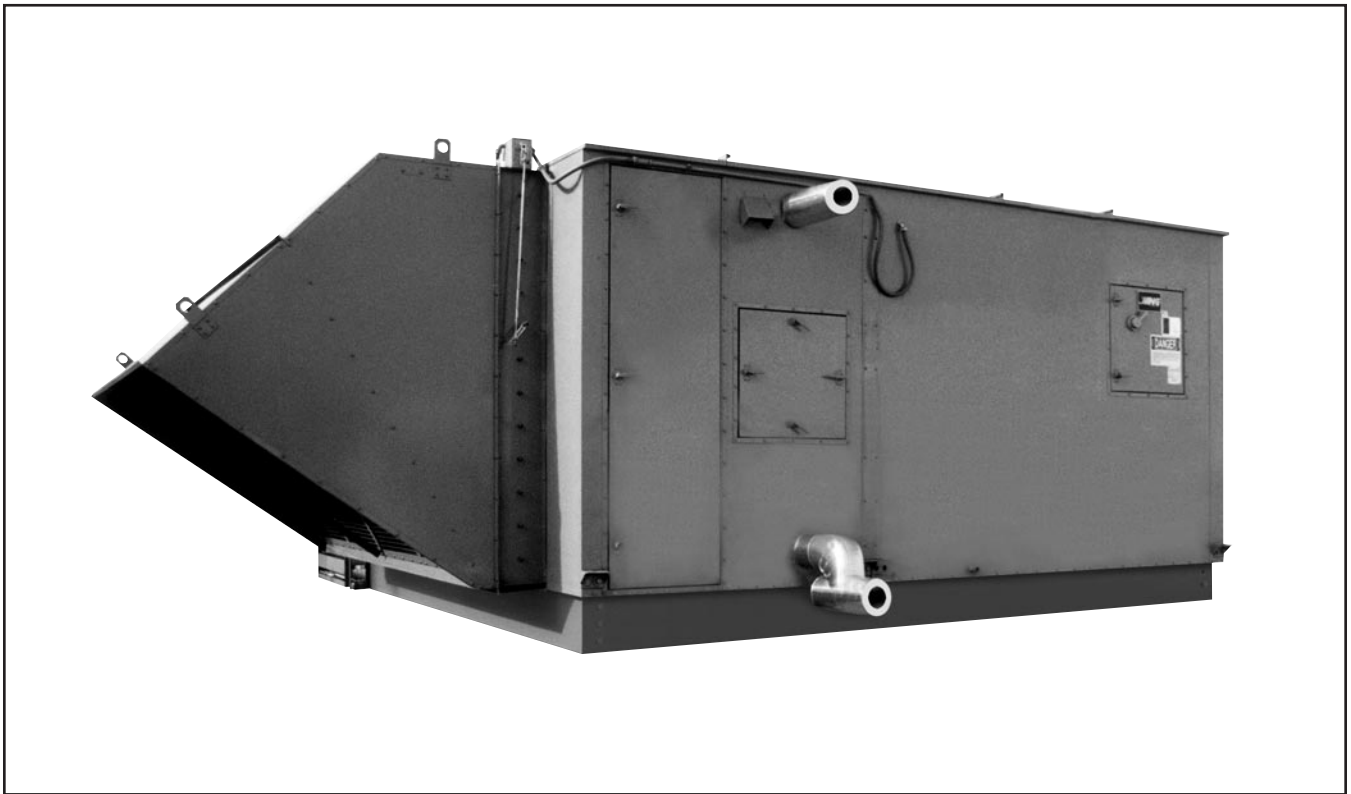


SAS Steadyair Make-Up Air Units Technical Guide



**A COMPLETE AIR TEMPERING PACKAGE FOR COMMERCIAL,
INSTITUTIONAL, AND INDUSTRIAL APPLICATIONS**

LJ  ING®

Since 1875, the L.J. Wing Company has been a leader in providing innovative solutions for difficult HVAC problems. The Steadyair make-up air unit (or SAS) combines the freeze-protection benefits of the Wing integral face and bypass coil with dependable air delivery in a single-source package. This technical guide will help you size, select and specify the proper SAS model to satisfy your project's make-up air preheating requirements. If you have questions, please contact your local L.J. Wing representative; he will be glad to assist you.



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www.ljwing.com

In the interest of product improvement, L.J. Wing reserves the right to make changes without notice.

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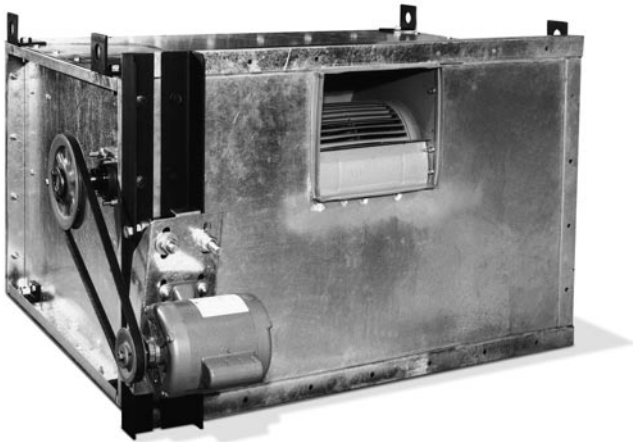
GENERAL INFORMATION

L.J. Wing's Steadyair heating and ventilating modular package provides the user with new levels of operating reliability, system flexibility, maintenance convenience and overall savings.

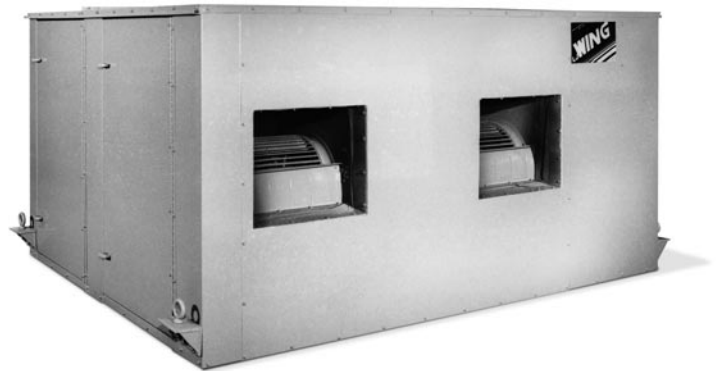
It features all the advantages of Wing's popular IFB Series of horizontal tube integral face and bypass coils – constant volume, positive freeze protection, accurate temperature control, elimination of stratification, and single source responsibility. The high quality standards of Wing are reflected in every component of the Steadyair – integral face and bypass coils, centrifugal fan, intake hood, filter box, mixing box, and other accessories.

Maintaining Wing's high standard of design and desire to satisfy the customer's needs, the SAS is designed specifically for either indoor or outdoor applications.

The modular design provides the user with system flexibility. Wing's Steadyair is readily adapted to existing ductwork, new construction, and rooftop or truss mounting. When fitted with one of Wing's unique optional vertical discharges, costly ductwork runs can be eliminated to significantly reduce installation costs. In total, the Steadyair is an ideal air handling solution for today's industrial, commercial and institutional needs.



Indoor



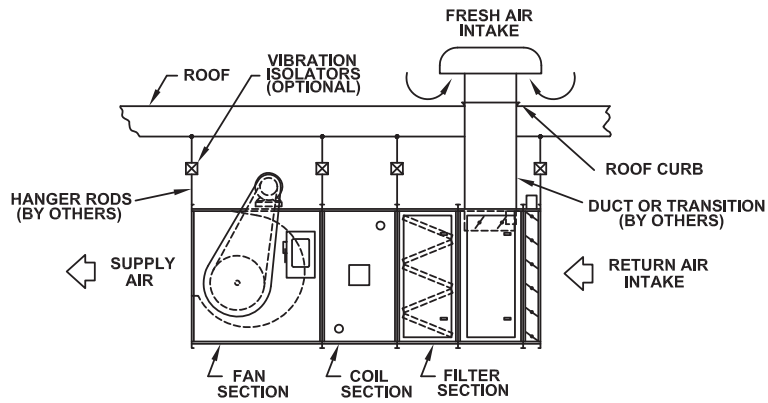
Outdoor

INSTALLATION

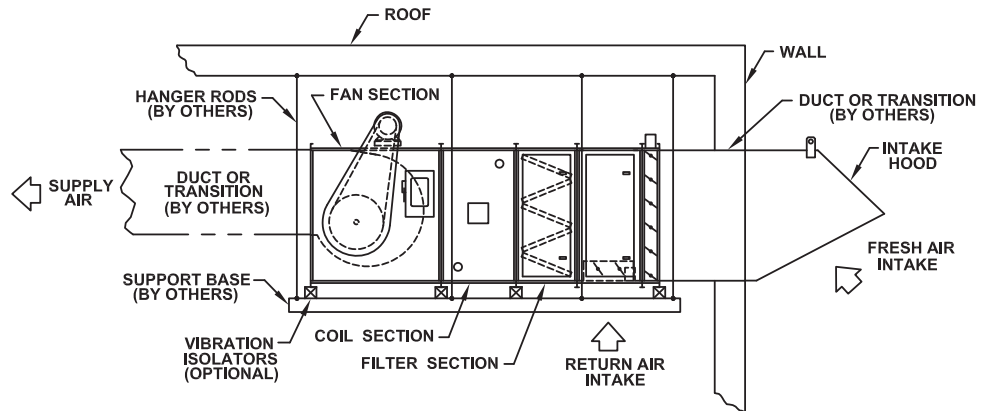
Typical Installation Arrangements

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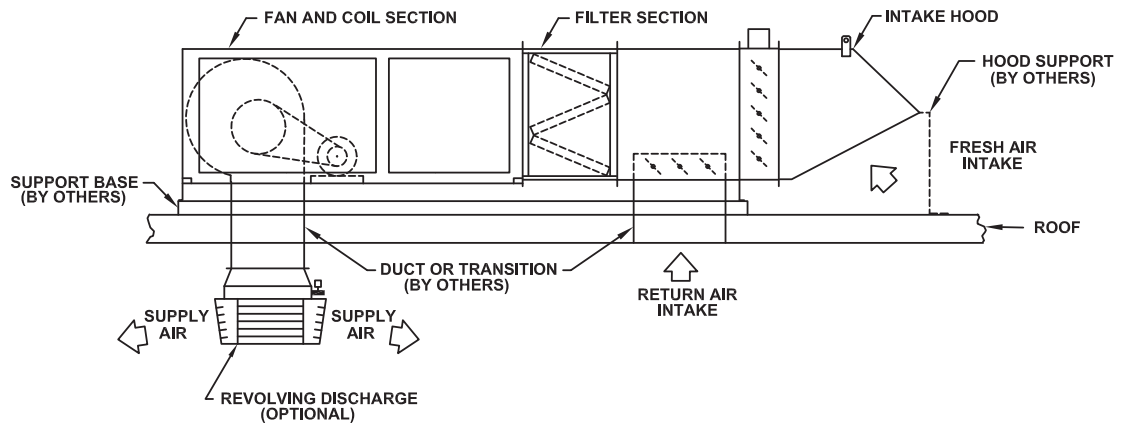
INDOOR CEILING SUSPENDED UNIT



INDOOR BASE SUPPORTED UNIT



OUTDOOR ROOF MOUNTED UNIT



NOTES

1. VIBRATION ISOLATORS ARE RECOMMENDED FOR ALL INSTALLATIONS.
2. FLEXIBLE DUCT AND PIPING CONNECTIONS ARE REQUIRED AS PART OF A COMPLETE VIBRATION ISOLATION SYSTEM.
3. SUPPORT BASE, HANGER RODS, FLEXIBLE PIPING AND DUCT CONNECTIONS TO BE PROVIDED BY OTHERS.

UNIT SELECTION

Selection Procedure and Example

Selection Procedure

Given:

- Indoor or outdoor application.
- Airflow rate at standard conditions of 70 degrees F at sea level.
- Entering Air Temperature, EAT, in degrees F.
- Desired Leaving Air Temperature, LAT desired, in degrees F.
- Steam pressure in psig or Hot Water Entering Temperature, EWT, in degrees F and Water Flow Rate, GPM.
- External Static pressure, ESP, in inches.
- Electrical Service characteristics in volts/phase/hertz.
- Desired optional accessories.
- Controls handing and discharge direction.

Procedure:

1. Select SAS model size from Unit Selection Table on page 7. In many instances, more than one model will be applicable.
2. Determine IFB coil performance using the Wing Specifier program.
3. Determine system total static pressure requirement as the sum of the given External Static Pressure, the IFB coil air pressure drop, and the static pressure drop losses from the AIR Pressure Drop for Optional Accessories Table below for any optional accessories.
4. Using the given standard airflow rate, the SAS model number from Step 1, and the total static pressure, TSP, calculated in Step 3, look up the required motor horsepower from the Fan Performance tables on pages 8-11.
5. Look up the last three letters of the model number from the Model Number Description shown on page 7 based on the given coil handing and discharge direction.

Air Pressure Drop for Optional Accessories

Item	Static Pressure Loss (inches w.c.)
Intake hood with birdscreen	0.13
Motorized inlet damper	0.13
Mixing dampers	0.13
V-Bank filter section	0.25
Vertical discharges	See tables, pages 22-23
Discharge louvers	0.25

Example:

Given:

- Outdoor application.
- Standard airflow = 6,000 scfm.
- EAT = -8 degrees F.
- Desired LAT = 70 degrees F.
- Steam pressure = 15 psig.
- ESP = 0.40 inches w.c.
- Electrical Service = 230volt/3 phase/60 Hz.
- Optional accessories: Intake hood, type 8R discharge.
- Right hand controls and bottom discharge.

Procedure:

1. From Unit Selection Table, it can be seen that either a model SAS(W)-115 or SAS(W)-118 will be applicable. Let us select the larger model, SAS(W)-118, to yield lower pressure drops and lower operating costs.
2. From Wing Specifier, model C-42 with 11 fpi:
 - LAT = 70.1 degrees F.
 - APD = 0.33 inches w.c.
 - Q = 503,440 Btuh.
 - CL = 532.7 lbm/hr
3. From Table 3 for intake hood: S.P. = 0.13 inches w.c.
 From the Optional Vertical Discharge Selection Coil Performance Table on page 23 for a SAS(W)-118 handling 6,000 scfm equipped with a type 8R discharge:
 - S.P. = 0.14 inches w.c.
 - Totalling the S.P. losses:

$$T.S.P. = 0.40 + 0.13 + 0.14 + 0.33 = 1.00 \text{ inches w.c.}$$
4. From the Fan Performance Table on page 10 for an SAS(W) – 118 with an airflow rate of 6,000 scfm and TSP = 1.00 inches w.c., a 2 HP motor is required.
5. From the Model Number Description it can be seen that the proper designation is HRB for right hand controls and bottom discharge. The complete model number for the unit selected is therefore SAS(W)-118-HRB.

