on dampers until their operators are disconnected.
BE SURE that fans are properly grounded before working on them.
Failure to follow these warnings could result in personal injury or equipment damage.

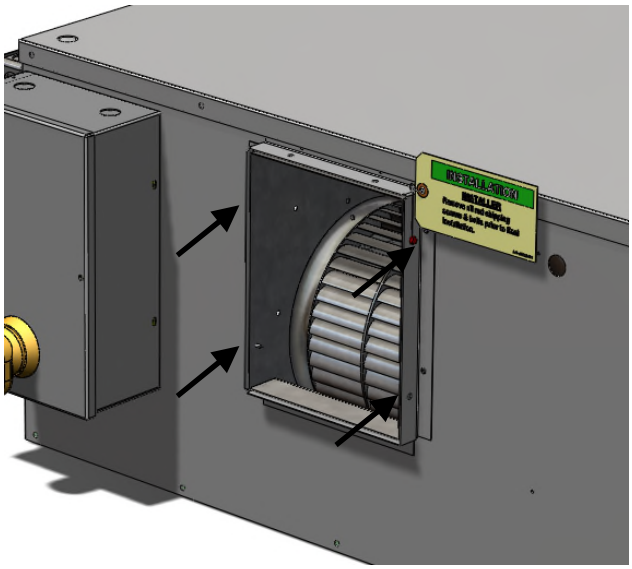


Figure 1
Remove Red Shipping Screws
(4 per blower discharge—single discharge shown)

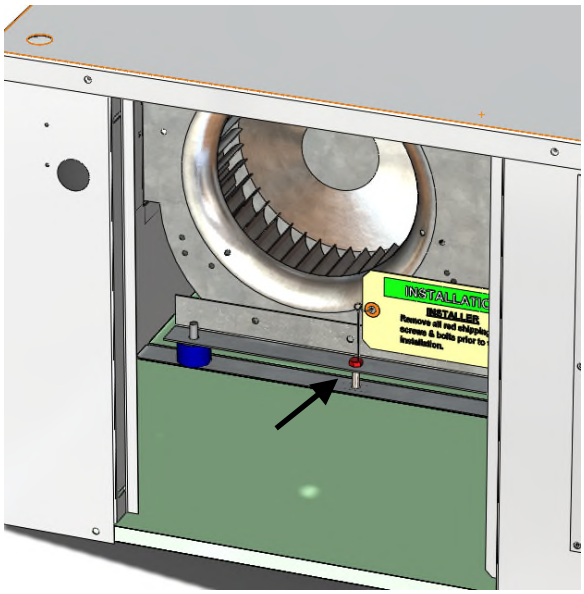


Figure 2
Remove Red Shipping Screws–Blower (1ea per side, 2ea total)

PREINSTALLATION

1. Check items received against packing list.
2. Do not stack unit components or accessories during storage. Stacking can cause damage or deformation.
3. If unit is to be stored for more than 2 weeks prior to installation, observe the following precautions:
   a. Choose a dry storage site that is reasonably level and sturdy to prevent undue stress or permanent damage to the unit structure or components. Do not store unit on vibrating surface. Damage to stationary bearings can occur. Set unit off ground if in heavy rain area.
   b. Remove all fasteners and other small parts from jobsite to minimize theft. Tag and store parts in a safe place until needed.
   c. Cover entire unit with a tarp or plastic coverall. Extend cover under unit if stored on ground. Secure cover with adequate tie-downs or store indoors. Be sure all coil connections have protective shipping caps.
   d. Monthly — Remove tarp from unit, enter fan section through access door or through fan inlet, and rotate fan and motor slowly by hand to redistribute the bearing grease and to prevent bearing corrosion.

Rigging — Do not remove shipping skids or protective covering until unit is ready for final placement. Use slings and spreader bars as applicable to lift unit. *Do not lift unit by coil connections or headers.*

Do not remove protective caps from coil piping connections until ready to connect piping.

Do not remove protective cover or grease from fan shaft until ready to install sheave.

Lay rigid temporary protection such as plywood walkways in unit to prevent damage to insulation or bottom panel during installation.

WARNING-AUXILIARY DRAIN PAN RECOMMMENDED:

This product has an auxiliary condensate drain which should be piped to a condensate overflow sensor or safe drain location or both to protect the equipment and property from damage in the case of condensate overflow.

In addition, the International Mechanical Code (IMC) section 307.2.3 requires the use of auxiliary drain pans. Many municipalities have adopted this code.

Magic Aire holds that this practice represents the standard for professional installation whether or not this code has been adopted in a specific municipality or territory. As such, water damages that would have been prevented had an auxiliary pan been deployed will not be considered for compensation. This position is taken regardless of whether the source of the moisture was specified as a potential failure mode in the applicable building code or not. A freeze burst, cracked drain pan, failed weld, or corrosion induced leak are some of the potential failure modes that are mitigated when an auxiliary pan is properly installed. Professional installers recognize the value of protecting customer assets against foreseeable events. Customers who choose to avoid the cost of common protective measures waive their right to seek damages when those foreseeable events occur. If the product is located above a living space or where damage may result from condensate overflow, install a watertight pan of corrosion-resistant metal beneath the unit to catch over-flow which may result from clogged drains or from other reasons. Provide proper drain piping for this auxiliary pan. Consult local codes for additional precautions before installation.

UNIT WEIGHT CALCULATION

Size	Component Weights (lbs)							
	Cabinet	Motor		Coil Weight, Dry				
		Std	High	1R	2R	4R	6R	Steam
04	92	15	15	10	10	18	23	13
06	93	15	15	12	12	22	27	15
08	125	18	20	16	16	30	50	20
12	141	18	20	20	20	40	59	25
16	160	20	25	25	25	50	77	31
20	192	20	25	31	31	62	81	39
30	383	30	35	n/a	42	84	102	53
40	414	40	45	n/a	54	108	143	68

Table 1 — Unit Dry Weight

Calculation Procedure:

1. Calculate coil water weight for each water coil using the following formula:

   Water Weight =
   Coil Volume (gal) x 8.345lb/gal (volume is from Physical Data table)

2. Calculate dry weight:

   Cabinet Dry Weight
   +Motor Weight
   +Dry Coil Weight (coil 1)
   +Dry Coil Weight (coil 2)
   = Total Unit Dry Weight

3. Calculate total weight:

   Total Unit Dry Weight
   +Water Weight (coil 1)
   + Water Weight (coil 2)
   = Total Unit Installed Weight

UNIT SUSPENSION

Ceiling Suspension: Acceptable forms of unit suspension are shown in Fig. 3, 4 and 5. Figure 3 shows suspension rods run through the knockouts in top and bottom of the unit. Use strut material and hardware at bottom as shown in the details. Figure 4 shows field-supplied platform mount. Units can also be supported by suspending the unit from crossbeams at the front and rear (Figure 5).

Size suspension rods to support the weight. Size any beam members to insure that they are adequate for a safe installation. Ensure that suspension rods are secured to adequately support the unit and that the rods extend entirely through their associated fasteners.

It is recommended that framing be constructed from structural steel or formed-strut materials.

WARNING! INSURE THAT UNIT IS ADEQUATELY SUPPORTED FROM STRUCTURE TO PREVENT DAMAGE OR INJURY CAUSED BY FALLING EQUIPMENT! If uncertain about how to connect to the structure, consult a qualified structural engineer.

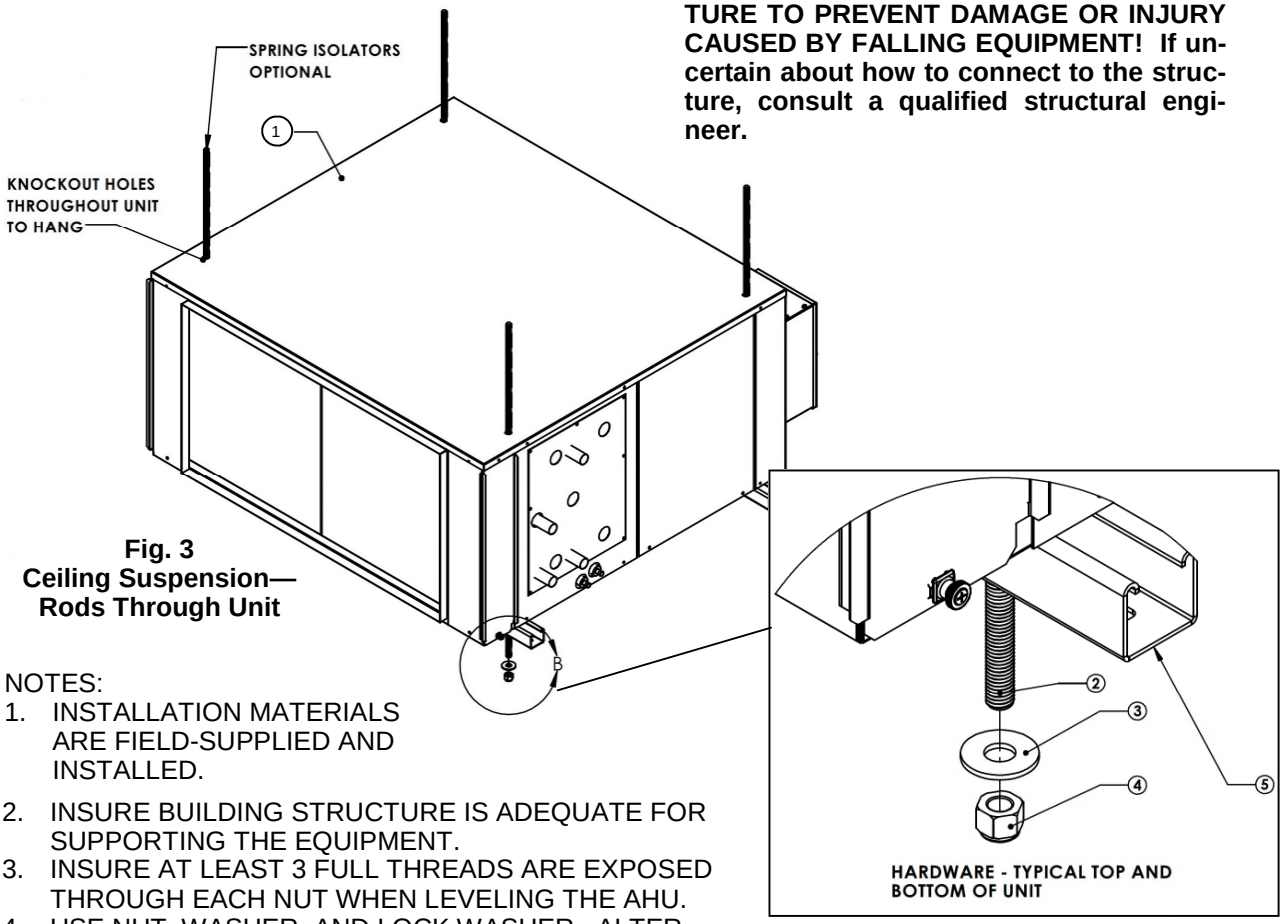


Fig. 3
Ceiling Suspension—Rods Through Unit

NOTES:

