



SOLUTION ENGINEERING GUIDE



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General Information

EXPERIENCE

Solution™ Custom air-handling units (AHUs) from YORK®—the only names you need to know for a line that has no limits. YORK engineers have developed an AHU line that is so flexible, and able to deliver such high standards of performance, that it can handle virtually any application. Whatever the air-handling challenge—IAQ, acoustics, energy, controls, you name it—YORK can build a Solution Custom AHU that will meet your needs.

FLEXIBILITY

Solution Custom AHUs offer the ultimate in dimensional, material, and component flexibility. This gives you the versatility to meet any air-system requirement.



Dimensional Flexibility: You can design Solution Custom AHUs to fit the application and the space. Length, height and width can all be varied to match building constraints. With variable aspect cross-sectional possibilities, you choose the best match for the application. In addition, all Solution Custom AHU components have been designed with a variable-aspect ratio to meet your space and air-velocity requirements.

Material Flexibility: A complete line of construction materials are available, including G-90 galvanized steel, aluminum, painted steel, stainless steel, and more. Solution Custom AHUs can handle a multitude of environments, from the most benign to the most corrosive.

Component flexibility: Today's AHUs are responsible for providing the built environment with quality indoor air, in an energy-efficient and quiet manner. Solution Custom AHUs help you meet that responsibility by offering every available component, from energy wheels to UV lights, from air-monitoring stations to specialty-purpose filters. And as technology creates new capabilities, YORK will apply these to our Solution Custom line.



PERFORMANCE

How an air-handling unit is designed and built determines how well it performs, and Solution Custom AHUs are built for performance. They have been tested in accordance with ARI Standard 430, evaluating the performance of the entire unit. They have also undergone extensive and rigorous testing to verify conformance with all U.S. and Canadian safety standards, and they bear the ETL Label.

IAQ



AHU leakage is an enemy of indoor air quality. It can deteriorate the quality of the supply air by allowing dirty, unfiltered air to seep into the airstream downstream of the filters. To prevent this leakage, the rigid, thermally superior panels of Solution Custom AHUs are matched with a rugged framework to provide impressive casing performance.

The maximum allowable air leakage is less than 1% at +/- 8" w.g. and a maximum L/240 deflection.

Micro-organisms can flourish in drain pans when cooling-coil condensate remains there during "off" or "heating" cycles. Solution Custom units remove that condensate with a multi-sloped drain pan that ensures positive drainage. Our pan design also offers the highest level of accessibility for periodic cleaning,



General Information

now required by ASHRAE Standard 62-2001. For added protection against microbial growth, anti-microbial coatings and ultraviolet lamps are available to kill fungus and molds, minimizing allergens and allergy-causing irritants.

A complete line of filters is available for Solution Custom AHUs. For light- or pre-filtering duty, use our pleated and extended-surface filters. For higher filtration needs, 60% to 95% efficient (11 to 14 MERV ratings) rigid or bag filters can be specified. For more stringent requirements, HEPA filters and ultra-HEPA filters (15 to 16 MERV ratings) are available to trap particles as small as 0.3 and 0.1 microns respectively with 99.97% effectiveness. If odor or VOC removal is required, activated carbon filters are available as well.



ENERGY

The HVAC industry has taken a leadership role by creating energy-performance guidelines, such as ASHRAE 90.1. Solution Custom AHUs are designed with ASHRAE 90.1 in mind.

In extreme ambient conditions, heat transfer through the casing must be controlled. Our casing offers maximum thermal performance in the floors, walls and roof. To prevent energy-robbing air leaks, units are designed for a maximum casing leakage of less than 1%.

In an AHU, the fan is the largest energy consumer. Solution Custom fans offer a range of energy-saving options through fan types and controls. From lighter aluminum fan wheels to direct-drive plenum fans, which eliminate belt-and-pulley energy losses, Solution Custom AHUs can meet your needs. In addition, high- and premium-efficiency motors can be specified.



If the air system is designed for variable-air volume (VAV), YORK offers the most efficient method of VAV fan control with our Air-Modulator™ drive, which is mounted, wired and tested in our factory.

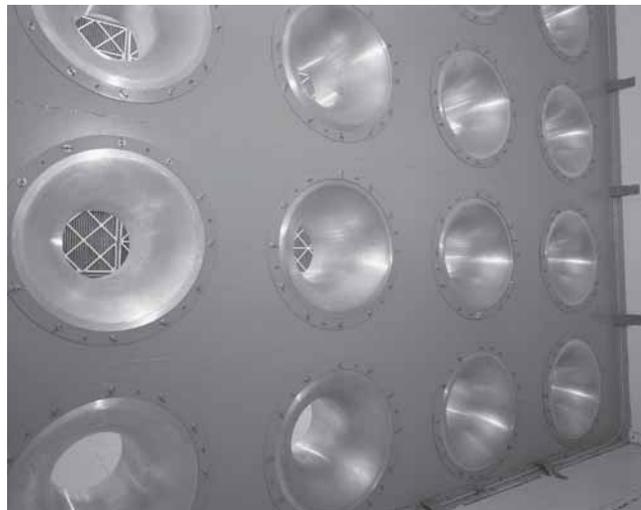
Numerous economizer configurations allow the

unit to mix cool/dry outside air with the return air to cool and dehumidify the facility during spring and fall operation, reducing the need for mechanical refrigeration. All Solution Custom economizer designs incorporate an ultra-low-leak damper, or optional aluminum and insulated damper, to minimize infiltration while maintaining thermal superiority.

The exhaust airstream can represent a costly waste of energy, as conditioned air is discarded from the building. Significant energy savings can be realized by equipping Solution Custom AHUs with one or more energy-recovery options that can economically transfer sensible and latent heat between the exhaust-air and makeup-air paths.

SOUND

The air-handling system is responsible for maintaining the indoor environmental quality (IEQ) of a facility, and an important component of IEQ is acoustics. In fact, applications such as theatres, performance halls and churches may view acoustics as the most important part of IEQ. For that reason, Solution Custom AHU sound data has been collected in accordance with ARI-260, and YORK offers a variety of noise-reducing technologies.



The best way to reduce noise is not to create it in the first place. Source attenuation is the first sound-reduction method that should be considered, and is typically least expensive. Since the fan is the primary moving part in an air-handling system, it's the first place to look when reducing noise. Solution Custom AHUs are available with a nearly endless array of fan types, all custom-selected for the exacting requirements of your project. Direct-drive plenum fans can reduce vibration and drive noise by eliminating the belt-and-pulley mechanism. A range of fan-base construction and iso-

lation techniques are available to help control sound. What little noise is left can be further reduced with direct methods of sound attenuation. Using sound-absorbing walls and sound traps in the fan and discharge-plenum sections, YORK sales engineers can help you design units to meet your critical sound requirements.

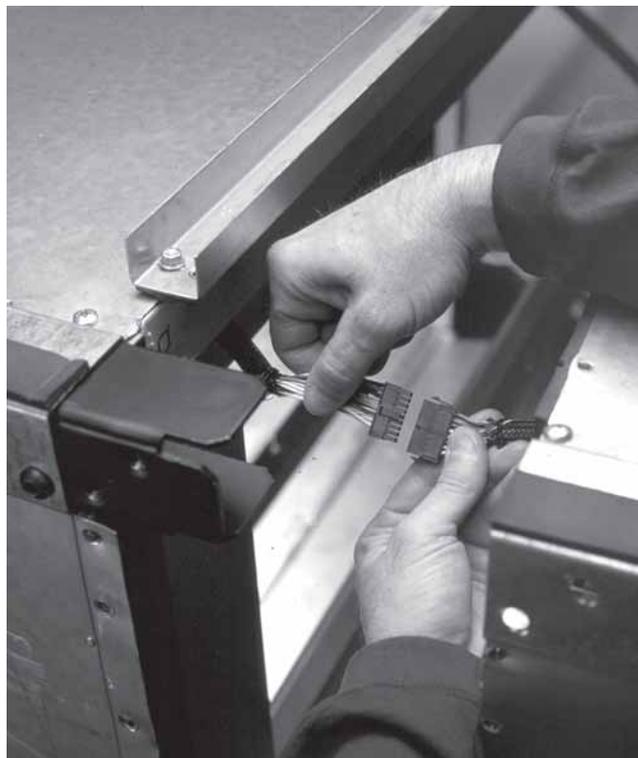
CONTROLS

Higher quality and consistency are assured when YORK pre-engineers, factory-mounts, wires and commissions your Solution Custom AHU with OptiLogic™ controls. Control of humidity, carbon dioxide, temperature and pressure levels can be maintained with greater accuracy than can be achieved with field-mounted controls. All OptiLogic controls are selected to communicate with any building automation system.



All units with OptiLogic controls come with ETL approval, and are in compliance with all National Electric Codes. Also, all sensing probes and elements have been pre-engineered to determine the best mounting location, which ensures an accurate and reliable reading.

While the unit is in the factory, YORK technicians are able to gain easy access to all segments. There are no accessibility problems to cramp the quality of the job or slow down the installation process. The proper and precise installation occurs quickly and efficiently with no increase in lead-time. “Quick-connects” are utilized at all shipping splits to reduce installation and start-up time required on the jobsite.



Every Solution Custom AHU equipped with OptiLogic controls goes through a detailed, automated commissioning process before it is shipped. This extensive testing, which ensures that each control works appropriately before the unit leaves the factory, is virtually impossible to duplicate in the field.

Here is a partial list of OptiLogic end devices.

- Outside-air actuator
- Return-air actuator
- Filter differential-pressure sensor
- Mixed-air temperature sensor
- Hot-water valve and actuator
- Low-limit switch
- Chilled-water valve and actuator
- Fan differential-pressure switch
- Fan start/stop relay
- Supply-air-temperature sensor
- Fan VFD-speed input
- Duct static-pressure transducer

General Information

SEGMENT IDENTIFICATION

FAN SEGMENTS

- FS – Supply
 - Forward Curved
 - Airfoil
 - Industrial Airfoil
 - SWSI Plenum (Belt and Direct Drive)
- FR – Return
 - Forward Curved
 - Airfoil
 - Industrial Airfoil
 - SWSI Plenum (Belt and Direct Drive)
- FE – Exhaust
 - Forward Curved
 - Airfoil
 - Industrial Airfoil

COIL SEGMENTS

- CC – Cooling Coil
- HC – Heating Only Coil
- VC – Vertical Coil

HEAT SEGMENTS

- IC – Integral Face & Bypass Coil
- IG – Indirect Gas Fired Furnace
- EH – Electric Heater

ENERGY RECOVERY

- HW – Heat Wheel

FILTER SEGMENTS

- FF – Flat Filter (2" or 4")
- AF – Angle Filter (2")
- RF – High Efficiency Filter
 - Rigid Filter (12")
 - Bag Filter (21")
 - Mini-Pleat Filter (4")
- HF – HEPA Filter

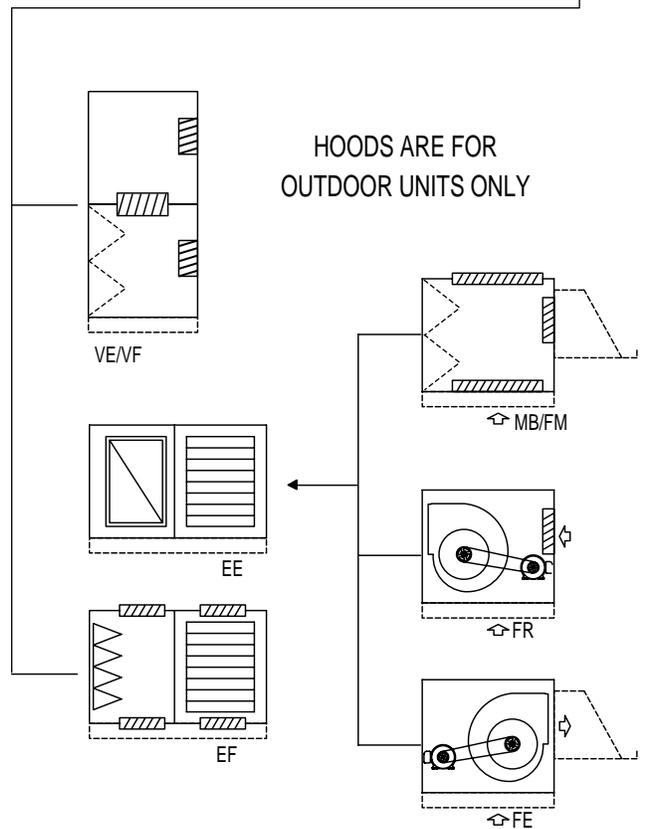
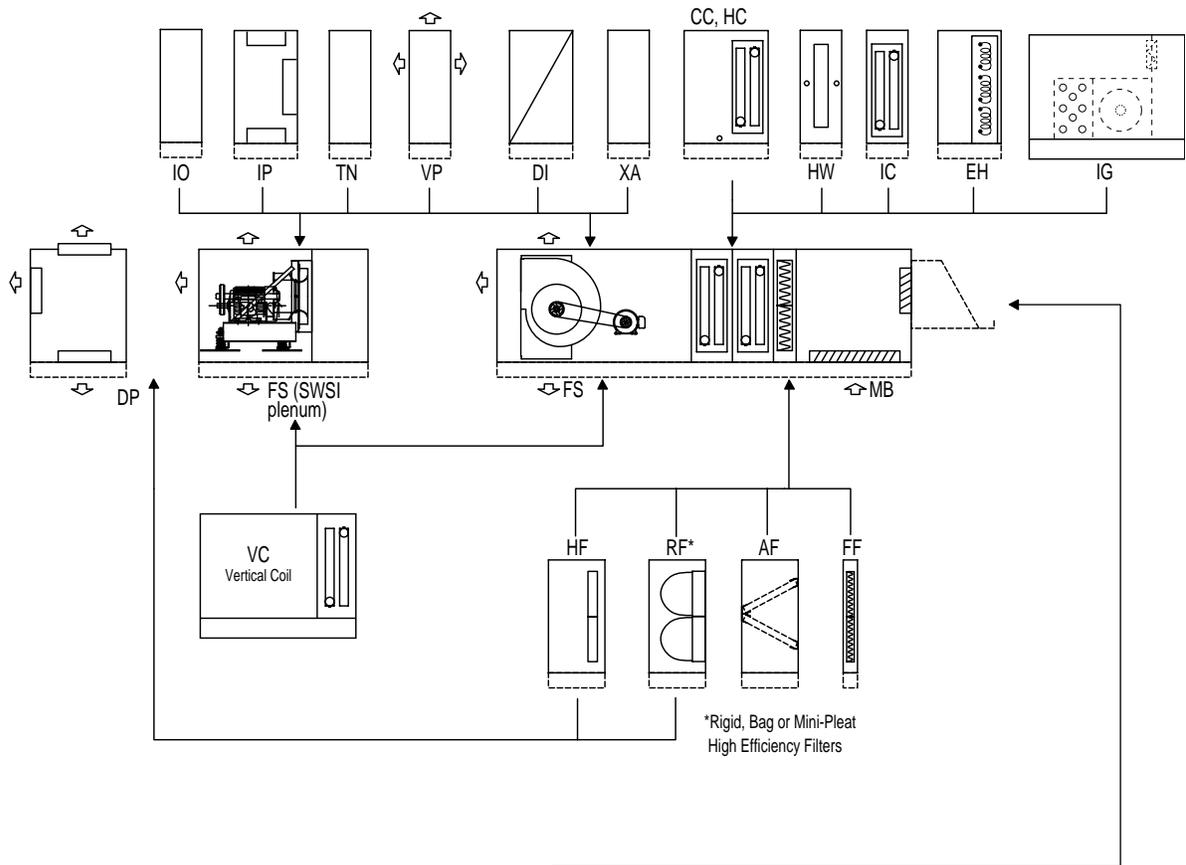
INLET SEGMENTS

- MB – Mixing Box
- FM – Filter/Mixing Box
- EF – Filter/Economizer
- EE – Economizer
- IP – Inlet Plenum
- VE – Vertical Economizer
- VF – Vertical Filter/Economizer

ACCESSORY SEGMENTS

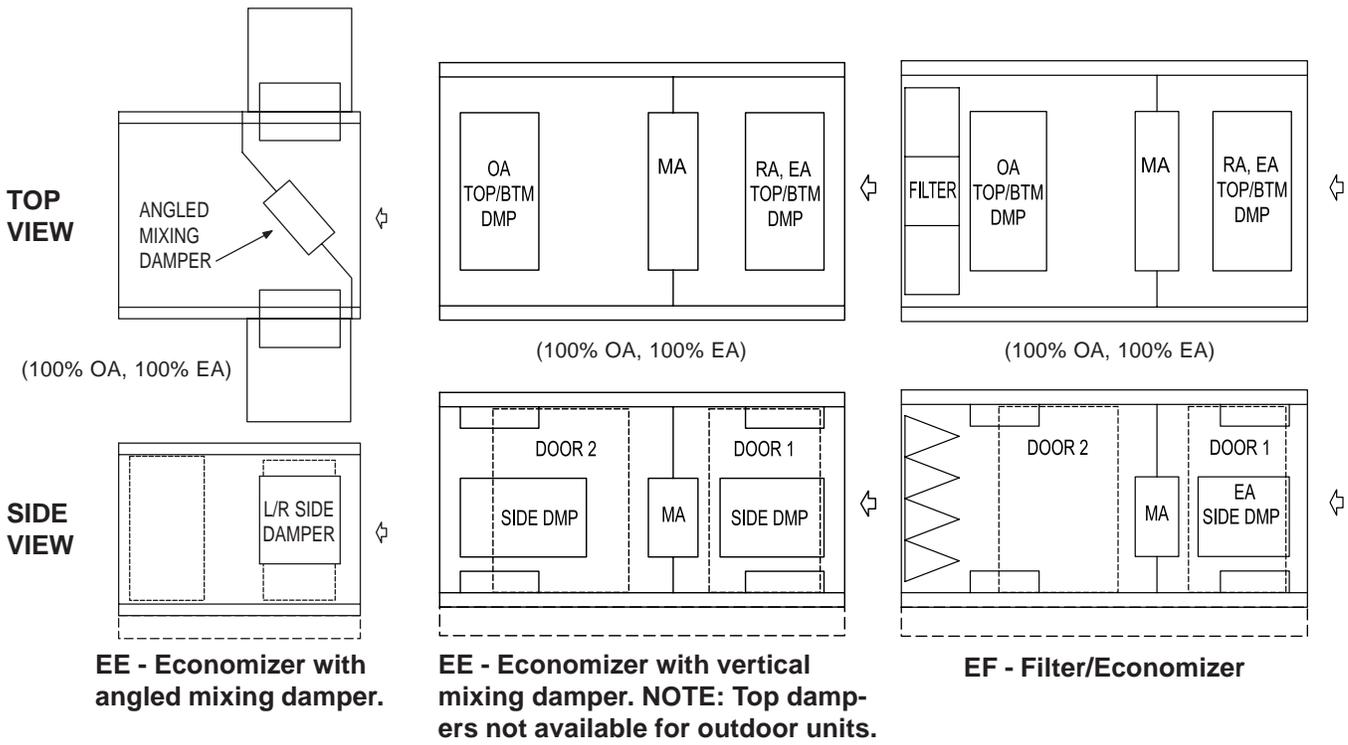
- VP – Vertical Plenum
- DP – Discharge Plenum
- TN – Turning Plenum
- DI – Diffuser
- XA – Access segment
- IO – Inlet/Outlet

SEGMENT AVAILABILITY



General Information

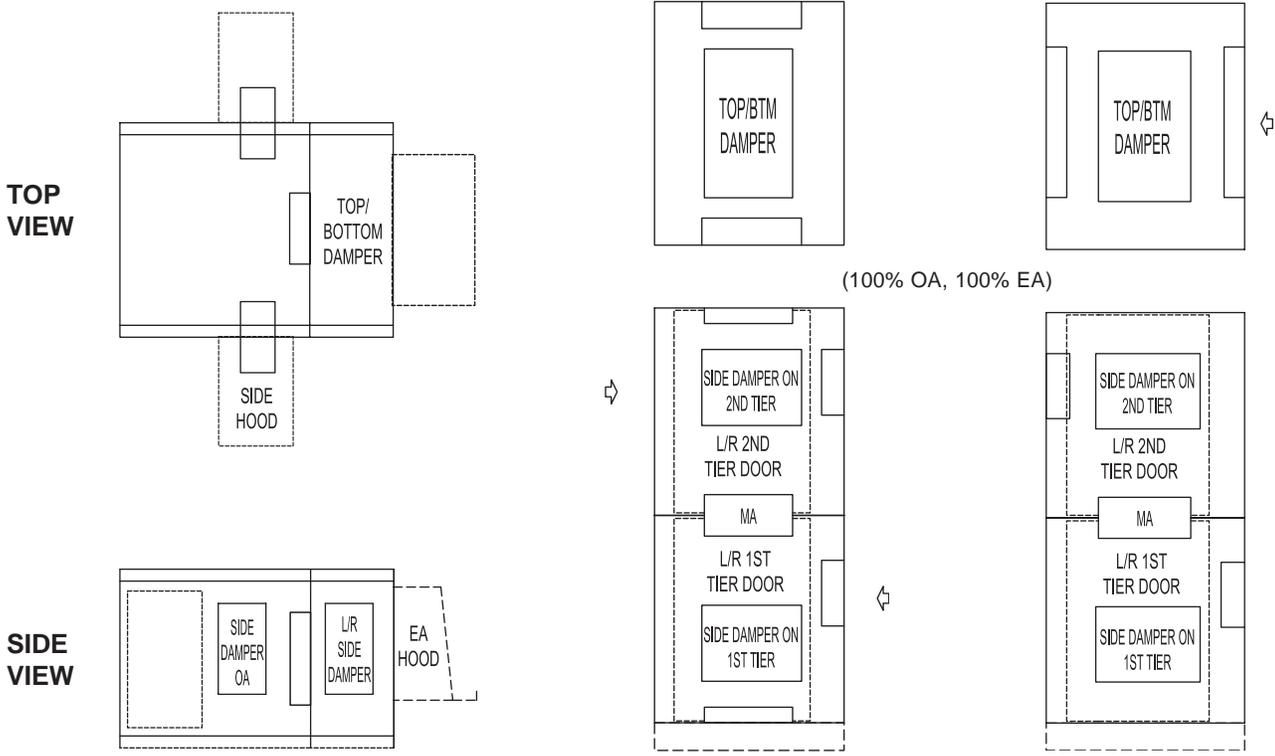
ECONOMIZER ARRANGEMENTS



LD08032

LD08033

LD08034



EE - Inlet/Economizer

(50% OA on each side with barometric exhaust)

VE - Vertical Economizer

NOTE: VF (Vertical Filter Economizer) is available with filtration.

LD08035

LD08036

LD08037

Unit Selection



10020b

SELECTION PROCEDURE

From the following pgs 12, 13, 23-47 and 56-61 you will be able to determine overall dimensions and weight of your SOLUTION Air Handler Unit.

You will also be able to determine the following information:

- Optimal Size (H x W) for your system CFM.
- Coil Face area, FH x FL, and nominal CFM at 500 fpm.
- Maximum fan size for each cabinet.
- Filter face area.
- Individual segment lengths.

UTILIZE THE FOLLOWING STEPS TO SELECT A CABINET.

1. Consult the Quick Select on pgs 10-13B.
2. Refine the unit size and optimize your face velocity by referring to the Coil Data table, pgs 14-16.
Optimal Face velocity for Cooling Coil is 500 fpm.
Optimal Face Velocity for Heating Coil is 750 - 850 fpm.
3. Consult the Fan Chart (pgs 18-19) to determine the maximum size fan allowable in the cabinet.
4. Consult the Filter Chart (pgs 20-22) for the filter face area.
5. Refer to the Segment Charts to determine overall unit length.
6. Estimate unit weight by using the Quick Select chart on pgs 12-13.

The following pages provide a sampling of sizes that we can offer. If further combinations are required, please contact your local YORK sales office.

Quick Select

QUICK SELECT TOOL – OPTIMAL SIZES

CFM	H	W	COIL AREA	AF SQ. FT AREA	RF/FF SQ. FT AREA	MAX FC FAN	MAX AF FAN	MAX SWSI FAN
900	27	27	1.8	4.4	-	7x7	-	-
1500	30	33	2.9	4.0	3.3	9x9	-	-
2000	36	33	4.0	8.0	4.0	12x9	-	-
2500	33	45	5.2	8.9	6.0	10x10	-	12
3500	36	48	6.9	11.1	6.0	12x12	12	12
4500	36	60	9.2	16.0	8.0	12x12	12	14
5500	42	60	10.8	16.0	10.7	15x15	15	18
6000	42	66	12.2	18.7	10.7	15x15	15	18
7000	42	72	13.5	26.7	13.3	15x15	15	18
8000	48	72	15.6	26.7	15.0	18x18	18	25
9000	48	78	17.9	35.6	15.0	18x18	18	25
10000	51	78	19.5	35.6	18.9	20x20	20	25
11500	57	78	21.8	35.6	22.7	22x22	22	28
13500	60	84	26.5	36.0	24.0	22x22	22	28
16500	66	96	32.1	53.3	31.1	28x28	28	35
19500	66	114	39.0	57.8	38.9	28x28	28	35
22500	72	120	45.0	62.2	45.0	32x32	32	39
26500	78	126	53.4	80.0	48.3	32x32	32	44
30500	90	120	60.0	93.3	60.0	36x36	36	49
34500	96	126	67.3	106.7	64.4	40x40	40	49
38500	108	126	75.2	106.7	77.3	40x40	40	49
42500	108	138	83.1	110.0	85.3	40x40	40	49
46500	114	144	94.0	151.1	91.7	40x40	40	49
50500	120	144	98.5	151.1	91.7	40x40	40	49
51500	126	144	103.0	151.1	104.7	40x40	40	49

STANDARD LENGTH COMPONENTS

FF		10"
RF-Mini-pleat		
No Prefilter		10"
2" Prefilter		12"
RF- Bag		
No Prefilter		25"
2" Prefilter		27"
RF-Rigid		
No Prefilter		18"
2" Prefilter		20"
HF-Hepa Filter		
11.5" 99.97%		16"
11.5" 99.99%		16"
CC		
	6 ROW	19"
	10 ROW	25"
HC		
WATER	1-4 ROW	10"
STEAM	1 ROW	8"
IC		
IFB-Steam or Water	2 ROW	26"
	3 ROW	26"
	4 ROW	43"
VIFB-Steam	1,2,3 ROWS	30"
Water	1,2 ROWS	30"
EH		10"-45"

NOTE: The electric heater segment length will vary from 10" to 45", in 1" increments based upon the controls required inside the control panel.

NOTES (APPLY TO THE FOLLOWING QUICK SELECT PAGES):

- Weights are estimates ONLY.
- Variable baserail height is not included in overall cabinet height.
- Pitched outdoor roof increases unit height by 2" - not included in above.
- Roof curb, rain hood, and pipe chase weights are not included in segment weights. Contact your local YORK sales office for details on these items.
- Access Segment (XA) is a variable length segment, from 2"-54".
- Filter media weight is not included.
- Cooling Coil Weights are based on 6 row, 10 fpi and 10 row, 12 fpi coils.
- Heating Coil Weight is based on a 1 row, 10 fpi steam coil.
- Fan segment weights include the largest available fan with the largest horsepower 230/460V motor.
- Lengths will change as shipping splits, doors, etc. are added to unit configuration.
- Integral face and bypass coil weights are based on copper tubes and 11 aluminum fins per inch coils.

