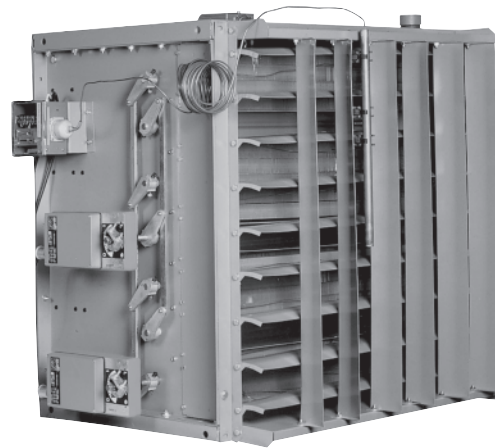


# FAS Fresh Air Supply Units TECHNICAL GUIDE



STEAM AND HOT WATER MAKE-UP AIR HEATERS WITH INTEGRAL  
FACE AND BYPASS COILS FOR EFFECTIVE TEMPERATURE CONTROL

**S**ince 1875, the L.J. Wing Company has been a leader in providing innovative solutions for difficult HVAC problems. Wing FAS Fresh Air Supply units provide heated make-up air for buildings. This technical guide will help you size, select and specify the proper FAS model to satisfy your project's make-up air heating requirements. If you have questions, please contact your local L.J. Wing representative; he will be glad to assist you.

## **TABLE OF CONTENTS**

<i>Make-Up Air Heaters</i> .....	.3
<i>Model Number Description</i> .....	.3
<i>Operation</i> .....	.4
<i>Design and Construction</i> .....	.5
<i>Performance</i> .....	.6
<i>Selection</i> .....	.7-8
<i>Dimensions</i> .....	.9-11
<i>Typical Vertical Unit Installations</i> .....	.12
<i>Controls</i> .....	.12-13
<i>Electrical</i> .....	.14
<i>Piping</i> .....	.15
<i>Typical Specification and Schedule</i> .....	.16



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# MAKE-UP AIR HEATING

## Why the FAS Unit is Needed

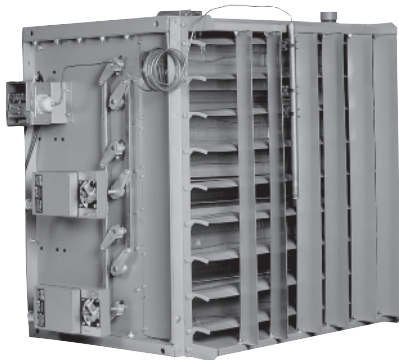
Make-up air is needed to replenish air being exhausted from buildings. Without sufficient fresh air, a negative pressure is created inside the building, starving the flow of air through the exhaust system and hindering its performance. Wing FAS Fresh Air Supply units offer a solution to this problem by delivering a constant volume of fresh tempered air.

FAS Units maintain effective temperature control by using integral face and bypass coils with steam or hot water as the heating source. The integral face and bypass coil concept eliminates the need for modulating control valves.

Fifteen sizes of FAS Units are available to cover a range of airflows from 855 to 26,000 cfm. Designs are available for either vertical or horizontal air flow.

Horizontal Air Flow - Type FASU units are designed for installation in wall openings. Fresh air is drawn in through optional weatherproof hoods or wall louvers (with or without optional filters) and discharged through adjustable vanes to achieve the desired airflow pattern. Discharge vanes may be horizontal, vertical, or both.

Type FASU units are ideal for preheating make-up air for boiler rooms; for further information on this application, please request current Application Manual AMCAP.

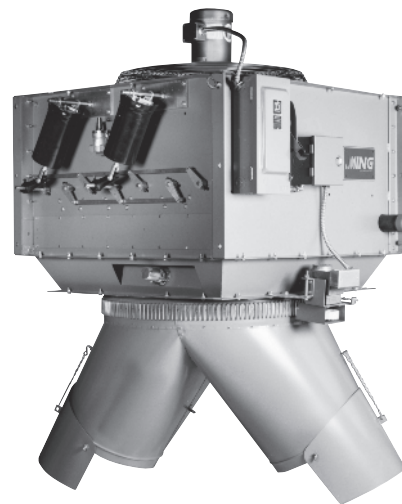


Vertical Air Flow – Vertical FAS Units are designed for ceiling mounting to save valuable floor space. Fresh air is drawn in through the roof-mounted intake air hood then flows downward through the heating section of the FAS Unit. Air is discharged through either a fixed (Type FASHCF) or revolving discharge (Type FASHCR).

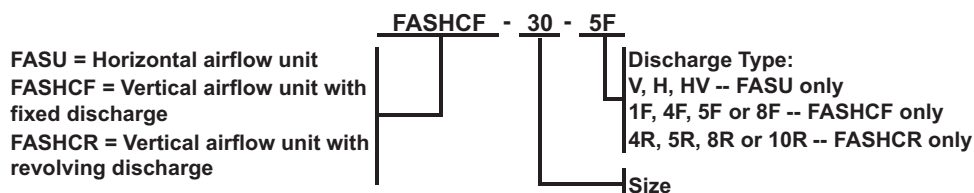
Type FASHCF has four different available fixed discharges to provide heating coverage over a wide range of mounting heights.

Type FASHCR has Wing’s unique revolving discharge that provides an even, gentle movement of tempered fresh air for comfortable ventilation. A small, high-torque gear motor slowly rotates the discharge by means of an idler gear drive. The discharge revolves steadily in a circular motion to cover all directions. The discharge velocity is sufficient to carry tempered air to walls, floor and remote corners. Four different discharge types are available to cover a wide range mounting heights.

By including an optional mixing box upstream of a vertical FAS unit, space heating can be obtained in addition to make-up air heating.



## Model Number Description



# OPERATION

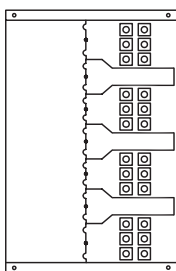
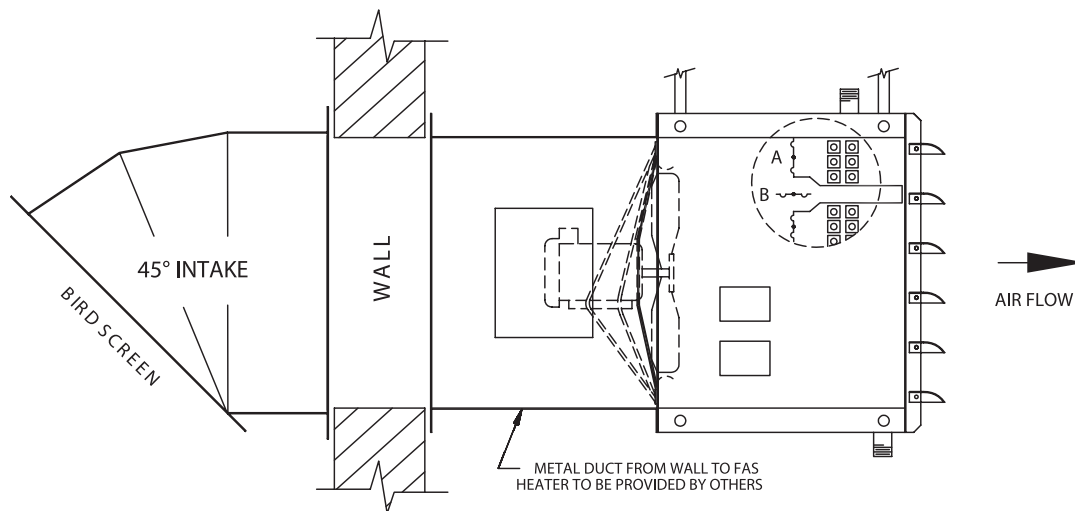
## Integral Face and Bypass Coil Operation