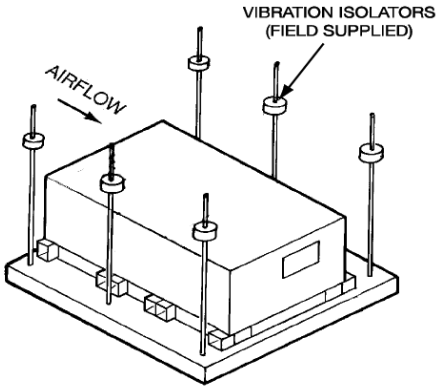
1. INSTALLATION MATERIALS ARE FIELD-SUPPLIED AND INSTALLED.
2. INSURE BUILDING STRUCTURE IS ADEQUATE FOR SUPPORTING THE EQUIPMENT.
3. INSURE AT LEAST 3 FULL THREADS ARE EXPOSED THROUGH EACH NUT WHEN LEVELING THE AHU.
4. USE NUT, WASHER, AND LOCK WASHER. ALTERNATE: NYLOCK NUT MAY BE USED INSTAD OF STANDARD NUT AND LOCK WASHER. **WARNING! DO NOT OMIT LOCK WASHER OR NYLOCK NUT!**

ITEM NO.	DESCRIPTION	MATERIAL / SPEC	QTY
1	HCA AIR HANDLER	HCA UNIT	1
2	3/8" ALL-THREAD	3/8"-16 COURSE THREAD, ASTM A307-GR A OR EQUIVALENT	AR
3	3/8" FLAT WASHER	1.0" MIN OUTER DIAMETER, USS ANSI B18.22.1	8
4	3/8" NYLOCK NUT	3/8"-16 UNC, ASTM A563-GR A OR EQUIVALENT	8
5	UNISTRUT, 1-5/8 X 1-5/8, MIN .50" OVERHANG ON UNIT ON EACH SIDE	16 GA MIN, 9/16" DIA HOLES OR EQUIV	AR

Floor mounting: Unit may be mounted on a housekeeping pad, floor or platform. **CAUTION! Make sure to allow enough elevation to permit construction of the condensate trap.**

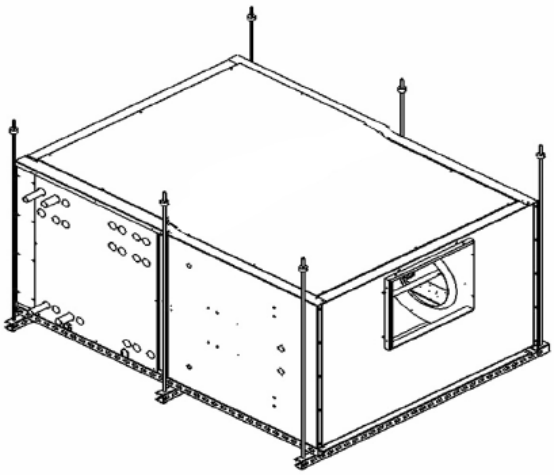
Vibration Isolators: (field supplied) If required, install isolators in the suspension rod system. Allow clearance as needed between isolators and unit.

Fig. 4
Ceiling Suspension—
Platform Mount



CEILING – RECOMMENDED
PLATFORM MOUNT

WARNING! INSURE THAT UNIT IS ADEQUATELY SUPPORTED FROM STRUCTURE TO PREVENT DAMAGE OR INJURY CAUSED BY FALLING EQUIPMENT! If uncertain about how to connect to the structure, consult a qualified structural engineer.



CEILING – ALTERNATE CROSSBEAM MOUNT

Fig. 5
Ceiling Suspension—
Crossbeam Mount

INSTALLATION—DUCTWORK

DUCTWORK CONNECTIONS

Install supply and return ductwork to the unit as required for the application. Note that free discharge or free return is acceptable.

Return Ductwork: Install return ductwork by attaching one side of a field-provided flexible duct connector to the duct flange on the return side of the unit (filter side). Attach the other side of the flexible duct connector to the return ductwork. Seal the connections using duct mastic or HVAC tape.

Supply Ductwork—Unit Sizes 04-20: Install supply ductwork by attaching one side of a field-provided flexible duct to the fan discharge duct collar on the front of the unit. Attach the other side to the supply ductwork. Seal the connections using duct mastic or HVAC tape. Refer to Figure 6.

NOTE: It is acceptable to omit the flexible duct connectors, but this may allow normal operating vibration or noise to transfer through the duct system **leading to customer complaints.**

Size all ductwork according to SMACNA and ASHRAE duct design standards.

MIXING BOX INSTALLATION

Mixing box accessory connects to the return (air inlet) flange on the rear of the unit. Refer to Mixing Box Installation Instructions (available at www.magicaire.com) for detailed instructions for installation along with economizer controls and damper installation.

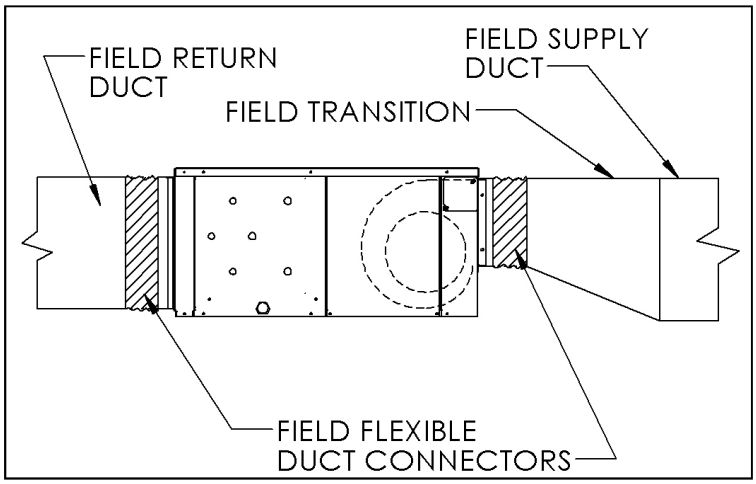


Fig. 6 — HCA size 04 to 20 Duct Connections

DANGER

WARNING: Hazardous voltage. Only qualified personnel must install the electrical service. Disconnect and Lock Out all incoming power sources before connecting to electrical service.

WARNING: This appliance must be permanently grounded in accordance with the National Electrical Code and local code requirements.

WARNING: For use with copper conductors only.

DANGER

NEVER enter an enclosed fan cabinet or reach into a unit while the fan is running.
LOCK OPEN AND TAG the fan motor power disconnect switch before working on a fan. Take fuses with you and note removal on tag. Electric shock can cause personal injury or death.
LOCK OPEN AND TAG the electric heat coil power disconnect switch before working on or near heaters.
Failure to follow these warnings could lead to personal injury or death.

INSTALLATION-ELECTRICAL

Typical wiring diagrams are shown on the following pages FOR REFERENCE. Always refer to the wiring diagram on the air handling unit for actual wiring.

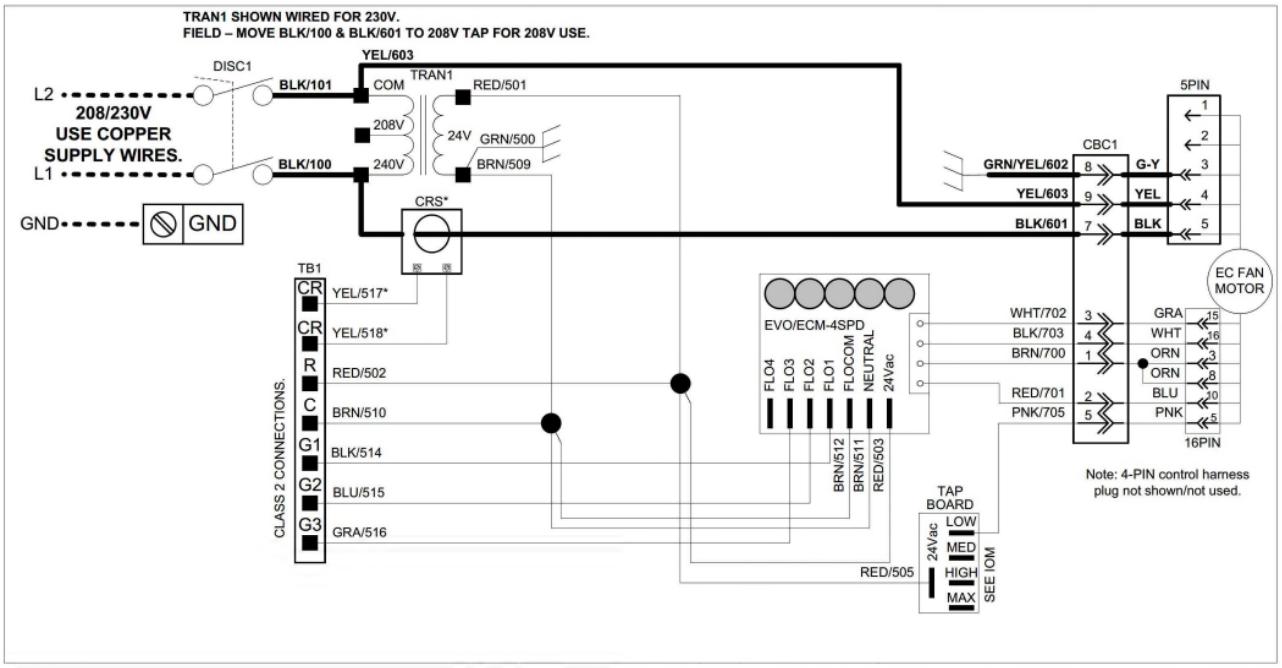
Connect electrical service to unit. Refer to unit wiring diagram**. NOTE:** CHECK MOTOR RATING PLATE FOR CORRECT LINE VOLTAGE. For power supply connection, route field power wiring to Motor Start/Stop Station (MSS) disconnect switch (if provided) or motor leads in the junction box (j-box).

Refer to nameplate FLA, maximum overcurrent protection device (MOPD) and minimum circuit ampacity (MCA). Also refer to wiring diagram affixed to unit to make control and power wiring connections.

NOTE: Installer is responsible for power wiring and branch circuit overcurrent protection.

NOTE: Motor provided **has** internal thermal overload protection. Units ordered Factory Electric Heat include fan relay or contactor and disconnect switch located inside the electric heat control box.

TYPICAL WIRING DIAGRAMS—
Control Option "C"
Four User-Adjustable Speeds

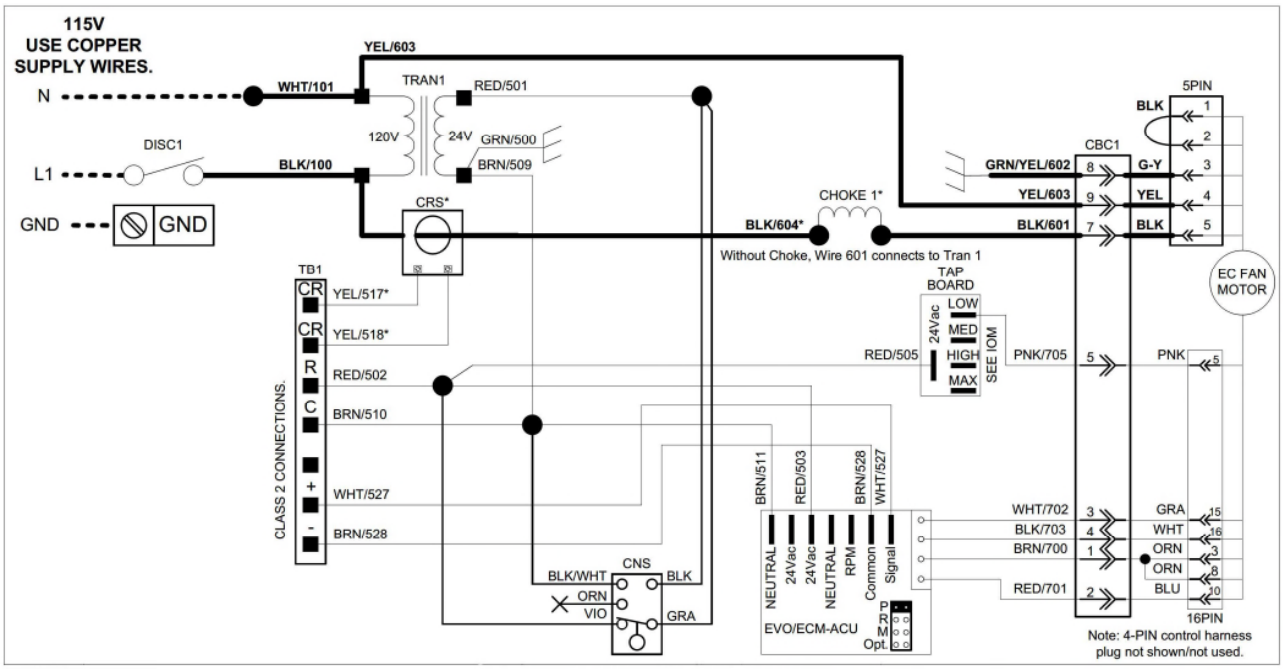


>>	HARNESS CONNECTION	DISC	DISCONNECT
●	SPLICE	CNS	CONDENSATE SW
■	CONNECTION POINT	CRS	CURRENT SWITCH
X	INSULATED WIRE	FR	FAN RELAY
*	ORDER OPTION	FU	FUSE
	FACTORY WIRING	SW	SWITCH
	WIRES BY OTHERS	TRAN	TRANSFORMER
	CHASSIS GROUND	TB	TERMINAL BLOCK
	EARTH GROUND	TDR	TIME DELAY RELAY