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Quick Select

SEGMENT LENGTHS/WEIGHTS

CFM	H	W	FAN SEGMENTS			COIL SEGMENTS				HEAT SEGMENTS			
			FE FR FS (FC)	FR FS (AF)	FR FS (SWSI)	CC- 6 Row	CC- 10 Row	HC	VC	IC	IG	EH	
900	27	27	39 424	- -	- -	19 135	25 184	8 55	26 472	- -	- -	45 200	L lbs
1500	30	33	43 552	- -	- -	19 166	25 229	8 68	26 491	- -	- -	45 262	L lbs
2000	36	33	46 664	- -	- -	19 196	25 274	8 81	29 534	- -	- -	45 304	L lbs
2500	33	45	44 656	- -	27 550	19 223	25 320	8 94	27 567	- -	- -	45 372	L lbs
3500	36	48	43 810	52 819	27 615	19 259	25 371	8 113	36 615	- -	- -	45 429	L lbs
4500	36	60	43 903	43 936	29 788	19 307	25 446	8 133	30 673	- -	- -	45 539	L lbs
5500	42	60	43 1018	43 1127	31 975	19 338	25 509	8 146	32 725	26 882	- -	45 621	L lbs
6000	42	66	43 1063	43 1172	31 1100	19 367	25 553	8 159	32 755	26 940	- -	45 670	L lbs
7000	42	72	43 1191	43 1217	31 1141	19 393	25 594	8 170	33 792	26 997	- -	45 734	L lbs
8000	48	72	45 1309	45 1362	38 1482	19 434	25 654	8 190	35 848	26 1125	58 2195	45 833	L lbs
9000	48	78	45 1354	45 1407	38 1542	19 477	25 710	8 207	35 878	26 1195	58 2405	45 907	L lbs
10000	51	78	51 1602	51 1641	38 1594	19 511	25 765	8 219	37 915	26 1214	58 2495	45 962	L lbs
11500	57	78	55 1939	79 1992	42 1696	19 551	25 830	8 235	40 980	26 1357	64 3080	45 1071	L lbs
13500	60	84	55 2007	55 2060	42 1794	19 621	25 956	8 278	41 1041	26 1445	64 3176	45 1220	L lbs
16500	66	96	66 2324	66 2808	49 2603	19 737	25 1151	8 288	44 1172	26 1642	64 3645	45 1546	L lbs
19500	66	114	66 2588	66 2960	49 2966	19 864	25 1360	8 341	44 1263	- -	79 5302	45 1857	L lbs
22500	72	120	73 3078	73 3484	55 3498	19 957	25 1541	8 392	46 1355	30 1968	79 5555	45 2141	L lbs
26500	78	126	73 3325	73 3600	61 4196	19 1101	25 1746	8 469	50 1477	- -	79 5665	45 2443	L lbs
30500	90	120	80 3867	80 4360	67 4547	19 1190	25 1895	8 512	56 1604	30 2193	79 5932	45 2678	L lbs
34500	96	126	87 3960	87 4838	67 4678	19 1298	25 2078	8 555	58 1719	30 2382	79 6603	45 3013	L lbs
38500	108	126	87 4769	87 4990	67 5196	19 1414	25 2270	8 599	63 1900	30 2651	- -	45 3363	L lbs
42500	108	138	87 4962	87 5514	67 5554	19 1526	25 2462	8 643	63 2019	30 2865	- -	45 3710	L lbs
46500	114	144	87 5219	87 5739	67 5766	19 1790	25 2946	8 680	67 2236	30 3115	86 9859	45 4104	L lbs
50500	120	144	87 5351	87 5871	67 6222	19 1855	25 3050	8 702	69 2368	30 3201	86 9876	45 4325	L lbs
51500	126	144	87 5498	87 6019	57 6363	19 1919	25 3156	8 724	72 2530	30 3299	86 9993	45 4496	L lbs

Quick Select

SEGMENT LENGTHS/WEIGHTS

CFM	H	W	FILTER SEGMENTS						INLET SEGMENTS							ACCESSORY SEGMENTS						Outdoor Roof Add lbs./ft Unit Length		
			FF	AF	RF-Bag	RF-Rigid	RF-Mini Pleat	HF	MB	FM	EE Angled Damper	EE Vertical Damper	EF	EE/MB	VE Vertical	IP	TN	XA	DP	VP	DI			IO
900	27	27	-	22	-	-	-	-	15	35	39	29	50	46	15	11	11	24	11	39	10	15	1.1	L
			-	81	-	-	-	-	132	198	198	157	234	261	226	81	104	79	104	230	41	40		lbs
1500	30	33	10	12	25	18	10	16	15	25	40	29	40	46	15	12	12	24	12	43	10	15	3.0	L
			47	56	105	78	49	87	169	207	246	195	247	322	286	112	137	91	137	300	48	46		lbs
2000	36	33	10	15	25	18	10	16	20	28	39	40	48	52	20	14	15	24	14	46	10	20	3.0	L
			52	77	114	86	53	96	236	269	276	277	325	413	409	154	182	98	178	363	54	54		lbs
2500	33	45	10	21	25	18	10	16	15	34	49	29	49	49	15	13	14	24	13	44	10	15	8.3	L
			64	110	133	101	66	110	223	309	372	262	368	431	370	133	184	110	180	388	57	66		lbs
3500	36	48	10	30	25	18	10	16	20	32	47	40	52	54	20	14	15	24	14	52	10	20	9.8	L
			70	112	145	110	72	125	309	367	401	371	445	538	522	168	225	117	220	481	63	75		lbs
4500	36	60	10	15	25	18	10	16	20	28	54	40	48	57	20	14	15	24	14	43	10	20	16.8	L
			74	107	159	121	78	138	372	416	513	445	514	654	628	242	265	132	260	511	69	91		lbs
5500	42	60	10	14	25	18	10	16	20	26	53	40	46	57	20	16	18	24	16	43	11	20	16.8	L
			85	107	173	133	88	152	404	438	561	475	536	713	683	275	312	139	301	561	82	104		lbs
6000	42	66	10	14	25	18	10	16	20	30	56	40	50	58	20	16	18	24	16	43	12	20	20.6	L
			91	114	184	141	94	161	436	497	621	512	601	772	736	309	334	147	322	599	91	112		lbs
7000	42	72	10	18	25	18	10	16	20	30	59	40	50	60	20	16	18	24	16	43	12	20	24.5	L
			97	145	194	149	100	170	468	532	680	549	643	838	789	322	355	154	343	636	95	120		lbs
8000	48	72	10	18	25	18	10	16	21	29	55	41	50	59	21	23	21	24	23	63	13	21	24.5	L
			102	152	204	157	106	185	522	576	713	579	671	907	845	346	407	161	420	821	110	133		lbs
9000	48	78	10	22	25	18	10	16	21	29	58	41	50	61	21	22	21	24	22	45	14	21	28.5	L
			109	188	215	166	112	194	557	612	776	617	713	977	899	367	429	168	436	737	121	140		lbs
10000	51	78	10	22	25	18	10	16	26	32	60	52	58	68	26	24	23	24	24	51	15	26	28.5	L
			119	192	226	176	123	205	627	669	823	763	840	1077	1057	384	458	171	465	805	137	147		lbs
11500	57	78	10	21	25	18	10	16	26	32	59	52	58	67	26	26	26	24	26	79	16	26	28.5	L
			121	192	232	180	124	210	658	703	881	797	878	1136	1115	411	511	178	511	1064	155	159		lbs
13500	60	84	10	14	25	18	10	16	26	32	58	52	58	67	26	26	27	24	26	55	17	26	32.5	L
			121	158	241	186	126	225	711	758	939	861	956	1224	1207	530	558	189	550	951	170	173		lbs
16500	66	96	10	19	25	18	10	16	26	33	63	52	59	69	26	28	30	24	28	77	19	26	40.3	L
			150	207	280	219	153	270	841	902	1149	988	1091	1459	1387	555	660	209	642	1269	217	199		lbs
19500	66	114	10	19	25	18	10	16	26	33	71	52	59	73	26	27	30	24	27	66	21	26	50.2	L
			169	231	312	245	174	297	952	1019	1385	1126	1243	1693	1566	680	727	230	698	7292	252	219		lbs
22500	72	120	10	18	25	18	10	16	32	38	89	63	70	87	32	30	33	24	30	73	23	32	52.8	L
			182	235	334	263	187	321	1111	1172	1749	1382	1505	2010	1857	822	809	244	779	1453	295	237		lbs
26500	78	126	10	16	25	18	10	16	32	39	83	63	71	84	32	31	36	24	31	73	25	32	55.0	L
			202	241	362	287	207	346	1220	1295	1835	1504	1659	2176	2014	1009	896	257	843	1548	331	255		lbs
30500	90	120	10	20	25	18	10	16	38	44	79	75	82	88	38	36	42	24	36	92	26	38	52.8	L
			192	290	357	279	197	372	1338	1404	1900	1749	1896	2329	2289	986	1003	264	937	1824	365	270		lbs
34500	96	126	10	17	25	18	10	16	38	45	88	75	83	93	38	38	45	24	38	92	28	38	55.0	L
			211	286	384	303	216	415	1463	1544	2223	1864	2045	2611	2448	1211	1107	279	1026	1945	418	292		lbs
38500	108	126	10	16	25	18	10	16	43	51	80	86	94	95	43	43	51	24	43	92	30	43	55.0	L
			212	286	395	309	218	415	1643	1740	2296	2190	2379	2843	2835	1358	1269	293	1171	2092	462	322		lbs
42500	108	138	10	17	25	18	10	16	43	49	86	86	92	98	43	43	51	24	43	87	32	43	57.8	L
			227	299	419	329	233	422	1772	1849	2539	2363	2520	3098	3073	1407	1364	308	1262	2181	507	354		lbs
46500	114	144	10	20	25	18	10	16	43	50	93	86	93	101	43	43	54	24	43	87	33	43	58.2	L
			245	373	446	352	250	461	1974	2068	2862	2521	2719	3440	3326	1566	1532	323	1384	2379	542	402		lbs
50500	120	144	10	20	25	18	10	16	49	55	97	98	104	109	49	45	57	24	45	87	34	49	58.2	L
			260	382	466	369	265	516	2162	2245	3039	2835	3024	3702	3705	1623	1656	331	1491	2505	568	435		lbs
51500	126	144	10	19	25	18	10	16	49	55	88	98	104	105	49	47	60	24	47	87	35	49	58.2	L
			258	375	470	371	264	541	2296	2381	3039	2918	3109	3838	3863	1717	1793	339	1609	2647	595	472		lbs

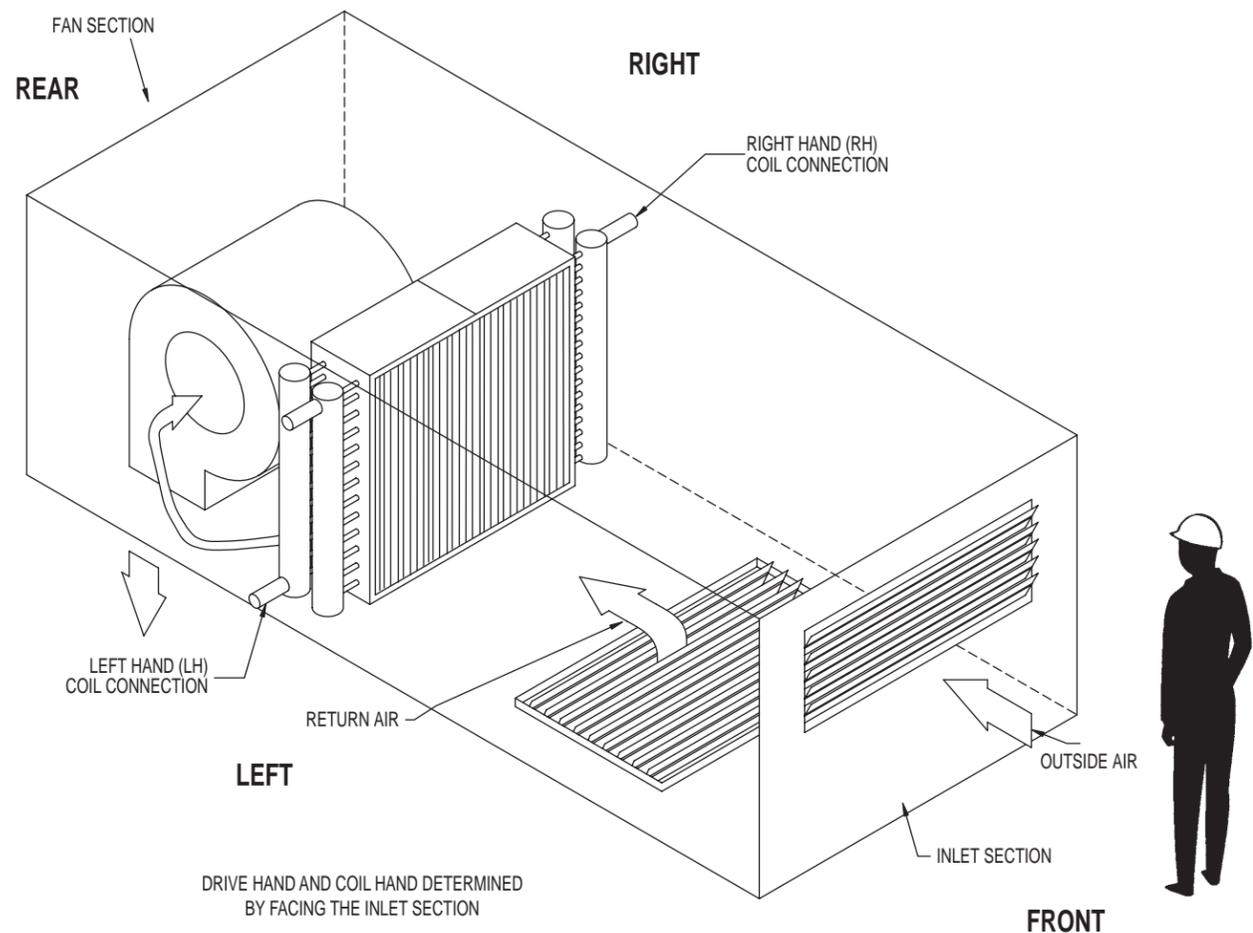
LEGEND

L = Length
lbs = Pounds

NOTE:

Quick Select

UNIT & COIL HAND SELECTION



LD08004

NOTE: Drive Hand and coil hand determined by facing the inlet section.

Engineering Data

COIL DATA

CABINET HEIGHT	CABINET WIDTH									
	27	30	33	36	39	42	45	48	54	60
27	17.5 x 15 1.8 900	17.5 x 18 2.2 1,100	17.5 x 21 2.6 1,300	17.5 x 24 2.9 1,450	17.5 x 27 3.3 1,650	17.5 x 30 3.6 1,800	17.5 x 33 4.0 2,000	17.5 x 36 4.4 2,200	17.5 x 42 5.1 2,550	
30	20 x 15 2.1 1,042	20 x 18 2.5 1,250	20 x 21 2.9 1,458	20 x 24 3.3 1,667	20 x 27 3.8 1,875	20 x 30 4.2 2,083	20 x 33 4.6 2,292	20 x 36 5.0 2,500	20 x 42 5.8 2,917	20 x 48 6.7 3,333
33		22.5 x 18 2.8 1,406	22.5 x 21 3.3 1,641	22.5 x 24 3.8 1,875	22.5 x 27 4.2 2,109	22.5 x 30 4.7 2,344	22.5 x 33 5.2 2,578	22.5 x 36 5.6 2,813	22.5 x 42 6.6 3,281	22.5 x 48 7.5 3,750
36		27.5 x 18 3.4 1,719	27.5 x 21 4.0 2,005	27.5 x 24 4.6 2,292	27.5 x 27 5.2 2,578	27.5 x 30 5.7 2,865	27.5 x 33 6.3 3,151	27.5 x 36 6.9 3,438	27.5 x 42 8.0 4,010	27.5 x 48 9.2 4,583
39			30 x 21 4.4 2,188	30 x 24 5.0 2,500	30 x 27 5.6 2,813	30 x 30 6.3 3,125	30 x 33 6.9 3,438	30 x 36 7.5 3,750	30 x 42 8.8 4,375	30 x 48 10.0 5,000
42				32.5 x 24 5.4 2,708	32.5 x 27 6.1 3,047	32.5 x 30 6.8 3,385	32.5 x 33 7.4 3,724	32.5 x 36 8.1 4,063	32.5 x 42 9.5 4,740	32.5 x 48 10.8 5,417
45				35 x 24 5.8 2,917	35 x 27 6.6 3,281	35 x 30 7.3 3,646	35 x 33 8.0 4,010	35 x 36 8.8 4,375	35 x 42 10.2 5,104	35 x 48 11.7 5,833
48					37.5 x 27 7.0 3,516	37.5 x 30 7.8 3,906	37.5 x 33 8.6 4,297	37.5 x 36 9.4 4,688	37.5 x 42 10.9 5,469	37.5 x 48 12.5 6,250
51						42.5 x 30 8.9 4,427	42.5 x 33 9.7 4,870	42.5 x 36 10.6 5,313	42.5 x 42 12.4 6,198	42.5 x 48 14.2 7,083
54							45 x 33 10.3 5,156	45 x 36 11.3 5,625	45 x 42 13.1 6,563	45 x 48 15.0 7,500
57								47.5 x 36 11.9 5,938	47.5 x 42 13.9 6,927	47.5 x 48 15.8 7,917
60								50 x 36 12.5 6,250	50 x 42 14.6 7,292	50 x 48 16.7 8,333
66									55 x 42 16.0 8,021	55 x 48 18.3 9,167
72										60 x 48 20.0 10,000
78										(2) 67.5 x 48 22.5 11,250
84										(2) 72.5 x 48 24.2 12,083
90										
96										
102										
108										
114										
120										
126										

LEGEND

FH x FL
Sq Ft FA
CFM @ 500 fpm

NOTES:

Based on 1/2" coils.
5/8" coils available.
1 - 12 rows available.

*(Quantity) = Connections per Unit

- (1) = 1 set of connections (1 supply, 1 return)
- (2) = 2 set of connections (2 supply, 2 return)
- (3) = 3 set of connections (3 supply, 3 return)

NOTES:

FH x FL = Finned Height (Inches) x Finned Length (Inches)

Sq. Ft. FA = Square Feet Face Area

COIL DATA (continued)

CABINET HEIGHT	CABINET WIDTH						
	66	72	78	84	90	96	102
27							
30							
33	22.5 x 54 8.4 4,219						
36	27.5 x 54 10.3 5,156	27.5 x 60 11.5 5,729					
39	30 x 54 11.3 5,625	30 x 60 12.5 6,250	30 x 66 13.8 6,875				
42	32.5 x 54 12.2 6,094	32.5 x 60 13.5 6,771	32.5 x 66 14.9 7,448	32.5 x 72 16.3 8,125			
45	35 x 54 13.1 6,563	35 x 60 14.6 7,292	35 x 66 16.0 8,021	35 x 72 17.5 8,750			
48	37.5 x 54 14.1 7,031	37.5 x 60 15.6 7,813	37.5 x 66 17.2 8,594	37.5 x 72 18.8 9,375	37.5 x 78 20.3 10,156		
51	42.5 x 54 15.9 7,696	42.5 x 60 17.7 8,854	42.5 x 66 19.5 9,740	42.5 x 72 21.3 10,625	42.5 x 78 23.0 11,510	42.5 x 84 24.8 12,396	
54	45 x 54 16.9 8,438	45 x 60 18.8 9,375	45 x 66 20.6 10,313	45 x 72 22.5 11,250	45 x 78 24.4 12,188	45 x 84 26.3 13,125	45 x 90 28.1 14,063
57	47.5 x 54 17.8 8,906	47.5 x 60 19.8 9,896	47.5 x 66 21.8 10,885	47.5 x 72 23.8 11,875	47.5 x 78 25.7 12,865	47.5 x 84 27.7 13,854	47.5 x 90 29.7 14,844
60	50 x 54 18.8 9,375	50 x 60 20.8 10,417	50 x 66 22.9 11,458	50 x 72 25.0 12,500	50 x 78 27.1 13,542	50 x 84 29.2 14,583	50 x 90 31.3 15,625
66	55 x 54 20.6 10,313	55 x 60 22.9 11,458	55 x 66 25.2 12,604	55 x 72 27.5 13,750	55 x 78 29.8 14,896	55 x 84 32.1 16,042	55 x 90 34.4 17,188
72	60 x 54 22.5 11,250	60 x 60 25.0 12,500	60 x 66 27.5 13,750	60 x 72 30.0 15,000	60 x 78 32.5 16,250	60 x 84 35.0 17,500	60 x 90 37.5 18,750
78	(2) 67.5 x 54 25.3 12,656	(2) 67.5 x 60 28.1 14,063	(2) 67.5 x 66 30.9 15,469	(2) 67.5 x 72 33.8 16,875	(2) 67.5 x 78 36.6 18,281	(2) 67.5 x 84 39.4 19,688	(2) 67.5 x 90 42.2 21,094
84	(2) 72.5 X 54 27.2 13,594	(2) 72.5 X 60 30.2 15,104	(2) 72.5 x 66 33.2 16,615	(2) 72.5 x 72 36.3 18,125	(2) 72.5 x 78 39.3 19,635	(2) 72.5 x 84 42.3 21,146	(2) 72.5 x 90 45.3 22,656
90	(2) 80 x 54 29.4 14,719	(2) 80 x 60 32.7 16,354	(2) 80 x 66 36.7 18,333	(2) 80 x 72 40.0 20,000	(2) 80 x 78 43.3 21,667	(2) 80 x 84 46.7 23,333	(2) 80 x 90 50.0 25,000
96		(2) 85 x 60 35.2 17,604	(2) 85 x 66 39.0 19,479	(2) 85 x 72 42.5 21,250	(2) 85 x 78 46.0 23,021	(2) 85 x 84 49.6 24,792	(2) 85 x 90 53.1 26,563
102		(2) 90 x 60 37.7 18,854	(2) 90 x 66 41.3 20,625	(2) 90 x 72 45.0 22,500	(2) 90 x 78 48.8 24,375	(2) 90 x 84 52.5 26,250	(2) 90 x 90 56.3 28,125
108			(3) 95 x 66 43.5 21,771	(3) 95 x 72 47.5 23,750	(3) 95 x 78 51.5 25,729	(3) 95 x 84 55.4 27,708	(3) 95 x 90 59.4 29,688
114				(3) 102.5 x 72 51.3 25,625	(3) 102.5 x 78 55.5 27,760	(3) 102.5 x 84 59.8 29,896	(3) 102.5 x 90 64.1 32,031
120					(3) 107.5 x 78 58.2 29,115	(3) 107.5 x 84 62.7 31,354	(3) 107.5 x 90 67.2 33,594
126					(3) 112.5 x 78 60.9 30,469	(3) 112.5 x 84 65.6 32,813	(3) 112.5 x 90 70.3 35,156

LEGEND

FH x FL
Sq Ft FA
CFM @ 500 fpm

NOTES:

Based on 1/2" coils.
5/8" coils available.
1 - 12 rows available.

NOTES:

FH x FL = Finned Height (Inches) x Finned Length (Inches)

Sq. Ft. FA = Square Feet Face Area

Engineering Data

COIL DATA (continued)

CABINET HEIGHT	CABINET WIDTH						
	108	114	120	126	132	138	144
27							
30							
33							
36							
39							
42							
45							
48							
51							
54							
57	47.5 x 96 31.7 15,833						
60	50 x 96 33.3 16,667						
66	55 x 96 36.7 18,333	55 x 102 39.0 19,479	55 x 108 41.3 20,625				
72	60 x 96 40.0 20,000	60 x 102 42.5 21,250	60 x 108 45.0 22,500	60 x 114 47.5 23,750	60 x 120 55.0 27,500		
78	(2) 67.5 x 96 45.0 22,500	(2) 67.5 x 102 47.8 23,906	(2) 67.5 x 108 50.6 25,313	(2) 67.5 x 114 53.4 26,719	(2) 67.5 x 120 57.5 28,750	(2) 67.5 x 126 60.4 30,188	(2) 67.5 x 132 63.3 31,625
84	(2) 72.5 x 96 48.3 24,167	(2) 72.5 x 102 51.4 25,677	(2) 72.5 x 108 54.4 27,188	(2) 72.5 x 114 57.4 28,698	(2) 72.5 x 120 60.4 30,208	(2) 72.5 x 126 65.6 32,813	(2) 72.5 x 132 68.8 34,375
90	(2) 80 x 96 53.3 26,667	(2) 80 x 102 56.7 28,333	(2) 80 x 108 60.0 30,000	(2) 80 x 114 63.3 31,667	(2) 80 x 120 66.7 33,333	(2) 80 x 126 70.0 35,000	(2) 80 x 132 73.3 36,667
96	(2) 85 x 96 56.7 28,333	(2) 85 x 102 60.2 30,104	(2) 85 x 108 63.8 31,875	(2) 85 x 114 67.3 33,646	(2) 85 x 120 70.8 35,417	(2) 85 x 126 74.4 37,188	(2) 85 x 132 77.9 38,958
102	(2) 90 x 96 60.0 30,000	(2) 90 x 102 63.8 31,875	(2) 90 x 108 67.5 33,750	(2) 90 x 114 71.3 35,625	(2) 90 x 120 75.0 37,500	(2) 90 x 126 78.8 39,375	(2) 90 x 132 82.5 41,250
108	(3) 95 x 96 63.3 31,667	(3) 95 x 102 67.3 33,646	(3) 95 x 108 71.3 35,625	(3) 95 x 114 75.2 37,604	(3) 95 x 120 79.2 39,583	(3) 95 x 126 83.1 41,563	(3) 95 x 132 87.1 43,542
114	(3) 102.5 x 96 68.3 34,167	(3) 102.5 x 102 72.6 36,302	(3) 102.5 x 108 76.9 38,438	(3) 102.5 x 114 81.1 40,573	(3) 102.5 x 120 85.4 42,708	(3) 102.5 x 126 89.7 44,844	(3) 102.5 x 132 94.0 46,979
120	(3) 107.5 x 96 71.7 35,833	(3) 107.5 x 102 76.1 38,073	(3) 107.5 x 108 80.6 40,313	(3) 107.5 x 114 85.1 42,552	(3) 107.5 x 120 89.6 44,792	(3) 107.5 x 126 94.1 47,031	(3) 107.5 x 132 98.5 49,271
126	(3) 112.5 x 96 75.0 37,500	(3) 112.5 x 102 79.7 39,844	(3) 112.5 x 108 84.4 42,188	(3) 112.5 x 114 89.1 44,531	(3) 112.5 x 120 93.8 46,875	(3) 112.5 x 126 98.4 49,219	(3) 112.5 x 132 103.1 51,563

LEGEND

FH x FL
Sq Ft FA
CFM @ 500 fpm

NOTES:

Based on 1/2" coils.
5/8" coils available.
1 - 12 rows available.

NOTES:

FH x FL = Finned Height (Inches) x Finned Length (Inches)

Sq. Ft. FA = Square Feet Face Area

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Engineering Data

MAXIMUM FAN SIZES ALLOWED IN A CABINET

CABINET HEIGHT	CABINET WIDTH											
	27	30	33	36	39	42	45	48	54	60	66	72
27	7x7 - -	7x7 - -	7x7 - -	7x7 - -	7x7 - -	7x7 - -	7x7 - -	7x7 - -	7x7 - -			
30	7x7 - -	9x6 - -	9x9 - -	9x9 - -	9x9 - -	9x9 - -	9x9 - -	9x9 - -	9x9 - -	9x9 - -		
33		9x6 - -	10x7 - -	10x10 - -	10x10 12 -							
36		10x7 - -	12x9 - -	12x12 12 -	12x12 12 12	12x12 12 12	12x12 12 12	12x12 12 12	12x12 12 14	12x12 12 14	12x12 12 14	12x12 12 14
39			12x9 - -	12x12 12 -	12x12 12 -	12x12 12 14	15x11 12 14	15x11 12 14	15x15 15 16	15x15 15 16	15x15 15 16	15x15 15 16
42				12x12 12 -	12x12 12 -	12x12 12 14	15x11 12 14	15x11 12 14	15x15 15 18	15x15 15 18	15x15 15 18	15x15 15 18
45				12x12 12 -	12x12 12 -	12x12 12 14	15x11 12 14	15x11 12 14	18x13 15 18	18x18 18 20	18x18 18 20	18x18 18 20
48					12x12 12 -	12x12 12 16	15x11 12 16	15x11 12 18	18x13 15 18	18x18 18 25	18x18 18 25	18x18 18 25
51						12x12 12 -	15x11 12 -	15x11 12 18	18x13 15 18	20x15 18 25	20x20 20 25	20x20 20 25
54							15x11 12 -	15x11 12 18	18x13 15 18	20x15 18 25	20x20 20 28	20x20 20 28
57								15x15 15 18	18x13 15 22	20x15 18 25	20x20 20 28	22x22 22 28
60								15x15 15 18	18x13 15 18	20x15 18 25	20x20 20 28	22x22 22 28
66									18x13 15 22	20x15 18 25	20x20 20 28	22x22 22 32
72										20x15 18 25	20x20 20 28	22x22 22 32
78										20x15 18 25	20x20 20 28	22x22 22 32
84										20x20 20 25	20x20 20 28	22x22 22 32
90											20x20 20 28	22x22 22 32
96												22x22 22 32
102												22x22 22 32
108	<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>LEGEND</p> <p>Max FC</p> <p>Max AF</p> <p>Max SWSI-Belt Drive</p> </div> <p>Direct Drive SWSI may fit into a smaller cabinet, contact your local YORK sales office for more information.</p>											
114												
120												
126												

MAXIMUM FAN SIZES ALLOWED IN A CABINET (continued)

CABINET HEIGHT	CABINET WIDTH											
	78	84	90	96	102	108	114	120	126	132	138	144
27												
30												
33												
36												
39	15x15 15 16											
42	15x15 15 18	15x15 15 18										
45	18x18 18 20	18x18 18 20										
48	18x18 18 25	18x18 18 25	18x18 18 25									
51	20x20 20 25	20x20 20 25	20x20 20 25	20x20 20 25								
54	20x20 20 28	20x20 20 28	20x20 20 28	20x20 20 28	20x20 20 28							
57	22x22 22 28	22x22 22 28	22x22 22 28	22x22 22 28	22x22 22 28	22x22 22 28						
60	22x22 22 28	22x22 22 28	22x22 22 28	22x22 22 28	22x22 22 28	22x22 22 28						
66	25x25 25 35	28x28 28 35										
72	25x25 25 35	28x28 28 39	28x28 28 39	28x28 28 39	32x32 32 39	32x32 32 39	32x32 32 39	32x32 32 39	32x32 32 39	32x32 32 39		
78	25x25 25 35	28x28 28 39	28x28 28 39	28x28 28 44	32x32 32 44							
84	25x25 25 35	28x28 28 39	28x28 28 39	28x28 28 44	32x32 32 44	36x36 32 49	36x36 36 49	36x36 36 49	36x36 36 49	36x36 36 49	36x36 36 49	36x36 36 49
90	25x25 25 35	28x28 28 39	28x28 28 39	28x28 28 44	32x32 32 44	36x36 32 49	36x36 36 49	40x40 40 49	40x40 40 49	40x40 40 49	40x40 40 49	40x40 40 49
96	25x25 25 35	28x28 28 39	28x28 28 39	28x28 28 44	32x32 32 44	36x36 32 49	36x36 36 49	40x40 40 49	40x40 40 49	40x40 40 49	40x40 40 49	40x40 40 49
102	25x25 25 35	28x28 28 39	28x28 28 39	28x28 28 44	32x32 32 44	36x36 32 49	36x36 36 49	40x40 40 49	40x40 40 49	40x40 40 49	40x40 40 49	40x40 40 49
108	25x25 25 35	28x28 28 39	28x28 28 39	28x28 28 44	32x32 32 44	36x36 32 49	36x36 36 49	40x40 40 49	40x40 40 49	40x40 40 49	40x40 40 49	40x40 40 49
114		28x28 28 39	28x28 28 39	28x28 28 44	32x32 32 44	36x36 32 49	36x36 36 49	40x40 40 49	40x40 40 49	40x40 40 49	40x40 40 49	40x40 40 49
120			28x28 28 39	28x28 28 44	32x32 32 44	36x36 32 49	36x36 36 49	40x40 40 49	40x40 40 49	40x40 40 49	40x40 40 49	40x40 40 49
126			28x28 28 39	28x28 28 44	32x32 32 44	36x36 32 49	36x36 36 49	40x40 40 49	40x40 40 49	40x40 40 49	40x40 40 49	40x40 40 49

LEGEND

Max FC
Max AF
Max SWSI-Belt Drive

Direct Drive SWSI may fit into a smaller cabinet, contact your local YORK sales office for more information.