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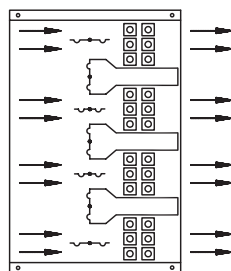
The integral face and bypass coil design incorporated into the FAS heater consists of a number of alternate heating passages (A) and bypass passages (B). Full steam or water flow is maintained in the heated, or “face”, section at all times, while air flowing through the bypass passages is not heated. The integral face and bypass design allows discharge air to blend into a single stream of uniform temperature to satisfy design requirements. Each passage is provided with a volume control damper.

Two synchronized spring-return damper motors are provided, one to operate the face set of dampers and one to operate the bypass set of dampers. The damper motors are actuated by either an airstream or room thermostat as required.

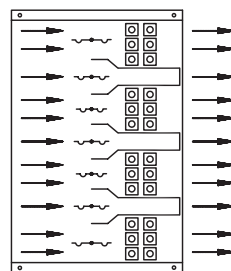
When no fresh air supply is needed, such as during non-operating hours, the fan motor will be off and the damper motors close both sets of dampers to prevent infiltration of cold outside air into the room.



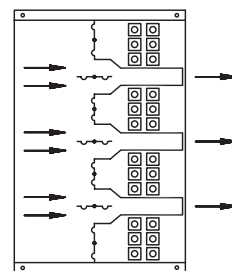
**FIGURE 1**  
WHEN THE UNIT'S FAN IS NOT RUNNING, ALL THE DAMPERS REMAIN CLOSED TO PREVENT INFILTRATION OF OUTSIDE AIR.



**FIGURE 2**  
WHEN MAXIMUM HEAT IS REQUIRED, THE BYPASS DAMPERS ARE COMPLETELY CLOSED AND ALL OUTSIDE AIR IS DIRECTED THROUGH THE HEATING CHANNELS.



**FIGURE 3**  
AS THE OUTSIDE AIR TEMPERATURE RISES NEAR THE THERMOSTAT SETTING, FRESH AIR PASSES THROUGH BOTH THE HEATING AND BYPASS CHANNELS.



**FIGURE 4**  
WHEN THE OUTSIDE AIR TEMPERATURE EXCEEDS THE THERMOSTAT SETTING, THE AIR IS DELIVERED THROUGH THE BYPASS CHANNELS ONLY.

# DESIGN AND CONSTRUCTION

## Construction Details

### Heating element

*Type:* Fin and tube, extended surface type.  
*Tubes:* 3/8" O.D. copper, 0.028" thick wall for service to 200 psig and 400 degrees F. (Optional 90/10 cupronickel and steel are available for higher working pressures and temperatures).

*Fins:* Smooth, rectangular aluminum fins, 0.010" thick; mechanically bonded to the tubes.

*Headers:* Schedule 40 steel, connected to tubes by a brazed joint.

### Casing assembly

*Material:* 14 gauge galvanized steel.

*Attachment to heating elements:* By heavy key plates welded to the headers. Tube ends are guided, spaced and secured against vibration by channel-shaped retainers.

### Face and bypass dampers

*Material:* 16 gauge galvanized steel The heater coil banks and by-pass passages are alternated for proper air proportioning.

### Fan

*Type:* propeller

*Material:* Aluminum through size 27; steel for larger sizes.

### Motor

*Type:* Totally enclosed, fan-cooled (TEFC)

*Frame:* 'C' face frame through size 27; rigid base for larger sizes.

### Finish

*Type:* Air-dried alkyd enamel paint.

## Motor Data

SIZE	CFM (AT INLET)	DIRECT DRIVE MOTOR				BELT DRIVE MOTOR			
		SINGLE PHASE		THREE PHASE		SINGLE PHASE		THREE PHASE	
		HP	RPM	HP	RPM	HP	RPM	HP	RPM
13	855	1/6	1140	1/4	1140	NOT AVAILABLE			
17	1,400	1/6	1140	1/4	1140				
19	2,000	1/4	1140	1/4	1140				
22	2,750	1/4	1140	1/4	1140				
24	3,700	1/2	1140	1/2	1140				
25	4,300	1/2	1140	1/2	1140				
27	5,300	3/4	1140	3/4	1140	3/4	1725	3/4	1725
30	7,000	NOT AVAILABLE		3/4	850	1-1/2	1725	1-1/2	1740
33	8,500			1-1/2	860	1-1/2	1725	1-1/2	1740
36	10,000			1-1/2	860	1-1/2	1725	1-1/2	1740
38	13,000			2	855	2	1725	2	1725
40	16,000			3	865	3	1725	3	1725
41	17,200			3	865	3	1725	3	1725
43	22,000			5	870	5	1725	5	1750
44	26,000			7-1/2	870	7-1/2	1725	7-1/2	1760

### NOTES:

- Integral OSHA-approved fan guards are furnished as standard on all units up to and including size 26. For larger sizes, OSHA-approved fan guards are optional.
- Contact you local L.J. Wing representative to obtain sound data when required.

# PERFORMANCE

## Steam and Hot Water Units

**TABLE 1**

FAS	BASE PERFORMANCE WITHOUT FILTERS			BASE PERFORMANCE WITH FILTERS		
	CFM	BATRS	BATRW	CFM	BATRS	BATRW
13	855	96.3	71.7	600	111.8	87.0
17	1,400	92.4	67.8	800	116.6	91.6
19	2,000	92.2	67.6	1,400	107.4	82.7
22	2,750	96.0	71.4	2,000	109.8	85.1
24	3,700	84.3	60.1	3,000	92.4	67.8
25	4,300	93.8	69.2	3,500	102.5	77.9
27	5,300	85.6	61.3	4,500	92.0	67.4
30	7,000	87.9	63.4	6,600	90.2	65.6
33	8,500	87.2	62.8	8,200	88.6	64.1
36	10,000	87.9	63.4	9,500	89.9	65.3
38	13,000	77.7	55.2	12,400	79.6	56.4
40	16,000	84.6	60.4	15,300	86.3	61.9
41	17,200	81.8	58.1	16,400	83.6	59.6
43	22,000	86.3	61.9	20,500	89.0	64.5
44	26,000	79.9	56.6	25,000	81.4	57.7

Notes:

- (1) BATRS = Base air temperature rise for steam units at 15 psig steam pressure.
- (2) BATRW = Base air temperature rise for water units at 200 degrees F entering water temperature.
- (3) Performance with filters is based on a filter pressure drop = 0.15 inches w.c.