NOTES:

1. This diagram represents the factory-installed electrical option with 4 user-adjustable speeds.
2. Typical wiring is shown. For exact wiring, refer to the wiring diagram provided with the unit.
3. Field wiring includes power wiring (upper left hand corner) and low voltage control wiring (terminal block TB1).
4. Units ordered for 208V-240V voltage selection are factory wired for 240V. Field may rewire transformer primary tap for operation at 208V.
5. Selection of field provided and installed electrical components is the responsibility of the installer, including branch circuit protection and wiring.
6. To start the fan, connect R and G1 or G2 or G3 to energize fan at each respective speed. Add connection to terminal "FLO4" on the control board (EVOECM-4SPD) to enable a fourth speed. Adjust each fan speed using potentiometer control on the control board. Speed adjustments can be made while the fan is running. **WARNING: Hazardous voltage!**
7. The control power (R and C at terminal block TB1) can be used to power a standard 24VAC thermostat , DX relay and up to 2ea control valves. NOTE: Factory transformer is 40VA, so use caution when connecting multiple loads to the 24VAC control circuit.
8. Optional condensate switch (CNS) factory option interrupts 24VAC to thermostat (R) and controls when water level rises to preset sensor level in the drain pan.
9. Optional current switch (CRS) factory option makes upon current flow to the motor. Utilize as a dry contact for control system alarms as needed.

TYPICAL WIRING DIAGRAMS—
Control Option "E"
Variable Speed
0-10VDC Signal Fan Speed Control

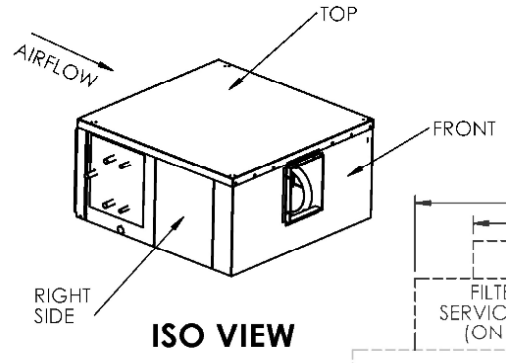


	HARNESS CONNECTION	DISC	DISCONNECT
●	SPLICE	CNS	CONDENSATE SW
■	CONNECTION POINT	CRS	CURRENT SWITCH
X	INSULATED WIRE	FR	FAN RELAY
*	ORDER OPTION	FU	FUSE
	FACTORY WIRING	SW	SWITCH
	WIRES BY OTHERS	TRAN	TRANSFORMER
	CHASSIS GROUND	TB	TERMINAL BLOCK
	EARTH GROUND	TDR	TIME DELAY RELAY

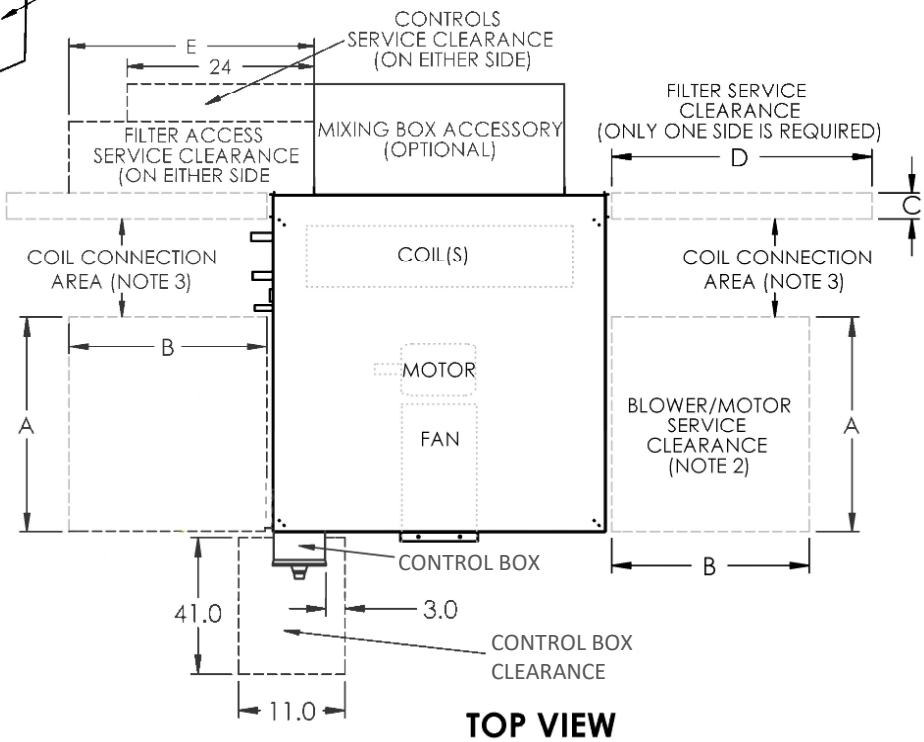
NOTES:

1. This diagram represents the factory-installed electrical option with constant CFM control using the pressure transducer mounted inside the unit. Control loop logic is contained in the VFD programming. VFD keypad is mounted on outside of unit.
2. Typical wiring is shown. For exact wiring, refer to the wiring diagram provided with the unit.
3. Field wiring includes power wiring (upper left hand corner) and low voltage control wiring (terminal block TB1).
4. Units ordered for 208V-240V voltage selection are factory wired for 240V. Field may rewire motor and transformer primary tap for operation at 208V.
5. Selection of field provided and installed electrical components is the responsibility of the installer, including branch circuit protection and wiring.
6. To start the fan, apply 2.0VDC to + (plus) and—(minus) terminals. Fan speed is variable from 2.0VDC (minimum speed) to 10.0VDC (maximum speed).
7. The control power (R and C at terminal block TB1) can be used to power a standard 24VAC thermostat , DX relay and up to 2ea control valves. NOTE: Factory transformer is 40VA, so use caution when connecting multiple loads to the 24VAC control circuit.
8. Optional condensate switch (CNS) factory option interrupts 24VAC to thermostat (R) and controls when water level rises to preset sensor level in the drain pan.
9. Optional current switch (CRS) factory option makes upon current flow to the motor. Utilize as a dry contact for control system alarms as needed.

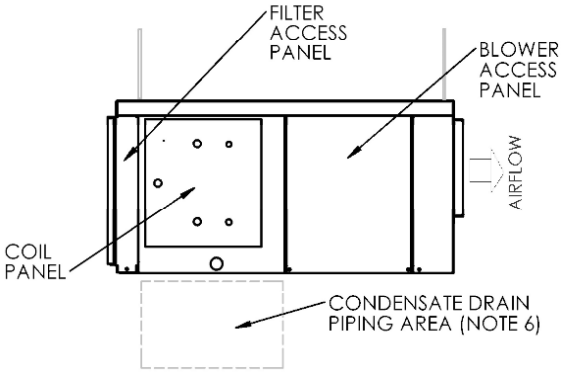
SERVICE CLEARANCES



ISO VIEW



TOP VIEW



RIGHT SIDE VIEW
(MSS NOT SHOWN)

HC UNIT SIZE	DIMENSIONS				
	A	B	C	D	E
04,06	18	36	4	30	26
08,12	20	36	4	36	31
16,20	23	36	4	30	38

NOTES:

1. NOT TO SCALE. REFER TO CATALOG DRAWINGS FOR UNIT OUTLINE DIMENSIONS.

2. MOTOR IS LOCATED ON THE SAME SIDE AS COOLING COIL CONNECTION (UNIT WITH 2 COILS) OR 2-PIPE/HEATING COIL CONNECTION (UNIT WITH SINGLE COIL).

3. ALLOW CLEARANCE FOR FIELD PIPING AS REQUIRED BY THE PROJECT REQUIREMENTS. CONNECTIONS MAY BE ON ONE SIDE OR ON BOTH SIDES.

4. REFER TO INSTALLATION INSTRUCTIONS FOR UNIT HANGING (SUSPENSION) REQUIREMENTS.

5. COIL, DRAINPAN OR BLOWER REPLACEMETN REQUIRES UNIT TO BE REMOVED TO FLOOR FOR SAFE WORKING CONDITION. ALLOW FULL WIDTH OF UNIT FOR COIL REMOVAL. REFER TO SERVICE INSTRUCTIONS.