Engineering Data

FILTER AREA

FLAT (FF) AND HIGH EFFICIENCY (RF) FILTER FACE AREA (SQ. FT.)

CABINET HEIGHT	CABINET WIDTH											
	27	30	33	36	39	42	45	48	54	60	66	72
27		2.2	2.2	2.2	2.2	2.2	2.2	2.2	4.4			
30	2.2	2.8	3.3	3.3	3.3	4.4	5.0	5.0	6.1	6.7		
33		3.3	4.0	4.0	4.0	5.3	6.0	6.0	7.3	8.0	9.3	
36		3.3	4.0	4.0	4.0	5.3	6.0	6.0	7.3	8.0	9.3	10.0
39			4.0	4.0	4.0	5.3	6.0	6.0	7.3	8.0	9.3	10.0
42				5.3	5.3	5.3	6.0	6.0	8.9	10.7	10.7	13.3
45				6.0	6.0	6.0	8.0	8.0	10.0	12.0	12.0	15.0
48					6.0	6.0	8.0	8.0	10.0	12.0	12.0	15.0
51						8.9	10.0	10.0	12.2	13.3	15.6	16.7
54							10.0	10.0	12.2	14.7	15.6	18.3
57								12.0	14.7	16.0	18.7	20.0
60								12.0	14.7	16.0	18.7	20.0
66									15.6	18.7	18.7	23.3
72										20.0	23.3	25.0
78										22.7	23.3	28.3
84										24.0	28.0	30.0
90											31.1	33.3
96												35.0
102												38.3
108												
114												
120												
126												

NOTE:

 No size available.

FLAT (FF) AND HIGH EFFICIENCY (RF) FILTER FACE AREA (SQ. FT.) (continued)

CABINET HEIGHT	CABINET WIDTH											
	78	84	90	96	102	108	114	120	126	132	138	144
27												
30												
33												
36												
39	11.3											
42	13.3	16.0										
45	15.0	18.0										
48	15.0	18.0	20.0									
51	18.9	20.0	22.2	23.3								
54	18.9	22.0	24.4	24.4	25.6							
57	22.7	24.0	26.7	28.0	30.7	32.0						
60	22.7	24.0	26.7	28.0	30.7	32.0						
66	23.3	28.0	31.1	31.1	31.1	37.3	38.9	38.9				
72	28.3	30.0	33.3	35.0	38.3	40.0	43.3	45.0	48.3	50.0		
78	28.3	34.0	37.8	37.8	38.3	45.3	47.2	47.2	48.3	56.7	56.7	60.7
84	34.0	36.0	40.0	42.0	46.0	48.0	52.0	54.0	58.0	60.0	64.0	66.0
90	37.8	40.0	44.4	46.7	51.1	53.3	57.8	60.0	64.4	66.7	71.1	73.3
96	37.8	42.0	46.7	46.7	51.1	56.0	58.3	60.0	64.4	70.0	71.1	73.3
102	38.3	46.0	51.1	51.1	57.1	61.3	63.9	63.9	64.4	76.7	82.7	76.7
108	45.3	48.0	53.3	56.0	61.3	64.0	69.3	72.0	77.3	80.0	85.3	88.0
114		52.0	57.8	58.3	63.9	69.3	72.2	75.0	80.6	86.7	88.9	91.7
120			60.0	60.0	63.9	72.0	75.0	75.0	80.6	90.0	90.0	91.7
126			64.4	64.4	72.4	77.3	80.6	80.6	88.6	96.7	96.7	104.7

FILTER AREA

ANGLE FILTER (AF) FACE AREA (SQ. FT.)

CABINET HEIGHT	CABINET WIDTH											
	27	30	33	36	39	42	45	48	54	60	66	72
27	4.4	4.4	4.0	4.0	6.7	8.9	8.9	8.9	8.9			
30	4.4	4.4	4.0	4.4	6.7	8.9	8.9	8.9	8.9	13.3		
33		4.4	4.4	6.7	8.0	8.9	8.9	8.9	11.1	13.3	15.6	
36		5.6	8.0	8.0	8.0	8.9	8.9	11.1	11.1	16.0	15.6	17.8
39			8.0	8.0	8.0	8.9	10.0	11.1	13.3	16.0	15.6	17.8
42				8.0	13.3	10.7	10.0	11.1	17.8	16.0	18.7	26.7
45				8.0	13.3	10.7	10.7	17.8	17.8	16.0	18.7	26.7
48					12.0	10.7	17.8	17.8	17.8	24.0	31.1	26.7
51						17.8	17.8	17.8	17.8	24.0	31.1	26.7
54							17.8	17.8	17.8	24.0	31.1	26.7
57								17.8	22.2	24.0	31.1	26.7
60								17.8	26.7	24.0	31.1	40.0
66									26.7	32.0	31.1	40.0
72									26.7	32.0	31.1	40.0
78										32.0	46.7	40.0
84										32.0	37.3	40.0
90											46.7	53.3
96												53.3
102												53.3
108												
114												
120												
126												

ANGLE FILTER (AF) FACE AREA (SQ. FT.) (continued)

CABINET HEIGHT	CABINET WIDTH											
	78	84	90	96	102	108	114	120	126	132	138	144
27												
30												
33												
36												
39	18.9											
42	22.7	24.0										
45	22.7	24.0										
48	35.6	36.0	35.6									
51	35.6	36.0	35.6	48.9								
54	35.6	36.0	35.6	48.9	48.9							
57	35.6	36.0	35.6	48.9	48.9	48.0						
60	35.6	36.0	53.3	48.9	48.9	48.0						
66	35.6	48.0	53.3	48.9	48.9	64.0	57.8	62.2				
72	37.8	48.0	53.3	48.9	51.1	64.0	57.8	62.2	80.0	80.0		
78	53.3	48.0	53.3	73.3	73.3	64.0	86.7	93.3	80.0	80.0	106.7	113.3
84	45.3	48.0	53.3	58.7	61.3	64.0	69.3	74.7	80.0	80.0	88.0	90.7
90	53.3	60.0	71.1	73.3	73.3	80.0	86.7	93.3	106.7	100.0	106.7	113.3
96	53.3	60.0	71.1	73.3	73.3	80.0	86.7	93.3	106.7	100.0	106.7	113.3
102	56.7	60.0	71.1	73.3	76.7	80.0	86.7	93.3	106.7	100.0	106.7	113.3
108	71.1	72.0	71.1	73.3	97.8	96.0	115.6	124.4	106.7	120.0	110.0	151.1
114		72.0	88.9	97.8	97.8	96.0	115.6	124.4	133.3	120.0	142.2	151.1
120			88.9	97.8	97.8	96.0	115.6	124.4	133.3	120.0	142.2	151.1
126			88.9	97.8	97.8	112.0	115.6	124.4	133.3	140.0	142.2	151.1

Engineering Data

FILTER AREA

HEPA FILTER (HF) FACE AREA (SQ. FT.)

CABINET HEIGHT	CABINET WIDTH											
	27	30	33	36	39	42	45	48	54	60	66	72
27			2.5	2.5	3.1	3.1	3.1	3.1	3.1			
30			2.5	2.5	3.1	3.1	3.1	3.1	3.1	5		
33			2.5	2.5	3.1	3.1	3.1	3.1	3.1	5	5.6	
36		2.5	4	4	5	5	5	6	7	8	9	10
39			4.5	4.5	5.6	5.6	5.6	6	7	9	9	11.3
42				5	6.3	6.3	6.3	7.5	8.8	10	11.3	12.5
45				5	6.3	6.3	6.3	7.5	8.8	10	11.3	12.5
48					7.5	7.5	7.5	7.5	8.8	12	13.5	15
51						8.1	8.1	8.1	8.8	13	13.5	16.3
54							8.8	8.8	8.8	14	14	17.5
57								9.4	9.8	15	16.9	18.8
60								12	14	16	18	20
66									14	18	18	22.5
72									17.5	20	22.5	25
78										21	22.5	27.5
84										24	27	30
90											28.1	32.5
96												35
102												37.5
108												
114												
120												
126												

NOTE:

No size available.

HEPA FILTER (HF) FACE AREA (SQ. FT.) (continued)

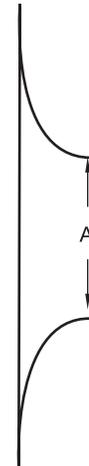
CABINET HEIGHT	CABINET WIDTH											
	78	84	90	96	102	108	114	120	126	132	138	144
27												
30												
33												
36												
39												
42												
45												
48												
51	16.3	19.5	19.5	21								
54	17.5	21	21	21	26.3							
57	18.8	22.5	24.4	26.3	28.1	30						
60	22.0	24	26	28	30	32						
66	22.5	27	28.1	28.1	33.8	36	36	39.4				
72	27.5	30	32.5	35	37.5	40	42.5	45	47.5	50		
78	27.5	31.5	32.5	35	39.4	42	42.5	45	47.5	52.5	52.5	55
84	33.0	36	39	42	45	48	51	54	57	60	63	66
90	33.0	39	40.6	43.8	48.8	52	53.1	56.9	59.4	65	65.6	68.8
96	35.0	42	43.8	43.8	52.5	56	56	61.3	63	70	70	70
102	41.3	45	48.8	52.5	56.3	60	63.8	67.5	71.3	75	78.8	82.5
108	41.3	46.5	48.8	52.5	58.1	62	63.8	67.5	71.3	77.5	78.8	82.5
114		49.5	52	56	61.9	66	68	72	76	82.5	84	88
120			56.9	61.3	65.6	70	74.4	78.8	83.1	87.5	91.9	96.3
126			58.5	63	69.4	74	76.5	81	85.5	92.5	94.5	99

Segment Dimensions

DWDI INLET CONE DIMENSIONS

FORWARD CURVED FANS

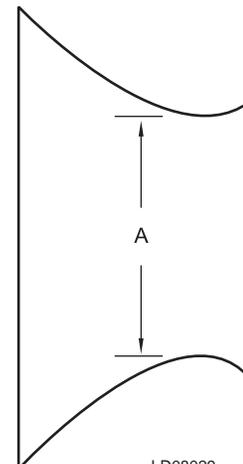
FAN SIZE	INLET DIMENSIONS (A)
7x7	6.69
9x6	7.80
9x9	7.80
10x7	8.78
10x10	8.78
12x9	10.24
12x12	10.24
15x11	12.52
15x15	12.52
18x13	15.47
18x18	15.47
20x15	16.22
20x20	16.22
22x22	18.19
25x25	20.39
28x28	22.95
32x32	25.79
36x36	29.02
40x40	32.72



LD02603

AIRFOIL FANS

FAN SIZE	INLET DIMENSIONS (A)
12	8.54
15	10.83
18	12.01
20	13.46
22	15.16
25	17.09
28	19.29
32	21.65
36	24.02
40	26.89



LD08029

All dimensions are in inches and are approximate. Not certified for construction.

Segment Dimensions

DWDI FAN SECTION

SEGMENT LENGTH VS MOTOR POSITION

FAN SIZE	FAN TYPE	MINIMUM H	MOTOR BEHIND			MOTOR BESIDE			MAX NEMA
			W	R-L	T-L	W	R-L	T-L	
7x7	FC	27	27	34	41	42	30	36	184T
9x6	FC	30	30	37	43	42	32	37	184T
9x9	FC	30	33	39	45	45	33	38	213T
10x7	FC	33	33	39	44	42	33	36	184T
10x10	FC	33	36	41	46	48	33	37	213T
12x9	FC	36	33	44	48	48	34	38	213T
12x12	AF-FC	36	36	47	52	54	36	43	254T
15x11	FC	39	45	50	54	54	37	42	254T
15x15	AF-FC	39	51	50	55	60	36	43	254T
18x13	FC	45	51	55	59	60	38	45	254T
18x18	AF-FC	45	57	55	59	63	38	45	256T
20x15	FC	51	57	64	73	69	43	51	284T
20x20	AF-FC	51	63	64	73	75	43	51	286T
22x22	AF-FC	57	72	70	79	84	45	55	326T
25x25	AF-FC	63	75	74	84	90	46	60	326T
28x28	AF-FC	66	84	81	92	96	49	66	364T
32x32	AF-FC	72	-	-	-	102	54	73	365T
36x36	AF-FC	84	-	-	-	108	60	80	365T
40x40	AF-FC	90	-	-	-	120	65	87	404T

NOTES:

Min H: Minimum height required W: Minimum Width required R-L: Rear discharge length T-L: Top discharge length

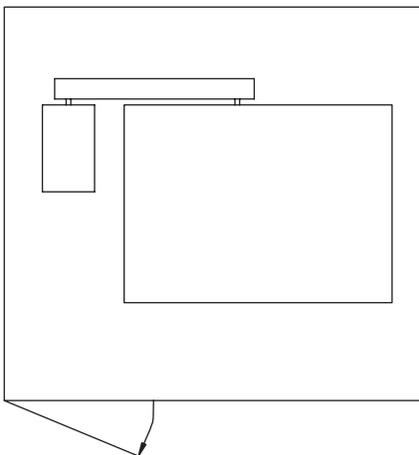
Variable baserail height is not included in overall cabinet height.

Pitched outdoor roof increases unit height by 2" - not included in above.

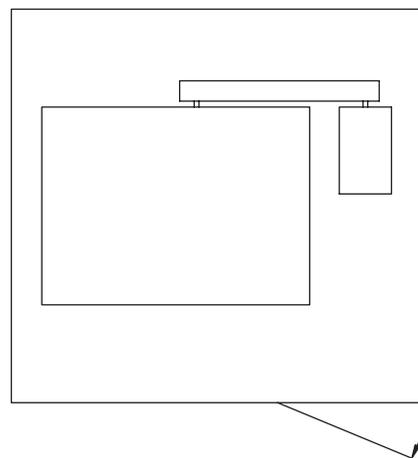
Lengths will change as shipping splits, doors, etc. are added to unit configuration.

All dimensions are in inches and are approximate. Not certified for construction.

DWDI BELT DRIVE



Front, Front Inverted, Top and Bottom Fan Orientations



Rear, Rear Inverted, Top Inverted and Bottom Inverted Fan Orientations

LD08005

SWSI PLENUM FAN SECTION

BELT DRIVE

SWSI FAN SIZE	MINIMUM H	MOTOR BEHIND		MOTOR BESIDE		MAX NEMA
		W	L	W	L	
12	33	39	40	45	41	184T
14	39	42	43	51	43	213T
16	48	42	44	54	44	215T
18	42	54	51	60	40	256T
20	45	57	53	63	42	256T
22	48	60	59	72	44	284T
25	48	60	64	78	52	324T
28	54	63	65	84	54	326T
32	63	69	76	93	60	364T
35	66	78	78	102	62	365T
39	72	84	84	114	66	404T
44	78	96	87	120	70	404T
49	84	108	92	132	73	404T
55	126	132	94	144	74	404T

DIRECT DRIVE

SWSI FAN SIZE	MINIMUM CASING		SEGMENT LENGTH	MAX NEMA
	H	W		
18	42	54	54	256T
20	42	57	56	256T
22	45	60	57	256T
25	48	60	59	256T
28	51	63	64	286T
32	63	69	75	326T
35	63	81	79	365T
39	69	87	82	365T
44	75	93	90	405T
49	84	108	93	405T
55	120	144	75	405T

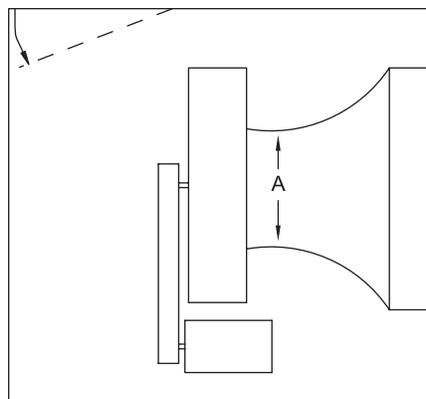
All dimensions are in inches and are approximate. Not certified for construction.

NOTES:

- Min H: Minimum height required
- W: Minimum Width required
- L: Minimum Length required
- Variable baserail height is not included in overall cabinet height.
- Segment lengths correspond with max. motor frame size.
- Pitched outdoor roof increases unit height by 2" - not included in above.
- Plenum fan performance is not within the scope of ARI Certification.
- Lengths will change as shipping splits, doors, etc. are added to unit configuration.

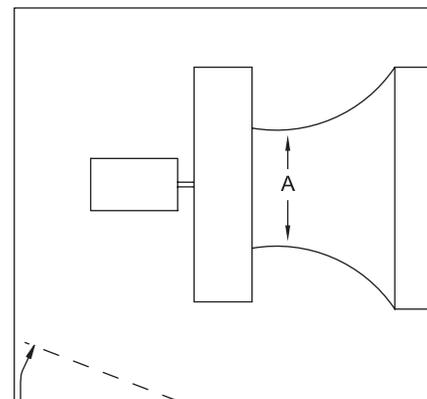
INLET CONE DIMENSIONS - SWSI PLENUM FANS

SWSI BELT DRIVE



FAN SIZE	INLET DIMENSIONS (A)
121	7.94
141	8.97
161	10.06
181	11.34
201	12.59
221	14.09
251	15.88
281	17.88
321	20.16
351	22.69
391	25.19
441	28.19
491	31.5
551	35.28
631	40.31
711	45.34
791	50.38

SWSI DIRECT DRIVE



LD08030

Segment Dimensions

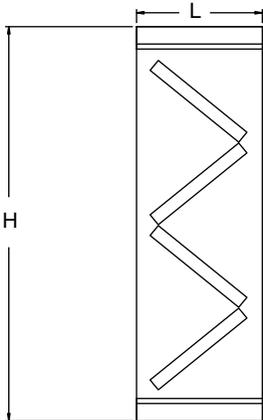
FILTERS

ANGLE FILTER (AF) SEGMENT LENGTHS

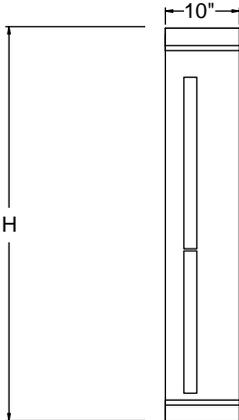
CABINET HEIGHT	CABINET WIDTH											
	27	30	33	36	39	42	45	48	54	60	66	72
27	22	18	13	13	22	22	22	18	18			
30	22	17	12	17	22	22	22	17	17	22		
33		16	16	21	15	21	21	16	21	21	21	
36		20	15	15	15	20	20	20	20	15	20	20
39			14	14	14	18	18	18	24	14	18	18
42				14	22	22	17	17	18	14	14	18
45				13	22	21	21	18	18	13	21	18
48					15	19	22	18	18	15	22	18
51						22	22	17	17	14	22	17
54							21	17	17	14	21	17
57								16	21	14	21	16
60								15	18	14	20	18
66									18	14	19	18
72										14	18	17
78										14	21	16
84										13	20	15
90											20	17
96												17
102												16
108												
114												
120												
126												

LEGEND
AF Length

NOTE:
 All other filters have standard lengths.
 Variable baserail height is not included in overall cabinet height.
 Pitched outdoor roof increases unit height by 2" - not included in above.
 Lengths will change as shipping splits, doors, etc. are added to unit configuration.



AF - ANGLE FILTER



FF - FLAT FILTER

LD08006a

All dimensions are in inches and are approximate. Not certified for construction.

FILTERS

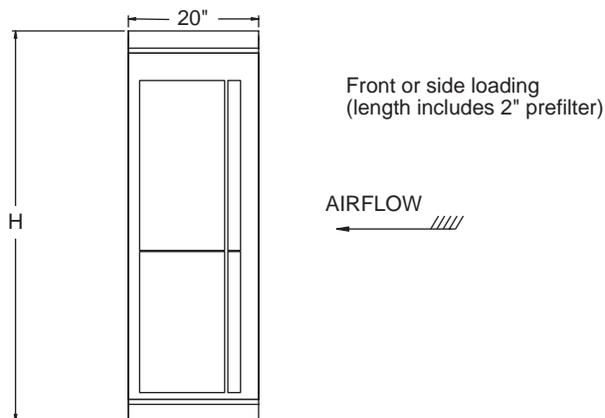
ANGLE FILTER (AF) SEGMENT LENGTHS (continued)

CABINET HEIGHT	CABINET WIDTH											
	78	84	90	96	102	108	114	120	125	132	138	144
27												
30												
33												
36												
39	18											
42	22	14										
45	21	13										
48	22	15	18									
51	14	17	22									
54	14	17	21	21								
57	21	14	16	21	21	14						
60	20	14	18	20	20	14						
66	19	14	18	19	19	14	19	19				
72	18	14	17	18	18	14	18	18	17	14		
78	21	14	16	21	21	14	21	21	16	14	21	21
84	20	13	15	20	20	13	20	20	15	13	20	20
90	20	14	17	20	20	14	20	20	17	14	20	20
96	19	14	17	19	19	14	19	19	17	14	19	19
102	18	13	16	18	18	13	18	18	16	13	18	18
108	21	14	16	17	21	14	21	21	16	14	17	21
114		13	17	20	20	13	20	20	17	13	20	20
120			17	20	20	13	20	20	17	13	20	20
126			16	19	19	14	19	19	16	14	19	19

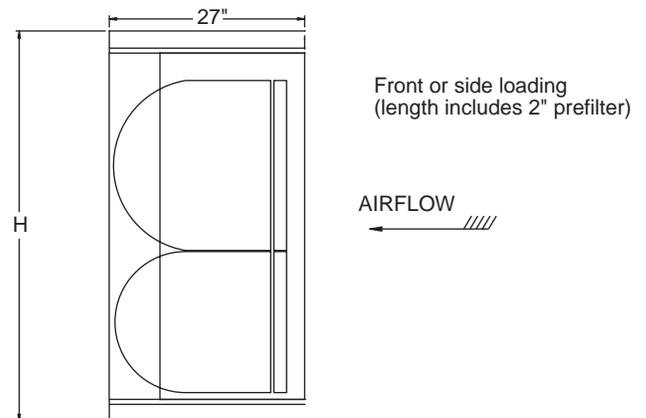
LEGEND
AF Length

NOTE:

- All other filters have standard lengths.
- Variable baserail height is not included in overall cabinet height.
- Pitched outdoor roof increases unit height by 2" - not included in above.
- Lengths will change as shipping splits, doors, etc. are added to unit configuration.



RF - RIGID FILTER



RF - BAG FILTER

LD08006b

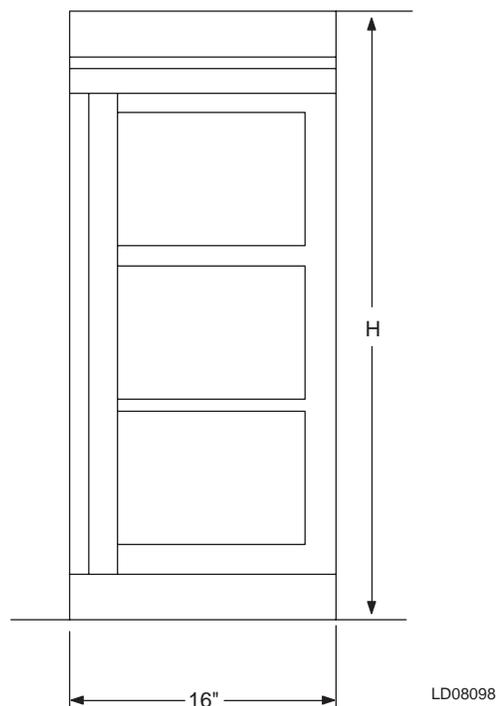
All dimensions are in inches and are approximate. Not certified for construction.

Segment Dimensions

FILTERS

HEPA FILTER (HF) NOTES

1. HEPA filter segment length is 16".
2. HEPA filters are only available in a front-load configuration.
3. Access must be provided in an upstream segment.
 - a. An access door must be in the upstream segment and must be at least 14" DOA to allow for removal of the filters.
4. Max air speed through the filter bank is 500 fpm.
 - a. When a HEPA filter segment is required in a unit, the airflow capacity is limited to 500 fpm through the filters.
5. Door Sizes and Locations
 - a. Doors are not available in the HEPA Filter segment.
 - b. An access door must be in the upstream segment and must be at least 14" DOA to allow for removal of the filters.
6. Filters
 - a. HEPA filters are orientation specific, (i.e., a 12x24 filter is different than a 24x12 filter).
 - i. 11.5", 99.97% efficiency.
 - ii. 11.5", 99.99% efficiency.
 - b. Pre-filters are not available for the HF segment.
7. Frames
 - a. Extruded aluminum bevel-welded frames.
8. Auxiliary Drain-pans
 - a. Default drain location is drive side.
 - b. Drain location is at middle of the segment.
 - c. Auxiliary drain-pan is equal to the length of the segment.
9. Design certified by testing to pass DOP penetration test.
10. Lengths will change as shipping splits, doors, etc. are added to unit configuration.



All dimensions are in inches and are approximate. Not certified for construction.

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Segment Dimensions

MIXING BOX (MB) / FILTER MIXING BOX (FM)

CABINET HEIGHT	CABINET WIDTH											
	27	30	33	36	39	42	45	48	54	60	66	72
27	15 35	15 31	15 26	15 26	15 31	15 35	15 35	15 31	15 31			
30	15 35	15 30	15 25	15 35	15 35	15 35	15 35	15 30	15 30	15 35		
33		15 29	15 29	15 34	15 34	15 34	15 34	15 29	15 34	15 34	15 34	
36		20 32	20 28	20 28	20 28	20 28	20 32	20 32	20 32	20 28	20 28	20 28
39			20 27	20 27	20 27	20 30	20 35	20 30	20 36	20 27	20 27	20 30
42				20 26	20 30	20 31	20 31	20 29	20 30	20 26	20 30	20 30
45				26 31	26 33	26 36	21 30	21 30	20 30	20 25	20 30	20 30
48				26 35	26 35	26 35	26 33	26 33	26 33	26 35	21 29	21 29
51					26 33	26 34	26 32	26 32	26 32	26 33	26 33	26 33
54						26 33	26 31	26 31	26 31	26 33	26 33	26 31
57							26 31	26 32	26 32	26 32	26 32	26 31
60							26 30	26 34	26 32	26 34	26 34	26 34
66								32 39	32 39	32 39	32 39	32 39
72										32 38	32 38	32 38
78										32 37	32 39	32 39
84										38 42	38 44	38 44
90											38 44	38 46
96												43 50
102												43 52
108												
114												
120												
126												

LEGEND

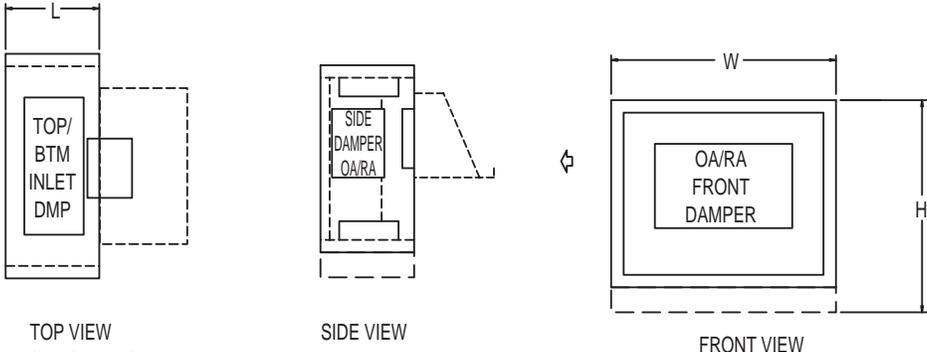
MB Length
 FM Length

NOTE:
 MB and FM lengths do not include side dampers. FM includes 2" filter media.

NOTES:

- Variable baserail height is not included in overall cabinet height.
- Check with local YORK sales office for hood dimensions.
- Pitched outdoor roof increases unit height by 2" - not included in above.
- Lengths will change as shipping splits, doors, etc. are added to unit configuration.

All dimensions are in inches and are approximate. Not certified for construction.



NOTE: hood for outdoor application only.