UNIT SELECTION

Unit Selection Table

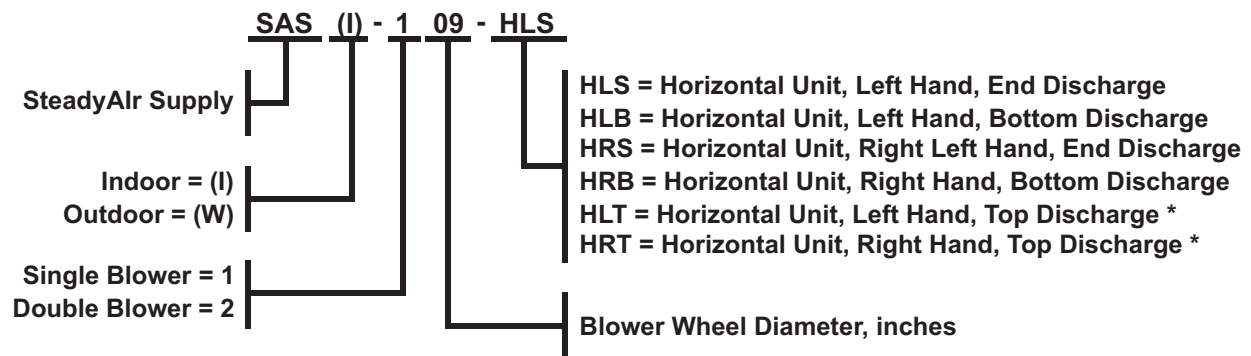
INDOOR UNITS - SAS(I)

	UNIT MODEL NO. (-)	MINIMUM AIRFLOW (CFM)	MAXIMUM AIRFLOW (CFM)	COIL MODEL NO. (-)
Single Blower	SAS(I)-109	1,000	3,000	B-36
	SAS(I)-112	2,000	4,250	B-36
	SAS(I)-115	3,000	6,000	C-42
	SAS(I)-118	4,000	8,000	C-42
	SAS(I)-120	6,000	11,000	E-54
	SAS(I)-122	11,000	16,000	E-54
	SAS(I)-125	14,000	20,000	F-66
Double Blower	SAS(I)-218	8,000	16,000	C-84
	SAS(I)-220	12,000	26,000	E-114
	SAS(I)-222	22,000	31,000	E-114
	SAS(I)-225	28,000	40,000	F-120

OUTDOOR UNITS - SAS(W)

	UNIT MODEL NO. (-)	MINIMUM AIRFLOW (CFM)	MAXIMUM AIRFLOW (CFM)	COIL MODEL NO. (-)
Single Blower	SAS(W)-109	1,000	3,000	A-36
	SAS(W)-112	2,000	3,750	A-36
	SAS(W)-115	3,000	6,000	C-42
	SAS(W)-118	4,000	8,000	C-42
Double Blower	SAS(W)-215	6,000	12,000	C-60
	SAS(W)-220	12,000	26,000	E-96
	SAS(W)-222	22,000	31,000	E-108
	SAS(W)-225	28,000	35,000	E-120

Model Number Description



* Configuration available on indoor units only

FAN PERFORMANCE

Single Blower Indoor Units

Model	SCFM	SFPM	Total Static Pressure (inches)									
			0.250	0.375	0.500	0.750	1.000	1.250	1.500	2.000	2.500	3.000
			Motor HP									
109	1,000	1,196	1/2	1/2	1/2	-	-	-	-	-	-	-
	1,250	1,495	1/2	1/2	1/2	1/2	1/2	-	-	-	-	-
	1,500	1,794	1/2	1/2	1/2	3/4	3/4	3/4	1	-	-	-
	1,750	2,093	1/2	1/2	3/4	3/4	3/4	1	1	1 1/2	-	-
	2,000	2,392	3/4	3/4	3/4	1	1	1 1/2	1 1/2	1 1/2	2	-
	2,250	2,691	1	1	1	1	1 1/2	1 1/2	1 1/2	2	3	3
	2,500	2,990	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	2	2	3	3
	2,750	3,289	1 1/2	1 1/2	1 1/2	2	2	2	2	3	3	3
	3,000	3,589	2	2	2	2	2	3	3	3	3	5
112	2,000	1,389	1/2	1/2	1/2	3/4	3/4	1	1	-	-	-
	2,250	1,563	1/2	1/2	1/2	3/4	3/4	1	1 1/2	1 1/2	-	-
	2,500	1,736	1/2	3/4	3/4	3/4	1	1	1 1/2	1 1/2	2	-
	2,750	1,910	3/4	3/4	3/4	1	1	1 1/2	1 1/2	2	2	3
	3,000	2,083	3/4	3/4	1	1	1 1/2	1 1/2	1 1/2	2	3	3
	3,250	2,257	1	1	1	1 1/2	1 1/2	1 1/2	2	2	3	3
	3,500	2,431	1	1 1/2	1 1/2	1 1/2	1 1/2	2	2	3	3	3
	3,750	2,604	1 1/2	1 1/2	1 1/2	1 1/2	2	2	3	3	3	5
	4,000	2,778	1 1/2	1 1/2	2	2	2	3	3	3	5	5
4,250	2,951	2	2	2	2	3	3	3	3	5	5	
115	3,000	1,493	1/2	3/4	3/4	3/4	1	1 1/2	1 1/2	-	-	-
	3,250	1,617	1/2	3/4	3/4	1	1	1 1/2	1 1/2	-	-	-
	3,500	1,741	3/4	3/4	3/4	1	1 1/2	1 1/2	2	2	-	-
	3,750	1,866	3/4	3/4	1	1 1/2	1 1/2	1 1/2	2	3	3	-
	4,000	1,990	1	1	1	1 1/2	1 1/2	2	2	3	3	-
	4,250	2,114	1	1	1 1/2	1 1/2	1 1/2	2	2	3	3	5
	4,500	2,239	1 1/2	1 1/2	1 1/2	1 1/2	2	2	3	3	5	5
	4,750	2,363	1 1/2	1 1/2	1 1/2	2	2	2	3	3	5	5
	5,000	2,488	1 1/2	1 1/2	1 1/2	2	2	3	3	3	5	5
	5,250	2,612	2	2	2	2	3	3	3	5	5	5
	5,500	2,736	2	2	2	3	3	3	3	5	5	5
	5,750	2,861	2	2	3	3	3	3	5	5	5	5
6,000	2,985	3	3	3	3	3	5	5	5	5	7 1/2	
118	4,000	1,394	3/4	3/4	1	1 1/2	1 1/2	2	2	-	-	-
	4,500	1,569	3/4	1	1	1 1/2	1 1/2	2	3	3	-	-
	5,000	1,742	1	1	1 1/2	1 1/2	2	2	3	3	5	-
	5,500	1,916	1	1 1/2	1 1/2	2	2	3	3	5	5	5
	6,000	2,090	1 1/2	1 1/2	2	2	3	3	3	5	5	7 1/2
	6,500	2,265	1 1/2	2	2	3	3	3	5	5	5	7 1/2
	7,000	2,439	2	2	3	3	3	5	5	5	7 1/2	7 1/2
	7,500	2,613	3	3	3	3	5	5	5	5	7 1/2	7 1/2
8,000	2,787	3	3	3	5	5	5	5	7 1/2	7 1/2	7 1/2	
120	6,000	1,429	1	1	1 1/2	1 1/2	2	3	3	-	-	-
	7,000	1,667	1 1/2	1 1/2	1 1/2	2	3	3	3	5	-	-
	8,000	1,905	2	2	2	3	3	5	5	5	7 1/2	-
	9,000	2,143	2	3	3	3	5	5	5	7 1/2	7 1/2	7 1/2
	10,000	2,381	3	3	5	5	5	5	5	7 1/2	7 1/2	10
	11,000	2,619	5	5	5	5	5	7 1/2	7 1/2	7 1/2	10	10
122	11,000	2,156	3	3	5	5	5	5	7 1/2	7 1/2	10	10
	12,000	2,353	5	5	5	5	5	7 1/2	7 1/2	10	10	15
	13,000	2,549	5	5	5	7 1/2	7 1/2	7 1/2	7 1/2	10	10	15
	14,000	2,745	5	7 1/2	7 1/2	7 1/2	7 1/2	7 1/2	10	10	15	15
	15,000	2,941	7 1/2	7 1/2	7 1/2	7 1/2	10	10	10	15	15	15
	16,000	3,137	7 1/2	7 1/2	10	10	10	10	15	15	15	20

FAN PERFORMANCE

Single and Double Blower Indoor Units

Model	SCFM	SFPM	Total Static Pressure (inches)									
			0.250	0.375	0.500	0.750	1.000	1.250	1.500	2.000	2.500	3.000
			Motor HP									
125	14,000	2,086	3	3	5	5	5	7 1/2	7 1/2	10	10	-
	15,000	2,236	5	5	5	5	7 1/2	7 1/2	7 1/2	10	15	15
	16,000	2,385	5	5	5	7 1/2	7 1/2	7 1/2	10	10	15	15
	17,000	2,534	5	5	5	7 1/2	7 1/2	10	10	15	15	15
	18,000	2,683	5	7 1/2	7 1/2	7 1/2	10	10	10	15	15	20
	19,000	2,832	7 1/2	7 1/2	7 1/2	7 1/2	10	10	15	15	15	20
	20,000	2,981	7 1/2	7 1/2	7 1/2	10	10	15	15	15	20	20
218	8,000	1,394	1	1 1/2	1 1/2	2	3	3	5	-	-	-
	9,000	1,568	1 1/2	2	2	3	3	5	5	7 1/2	-	-
	10,000	1,742	2	2	3	3	5	5	5	7 1/2	7 1/2	-
	11,000	1,916	2	3	3	5	5	5	7 1/2	7 1/2	10	10
	12,000	2,091	3	3	3	5	5	7 1/2	7 1/2	7 1/2	10	15
	13,000	2,265	3	5	5	5	5	7 1/2	7 1/2	7 1/2	10	15
	14,000	2,439	5	5	5	5	7 1/2	7 1/2	7 1/2	10	15	15
	15,000	2,613	5	5	5	7 1/2	7 1/2	7 1/2	10	10	15	15
220	16,000	2,787	5	7 1/2	7 1/2	7 1/2	7 1/2	10	10	15	15	15
	12,000	1,429	2	2	3	3	5	5	7 1/2	-	-	-
	13,000	1,548	3	3	3	5	5	5	7 1/2	-	-	-
	14,000	1,667	3	3	3	5	5	7 1/2	7 1/2	10	-	-
	15,000	1,786	3	3	5	5	5	7 1/2	7 1/2	10	15	-
	16,000	1,905	3	5	5	5	7 1/2	7 1/2	7 1/2	10	15	-
	17,000	2,024	5	5	5	5	7 1/2	7 1/2	10	10	15	15
	18,000	2,143	5	5	5	7 1/2	7 1/2	7 1/2	10	15	15	15
	19,000	2,262	5	7 1/2	7 1/2	7 1/2	7 1/2	10	10	15	15	20
	20,000	2,381	7 1/2	7 1/2	7 1/2	7 1/2	10	10	10	15	15	20
	21,000	2,500	7 1/2	7 1/2	7 1/2	10	10	10	15	15	20	20
	22,000	2,619	7 1/2	7 1/2	7 1/2	10	10	15	15	15	20	20
	23,000	2,738	7 1/2	10	10	10	15	15	15	15	20	20
222	24,000	2,857	10	10	10	15	15	15	15	20	20	25
	25,000	2,976	10	10	15	15	15	15	15	20	20	25
	26,000	3,095	10	15	15	15	15	15	20	20	25	25
	22,000	2,157	7 1/2	7 1/2	7 1/2	7 1/2	10	10	15	15	20	20
	23,000	2,255	7 1/2	7 1/2	7 1/2	10	10	15	15	15	20	20
	24,000	2,353	7 1/2	7 1/2	7 1/2	10	10	15	15	15	20	25
	25,000	2,451	7 1/2	10	10	10	15	15	15	20	20	25
	26,000	2,549	10	10	10	15	15	15	15	20	20	25
	27,000	2,647	10	10	10	15	15	15	20	20	25	25
	28,000	2,745	10	15	15	15	15	15	20	20	25	30
29,000	2,843	15	15	15	15	15	20	20	25	25	30	
30,000	2,941	15	15	15	15	20	20	20	25	25	30	
31,000	3,039	15	15	15	20	20	20	25	25	30	30	
225	28,000	2,086	7 1/2	7 1/2	7 1/2	10	10	15	15	20	20	-
	29,000	2,161	7 1/2	7 1/2	7 1/2	10	15	15	15	20	20	25
	30,000	2,235	7 1/2	7 1/2	7 1/2	10	15	15	15	20	25	25
	31,000	2,310	7 1/2	7 1/2	10	10	15	15	15	20	25	30
	32,000	2,385	7 1/2	10	10	15	15	15	20	20	25	30
	33,000	2,459	10	10	10	15	15	15	20	20	25	30
	34,000	2,534	10	10	10	15	15	20	20	25	25	30
	35,000	2,608	10	10	15	15	15	20	20	25	30	30
	36,000	2,683	10	15	15	15	20	20	20	25	30	30
	37,000	2,757	15	15	15	15	20	20	20	25	30	40
	38,000	2,832	15	15	15	15	20	20	20	25	30	40
	39,000	2,906	15	15	15	20	20	20	25	25	30	40
40,000	2,981	15	15	15	20	20	20	25	30	40	40	