6. ALLOW ADEQUATE DEPTH FOR CONDENSATE DRAIN TRAP. REFER TO INSTALLATION INSTRUCTIONS FOR TRAP REQUIREMENTS.

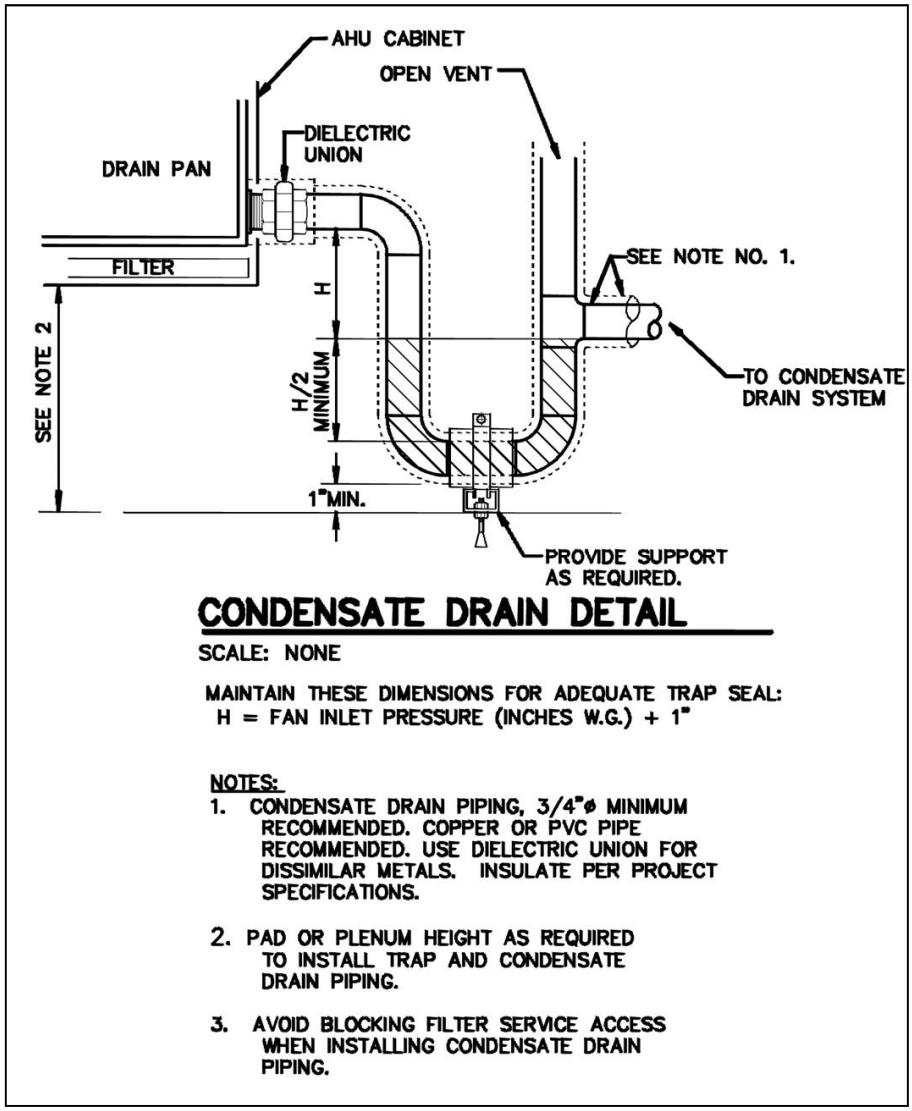


Fig. 7 — Condensate Drain

INSTALLATION

Condensate Drain — Install a trapped condensate drain line at unit drain connection. HCA units have a 3/4 in. FPT condensate drain connection, or alternately a 3/4" male PVC pipe outlet for the condensate drain connection.

WARNING! To prevent excessive build-up of condensate in drain pan, adequate trap clearance (trap depth) must be provided beneath the unit as indicated in Fig. 6.

Measure maximum design negative static pressure upstream from the fan. Referring to Fig. 7, height "H" must be 1" larger than the fan inlet static pressure Iinches w.g.) at the design operating conditions. Prime enough water in trap to prevent losing seal when starting up the unit. After the fan is running with the design fan inlet (negative) pressure, the elevation of the water on the unit side of the trap will be 1" below the drain invert.

Provide freeze-up protection as required to insure reliable condensate drainage. Freeze protection measures are customer-supplied and installed.

Water Coil Piping Recommendations

Water coils are piped by connecting the supply at the bottom and the return at the top. This is "counterflow" piping arrangement and is necessary to achieve rated thermal performance.

> **CAUTION!** Piping the other way (parallel) will result in reduced thermal performance!

Coil Venting: Water coils are not provided with venting devices. Insure that the circulating water system has proper air venting capability. If vents are required at the coil, install them in the field piping attached to the return (upper) connection.

Steam Coil Piping Recommendations

GENERAL — Use straps around the coil casing to lift and place the coil.

CAUTION

To prevent damage to the coil or coil headers: **Do not use the headers to lift the coil.** Support the piping and coil connections independently. Do not use the coil connections to support piping. When tightening coil connections, use a backup wrench on the coil connection stub-out.

NOTE: Piping should be installed by a qualified installer familiar with the type of piping to be installed. Perform piping to industry best practices.

STEAM COILS — Position the steam supply connection at the top of the coil, and the return (condensate) connection at the bottom.

Figure 8 illustrates the normal piping components and the suggested locations for high, medium, or low-pressure steam coils. The low-pressure application (zero to 15 psig) can dispense with the ¼-in. petcock for continuous venting located above the vacuum breaker (check valve).

Note the horizontal location of the 15-degree check valve, and the orientation of the gate/pivot. This valve is intended to relieve any vacuum forming in the condensate outlet of a condensing steam coil, and to seal this port when steam pressure is again supplied to the coil. It must not be installed in any other position, and should not be used in the supply line.

For coils used in tempering service, or to preheat outside air, install an immersion thermostat in the condensate line ahead of the trap. This will shut down the supply fan and close the outdoor damper whenever the condensate falls to a predetermined point, perhaps 120 F.

NOTE: DO NOT use an immersion thermostat to override a duct thermostat and open the steam supply valve. For vacuum return systems, the vacuum breaking check valve would be piped into the condensate line between the trap and the gate valve instead of open to the atmosphere.

Figure 9 illustrates the typical piping at the end of every steam supply main. Omitting this causes many field problems and failed coils.

Figure 10 shows the typical field piping of multiple coils. Use this only if the coils are the same size and have the same pressure drop. If this is not the case, an individual trap must be provided for each coil.

Figure 11 shows a multiple coil arrangement applied to a gravity return, including the open air relief to the atmosphere, which DOES NOT replace the vacuum breakers.

Figure 12 illustrates the basic condensate lift piping.

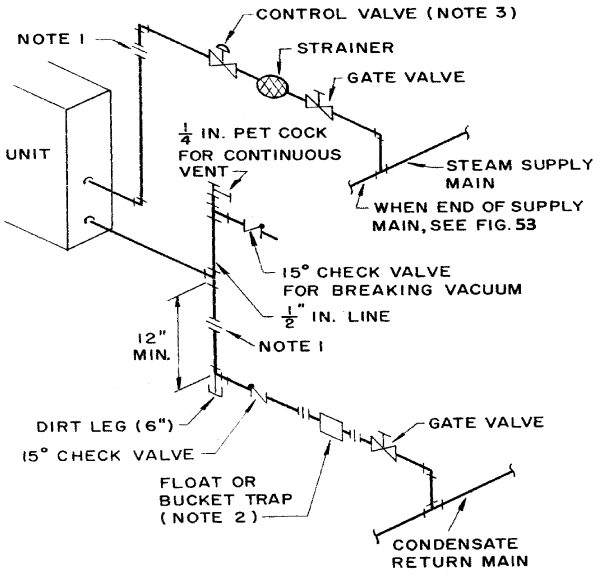


Fig. 8 — Low, Medium or High Pressure Coil Piping

NOTES:

1. Flange or union is located to facilitate coil removal.
2. Flash trap may be used if pressure differential between steam and condensate return exceeds 5 psi.
3. Dirt leg may be replaced with a strainer. If so, tee on drop can be replaced by a reducing ell.
4. The petcock is not necessary with a bucket trap or any trap which has provision for passing air. The great majority of high or medium pressure returns end in hot wells or deaerators which vent the air.

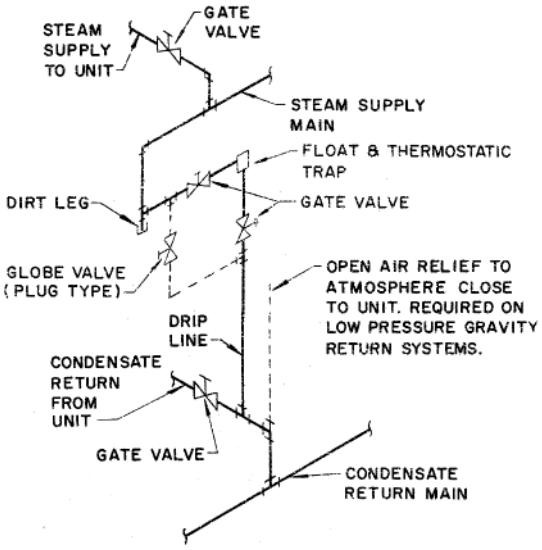


Fig. 9 — End of Steam Supply Main Piping Detail

Steam Coil Piping Recommendations (Cont'd)

NOTES (Figure 9):
1. A bypass is necessary around trap and valves when uninterrupted operation is necessary.
2. Bypass to be the same size as trap orifice but never less than 1/2 inch.

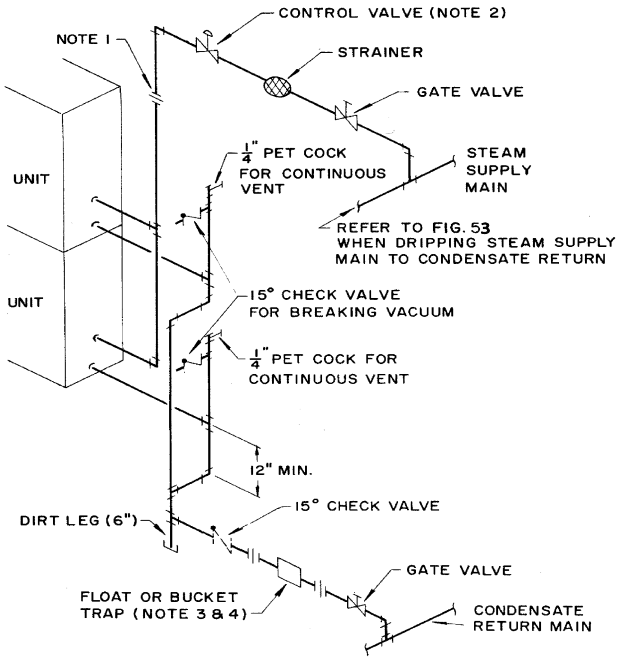


Fig. 10 — Multiple Coil High Pressure Piping

NOTES:
1. Flange or union is located to facilitate coil removal.
2. When a bypass with control is required.
3. Flash trap can be used if pressure differential between supply and condensate return exceeds 5 psi.
4. *Coils with different pressure drops require individual traps. This is often caused by varying air velocities across the coil bank.*
5. Dirt leg may be replaced with a strainer. If so, tee on drop can be replaced by a reducing ell.
6. The petcock is not necessary with a bucket trap or any trap which has provision for passing air. The great majority of high pressure return mains terminate in hot wells or deaerators which vent the air.

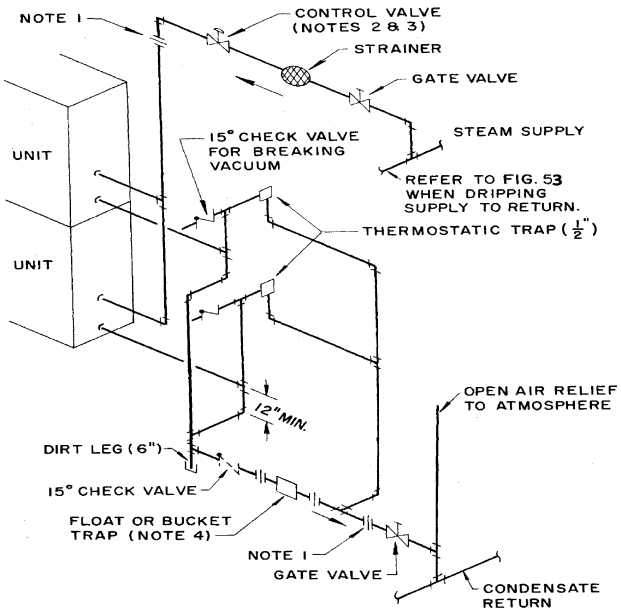


Fig. 11 — Multiple Coil Low Pressure Piping Gravity Return

NOTES:
1. Flange or union is located to facilitate coil removal.
2. When control valve is omitted on multiple coils in parallel air flow.
3. When a bypass with control is required.
4. *Coils with different pressure drops require individual traps. This is often caused by varying air velocities across the coil bank.*

