



# Installation & Operations Manual

Bulletin No. H-IM-AH

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Part Number 4346B001

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## Air Handler Unit



### Table of Contents

Inspection .....	2
Shipment of Units	
Handling	
Suspended Units	
Installation	
Motors & Drives	
Steam Coils	
Steam Coils .....	3
Water Coils	
Direct Expansion Coils	
Start-up .....	4
Maintenance	
Condensate Drain Traps	
Internal Isolation	
Section Assembly .....	5
Coil Stacking	
Freezing Temperatures .....	6
Weights .....	7
Shipment of Sections	
Filter Quantities .....	8
Replacement Parts	

## Inspection

Shipment should be checked against the bill of lading to verify that all items listed have been received. All parts should be carefully inspected to determine if any damage was incurred in shipment.

Any shortage and/or claims for damage should be immediately reported to the delivering carrier, followed by filing a claim for shortages and/or damages.

## Shipment of Units

Depending on the unit size and accessories included, the shipment may be in two or more sections.

## Handling

Special care should be taken when handling and assembling component sections of the unit. Rough handling at the jobsite can result in damaged bearings, bent shafts, etc.

All units are shipped on wooden skids. It is recommended that units not be moved removed from skids until they are at a place of installation. The mounting legs/rails provided for isolators should be used when lifting units into place.

## Suspended Units

Sizes 03 through 41 may be ceiling-suspended from the mounting legs/based rails with 5/8" diameter rods (not furnished). These rods will pass through the 11/16" diameter mounting holes provided. Sizes 50, 65 and 75 cannot be ceiling-suspended.

## Installation

It is very important that the unit be installed in a level position to prevent distortion and to ensure proper damper operation and coil drainage.

Allow sufficient space around the unit for proper maintenance. Consider factors such as filter removal for cleaning or replacement, access to all removal panels, removal of coils and shaft if necessary, lubrication access or motor belt adjustment. Canvas duct connections should be used between the unit and supply and return air ducts.

Units are furnished with 1-1/4" FPT drain connection on each side of the coil section. The drain line from the drain pan connection must be adequately pitched and should have a water seal of sufficient depth to compensate for the air pressure within the units. (See Condensate Drain Traps on page 4.)

When the unit is located on the roof, it must be mounted on support beams that span load-bearing walls. If not, excessive vibration may occur because of the resiliency of the roof.

Fan noise is a function of fan design, volume flow, pressure and fan efficiency and could be loud enough to disturb those in occupied areas. Therefore, on critical applications we recommend extra sound attention.

## Motors and Drives

All units will normally be shipped with motor and drive installed. When mounting a motor on the adjustable base (installed on the unit), extreme care should be taken to ensure proper alignment and belt tension. All electrical work should be done in strict accordance with local codes and regulations.

## Steam Coils

Type J and NFS coils have supply and return connections on the same end. Types R, S and RA coils have supply and return connections on opposite ends. Type NFD coils have supply connections on each end of the coil, with a single return connection on one end only.

All piping should be in accordance with accepted industry standards and local codes. Support all piping independent of coil and provide adequate swing joints in all piping to absorb expansion and contraction strains.

Run return piping the full size of the coil return connection from the coil to a dirt pocket. (Do not use reducing fittings.) Install drip traps in steam mains ahead of coils. Do not drip steam mains through the coils.

Install a vacuum breaker (1/2" 15° check valve) ahead of the trap on low-pressure, open-gravity return systems and on high pressure systems. Install a 1/2" 15° swing check valve in a 1/2" vacuum-equalizing line, bypassing the condensate trap, on low pressure vacuum systems.

When two or more steam coils are furnished in a unit, provide separate traps for each coil. Size traps with ample capacity using the maximum heating load and service factor recommended by the trap manufacturer.

Select control valves in accordance with the recommendations of the control manufacturer using actual heating loads.

Install suitable strainer ahead of all automatic valves and traps to catch dirt and scale. Provide adequate air vents to expel air and other non-condensable material.

Control valves used for type J, NFS, RA and NFD coils must be gradual-acting, modulating type with veepport.