**TABLE 2**

STEAM PRESSURE (PSIG)	SATURATED TEMP., SST (DEGREES F)	LATENT HEAT (BTU/LBM)
5	227	960
10	239	953
15	250	946
20	259	939
30	274	929
40	287	919
50	298	911
60	307	904
70	316	897
80	324	891
90	331	886
100	338	880
120	350	870
140	361	861
160	372	851
180	380	846
200	388	840

**TABLE 3**

FAS SIZE	BASE WATER FLOW RATE, GPMB (GPM)	BASE WATER PRESSURE DROP, WPDB (FT. H2O)
13	13.5	3.7
17	14.8	4.4
19	17.6	5.0
22 & 24	23.5	6.9
25 & 27	35.0	10.0
30	49.0	5.8
33	58.0	7.7
36 & 38	70.0	9.4
40 & 41	103.0	10.0
43 & 44	147.0	10.0

**TABLE 4**

WATER FLOW RATE/BASE WATER FLOW RATE (---)	ATR CORRECTION FACTOR, ATRF (----)	WPD CORRECTION FACTOR, WPDF (----)
1.5	1.040	2.25
1.2	1.020	1.44
1.0	1.000	1.00
0.8	0.965	0.64
0.6	0.910	0.36
0.5	0.860	0.26

# SELECTION

## Steam Units

1. Select FAS Unit with or without filters to meet project make-up air requirements from Table 1.
2. Read the base air temperature rise for steam units, BATRS, from Table 1.
3. Calculate the air temperature rise correction factor, ATRS:  $ATRS = (SST - EAT) / 250$   
where SST = Saturated steam temperature from Table 2 and EAT = Entering air temperature as given.  
Calculate heat transfer, Q:
4.  $Q = 1.085 \times CFM \times ATRS \times BATRS$   
where CFM = Airflow from Table 1.
5. Calculate the air temperature leaving the FAS unit, LAT:  $LAT = EAT + (BATRS \times ATRS)$
6. Calculate the condensate load, CL:  $CL = Q / LH$   
where LH = Latent Heat from Table 2.

**Example:** Select FAS unit without filters for 7,000 CFM of make-up air using 5 psig steam to heat outside air at -12 degrees F.

### **Solution:**

1. For 7,000 CFM, choose an FAS-30 from Table 1.
2. Also from Table 1, BATRS = 87.9 degrees F for an FAS-30.
3. From Table 2, SST = 227 degrees F, so:  
 $ATRS = (227 - (-12)) / 250 = 0.956$
4.  $Q = 1.085 \times 7,000 \times 87.9 \times 0.956 = 638,200$  Btuh
5.  $LAT = -12 + (87.9 \times 0.956) = 72.0$  degrees F
6. From Table 3, LH = 960, so:  
 $CL = 638,200 / 960 = 664.8$  lb/hr.

## Hot Water Units

1. Select FAS Unit with or without filters to meet project make-up air requirement from Table 1.
2. Read the base air temperature rise for water units, BATERW, from Table 1.
3. Calculate the air temperature rise correction factor, ATRW:  
 $ATRW = (EWT - EAT) / 200$   
where EWT = Entering water temperature as given and EAT = Entering air temperature as given.
4. Using the given water flow rate, calculate the ratio to Base Water Flow Rate from Table 3.
5. Using the ratio of step 4, look up the Air Temperature Rise correction factor due to gpm, ATRF, from Table 4.
6. Calculate the Heat transfer, Q:  
 $Q = 1.085 \times CFM \times (BATERW \times ATRW \times ATRF)$   
where CFM = Airflow from Table 1.
7. Calculate the air temperature leaving the FAS unit, LAT:  
 $LAT = EAT + (BATERW \times ATRW \times ATRF)$
8. Read the Base Water Pressure Drop, WPDB, from Table 3 for the unit selected.
9. Read the Water pressure Drop correction factor due to flow, WPDF, from Table 4 using the flow ratio of Step 4.
10. Calculate the water pressure drop, WPD:  
 $WPD = WPDB \times WPDF$
11. Calculate the Water temperature Drop, WTD:  
 $WTD = Q / (500 \times GPM)$

**Example:** Select FAS unit with filters for 4,300 CFM of make-up air using 42.0 gpm of 210 degrees F water to heat outside air at 0 degrees F.

### **Solution:**

1. For 4,300 CFM, choose an FAS-25 from Table 1.
2. Also from Table 1, BATERW = 69.2 degrees F for an FAS-25.
3.  $ATRW = (210 - 0) / 200 = 1.05$
4. From Table 3, base water flow rate = 35 gpm.  
Water flow rate/base water flow rate =  $42.0 / 35 = 1.20$ .
5. From Table 4 at Water flow rate/ base water flow rate = 1.20: ATRF = 1.02.
6.  $Q = 1.085 \times 4,300 \times (69.2 \times 1.05 \times 1.02) = 345,800$  Btuh.
7.  $LAT = 0 + (69.2 \times 1.05 \times 1.02) = 74.1$  degrees F.
8. From Table 3 for FAS-25: WPDB = 10.0 feet H<sub>2</sub>O.
9. From Table 4 at a water flow ratio of 1.20:  
WPDF = 1.44.
10.  $WPD = (10.0 \times 1.44) = 14.4$  ft. H<sub>2</sub>O.
11.  $WTD = 345,800 / (500 \times 42.0) = 16.5$  degrees F.

# SELECTION

## Vertical Unit Discharges

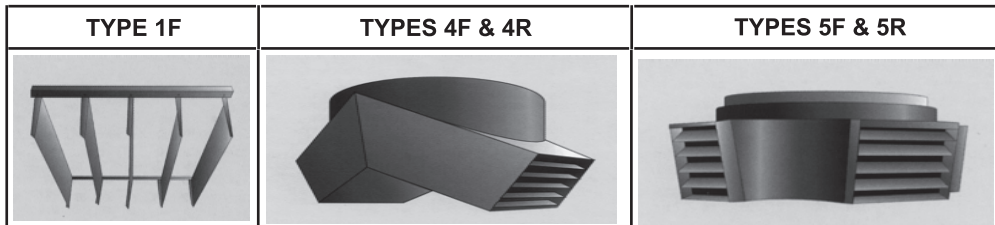
**Example:** Select a discharge for a size 36 vertical FAS unit to be mounted 31 feet above the floor to distribute heated fresh air over an area of 105 feet by 105 feet.

**Solution:** Evaluating each of the discharge types:  
Types 1F and 4F: Do not give either the required coverage or meet the mounting height requirement.

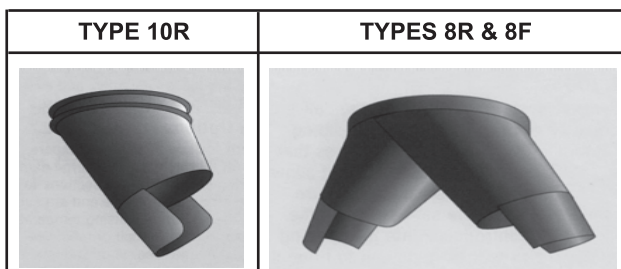
Types 4R, 5R and 5F: Coverages are acceptable but do not meet the mounting height requirement.

Type 8F: Does not give the required coverage.

Types 8R and 10R: Meet both the coverage as well as the mounting height requirements. Proper choice is a Type 8R discharge as it most closely matches the area coverage and mounting height requirements.