FAN PERFORMANCE

Single Blower Outdoor Units

Model	SCFM	SFPM	Total Static Pressure (inches)									
			0.250	0.375	0.500	0.750	1.000	1.250	1.500	2.000	2.500	3.000
			Motor HP									
109	1,000	1,196	1/2	1/2	1/2	-	-	-	-	-	-	-
	1,250	1,495	1/2	1/2	1/2	1/2	1/2	-	-	-	-	-
	1,500	1,794	1/2	1/2	1/2	3/4	3/4	3/4	1	-	-	-
	1,750	2,093	1/2	1/2	3/4	3/4	3/4	1	1	1 1/2	-	-
	2,000	2,392	3/4	3/4	3/4	1	1	1 1/2	1 1/2	1 1/2	2	-
	2,250	2,691	1	1	1	1	1 1/2	1 1/2	1 1/2	2	3	3
	2,500	2,990	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	2	2	3	3
	2,750	3,289	1 1/2	1 1/2	1 1/2	2	2	2	2	3	3	3
	3,000	3,589	2	2	2	2	2	3	3	3	3	5
112	2,000	1,389	1/2	1/2	1/2	3/4	3/4	1	1	-	-	-
	2,250	1,563	1/2	1/2	1/2	3/4	3/4	1	1 1/2	1 1/2	-	-
	2,500	1,736	1/2	3/4	3/4	3/4	1	1	1 1/2	1 1/2	2	-
	2,750	1,910	3/4	3/4	3/4	1	1	1 1/2	1 1/2	2	2	3
	3,000	2,083	3/4	3/4	1	1	1 1/2	1 1/2	1 1/2	2	3	3
	3,250	2,257	1	1	1	1 1/2	1 1/2	1 1/2	2	2	3	3
	3,500	2,431	1	1 1/2	1 1/2	1 1/2	1 1/2	2	2	3	3	3
	3,750	2,604	1 1/2	1 1/2	1 1/2	1 1/2	2	2	3	3	3	5
	4,000	2,778	1 1/2	1 1/2	2	2	2	3	3	3	5	5
4,250	2,951	2	2	2	2	3	3	3	3	5	5	
115	3,000	1,493	1/2	3/4	3/4	3/4	1	1 1/2	1 1/2	-	-	-
	3,250	1,617	1/2	3/4	3/4	1	1	1 1/2	1 1/2	-	-	-
	3,500	1,741	3/4	3/4	3/4	1	1 1/2	1 1/2	2	2	-	-
	3,750	1,866	3/4	3/4	1	1 1/2	1 1/2	1 1/2	2	3	3	-
	4,000	1,990	1	1	1	1 1/2	1 1/2	2	2	3	3	-
	4,250	2,114	1	1	1 1/2	1 1/2	1 1/2	2	2	3	3	5
	4,500	2,239	1 1/2	1 1/2	1 1/2	1 1/2	2	2	3	3	5	5
	4,750	2,363	1 1/2	1 1/2	1 1/2	2	2	2	3	3	5	5
	5,000	2,488	1 1/2	1 1/2	1 1/2	2	2	3	3	3	5	5
	5,250	2,612	2	2	2	2	3	3	3	5	5	5
	5,500	2,736	2	2	2	3	3	3	3	5	5	5
5,750	2,861	2	2	3	3	3	3	5	5	5	5	
6,000	2,985	3	3	3	3	3	5	5	5	5	7 1/2	
118	4,000	1,394	3/4	3/4	1	1 1/2	1 1/2	2	2	-	-	-
	4,500	1,569	3/4	1	1	1 1/2	1 1/2	2	3	3	-	-
	5,000	1,742	1	1	1 1/2	1 1/2	2	2	3	3	5	-
	5,500	1,916	1	1 1/2	1 1/2	2	2	3	3	5	5	5
	6,000	2,090	1 1/2	1 1/2	2	2	3	3	3	5	5	7 1/2
	6,500	2,265	1 1/2	2	2	3	3	3	5	5	5	7 1/2
	7,000	2,439	2	2	3	3	3	5	5	5	7 1/2	7 1/2
	7,500	2,613	3	3	3	3	5	5	5	5	7 1/2	7 1/2
8,000	2,787	3	3	3	5	5	5	5	7 1/2	7 1/2	7 1/2	

FAN PERFORMANCE

Double Blower Outdoor Units

Model	SCFM	SFPM	Total Static Pressure (inches)									
			0.250	0.375	0.500	0.750	1.000	1.250	1.500	2.000	2.500	3.000
215	6,000	1,493	1	1	1 1/2	1 1/2	2	3	3	-	-	-
	6,500	1,617	1	1 1/2	1 1/2	2	2	3	3	-	-	-
	7,000	1,741	1 1/2	1 1/2	1 1/2	2	3	3	3	5	-	-
	7,500	1,866	1 1/2	1 1/2	2	2	3	3	5	5	7 1/2	-
	8,000	1,990	1 1/2	2	2	3	3	3	5	5	7 1/2	-
	8,500	2,114	2	2	2	3	3	5	5	5	7 1/2	7 1/2
	9,000	2,239	2	3	3	3	5	5	5	7 1/2	7 1/2	7 1/2
	9,500	2,363	3	3	3	3	5	5	5	7 1/2	7 1/2	10
	10,000	2,488	3	3	3	5	5	5	5	7 1/2	7 1/2	10
	10,500	2,612	3	5	5	5	5	5	7 1/2	7 1/2	7 1/2	10
	11,000	2,736	5	5	5	5	5	7 1/2	7 1/2	7 1/2	10	10
	11,500	2,861	5	5	5	5	5	7 1/2	7 1/2	7 1/2	10	10
12,000	2,985	5	5	5	5	7 1/2	7 1/2	7 1/2	10	10	15	
220	12,000	1,429	2	2	3	3	5	5	7 1/2	-	-	-
	13,000	1,548	3	3	3	5	5	5	7 1/2	-	-	-
	14,000	1,667	3	3	3	5	5	7 1/2	7 1/2	10	-	-
	15,000	1,786	3	3	5	5	5	7 1/2	7 1/2	10	15	-
	16,000	1,905	3	5	5	5	7 1/2	7 1/2	7 1/2	10	15	-
	17,000	2,024	5	5	5	5	7 1/2	7 1/2	10	10	15	15
	18,000	2,143	5	5	5	7 1/2	7 1/2	7 1/2	10	15	15	15
	19,000	2,262	5	7 1/2	7 1/2	7 1/2	7 1/2	10	10	15	15	20
	20,000	2,381	7 1/2	7 1/2	7 1/2	7 1/2	10	10	10	15	15	20
	21,000	2,500	7 1/2	7 1/2	7 1/2	10	10	10	15	15	20	20
	22,000	2,619	7 1/2	7 1/2	7 1/2	10	10	15	15	15	20	20
	23,000	2,738	7 1/2	10	10	10	15	15	15	15	20	20
24,000	2,857	10	10	10	15	15	15	15	20	20	25	
25,000	2,976	10	10	15	15	15	15	15	20	20	25	
26,000	3,095	10	15	15	15	15	15	20	20	25	25	
222	22,000	2,157	7 1/2	7 1/2	7 1/2	7 1/2	10	10	15	15	20	20
	23,000	2,255	7 1/2	7 1/2	7 1/2	10	10	15	15	15	20	20
	24,000	2,353	7 1/2	7 1/2	7 1/2	10	10	15	15	15	20	25
	25,000	2,451	7 1/2	10	10	10	15	15	15	20	20	25
	26,000	2,549	10	10	10	15	15	15	15	20	20	25
	27,000	2,647	10	10	10	15	15	15	20	20	25	25
	28,000	2,745	10	15	15	15	15	15	20	20	25	30
	29,000	2,843	15	15	15	15	15	20	20	25	25	30
	30,000	2,941	15	15	15	15	20	20	20	25	25	30
	31,000	3,039	15	15	15	20	20	20	25	25	30	30
225	28,000	2,086	7 1/2	7 1/2	7 1/2	10	10	15	15	20	20	-
	29,000	2,161	7 1/2	7 1/2	7 1/2	10	15	15	15	20	20	25
	30,000	2,235	7 1/2	7 1/2	7 1/2	10	15	15	15	20	25	25
	31,000	2,310	7 1/2	7 1/2	10	10	15	15	15	20	25	30
	32,000	2,385	7 1/2	10	10	15	15	15	20	20	25	30
	33,000	2,459	10	10	10	15	15	15	20	20	25	30
	34,000	2,534	10	10	10	15	15	20	20	25	25	30
	35,000	2,608	10	10	15	15	15	20	20	25	30	30

DIMENSIONS

Single Blower Indoor Units

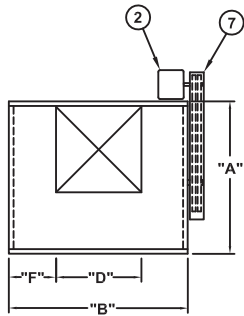
C000604

UNIT COMPONENTS

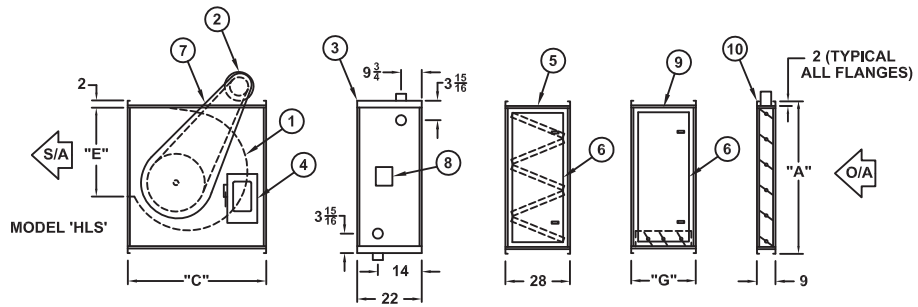
1. CENTRIFUGAL SUPPLY FAN
2. FAN MOTOR
3. HEATING COIL - STEAM OR HOT WATER

4. CONTROL LOCATION
5. V-BANK FILTER SECTION
6. HINGED ACCESS DOOR
7. BELT GUARD

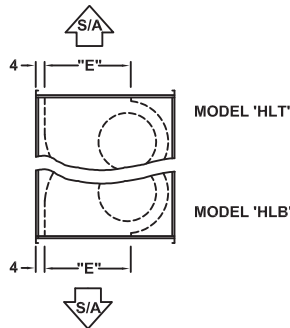
8. FACE AND BYPASS DAMPER CONTROL LOCATION
9. RETURN AIR SECTION
10. OUTSIDE AIR DAMPER



END VIEW



FRONT VIEW



NOTES

1. ON UNITS PROVIDED WITH A DOUBLE SECTION COIL, THE STEAM OR HOT WATER HEATING COIL LENGTH INCREASES FROM 22" TO 38 1/2" AND THE SUPPLY AND RETURN CONNECTIONS DOUBLE.
2. LEFT HAND UNIT SHOWN. RIGHT HAND UNIT OPPOSITE FROM SHOWN UNIT.
3. MODELS 109, 112, 115, 118, 120 AND 122 HAVE SIDE HEATING COIL CONNECTIONS.
4. MODEL 125 HAS TOP AND BOTTOM HEATING COIL CONNECTIONS.
5. ALL DIMENSIONS ARE IN INCHES.

SAS MODEL	IFB MODEL	DIMENSIONS						
		A	B	C	D	E	F	G
109	B-36	29	45	33	11 ¹³ / ₁₆	10 ¹ / ₄	16 ⁵ / ₈	28
112	B-36	29	45	33	15 ¹³ / ₁₆	13 ⁷ / ₁₆	14 ⁵ / ₈	28
115	C-42	37 ¹ / ₄	51	43	18 ¹⁵ / ₁₆	15 ⁷ / ₈	16 ¹ / ₈	43
118	C-42	37 ¹ / ₄	51	43	21 ¹⁵ / ₁₆	18 ⁷ / ₈	14 ⁹ / ₁₆	43
120	E-54	54	60	52	24 ¹⁵ / ₁₆	24 ³ / ₄	17 ⁹ / ₁₆	52
122	E-54	54	60	52	27 ⁷ / ₁₆	27 ¹ / ₄	16 ⁵ / ₁₆	52
125	F-66	66	72	60	31 ³ / ₈	31 ¹ / ₄	20 ⁵ / ₁₆	52

DIMENSIONS

Double Blower Indoor Units

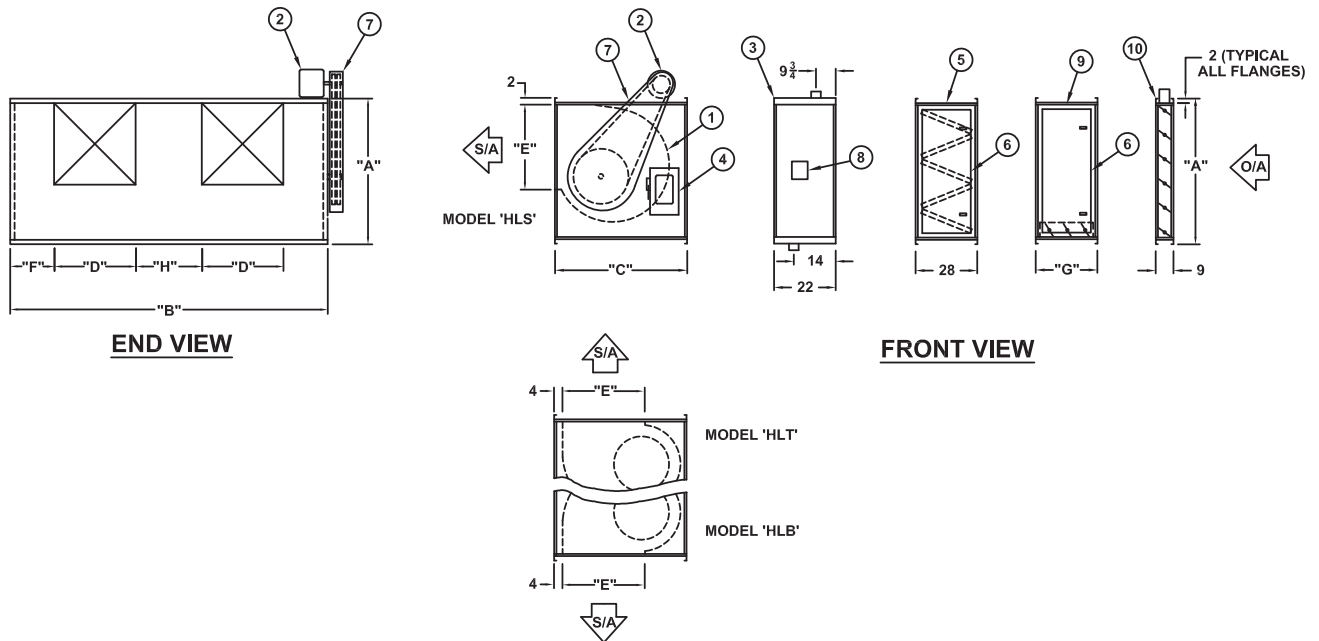
C000605A

UNIT COMPONENTS

1. CENTRIFUGAL SUPPLY FAN
2. FAN MOTOR
3. HEATING COIL - STEAM OR HOT WATER

4. CONTROL LOCATION
5. V-BANK FILTER SECTION
6. HINGED ACCESS DOOR
7. BELT GUARD

8. FACE AND BYPASS DAMPER CONTROL LOCATION
9. RETURN AIR SECTION
10. OUTSIDE AIR DAMPER



NOTES

1. ON UNITS PROVIDED WITH A DOUBLE SECTION COIL, THE STEAM OR HOT WATER HEATING COIL LENGTH INCREASES FROM 22" TO 38 1/2" AND THE SUPPLY AND RETURN CONNECTIONS DOUBLE.
2. LEFT HAND UNIT SHOWN, RIGHT HAND UNIT OPPOSITE FROM SHOWN UNIT.
3. MODELS 218, 220, 222 AND 225 HAVE TOP AND BOTTOM HEATING COIL CONNECTIONS.
4. ALL DIMENSIONS ARE IN INCHES.