Where a control valve is used for type S or R coils and the entering air temperature is below 35°F, use a two-position valve. Locate control element in the entering air

stream so that valve will remain open with a minimum of five pounds steam pressure when the entering air temperature is below 35°F. At system start-up, the damper should remain closed for approximately ten minutes after the steam valve is opened.

Properly locate all temperature sensing elements at a point of true average air mixture temperature. Refer to Diagrams 1 and 2 for controls positioning and piping configuration.

When face and bypass dampers are used, it is good practice to install a valve that closes with the face damper to prevent overheating because of damper leakage or heat from the exposed coil face.

### Water Piping

All piping must be supported independent of coils. Swing joints or flexible fittings must be provided to absorb expansion and contraction strains. Rigid piping may also reduce effectiveness of vibration isolators.

The water supply should always be connected to the bottom inlet of the coil. The coil connections are identified with stickers.

Water coils (3 through 10 rows) are supplied with a vent and drain connection (1/4" MPT) that extends through the unit casing. Coils must be adequately vented in order to prevent air binding. For protection of coils exposed to freezing temperatures, refer to page 6.

### Direct Expansion

Both the liquid distributor and the suction line extend through the casing. The expansion valve utilized must be the external equalizer tube type. The expansion valve bulb must be placed on the suction line between the coil and the 1/4" external equalizer tube. Never put the bulb in a trap.

All refrigerant piping practices should be in accordance with local codes and latest ANSI Standard B9 Safety Code. Hard-drawn type L or K copper tubing should be used. Soft tubing may be used where bending is required, provided it is in accordance with local codes.

Remember to check for adequate vacuum, clear tubes of foreign material, etc.

Diagram 1. Typical Steam Coil Piping

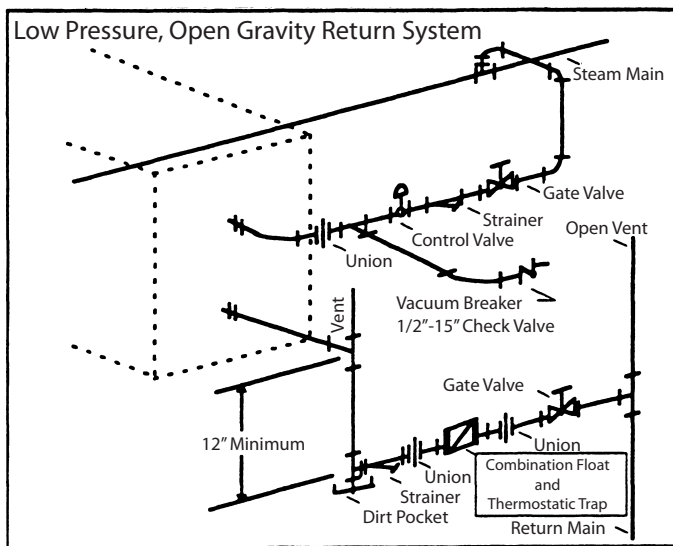
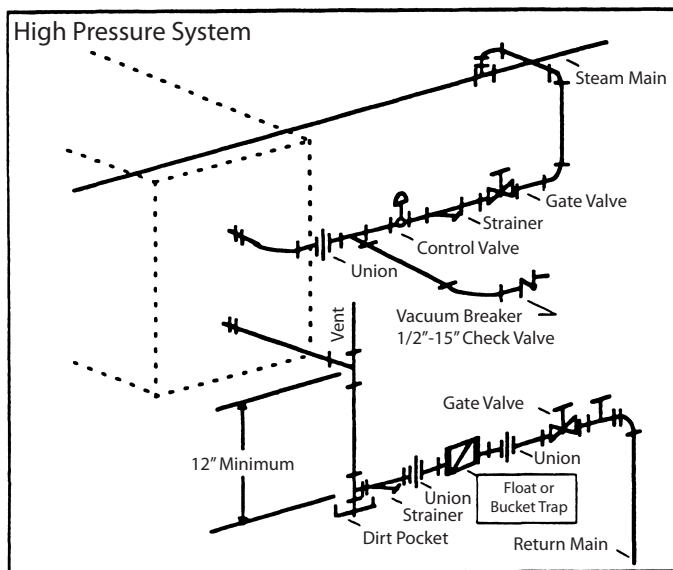


Diagram 2. Typical Steam Coil Piping



## Start-Up

Make sure all bolts and screws are tight. Remove tagged shipping tie-down bolts and spacers from the fan and motor assembly before start-up on internally isolated units only.