LD08013

MIXING BOX (MB) / FILTER MIXING BOX (FM)

CABINET HEIGHT	CABINET WIDTH											
	78	84	90	96	102	108	114	120	126	132	138	144
27												
30												
33												
36												
39	20 36											
42	20 30	20 26										
45	20 30	20 25										
48	21 29	21 29	20 29									
51	26 32	26 33	26 33	26 33								
54	26 33	26 33	26 33	26 33	26 33							
57	26 32	26 32	26 32	26 32	26 32	26 32						
60	26 34	26 32	26 32	26 34	26 34	26 32						
66	27 33	26 33										
72	32 38	32 38	32 38	32 38	32 38	32 38	32 38	32 38	32 38	32 38		
78	32 40	32 37	32 39	32 39	32 39	32 37	32 37	32 39	32 39	32 37	32 37	32 39
84	38 45	38 42	38 44	38 44	38 44	38 42	38 44	38 44	38 44	38 42	38 39	38 39
90	38 44	38 44	38 44	38 46	38 46	38 44	38 44	38 44	38 46	38 44	38 44	38 44
96	38 44	38 43	38 45	38 45	38 45	38 43	38 43	38 45	38 45	38 43	38 43	38 45
102	43 52	43 48	43 50	43 50	43 52	43 48	43 50	43 50	43 50	43 48	43 50	43 50
108	43 49	43 49	43 49	43 51	43 51	43 49	43 49	43 49	43 51	43 49	43 49	43 49
114		43 49	43 50	43 50	43 52	43 48	43 48	43 50	43 50	43 48	43 48	43 50
120			49 55	49 55	49 57	49 54	49 55	49 55	49 55	49 54	49 55	49 55
126			49 55	49 56	49 56	49 55	49 55	49 55	49 56	49 55	49 55	49 55

LEGEND

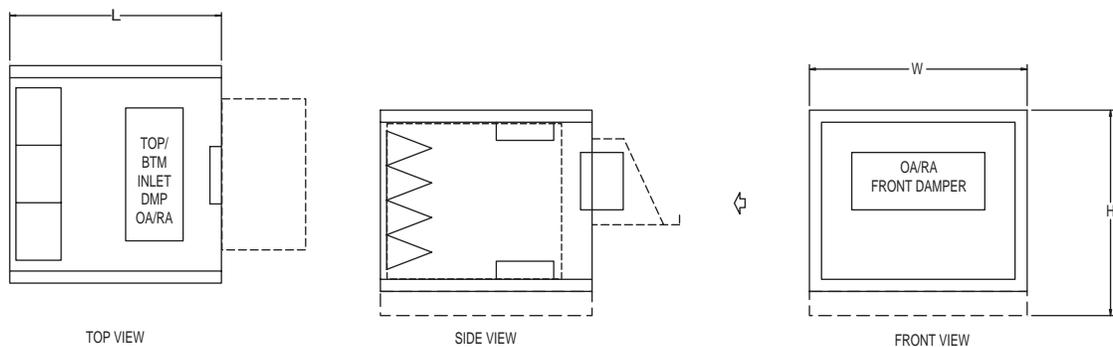
 MB Length
 FM Length

NOTE:
 MB and FM lengths do not include side dampers. FM includes 2" filter media.

NOTES:

- Variable baserail height is not included in overall cabinet height.
- Check with local YORK sales office for hood dimensions.
- Pitched outdoor roof increases unit height by 2" - not included in above.
- Lengths will change as shipping splits, doors, etc. are added to unit configuration.

All dimensions are in inches and are approximate. Not certified for construction.



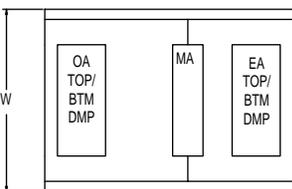
NOTE: hood for outdoor application only.

LD08015

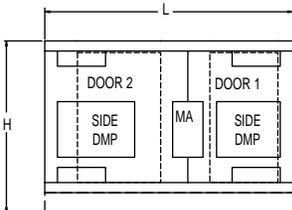
Segment Dimensions

ECONOMIZER (EE)

CABINET HEIGHT	CABINET WIDTH												
	27	30	33	36	39	42	45	48	54	60	66	72	
27	39 29 50 46	42 29 46 46	44 29 41 46	46 29 41 47	49 29 46 49	51 29 50 50	53 29 50 51	56 29 46 52	60 29 46 54				
30	37 29 50 46	39 29 45 46	40 29 40 46	42 29 50 46	44 29 50 46	46 29 50 47	47 29 50 48	49 29 45 49	53 29 45 51	56 29 50 52			
33			40 29 44 46	42 29 44 46	43 29 49 46	45 29 49 47	47 29 49 48	49 29 44 49	51 29 49 50	55 29 49 52	59 29 49 54	63 29 49 56	
36			38 40 52 52	39 40 48 52	41 40 48 52	43 40 48 52	44 40 48 52	46 40 52 53	47 40 52 54	51 40 52 56	54 40 48 57	57 40 48 59	60 40 48 60
39				40 40 47 52	42 40 47 52	44 40 47 52	46 40 50 53	47 40 55 54	49 40 56 57	53 40 56 57	56 40 47 58	60 40 47 60	63 40 50 62
42				40 40 46 52	42 40 50 52	43 40 51 52	45 40 51 53	46 40 49 53	50 40 50 55	53 40 46 57	56 40 50 58	59 40 50 60	
45					38 52 57 58	40 52 59 58	42 52 62 59	43 41 51 53	45 41 51 54	48 40 50 56	52 40 45 58	55 40 50 59	59 40 50 61
48						38 52 61 58	40 52 61 58	41 52 61 58	43 52 59 59	46 52 59 61	49 52 61 62	52 41 50 58	55 41 50 59
51							41 52 59 58	43 52 60 59	44 52 58 60	48 52 58 62	51 52 59 63	54 52 59 65	57 52 59 66
54								41 52 59 58	43 52 57 59	46 52 57 61	49 52 59 62	51 52 59 63	54 52 57 65
57									44 52 57 60	47 52 58 61	50 52 58 63	53 52 58 64	56 52 57 66
60									41 52 56 58	44 52 60 60	47 52 58 61	50 52 60 63	52 52 60 64
66										44 63 71 65	47 63 71 66	50 63 71 68	52 63 71 69
72											53 63 70 69	57 63 70 71	60 63 70 73
78											50 64 69 69	53 63 71 69	56 63 71 71
84											52 75 80 75	55 75 82 76	59 75 82 78
90												52 75 84 76	55 75 84 76
96													58 86 93 84
102													60 86 95 85
108													
114													
120													
126													

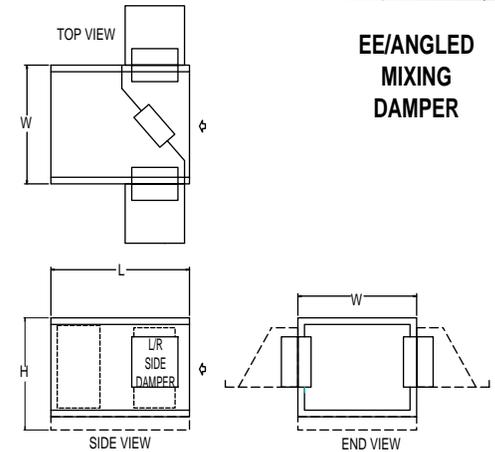


TOP VIEW



SIDE VIEW

EE/VERTICAL MIXING DAMPER



EE/ANGLED MIXING DAMPER

LEGEND

- EE (with angled mixing damper)
- EE (with vertical mixing damper)
- EF (same as EE but with filter)
- EE (inlet economizer)

EE Angled MA Wall: 100% OA, 100% EA, Indoor/Outdoor.
 EE Vertical MA Wall: 100% OA, 100% EA, Indoor Only.
 EF: Same as EE Indoor but with combined filter segment.
 EE: 50% OA on each side with barometric exhaust, Outdoor Only.

- NOTE:**
- EE Indoor and EF segment lengths include top dampers. Side dampers may increase segment lengths.
 - Variable baserail height is not included in overall cabinet height.
 - Pitched outdoor roof increases unit height by 2" - not included in above.
 - Lengths will change as shipping splits, doors, etc. are added to unit configuration.

All dimensions are in inches and are approximate. Not certified for construction.

ECONOMIZER (EE) (continued)

CABINET HEIGHT	CABINET WIDTH																				
	78	84	90	96	102	108	114	120	126	132	138	144									
27																					
30																					
33																					
36																					
39	67 40 56 64																				
42	62 40 50 61	65 40 46 63																			
45	62 40 50 63	65 40 45 64																			
48	58 41 50 61	61 41 50 62	64 40 49 64																		
51	60 52 58 68	64 52 59 70	67 52 59 71	70 52 59 73																	
54	57 52 59 66	60 52 59 68	63 52 59 69	66 52 59 71	69 52 59 72																
57	59 52 58 67	63 52 58 69	66 52 58 71	69 52 58 72	72 52 58 74	75 52 58 75															
60	55 52 60 65	58 52 58 67	61 52 58 68	63 52 60 69	66 52 60 71	69 52 58 72															
66	55 53 60 65	58 52 59 67	60 52 59 68	63 52 59 69	66 52 59 71	69 52 59 72	71 52 59 73	74 52 59 75													
72	64 63 70 75	68 63 70 77	71 63 70 78	75 63 70 80	78 63 70 82	82 63 70 84	85 63 70 85	89 63 70 87	93 63 70 89	96 63 70 91											
78	59 63 72 72	62 63 69 74	65 63 71 75	68 63 71 77	71 63 71 78	74 63 69 80	77 63 71 81	80 63 71 83	83 63 71 84	87 63 69 86	90 63 69 88	93 63 71 89									
84	62 75 83 80	65 75 80 81	69 75 82 83	72 75 82 85	75 75 82 86	79 75 80 88	82 75 82 90	85 75 82 91	89 75 82 93	92 75 80 95	95 64 71 91	99 64 71 93									
90	58 75 82 78	61 75 82 79	64 76 82 82	67 75 84 82	70 75 84 84	73 75 82 85	76 75 82 87	79 75 82 88	82 75 84 90	85 75 82 91	88 75 82 93	91 75 82 94									
96	61 76 82 80	65 75 81 81	68 75 83 83	71 75 83 84	75 75 83 86	78 75 81 88	81 75 81 89	85 75 83 91	88 75 83 93	91 75 81 94	95 75 81 96	98 75 83 98									
102	64 86 95 87	67 86 91 88	71 86 93 90	75 86 93 92	78 86 95 94	82 86 91 96	85 86 93 97	89 86 93 99	92 86 93 101	96 86 93 103	99 86 93 104	103 86 93 106									
108	57 86 92 83	60 86 92 85	63 86 92 86	66 86 94 88	68 86 94 89	71 86 92 90	74 86 92 92	77 86 92 93	80 86 94 95	83 86 92 96	86 86 92 98	89 86 92 99									
114		62 87 93 86	65 87 94 87	68 86 93 89	71 86 95 90	74 86 91 92	77 86 93 95	80 86 93 96	83 86 93 96	87 86 91 98	90 86 91 100	93 86 93 101									
120			67 98 104 94	71 98 104 96	74 98 106 98	77 98 103 99	80 98 104 101	84 98 104 103	87 98 104 104	90 98 103 106	93 98 104 107	97 98 104 109									
126			62 98 104 92	65 98 105 93	68 98 105 95	71 98 104 96	73 98 104 97	76 98 104 99	79 98 105 100	82 98 104 102	85 98 104 103	88 98 104 105									

LEGEND

EE (with angled mixing damper)
 EE (with vertical mixing damper)
 EF (same as EE but with filter)
 EE (inlet economizer)

EE Angled MA Wall: 100% OA, 100% EA, Indoor/Outdoor.
 EE Vertical MA Wall: 100% OA, 100% EA, Indoor Only.
 EF: Same as EE Indoor but with combined filter segment.
 EE: 50% OA on each side with barometric exhaust, Outdoor Only.

NOTE:

1. EE Indoor and EF segment lengths include top dampers. Side dampers may increase segment lengths.
2. Variable baserail height is not included in overall cabinet height.
3. Pitched outdoor roof increases unit height by 2" - not included in above.
4. Lengths will change as shipping splits, doors, etc. are added to unit configuration.

All dimensions are in inches and are approximate. Not certified for construction.

Segment Dimensions

ECONOMIZER - (VE) VERTICAL

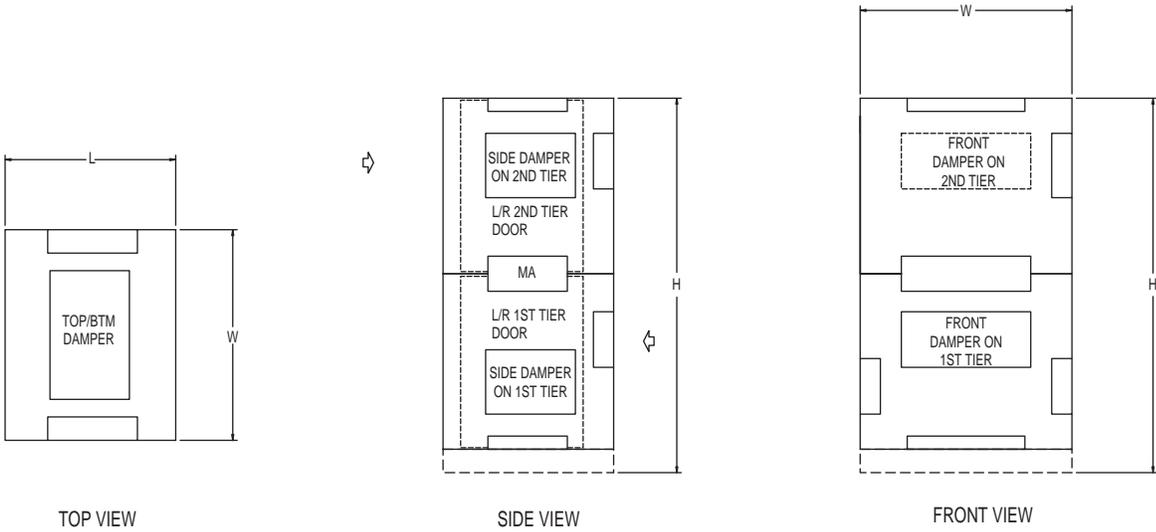
CABINET HEIGHT	CABINET WIDTH																	
	27	30	33	36	39	42	45	48	54	60	66	72						
27	15	15	15	15	15	15	15	15	15									
30	15	15	15	15	15	15	15	15	15	15								
33		15	15	15	15	15	15	15	15	15	15							
36			20	20	20	20	20	20	20	20	20	20						
39				20	20	20	20	20	20	20	20	20						
42					20	20	20	20	20	20	20	20						
45						26	26	21	20	20	20	20						
48							26	26	26	26	21	21						
51								26	26	26	26	26						
54									26	26	26	26						
57										26	26	26						
60											26	26						
66												32						
72													32					
78														32				
84															38			
90																38		
96																	43	
102																		43
108																		
114																		
120																		
126																		

LEGEND


NOTE:
 VE does not include side dampers, which may increase length.

NOTE:
 Variable baserail height is not included in overall cabinet height.
 Check with your local YORK sales office for hood details.
 VF (Vertical Filter Economizer) is available with filtration may stretch the segment length.
 Lengths will change as shipping splits, doors, etc. are added to unit configuration.

All dimensions are in inches and are approximate. Not certified for construction.



LD08016

ECONOMIZER - (VE) VERTICAL

CABINET HEIGHT	CABINET WIDTH											
	78	84	90	96	102	108	114	120	126	132	138	144
27												
30												
33												
36												
39	20											
42	20	20										
45	20	20										
48	21	21	20									
51	26	26	26	26								
54	26	26	26	26	26							
57	26	26	26	26	26	26						
60	26	26	26	26	26	26						
66	27	26	26	26	26	26	26					
72	32	32	32	32	32	32	32	32	32			
78	32	32	32	32	32	32	32	32	32	32		
84	38	38	38	38	38	38	38	38	38	38	32	32
90	38	38	38	38	38	38	38	38	38	38	38	38
96	38	38	38	38	38	38	38	38	38	38	38	38
102	43	43	43	43	43	43	43	43	43	43	43	43
108	43	43	43	43	43	43	43	43	43	43	43	43
114		44	44	43	43	43	43	43	43	43	43	43
120			49	49	49	49	49	49	49	49	49	49
126			49	49	49	49	49	49	49	49	49	49

LEGEND

VE - Vertical Length

NOTE:

VE does not include side dampers, which may increase length.

NOTE:

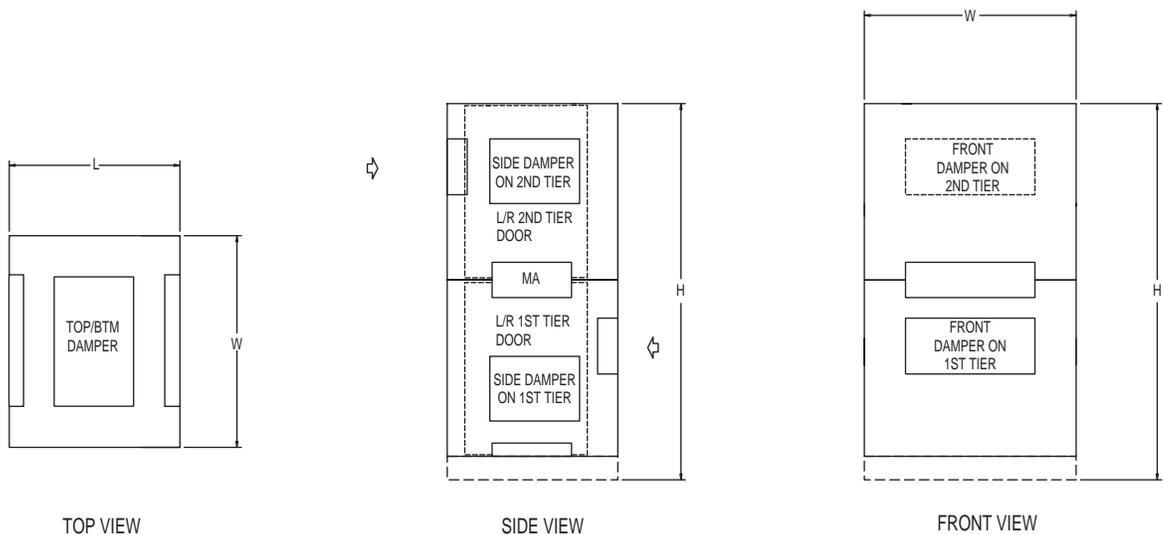
Variable baserail height is not included in overall cabinet height.

Check with your local YORK sales office for hood details.

VF (Vertical Filter Economizer) is available with filtration may stretch the segment length.

Lengths will change as shipping splits, doors, etc. are added to unit configuration.

All dimensions are in inches and are approximate. Not certified for construction.



LD08038

Segment Dimensions

DIFFUSER (DI)

CABINET HEIGHT	CABINET WIDTH											
	27	30	33	36	39	42	45	48	54	60	66	72
27	10	10	10	10	10	10	10	10	10			
30	10	10	10	10	10	10	10	10	10	10		
33		10	10	10	10	10	10	10	10	10	10	
36		10	10	10	10	10	10	10	10	10	11	11
39			10	10	10	10	10	10	10	10	11	12
42				10	10	10	10	10	10	11	12	12
45				10	10	10	10	10	11	11	12	13
48					10	10	10	10	11	12	13	13
51						10	10	11	12	12	13	14
54							11	11	12	13	14	14
57								12	12	13	14	15
60								12	13	14	15	15
66									14	15	16	16
72										15	16	17
78										16	17	18
84										17	18	19
90											19	20
96												20
102												21
108												
114												
120												
126												

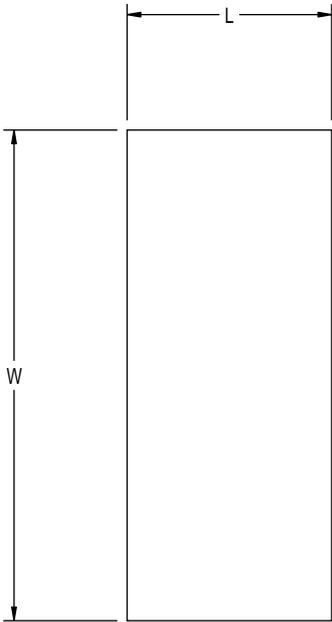
LEGEND

DI Length

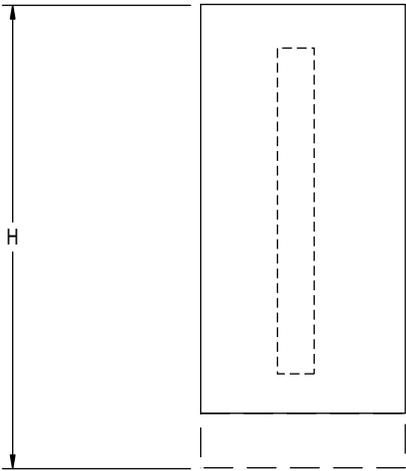
NOTE:

Variable baserail height is not included in overall cabinet height.
 Pitched outdoor roof increases unit height by 2" - not included in above.
 Lengths will change as shipping splits, doors, etc. are added to unit configuration.

All dimensions are in inches and are approximate. Not certified for construction.



TOP VIEW



SIDE VIEW



DIFFUSER (DI)

CABINET HEIGHT	CABINET WIDTH												
	78	84	90	96	102	108	114	120	126	132	138	144	
27													
30													
33													
36													
39	12												
42	13	14											
45	14	14											
48	14	15	15										
51	15	15	17	17									
54	15	16	17	17	18								
57	16	16	17	18	18	19							
60	16	17	18	18	19	20							
66	17	18	19	19	20	21	21	22					
72	18	19	20	20	21	22	22	23	24	24			
78	19	20	21	21	22	23	24	24	25	26	26	27	
84	20	21	21	22	23	24	25	25	26	27	27	28	
90	21	21	22	23	24	25	26	26	27	28	28	29	
96	21	22	23	24	25	26	27	27	28	29	30	30	
102	22	23	24	25	26	27	27	28	29	30	31	31	
108	23	24	25	26	27	28	28	29	30	31	32	32	
114		25	26	27	27	28	29	30	31	32	32	33	
120			26	27	28	29	30	31	32	33	33	34	
126			27	28	29	30	31	32	33	33	34	35	

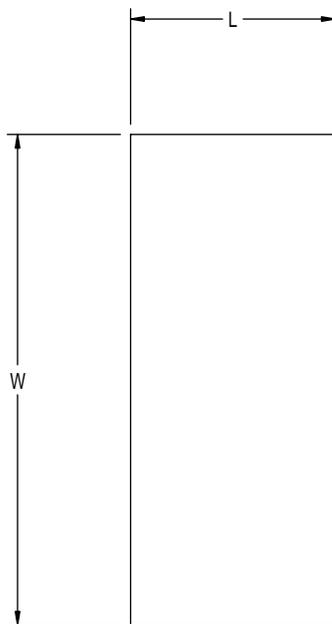
LEGEND

DI Length

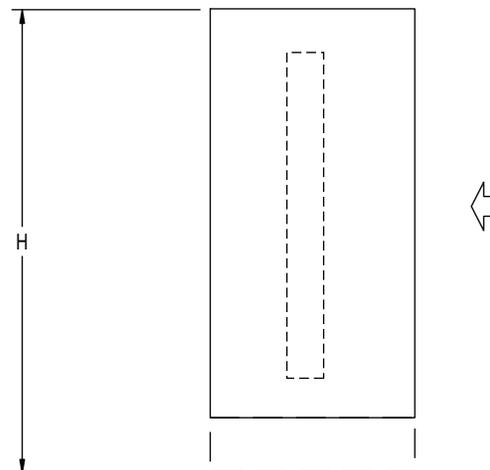
NOTE:

Variable baserail height is not included in overall cabinet height.
 Pitched outdoor roof increases unit height by 2" - not included in above.
 Lengths will change as shipping splits, doors, etc. are added to unit configuration.

All dimensions are in inches and are approximate. Not certified for construction.



TOP VIEW



SIDE VIEW

LD08031

Segment Dimensions

DISCHARGE PLENUM (DP)

DP SEGMENT

CABINET HEIGHT	CABINET WIDTH											
	27	30	33	36	39	42	45	48	54	60	66	72
27	11	11	11	11	11	11	11	11	11			
30	12	12	12	12	12	12	12	12	12	12		
33		13	13	13	13	13	13	13	13	13	13	
36		14	14	14	14	14	14	14	14	14	14	14
39			15	15	15	15	15	15	15	15	15	15
42				16	16	16	16	16	16	16	16	16
45				23	23	23	22	22	22	22	22	21
48					24	24	23	23	23	23	23	23
51						25	25	24	24	24	24	24
54							26	26	25	25	25	25
57								27	26	26	26	26
60								27	26	26	26	26
66									29	28	28	28
72										31	31	30
78										33	32	32
84										35	35	34
90											37	37
96												39
102												41
108												
114												
120												
126												

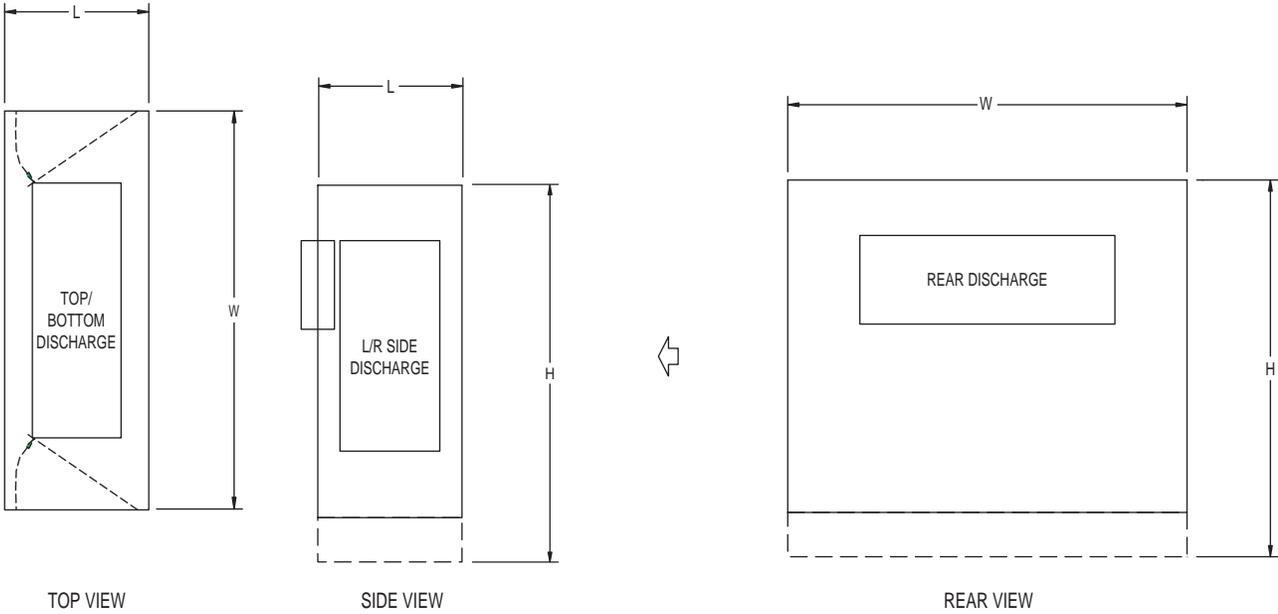
LEGEND

DP Length

NOTE:
Multiple openings may be selected in a DP segment.

NOTE:
 Variable baserail height is not included in overall cabinet height.
 Selection of side openings may increase segment lengths.
 Pitched outdoor roof increases unit height by 2" - not included in above.
 Lengths will change as shipping splits, doors, etc. are added to unit configuration.

All dimensions are in inches and are approximate. Not certified for construction.



DISCHARGE PLENUM (DP)

DP SEGMENT (continued)

CABINET HEIGHT	CABINET WIDTH											
	78	84	90	96	102	108	114	120	126	132	138	144
27												
30												
33												
36												
39	15											
42	16	16										
45	21	21										
48	22	22	22									
51	24	23	23	23								
54	25	24	24	24	24							
57	26	26	25	25	25	25						
60	26	26	26	25	25	25						
66	28	28	28	28	28	27	27	27				
72	30	30	30	30	30	30	30	30	30	30		
78	32	32	32	32	32	32	32	32	32	31	31	31
84	34	34	34	34	34	34	34	34	34	34	34	33
90	36	36	36	36	36	36	36	36	36	36	36	35
96	39	38	38	38	38	38	38	38	38	38	38	38
102	41	40	40	40	40	40	40	40	40	40	40	40
108	42	42	43	43	43	43	43	43	43	43	43	43
114		44	44	43	43	43	43	43	43	43	43	43
120			46	46	45	45	45	45	45	45	45	45
126			48	48	48	47	47	47	47	47	47	47

LEGEND

DP Length

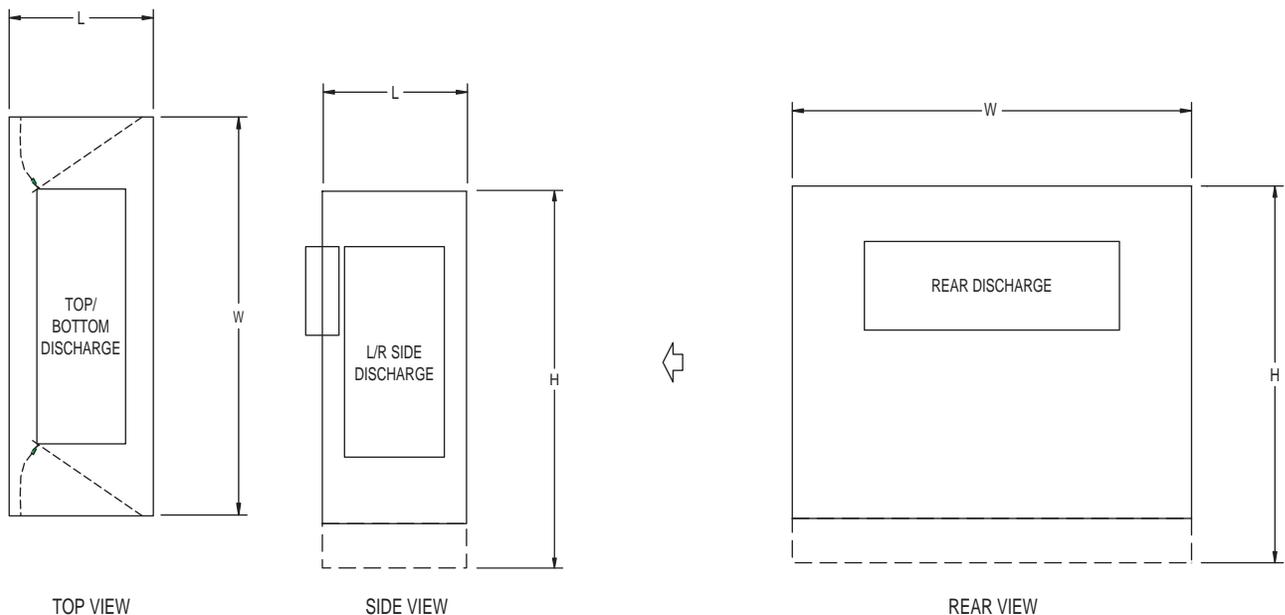
NOTE:

Multiple openings may be selected in a DP segment.