SIZE	TYPE 1F		TYPES 4F & 4R			TYPES 5F & 5R		
	MH	CF	MH	CR	CF	MH	CR	CF
13	10	20x40	10	43x43	22x43	8	43x43	43x43
17	12	26x52	11	56x56	28x56	9	56x56	56x56
19	14	29x58	12	63x63	32x63	10	63x63	63x63
22	16	33x66	14	73x73	37x73	12	73x73	73x73
24	17	35x70	15	76x76	38x76	12	76x76	76x76
25	18	38x76	16	83x83	42x83	13	83x83	83x83
27	19	39x78	17	86x86	43x86	14	86x86	86x86
30	22	45x90	19	105x105	52x105	15	99x99	99x99
33	23	49x99	20	115x115	57x115	16	109x109	109x109
36	24	54x108	21	120x120	60x120	17	119x119	119x119
38	26	55x112	24	145x145	72x145	18	125x125	125x125
40	28	60x115	25	152x152	76x152	19	132x132	132x132
41	29	63x120	27	160x160	80x160	20	135x135	135x135
43	31	65x122	31	180x180	90x180	21	139x139	139x139
44	34	65x122	34	195x195	97x195	24	150x150	150x150



SIZE	TYPE 10R		TYPES 8R & 8F		
	MH	CR	MH	CR	CF
13	----	----	12	39x39	20x39
17	----	----	14	51x51	26x51
19	----	----	16	57x57	28x57
22	----	----	18	66x66	33x66
24	----	----	19	69x69	35x69
25	----	----	20	75x75	38x75
27	----	----	21	78x78	39x78
30	33	98x98	28	90x90	45x90
33	37	110x110	30	100x100	50x100
36	39	118x118	32	108x108	54x108
38	46	127x127	40	114x114	57x114
40	51	132x132	43	120x120	60x120
41	56	136x136	48	124x124	62x124
43	68	150x150	58	130x130	65x130
44	73	160x160	63	140x140	70x140

**Notes:**

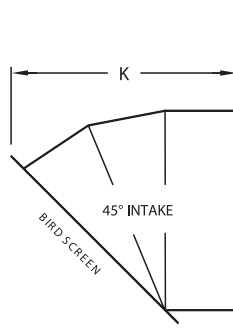
- MH = Mounting height in feet  
CF = Coverage in feet for a fixed discharge;  
CR = Coverage in feet for a revolving discharge.
- Mounting height is the distance from the floor to the bottom of the discharge outlet.
- Mounting height and coverage are based on 90 deg. F EAT and 65 deg. F floor temperature. For operation at other conditions, consult your Wing representative for recommendations.



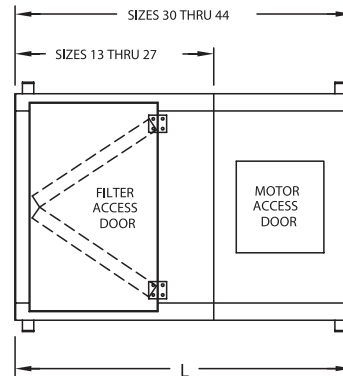
# DIMENSIONS

## Horizontal Units

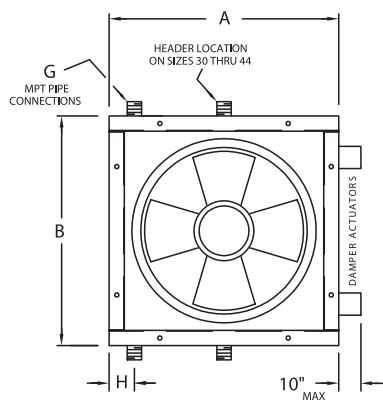
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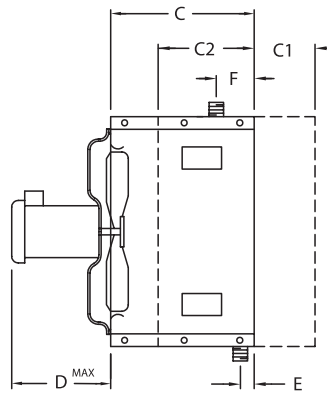
WALL INTAKE HOOD



FILTER BOX

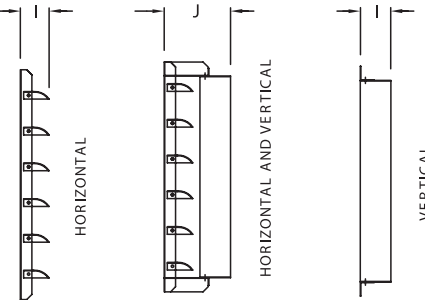


MODEL FASU  
SAME FOR FASHCF  
AND FASHCR



DIRECT DRIVE ASSEMBLY  
SIZES 13 THRU 44  
BELT DRIVE ALSO AVAILABLE  
ON SIZES 30 THRU 44

C = STANDARD HEATER CASING DEPTH  
C1 = OPTIONAL DISCHARGE DAMPER DEPTH  
C2 = OPTIONAL SHORTDEPTH HEATER CASING



DISCHARGE LOUVER ASSEMBLY FURNISHED  
AND MOUNTED ON THE UNIT AT THE FACTORY

FAS	DIMENSIONS														WEIGHTS			
	A	B	C	C1	C2	D	E	F	G	H	I	J	K	L	B1	B2	WI	FB
13	19 3/4	19 3/4	17	7	12	11 11/16	3 9/32	1 5/32	1 1/2	2 9/16	3 5/16	6 1/2	19 1/16	26 1/2	115	126	30	40
17	22 3/4	22 3/4	17	7 1/2	12	11 3/16	3 7/16	1 15/16	1 1/2	2 9/16	3 5/16	6 1/2	21 7/32	21	127	139	40	45
19	27 3/4	27 3/4	21	7 1/2	12	11 3/16	3 25/32	1 15/32	1 1/2	2 3/4	3 5/16	6 1/2	24 3/4	28	183	200	55	65
22	32 3/4	32 3/4	21	7	12	11 1/4	3 27/32	1 13/32	1 1/2	2 3/4	3 5/16	6 1/2	28 9/32	31	253	276	70	80
24	32 3/4	32 3/4	21	7	12	11 1/4	3 27/32	1 13/32	1 1/2	2 3/4	3 5/16	6 1/2	28 9/32	31	233	257	70	80
25	39 1/8	39 1/8	22	8	13	11 1/4	4 5/16	1 11/16	2	3 7/16	4 5/16	8 1/2	32 3/32	37	301	335	95	120
27	39 1/8	39 1/8	22	8	13	10 13/16	4 5/16	1 11/16	2	3 7/16	4 5/16	8 1/2	32 3/32	37	310	344	95	120
30	50 1/8	45 1/8	28	8	14	16 7/8	5 3/8	2	2 1/2	25 1/16	4 5/16	8 1/2	35 5/16	42	577	628	125	200
33	60 3/4	45 1/8	28	8	14	18 1/4	5 3/8	2	2 1/2	30 3/8	4 5/16	8 1/2	36 5/16	50	649	709	150	240
36	60 3/4	49 3/4	32 1/8	8	16	18 5/8	8 1/4	4 1/4	3	30 3/8	4 5/16	8 1/2	39 19/32	44	741	806	165	275
38	60 3/4	49 3/4	32 1/8	8	16	17 15/16	8 1/4	4 1/4	3	30 3/8	4 5/16	8 1/2	39 19/32	44	781	846	165	275
40	73	57	40	9	20	22 5/16	8 1/8	4 1/8	3	36 1/2	4 5/16	8 1/2	44 23/32	48	880	972	230	360
41	73	57	40	9	20	22 5/16	8 1/8	4 1/8	3	36 1/2	4 5/16	8 1/2	44 23/32	48	880	972	230	360
43	73 1/8	80 1/4	44	9	20	23 13/16	8 1/8	4 1/8	3	1 3/4	4 5/16	8 1/2	61 9/32	50	1,636	1,748	365	445
44	73 1/8	80 1/4	44	9	20	22 1/16	8 1/8	4 1/8	3	1 3/4	4 5/16	8 1/2	61 9/32	50	1,671	1,783	365	445