Check the alignment of the sheaves and tighten the set screws. Make sure that the dimension across the top is equal on all grooves, otherwise excessive belt wear will result.

Check for proper rotation of the blower pulley. Three-phase motor rotation can be reversed by exchanging two of the three leads at the motor starter. The rotation of single-phase motors can be reversed by exchanging leads inside the motor junction box. (See motor wiring diagram.)

Check the amperage draw of the motor; should not exceed the nameplate amps shown on the motor serial plate.

After approximately two weeks of operation, the belts will have almost reached their permanent stretch. At this point, the belt tension should be checked again and proper adjustment made.

## Maintenance

The belt tension should be checked at three-month intervals. The fan shaft bearings on sizes 03, 06, 08, 10 and 12 are lifetime-lubricated. All other units have ball bearings that can be re-lubricated.

Bearings mounted inside the fan section have extended lubrication lines on the outside of the fan panels. The suggested greasing intervals are indicated on a sticker on the unit. It is recommended that bearings are lubricated with a high quality lithium grease as indicated on the sticker. Instructions are included on the motor nameplate for lubricating the motor bearings.

The filter should be periodically inspected and replaced or cleaned when necessary. Dirty filters inhibit air flow, reducing the capacity of the system.

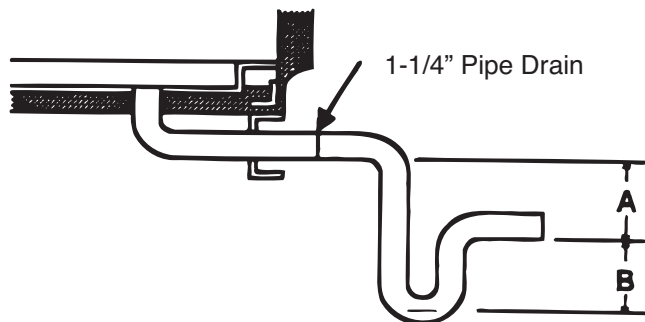
Do not operate system without filters.

## Condensate Drain Traps

The condensate drain trap piping must be properly designed to ensure the removal of condensate. Incorrect trapping can hold water, causing overflow in the drain pan. On blow-thru units with incorrect trapping, system air can be lost down the drain.

Figure 1.

### Condensate Drain Trap (Air Seal)

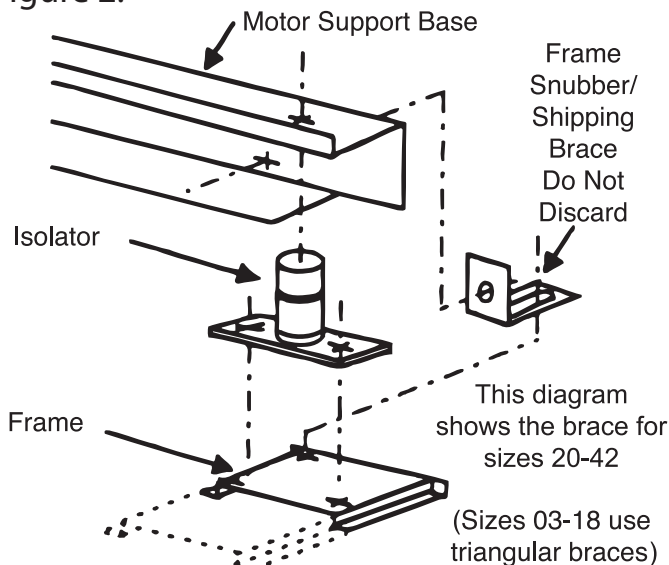


- (a) On draw-thru units (A) shall be equal to or greater the coil section's negative pressure at operating conditions
- (b) On blow-thru units (A) can be as small as 1" but (B) must equal or exceed the total static pressure in the coil section

## Internally Isolated Units

Sizes 03-41 with optional internal spring isolation have four hold-down shipping braces. Remove the 1/2" bolt between each shipping brace and the motor base, then loosen the bolt between the frame and brace and slide the brace 5/8" from the motor support base. Re-tighten the bolt so the shipping brace acts as a snubber on fan start-up.