SAS MODEL	IFB MODEL	DIMENSIONS							
		A	B	C	D	E	F	G	H
218	C-84	37 $\frac{1}{4}$	93	43	21 $\frac{15}{16}$	18 $\frac{7}{8}$	13 $\frac{5}{16}$	43	22 $\frac{1}{2}$
220	E-114	54	120	52	24 $\frac{15}{16}$	24 $\frac{3}{4}$	20 $\frac{1}{4}$	52	29 $\frac{5}{8}$
222	E-114	54	120	52	27 $\frac{7}{16}$	27 $\frac{1}{4}$	17 $\frac{3}{4}$	52	29 $\frac{5}{8}$
225	F-120	66	144	60	31 $\frac{3}{8}$	31 $\frac{1}{4}$	21 $\frac{13}{16}$	52	37 $\frac{5}{8}$

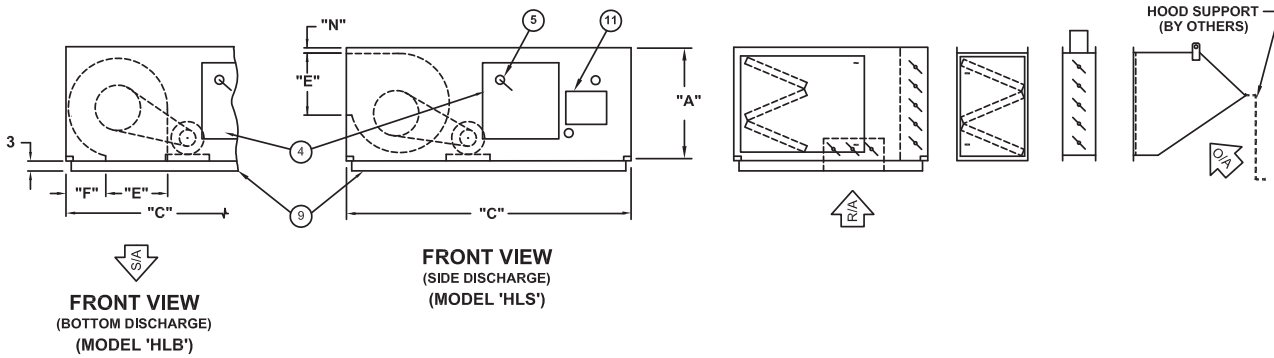
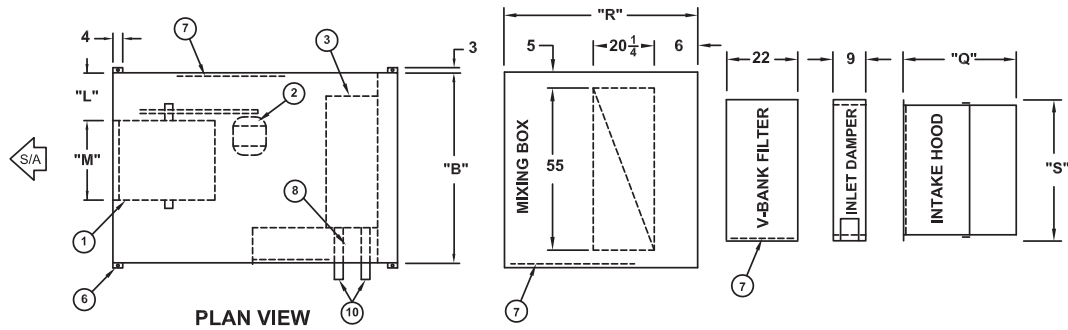
DIMENSIONS

Single Blower Outdoor Units

C000601

UNIT COMPONENTS

- | | | |
|--------------------------------------|---------------------------------------|--|
| 1. CENTRIFUGAL SUPPLY FAN | 4. CONTROL CABINET | 8. FACE AND BYPASS DAMPER CONTROL LOCATION |
| 2. FAN MOTOR | 5. HINGED CONTROL CABINET ACCESS DOOR | 9. UNIT BASE |
| 3. HEATING COIL - STEAM OR HOT WATER | 6. REMOVABLE LIFTING LUG | 10. SUPPLY AND RETURN CONNECTIONS |
| | 7. HINGED ACCESS DOOR | 11. COIL ACTUATOR ACCESS PANEL |



NOTES

- ON UNITS PROVIDED WITH A DOUBLE SECTION COIL, ADD 16" TO DIMENSION "C".
- LEFT HAND UNIT SHOWN. RIGHT HAND UNIT OPPOSITE FROM SHOWN UNIT.
- ALL DIMENSIONS ARE IN INCHES.

SAS MODEL	IFB MODEL	DIMENSIONS										
		A	B	C	E	F	L	M	N	Q	R	S
109	A-36	36	65	77	10 ³ / ₈	15 ¹ / ₈	26 ¹ / ₂	11 ¹⁵ / ₁₆	7 ¹ / ₈	30	54	47 ¹ / ₄
112	A-36	36	65	77	13 ⁹ / ₁₆	13 ⁹ / ₁₆	24 ¹ / ₂	15 ¹⁵ / ₁₆	7 ¹ / ₈	30	54	47 ¹ / ₄
115	C-42	48	65	77	16	12 ³ / ₈	23	18 ¹⁵ / ₁₆	7 ¹ / ₈	54 ¹ / ₁₆	54	47 ¹ / ₄
118	C-42	48	65	77	19	12 ³ / ₈	21 ¹ / ₂	22 ¹ / ₁₆	7 ¹ / ₈	54 ¹ / ₁₆	54	47 ¹ / ₄

DIMENSIONS

Double Blower Outdoor Units

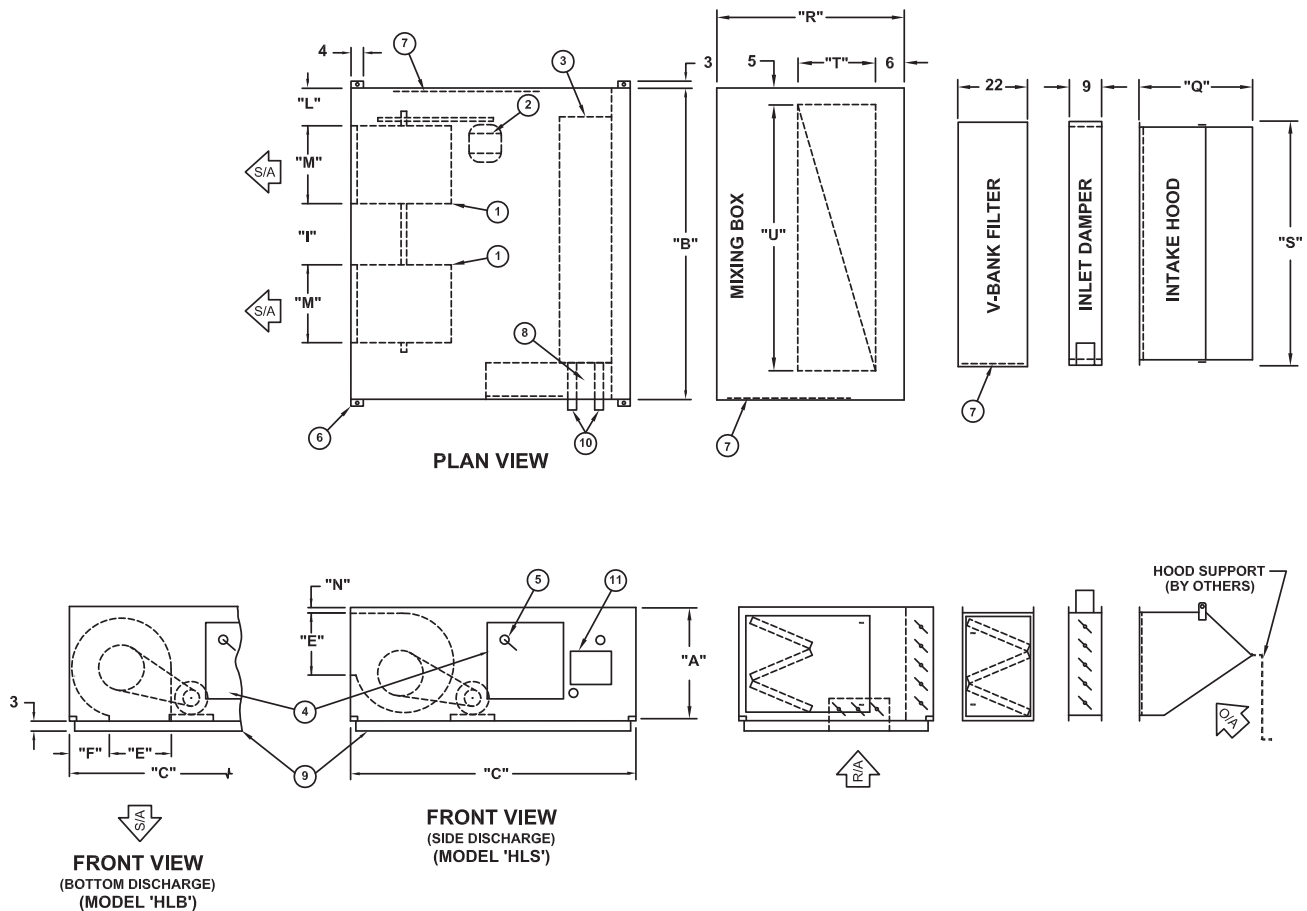
C000602

UNIT COMPONENTS

1. CENTRIFUGAL SUPPLY FAN
2. FAN MOTOR
3. HEATING COIL - STEAM OR HOT WATER

4. CONTROL CABINET
5. HINGED CONTROL CABINET ACCESS DOOR
6. REMOVABLE LIFTING LUG
7. HINGED ACCESS DOOR

8. FACE AND BYPASS DAMPER CONTROL LOCATION
9. UNIT BASE
10. SUPPLY AND RETURN CONNECTIONS
11. COIL ACTUATOR ACCESS PANEL



NOTES

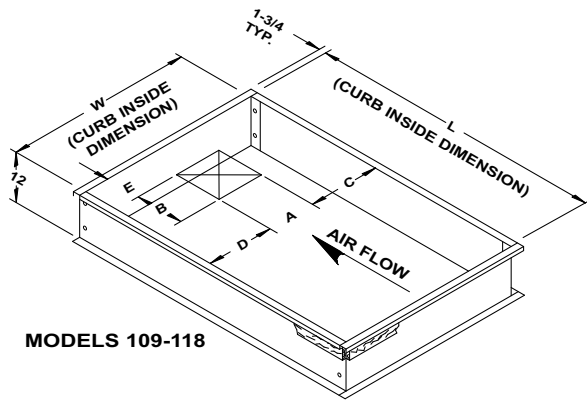
1. ON UNITS PROVIDED WITH A DOUBLE SECTION COIL, ADD 16" TO DIMENSION "C".
2. LEFT HAND UNIT SHOWN. RIGHT HAND UNIT OPPOSITE FROM SHOWN UNIT.
3. MODELS 220, 222 AND 225 TO BE SHIPPED IN TWO SECTIONS.
4. ALL DIMENSIONS ARE IN INCHES.

SAS MODEL	IFB MODEL	DIMENSIONS													
		A	B	C	E	F	I	L	M	N	Q	R	S	T	U
215	C-60	48	94	77	16	12 $\frac{3}{8}$	18 $\frac{3}{8}$	18 $\frac{7}{8}$	18 $\frac{15}{16}$	7 $\frac{1}{4}$	54 $\frac{1}{16}$	54	82	20 $\frac{1}{4}$	84
220	E-96	78	154	102	24 $\frac{7}{8}$	13 $\frac{3}{8}$	29 $\frac{5}{8}$	37 $\frac{1}{8}$	25 $\frac{1}{16}$	32 $\frac{1}{4}$	60	60	121 $\frac{3}{8}$	26 $\frac{1}{2}$	144
222	E-108	78	154	102	27 $\frac{3}{8}$	14 $\frac{3}{8}$	24 $\frac{5}{8}$	37 $\frac{1}{8}$	27 $\frac{9}{16}$	32 $\frac{1}{4}$	60	60	121 $\frac{3}{8}$	26 $\frac{1}{2}$	144
225	E-120	78	154	102	31 $\frac{3}{8}$	17 $\frac{9}{16}$	37 $\frac{5}{8}$	26 $\frac{11}{16}$	31 $\frac{1}{2}$	20 $\frac{1}{4}$	60	60	121 $\frac{3}{8}$	26 $\frac{1}{2}$	144

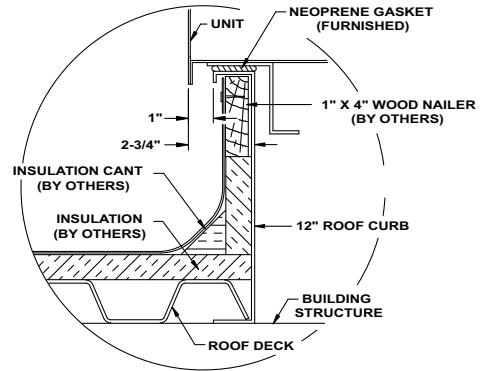
DIMENSIONS

Optional Roof Curb Dimensions

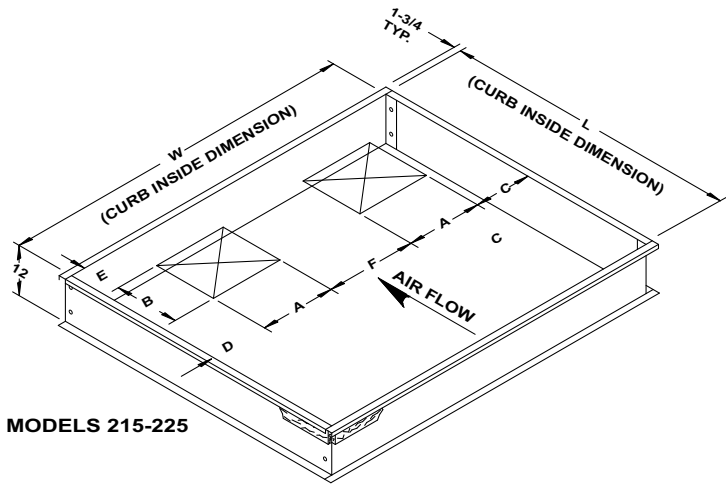
C000017



MODELS 109-118



ROOF CURB DETAIL



MODELS 215-225

MODEL	DIMENSIONS						CURB	
	A	B	C	D	E	F	L	W
109	11-15/16	10-3/8	23-13/16	23-3/4	12-3/8	—	71-1/2 *	59-1/2
112	15-15/16	13-9/16	21-13/16	21-3/4	10-13/16	—	71-1/2 *	59-1/2
115	18-15/16	16	20-5/16	20-1/4	9-5/8	—	71-1/2 *	59-1/2
118	22-1/16	19	18-11/16	18-3/4	9-5/8	—	71-1/2 *	59-1/2
215	18-15/16	16	16-1/8	16-1/8	9-5/8	18-3/8	71-1/2 *	88-1/2
220	25-1/16	24-7/8	34-3/8	34-3/8	10-5/8	29-5/8	96-1/2 *	148-1/2
222	27-9/16	27-3/8	34-3/8	34-3/8	11-5/8	24-5/8	96-1/2 *	148-1/2
225	31-1/2	31-3/8	23-15/16	23-15/16	14-13/16	37-5/8	96-1/2 *	148-1/2