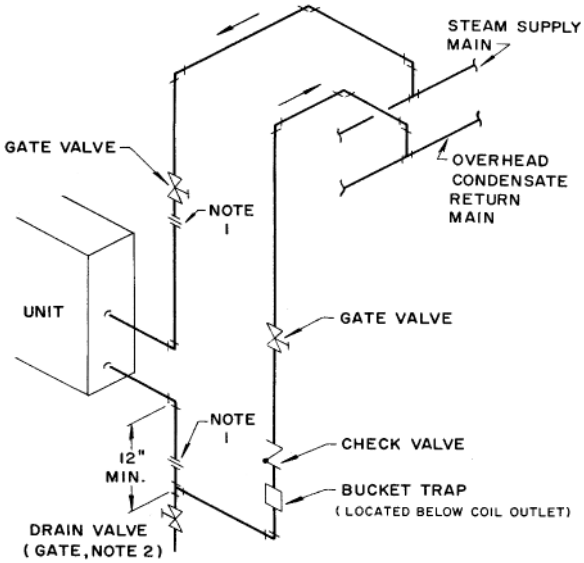


Fig. 12 — Multiple Coil Low Pressure Piping Gravity Return

NOTES:
1. Flange or union is located to facilitate coil removal.
2. To avoid water hammer, drain coil before admitting steam.
3. Do not exceed one foot of lift between trap discharge and return main for each pound of pressure differential.
4. *Do not use this arrangement for units handling outside air.*

Steam Coil Piping Recommendations (Cont'd)

Following the piping diagrams in Fig. 8-12, make all connections while observing the following precautions:

• Install a drip line and trap on the pressure side of the inlet control valve. Connect the drip line to the return line downstream of the return line trap.
• To prevent scale or foreign matter from entering the control valve and coil, install a 3/32-in. mesh strainer in the steam supply line upstream from the control valve.
• Provide air vents for the coils to eliminate noncondensable gases.
• Select a control valve according to the steam load, not he coils supply connection size. Do not use an oversized control valve.
• Do not use bushings that reduce the size of the header return connection. The return connection should be the same size as the return line and reduced only at the downstream trap.
• To lift condensate above the coil return line into overhead steam mains, or pressurized mains, install a pump and receiver between the condensate trap and the pressurized main. Do not try to lift condensate with modulating or on-and-off steam control valves. Use only
15-degree check valves, as they open with a lower water head. Do not use 45-degree or vertical-lift check valves.
• Use float and thermostatic traps. Select the trap size according to the pressure difference between the steam supply main and the return main.
• Load variations can be caused by uneven inlet air distribution or temperature stratification.
• Drain condensate out of coils completely at the end of the heating season to prevent the formation of acid.

Coil Freeze-Up Protection

STEAM COILS — When used for preheating outdoor air in pressure or vacuum systems, an immersion thermostat to control outdoor-air damper and fan motor is recommended. This control is actuated when steam supply fails or condensate temperature drops below an established level, such as 120 to 150 F. A vacuum breaker should also be used to equalize coil pressure with the atmosphere when steam supply throttles close. Steam should not be modulated when outdoor air is below 40 F.

On low-pressure and vacuum steam-heating systems, the thermostat may be replaced by a condensate drain with a thermal element. This element opens and drains the coil when condensate temperature drops below 165 F. Note that condensate drains are limited to 5 psig pressure.

INNER DISTRIBUTING TUBE STEAM COILS — The inner distributing tube (IDT) steam coil used in the HHA air handling units has an inner tube pierced to facilitate the distribution of the steam along the tube's length. The outer tubes are expanded into plate fins. The completed assembly includes the supply and condensate header and side casings which are built to slant the fin/tube bundle back toward the condensate header. The slanting of the assembly ensures that condensate will flow toward the drains. This condensate must be removed through the return piping to prevent premature failure of the coil. The fin/tube bundle is slanted vertically for horizontal airflow coils, and horizontally for vertical airflow coils.

IDT Steam Coil Piping — The following piping guidelines will contribute to efficient coil operation and long coil life:

1. Use full size coil outlets and return piping to the steam trap. Do not bush return outlet to the coil. Run full size to the trap, reduce at the trap.
2. Use float and thermostatic (F & T) traps only for condensate removal. Trap size selection should be based on the difference in pressure between the steam supply main and the condensate return main. It is good practice to select a trap with 3 times the condensate rating of the coil to which it is connected.
3. Use thermostatic traps for venting only.
4. Use only 1/2-in., 15-degree swing check valves installed horizontally, piped open to atmosphere, and located at least 12 in. above the condensate outlet. Do not use 45-degree, vertical lift and ring check valves.
5. The supply valve must be sized for the maximum anticipated steam load.
6. Do not drip steam mains into coil sections. Drip them on the pressure side of the control valve and trap them into the return main beyond the trap for the coil.
7. Do not use a single trap for two or more coils installed in series. Where two or more coils are installed in a single bank, in parallel, the use of a single trap is permissible, but only if the load on each coil is equal. Where loads in the same coil bank vary, best practice is to use a separate trap for each coil. Variation in load on different coils in the same bank may be caused by several factors. Two of the most common are uneven airflow distribution across the coil and stratification of inlet air across the coil.
8. Do not try to lift condensate above the coil return into an overhead main, or drain into a main under pressure with a modulating or on/off steam control valves. A pump and receiver should be installed between the coil condensate traps and overhead mains and return mains under pressure.
9. Use a strainer (3/32-in. mesh) on the steam supply side, as shown in the piping diagrams, to avoid collection of scale or other foreign matter in the inner tube distributing orifices.

NOTE: IDT coils must be installed with the tubes draining toward the header end of the coil. The IDT steam coils are pitched toward the header end as installed in the unit.

10. Ensure the AHU (air-handling unit) is in-

stalled level to maintain the inherent slope. Also ensure the unit is installed high enough to allow the piping to be installed correctly, especially the traps which require long drip legs.

11. Do not fail to provide all coils with the proper air vents to eliminate noncondensable gasses.
12. Do not support steam piping from the coil units. Both mains and coil sections should be supported separately.

IDT Steam Coil Installation — Refer to drawings to position the coils properly with regard to the location of the supply and return connections. Ensure that the IDT coil is pitched with the tubes draining toward the header. The AHUs provide proper coil pitch when the AHU is installed level. Refer to schematic piping diagrams and piping connection notes for the recommended piping methods.

SUCTION PIPING — Connect suction piping as shown in Fig. 13 for face split coil.

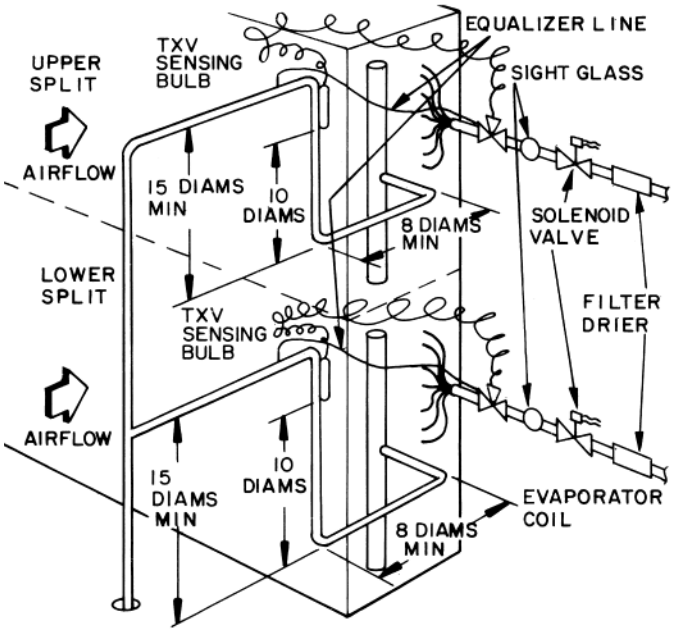


Fig. 13 — Face Split Coil Suction Line Piping
(TXV — Thermostatic Expansion Valve)

Refrigerant Piping, Direct-Expansion (DX) Coils —

Direct-expansion coils are divided into 1 or 2 splits depending upon the unit size and coil circuiting. Each split requires its own distributor nozzle, expansion valve, and suction piping. Suction connections are on the air entering side when the coil is properly installed. Matching distributor connections for each coil split are on the air leaving side. See unit label or certified drawing to assure connection to matching suction and liquid connections.

The lower split of face split coils should be *first on, last off* (Fig. 13).

Row split coils utilize special intertwined circuits; either split of these row split coils can be *first on, last off*.

CAUTION

Direct-expansion coils are shipped pressurized with dry nitrogen. Release pressure from each coil split through valves in protective caps before removing caps.

Do not leave piping open to the atmosphere unnecessarily. Water and water vapor are detrimental to the refrigerant system. Until the piping is complete, recap the system and charge with nitrogen at the end of each workday. Clean all piping connections before soldering joints.

Failure to follow these procedures could result in personal injury or equipment damage.

Suction line from coil connection to end of the 15-diameter-long riser should be same tube size as coil connection to ensure proper refrigerant velocity.

Size remaining suction line to compressor for a pressure drop equivalent to 2.0 F. This will provide a total suction line header pressure drop equivalent to approximately 2.5 F. Refer to Fig. 14 for piping risers to the compressor.

To minimize the possibility of flooded starts and compressor damage during prolonged light load operation, install an accumulator in the suction line or a solenoid in the liquid line of last-on, first off split in row-split applications.

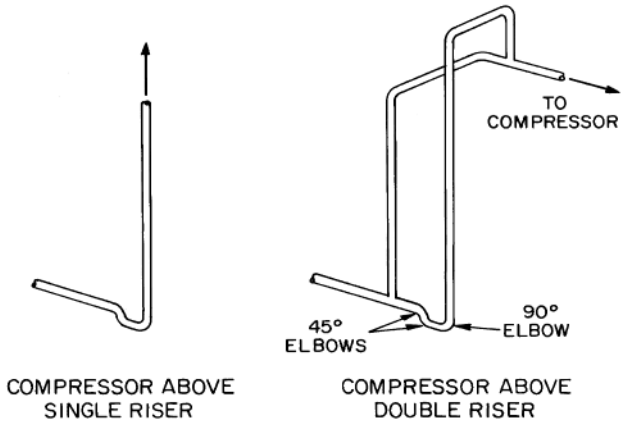


Fig. 14 — Suction Line Riser Piping

Refrigerant Piping, Direct-Expansion (DX) Coils (Cont'd)

EXPANSION VALVE PIPING — Distributor nozzles and expansion valves sized for acceptable performance for a range of conditions are factory supplied. Use the AHU (air-handling unit) selection program in the electronic catalog to select optimal nozzle sizes.
Circuiting selection should result in a circuit loading of 0.8 to 2.0 tons per circuit at design load. Circuit loading must be evaluated at minimum load to ensure that it does not drop below 0.6 tons per circuit. Solenoid valves may be used, if necessary, to shut off the refrigerant supply to individual expansion valves to maintain adequate coil circuit loading.
Compressor minimum unloading and TXV quantity is necessary to determine minimum tonnage per circuit.
Minimum Unloading Equation:

$$\frac{(\text{Tons per Circuit}) \times (\text{Minimum Unloading}) \times (\text{Total no. of TXVs})}{\text{no. of TXVs Active}}$$

Example:

Condensing Unit:	38ARS012
Minimum Unloading:	33%
Coil:	6 row, 11 FPI, Half Circuit
Coil Tons per Circuit:	1.68
Total TXVs:	2

In the first example we will determine the tons per circuit when both TXVs are active and the compressor is unloaded to its minimum of 33%

$$= \frac{(1.68\ \text{Tons per Circuit}) \times (33\%\ \text{Minimum Unloading}) \times (2\ \text{TXVs})}{2\ \text{TXVs Active}}$$

$$= \frac{(1.68) \times (.33) \times (2)}{2}$$

= .55 tons per circuit at minimum unloading UNACCEPTABLE

If we install a liquid line solenoid valve before one of the TXVs and close it so that only one TXV is active when the compressor is unloaded to its minimum of 33%, we see the following:

$$= \frac{(1.68\ \text{Tons per Circuit}) \times (33\%\ \text{Minimum Unloading}) \times (2\ \text{TXVs})}{1\ \text{TXV Active}}$$

$$= \frac{(1.68) \times (.33) \times (2)}{1}$$

= 1.10 tons per circuit at minimum unloading ACCEPTABLE

There are three different options to control tons per circuit when using an unloading compressor. The first is to use drop solenoid valve control as illustrated above and let the suction cutoff unloaders "ride" with the load. The second is to use drop solenoid valve control as illustrated above with electric unloaders and let the control algorithm determine the combination of solenoid valves and unloaders to limit tons per circuit to acceptable limits. The third is to limit the minimum amount of unloading so that tons per circuit is within acceptable limits.
TXV SENSING BULB—sensing bulb for TXV is shipped coiled up inside cabinet. Remove coil connection panel, route sensing bulb out through suction line hole in panel, reinstall panel. Locate sensing bulb on horizontal section of suction line , and attach to tubing using copper plated strap. Attach sensing bulb between but no lower than the 2-o'clock and 10-o'clock positions. Make sure that there is good contact between the bulb cylinder and tubing. INSULATE the sensing bulb to insure that it reads the temperature of the suction line. For dual-circuit DX coils, make sure to locate the sensing bulb on the correct suction line.