Figure 2.



Typical 'Accessory-to-Coil-Section'  
and 'Accessory-to-Accessory' Attachment

Figure 3.

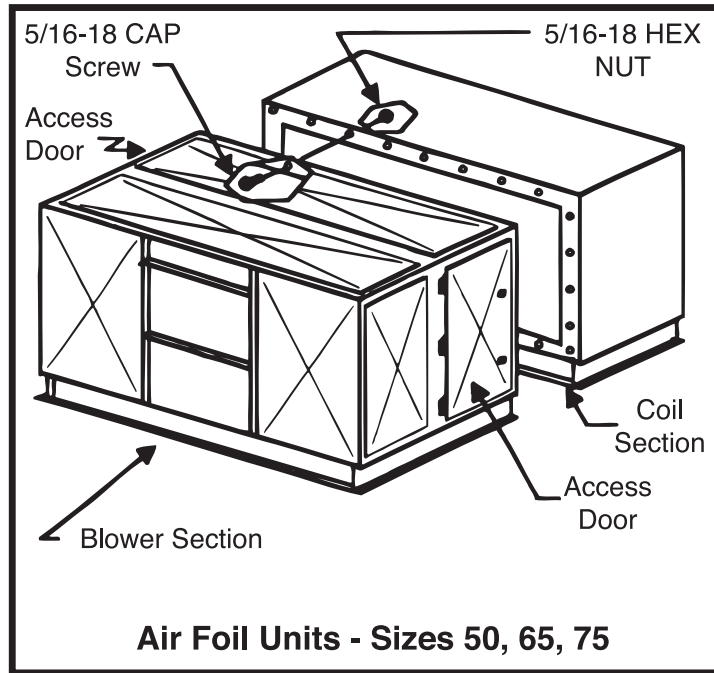


Figure 4.

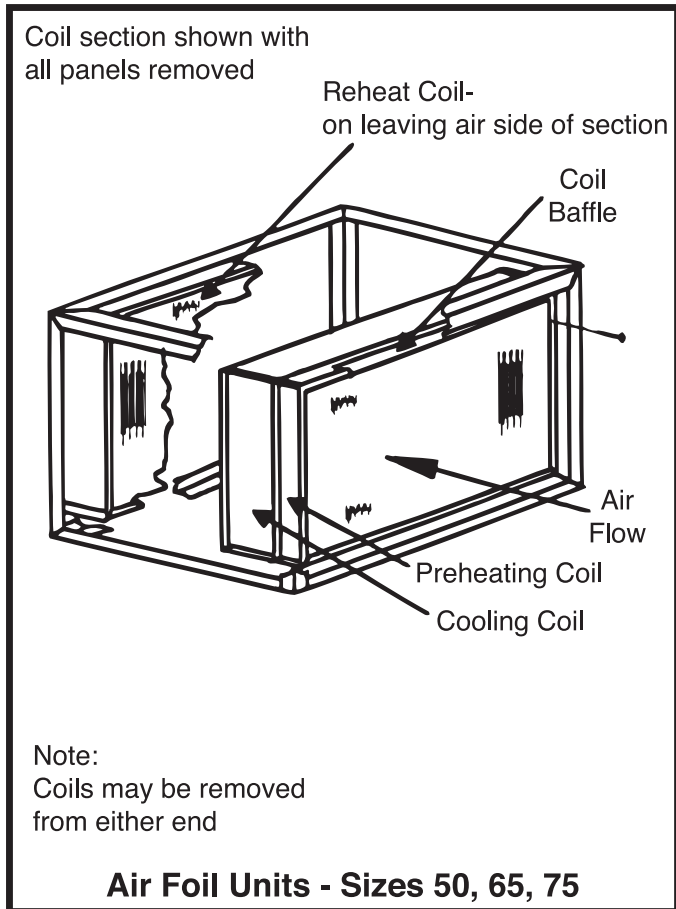
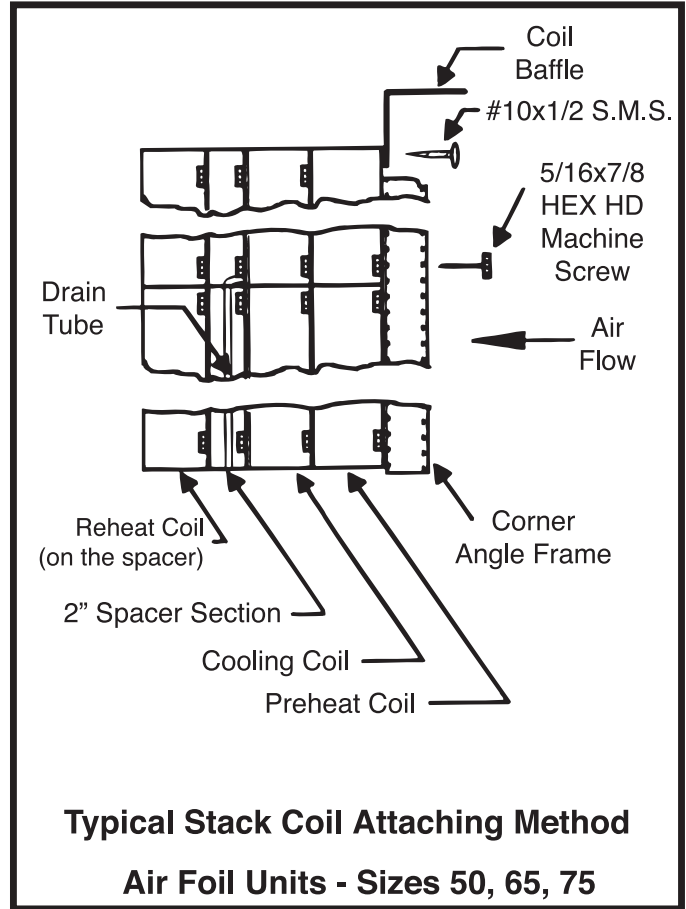