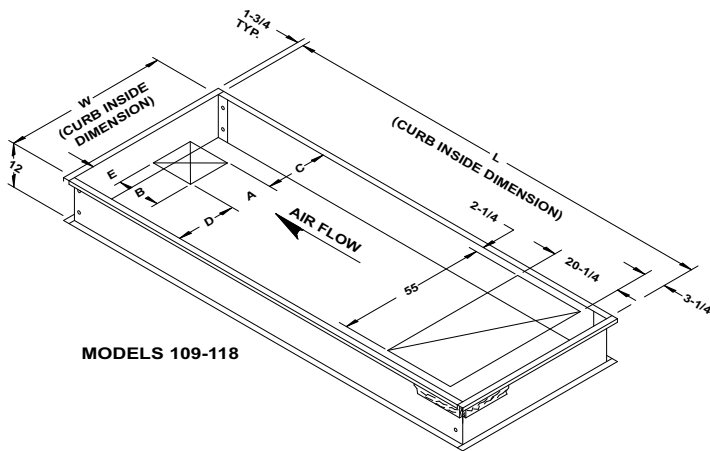
NOTES

1. FOR DOUBLE COIL SECTION ADD 16" TO 'L' DIMENSION.
2. ALL DIMENSIONS ARE IN INCHES.

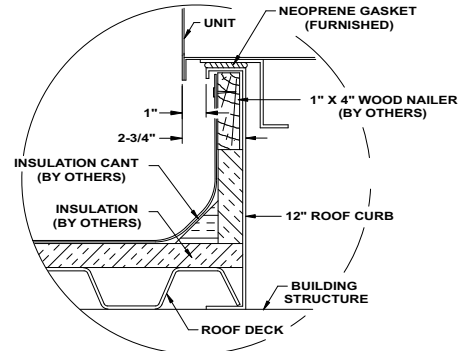
DIMENSIONS

Optional Roof Curb Dimensions - Units With Return Air

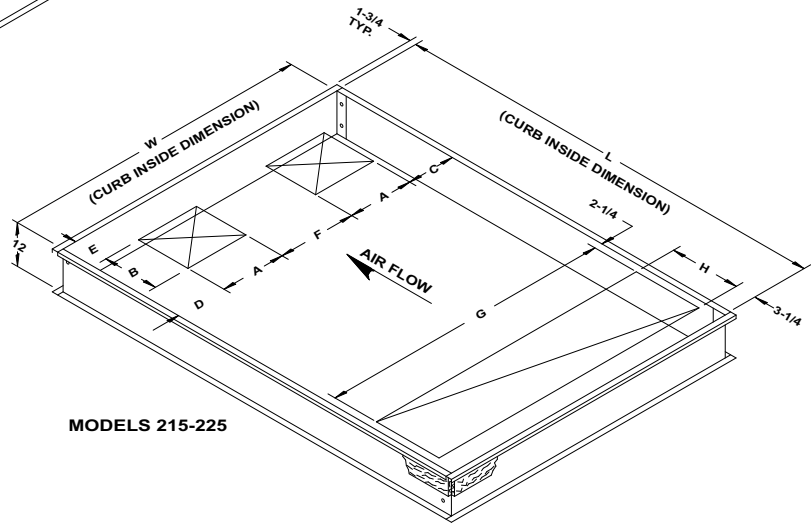
C000603



MODELS 109-118



ROOF CURB DETAIL



MODELS 215-225

CURB FOR UNITS WITH RETURN AIR

MODEL	DIMENSIONS								CURB	
	A	B	C	D	E	F	G	H	L	W
109	11-15/16	10-3/8	23-13/16	23-3/4	12-3/8	—	—	—	125-1/2 *	59-1/2
112	15-15/16	13-9/16	21-13/16	21-3/4	10-13/16	—	—	—	125-1/2 *	59-1/2
115	18-15/16	16	20-5/16	20-1/4	9-5/8	—	—	—	125-1/2 *	59-1/2
118	22-1/16	19	18-11/16	18-3/4	9-5/8	—	—	—	125-1/2 *	59-1/2
215	18-15/16	16	16-1/8	16-1/8	9-5/8	18-3/8	84	20-1/4	125-1/2 *	88-1/2
220	25-1/16	24-7/8	34-3/8	34-3/8	10-5/8	29-5/8	144	26-1/2	156-1/2 *	148-1/2
222	27-9/16	27-3/8	34-3/8	34-3/8	11-5/8	24-5/8	144	26-1/2	156-1/2 *	148-1/2
225	31-1/2	31-3/8	23-15/16	23-15/16	14-13/16	37-5/8	144	26-1/2	156-1/2 *	148-1/2

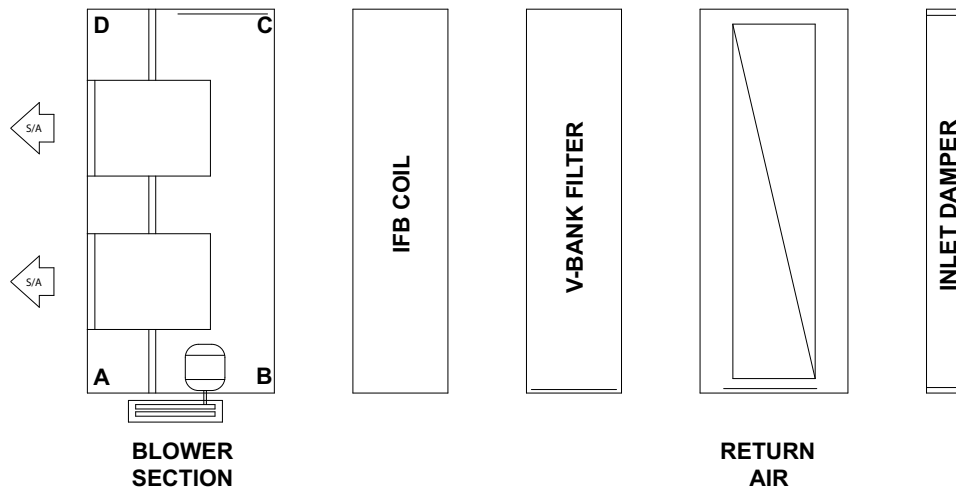
NOTES

1. FOR DOUBLE COIL SECTION ADD 16" TO 'L' DIMENSION.
2. ALL DIMENSIONS ARE IN INCHES.

WEIGHTS

Indoor Unit Weights

C000596



SAS(I) MODEL	IFB MODEL	BLOWER SECTION				INTAKE HOOD	INLET DAMPER	RETURN AIR	V-BANK FILTER	SINGLE SECTION COIL	DOUBLE SECTION COIL	V-BANK FILTERS SIZE & (QTY)
		A	B	C	D							
109-112	B-36	149	67	67	67	140	55	104	165	315	535	20x20x2(4)
115-118	C-42	253	94	94	94	150	70	116	185	415	705	16x20x2(9)
120-122	E-54	439	159	159	159	183	120	151	275	662	1125	20x25x2(10)
125	F-66	590	224	224	224	216	155	208	310	899	1528	16x20x2(24)
218	E-84	438	158	158	158	224	125	141	275	986	1676	15x20x2(18)
220-222	E-114	697	268	268	268	290	233	226	410	1299	2208	16x20x2(35)
225	F-120	953	388	388	388	350	340	302	500	1547	2630	20x20x2(42)

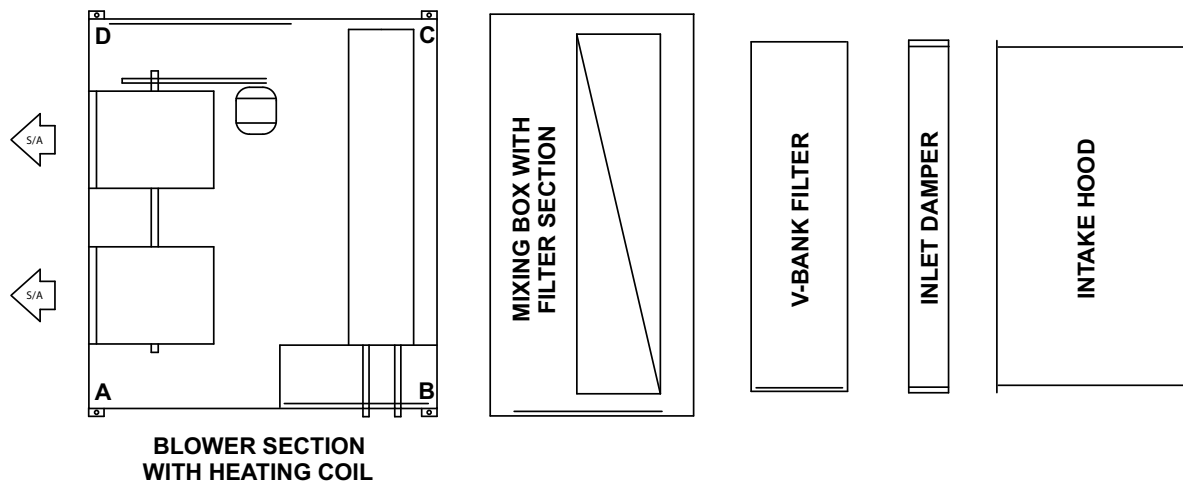
NOTES

1. ALL WEIGHTS ARE IN POUNDS.

WEIGHTS

Outdoor Unit Weights

C000016



SAS MODEL	IFB MODEL	BLOWER SECTION				INTAKE HOOD	INLET DAMPER	MIXING BOX	V-BANK FILTER	SINGLE SECTION COIL	DOUBLE SECTION COIL	V-BANK FILTERS SIZE & (QTY)
		A	B	C	D							
109-112	A-36	190	235	295	295	105	70	540	120	245	490	15x20x2(9)
115-118	C-42	205	240	310	310	185	90	570	145	415	790	15x20x2(12)
215	C-60	295	340	400	400	330	150	880	245	517	980	20x20x2(12)
220	E-96	615	655	745	745	425	320	1540	330	1111	2090	15x20x2(48)
222	E-108	665	705	795	795	425	320	1540	330	1236	2300	15x20x2(48)
225	E-120	710	750	840	840	425	320	1540	330	1361	2315	15x20x2(48)

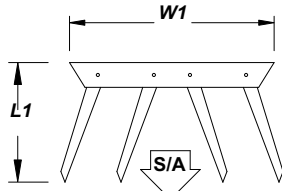
NOTES

1. BLOWER SECTION WEIGHTS DO NOT INCLUDE COILS.
2. ALL WEIGHTS ARE IN POUNDS.
3. DOUBLE SECTION COIL WEIGHT INCLUDES THE WEIGHT OF 16" EXTRA CABINET LENGTH.
4. DOUBLE WALL CONSTRUCTION WEIGHT MULTIPLIERS:
 BLOWER SECTION : 1.20
 DOUBLE SECTION COIL : 1.05
 COMBINATION FILTER AND MIXING BOX : 1.26

VERTICAL DISCHARGES

Dimensions - Sizes 1F, 4R, 4F, 5R, 5F

C000597

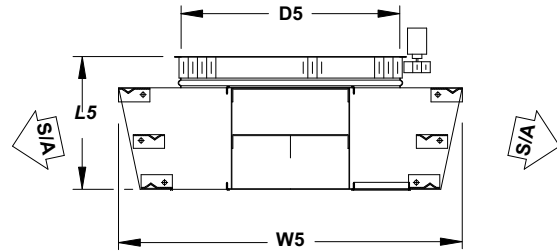


1F DISCHARGE

A VANE TYPE DISCHARGE.

DISCHARGE VANES
ARE ADJUSTABLE.

DISCHARGE DESIGNED
FOR CONCENTRATED
VERTICAL AIR FLOW.

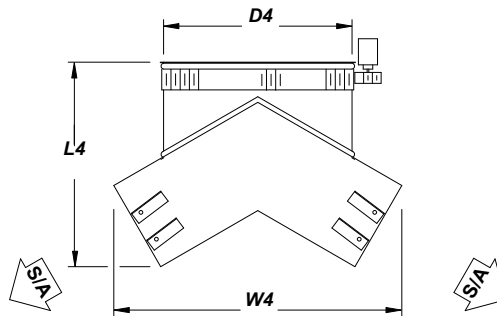


5F AND 5R DISCHARGE

A FOUR OUTLET DISCHARGE DESIGNED
FOR FULL AIR DISTRIBUTION.

DISCHARGE VANES ARE ADJUSTABLE.

DISCHARGE DESIGNED FOR
LOW CEILING HEIGHT APPLICATIONS.



4F AND 4R DISCHARGE

A TWO OUTLET DISCHARGE.

DISCHARGE VANES ARE ADJUSTABLE.

DISCHARGE DESIGNED FOR
MEDIUM CEILING HEIGHT APPLICATIONS.

DISCHARGE DIMENSIONS AND WEIGHT

DISCH. SIZE	1F DISCHARGE			4F AND 4R DISCHARGE					5F AND 5R DISCHARGE				
	W1	L1	WT.	D4	L4	W4	4F WT.	4R WT.	D5	L5	W5	5F WT.	5R WT.
17	20	7 1/8	50	17 11/16	17 1/2	25 3/16	50	100	17 1/2	9 1/4	25 1/2	45	100
19	---	---	---	20 11/16	17 1/2	25 1/8	60	105	---	---	---	---	---
22	---	---	---	27 3/4	30 1/4	29	---	---	25 11/16	11	34 1/2	60	110
25	---	---	---	31 1/8	23	39 1/4	75	125	31 1/8	14	40	65	120
28	35 1/4	10 1/4	70	36 1/2	27 1/2	39 13/16	100	155	36 1/2	16 5/8	50	90	160
36	41 1/4	10 1/4	80	42 1/2	32	47 1/4	110	180	42 1/2	18 1/4	57	110	185
40	47 3/4	10 1/4	90	49 1/2	36	51 1/16	130	200	49 1/2	20	66 1/2	120	200
44	---	---	---	49 1/2	38	51 1/16	240	310	49 1/2	26 3/4	66 1/2	160	245

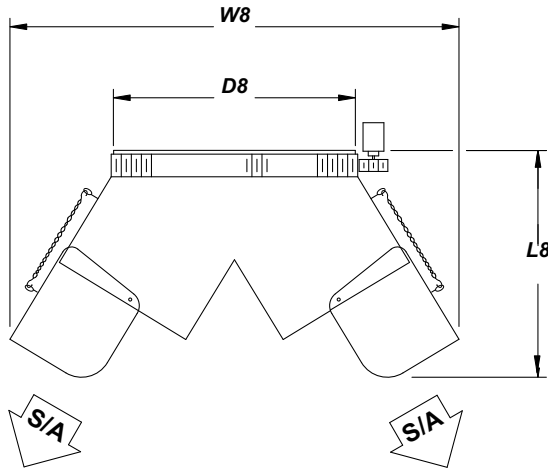
Notes:

- (1) All dimensions in inches.
- (2) All weights in pounds.