Electrical Installation

WARNING

To avoid possible injury or death due to electrical shock, open the power supply disconnect switch and secure it in an open position during installation.

All field-installed wiring, including the electrical ground, MUST comply with the National Electrical Code (NEC) as well as applicable local codes. In addition, all field wiring must conform to the Class II temperature limitations described in the NEC.
Refer to factory wiring diagrams installed in the unit.

CAUTION

Use only copper conductors for field-installed electrical wiring. Unit terminals are not designed to accept other types of conductors.

START-UP

Pre-Startup

BUILDING ENVELOPE**—**All building windows and doors should be installed and closed before starting unit. During summer construction, avoid unit sweating by allowing for gradual pull down: use elevated chilled water temperature, reduce chilled water flow rate (gpm), use maximum available airflow.

HEATING FLUID TEMPERATURE-Maximum entering water temperature is 180°F, unless nameplate indicates 200°F. **CAUTION**: If unit is marked for 200°F maximum entering water temperature, customer must ensure that water vaporization does not occur especially at higher elevations when entering water temperatures are greater than 190°F.

TEMPERATURE CONTROLS-Check that unit or wall mounted thermostat or field-supplied controller is connected to the unit.

OUTSIDE AIR AND FREEZE PROTECTION-

WARNING: Insure that the unit is protected against freezing conditions Failure to provide freeze protection may result in equipment or property damage. Freeze protection measures are customer-provided and installed and include but are not limited to low-limit thermostats, automatic temperature controls, and use of glycol based heat transfer fluids (see section FREEZE PROTECTION OF WATER PIPING).

1. If “locking quadrant” manual damper operator provided, set to desired position.
2. If damper actuator provided, insure that actuator opens the damper when the fan turns on, and closes when fan stops. Test mixing box controls to make sure OA damper closes on power failure or upon activation of customer-supplied and installed low limit thermostat or other freeze protection device.

Start-Up Check List — Remove all construction debris from unit interior. *Remove tools and all foreign objects before starting unit. Checklist—perform full startup checklist located on the last page of this manual, and submit to the factory to register the warranty.*

FILTERS — Install unit filters in all filter sections. Protect open filters from drywall dust and construction debris.

MOTOR/FAN ASSEMBLY

1. Hand turn fan to make certain it turns freely and fan wheel does not rub the inlet ring.
2. Check fan speed with a laser-type tachometer to confirm operating speed (access doors must be closed to apply correct external static pressure to the fan).
3. Check direction of rotation (see Fig. 15).
4. Check vibration. If excessive vibration occurs, check for the following:
    A. Shipping screws removed.
    B. Inadequate airflow.
    C. Damaged wheel.
    D. Loose mounting bolts.
    E. Wheel or motor out of balance.
    F. External vibration isolators improperly adjusted.
    G. Out-of-balance or corroded wheel (rebalance or replace if necessary).
    H. Accumulation of material on wheel (remove excess material).

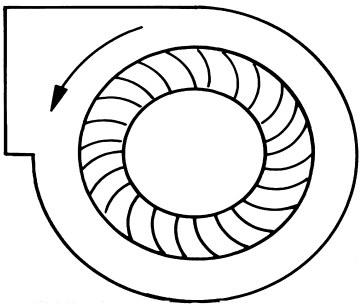


Fig. 15 — Fan Wheel Rotation

COILS

1. Make sure freeze protection measures are in place to protect water coils from freezing (see section FREEZE PROTECTION OF WATER PIPING).
2. Make sure hydronic (water based chllled water and hot water) systems are filled and have air removal devices in operation.
3. For hydronic coils with 3ea connections, make sure that the supply connection is at the bottom (air leaving side of coil) and return connection is in the middle (air entering side of coil), and the top connection is capped with the factory-provided cap.

Start-Up—Run Fan, Set Airflows

CONTROLS

Set up control system so that it correctly runs the fan as needed and activates control valves when required. Note that operating cooling with the fan off can cause the cabinet temperature to become too low and result in condensation inside and outside the unit cabinet, leading to unsafe conditions. When fan is not running, cooling should be inactive.

START THE FAN

With 4-Speed Control:

1. Using a thermostat: Route R, C and G1 connections in the HCA control box to the matching thermostat connections (include G2 and G3 if required). Set thermostat to run the fan at speed G1.
2. Without a thermostat: Jump together the R and G1 terminals in the control box.
3. While fan is running, adjust potentiometer marked “FLO1” that controls fan speed G1 using a small flat blade screwdriver. Repeat for the other speeds as needed.

With 0-10VDC Control:

1. Using a thermostat: Route R, C, + (plus) and -(minus) connections in the HCA control box to the matching thermostat connections. Set the thermostat to run the fan.
2. Without a thermostat: Provide a DC control voltage across the + (plus) and — (minus) terminals.
3. Fan starts at 2.0VDC. Fan speed varies across available range (pre-programmed at factory) from 2.0 VDC (minimum speed) to 10.0 VDC (maximum speed).

DANGER

NEVER enter an enclosed fan cabinet or reach into a unit while the fan is running.
LOCK OPEN AND TAG the fan motor power disconnect switch before working on a fan. Take fuses with you and note removal on tag. Electric shock can cause personal injury or death.
LOCK OPEN AND TAG the electric heat coil power disconnect switch before working on or near heaters.
Failure to follow these warnings could lead to personal injury or death.

SERVICE

General

1. Place a suitable walkway to protect floor insulation whenever entering the fan section.
2. Review Safety Considerations at beginning of these instructions. Good safety habits are important tools when performing service procedures.
3. To make speed measurements, use a laser-style tachometer and make sure the access doors are closed.

Fan Motor Replacement

Shut off motor power and lock out power supply.

Procedure:

1. Disconnect motor power and control wiring harness(es).
2. Loosen fan inlet ring on motor side of the unit.
3. Carefully remove motor mounting bolts where they attach to the housing. WARNING: Blower motor/wheel assembly will fall, so be sure to fully support the assembly before removing the bolts.
4. Remove fan motor and wheel assembly and inlet ring from the blower housing and unit.
5. Remove the wheel from the fan motor shaft by loosening the setscrew.
6. Before removing motor mount from motor, mark the location of the motor mount for reference.
7. Attach new motor to existing or new wheel. NOTE! Install blower ring BETWEEN motor and wheel.
8. Attach existing motor mount to new motor, using mark on old motor as a reference.
9. Install motor/wheel/ring assembly in the fan housing. Ring is loose. Reinstall ring and motor mount bolts.
10. Reattach motor harness to motor.
11. Return unit to serviceInstall impeller on new motor (or new impeller on motor):

Fan System Periodic Maintenance

1. Magic Aire strongly recommends use of a Preventive Maintenance program to insure that the unit operates safely and efficiently.
2. Deposits of dust or other debris on the impeller can cause vibration and premature failure. Follow cleaning instructions in section “Fan Maintenance & Cleaning”.

Fan Maintenance & Cleaning

1. Regular inspection, and cleaning is necessary to prevent imbalance due to ingress of dirt.
2. Clean the fan’s flow area - maintenance interval in accordance with the degree of contamination. **Verify vibration free motion**.
3. The fan wheel can be cleaned with a moist cloth.
4. Do not use any aggressive, paint solvent cleaning agents when cleaning.
5. Never use a high-pressure cleaner or waterspray for cleaning - particularly when the fan is running.

   WARNING! Wet cleaning under voltage may lead to electric shock and serious injury or death!

Coil Cleaning

DETERGENT — Spray mild detergent solution on coils with garden-type sprayer. Rinse with fresh water. Check to ensure condensate line is free. Excess water from cleaning may flood unit if condensate line is plugged.

Winter Shutdown (Chilled Water Coil Only)

ANTIFREEZE METHODS OF COIL PROTECTION

1. Close coil water supply and return valves.
2. Drain coil as follows:
   Method I — ‘Break’ flange of coupling at each header location. Separate flange or coupling connection to facilitate coil draining.
   Method II — Open both valves to auxiliary drain piping.

3. After coil is drained:

Method I — Connect line with a service valve and union from upper connection to an antifreeze reservoir. Connect a self-priming reversible pump between the low header connection and the reservoir.

Method II — Make connection to auxiliary drain valves.

4. Fill reservoir with any inhibited antifreeze acceptable to code and underwriter authority.
5. Open service valve and circulate solution for 15 minutes; then check its strength.
6. If solution is too weak, add more antifreeze until desired strength is reached, then circulate solution through coil for 15 minutes or until concentration is satisfactory.
7. Remove upper line from reservoir to reversible pump. Drain coil to reservoir and then close service valve.
8. Break union and remove reservoir and its lines.
9. Leave coil flanges or coupling open and auxiliary drain valves open until spring.

AIR DRYING METHOD OF COIL PROTECTION
(Unit and coil must be level for this method.)

1. Close coil water supply and return main valves.

2. Drain coil as described in procedures for Anti-freeze Methods of Coil Protection.
3. Connect air supply or air blower to inlet header connection and close its drain connection.
4. Circulate air and check for air dryness by holding mirror in front of open vent in outlet header drain connection. Mirror will fog if water is still present.
5. Allow coil to stand for a few minutes; repeat Step 4 until coil is dry.

PIPING — Direct expansion, chilled water, and hot water coils should always be piped for counterflow. (Fluid should enter the coil at the leaving-air side.) Steam coils must have the condensate connection at bottom of coil.

To determine intervals for cleaning coils in contaminated air operations, pressure taps should be installed across the coils and checked periodically. Abnormal air pressure drop will indicate a need for cleaning the coils.

Steam Systems

Annual steam system maintenance should include:

1. Clean the line strainers.
2. Blow down the dirt leg.
3. Clean and check operation of steam traps.
4. Check operation of control valves.
5. Check the operation of check valves to prevent condensate flowback.
6. Check operation of thermostatic air vents, if used. A float and thermostatic trap will contain a thermostatic air vent. When the bellows is ruptured, it will fail closed.