NOTE:

- Variable baserail height is not included in overall cabinet height.
- Selection of side openings may increase segment lengths.
- Pitched outdoor roof increases unit height by 2" - not included in above.
- Lengths will change as shipping splits, doors, etc. are added to unit configuration.

All dimensions are in inches and are approximate. Not certified for construction.



Segment Dimensions

TURNING SEGMENT (TN)

TN SEGMENT

CABINET HEIGHT	CABINET WIDTH											
	27	30	33	36	39	42	45	48	54	60	66	72
27	11	11	11	11	11	11	11	11	11			
30	12	12	12	12	12	12	12	12	12	12		
33		14	14	14	14	14	14	14	14	14		
36		15	15	15	15	15	15	15	15	15	15	51
39			17	17	17	17	17	17	17	17	17	17
42				18	18	18	18	18	18	18	18	18
45				20	20	20	20	20	20	20	20	20
48					21	21	21	21	21	21	21	21
51						23	23	23	23	23	23	23
54							24	24	24	24	24	24
57								26	26	26	26	26
60								27	27	27	27	27
66									30	30	30	30
72										33	33	33
78										36	36	36
84										39	39	39
90											42	42
96												45
102												48
108												
114												
120												
126												

LEGEND

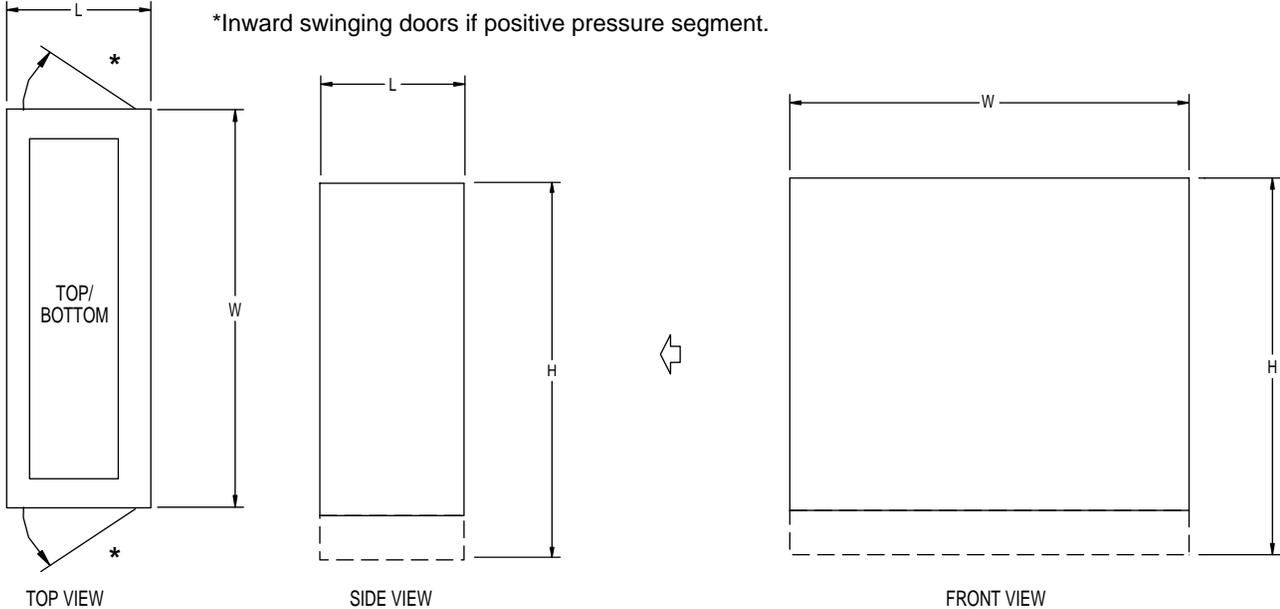
TN Length

NOTE:
This segment is to be used for stacked units, bottom tier and top tier.

NOTE:

- Variable baserail height is not included in overall cabinet height.
- Access doors will be inward opening in positive pressure applications.
- Pitched outdoor roof increases unit height by 2" - not included in above.
- Lengths will change as shipping splits, doors, etc. are added to unit configuration.

All dimensions are in inches and are approximate. Not certified for construction.



TURNING SEGMENT (TN)

TN SEGMENT (continued)

CABINET HEIGHT	CABINET WIDTH											
	78	84	90	96	102	108	114	120	126	132	138	144
27												
30												
33												
36												
39	17											
42	18	18										
45	20	20										
48	21	21	21									
51	23	23	23	23								
54	24	24	24	24	24							
57	26	26	26	26	26	26						
60	27	27	27	27	27	27						
66	30	30	30	30	30	30	30	30				
72	33	33	33	33	33	33	33	33	33	33		
78	36	36	36	36	36	36	36	36	36	36	36	36
84	39	39	39	39	39	39	39	39	39	39	39	39
90	42	42	42	42	42	42	42	42	42	42	42	42
96	45	45	45	45	45	45	45	45	45	45	45	45
102	48	48	48	48	48	48	48	48	48	48	48	48
108	51	51	51	51	51	51	51	51	51	51	51	51
114		54	54	54	54	54	54	54	54	54	54	54
120			57	57	57	57	57	57	57	57	57	57
126			60	60	60	60	60	60	60	60	60	60

LEGEND

TN Length

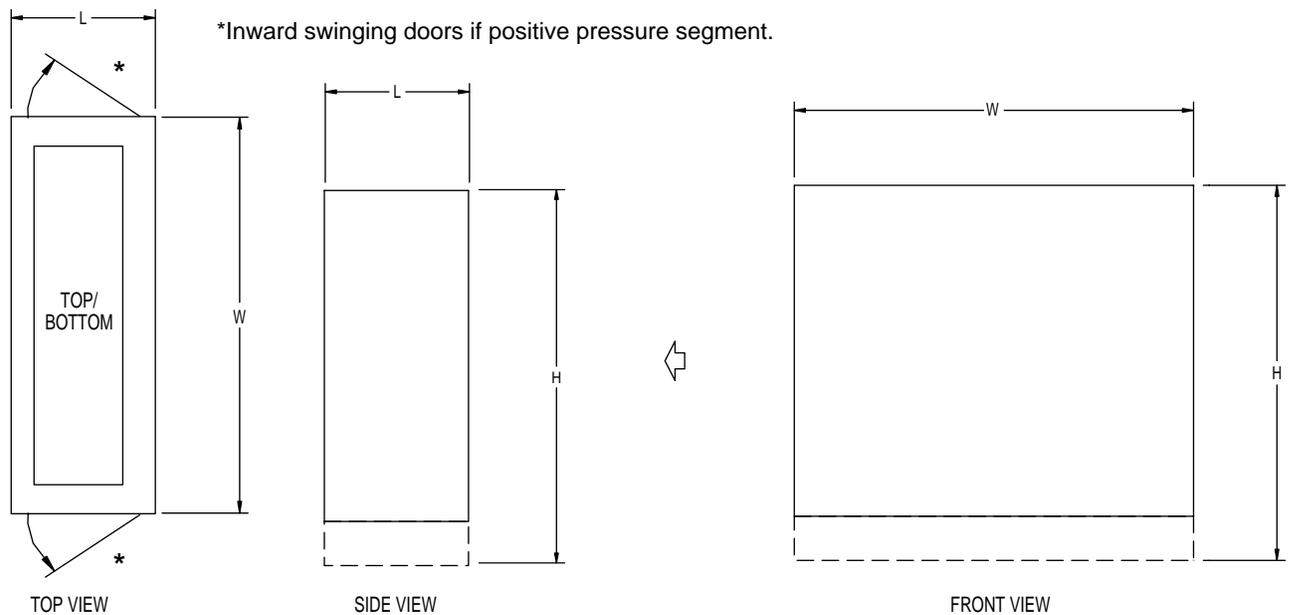
NOTE:

This segment is to be used for stacked units, bottom tier and top tier.

NOTE:

- Variable baserail height is not included in overall cabinet height.
- Access doors will be inward opening in positive pressure applications.
- Pitched outdoor roof increases unit height by 2" - not included in above.
- Lengths will change as shipping splits, doors, etc. are added to unit configuration.

All dimensions are in inches and are approximate. Not certified for construction.



Segment Dimensions

INTEGRAL FACE AND BYPASS COIL SEGMENT (IC)

IC SEGMENT

CABINET HEIGHT	CABINET WIDTH											
	27	30	33	36	39	42	45	48	54	60	66	72
27												
30												
33												
36												
39					43	N/A	43	43	43	43	43	43
42					N/A	N/A	43	N/A	N/A	43	43	43
45					N/A	43						
48					43			43	43	43	43	43
51								N/A	43	43	43	43
54								N/A	N/A	43	43	43
57								43	43	43	43	43
60								43	43	43	43	43
66									43	43	43	43
72									30	43	43	43
78										43	43	43
84										43	43	43
90											43	43
96												30
102												30
108												
114												
120												
126												

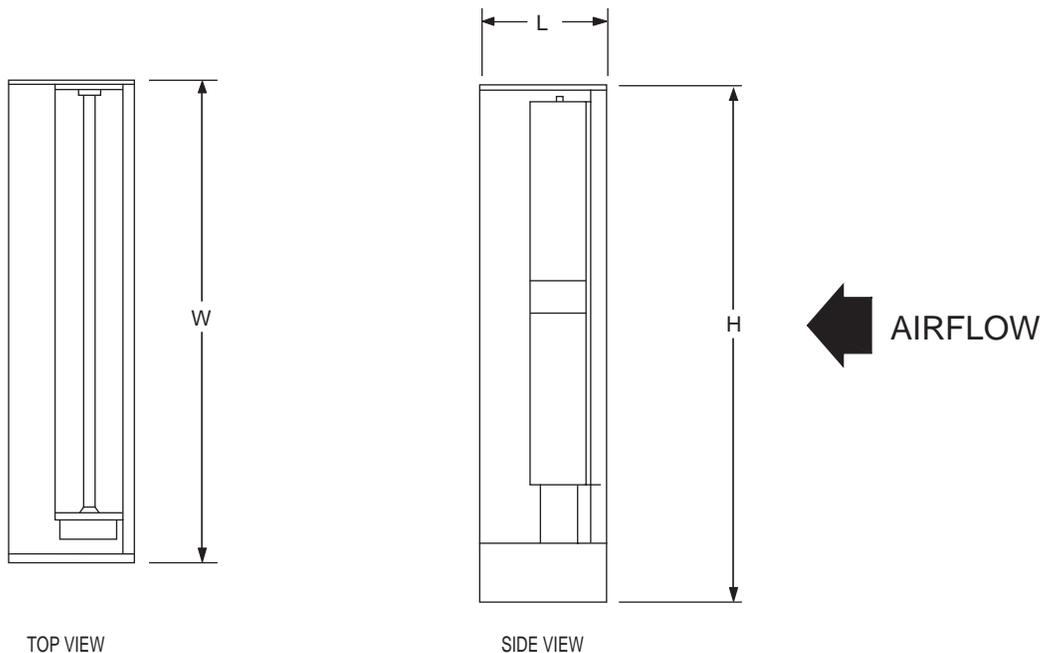
LEGEND

IC Length

NOTE:

- Variable baserail height is not included in overall cabinet height.
- Selection of largest possible coil assumed.
- Pitched outdoor roof increases unit height by 2" - not included in above.
- Lengths will change as shipping splits, doors, etc. are added to unit configuration.

All dimensions are in inches and are approximate. Not certified for construction.



LD08099

INTEGRAL FACE AND BYPASS COIL SEGMENT (IC)

IC SEGMENT (continued)

CABINET HEIGHT	CABINET WIDTH											
	78	84	90	96	102	108	114	120	126	132	138	144
27												
30												
33												
36												
39	43											
42	43	43										
45	43	43										
48	43	43	43									
51	43	43	43	43								
54	43	43	43	N/A								
57	43	43	43	43								
60	43	43	43	43	43							
66	43	43	43	43	43	43						
72	43	43	43	30	30	30	30	30	30	30		
78	43	43	43	43	43	N/A	N/A	N/A	N/A	N/A	N/A	
84	43	43	43	30	30	30	30	30	30	30	30	30
90	43	43	43	30	30	30	30	30	30	30	30	30
96	30	43	30	30	30	30	30	30	30	30	30	30
102	30	43	30	30	30	30	30	30	30	30	30	30
108	30	30	30	30	30	30	30	30	30	30	N/A	30
114		30	30	30	30	30	30	30	30	30	30	30
120			30	30	30	30	30	30	30	30	30	30
126			30	30	30	30	30	30	30	30	30	30

LEGEND

IC Length

NOTE:

Variable baserail height is not included in overall cabinet height.

Selection of largest possible coil assumed.

Pitched outdoor roof increases unit height by 2" - not included in above.

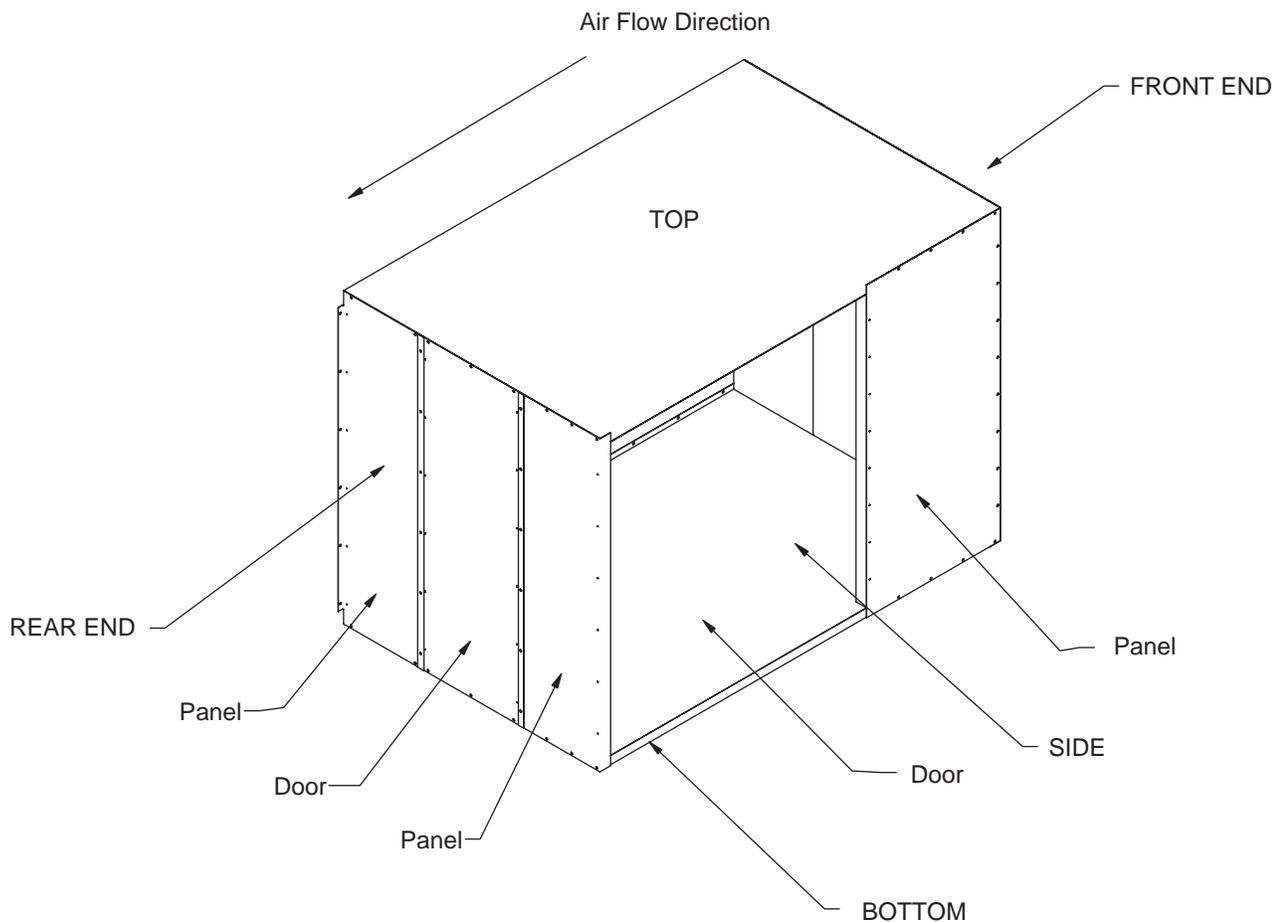
All dimensions are in inches and are approximate. Not certified for construction.

INTEGRAL FACE AND BYPASS COIL (IC) NOTES

1. Segment length for IFB Steam or hot water coil with single section (2 row and 3 row coils) is 26".
2. Segment length for IFB Steam or hot water coil with double section (4 row coils) is 43".
3. Segment length for VIFB Steam or hot water coil is 30".
4. A minimum of 24" length empty segment (TN, DP, XA, or IO) with a door is required downstream of any IFB coil segment.
5. A minimum of 18" length empty segment (TN, DP, XA, or IO) with a door is required downstream of any VIFB coil segment. The coil connections must be located on the opposite side of the unit as the access door.
6. The outdoor unit with an Integral Face and Bypass Coil segment will have the option of a pipe chase. The pipe chase is not intended for trapping or piping, but for the connections only. Headers
 - a. Default header location is on the drive side.
 - b. Must be located on the opposite side of the unit as the access door.
7. Coils
 - a. Only hot water and steam coils are available for this segment.
8. Auxiliary Drain pans
 - a. An auxiliary drain pan is optional for this segment. The length of the drain pan is same as the segment length.
 - b. Default drain location is on the header side for IFB coil and it is on the left side of the unit for VIFB coil.
 - c. The drain is always on the opposite side from the pipechase.
 - d. Drain location is always at the midpoint of the segment.
9. Doors
 - a. A door is required on downstream segment.
10. Lengths will change as shipping splits, doors, etc. are added to unit configuration.
11. For IFB coils, only side header option is offered. Central header option is not available.

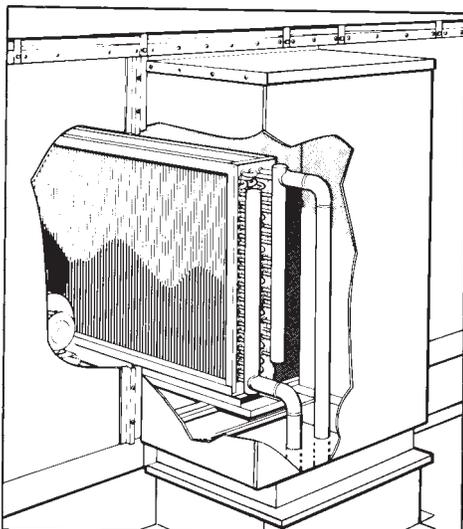
Segment Dimensions

PIPE CHASE ENCLOSURE



PIPE CHASE DIMENSION DRAWING NOTES

- The Pipe Chase can be 24", 36" or 48" in depth.
 - The 24" depth is standard.
- Pipe Chase is the same as the unit height.
- A pipe chase will be sized in 1" increments from 17" long to 108" long.
- A Pipe Chase can be applied to either a single XA, HC, CC, VC or IG segment or any combination of segments that are side by side. These segments must be on the bottom tier of an indoor or outdoor unit.
- Inside clearances are as follows
 - DOA Clearance = Pipe Chase Length in DOA - 4.00"
 - Height Clearance = Unit Height - 3.00"
 - Depth Clearance = Pipe Chase Depth - 2.00"
- Side and end panels will be 2.0" double wall construction.
 - Pipe chase side panel gage construction is equal to unit side panel gage construction.
- Roof and Floor panels will be 1.50" wall construction.
 - Pipe chase roof and floor panel gage construction is equal to unit roof and floor panel gage construction.
- Pipe chase doors
 - All pipe chases must have at least one door.
 - If a pipe chase has front doors and no side doors then the side panels will consist of three separate panels.
- Pipe chase curb
 - The pipe curb under a pipe chase will be level with the curb under the unit.
 - The pipe chase curb depth and length under the pipe chase will be pipe chase depth minus 0.00" and pipe chase length minus 0.875".
- Lengths will change as shipping splits, doors, etc. are added to unit configuration.



LD06280

Drain connection opposite pipe chase is standard.
A header panel covers entire segment.

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Segment Dimensions

VERTICAL COIL SEGMENT (VC)

VC SEGMENT

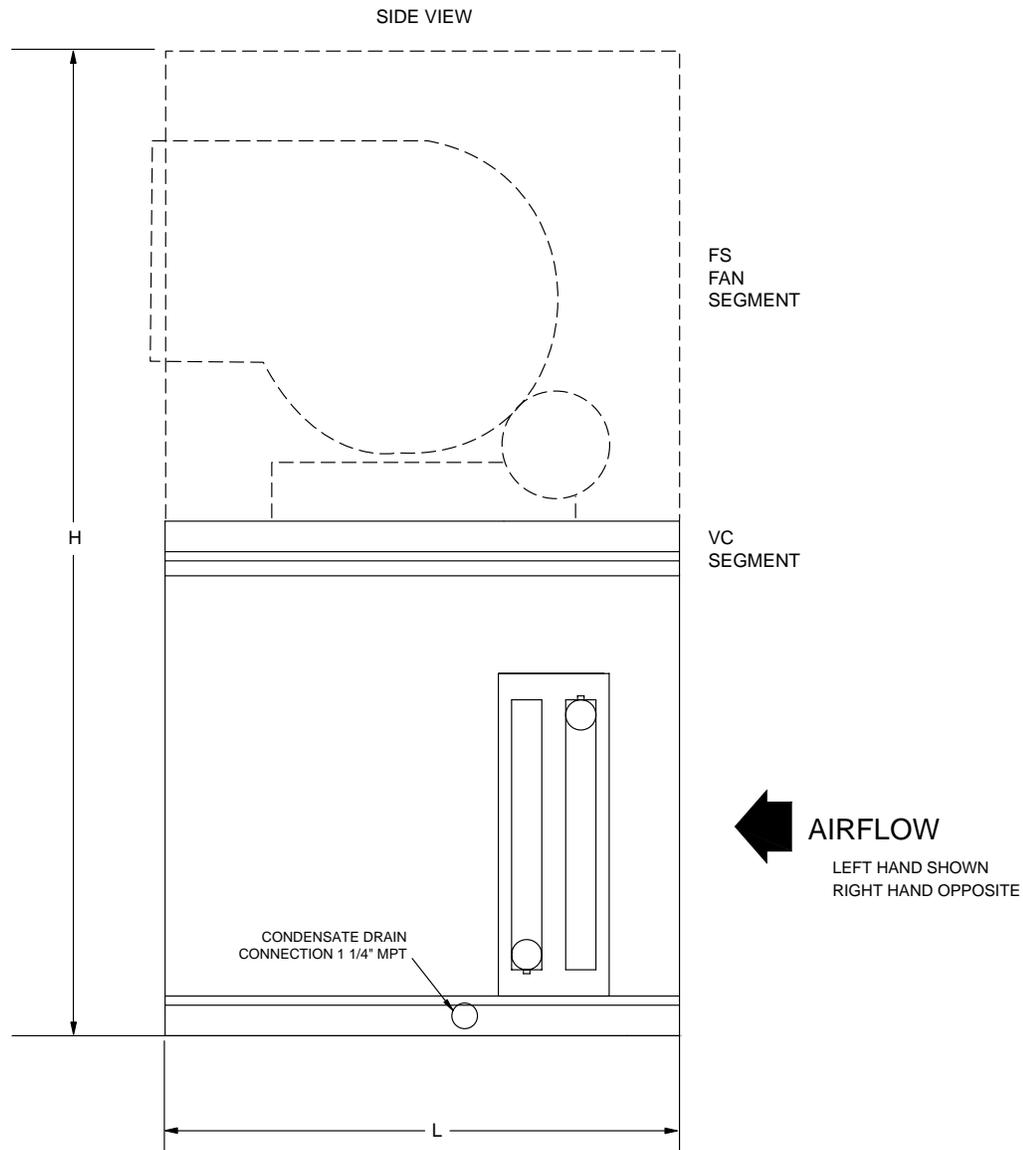
CABINET HEIGHT	CABINET WIDTH											
	27	30	33	36	39	42	45	48	54	60	66	72
27	26.0	26.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0			
30	27.0	27.0	28.0	28.0	28.0	28.0	28.0	28.0	29.0	29.0		
33		28.0	29.0	29.0	29.0	29.0	29.0	29.0	30.0	30.0	30.0	
36		30.0	31.0	31.0	31.0	31.0	32.0	32.0	32.0	32.0	32.0	32.0
39			32.0	32.0	32.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0
42				33.0	33.0	34.0	34.0	34.0	34.0	34.0	34.0	35.0
45				34.0	34.0	35.0	35.0	35.0	35.0	35.0	36.0	36.0
48					36.0	36.0	36.0	36.0	36.0	37.0	37.0	37.0
51						38.0	38.0	38.0	39.0	39.0	39.0	39.0
54							39.0	39.0	40.0	40.0	40.0	40.0
57								41.0	41.0	41.0	41.0	42.0
60								42.0	42.0	42.0	43.0	43.0
66									44.0	45.0	45.0	45.0
72										47.0	47.0	47.0
78										50.0	51.0	51.0
84										53.0	53.0	53.0
90											56.0	57.0
96												59.0
102												61.0
108												
114												
120												
126												

All dimensions are in inches and are approximate. Not certified for construction.

VC SEGMENT (continued)

CABINET HEIGHT	CABINET WIDTH											
	78	84	90	96	102	108	114	120	126	132	138	144
27												
30												
33												
36												
39	34.0											
42	35.0	35.0										
45	36.0	36.0										
48	37.0	37.0	37.0									
51	39.0	39.0	40.0	40.0								
54	41.0	41.0	41.0	41.0								
57	42.0	42.0	42.0	42.0								
60	43.0	43.0	43.0	43.0								
66	45.0	45.0	45.0	46.0								
72	48.0	48.0	48.0	48.0								
78	51.0	51.0	51.0									
84	53.0	54.0										
90	57.0											
96												
102												
108												
114												
120												
126												

VERTICAL COIL SEGMENT (VC)



LD08101

NOTES:

1. Door is always on the downstream end of the segment.
2. If a pipe chase is required, 5" of upstream space is required.
3. If the length of a bottom tier (VC segment) is within 2" of the top tier (Fan Segment), then the VC segment length is to be adjusted to match the length of the Fan Segment.
4. Default door location is on the drive side.
5. Doors are always last in the air stream of the segment.
6. Nominal door size is 18".
7. XTO units are not available as stacked.
8. Default header location is on the drive side.
9. All headers in the same segment must exit the unit on the same side.
10. Default drain location is on header side.
11. Lengths will change as shipping splits, doors, etc. are added to unit configuration.
12. Drain is located 4.15" (to center) from downstream side of drain pan.

Engineering Data

INSURANCE OPTIONS & LOCAL CODE REQUIREMENTS

There are two types of pipe trains available on power duct furnaces. The insurance options for these pipe trains areas follows:

- a. IRI – Industrial Risk Insurers
- b. FM – Factory Mutual

All IRI gas trains are provided with atmospheric vents on the vent valve piped to the exterior of the unit. Local codes and project requirements vary. For this reason, sales must carefully review the requirements that apply to the area where the equipment is to be installed.

GAS PRESSURE REQUIREMENTS

The Solution furnaces are designed to handle a wide range of inlet gas pressures as listed below. Exact values depend on the required options and capacity of the furnace. These limits must be adhered to in order to obtain safe and reliable performance. Please allow this to supersede all previous data.

The location of the max/min gas pressure required is at the inlet to the main gas shutoff cock on the gas pipe train.

If the gas pressure exceeds the furnace maximum then the field must provide a pressure regulator to reduce the inlet pressure to acceptable levels.

If the inlet pressures fall short of the furnace minimum the field must provide a booster pump to increase inlet pressure to acceptable levels.

The YORK pressure range is competitive, however, note that the extra turn down, associated with a **25:1 burner requires a greater inlet pressure.**

POWER BURNER FURNACES

MODEL	MAX BTUs INPUT (1)	BTUs OUTPUT	MINIMUM AIRFLOW			MAXIMIM AIRFLOW			GAS CONN (NPT)
			CFM	A.P.D.	TEMP RISE	CFM	A.P.D.	TEMP RISE	
15	187,500	150,000	1543	0.18	90.0	5,248	2.00	26.5	SEE PAGE 50
20	250,000	200,000	2058	0.31	90.0	5,248	2.00	35.3	
25	312,500	250,000	2572	0.48	90.0	5,248	2.00	44.1	
40	500,000	400,000	4115	0.43	90.0	8,440	2.00	43.9	
50	625,000	500,000	5144	0.49	90.0	10,725	2.00	43.2	
75	937,500	750,000	7716	0.73	90.0	12,900	2.00	53.8	
100	1,250,000	1,000,000	10288	0.67	90.0	18,000	2.00	51.4	
125	1,562,500	1,250,000	12860	0.46	90.0	26,500	2.00	38.6	
150	1,875,000	1,500,000	15432	0.69	90.0	26,500	2.00	46.3	
175	2,187,500	1,750,000	18004	0.51	90.0	36,000	2.00	45.0	
200	2,500,000	2,000,000	20576	0.67	90.0	36,000	2.00	51.4	
250	3,125,000	2,500,000	25720	0.39	90.0	58,475	2.00	45.3	
300	3,750,000	3,000,000	30864	0.56	90.0	58,475	2.00	54.4	
350	4,375,000	3,500,000	36008	0.52	90.0	70,573	2.00	63.4	
400	5,000,000	4,000,000	41152	0.68	90.0	70,573	2.00	72.5	

NOTES:

(1) Based on 1,000 BTU/CU Ft. natural gas

Furnaces in VAV applications are designed to be used only with 100% supply fan airflow. Use of furnace in reduced airflow operation may result in serious damage to equipment and may be hazardous.