VERTICAL DISCHARGES

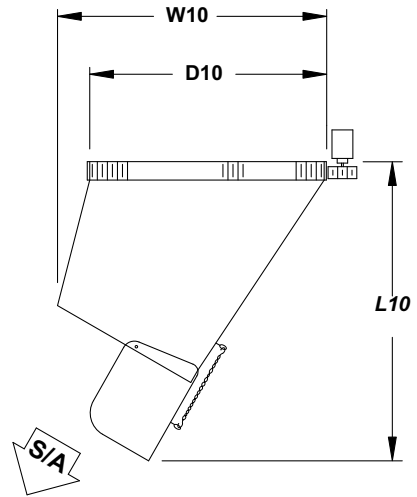
Dimensions - Sizes 8R, 8F, 10R

C000598



8F AND 8R DISCHARGE

A TWO OUTLET DISCHARGE SIMILAR TO THE 4F AND 4R DISCHARGE.
DISCHARGE DESIGNED FOR HIGH MOUNTING APPLICATIONS.



10R DISCHARGE

A SINGLE OUTLET DISCHARGE.
DISCHARGE DESIGNED FOR EXTREMELY HIGH MOUNTING APPLICATIONS.

DISCHARGE DIMENSIONS AND WEIGHT									
DISCH. SIZE	8F AND 8R DISCHARGE					10R DISCHARGE			
	D8	L8	W8	8F WT.	8R WT.	D10	L10	W10	10R WT.
17	---	---	---	---	---	---	---	---	---
19	---	---	---	---	---	---	---	---	---
22	25 11/16	26	47 1/2	80	100	---	---	---	---
25	---	---	---	---	---	---	---	---	---
28	36 1/2	33	64	100	125	36 1/2	45 1/16	39 13/16	140
36	42 1/2	41 1/2	77	120	145	42 1/2	51 5/8	44 7/8	150
40	49 1/2	47 1/2	89 1/2	140	165	49 1/2	59 1/8	53 3/16	170
44	49 1/2	45 3/4	86	160	195	49 1/2	56 7/8	56	180

Notes:

- (1) All dimensions in inches.
- (2) All weights in pounds.

VERTICAL DISCHARGES

Selection Table - Sizes 1F, 4R, 4F, 5R, 5F

MODEL	CFM	DESIGN NO. 1F				DESIGN NO. 4R & 4F				REVOLVING COVERAGE	DESIGN NO. 5R & 5F			
		SIZE	AIR PRESSURE DROP	MOUNT HEIGHT	FIXED COVERAGE	SIZE	AIR PRESSURE DROP	MOUNT HEIGHT	FIXED COVERAGE		SIZE	AIR PRESSURE DROP	MOUNT HEIGHT	FIXED AND REVOLVING COVERAGE
SAS (I) 109	1,000	17	0.03	11	24 x 50	17	0.04	10	25 x 50	50 x 50	17	0.02	8	53 x 53
	2,000		0.11	14	30 x 59		0.17	12	32 x 63	63 x 63		0.07	10	63 x 63
	3,000		0.25	15	35 x 70		0.39	13	33 x 66	66 x 66		0.16	11	69 x 69
SAS (I) 112	2,000	17	0.11	14	30 x 59	19	0.12	12	32 x 63	63 x 63	22	0.03	12	70 x 70
	3,250		0.29	15	35 x 70		0.33	12	36 x 72	72 x 72		0.07	13	75 x 75
	4,250		0.50	16	37 x 74		0.56	12	40 x 80	80 x 80		0.11	14	78 x 78
SAS (I) 115	3,000	17	0.25	15	35 x 70	25	0.07	15	35 x 70	70 x 70	25	0.02	12	83 x 83
	4,500		0.56	17	40 x 79		0.16	16	42 x 83	83 x 83		0.05	13	86 x 86
	6,000		1.00	18	44 x 86		0.29	17	45 x 89	89 x 89		0.10	14	90 x 90
SAS (I) 118	4,000	28	0.02	19	39 x 78	28	0.06	17	41 x 82	82 x 82	28	0.02	12	83 x 83
	6,000		0.04	21	42 x 84		0.12	18	48 x 96	96 x 96		0.05	14	92 x 92
	8,000		0.08	23	49 x 99		0.22	19	55 x 110	110 x 110		0.10	16	109 x 109
SAS (I) 120	6,000	36	0.02	20	52 x 100	36	0.06	18	48 x 96	96 x 96	36	0.03	14	92 x 92
	8,500		0.05	22	53 x 106		0.13	20	57 x 115	115 x 115		0.08	16	109 x 109
	11,000		0.08	25	54 x 110		0.21	22	64 x 128	128 x 128		0.09	17	122 x 122
SAS (I) 122	11,000	40	0.04	24	50 x 99	40	0.11	22	64 x 128	128 x 128	40	0.05	17	122 x 122
	13,500		0.06	33	65 x 129		0.17	24	72 x 145	145 x 145		0.08	18	127 x 127
	16,000		0.09	37	80 x 160		0.24	25	76 x 153	153 x 153		0.11	19	132 x 132
SAS (I) 125	14,000	40	0.07	34	67 x 134	44	0.11	24	73 x 146	146 x 146	44	0.05	18	129 x 129
	18,000		0.11	40	93 x 186		0.18	28	83 x 166	166 x 166		0.09	21	139 x 139
	20,000		0.14	42	106 x 212		0.23	31	90 x 180	180 x 180		0.11	23	145 x 145
SAS (I) 218	8,000	40	0.02	23	53 x 106	40	0.06	20	57 x 115	115 x 115	40	0.03	16	109 x 109
	12,000		0.05	28	57 x 114		0.14	23	67 x 136	136 x 136		0.06	18	123 x 123
	16,000		0.09	37	80 x 160		0.24	25	76 x 152	152 x 152		0.11	19	132 x 132
SAS (I) 220	12,000	40	0.05	28	57 x 114	44	0.08	23	68 x 136	136 x 136	44	0.04	17	120 x 120
	19,000		0.12	41	96 x 192		0.21	28	85 x 170	170 x 170		0.10	22	142 x 142
	26,000		0.23	50	145 x 290		0.39	34	97 x 195	195 x 195		0.19	27	164 x 164
SAS (I) 222	22,000	40	0.17	44	119 x 238	44	0.28	31	90 x 180	180 x 180	44	0.14	25	151 x 151
	26,500		0.24	50	145 x 290		0.40	34	97 x 195	195 x 195		0.20	27	164 x 164
	31,000		0.33	56	171 x 342		0.55	37	108 x 216	216 x 216		0.27	29	177 x 177
SAS (I) 225	28,000	40	0.27	53	158 x 316	44	0.45	35	102 x 204	204 x 204	44	0.22	28	170 x 170
	34,000		0.39	59	186 x 373		0.66	39	116 x 232	232 x 232		0.32	30	184 x 184
	40,000		0.55	64	214 x 429		0.92	44	131 x 261	261 x 261		0.45	32	198 x 198
SAS (W) 109	1,000	17	0.03	11	24 x 50	17	0.04	10	25 x 50	50 x 50	17	0.02	8	53 x 53
	2,000		0.11	14	30 x 59		0.17	12	32 x 63	63 x 63		0.07	10	63 x 63
	3,000		0.25	15	35 x 70		0.39	13	33 x 66	66 x 66		0.16	11	69 x 69
SAS (W) 112	2,000	17	0.11	14	30 x 59	19	0.12	12	32 x 63	63 x 63	22	0.03	12	70 x 70
	2,875		0.23	14	33 x 67		0.26	12	35 x 70	70 x 70		0.05	13	73 x 73
	3,750		0.39	16	36 x 72		0.44	12	39 x 78	78 x 78		0.09	14	76 x 76
SAS (W) 115	3,000	17	0.25	15	35 x 70	25	0.07	15	35 x 70	70 x 70	25	0.02	12	83 x 83
	4,500		0.56	17	40 x 79		0.16	16	42 x 83	83 x 83		0.05	13	86 x 86
	6,000		1.00	18	44 x 86		0.29	17	45 x 89	89 x 89		0.10	14	90 x 90
SAS (W) 118	4,000	28	0.02	19	39 x 78	28	0.06	17	41 x 82	82 x 82	28	0.02	12	83 x 83
	6,000		0.04	21	42 x 84		0.12	18	48 x 96	96 x 96		0.05	14	92 x 92
	8,000		0.08	23	49 x 99		0.22	19	55 x 110	110 x 110		0.10	16	109 x 109
SAS (W) 215	6,000	36	0.02	20	52 x 100	36	0.06	18	48 x 96	96 x 96	36	0.03	14	92 x 92
	8,000		0.04	23	53 x 106		0.10	20	57 x 115	115 x 115		0.05	16	109 x 109
	12,000		0.09	25	55 x 110		0.25	23	68 x 136	136 x 136		0.11	18	123 x 123
SAS (W) 220	12,000	40	0.05	28	57 x 114	44	0.08	23	68 x 136	136 x 136	44	0.04	17	120 x 120
	19,000		0.12	41	96 x 192		0.21	28	85 x 170	170 x 170		0.10	22	142 x 142
	26,000		0.23	50	145 x 290		0.39	34	97 x 195	195 x 195		0.19	27	164 x 164
SAS (W) 222	22,000	40	0.17	44	119 x 238	44	0.28	31	90 x 180	180 x 180	44	0.14	25	151 x 151
	26,500		0.24	50	145 x 290		0.40	34	97 x 195	195 x 195		0.20	27	164 x 164
	31,000		0.33	56	171 x 342		0.55	37	108 x 216	216 x 216		0.27	29	177 x 177
SAS (W) 225	28,000	40	0.27	53	156 x 318	44	0.45	35	102 x 204	204 x 204	44	0.22	28	170 x 170
	31,500		0.34	56	175 x 350		0.57	38	110 x 220	220 x 220		0.28	29	178 x 178
	35,000		0.41	59	191 x 382		0.70	40	118 x 237	237 x 237		0.34	31	187 x 187

VERTICAL DISCHARGES

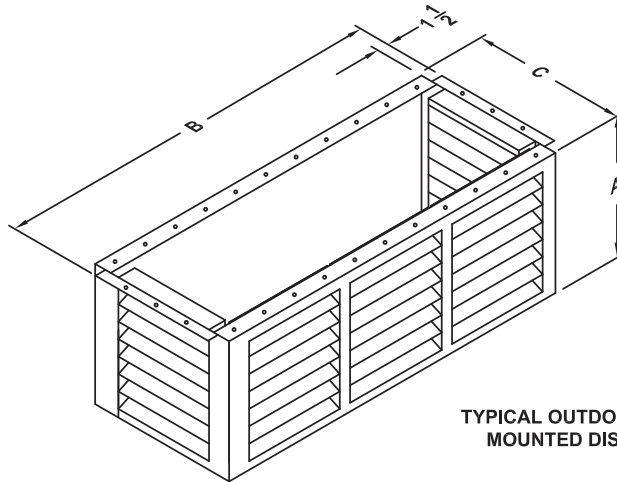
Selection Table - Sizes 8R, 8F, 10R

MODEL	CFM	DESIGN NO. 8R & 8F					DESIGN NO. 10R			
		SIZE	AIR PRESSURE DROP	MOUNT HEIGHT	FIXED COVERAGE	REVOLVING COVERAGE	SIZE	AIR PRESSURE DROP	MOUNT HEIGHT	REVOLVING COVERAGE
SAS (I) 109	1,000	22	0.01	12	20 x 39	39 x 39	28	0.01	14	60 x 60
	2,000		0.05	16	28 x 57	57 x 57		0.02	20	71 x 71
	3,000		0.12	18	33 x 66	66 x 66		0.04	25	81 x 81
SAS (I) 112	2,000	22	0.05	16	28 x 57	57 x 57	28	0.02	20	71 x 71
	3,250		0.14	18	33 x 66	66 x 66		0.04	25	81 x 81
	4,250		0.25	20	38 x 75	75 x 75		0.08	27	85 x 85
SAS (I) 115	3,000	22	0.12	18	33 x 66	66 x 66	28	0.04	25	81 x 81
	4,500		0.28	20	39 x 78	78 x 78		0.09	27	85 x 85
	6,000		0.49	23	41 x 81	81 x 81		0.15	29	89 x 89
SAS (I) 118	4,000	28	0.06	20	38 x 75	75 x 75	28	0.07	26	83 x 83
	6,000		0.14	26	42 x 84	84 x 84		0.15	29	89 x 89
	8,000		0.26	29	48 x 95	95 x 95		0.27	32	95 x 95
SAS (I) 120	6,000	36	0.08	26	42 x 84	84 x 84	36	0.08	31	107 x 107
	8,500		0.16	30	49 x 97	97 x 97		0.16	36	114 x 114
	11,000		0.27	35	55 x 110	110 x 110		0.27	41	121 x 121
SAS (I) 122	11,000	40	0.14	35	55 x 110	110 x 110	40	0.14	41	121 x 121
	13,500		0.21	40	57 x 114	114 x 114		0.21	46	127 x 127
	16,000		0.29	43	60 x 120	120 x 120		0.29	51	132 x 132
SAS (I) 125	14,000	44	0.14	40	57 x 114	114 x 114	44	0.14	46	127 x 127
	18,000		0.22	50	63 x 125	125 x 125		0.23	57	138 x 138
	20,000		0.27	58	65 x 130	130 x 130		0.28	68	150 x 150
SAS (I) 218	8,000	40	0.07	30	49 x 97	97 x 97	40	0.07	36	114 x 114
	12,000		0.17	37	56 x 112	112 x 112		0.17	44	124 x 124
	16,000		0.29	43	60 x 120	120 x 120		0.29	51	132 x 132
SAS (I) 220	12,000	44	0.10	37	56 x 112	112 x 112	44	0.10	44	124 x 124
	19,000		0.25	54	64 x 126	126 x 126		0.26	62	144 x 144
	26,000		0.47	76	73 x 146	146 x 146		0.48	90	173 x 173
SAS (I) 222	22,000	44	0.33	66	67 x 135	135 x 135	44	0.34	77	162 x 162
	26,500		0.49	76	73 x 146	146 x 146		0.50	90	173 x 173
	31,000		0.66	86	79 x 158	158 x 158		0.68	103	184 x 184
SAS (I) 225	28,000	44	0.54	81	75 x 151	151 x 151	44	0.55	96	179 x 179
	34,000		0.80	92	82 x 165	165 x 165		0.81	106	196 x 196
	40,000		1.10	103	91 x 183	183 x 183		1.14	116	214 x 214
SAS (W) 109	1,000	22	0.01	12	20 x 39	39 x 39	28	0.01	14	60 x 60
	2,000		0.05	16	28 x 57	57 x 57		0.02	20	71 x 71
	3,000		0.12	18	33 x 66	66 x 66		0.04	25	81 x 81
SAS (W) 112	2,000	22	0.05	16	25 x 57	57 x 57	28	0.02	20	71 x 71
	2,875		0.11	17	31 x 62	62 x 62		0.04	24	77 x 77
	3,750		0.19	19	36 x 72	72 x 72		0.06	26	83 x 83
SAS (W) 115	3,000	22	0.12	18	33 x 66	66 x 66	28	0.04	25	81 x 81
	4,500		0.28	20	39 x 78	78 x 78		0.09	27	85 x 85
	6,000		0.49	23	41 x 81	81 x 81		0.15	29	89 x 89
SAS (W) 118	4,000	28	0.06	20	38 x 75	75 x 75	28	0.07	26	83 x 83
	6,000		0.14	26	42 x 84	84 x 84		0.15	29	89 x 89
	8,000		0.26	29	48 x 95	96 x 95		0.27	32	95 x 95
SAS (W) 215	6,000	36	0.08	26	42 x 84	84 x 84	36	0.08	31	107 x 107
	8,000		0.14	30	49 x 97	97 x 97		0.15	36	114 x 114
	12,000		0.32	37	56 x 112	112 x 112		0.33	44	124 x 124
SAS (W) 220	12,000	44	0.10	37	56 x 112	112 x 112	44	0.10	44	124 x 124
	19,000		0.25	54	64 x 128	128 x 128		0.26	62	144 x 144
	26,000		0.47	76	73 x 146	146 x 146		0.48	90	173 x 173
SAS (W) 222	22,000	44	0.33	66	67 x 138	138 x 138	44	0.34	77	162 x 162
	26,500		0.49	76	73 x 146	146 x 146		0.50	90	173 x 173
	31,000		0.66	86	79 x 158	158 x 158		0.68	103	184 x 184
SAS (W) 225	28,000	44	0.54	81	75 x 151	151 x 151	44	0.55	96	179 x 179
	31,500		0.61	87	79 x 159	159 x 159		0.62	102	189 x 189
	35,000		0.85	94	84 x 168	168 x 168		0.86	107	199 x 199