Figure 5.



## Protecting Water Coils Exposed to Freezing Temperatures

Water coils exposed to freezing temperatures must be protected by properly draining the coils or adding antifreeze solution to coils.

The coils are circuited so there are no trapped circuits. However, because of the serpentine nature of the circuiting, it is almost impossible to adequately drain the coils with gravity alone. On longer coils, a fraction of a degree deviation from a horizontal plane can lead to trapped water within the circuits.

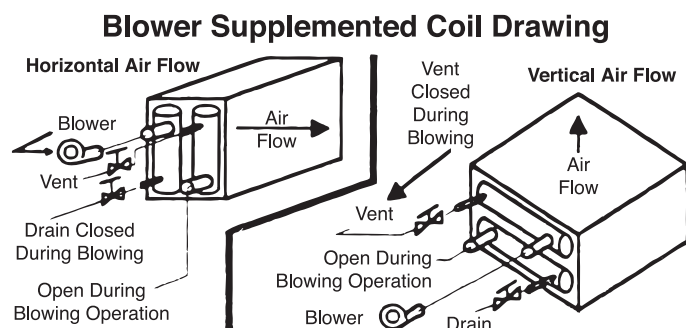
Water that failed to drain from a single tube, or even part of a tube, can cause the tube to rupture upon freezing.

## Draining Coils Using Supplemental Air Blower

Ideally, a blower capable of delivering 150 CFM of air at approximately 40-50 inches of water or more should be used. Some small air compressors, while delivering higher pressures, will not deliver sufficient volume of air.

1. Drain the coils by gravity after opening the supply, return, vent and drain connection. Tap the coil causing along the length of the coil during the draining process.
2. Connect the blower to a large connection at the greatest elevation. The small vent or drain connection on the header that the blower is connected to should be closed. Refer to Figure 6 for typical hook-up during the blow-out operation.

Figure 6.



3. Turn on the blower. The blower should be operated until no moisture can be detected leaving the coil. Then, shut the blower off and let the coil stand for a few minutes, allowing the moisture on the walls to accumulate.
4. Then the blowing-out operation should be repeated. Ideally, the coil should stand 24 hours and then be blown out again. Leave all connections open until coil is put into operation.