Furnace includes a 430 series stainless steel primary heat exchanger. A secondary stainless steel heat exchanger is also included.

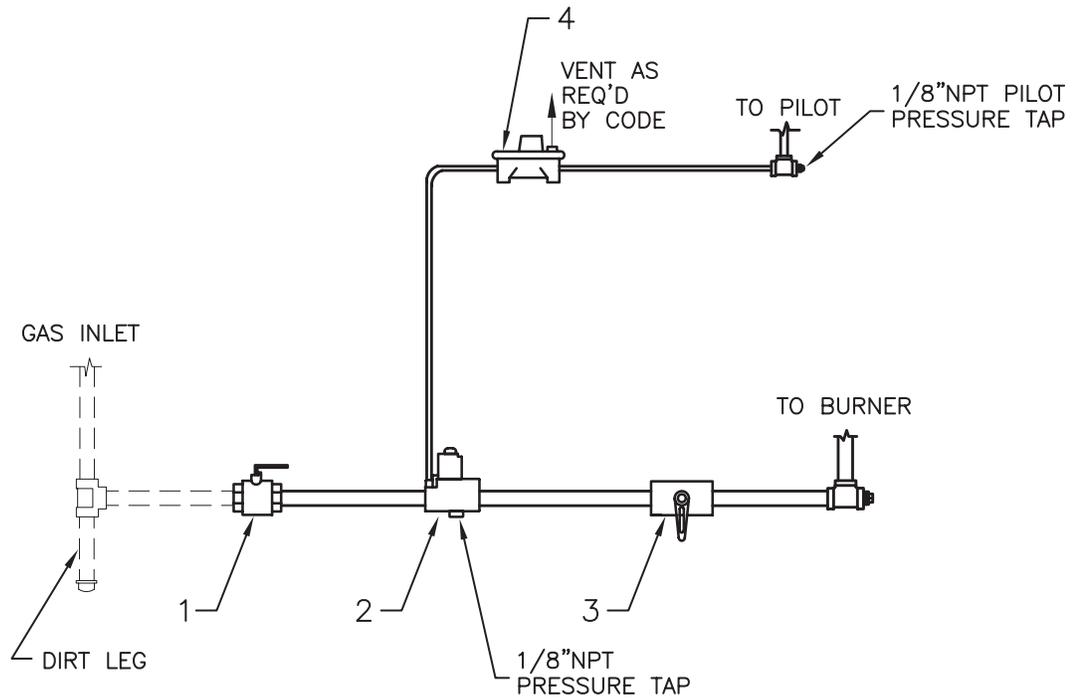
Engineering Data

INDIRECT GAS-FIRED FURNACE INLET GAS REQUIREMENTS

Note: Max/Min gas pressure requirements at the inlet to the main manual shutoff cock of the gas pipe train.

NOMENCLATURE	MAXIMUM ALLOW INLET PRESSURE										MINIMUM INLET PRESSURE TO FIRE										INLET SIZE (NPT)															
	GAS BURNER PIPING/GAS BURNER TD					GAS BURNER PIPING/GAS BURNER TD					GAS BURNER PIPING/GAS BURNER TD					GAS BURNER PIPING/GAS BURNER TD					GAS BURNER PIPING/GAS BURNER TD					GAS BURNER PIPING/GAS BURNER TD										
	U03	R03	U10	R10	R25	U03	R03	U10	R10	R25	U03	R03	U10	R10	R25	U03	R03	U10	R10	R25	U03	R03	U10	R10	R25	U03	R03	U10	R10	R25						
GAS BTUS	FM 3	IRI 3	FM 10	IRI 10	FM 25	IRI 25	FM 3	IRI 3	FM 10	IRI 10	FM 25	IRI 25	FM 3	IRI 3	FM 10	IRI 10	FM 25	IRI 25	FM 3	IRI 3	FM 10	IRI 10	FM 25	IRI 25	FM 3	IRI 3	FM 10	IRI 10	FM 25	IRI 25	FM 3	IRI 3	FM 10	IRI 10	FM 25	IRI 25
FURNACE OUTPUT	UL/FM	IRI	UL/FM	IRI	UL/FM	IRI	UL/FM	IRI	UL/FM	IRI	UL/FM	IRI	UL/FM	IRI	UL/FM	IRI	UL/FM	IRI	UL/FM	IRI	UL/FM	IRI	UL/FM	IRI	UL/FM	IRI	UL/FM	IRI	UL/FM	IRI	UL/FM	IRI	UL/FM	IRI	UL/FM	IRI
	3:1	3:1	10:1	10:1	25:1	25:1	3:1	3:1	10:1	10:1	25:1	25:1	3:1	3:1	10:1	10:1	25:1	25:1	3:1	3:1	10:1	10:1	25:1	25:1	3:1	3:1	10:1	10:1	25:1	25:1	3:1	3:1	10:1	10:1	25:1	25:1
015	14.00		27.00				4.00		13.00				4.00		13.00				4.00		13.00				4.00		13.00				0.75		1.00			
020	14.00		27.00				4.00		13.00				4.00		13.00				4.00		13.00				4.00		13.00				0.75		1.00			
025	14.00		27.00				4.00		13.00				4.00		13.00				4.00		13.00				4.00		13.00				0.75		1.00			
030	14.00		27.00				4.00		13.00				4.00		13.00				4.00		13.00				4.00		13.00				0.75		1.00			
035	14.00	14.00	14.00	14.00			6.00	4.60	4.00	4.00			6.00	4.60	4.00	4.00			6.00	4.60	4.00	4.00			6.00	4.60	4.00	1.00			1.00	1.00	1.00	1.00		
040	14.00	14.00	14.00	14.00	27.00	27.00	6.00	4.70	4.50	4.50	13.00	13.00	6.00	4.70	4.50	4.50	13.00	13.00	6.00	4.70	4.50	4.50	13.00	13.00	6.00	4.70	4.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
045	14.00	14.00	14.00	14.00	27.00	27.00	6.00	4.00	5.00	5.00	13.00	13.00	6.00	4.00	5.00	5.00	13.00	13.00	6.00	4.00	5.00	5.00	13.00	13.00	6.00	4.00	5.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
050	14.00	14.00	14.00	14.00	27.00	27.00	6.00	4.80	5.00	5.00	13.00	13.00	6.00	4.80	5.00	5.00	13.00	13.00	6.00	4.80	5.00	5.00	13.00	13.00	6.00	4.80	5.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
060	14.00	14.00	14.00	14.00	27.00	27.00	4.20	5.50	5.00	5.00	13.00	13.00	4.20	5.50	5.00	5.00	13.00	13.00	4.20	5.50	5.00	5.00	13.00	13.00	4.20	5.50	5.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
075	14.00	14.00	14.00	14.00	27.00	27.00	4.90	5.50	6.00	6.00	13.00	13.00	4.90	5.50	6.00	6.00	13.00	13.00	4.90	5.50	6.00	6.00	13.00	13.00	4.90	5.50	6.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
085	14.00	14.00	14.00	14.00	27.00	27.00	5.00	7.00	7.25	7.25	13.00	13.00	5.00	7.00	7.25	7.25	13.00	13.00	5.00	7.00	7.25	7.25	13.00	13.00	5.00	7.00	7.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
100	14.00	14.00	14.00	14.00	27.00	27.00	6.50	9.00	9.50	9.50	13.00	13.00	6.50	9.00	9.50	9.50	13.00	13.00	6.50	9.00	9.50	9.50	13.00	13.00	6.50	9.00	9.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.25
125	14.00	14.00	14.00	14.00	27.00	27.00	5.50	6.00	6.50	6.50	20.00	20.00	5.50	6.00	6.50	6.50	20.00	20.00	5.50	6.00	6.50	6.50	20.00	20.00	5.50	6.00	6.50	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.50
150	14.00	14.00	14.00	14.00	27.00	27.00	6.00	8.00	9.00	9.00	20.00	20.00	6.00	8.00	9.00	9.00	20.00	20.00	6.00	8.00	9.00	9.00	20.00	20.00	6.00	8.00	9.00	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.50
175	14.00	14.00	14.00	14.00	27.00	27.00	7.50	11.00	11.50	11.50	21.00	21.00	7.50	11.00	11.50	11.50	21.00	21.00	7.50	11.00	11.50	11.50	21.00	21.00	7.50	11.00	11.50	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.50
200	14.00	14.00	14.00	14.00	27.00	27.00	9.50	13.00	12.00	12.00	23.00	23.00	9.50	13.00	12.00	12.00	23.00	23.00	9.50	13.00	12.00	12.00	23.00	23.00	9.50	13.00	12.00	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
225	14.00	14.00	14.00	14.00	27.00	27.00	6.60	8.00	6.60	6.60	23.00	23.00	6.60	8.00	6.60	6.60	23.00	23.00	6.60	8.00	6.60	6.60	23.00	23.00	6.60	8.00	6.60	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	2.00
250	14.00	14.00	14.00	14.00	27.00	27.00	7.90	9.20	7.90	7.90	23.00	23.00	7.90	9.20	7.90	7.90	23.00	23.00	7.90	9.20	7.90	7.90	23.00	23.00	7.90	9.20	7.90	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	2.00
275	14.00	14.00	14.00	14.00	27.00	27.00	9.90	10.50	9.90	9.90	23.00	23.00	9.90	10.50	9.90	9.90	23.00	23.00	9.90	10.50	9.90	9.90	23.00	23.00	9.90	10.50	9.90	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	2.00
300	14.00	14.00	14.00	14.00	27.00	27.00	11.00	12.50	11.00	11.00	23.00	23.00	11.00	12.50	11.00	11.00	23.00	23.00	11.00	12.50	11.00	11.00	23.00	23.00	11.00	12.50	11.00	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	2.00
325	14.00	14.00	14.00	14.00	27.00	27.00	7.00	8.50	7.00	7.00	32.00	32.00	7.00	8.50	7.00	7.00	32.00	32.00	7.00	8.50	7.00	7.00	32.00	32.00	7.00	8.50	7.00	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
350	14.00	14.00	14.00	14.00	48.00	48.00	7.00	8.50	7.00	7.00	32.00	32.00	7.00	8.50	7.00	7.00	32.00	32.00	7.00	8.50	7.00	7.00	32.00	32.00	7.00	8.50	7.00	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
375	14.00	14.00	14.00	14.00	48.00	48.00	7.50	9.20	7.50	7.50	32.00	32.00	7.50	9.20	7.50	7.50	32.00	32.00	7.50	9.20	7.50	7.50	32.00	32.00	7.50	9.20	7.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
400	14.00	14.00	14.00	14.00	48.00	48.00	8.00	10.00	8.00	8.00	32.00	32.00	8.00	10.00	8.00	8.00	32.00	32.00	8.00	10.00	8.00	8.00	32.00	32.00	8.00	10.00	8.00	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50

GAS TRAIN SERIES DF-15 THROUGH 30 3:1 TDR*



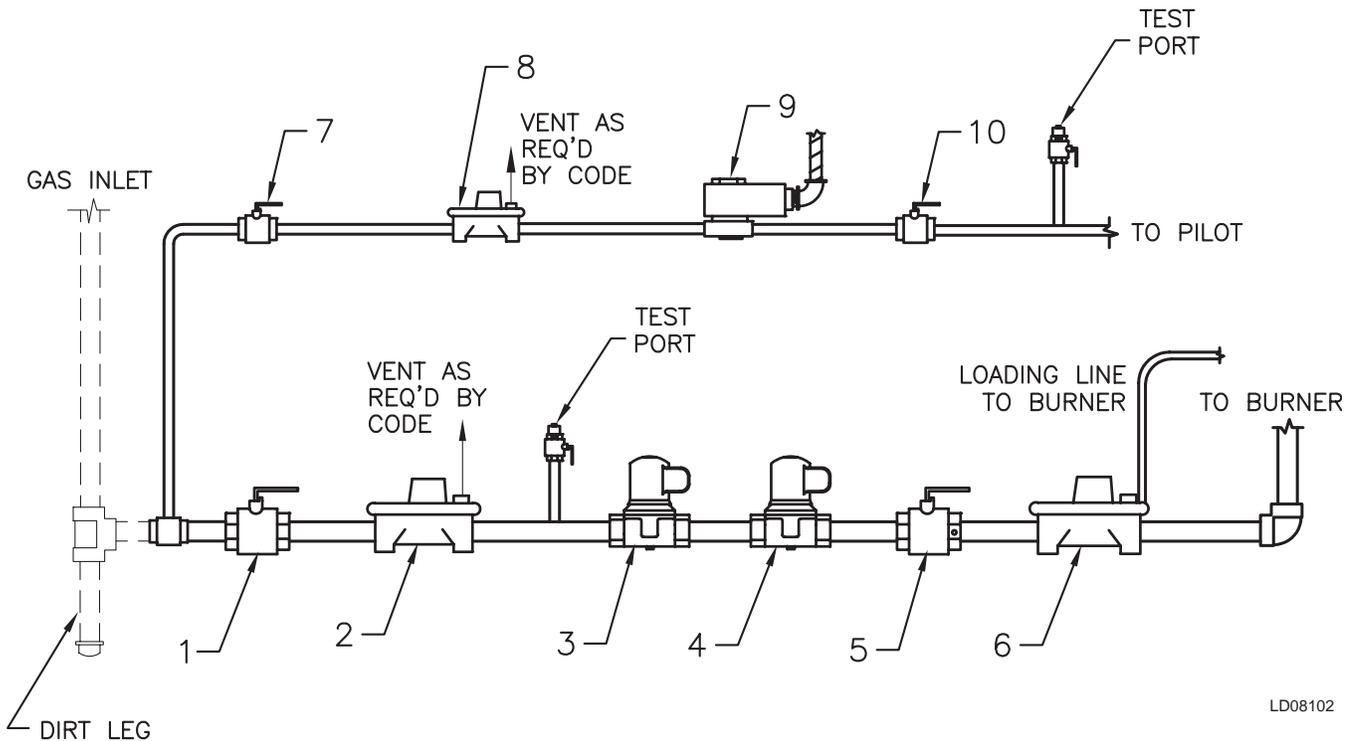
LD08103

ITEM	ANSI/UL	FM	IRI
1 Main Gas Shutoff Cock	STD	N/A	N/A
2 Main Gas Pressure Regulator	STD	N/A	N/A
3 Auxiliary Gas Valve	STD	N/A	N/A
4 Pilot Pressure Regulator	STD	N/A	N/A

*NOTE: Direct Spark Ignition

Engineering Data

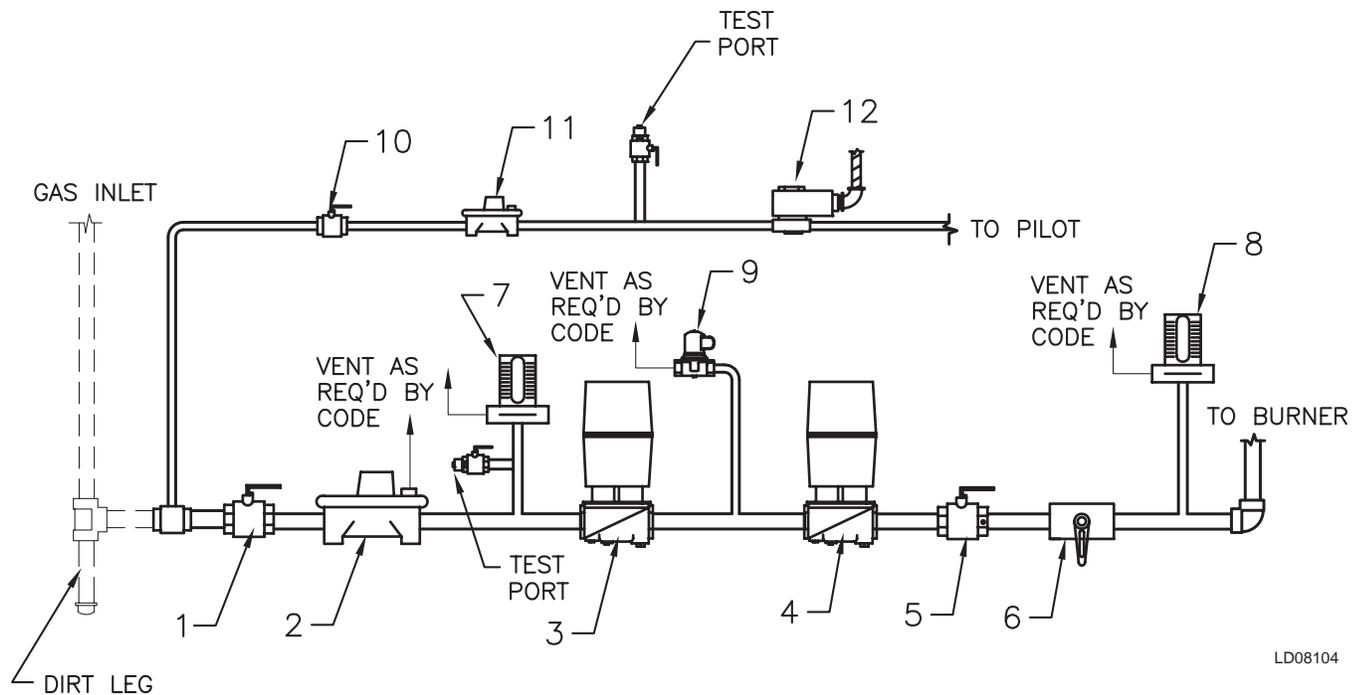
GAS TRAIN SERIES DF-15 THROUGH 30 10:1 TDR



LD08102

ITEM	UL/ANSI	FM	IRI
1 Main Gas Shutoff Cock	STD	N/A	N/A
2 Main Gas Pressure Regulator	STD	N/A	N/A
3 Auxiliary Gas Valve	STD	N/A	N/A
4 Main Gas Valve	STD	N/A	N/A
5 Approved Leak Test Shutoff Cock	STD	N/A	N/A
6 Ratio Regulator	STD	N/A	N/A
7 Pilot Shutoff Cock	STD	N/A	N/A
8 Pilot Pressure Regulator	STD	N/A	N/A
9 Pilot Solenoid Shutoff Valve	STD	N/A	N/A
10 Needle Valve	STD	N/A	N/A

GAS TRAIN SERIES DF-35 THROUGH 400 3: 1 & 10:1 TDR

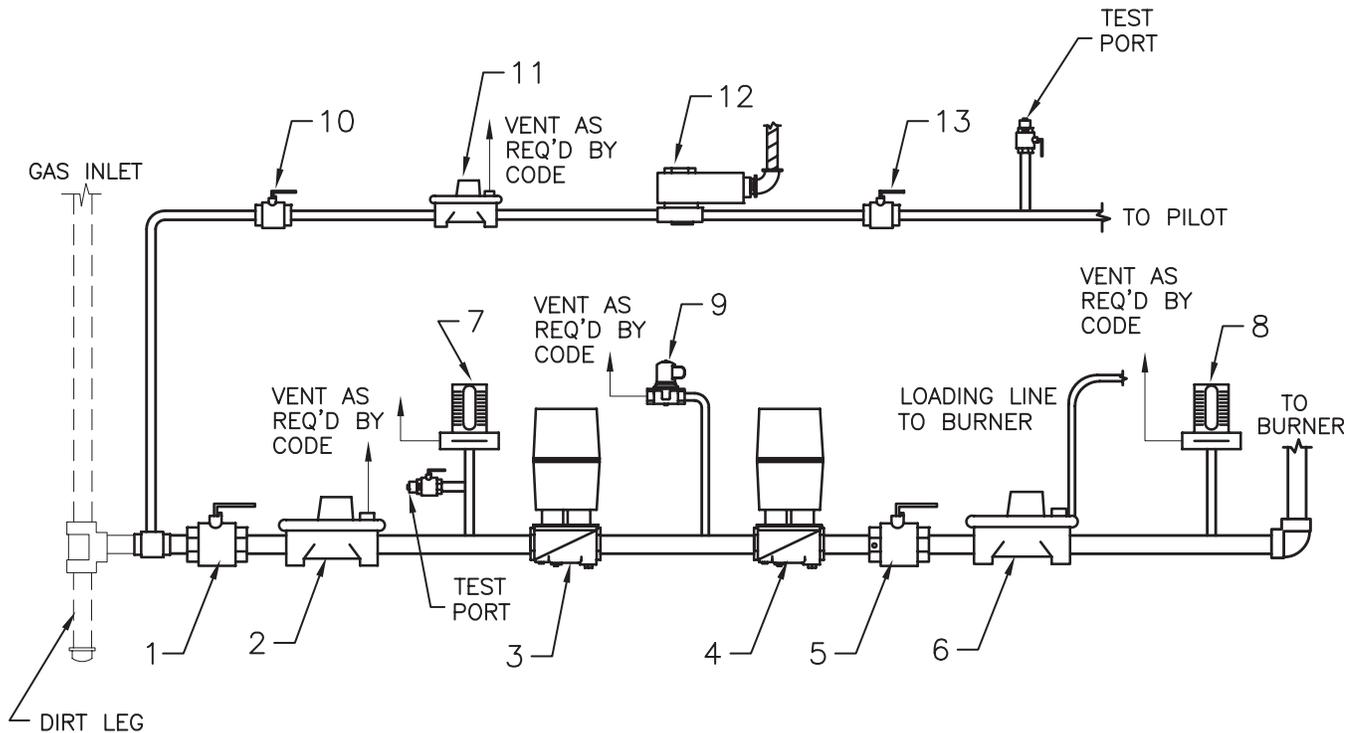


ITEM		UL/ANSI STD ON DF-35 THRU 200	FM STD ON DF-225 THRU 400	IRI OPT ON DF-35 THRU 400
1	Main Gas Shutoff Cock	STD	STD	STD
2	Main Gas Pressure Regulator	(3) N/A	STD	STD
3	Auxiliary Gas Valve	(1) STD	N/A	STD
4	Main Gas Valve	STD	(2) STD	STD
5	Approved Leak Test Shutoff Cock	STD	STD	(4) STD
6	Modulating Butterfly Valve	STD	STD	STD
7	Low Gas Pressure Switch	N/A	STD	STD
8	High Gas Pressure Switch	N/A	STD	STD
9	Normally Open Vent Valve	N/A	N/A	STD
10	Pilot Shutoff Cock	STD	STD	STD
11	Pilot Pressure Regulator	STD	STD	STD
12	Pilot Solenoid Shutoff Valve	STD	STD	STD

- (1) Combination Auxiliary Gas Valve & pressure regulator (3:1 TDR only).
 (2) Main Gas Valve with Proof of Closure.
 (3) STD on 10:1 TDR.
 (4) Lube Plug Cock with Test Port Down Stream.

Engineering Data

GAS TRAIN SERIES DF-35 THROUGH 400 25:1 TDR



LD08105

ITEM		UL STD ON DF-35 THRU 200	FM STD ON DF-225 THRU 400	IRI OPT ON DF-35 THRU 400
1	Main Gas Shutoff Cock	STD	STD	STD
2	Main Gas Pressure Regulator	STD	STD	STD
3	Auxiliary Gas Valve	STD	N/A	STD
4	Main Gas Valve	STD	(1) STD	STD
5	Approved Leak Test Shutoff Cock	STD	STD	STD
6	Ratio Regulator	STD	STD	STD
7	Low Gas Pressure Switch	N/A	STD	STD
8	High Gas Pressure Switch	N/A	STD	STD
9	Normally Open Vent Valve	N/A	N/A	STD
10	Pilot Shutoff Cock	STD	STD	STD
11	Pilot Pressure Regulator	STD	STD	STD
12	Pilot Solenoid Shutoff Valve	STD	STD	STD
13	Needle Valve	STD	STD	STD

(1) Main Gas Valve with Proof of Closure

TOTAL FLA

Reference Wiring Diagram	IG Model	Transformer VA	TOTAL FLA on PRIMARY SIDE									
			120-1-60	200/208-3-60	277-1-60	230/240-3-60	380-3-60	440-3-50	460-3-60	380/415-3-50	575-3-60	220-3-50
WD Single Phase (Wiring Diagram with Single Phase Motors)	15-100	1500	*10	6.7	*6.7	6.7	4.2	3.3	3.3	3.3	2.3	6.0
WD Three Phase 1 (Wiring Diagram with 1 Three Phase Motor)	125-150	1000		7.4		6.9	3.3	3.3	3.3	3.6	2.8	6.9
WD Three Phase 2 (Wiring Diagram with 2 Three Phase Motors)	175	500		7.7		7.0	3.9	4.1	3.5	3.7	2.9	8.0
	200	500		7.7		8.0	3.9	4.4	4.1	3.9	3.1	8.9
	225-250	500		9.8		9.5	6.0	5.1	5.8	6.0	3.9	10.4
	275-350	500		11.2		10.9	6.7	5.8	6.5	6.7	4.3	11.5
	375-400	500		16.5		14.2	8.7	9.1	8.5	9.3	5.3	17.8

*Stepdown transformer not required, (1) Secondary fuse

Engineering Data

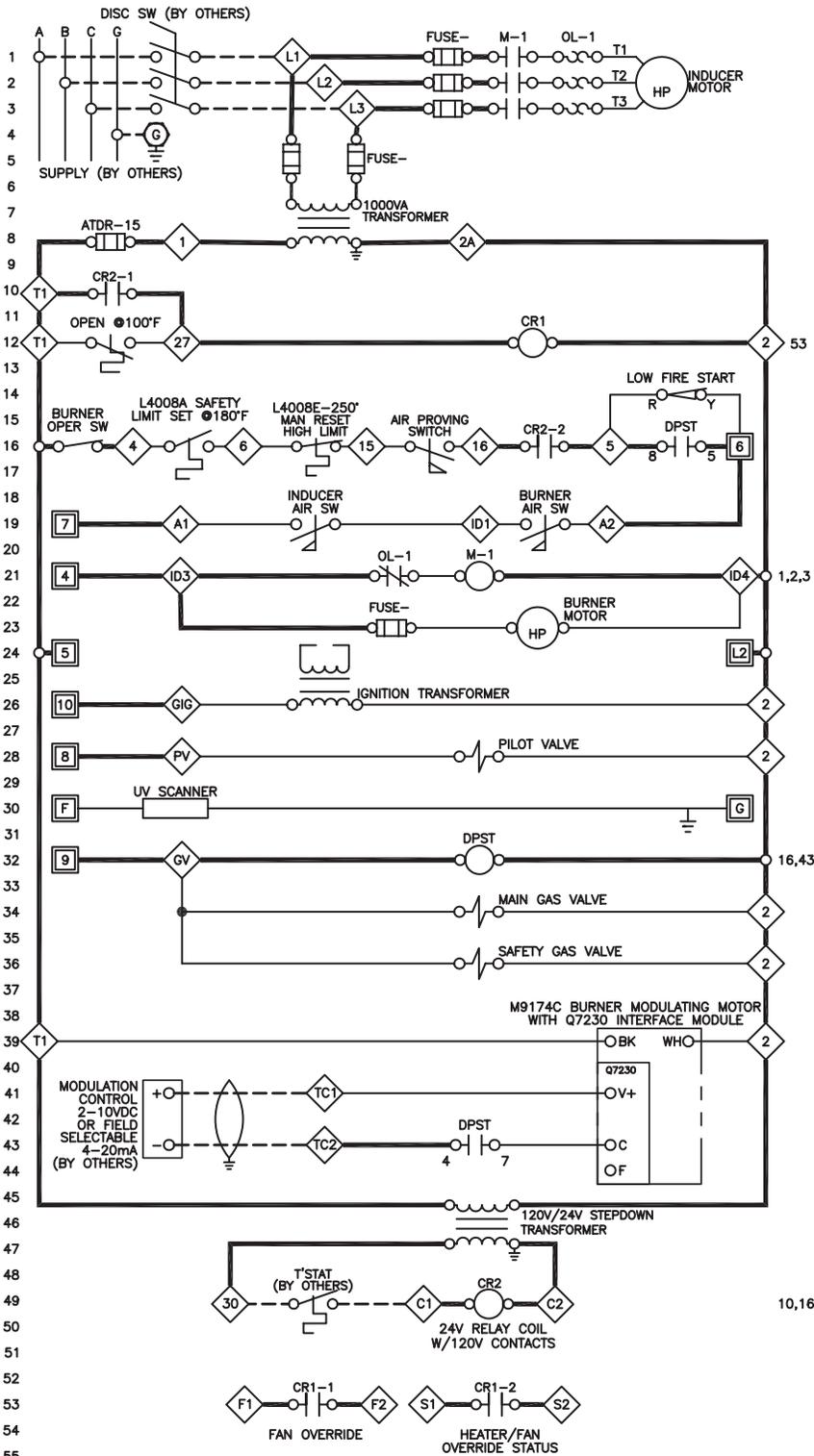
BREAKDOWN OF FLA

Reference Wiring Diagram	IG Model	Transformer VA	Fuse For	TOTAL FLA on PRIMARY SIDE										
				120-1-60	200/208-3-60	277-1-60	230/240-3-60	380-3-60	440-3-50	460-3-60	380/415-3-50	575-3-60	220-3-50	
WD Single Phase (Wiring Diagram with Single Phase Motors)	15-100	1500	Transformer	*10	6.7	*6.7	6.7	4.2	3.3	3.3	3.3	3.3	2.3	6.0
			Transformer		4.7		4.2	2	2	2	2	2.3	1.7	4.2
WD Three Phase 1 (Wiring Diagram with 1 Three Phase Motor)	125-150	1000	ID Fan Motor		2.7		2.7	1.3	1.3	1.3	1.3	1.3	1.1	2.7
			Transformer		2.3		2	1.3	1.1	1.1	1.3	0.9	2	
			ID Fan Motor		2.7		2.7	1.3	1.3	1.3	1.3	1.1	1.1	2.7
WD Three Phase 2 (Wiring Diagram with 2 Three Phase Motors)	175	500	Burner Motor		2.7		2.3	1.3	1.7	1.7	1.1	1.1	0.9	3.3
			Transformer		2.3		2	1.3	1.1	1.1	1.3	0.9	2	
			ID Fan Motor		2.7		2.7	1.3	1.3	1.3	1.3	1.1	1.1	2.7
	200	500	Burner Motor		2.7		3.3	1.3	2	1.7	1.3	1.3	1.1	4.2
			Transformer		2.3		2	1.3	1.1	1.1	1.3	0.9	2	
			ID Fan Motor		4.2		4.2	2.7	2	2.7	2.7	1.7	4.2	
225-250	500	Burner Motor		3.3		3.3	2	2	2	2	2	1.3	4.2	
		Transformer		2.3		2	1.3	1.1	1.1	1.3	0.9	2		
		ID Fan Motor		4.2		4.2	2.7	2	2.7	2.7	1.7	4.2		
275-350	500	Burner Motor		4.7		4.7	2.7	2.7	2.7	2.7	2.7	1.7	5.3	
		Transformer		2.3		2	1.3	1.1	1.1	1.3	0.9	2		
		ID Fan Motor		4.2		4.2	2.7	2	2.7	2.7	1.7	4.2		
375-400	500	Burner Motor		10		8	4.7	6	4.7	6	4.7	2.7	11.6	
		ID Fan Motor		4.2		4.2	2.7	2	2.7	2	2.7	1.7	4.2	