7. Check operation of vacuum breakers.
8. Check operation of the thermal protection devices used for freeze-up protection.
9. Steam or condensate should not be allowed to remain in the coil during the off season. This will prevent the formation and build up of acids.

There are additional precautions and control strategies, as found in various catalogues and in the ASHRAE Fundamentals Handbook when the entering-air temperature to the coil falls below 35 F. These conditions occur when IDT coils are used for pre-heat and/or face and bypass applications.

Freeze up protection:

1. Use a strainer in the supply line and the dirt leg ahead of the trap.
2. Use a vacuum breaker in the return.
3. Do not use overhead returns from the coil. A floodback can occur.
4. An immersion thermostat to control outdoor-air dampers and the fan motor is recommended. This control is activated when the steam supply fails or the condensate temperature drops below a predetermined temperature, usually 120 F.
5. On low pressure and vacuum systems, the immersion thermostat may be replaced by a condensate drain with a thermal element. This element opens and drains the coil when the condensate temperature drops below 165 F. Note the thermal condensate drain is limited to 5 psig pressure. At greater coil pressures they will not open.

In spite of the precautions listed above, a coil may still freeze up. An oversize capacity coil, at partial load, with a modulating steam control valve will occasionally freeze. Freezing occurs in the 20 F to 35 F range of entering-air temperatures. A better installation would be an undersize coil, with an on/off control valve with thermostatic control in the outside air, set at 35 F air temperature, installed downstream of the first coil; or setting the minimum steam pressure at 5 psig.

Filters

FILTER SECTIONS — Open or remove filter panel to replace old filter with a new filter. See physical data tables for filter data.

SERVICE-Coil & Drainpan Removal and Reinstallation Procedure

1. Perform procedure on the ground for safety. If working at heights USE EXTREME CAUTION observe all FALL SAFETY considerations. Under all conditions, LOCK OUT all power supplies before performing this procedure.
2. Isolate and drain coil from heating/cooling fluid and/or reclaim refrigerant. Disconnect unit from piping. Remove supply piping to allow access into the coil section from the side. Refer to Service Clearance drawing to determine required clear space.
3. Remove the flat coil stubout panel. Refer to Figure 16 and 17. Note that there is another coil access panel on the opposite side of the unit.
4. Remove filter door and filter (Figure 17 and 18).
5. Remove coil retaining screws (4ea sizes 04-20, up to 6ea sizes 30-40). Screws attach the first coil to the coil panel. Screws are visible from the coil side (Figure 19) and are accessible from the filter side of the unit (Figure 20).

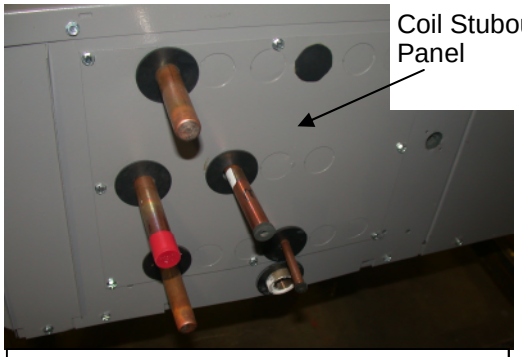


Figure 16

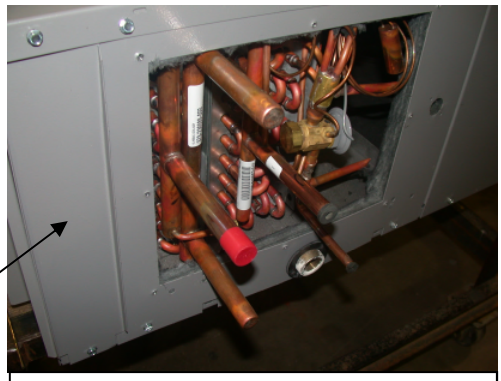


Figure 17
Coil Stubout Panel shown removed

Figure 18
Filter removal

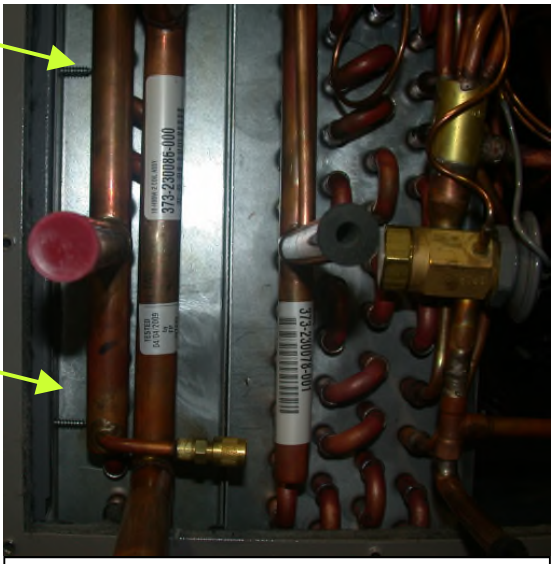


Figure 19
Coil Retaining Screws

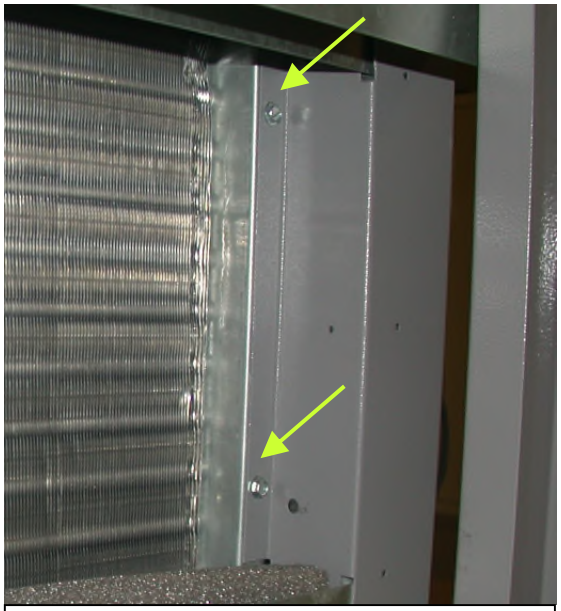


Figure 20
Coil Retaining Screws-filter side view (filter removed)

6. Remove top panel screws at sides and rear (rear leg and coil panel) to allow top to be lifted up. Front screws can remain. Remove top filter rail. (Figure 21 and 22). **WARNING! Insure unit is adequately supported before removing top panel screws!**

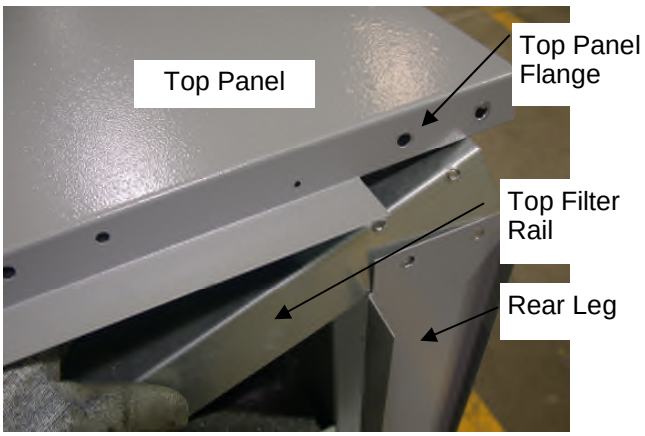


Figure 21

Figure 22

7. Remove screws at bottom of coil panel. Remove coil panel. (Figure 23 and 24)

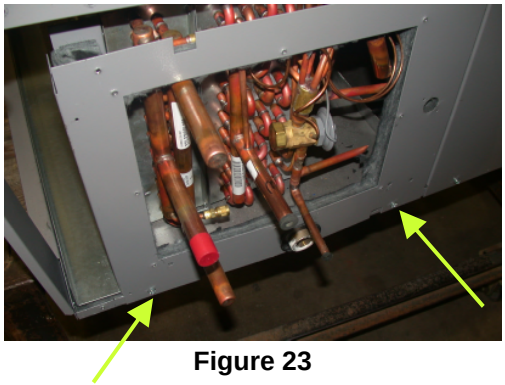


Figure 23

8. Remove coils from unit along with drainpan. Drainpan will slide out of unit (Figure 25 or 26). To remove coils and drainpan, top will need to be lifted up as shown in Figure 21.
9. At this point, the drainpan or one or more coils may be replaced.

Figure 24

Figure 25

Figure26

10. Follow instructions in reverse to reassemble the unit.

Magic Aire Water Quality Guidelines

For Heat Exchanger Coils with Copper Tubes

Introduction:

Poor cooling/heating water quality can cause serious problems. Ground source or open loop water quality varies and therefore should be tested to determine suitability for use with Magic Aire equipment. Test water for hardness, acidity and iron content before the equipment is installed. Poor water quality can cause one or more of the following problems: mineral deposits, sediment deposits or corrosion. These problems will result in fouling, contamination or damage to water coils and may render them inoperable or inefficient. It is the responsibility of the customer to insure that the water quality meets or exceeds water quality specifications prescribed in Table 1.

Table 1

Condition	Acceptable Level	
pH	7 to 9	
Total Hardness	Calcium and magnesium carbonate should not exceed 20 grains per gallon (350 ppm).	
Iron Oxides	< 1 ppm.	
Iron Bacteria	No level allowable.	
Brackish	Calcium or sodium chloride concentrations ≤ 125 ppm. (Seawater is approximately 25,000 ppm)	
Sediment/Solids	Provide ≤ 800 micron filtration on open loop or ground source systems.	
Corrosion[1]	Ammonia, Ammonium Hydroxide	0.5 ppm max.
	Ammonium Chloride, Ammonium Nitrate	0.5 ppm max.
	Ammonium Sulfate	0.5 ppm max.
	Chlorine/Chlorides	0.5 ppm max.
	Hydrogen Sulfide[2]	None Allowable

NOTES:

1. If the concentration of these corrosives exceeds the maximum allowable level, then the potential for serious corrosion problems exists.

2. Sulfides in the water quickly oxidize when exposed to air, requiring that no agitation occur as the sample is taken. Unless tested immediately at the site, the sample will require stabilization with a few drops of one Molar zinc acetate solution, allowing accurate sulfide determination up to 24 hours after sampling. A low pH and high alkalinity cause system problems, even when both values are within ranges shown. The term pH refers to the acidity, basicity, or neutrality of the water supply. Below 7.0, the water is considered to be acidic. Above 7.0, water is considered to be basic. Neutral water contains a pH of 7.0.