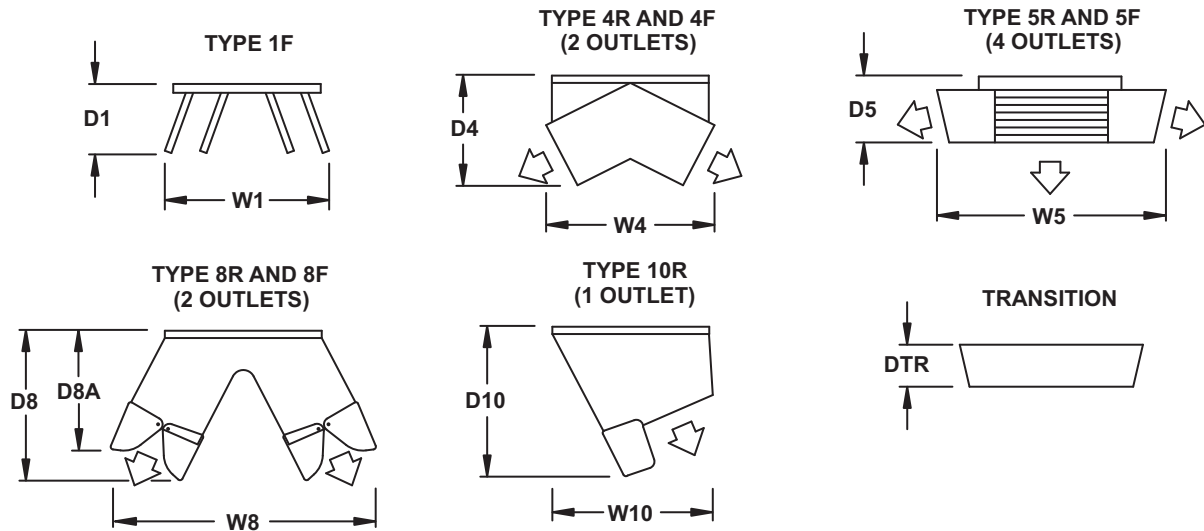
Notes:

- All dimensions in inches.
- All weights in pounds.
- Weight nomenclature: B1 = Base Horizontal Unit with Horizontal or Vertical blade discharge; B2 = Base Horizontal Unit with Horizontal and Vertical blade discharge; WI = Wall Intake; FB = Filter Box.
- Dimensions A through H apply to both Horizontal (FASU) and Vertical (FASHCF and FASHCR) units.

# DIMENSIONS

## Dimensions for Vertical Units

C000650A



FAS	DIMENSIONS (inches)											
	D1	W1	D4	W4	D5	W5	D8	D8A	W8	D10	W10	DTR
13	7 1/8	27 1/8	17 3/8	25 3/4	10 1/8	25 1/2	24 3/8	22 3/8	35 1/2	----	----	5
17	7 1/8	27 1/8	17 3/8	25 3/4	10 1/8	25 1/2	24 3/8	22 3/8	35 1/2	----	----	5
19	7 1/8	31 1/8	18 9/16	25	11 1/8	28 15/16	27 9/16	24 13/16	41	----	----	5
22	8 1/8	38 1/16	21	29 1/4	11 7/8	34 1/2	29 7/8	26 7/8	47 1/2	----	----	5
24	8 1/8	38 1/16	21	29 1/4	11 7/8	34 1/2	29 7/8	26 7/8	47 1/2	----	----	5
25	9 1/8	45	24 7/8	39	14 3/4	40	31 1/2	28 1/4	53 1/2	----	----	5
27	9 1/8	45	24 7/8	39	14 3/4	40	31 1/2	28 1/4	53 1/2	----	----	5
30	10 1/8	52 3/8	28 1/4	42	17 3/8	50	35 1/2	33 3/4	64	40 1/2	39 11/16	9
33	10 1/8	52 3/8	28 1/4	42	17 3/8	50	35 1/2	33 3/4	64	40 1/2	39 11/16	9
36	10 1/8	58 3/8	35 1/4	47 1/4	20 1/16	57	47 1/16	43 5/16	77	45 13/16	44 9/16	9
38	10 1/8	58 3/8	35 1/4	47 1/4	20 1/16	57	47 1/16	43 5/16	77	45 13/16	44 9/16	9
40	10 1/8	64 7/8	39 1/4	54	21 15/16	66 1/2	54 9/16	49 5/16	89 1/2	52 9/16	53 3/16	12
41	10 1/8	64 7/8	39 1/4	54	21 15/16	66 1/2	54 9/16	49 5/16	89 1/2	52 9/16	53 3/16	12
43	10 1/8	64 7/8	42 1/8	54	23 11/16	66 1/2	53 7/16	47 7/16	86	50 3/16	56	16
44	10 1/8	64 7/8	42 1/8	54	23 11/16	66 1/2	53 7/16	47 7/16	86	50 3/16	56	16

Notes: (1) Values shown for D4, D5, D8, and D8A apply to revolving discharge only. To get dimension of fixed discharge, subtract 13/16" from values shown for sizes 13 through 33 and for larger sizes, subtract 1 3/4".

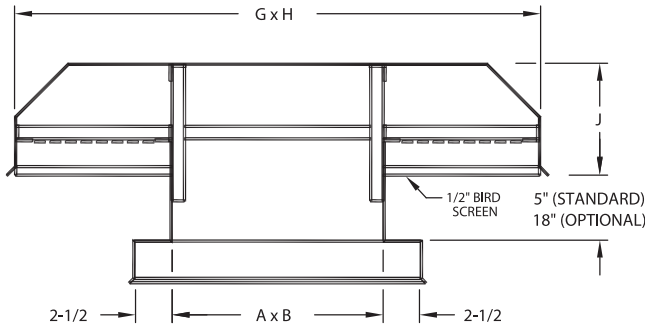
(2) To get overall unit height including the transition and discharge, add dimensions C plus D from page 9 to dimension DTR and either D4, D5, D8, or D10 as appropriate from the above table.