*Stepdown transformer not required, (1) Secondary fuse

Engineering Data

THREE PHASE MOTOR 1000VA TRANSFORMER

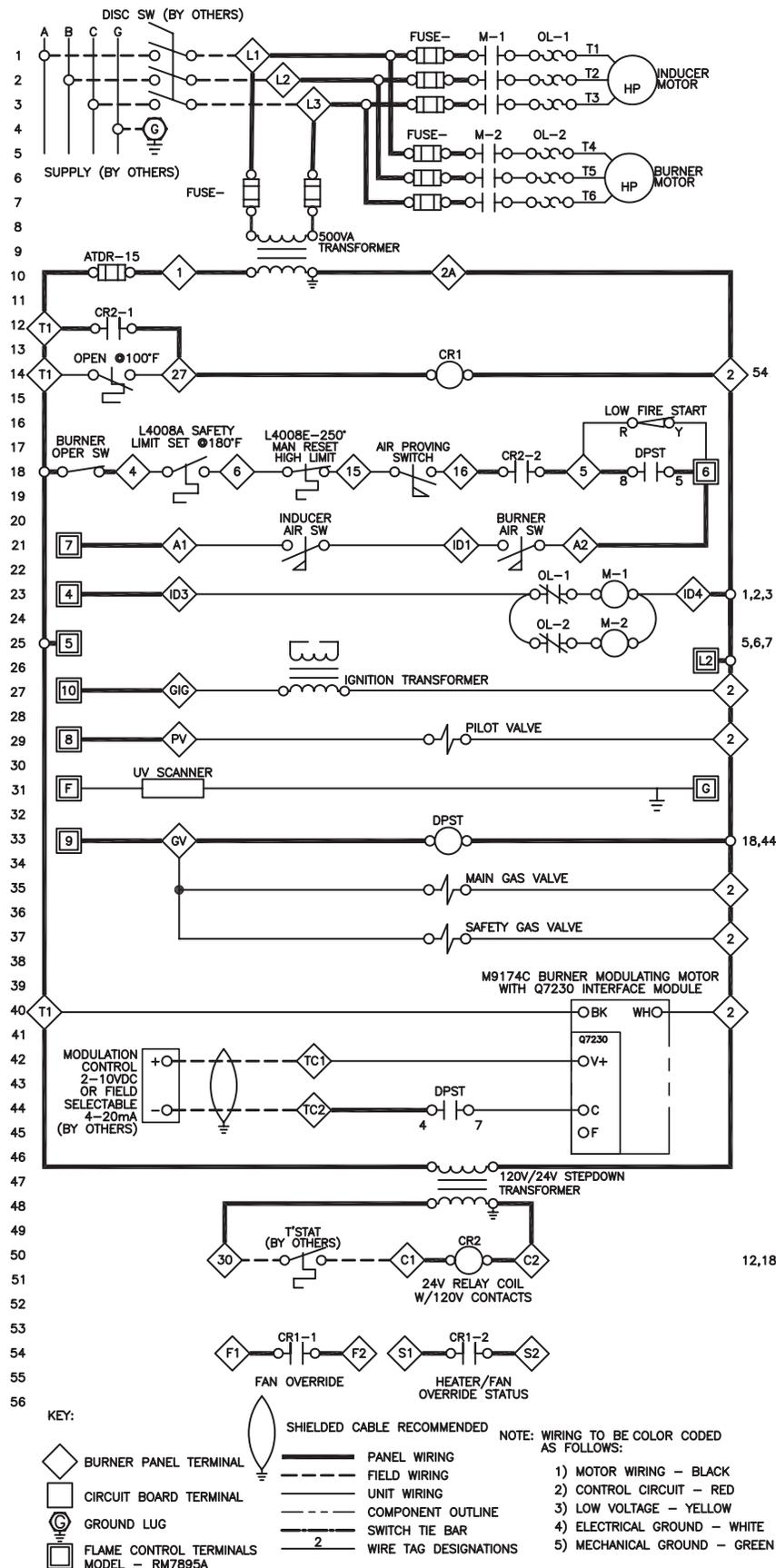


KEY:

	BURNER PANEL TERMINAL		SHIELDED CABLE RECOMMENDED	NOTE: WIRING TO BE COLOR CODED AS FOLLOWS:
	CIRCUIT BOARD TERMINAL		PANEL WIRING	
	GROUND LUG		FIELD WIRING	1) MOTOR WIRING - BLACK
	FLAME CONTROL TERMINALS MODEL - RM7895A		UNIT WIRING	2) CONTROL CIRCUIT - RED
			COMPONENT OUTLINE	3) LOW VOLTAGE - YELLOW
			SWITCH TIE BAR	4) ELECTRICAL GROUND - WHITE
			WIRE TAG DESIGNATIONS	5) MECHANICAL GROUND - GREEN

LD08124

THREE PHASE MOTORS 500VA TRANSFORMER



Segment Dimensions

INDIRECT FIRED GAS CONFIGURATIONS (IG)

IG SEGMENT

CABINET HEIGHT	CABINET WIDTH											
	27	30	33	36	39	42	45	48	54	60	66	72
27												
30												
33												
36												
39												
42												
45							42.0	42.0	42.0	43.0	43.0	43.0
48							42.0	42.0		43.0	43.0	43.0
51							42.0	42.0		43.0	43.0	
54							42.0			43.0	43.0	
57										43.0		
60										43.0		
66												
72												
78												
84												
90												
96												
102												
108												
114												
120												
126												

LEGEND

Furnace Output MBH = Segment Length
 15, 20, 25 = 42"
 40, 50 = 43"
 75, 100 = 51"
 125, 150, 175, 200 = 64"
 250, 300 = 72"
 350 = 84"
 400 = 89"

NOTE:

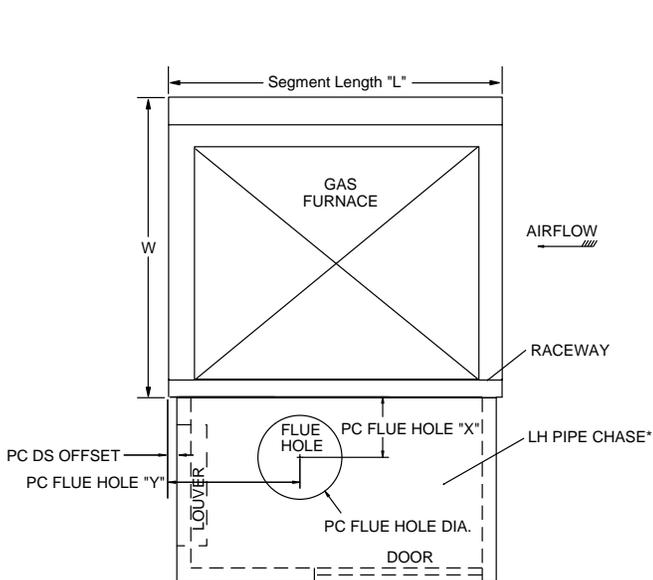
Variable baserail height is not included in overall cabinet height.

Selection of largest possible coil assumed.

Pitched outdoor roof increases unit height by 2" - not included in above.

Lengths will change as shipping splits, doors, etc. are added to unit configuration.

All dimensions are in inches and are approximate. Not certified for construction.



TOP VIEW

FURNACE OUTPUT	PC FLUE HOLE "X"	RH PIPE	LH PIPE	PC FLUE HOLE DIA.
		PC FLUE HOLE "Y"	PC FLUE HOLE "Y"	
1	11.97	10.3	13.813	14.00
2	11.97	10.3	13.813	14.00
2	11.97	10.3	13.813	14.00
4	12.72	11.06	16.813	16.00
5	12.72	10.38	16.126	16.00
7	12.72	11.06	16.813	16.00
10	12.72	11.06	16.813	16.00
12	13.72	11.94	21.062	18.00
15	13.72	11.94	21.062	18.00
17	13.72	11.94	21.062	18.00
200	13.72	11.94	21.062	18.00
250	13.72	13.50	23.500	20.00
300	13.72	13.50	23.500	20.00
350	13.72	12.63	22.625	20.00
400	13.72	13.08	23.075	20.00

NOTE:

1. PC DS OFFSET = 1"

*Pipe chase may be installed on either left or right side of unit.

INDIRECT FIRED GAS CONFIGURATIONS (IG)

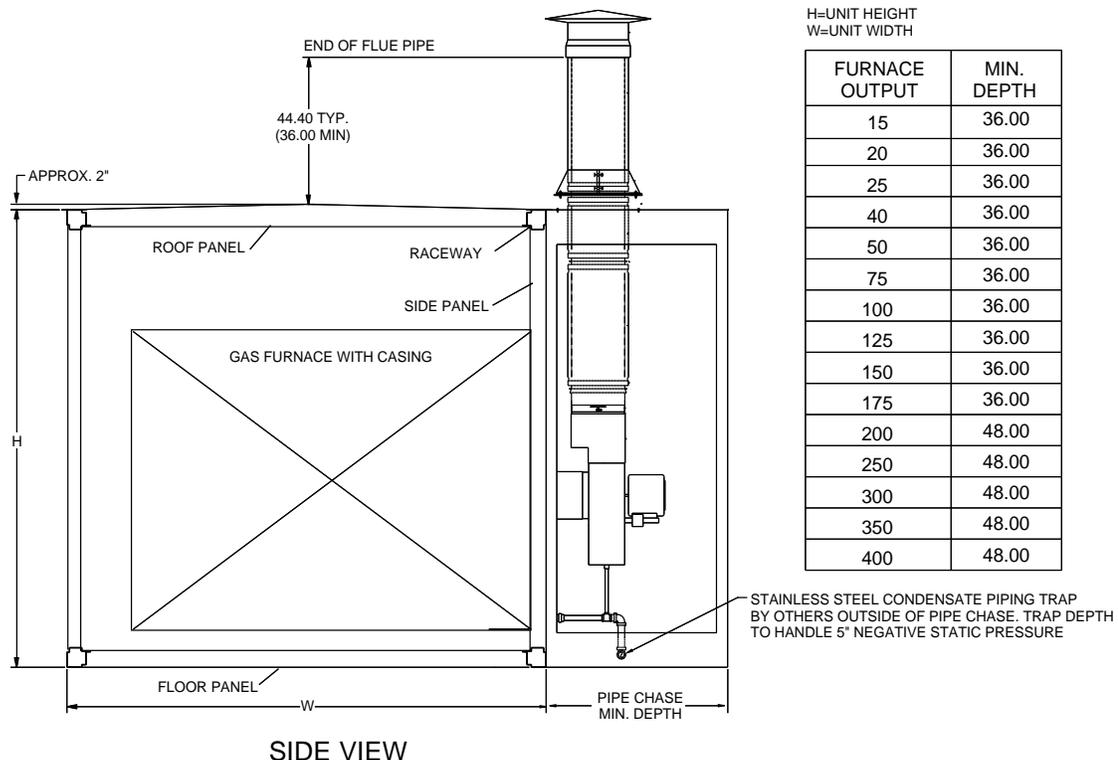
IG SEGMENT (continued)

CABINET HEIGHT	CABINET WIDTH											
	78	84	90	96	102	108	114	120	126	132	138	144
27												
30												
33												
36												
39												
42												
45	43.0	43.0										
48	43.0	43.0	43.0									
51	43.0	43.0										
54	51.0	51.0	51.0	51.0	51.0							
57	51.0	51.0	51.0	51.0	51.0	51.0						
60	51.0	51.0	51.0	51.0	51.0	51.0						
66	51.0		51.0	64.0	64.0	64.0	64.0	64.0				
72			51.0	64.0	64.0	64.0	64.0	64.0	64.0	64.0		
78			51.0	64.0	64.0	64.0	64.0	64.0	64.0	64.0	64.0	72.0
84				64.0	64.0	64.0	64.0	64.0	64.0	64.0	64.0	72.0
90				64.0	64.0	64.0	64.0	64.0	64.0	64.0	64.0	72.0
96				64.0	64.0	64.0	64.0	64.0	64.0	64.0		84.0
102				64.0	64.0	64.0	64.0	64.0	64.0			89.0
108				64.0	64.0	64.0	64.0	64.0				89.0
114				64.0		64.0	64.0					89.0
120						64.0						89.0
126												89.0

NOTE:

- Variable baserail height is not included in overall cabinet height.
- Selection of largest possible coil assumed.
- Pitched outdoor roof increases unit height by 2" - not included in above.
- Lengths will change as shipping splits, doors, etc. are added to unit configuration.

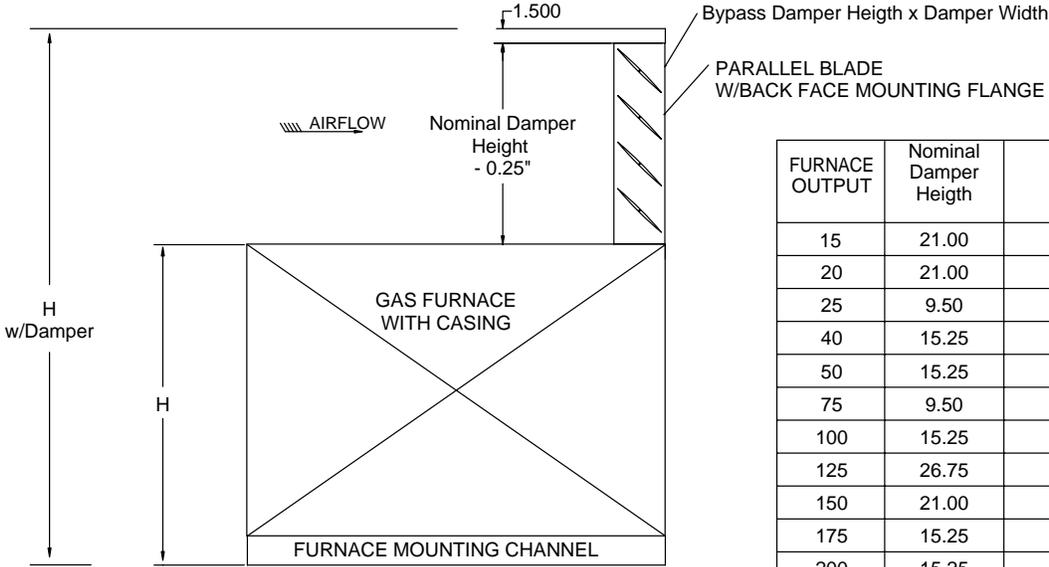
All dimensions are in inches and are approximate. Not certified for construction.



Segment Dimensions

INDIRECT FIRED GAS CONFIGURATIONS (IG)

All dimensions are in inches and are approximate. Not certified for construction.



NOTE: Bypass DAmper Blades shall be Adjusted Manually w/Manual Quadrant Mounted on Damper

FURNACE OUTPUT	Nominal Damper Height	Nominal Damper Width
15	21.00	34.00
20	21.00	34.00
25	9.50	36.00
40	15.25	49.00
50	15.25	63.00
75	9.50	63.00
100	15.25	75.00
125	26.75	81.00
150	21.00	83.00
175	15.25	93.00
200	15.25	93.00
250	26.75	126.00
300	21.00	126.00
350	15.25	126.00
400	9.50	126.00

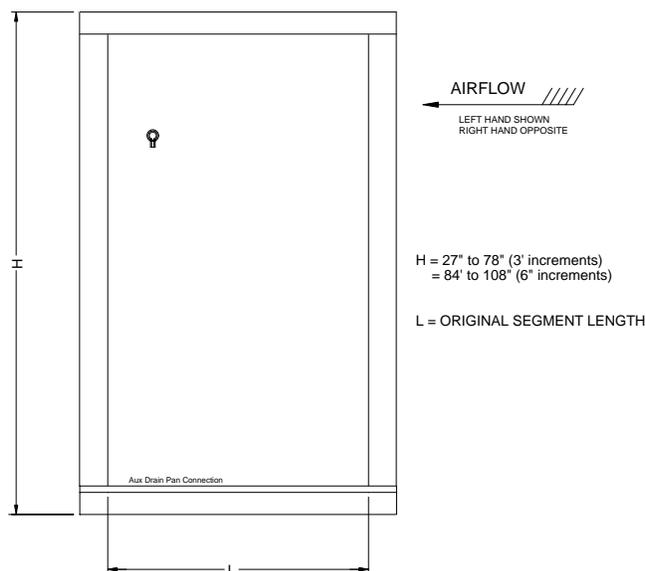
LD08108

ELECTRIC HEATER (EH)

ELECTRIC HEATER DESIGN & PERFORMANCE DATA (Open Coil Type & Finned Tubular Type Elements)

CABINET HEIGHT	CABINET WIDTH	UNIT NOMINAL CFM	OPEN ELEMENT STYLE HEATERS				FINNED TUBULAR HEATER			
			FACE AREA FT ²	FPM THRU HEATER	MAX. KW @ NOMINAL FPM & 80°F INLET	APPROX. HEATER DELTA P "W.C..	FACE AREA FT ²	FPM THRU HEATER	MAX. KW @ NOMINAL FPM	APPROX. HEATER DELTA P "W.C..
27	27	911	1.07	854	24.00	0.05	1.07	854	18.20	0.14
30	33	1458	2.03	718	37.20	0.04	2.03	718	32.00	0.10
36	33	2005	2.71	740	51.50	0.04	2.71	740	44.60	0.11
33	45	2578	3.83	673	63.20	0.04	3.83	673	55.30	0.09
36	48	3438	4.88	705	87.30	0.04	4.88	705	75.10	0.10
36	60	4583	6.88	667	112.10	0.04	6.88	667	97.80	0.09
42	60	5417	8.59	630	130.60	0.04	8.59	630	114.70	0.08
42	66	6094	9.43	646	148.90	0.04	9.43	646	128.90	0.08
42	72	6771	10.68	634	163.40	0.04	10.68	634	143.40	0.08
48	72	7813	12.81	610	185.80	0.04	12.81	610	163.90	0.07
48	78	8594	14.31	600	203.20	0.04	14.31	600	178.90	0.07
51	78	9740	15.51	628	234.10	0.04	15.51	628	206.40	0.08
57	78	10885	17.89	608	257.60	0.04	17.89	608	227.90	0.07
60	84	12500	21.08	593	295.20	0.03	21.08	593	258.50	0.07
66	96	16042	28.22	568	372.50	0.03	28.22	568	325.60	0.07
66	114	19479	34.97	557	444.10	0.03	34.97	557	392.00	0.06
72	120	22500	41.35	544	500.00	0.03	41.35	544	447.50	0.06
78	126	26719	48.24	554	500.00	0.03	46.78	571	500.00	0.06
90	120	30000	53.76	558	500.00	0.03	52.38	573	500.00	0.07
96	126	33646	61.40	548	500.00	0.03	59.93	561	500.00	0.06
108	126	37604	69.44	542	500.00	0.03	68.38	550	500.00	0.06
108	138	41563	77.35	537	500.00	0.03	76.21	545	500.00	0.06
114	144	46979	86.45	543	500.00	0.03	85.24	551	500.00	0.06
120	144	49271	91.58	538	500.00	0.03	90.36	545	500.00	0.06
126	144	51563	95.47	540	500.00	0.03	93.08	554	500.00	0.06

All dimensions are in inches and are approximate. Not certified for construction.



DESIGN CONSIDERATIONS & FLOW RATES:

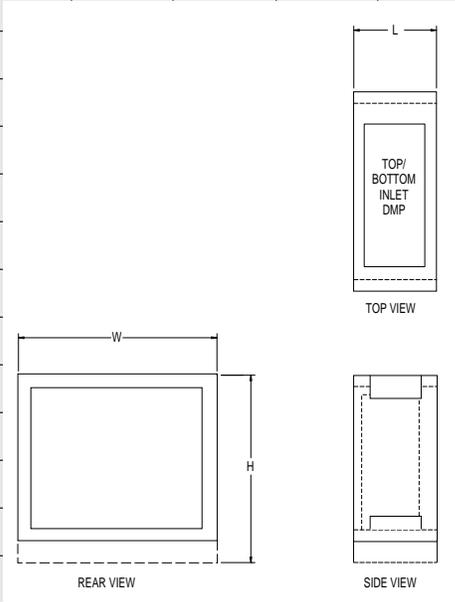
1. The max Kw ratings are at nominal CFM conditions only, application at other CFM conditions will result in different ratings.
2. $\Delta T = \frac{KW \times 3160}{CFM}$
3. The EH segment can be installed in either a draw through or blow through arrangement.
4. The access door size will be the basic EH segment length. Other segment length determining factors are: shipping splits, upstream and downstream adjacent doors, optional SCR controllers, and opposite side, optional access doors.
5. An SCR Controller is not available on a heater that has an "H" dimension of less than 26.5".
6. An optional 18" wide access door may be ordered on the opposite side of the electric heater control panel.
7. If the electric heat segment is used in a blow through application then a door safety catch is required to be used on the door that provides access to the EH control panel. The optional access door on the opposite side will be an in swinging door in this instance and no safety catch will be required for it.
8. The electric heater segment length will vary from 10" to 45", in 1" increments based upon the controls required inside of the control panel.

Segment Dimensions

IO & IP SEGMENTS

IO & IP SEGMENTS

CABINET HEIGHT	CABINET WIDTH											
	27	30	33	36	39	42	45	48	54	60	66	72
27	15 11	15 11	15 11	15 11	15 11	15 11	15 11	15 11	15 11			
30	15 12	15 12	15 12	15 12	15 12	15 12	15 12	15 12	15 12	15 12		
33		15 13										
36		20 14										
39			20 15									
42				20 16								
45				26 23	26 23	26 23	21 22	21 22	20 22	20 22	20 22	20 21
48				26 24	26 24	26 24	26 23	26 23	26 23	26 23	21 23	21 23
51						26 25	26 25	26 24	26 24	26 24	26 24	26 24
54							26 26	26 26	26 25	26 25	26 25	26 25
57								26 27	26 26	26 26	26 26	26 26
60								26 27	26 26	26 26	26 26	26 26
66									32 29	32 28	32 28	32 28
72										32 31	32 30	32 30
78										32 33	32 32	32 32
84										38 35	38 35	38 34
90											38 37	38 37
96												43 39
102												43 41
108												
114												
120												
126												



LEGEND

IO Inlet/Outlet
IP Inlet Plenum

IP - No dampers, only intakes. 2 end panels.

All dimensions are in inches and are approximate. Not certified for construction.

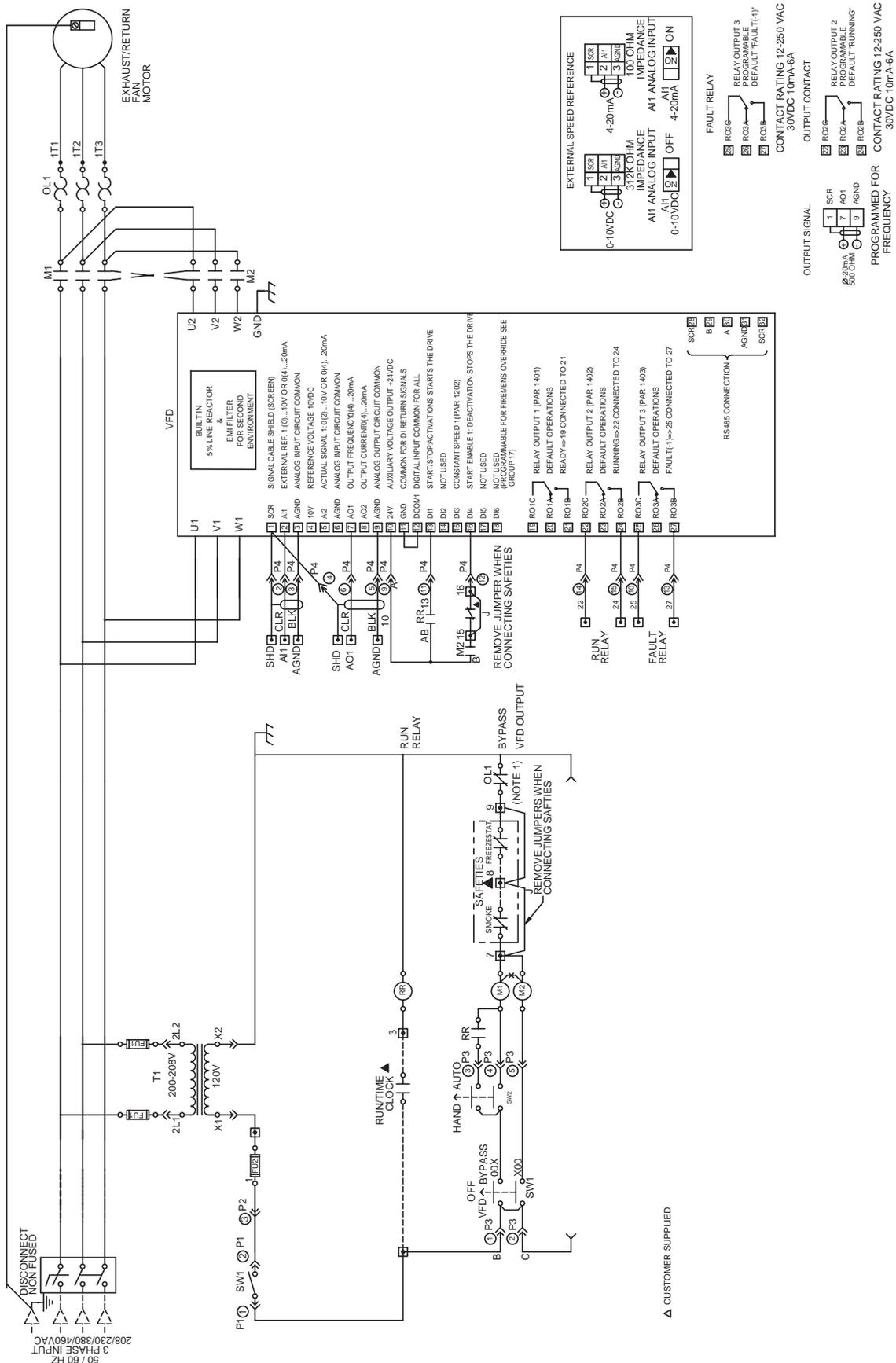
IO & IP SEGMENTS

IO & IP SEGMENTS (continued)