3. To convert ppm to grains per gallon, divide by 17. Hardness in mg/l is equivalent to ppm.

PHYSICAL DATA

Model HCA			Unit Size 04	06	08	12	16	20
Nominal Capacity (Tons)			1	1.5	2	3	4	5
Nominal Capacity (BTU/HR)			12000	18000	24000	36000	48000	60000
Nominal Airflow (CFM)			400	600	800	1200	1600	2000
Fan								
Fan Size			97-6T		90-6R		120-11R	
Pre-Filter								
Quantity / Actual size	2" Pleated (MERV 8)		12 x 24		16 x 32		20 x 20	
	4" Pleated (MERV 13)							
Coil Face Area								
Face Area-Hydronic (sq ft.)		1- Row	1.58	1.79	1.50	2.39	4.03	5.00
		2- Row	1.58	1.79	1.56	2.39	3.52	4.38
		4- Row	1.58	1.79	2.00	3.06	4.03	5.00
		6- Row	1.58	1.79	2.00	3.06	3.94	5.00
Face Area-DX (sq ft.)			1.19	1.79	2.00	3.06	4.03	5.00
Face Area-Steam Heating (sq ft.)			1.13	1.13	1.88	2.86	3.63	4.50
Coil Rows/FPI								
Chilled Water/2-Pipe - 4 row			4/10	4/10	4/10	4/10	4/10	4/10
Chilled Water/2-Pipe - 6 row			6/10	6/10	6/10	6/10	6/10	6/10
Std Capacity Steam		(See	2/8	2/8	2/6	2/6	2/6	2/6
High Capacity Steam		Note 1)	-	-	2/14	2/14	2/14	2/14
Std Capacity DX			3/10	3/10	3/12	3/10	3/12	3/12
High Capacity DX			6/10	6/10	6/10	6/10	6/10	6/10
Max Coil Rows			10 Rows Total (note 1)					
Coil Connections (in)								
Chilled Water (OD Copper Tube)		4-Row	0.75	0.75	0.75	0.875	0.875	1.125
		6-Row					1.125	
Hot Water (OD Copper Tube)			0.75	0.625	0.625	0.625	0.875	0.875
Steam-Std Cap-Supply/Return (MPT)			1.50/1.00	1.50/1.00	1.50/1.00	1.50/1.00	1.50/1.00	1.50/1.00
Steam-High Cap-Supply/Return (MPT)			-	-	1.50/1.00	1.50/1.00	1.50/1.00	1.50/1.00
Std Cap DX	Liquid (OD Sweat)		0.375	0.375	0.375	0.375	0.375	0.625
	Suction (OD Sweat)		0.625	0.625	0.75	0.75	0.75	1.125
Std Cap DX (dual ckt)	Liquid (OD Sweat) 2ea		-	-	0.375	0.375	0.375	0.375
	Suction (OD Sweat) 2ea		-	-	0.75	0.75	0.75	0.75
High Cap DX	Liquid (OD Sweat)		0.375	0.375	0.375	0.5	0.625	0.625
	Suction (OD Sweat)		0.75	0.75	0.75	0.875	0.875	1.125
High Cap DX (dual ckt)	Liquid (OD Sweat) 2ea		-	-	0.375	0.375	0.5	0.5
	Suction (OD Sweat) 2ea		-	-	0.75	0.75	0.875	0.875
Condensate Drain Line								
Primary & Auxiliary			3/4" FPT					
Coil Volume								
Hot Water - 1 row (gal)			0.1	0.2	0.2	0.3	0.5	0.6
Hot Water - 2 row (gal)			0.3	0.3	0.3	0.7	0.7	0.9
Chilled Water/2-Pipe - 4 row (gal)			0.5	0.6	0.6	0.8	1.1	1.4
Chilled Water/2-Pipe - 6 row (gal)			0.8	0.9	0.8	1.3	1.7	2.1
Std Capacity DX		(cu in)	68	103	115	175	231	286
High Capacity DX		(note 2)	136	205	229	350	461	573

Notes:

1. Steam coils are 1-row, 5/8" tube-in-tube steam distributing type construction. When calcuating total rows of coil for the unit, these count as 2 rows.
2. For dual circuit coils, volume per circuit is half of that listed.
3. Not all combinations equaling 10 rows are allowed. Please refer to New Magic 4 Software for permissible selections.

CODE NO. / CATALOG NO. MagicAire®

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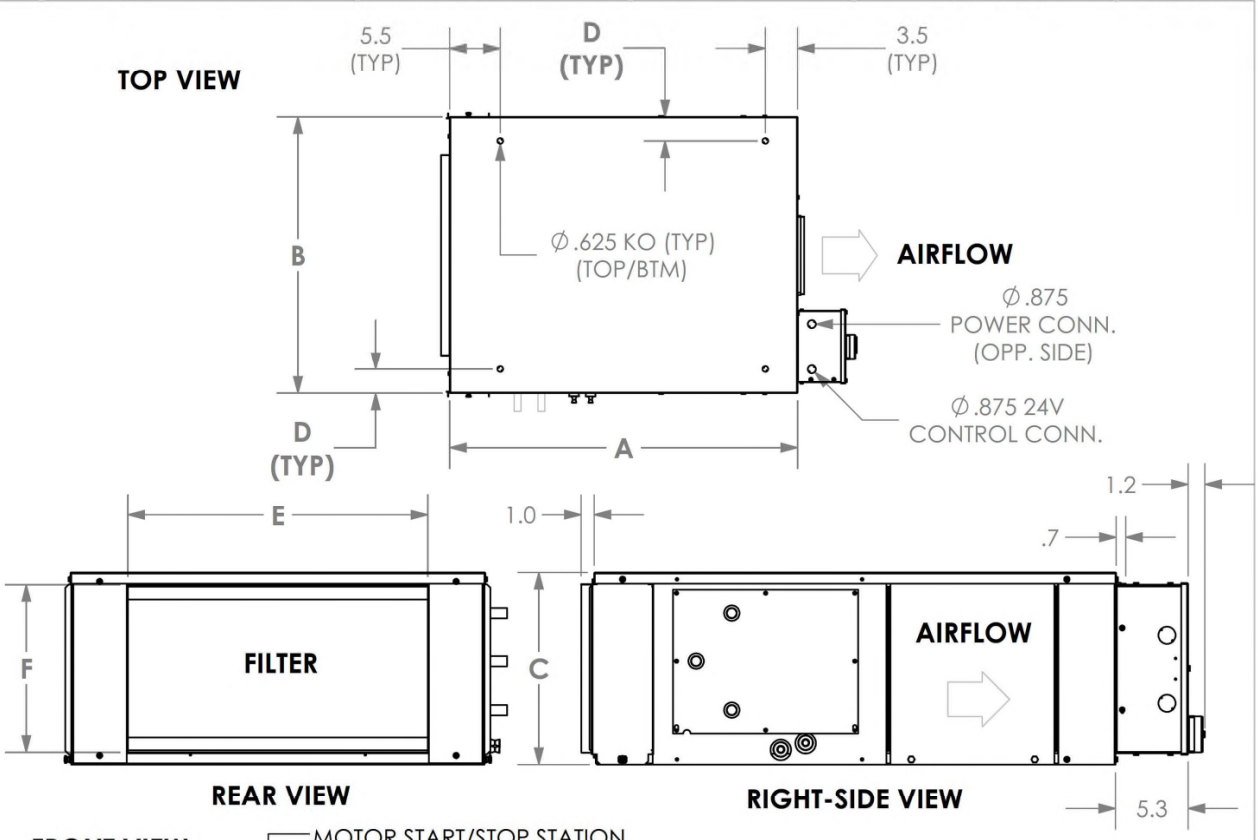
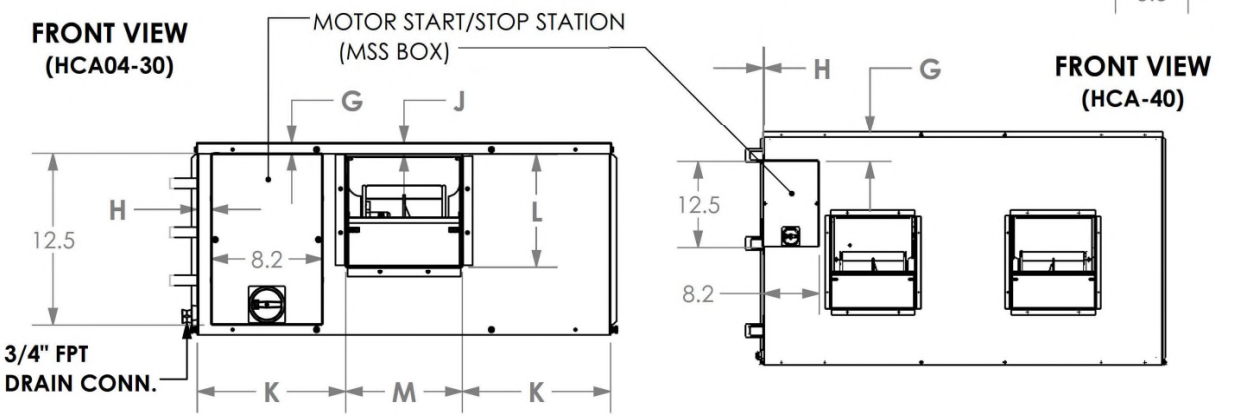
HCA04-40 UNIT OUTLINE
RIGHT HAND CONN
CW/HW/DX

HCA
DESIGN "A"





MODEL	DEPTH	WIDTH	HEIGHT	UNIT MTG	RETURN OPENING		MSS BOX		SUPPLY OPENING			
	A	B	C	D	E	F	G	H	J	K	L	M
HCA04/06	38.1	30.3	14.0	2.6	21.9	12.2	0.8	1.0	0.8	10.8	8.2	8.5
HCA08/12	38.1	37.8	18.0	2.1	27.5	16.2	2.8	0.7	1.2	14.6	10.5	8.5
HCA16/20	42.1	46.3	22.0	2.1	35.9	20.2	4.8	1.0	1.0	15.6	13.8	14.9
HCA30	52.6	59.3	34.0	2.1	47.9	32.2	4.2	0	12.2	22.8	13.8	12.5
HCA40							4.2	0	12.2	9.7	13.8	12.5

PRODUCT INFORMATION IS SUBJECT TO CHANGE WITHOUT NOTICE

JOB NAME	JOB #	BUYER	BUYER #	LOCATION	DRAWING NO.	REV
					HCA-100	-

AIR HANDLERS AND FAN COILS

Warranty Registration and Start-up Report

Warranty Registration Form: Complete and submit this form within ten (10) days of start-up to comply with the terms of the Magic Aire warranty. Form must be completed to clearly indicate startup for each unit being registered.

Mail form(s) to Magic Aire
Warranty Department
501 Galveston St.
Wichita Falls, TX, 76301 or
Email customer.service@MagicAire.com

Job Name		City	
Sales Order #		Unit Tag	
Model Number		Serial Number	
Installer		Quantity of Units	

STARTUP REPORT			
Group	**Checklist Item**	**Yes**	**No**
Electrical/Operational	Have red shipping screws been removed from pallet and blower rails?		
	Does electrical service correspond to unit nameplate?		
	-Nameplate Supply Voltage/Phase: Rated_____ Measured_____		
	-Nameplate Rated FLA motor current: Rated_____ Measured_____		
	Does all field wiring conform to unit wiring diagram?		
	Is field-provided freeze protection present? (for DX and hydronic coils)		
	Is fan wheel turning the correct direction?		
	Are mixing box dampers operating properly?		
	Is the filter clean?		
Structural	Is unit properly supported?		
	Is unit installed level (necessary for proper condensate drainage)?		
	Is properly sized condensate trap present?		
	Is the condensate disposal system operating correctly?		
	Is auxiliary external condensate drain pan installed as recommended by IOM? (not required for valid warranty)		
DX Systems	Is expansion valve sensing bulb properly installed and insulated?		
	Is Heat Pump Bypass Kit (HPK) present if required?		
	Is the DX system charged per the condensing unit mfr's instructions?		
Piping Check	Is unit piping correct and insulated to prevent condensation?		
	Are the control valve packages piped correctly?		
	Are Valve packages properly insulated?		
	Are there any leaks detected: interior to unit, at connections, or at valve packages?		
Hydronic Systems	Have customer-provided Freeze Protection measures been taken, such as Low Limit Thermostats and glycol (antifreeze) heat transfer fluids?		
	Does the hydronic system include a pressure relief valve or other pressure relief device to protect the coil from operating pressures beyond the nameplate design working pressure rating?		
	Are coils equipped with control valves to stop fluid flow to save energy and prevent cabinet condensation (wild coil in cooling) when heating/cooling is not required?		

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HCA Series Air Handler

Installation, Operation and Maintenance Manual