## Installation of Antifreeze Solution

A second way to prevent a coil freeze-up is to add an antifreeze such as glycol to the coil.

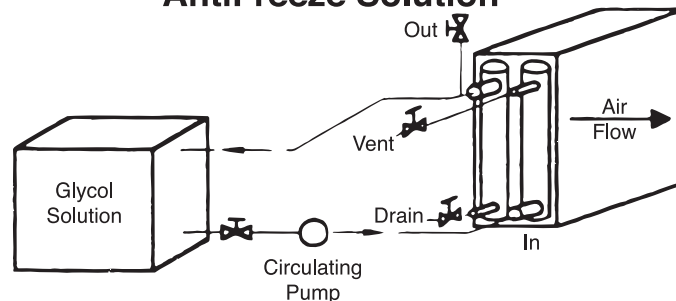
The addition of antifreeze to a system exposed to freezing conditions may be necessary if the system must be operational at a moment's notice. Antifreeze affects the chiller and coil performance and must be taken into consideration when selecting the components.

Valve off the coil so only the coil has antifreeze added. The best way to mix the antifreeze is to make a run-around loop with a circulating pump.

1. Open all connections and drain the coil as thoroughly as possible.
2. The antifreeze solution should be added and circulated until the solution is thoroughly mixed and all air is purged from the coil. To accomplish this the air vent should be opened during the filling operation and cracked during the pumping operation.
3. When the solution has circulated for 15-20 minutes, the concentration of the solution should be checked with a suitable hydrometer. If the concentration is low, add more glycol and operate the pump again. A typical piping diagram is shown in Figure 7.
4. The antifreeze solution may then be left in the coils or drained and used to flush another coil. The concentration must be checked for each coil flushed.

Figure 7.

## Typical Piping Diagram for Adding AntiFreeze Solution



Note: Most antifreeze solutions will be furnished with a concentration chart. Also, make sure the antifreeze solution is not corrosive.

Air Handler Component Weight (lbs.)

Air Handler Component				Unit Size													
Section	Model ID	Description	Fan	03	06	08	10	12	14	18	20	26	34	41	50	65	75
Fan and Coil Section	S	Short	FC	290	430	500	550	650	790	816	836	968	1,188	1,386	-	-	-
	S	Short	AF	-	-	-	-	-	-	-	946	1,177	1,518	1,782	2,700	3,300	4,496
	L	Long	FC	318	450	553	600	732	988	1,033	1,067	1,221	1,474	1,672	-	-	-
	L	Long	AF	-	-	-	-	-	-	-	1,177	1,430	1,793	2,057	2,850	3,480	4,690
	V	Vertical	FC	296	387	482	535	615	860	1,004	1,111	1,254	1,628	1,881	-	-	-
	HD	Heating Duty	FC	170	280	312	360	450	510	564	605	693	902	1,078	-	-	-
	HD	Heating Duty	AF	-	-	-	-	-	-	-	715	891	1,221	1,474	2,600	3,200	3,359
	FO	Fan Only	FC	162	266	296	342	428	485	536	575	658	857	1,024	-	-	-
	FO	Fan Only	AF	-	-	-	-	-	-	-	679	846	1,160	1,400	2,470	3,040	3,191
	Filter Section	Flat - TA & Pleated 2"			60	73	83	95	99	104	106	108	115	160	185	255	315
Flat - Permanent 2"			66	79	89	101	106	114	126	135	165	240	275	390	460	560	
Flat - Pleated 4"			75	88	98	110	119	124	126	127	130	185	210	298	351	428	
High Capacity - TA & Pleated			149	168	187	206	215	224	230	234	244	260	290	360	440	535	
High Capacity - Permanent			155	176	196	216	225	234	240	244	254	365	450	520	650	790	
High Efficiency - 21" Section			82	95	112	133	133	153	175	180	194	235	248	269	330	359	
High Efficiency - 28" Section			103	121	143	170	170	196	225	224	246	296	318	345	425	463	
High Efficiency - 44" Section			127	150	173	201	201	230	264	274	299	358	380	412	516	552	
Other Accessories	Economizer			174	195	216	224	236	247	254	260	300	430	550	680	800	975
	Combination Filter & Economizer			323	363	403	430	451	471	484	494	544	690	840	1,040	1,240	1,510
	Internal Face and Bypass			52	68	79	100	115	138	148	155	180	260	350	420	520	634
	External Face and Bypass			57	75	87	110	128	155	166	175	200	286	385	462	650	793
	S Auxiliary Coil Module			129	164	204	208	223	306	280	261	310	331	362	515	640	1,305
	L Auxiliary Coil Module			157	184	257	258	305	504	497	492	563	617	648	665	820	1,499
Electric Heater			223	356	454	550	670	774	954	1,104	1,434	1,760	2,118	2,481	3,143	3,599	
Large Coils	5/8" Tube (Type 5) 10 FPI	1 Row	36	56	70	80	94	106	110	112	144	195	239	339	406	538	
		2 Row	50	80	101	120	143	164	169	173	228	318	396	562	673	891	
		3 Row	64	106	134	161	195	223	231	236	314	444	557	737	936	1,168	
		4 Row	78	132	168	202	246	282	292	299	398	569	718	913	1,199	1,445	
		6 Row	109	187	240	290	353	408	422	432	578	830	1,052	1,278	1,677	2,017	
		8 Row	141	242	311	379	461	534	552	565	760	1,092	1,385	1,638	2,154	2,589	
		10 Row	172	297	383	467	569	659	682	699	942	1,355	1,718	2,194	2,893	3,478	