FASHCF, FASHCR	Total Unit Weight with Discharge of Stated Size (lbs.)							
	1F	4F	4R	5F	5R	8F	8R	10R
13	123	143	149	144	149	143	148	----
17	133	154	159	154	160	153	159	----
19	195	224	231	221	228	223	229	----
22	263	305	313	297	304	302	309	----
24	251	293	300	284	291	289	296	----
25	330	376	414	375	414	371	409	----
27	339	385	423	384	423	380	418	----
30	619	693	737	695	740	687	732	725
33	702	775	820	778	822	769	814	807
36	788	903	1,007	885	989	893	997	971
38	834	949	1,053	932	1,036	939	1,044	1,017
40	1,149	1,293	1,412	1,322	1,442	1,287	1,407	1,377
41	1,149	1,293	1,412	1,322	1,442	1,287	1,407	1,377
43	1,738	1,887	2,007	1,919	2,039	1,871	1,990	1,967
44	1,773	1,922	2,042	1,954	2,074	1,906	2,025	2,002

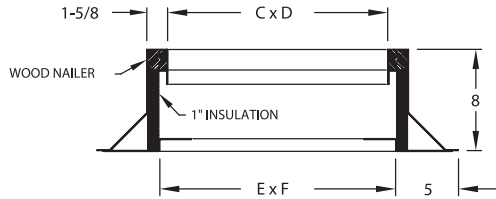
# DIMENSIONS

## Accessories for Vertical Units

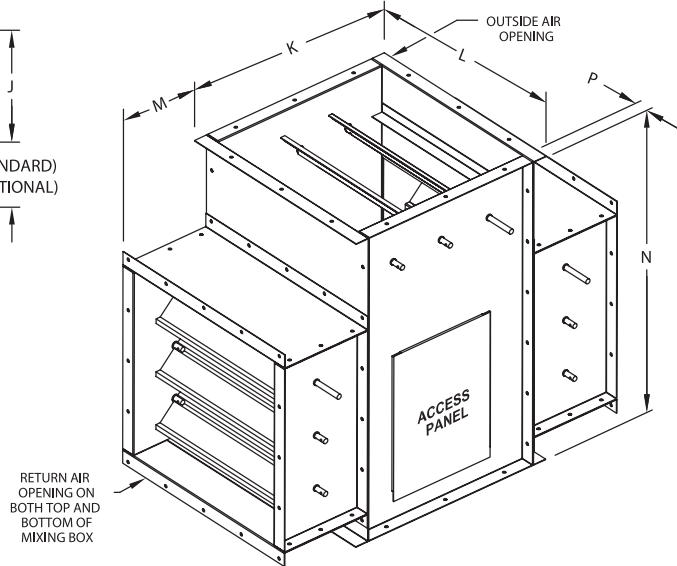
C000621



INTAKE HOOD



FLAT ROOF CURB SECTION



MIXING BOX

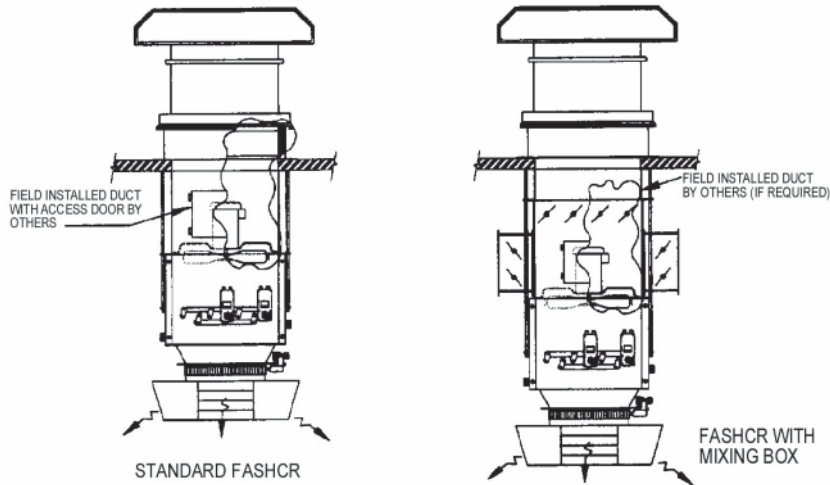
FAS	DIMENSIONS														WEIGHTS		
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	IH	RC	MB
13	14 3/4	14 3/4	15 1/2	15 1/2	16 3/4	16 3/4	27	27	6 1/4	19 3/4	19 3/4	8 1/2	30	1 1/2	225	23	115
17	17 3/4	17 3/4	18 1/2	18 1/2	19 3/4	19 3/4	31 1/4	32	7 1/4	22 3/4	22 3/4	8 1/2	33	1 1/2	261	25	140
19	22 3/4	22 3/4	23 1/2	23 1/2	24 3/4	24 3/4	40 1/16	41	8 1/4	27 3/4	27 3/4	8 1/2	33	1 1/2	321	29	185
22	27 3/4	27 3/4	28 1/2	28 1/2	29 3/4	29 3/4	48 7/8	49	10 1/4	32 3/4	32 3/4	8 1/2	30	1 1/2	381	34	195
24	27 3/4	27 3/4	28 1/2	28 1/2	29 3/4	29 3/4	48 7/8	49	10 1/4	32 3/4	32 3/4	8 1/2	30	1 1/2	381	34	195
25	33 1/8	33 1/8	33 7/8	33 7/8	35 1/8	35 1/8	58	59	11 1/4	39 1/8	39 1/8	8	34	2	446	39	250
27	33 1/8	33 1/8	33 7/8	33 7/8	35 1/8	35 1/8	58	59	11 1/4	39 1/8	39 1/8	8	34	2	446	39	250
30	44 1/8	39 1/8	44 7/8	39 7/8	46 1/8	41 1/8	68 7/8	78	13 1/4	50 1/8	45 1/8	8	34	2	548	48	330
33	54 3/4	39 1/8	55 1/2	39 7/8	56 3/4	41 1/8	68 7/8	97	14 1/4	60 3/4	45 1/8	8	34	2	611	53	340
36	54 3/4	43 3/4	55 1/2	44 1/2	56 3/4	45 3/4	77 1/16	97	15 1/4	60 3/4	49 3/4	8	34	2	639	55	355
38	54 3/4	43 3/4	55 1/2	44 1/2	56 3/4	45 3/4	77 1/16	97	15 1/4	60 3/4	49 3/4	8	34	2	639	55	355
40	67	51	67 3/4	51 3/4	69	53	89 13/16	118	18 1/4	73	57	8	40	2	756	64	515
41	67	51	67 3/4	51 3/4	69	53	89 13/16	118	18 1/4	73	57	8	40	2	756	64	515
43	66 7/8	74	67 5/8	74 3/4	68 7/8	76	111	145	24	72 7/8	80	8	53	2	893	81	740
44	66 7/8	74	67 5/8	74 3/4	68 7/8	76	111	145	24	72 7/8	80	8	53	2	893	81	740

Notes:

1. All dimensions in inches.
2. All weights in pounds.
3. Weight nomenclature: IH = Intake Hood; RC = Roof Curb; MB = Mixing Box.

# TYPICAL INSTALLATIONS AND CONTROLS

## Typical Vertical Installations



## Control Systems

### Methods of Control

The FAS 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 face and bypass dampers. With Airstream control, the controller is mounted on 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 direct-coupled 24 volt damper actuators with compatible controllers. Consult factory for availability of controls by specific manufacturers.