DISCHARGE LOUVERS

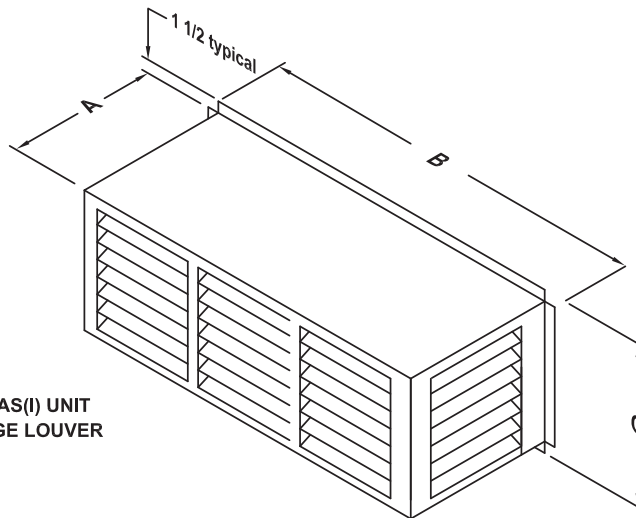
Dimensions and Weights

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TYPICAL OUTDOOR SAS (W) REMOTE MOUNTED DISCHARGE LOUVER

MODEL	DIMENSIONS			WEIGHT
	A	B	C	
109-112	21	20-13/16	17-7/16	44
115-118	24	26-15/16	23	64
215	24	64-7/8	23	112
220-222	45	84-1/2	31-1/4	218
225	45	105-3/8	40-3/4	310



TYPICAL INDOOR SAS (I) UNIT MOUNTED DISCHARGE LOUVER

MODEL	DIMENSIONS			WEIGHT
	A	B	C	
109-112	21	20-13/16	17-7/16	70
115-118	24	26-15/16	23	80
120-122	45	32-1/2	31-1/4	110
125-130	45	41-7/8	40-3/4	125
218	25-7/8	70-3/4	23-3/8	150
220-222	45	88-3/4	31-1/4	215
225	25-1/16	111-1/8	42-1/4	230

NOTES

1. ALL DIMENSIONS ARE IN INCHES.
2. ALL WEIGHTS ARE IN POUNDS.

PIPING

Piping Instructions

The integrity of the system depends in part on proper piping. The following recommendations should be diligently observed.

Steam Systems

1. All piping in contact with airflow should be insulated.
2. Install the Steadyair® unit level to ensure the coil tubes will drain properly.
3. Steam traps, return mains and traps should be anchored and supported independently of the IFB coil.
4. A drip trap should be installed in the steam supply line and drip into the return main. This will prevent steam line condensate from entering the unit with the steam. Avoid dripping steam mains into the line between the IFB coil and traps.
5. Use only bucket or float and thermostatic traps for condensate removal. Use thermostatic traps for venting only.
6. Steam traps should be sized for three times the calculated condensate loading at the coil design conditions, based on the pressure differential across the trap rather than the boiler pressure. Each trap should be selected for the actual pressure differential across the trap, not the boiler pressure. Pressure differential is herein defined as the gauge pressure at the trap minus the pressure in the return main.
7. The return connection should be full size of the coil header and reduced at the trap. Use of a reducing bushing on the coil return connection is not recommended. (If shutoff valve, strainer and trap are piped together with pipe nipples, then the pipe can be reduced to the trap inlet size at the shutoff valve.)
8. Strainers should be installed ahead of traps to prevent dirt and sludge from affecting trap operation.
9. In the case of double section coils, each of the coil sections should be individually trapped and vented.
10. Risers should not be installed in condensate return lines.
11. When the “closed circuit gravity return system” leads directly to the boiler, the coil traps should be located at least 2 feet above the water line of the boiler.
12. The steam trap should have provisions for air venting. If the trap is non-venting, proper air vents should be provided for each coil section to eliminate condensable gases. All air vent lines should be minimum 1-inch diameter and properly pitched to assure free venting of air. The venting device should be located at least 12 inches above the bottom of the coil casing. In low-pressure steam systems (15 psig and below) in which a non-venting trap is used for condensate removal, a thermostatic air trap should be installed in a 1 inch diameter air line bypassing the condensate trap to the atmospheric return main. An automatic air vent should be installed in a 1-inch diameter air line before the condensate trap on systems with a vacuum return system. In high-pressure steam systems (above 15 psig) in which a non-venting trap is used for condensate removal, an automatic air vent should be installed in a 1 inch diameter air line before the condensate trap. Do not return vented air to the condensate return main.
13. It is recommended that a bypass line with valve be installed around the trap to allow for operation of the coil during trap maintenance. This feature will also provide better coil start-up conditions when temperatures are below freezing.
14. If condensate must be lifted above the coil return level into overhead mains or if return mains are pressurized, then a pump and receiver should be installed between the condensate traps and return mains.
15. Proper vacuum breakers should be furnished as shown on the piping diagrams.
16. Swing check valves of 15-degree type should be used to prevent condensate backup in the case of steam system failure. Vertical lift check valves or 45-degree swing check valves should not be used as they require a higher head pressure of water to open them.

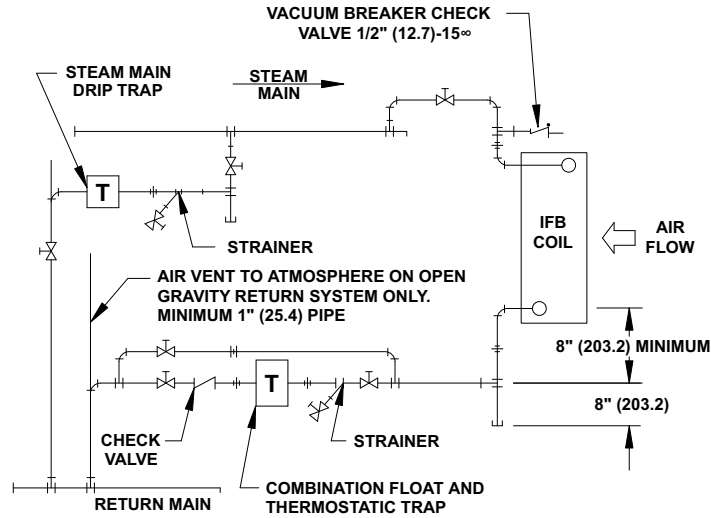
Hot Water Systems

1. Install the Steadyair® unit level to ensure the coil tubes will drain properly.
2. Water mains, inlet and outlet mains should be anchored and supported independently of the IFB coil.

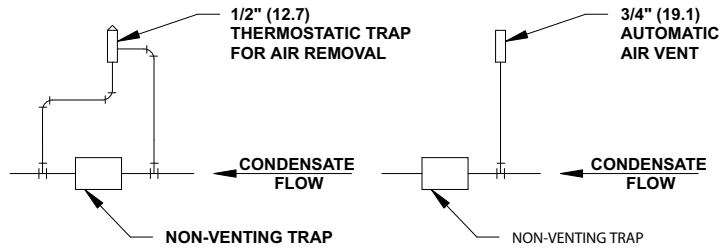
Piping Diagrams – Steam Coils

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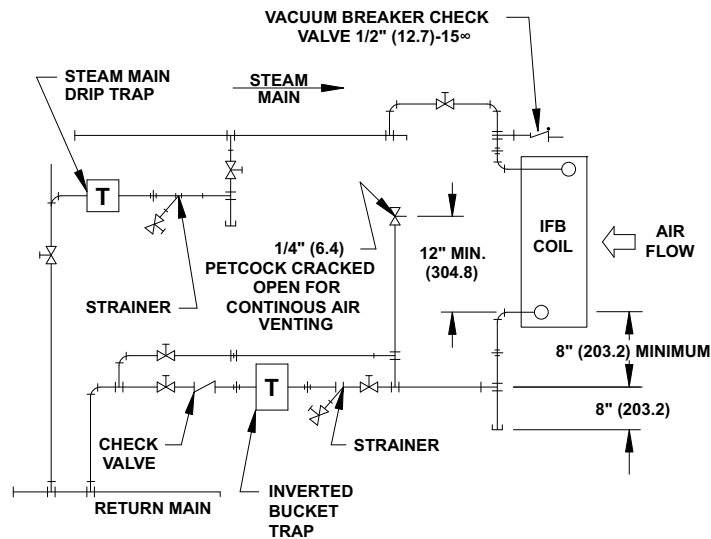
PIPING DIAGRAM - STEAM PRESSURE BELOW 15 PSIG OR 103.4 KPA



Non-venting Traps (Steam Pressure Below 15 PSIG Or 103.4 KPa)

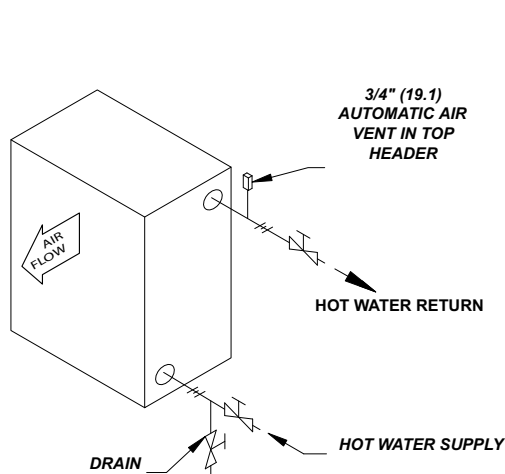


PIPING DIAGRAM - STEAM PRESSURE ABOVE 15 PSIG OR 103.4 KPA



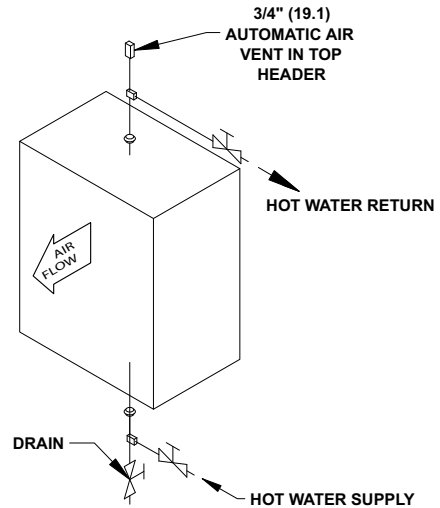
NOTE : DIMENSIONS ARE IN INCHES.
DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.

HOT WATER PIPING DIAGRAM - IFB SINGLE SECTION COIL



SIDE HEADER COIL

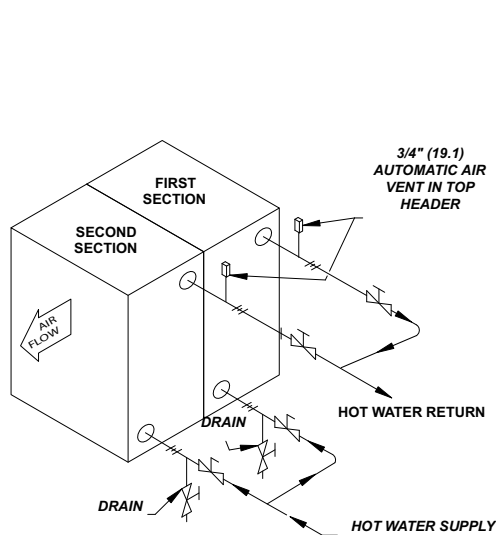
APPLIES TO COIL MODEL NUMBERS
A-36, B-36, C-42, C-60 AND E-54



CENTER HEADER COIL

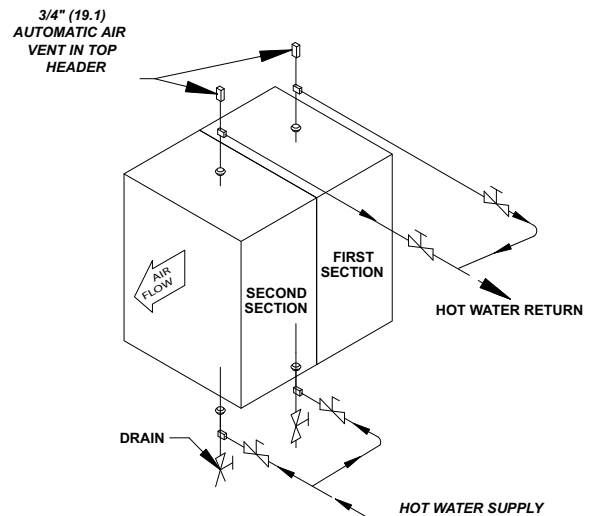
APPLIES TO COIL MODEL NUMBERS
E-84, E-96, E-108, E-114,
E-120, F-66 AND F-120

HOT WATER PIPING DIAGRAM - IFB DOUBLE SECTION COIL



SIDE HEADER COIL

APPLIES TO COIL MODEL NUMBERS
A-36-DS, B-36-DS, C-42-DS,
C-60-DS AND E-54-DS



CENTER HEADER COIL

APPLIES TO COIL MODEL NUMBERS
E-84-DS, E-96-DS, E-108-DS, E-114-DS,
E-120-DS, F-66-DS AND F-120-DS

NOTES :

1. DIMENSIONS ARE IN INCHES.
2. DIMENSIONS IN PARENTHESIS ARE IN MILLIMETERS.
3. THE SUPPLY AND RETURN CONNECTIONS ON EACH COIL PROVIDED IN AN OUTDOOR UNIT ARE PLUMBED TO THE EXTERIOR OF THE HOUSING OF THE UNIT.