(Coil weight includes the weight of water when filled)

To Estimate Weights For Other Coils	
TA = Throwaway filters AF = Airfoil Fan FC = Forward Curved Fan	For 1/2" Tube (Type A): Multiply Type 5 coil weight by 0.800 For small coil: Multiply large coil weight by 0.823
	For 14 FPI: Multiply 10 FPI coil weight by 1.121 For 12 FPI: Multiply 10 FPI coil weight by 1.065
	For 8 FPI: Multiply 10 FPI coil weight by 0.935 For 6 FPI: Multiply 10 FPI coil weight by 0.915

Air Handler Motor and Drive Weight (lbs.)	Motor Horsepower, 1800 RPM													
	1	1.5-2	3	5	7.5	10	15	20	25	30	40	50	60	75
Open Single Speed Motor	55	65	86	105	172	193	253	286	348	400	529	600	720	828
Totally Enclosed Fan Cooled (TEFC)	56	71	88	104	178	194	275	336	411	461	624	670	-	-
High Efficiency Open Single Speed	67	74	114	127	209	216	341	384	396	427	621	623	-	-
Open 2 Speed, 2 Winding	71	97	115	160	291	267	368	356	366	-	-	-	-	-
T - Frame Size	143	145	182	184	213	215	254	256	284	286	324	326	364	365

Central Station Air Handler, Shipment of Assemblies - Basic Unit	
Horizontal Style Units, Fan, Coil, Flat Filter Section	Vertical Style Units, Fan, Coil, Flat Filter Section
S, L, FO, HD Sizes 03 - 18 	We ship high capacity and high efficiency filter sections, economizers, dampers and electric heat sections separately.
S, L, FO, HD Sizes 20 - 75 	
These diagrams show typical shipments. Some set-ups may vary with certain units. Consult the factory if you require a specific assembly shipped in a special way.	V Sizes 03 - 18 
	V Sizes 20 - 41 

Quantity and Dimensions of Filters for Flat Filter Section														
Filter Dimensions	Air Handler Unit Size													
	03	06	08	10	12	14	18	20	26	34	41	50	65	75
2" x 16" x 20"	1	-	2	-	3	1	2	6	4	-	6	7	8	4
2" x 20" x 20"	1	-	-	-	3	1	2	4	8	-	12	-	20	10
2" x 16" x 25"	-	-	2	4	-	2	2	-	-	4	-	14	-	4
2" x 20" x 25"	-	2	-	-	-	2	2	-	-	8	-	-	-	10
High Capacity Filter Section														
2" x 16" x 20"	2	-	-	-	-	-	-	-	-	4	-	-	-	-
2" x 20" x 20"	2	-	-	-	-	-	-	-	-	20	-	-	-	-
2" x 16" x 25"	-	-	6	2	8	4	6	4	2	-	4	-	12	14
2" x 20" x 25"	-	4	-	4	-	4	4	6	10	-	20	30	30	35
High Efficiency Filter Section														
24" x 24"	1	2	2	2	2	3	6	4	5	10	10	15	15	20
12" x 24"	1	-	2	3	3	3	-	4	5	-	5	-	3	4