### Controller Setpoints

The FAS heater is a make-up air system and, as such, the delivered air temperature should be at or near that of the room ambient temperature. With Room with Low Limit control, this insures that if the Room thermostat is satisfied, the Low Limit controller will not allow the unit discharge to fall below the desired temperature. Without this, or if the Low Limit were set well below the Room, 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 face dampers are fully open to the heating sections while the bypass dampers are fully closed. With electric actuators, as the discharge temperature approaches the controller setpoint, the bypass dampers will begin to open. Once the bypass dampers are fully open, if even less temperature rise is required, the face dampers will begin to close. With pneumatic actuators, as the discharge temperature approaches the controller setpoint, the bypass dampers will begin to open while the face dampers begin to close.

### Shutoff Feature

When the unit is shut down, both the face and bypass dampers close to prevent the infiltration of cold outside air. There is no need for a separate motorized shutoff damper.

### Additional Control Options

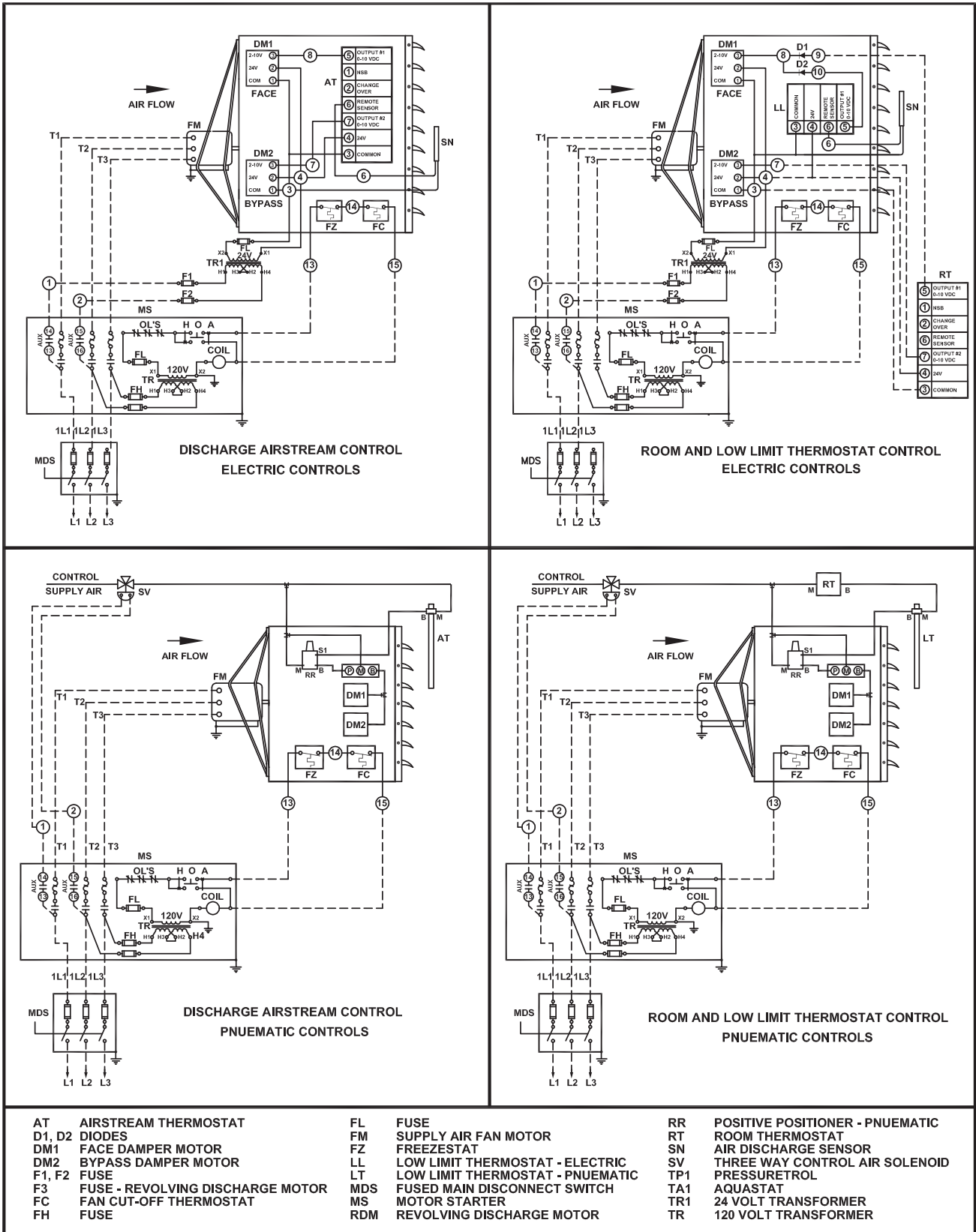
Included among the additional control options are:

- 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 temperature that could potentially lead to a frozen tube or coil.
- Discharge Dampers – Can be installed on the leaving side of the face sections to minimize temperature override.

# CONTROLS

## Control Arrangements

C000608A



# ELECTRICAL

## Amp Draw Table

ITEM	SOURCE	ELECTRICAL SERVICE	MOTOR AMPS AT GIVEN MOTOR HORSEPOWER							
			1/2	3/4	1	1 1/2	2	3	5	7 1/2
A	Fan Motor	208V 3 Ph	2.4	3.5	4.6	6.6	7.5	10.6	16.7	24.2
		230V 3 Ph	2.2	3.2	4.2	6.0	6.8	9.6	15.2	22.0
		460V 3 Ph	1.1	1.6	2.1	3.0	3.4	4.8	7.6	11.0
		575V 3 Ph	0.9	1.3	1.7	2.4	2.7	3.9	6.1	9.0
B	Control Transformer	ELECTRICAL SERVICE	CONTROL CIRCUIT AMPS							
		208V 3 Ph	0.5							
		230V 3 Ph	0.4							
		460V 3 Ph	0.2							
		575V 3 Ph	0.2							

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.
3. Steps to size optional disconnect switch:
  - A. Using the required fan motor HP from page 5 and the given electrical service, look up the fan motor amp draw from Item A in the above chart.
  - B. Look up the control circuit amps from Item B in above chart.
  - C. Add Fan Motor amps from Step A to Control Circuit amps of Step B, then multiply result by 1.25 to get required size of optional disconnect switch.