CONTROLS

Controls Systems

Methods of Control

Steadyair is available with either of two methods of control: Airstream or Room with Low Limit. Both methods control the discharge temperature of the unit by modulating the coil face and bypass dampers. With Airstream control, the controller is mounted in the unit and has a single sensing element located in the discharge airstream. Room with Low Limit control uses the Airstream controller as its low limit and adds a room thermostat as the primary control.

Pneumatic or Electric Actuators

Both methods of control are available in either electric or pneumatic versions.

The standard electric version uses foot-mounted 24 volt Honeywell damper actuators with Honeywell controllers. In the event of a control failure, the dampers will remain at the last controlling position.

The standard pneumatic version uses Siemens actuators. These actuators close the bypass dampers on the spring return stroke to protect the system in the event of control air pressure failure. Pilot positioners are required.

Controller Setpoints

Steadyair is a make-up air unit and, as such, the delivered air temperature should be at or near that of the room ambient temperature. Using Room with Low Limit control insures that if the Room thermostat is satisfied, the Low Limit controller will not allow the unit discharge to fall below the controller setpoint. Without this, or if the Low Limit temperature was set well below the Room Temperature, unheated air could be introduced into the room, driving the ambient temperature down and requiring the unit to bring it back up. The Room with Low limit Control prevents this unwanted temperature cycling.

Sequence of Operation

When maximum temperature rise is required, the IFB coil face dampers are fully open to the heating sections while the bypass dampers are fully closed. As the discharge temperature approaches the controller setpoint, the bypass dampers will begin to open while the face dampers will begin to close. Once the discharge temperature reaches the controller setpoint, the bypass dampers remain fully open while the face dampers are fully closed.

Note that the IFB coil is designed to operate with full steam pressure or constant water flow. This results in some temperature override when the set point is reached. In the event that this is undesirable, then a slow-acting, two-position (fully open/fully closed) valve should be installed. The use of modulating valves on steam systems when the outdoor air temperatures are below freezing is strongly discouraged as this can lead to coil freeze-ups.

Additional Control Options

Included among the additional control options are:

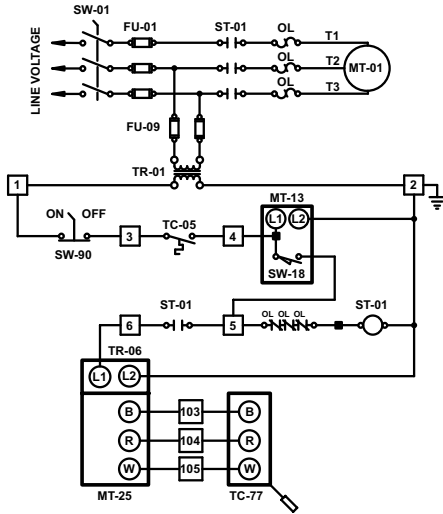
- Freezestat – Uses an averaging sensing element mounted to one heating element to shut down the unit upon sensing a temperature that could potentially lead to a frozen tube or coil.
- Fan Cut-Off Thermostat - Uses a single sensing bulb to shut down the unit upon sensing a discharge temperature that is below the setpoint.

CONTROLS

Control Diagrams

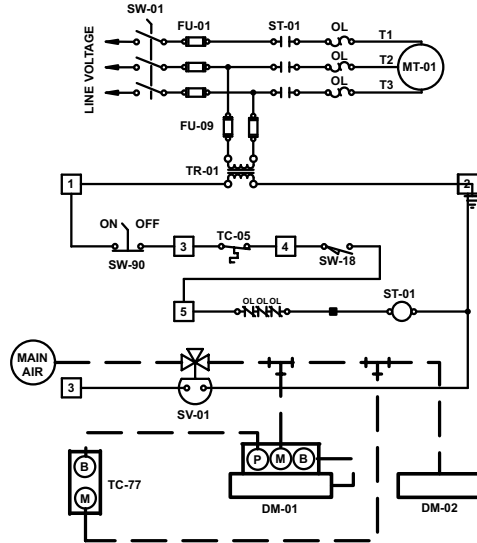
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ELECTRIC AIRSTREAM CONTROL



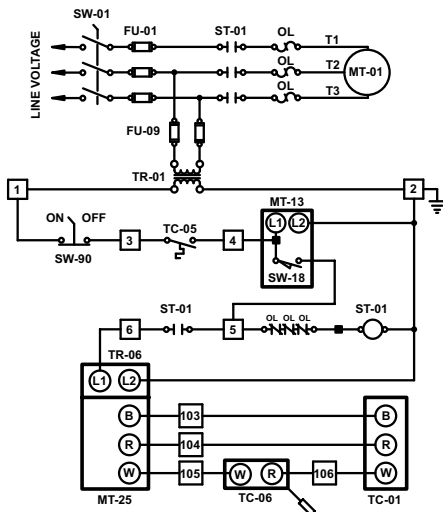
UNIT SHALL BE GROUNDED ACCORDING TO THE LATEST PROVISIONS OF NEC.
CAUTION: OPEN MAIN DISCONNECT SWITCH BEFORE SERVICING EQUIPMENT.

PNEUMATIC AIRSTREAM CONTROL



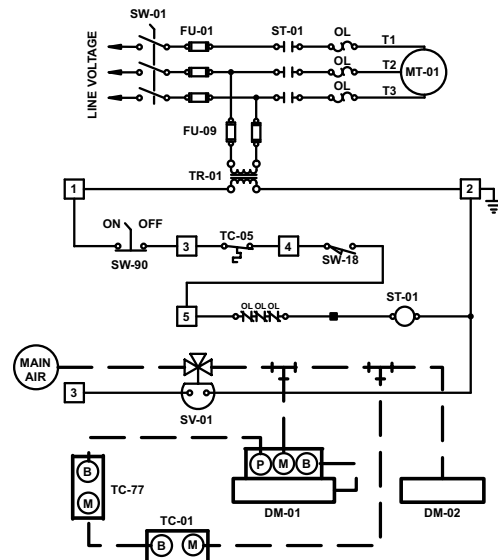
UNIT SHALL BE GROUNDED ACCORDING TO THE LATEST PROVISIONS OF NEC.
CAUTION: OPEN MAIN DISCONNECT SWITCH BEFORE SERVICING EQUIPMENT.

ELECTRIC ROOM AND LOW LIMIT CONTROL



UNIT SHALL BE GROUNDED ACCORDING TO THE LATEST PROVISIONS OF NEC.
CAUTION: OPEN MAIN DISCONNECT SWITCH BEFORE SERVICING EQUIPMENT.

PNEUMATIC ROOM AND LOW LIMIT CONTROL



UNIT SHALL BE GROUNDED ACCORDING TO THE LATEST PROVISIONS OF NEC.
CAUTION: OPEN MAIN DISCONNECT SWITCH BEFORE SERVICING EQUIPMENT.

COMPONENT IDENTIFICATION

DM-01	PNEUMATIC COIL FACE AND BY-PASS DAMPER MOTOR
DM-02	PNEUMATIC OUTSIDE AIR DAMPER MOTOR
FU-01	MAIN DISCONNECT FUSE
FU-09	CONTROL TRANSFORMER FUSE
MT-01	SUPPLY FAN MOTOR
MT-13	ELECTRIC OUTSIDE AIR DAMPER MOTOR
MT-25	ELECTRIC COIL FACE AND BY-PASS DAMPER MOTOR
ST-01	SUPPLY FAN MOTOR STARTER
SV-01	AIR SOLENOID VALVE

COMPONENT IDENTIFICATION

SW-01	MAIN DISCONNECT SWITCH
SW-18	OUTSIDE AIR DAMPER ACTUATOR END SWITCH
SW-90	UNIT ON-OFF SWITCH
TC-01	ROOM THERMOSTAT
TC-05	MANUAL RESET FAN CUT-OFF THERMOSTAT
TC-77	LOW LIMIT DISCHARGE AIR DUCTSTAT
TC-77	AIRSTREAM THERMOSTAT
TR-01	CONTROL TRANSFORMER
TR-06	DAMPER TRANSFORMER

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ELECTRICAL DATA

Amp Draw Table

ITEM	SOURCE	AMPS	MOTOR HORSEPOWER									
			1	1 1/2	2	3	5	7 1/2	10	15		
A	Blower Motor	AMPS for 208V 3 Ph	4.6	6.6	7.5	10.6	16.7	24.2	30.8	46.2		
		AMPS for 230V 3 Ph	4.2	6.0	6.8	9.6	15.2	22.0	28.0	42.0		
		AMPS for 460V 3 Ph	2.1	3.0	3.4	4.8	7.6	11.0	14.0	21.0		
		AMPS for 575V 3 Ph	1.7	2.4	2.7	3.9	6.1	9.0	11.0	17.0		
				MOTOR HORSEPOWER								
				20	25	30	40	50	60	75	100	
				AMPS for 208V 3 Ph	59.4	74.8	88.0	114.0	143.0	169.0	211.0	273.0
				AMPS for 230V 3 Ph	54.0	68.0	80.0	104.0	130.0	154.0	192.0	248.0
		AMPS for 460V 3 Ph	27.0	34.0	40.0	52.0	65.0	77.0	96.0	124.0		
		AMPS for 575V 3 Ph	22.0	27.0	32.0	41.0	52.0	62.0	77.0	99.0		
B	Control Transformer		CONTROL CIRCUIT AMPS									
			AMPS									
			AMPS for 208V 3 Ph	2.4								
			AMPS for 230V 3 Ph	2.2								
			AMPS for 460V 3 Ph	1.1								
		AMPS for 575V 3 Ph	0.9									

NOTES:

1. Above motor amps are based on the latest edition of the National Electrical Code.
2. Control circuit amps are based on standard controls.

Steps to size optional disconnect switch:

1. Find the blower motor HP required from tables on pages 8 to 11.
2. Find amp draw for required motor HP from chart in **Item A** above.
3. Find amps for control circuit from chart in **Item B** above.
4. Add amps from step 2 and step 3, then multiply by 1.25.

SPECIFICATIONS

Specifications

Furnish L.J. Wing Steadyair air handling unit(s) with airflow and heating capacities as shown on the schedule.

Unit Casing

Unit casing and accessories shall be fabricated from heavy gauge steel suitably reinforced to insure rigidity. All panels will be galvanized steel. All casings shall be airtight. **(Outdoor units only:** Casing shall also be weatherproof and the base of the unit shall be adaptable for curb mounting). Complete access shall be provided to all internal components through gasketed access doors.

Blower Section

Each unit shall be supplied with centrifugal forward curved, DWDI fan(s) rated in accordance with AMCA standards. The fan or fans shall be mounted on a solid shaft for single blowers and a hollow shaft for double blowers. Shaft shall be designed for a maximum operating speed not to exceed 75% of its first critical speed. Bearings are to be heavy-duty industrial pre-lubricated type. **(Indoor units only:** Bearings are to be external type.) **(Outdoor units only:** Bearings to have extended grease lines to the control side of the cabinet.) Blowers are to be driven by a V-belt package sized with a capacity that is 25% greater than the motor horsepower. Multiple belt applications must be matched sets. Drives are to be adjustable for motor sizes through 7 ½ HP, and fixed for 10 HP and larger. Motor shall be single-speed (or two-speed) open drip-proof (or totally enclosed fan-cooled) type. Motor to be mounted on an adjustable slide base. **(Indoor unit only:** Motor is to be mounted external to the cabinet. A belt guard shall be provided for protection.) **(Outdoor unit only:** Motor, bearings, and drives shall be mounted inside the cabinet for maximum weather protection).

Controls

Unit shall be furnished with controls on left hand side **(Optional:** right hand side) when facing in the direction of airflow.

Typical Schedule

From example on page 6:

Model no.	Airflow Rate (scfm)	Ent. Air Temp. (degrees F)	Leav. Air Temp. (degrees F)	Heat Transfer (MBtuh)	Steam Pressure (psig)	Condensate load (lbm/hr)	Total S.P. (inches w.c.)	Electrical Service (volt/ph./Hz)	Motor Horsepower (HP)
SAS(W)-118-HRB	5,800	-10	70	503.4	15	532.7	0.58	230/3/60	1-1/2

Heating Coil

The heating coil shall be a horizontal tube integral face and bypass coil consisting of built-in series of finned heating elements and bypasses with interlocked dampers controlled by an electric (or pneumatic) damper motor and an airstream thermostat. Unit casing and dampers shall be fabricated of galvanized steel. Coil shall be capable of maintaining a constant discharge air temperature regardless of variations in the entering air temperature. Full steam pressure (or full hot water flow) shall be provided to the coil at all times.

Proportion of the air shall be such that the air temperature at any point in a plane parallel to the face of the coil three feet downstream from the coil's leaving side will not vary more than 5 degrees F from the average discharge temperature.

Finned heating elements shall be fabricated of seamless copper tubes with rectangular aluminum fins spaced not closer than 12 fins per inch. Each tube shall be brazed to the inlet and return headers. Finned elements shall be factory tested at 500 psig hydrostatic pressure.

Air pressure drop through the coil shall not vary more than plus or minus 5 percent regardless of the internal damper position.

Performance of the coil shall be AHRI-certified. Coil shall be ETL listed to UL standard 1995.

Options:

1. Fixed or revolving discharge
2. Discharge louver box
3. Inlet filter box
4. Roof curb (Outdoor units only)
5. Electric or pneumatic air stream controls
6. Inlet hood with bird screen
7. V-bank filter section
8. Combination V-bank filter with mixing box
9. Electric or pneumatic two-position damper motor
10. Pressure control system
11. Insulated fan box
12. Inlet air damper
13. Vibration feet
14. Blower/motor isolation (rooftop units only)
15. Painted cabinet.