Replacement Parts - Note: Confirm the shaft diameter when ordering parts							
Sizes 03-12 Forward Curved, Fan Diameter, Type			Shaft Diameter	Bearing Part No.	Bearing Type	Shaft Part No.	Blower Assembly
03 FC	9"	Low Pressure	3/4"	4215V	Cartridge	4317Z	4317M
03 FC	9"	Med. Pressure	1"	4352N	Pillow Block	4343N	4322M
06 FC	12"	Low Pressure	1"	4350N	Cartridge	4318Z	4318M
06 FC	12"	Med. Pressure	1-3/16"	4353N	Pillow Block	4344N	4323M
08 FC	15"	Low Pressure	1"	4350N	Cartridge	4319Z	4319M
08 FC	15"	Med. Pressure	1-3/16"	4353N	Pillow Block	4345N	4324M
10 FC	18"	Low Pressure	1"	4350N	Cartridge	4320Z	4320M
10 FC	18"	Med. Pressure	1-3/16"	4353N	Pillow Block	4346N	4325M
12 FC	18"	Low Pressure	1"	4350N	Cartridge	4320Z	4320M
12 FC	18"	Med. Pressure	1-3/16"	4353N	Pillow Block	4346N	4325M

NOTES: For sizes 03-12, it is less expensive to replace the blower assembly than to replace the blower wheel. Blower assembly also includes bearings and shaft

Sizes 14-41 Forward Curved, Fan Diameter, Type			Shaft Diameter	Pillow Block Bearing	Shaft Wheel	Blower Wheel	Blower Cut-Off
14 FC	20"	Low Pressure	1-3/16"	4353N	4342N	5154E	Part of housing
14 FC	20"	Med. Pressure	1-3/16"	4353N	4342N	5154E	Part of housing
18 FC	20"	Low Pressure	1-3/16"	4353N	4342N	5154E	Part of housing
18 FC	20"	Med. Pressure	1-3/16"	4353N	4342N	5154E	Part of housing
20 FC	22"	Med. Pressure	1-7/16"	5562N	4522R	5153E	4418T
26 FC	22"	Med. Pressure	1-7/16"	5562N	4522R	5153E	4418T
34 FC	25"	Med. Pressure	1-11/16"	5563N	4525R	5179D	4419T
41 FC	30"	Med. Pressure	1-15/16"	5564N	4500S	5178D	4421T

NOTES: For sizes 14-41 forward curved fans, it is less expensive to replace the blower wheel than to replace the blower assembly

Sizes 26-75, Air Foils Unit Size, Fan Diameter, Type			Shaft Diameter	Pillow Block Bearing
20 AF	18-1/4"	Med. Pressure	1-7/16"	5562N
26 AF	18-1/4"	Med. Pressure	1-7/16"	5562N
34 AF	24-1/2"	Med. Pressure	1-15/16"	5564N
41 AF	30"	Med. Pressure	2-3/16"	5521T
50 AF	32-3/8"	Med. Pressure	2-7/16"	5597T
65 AF	39-3/8"	Med. Pressure	2-11/16"	5875E
75 AF	39-3/8"	Med. Pressure	2-11/16"	5875E

### Air Foil Note:

For size 41-75 air foils and parts other than bearing replacement, call the parts department, 800-686-7278, with air handler model number and discharge arrangement.

Heatcraft Refrigeration Products can then advise the correct blower assembly description for you.

Visit our website at [www.heatcraftprd.com](http://www.heatcraftprd.com) for technical literature online.

Heatcraft Refrigeration Products LLC

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Since product improvement is a continuing effort, we reserve the right to make changes in specifications without notice.