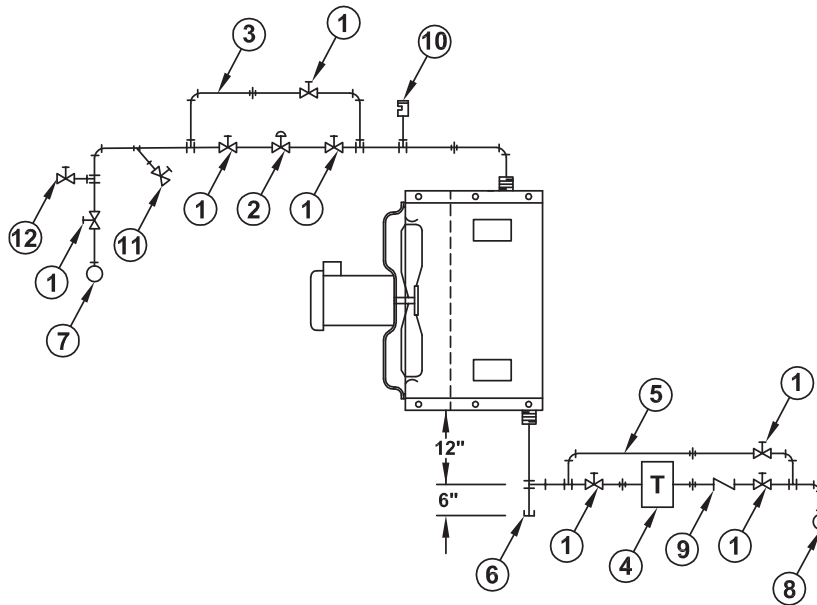
## Wiring

All units should be equipped with either a manual or a magnetic starter. (Both of these items are available as options). They may be factory-mounted and wired or shipped loose. For your convenience, both NEMA-rated and IEC-rated starters are offered.

Smaller single-phase motors may be controlled with a line voltage thermostat, while larger single phase and all three phase motors require a magnetic starter, with the thermostat controlling the holding coil.

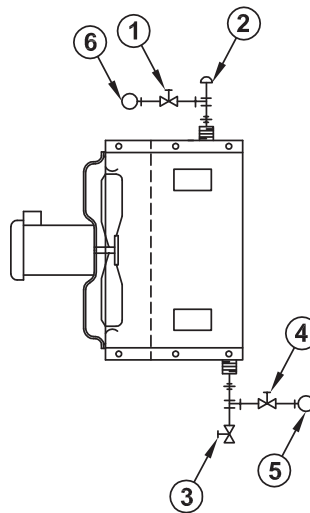
Models equipped with revolving discharges are supplied with the "R" drive motor pre-wired. Units supplied for any electrical service other than 115 volts/single-phase or 230 volts/three-phase are factory equipped with a step-down transformer.

### HU AND FAS UNIT HEATER STEAM PIPING DIAGRAM



#### STEAM PIPING LEGEND (FOR GRAVITY ATMOSPHERIC RETURN SYSTEMS)

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>1. GLOBE OR GATE VALVE</li> <li>2. OPTIONAL MOTORIZED SHUT-OFF VALVE</li> <li>3. BY-PASS TO ALLOW SERVICING OF MOTORIZED VALVE.<br/>BY-PASS LINE TO BE THE SAME SIZE AS MOTORIZED VALVE.</li> <li>4. INVERTED BUCKET OR COMBINATION FLOAT AND THERMOSTATIC TRAP WITH VENT.</li> <li>5. BY-PASS TO PERMIT SERVICING OF TRAP. BY-PASS TO BE ONE PIPE SIZE LARGER THAN TRAP ORIFICE.</li> <li>6. DIRT POCKET AND DRIP LEG. TO BE THE SAME SIZE AS THE HEATER CONDENSATE RETURN LINE.</li> </ul> | <ul style="list-style-type: none"> <li>7. STEAM SUPPLY MAIN.</li> <li>8. CONDENSATE RETURN MAIN.</li> <li>9. 15° SWING CHECK VALVE.</li> <li>10. 1/2" SPRING LOADED VACUUM BREAKER VENTED TO ATMOSPHERE.</li> <li>11. STEAM STRAINER WITH BLOW-DOWN VALVE.</li> <li>12. 1/2" DRAIN VALVE. TO BE OPENED WHEN GLOBE OR GATE SHUTOFF VALVE IS CLOSED.</li> </ul> |
|---|---|



#### HOT WATER PIPING LEGEND

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>1. GLOBE OR GATE VALVE</li> <li>2. AUTOMATIC AIR VENT</li> <li>3. COIL DRAIN VALVE</li> </ul> | <ul style="list-style-type: none"> <li>4. WATER FLOW CONTROL VALVE</li> <li>5. HOT WATER SUPPLY LINE</li> <li>6. HOT WATER RETURN LINE</li> </ul> |
|--|---|

# TYPICAL SPECIFICATION AND SCHEDULE

## Typical Specification

### General

Furnish a factory-assembled FAS Fresh Air supply unit as manufactured by L.J. Wing, Dallas, TX, to heat outside air. Performance shall be as shown in the schedule. Unit shall be capable of maintaining discharge air temperature regardless of fluctuations in inlet air temperature. Each unit shall consist of a heater section containing an integral face and bypass coil consisting of built-in multiple alternate finned heating elements and bypasses. Separate dampers shall control the airflow through these face and bypass sections. Each set of dampers shall be interlocked and controlled by a separate electric or pneumatic damper motor as scheduled. Finned heating elements shall be fabricated of seamless return bend type 3/8" o.d. copper (Optional: 90/10 cupronickel or steel) tubes with rectangular 0.010" thick aluminum fins. Each tube shall be secured to the headers by a brazed joint. The opposite end of the tubes shall be secured by channel-shaped retainers that permit expansion and contraction. Finned elements shall be factory tested with 500 psig hydrostatic pressure. Unit shall have a propeller type fan blade driven by a TEFC motor with characteristics as scheduled. Casing and discharge shall be constructed of galvanized sheet metal.

### Controls

Unit shall be furnished with \_\_\_\_\_ (indicate either "Airstream Control with a thermostat to provide a constant discharge temperature regardless of inlet air temperature fluctuations", or "Room with Low Limit Control having a room thermostat and overriding low limit thermostat to prevent the unit's discharge temperature from falling below the desired minimum.")

### Discharge – Horizontal Units

Unit shall have a discharge consisting of \_\_\_\_\_ (indicate either "horizontal vanes for maximum horizontal airflow projection"; "vertical vanes for maximum airflow spread"; or "horizontal and vertical vanes for adjustable airflow projection and spread"). Discharge shall be attached to and supported by flanged brackets bolted to outlet of the unit for easy vane positioning.

### Discharge - Vertical Units

Unit shall be provided with a (fixed discharge) (revolving discharge consisting of a gear-driven revolving outlet mounted on a sheet steel air chamber that is properly balanced and suspended from the unit casing on a dual, pre-lubricated, sealed ball bearing assembly). (Type 8F, 8R and 10R only: Each outlet opening shall be fitted with adjustable deflectors to permit adjusting the discharged air to provide proper coverage at the floor.)

### Finish

Unit casing and discharge shall be painted inside and out with an air-dried alkyd enamel finish.

### Intake Hood (optional)

Unit shall be furnished with an intake hood fashioned of heavy gauge sheet steel with 45 angular degree overhang and turned-up flange to prevent water from entering the unit. Intake shall be covered with bird screen to keep out animals and debris.

### Filter Box (optional)

Unit shall be equipped with a filter box fabricated of heavy gauge sheet steel, complete with \_\_\_\_\_ (indicate "throwaway" or "cleanable") filters.

## Typical Schedule

Model no.	Airflow Rate (scfm)	Ent. Air Temp. (degrees F)	Leav. Air Temp. (degrees F)	Steam Pressure (psig)	Condensate load (lbm/hr)	External S.P. (inches w.c.)	Electrical Service (volt/ph./Hz)	Motor Horsepower (HP)
FASU-30-HV	7,000	-12	72	5	664.8	0	208/3/60	3/4