CABINET HEIGHT	CABINET WIDTH												
	78	84	90	96	102	108	114	120	126	132	138	144	
27													
30	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> LEGEND IO Inlet/Outlet IP Inlet Plenum </div>												
33													
36													
39	20 15												
42	20 16	20 16											
45	20 21	20 21											
48	21 22	21 22	20 22										
51	26 24	26 23	26 23	26 23									
54	26 25	26 24	26 24	26 24	26 24								
57	26 26	26 26	26 25	26 25	26 25	26 25							
60	26 26	26 26	26 26	26 25	26 25	26 25							
66	27 28	26 28	26 28	26 28	26 27	26 27	26 27						
72	32 30	32 30	32 30	32 30	32 30	32 30	32 30	32 30	32 30				
78	32 32	32 32	32 32	32 32	32 32	32 32	32 32	32 32	32 31	32 31	32 31	32 31	
84	38 34	38 34	38 34	38 34	38 34	38 34	38 34	38 34	38 34	38 34	38 33	38 33	
90	38 36	38 36	38 36	38 36	38 36	38 36	38 36	38 36	38 36	38 36	38 36	38 35	
96	38 39	38 38											
102	43 41	43 40											
108	43 42	43 42	43 43										
114		44 44	44 44	43 43									
120			49 46	49 46	49 45								
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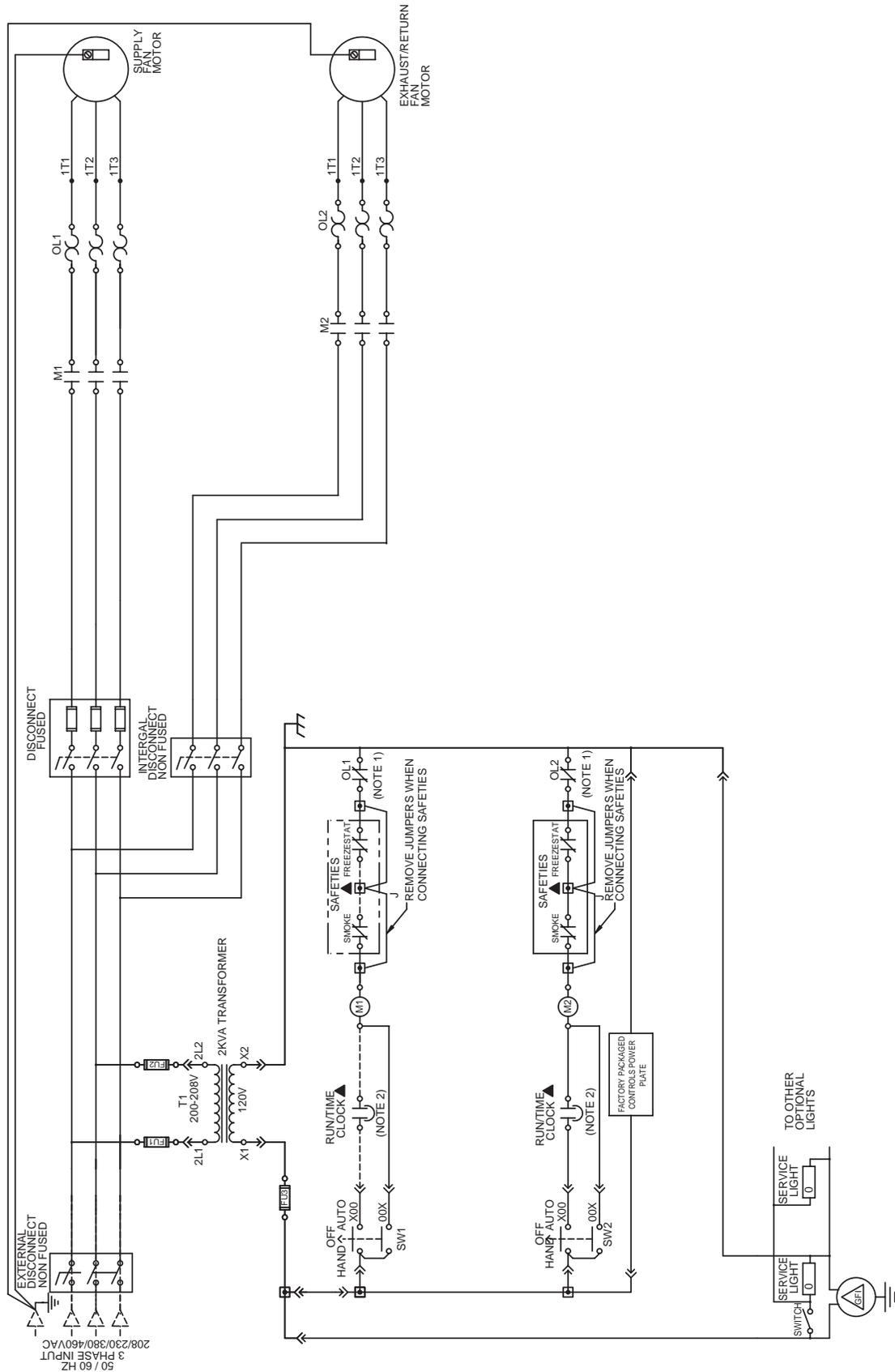
Physical Data / Wiring

EXHAUST/RETURN FAN – VFD W/BYPASS, LIGHTS AND FPC



LD08110

SINGLE POINT POWER DUAL STARTERS LIGHTS FPC



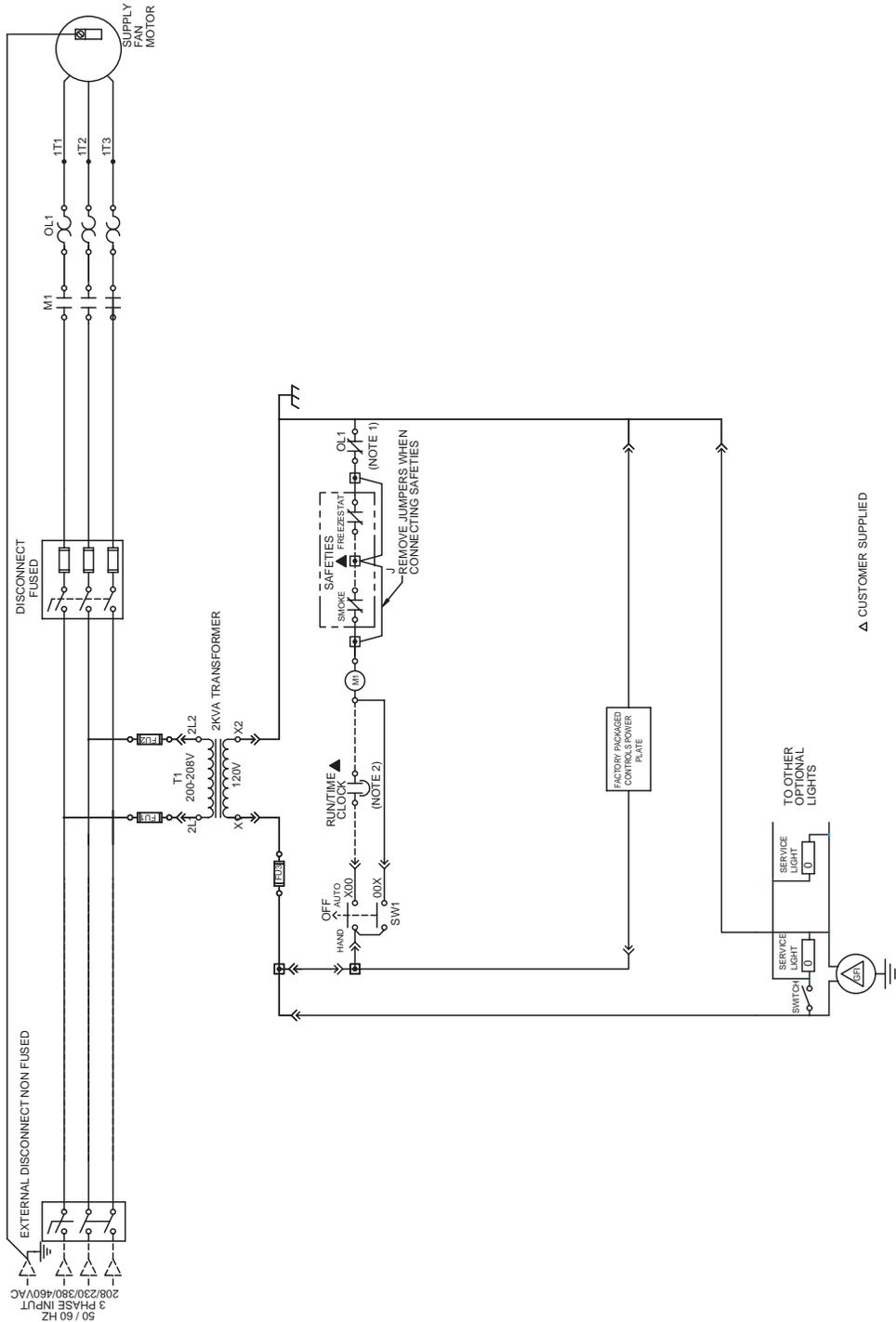
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△ CUSTOMER SUPPLIED

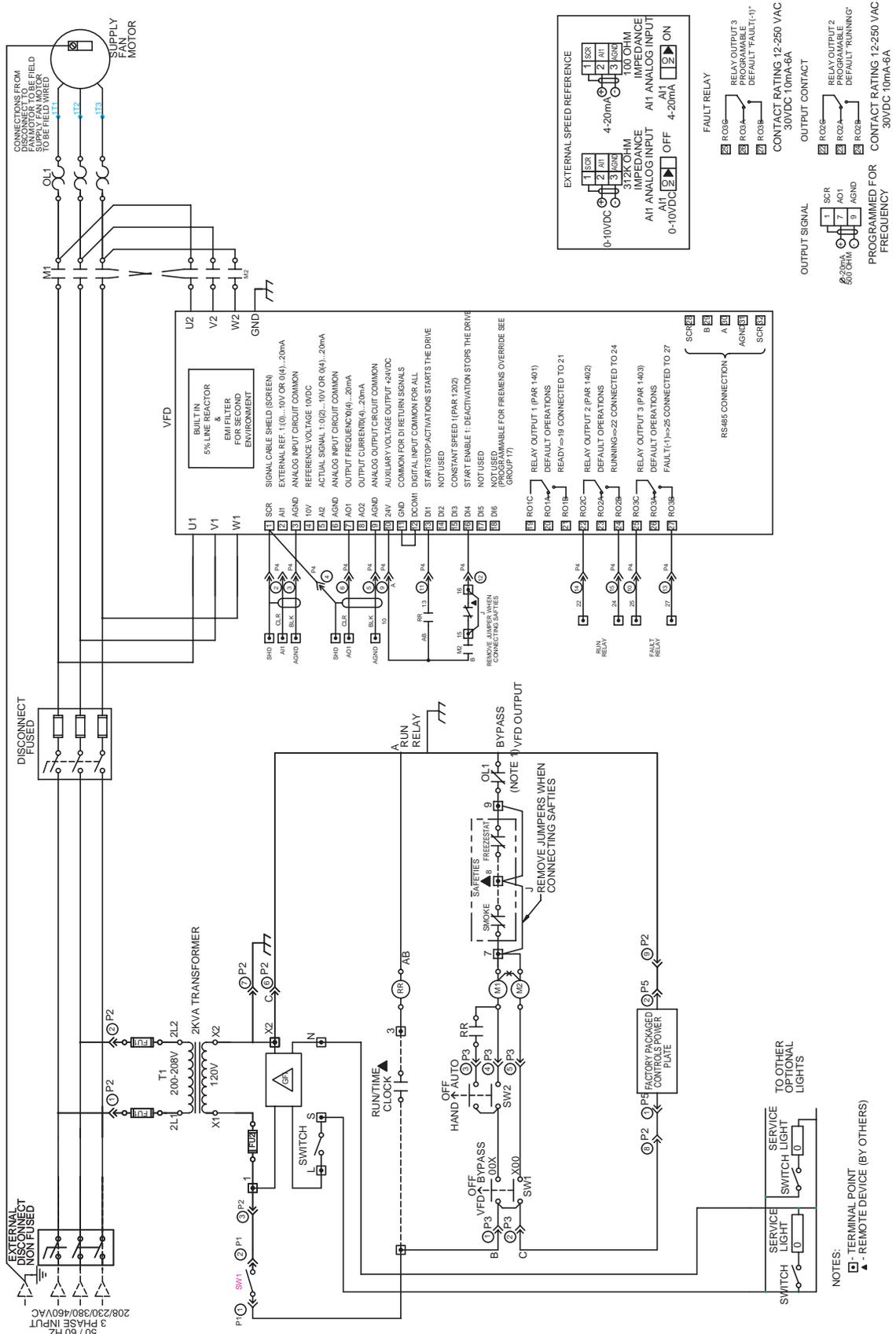
Physical Data / Wiring

SINGLE POINT POWER – SUPPLY FAN STARTER LIGHTS FPC

LD08112



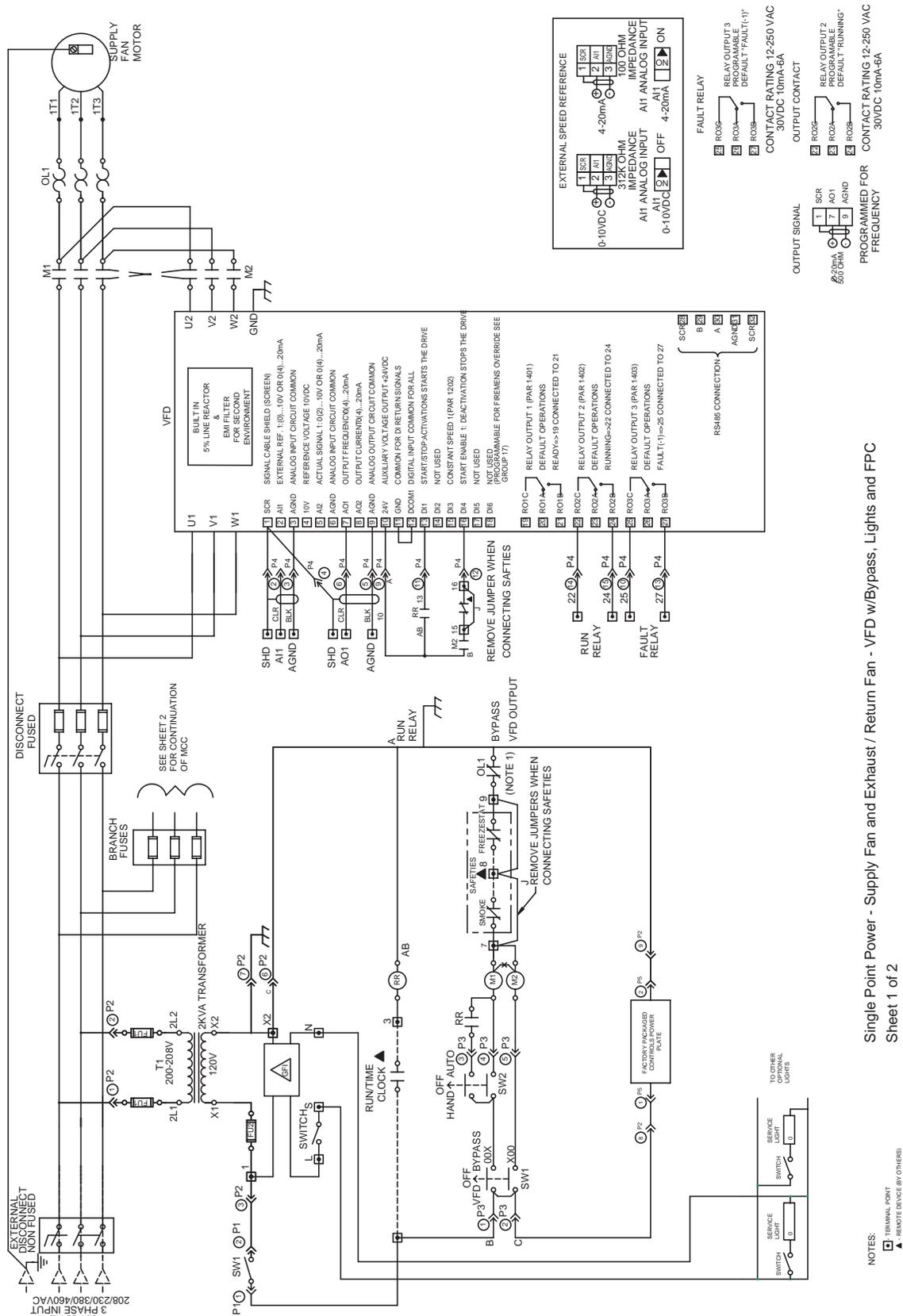
SUPPLY FAN – VFD W/BYPASS, LIGHTS AND FPC



LD08113

Physical Data

SINGLE POINT POWER – SUPPLY AND EXHAUST/RETURN FANS VFD W/BYPASS, LIGHTS AND FPC (SUPPLY ONLY)



LD08114

Single Point Power - Supply Fan and Exhaust / Return Fan - VFD w/Bypass, Lights and FPC
Sheet 1 of 2

Guide Specifications

PART 1: GENERAL

1.01 WORK INCLUDED

- A. Indoor and outdoor air-handling units and components as shown, scheduled, and indicated on the drawings.

1.02 RELATED SECTIONS

- A. The requirements of the General Conditions, Supplementary Conditions, Division 1, and Drawings apply to all work herein.
- B. Requirements of the following sections apply.
- Section 01513 - Temporary Heating, Cooling, and Ventilating.
 - Section 15121 - Expansion Compensation.
 - Section 15170 - Motors.
 - Section 15242 - Vibration Isolation.
 - Section 15290 - Ductwork Insulation.
 - Section 15410 - Plumbing Piping: Equipment Drains.
 - Section 15790 - Air Coils.
 - Section 15811 - Evaporative Humidifier.
 - Section 15812 - Evaporative Pan Humidifier.
 - Section 15813 - Steam Grid Humidifier.
 - Section 15821 - Spray Coil Humidifier.
 - Section 15860 - Centrifugal Fans.
 - Section 15865 - Axial Fans.
 - Section 15885 - Air Cleaning.
 - Section 15890 - Ductwork.
 - Section 15910 - Ductwork Accessories: Flexible Duct Connections.
 - Section 16180 - Equipment Wiring Systems: Electrical Characteristics and Wiring Connections.

1.03 QUALITY ASSURANCE

- A. Manufacturers: The design shown on the drawing is based upon products of the manufacturer scheduled. Alternate equipment manufacturers will be acceptable if equipment meets the scheduled performance and complies with these specifications. The intent of this specification requirement is to assure that the products are delivered through a quality system and framework that will assure consistent quality. If equipment manufactured by manufacturer other than that scheduled is utilized, then the Mechanical Contractor shall be responsible for coordinating with the General Contractor and all affected Subcontractors to ensure proper provisions for installation of the furnished unit. This coordination

shall include, but not be limited to, the following:

- Structural supports for units.
- Piping size and connection/header locations.
- Electrical power requirements and wire/conduit and overcurrent protection sizes.
- The Mechanical Contractor shall be responsible for all costs incurred by the General Contractor, Subcontractors, and Consultants to modify the building provisions to accept the furnished units.

1.04 REFERENCES

- AMCA 99 – Standard Handbook.
- AMCA 210 – Laboratory Methods of Testing Fans for Rating Purposes.
- AMCA 300 – Test Code for Sound Rating Air Moving Devices.
- AMCA 301 – Method of Publishing Sound Ratings for Air Moving Devices.
- AMCA 500 – Test Methods for Louvers, Dampers, and Shutters.
- ANSI/AFBMA 9 – Load Ratings and Fatigue Life for Ball Bearings.
- ANSI/UL 900 – Test Performance of Air Filter Units.
- ARI 410 – Forced-Circulation Air Cooling and Air Heating Coils.
- ARI 430 – Standard for Application of Central-Station Air Handling Units.
- ARI 260 – Sound Rating of Ducted Air Moving and Conditioning Equipment.
- NFPA 90A – Installation of Air Conditioning and Ventilation Systems.
- SMACNA – Low Pressure Duct Construction Standards.
- AMCA 611-95 – Methods of Testing Airflow Measurement Stations for Rating.
- ASHRAE 52.1/52.2 – Method of Testing General Ventilation Air Cleaning Devices for Removal Efficiency by Particle Size.
- ASHRAE 62 – Ventilation for Acceptable Indoor Air Quality.
- ASHRAE 90.1 – Energy Standard for Buildings Except Low-Rise Residential Buildings.

1.05 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section _____.

- B. Shop drawings shall indicate assembly, unit dimensions, weight loading, required clearances, construction details, and field connection details.
- C. Product data shall indicate dimensions, weights, capacities, ratings, fan performance, motor electrical characteristics, gages, and finishes of materials.
- D. Provide fan curves with specified operating point clearly plotted.
- E. Submit product data of filter media, filter performance data, filter assembly, and filter frames.
- F. Submit electrical requirements for power supply wiring including wiring diagrams for interlock and control wiring, clearly indicating factory-installed and field-installed wiring.
- G. Submit manufacturer's installation instructions under provisions of Section_____.

1.06 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data under provisions of Section_____.
- B. Include instructions for lubrication, filter replacement, motor and drive replacement, spare parts lists, and wiring diagrams.

1.07 RATINGS AND CERTIFICATIONS

- A. Conform to AMCA 210 for fan performance ratings.
- B. Conform to E.T.L. or U.L. standards.
- C. Conform to ARI 410 for capacities, pressure drops, and selection procedures of air coils.
- D. Conform to ARI 430 for all fabrication procedures of air handling units.
- E. Utilize only ANSI/UL 900 listed Class I or Class II filter media, approved by local authorities.
- F. Utilize only ISO9001, 9000, or 9002 certified facilities in the manufacturing of the air- handling unit.
- G. Electric control wiring shall be in accordance NEC codes & ETL requirements
- H. Motors shall satisfy the Federally mandated Energy Policy Act (EPACT).
- I. Test Airflow Monitoring Stations in accordance with AMCA 611-95. Provide Certified Ratings Seal for Airflow Measurement Performance.

1.08 DELIVERY, STORAGE AND HANDLING

- A. All handling and storage procedures shall be per manufacturer's recommendations.
- B. Unpainted units shall be shrink-wrapped by the

manufacturer prior to shipment to prevent damage due to weather and road debris during transportation and thereafter while in storage awaiting installation. Alternatively, units may be completely covered by tarps while in transit or shipped in an enclosed truck. Units not factory shrink-wrapped shall be re-covered by the contractor at the job- site while awaiting installation. Protection of the complete unit for avoidance of general rusting must be handled as best suits the circumstances. Store in a place protected from construction traffic and handle carefully to avoid damage to components, enclosures, and finish.

- C. All openings shall be protected against damage from shipping
- D. Safety warning labels shall be clearly marked in 3-language format
- E. Filters will [ship loose from factory with unit] or [require call for delivery] as scheduled.
- F. All loose-shipped items need to be packed, protected and secured with the air units.
- G. Pipe chases will ship attached to the unit as indicated on the drawings unless the total unit width including the pipe chase exceeds 102", in which case the pipe chase will ship loose.
- H. Rain hoods will [ship loose] [ship attached to the unit] as indicated on the drawings.
- I. Factory Packaged Controls (FPC) will be factory mounted or shipped loose as selected. Motor control devices will be factory mounted or shipped loose as selected and indicated on the drawings. Electronic equipment cannot be stored in wet or damp areas even though they are sealed and secured.
- J. Motors should be protected and inspected in accordance with the manufacturers specific instructions regarding periods of long storage.

1.09 WARRANTY

- A. The manufacturer's standard warranty shall be for a period of eighteen months from the date of shipment.

Warranty is limited to manufacturers defect only.

The warranty shall include parts (18 mo.) and labor (12 mo.) during this period.

A factory trained and factory employed technician shall be available within 50 miles of the job site to respond to a service call.

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The warranty shall not include parts associated with routine maintenance, such as belts, air filters, etc.

Warranty is not extended to any alteration, modifications or external component attached to "original" equipment "as-built" and shipped from manufacturing facilities.

All factory provided controls will carry the "Limited Warranty" as described above.

1.10 ENVIRONMENTAL REQUIREMENTS

- A. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.
- B. Manufacturers "start-up" requirements must be complied-with to ensure safe and correct operation.

1.11 EXTRA STOCK

- A. Provide one spare set(s) of filters per unit.
- B. Provide one set of spare fan belts for each unit.

PART 2: PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. York Solution (Basis of design).
- B. _____
- C. _____

2.02 GENERAL DESCRIPTION

- A. Factory manufactured air-handling units designed to the performance levels specified with a combination of air-handling components in unitized housings to form complete, integrated machines as indicated on the drawings.
- B. Fabricate air-handling units suitable for the scheduled capacities.
- C. Factory test and balance fan design and drives to limit vibration (displacement in mils) at operating speeds.
- D. Base performance on sea level conditions or [altitude].
- E. All internal components specified in the air handling unit schedule shall be factory furnished and installed. Unit(s) shall be completely factory assembled.
- G. Unit(s) shall ship in one (1) piece whenever possible.

Unit splits will be provided only where necessary for shipping [or where indicated by customer]. Lifting lugs will be supplied on each side of a shipping split and at all unit corners to facilitate rigging and aid in joining shipping sections. Lifting lugs to be suitable for rigging without requiring additional support frames.

2.03 UNIT CASING

- A. The air-handling unit shall be specifically designed for use in an indoor or outdoor application, as specified.
- B. The construction of the air handling unit shall consist of a complete structural frame with removable panels. Casing shall be supported in such a manner so that maximum allowable air leakage shall not exceed 1% and panel deflection shall not exceed a L/240 ratio when subjected to +/- 8-in. w.g. static pressure. All panels shall be completely gasketed prior to shipment and shall be completely removable for unit access and removal of components. Removal of any or all panels shall not affect the structural integrity of the unit.
- C. The air-handling unit shall be provided with a full perimeter base rail channel.
 - a. The base rail channel shall be formed of 16-gage minimum galvanized steel.
 - b. The base rail channel shall have a minimum height of [3] [6] [8] [10]" to insure adequate clearance for drain pipe trapping.
 - c. The base rail channel shall support all major components.
 - d. Perimeter structural steel lifting lugs shall be provided to accommodate overhead lifting.
- D. The air-handling unit shall be supplied with double wall panels for walls, roof, and floor constructed of G90 mill galvanized sheet steel.
- E. Outdoor air handling unit(s) shall be provided with a full-perimeter, gasketed [insulated] roof curb. Roof curb shall ship loose for field installation prior to unit placement.
 - a. Roof curb shall be a prefabricated galvanized steel-mounting curb.
 - b. Roof curb application shall provide for continuous insulation between unit panels and roof curb.
 - c. The roof curb shall have 1.5-inch, 3 pound per cubic foot density fiberglass insulation.
 - d. Roof curb shall be a perimeter type providing complete perimeter support of the air-handling unit.
 - e. Roof curb shall be flat or sloped to accommodate

- the roof pitch, as indicated on the curb drawings.
- f. The curb shall be a minimum 18 gage and a minimum of 14 inches high.
 - g. Gasketing shall be provided for field mounting between the unit base and the roof curb.
 - h. The curb shall include a 1" x 4" wood nailer.
- F. Outdoor air handling unit(s) shall be provided with an external, double wall construction, insulated pipe-chase to fully contain field piping and valves. Pipe-chase must provide sufficient space for coil connections and piping to be installed without interference. Pipe-chase enclosures of adjacent segments shall be combined to be a continuous open pipe-chase.
- a. Pipe chase shall be [24"] [36"] [48"] in nominal depth, with an internal clearance of 2" less than nominal dimension.
 - b. Pipe chase wall and floor construction shall be the same as that of the unit.
- G. The air handling unit casing shall be constructed of 2" thick double wall roof panels, floor panels, and wall panels having exterior construction of [20] [18] [16] gage G90 galvanized steel. The interior lining shall be a solid lining of minimum 20 gage [minimum 20-gauge 304 stainless steel solid or .080" thick aluminum perforated lining in specific segments as indicated.] Exterior casing screws shall be zinc chromate coated.
- H. Floor panels shall be double wall construction, designed to provide at most L/240 deflection based on 300 lb. concentrated load at mid-span. The interior liner of the floor panels shall be a solid lining of minimum 20 gage galvanized [304 stainless steel].
- An additional 0.125" aluminum diamond tread plate liner shall be provided as a walk-on surface in unit access areas.
- I. The outdoor air-handling unit shall be supplied with a double-sloped roof to promote drainage of precipitation and prevent standing water.
- a. Roof construction design shall accommodate a minimum snow-load of 30 lb/ft².
 - b. The roof shall have a minimum pitch of 1/4" per foot.
 - c. The roof shall overhang all side and end panels to prevent precipitation drainage from streaming down the unit wall panels.
 - d. Outdoor units supplied with flat roofs shall not be acceptable.
- J. The air-handling unit shall be completely insulated throughout all panels and structural frame members with spray injected foam to thoroughly insulate and seal the air unit structure. Openings in structural channels shall be covered. If structural channels are not internally insulated, then structural channels must be wrapped with an armaflex type insulation to maintain unit thermal performance and prevent sweating. Any portion of the unit that is not insulated (gaps) or has less than 2" of insulation shall be the responsibility of the contractor to modify.
- a. Insulation shall be a full 2" throughout the entire unit.
 - b. Units with less than 2" of insulation in any part of the walls, floor, or roof shall not be acceptable.
 - c. Insulation application shall conform to NFPA 90A requirements.
 - d. Panels shall have a minimum thermal conductivity R of 12.5 (Hr-Ft²-°F/BTU).
 - e. For outdoor units all pipe chases, coil header panels and return bend panels shall be fully insulated.
 - f. Panels with perforated panel liner shall utilize a triple-wall construction, joining a matte-faced fiberglass insulated panel with a foam insulated panel to achieve both superior thermal performance and sound attenuation.
 - g. All drain pans shall have double-wall construction and be insulated with spray injected foam. Fiberglass insulation is not acceptable.
- K. Double wall access doors shall be provided on sections as scheduled. Doors shall be of the same material type as the wall panels. A bulb-type gasket shall be provided around the entire door perimeter. Industrial style stainless steel hinges shall permit a complete 180 degree door swing. All doors shall open against positive pressure. Alternatively, if doors opening against positive pressure are not available, a safety chain mechanism and warning labels shall be provided to prevent injury to maintenance personnel.
- a. Access door must be of the same material type as exterior/interior casing.
 - b. Access door latches shall utilize a roller cam latching mechanism to insure maximum sealing. Latches featuring a rotating "paw" are not acceptable.
 - c. Access doors shall be provided with a single door handle linked to multiple latching points. Stacked indoor units shall insure door handles are positioned at the lowest possible point of the top tier segments for convenient access.
 - d. Doors serving access areas shall be provided with inside operable door latches.

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- e. Unit access doors shall be provided with a locking hasp to accommodate a combination/pad lock.
- f. Unit access doors shall be provided with a key-lock. All access doors shall be operated by the same key.
- L. Viewing windows shall be provided as shown on the schedule. All windows shall be double-pane tempered glass.
- M. Provide auxiliary drain pans in segments as indicated on the schedule.
 - a. The auxiliary pans shall be double sloped, positive draining with galvanized [stainless] steel liner and double wall construction with drain connection of like material, draining to one side of the unit.
 - b. Coat auxiliary drain pans with a [mastic] [anti-microbial] coating.
 - c. Drain connection shall be welded to the drain pan. If threaded screw-type joint is used, all joints must be easily accessible for inspection and service.
- G. After the pre-balanced fan is installed on the fan skid and isolator rails, the entire fan skid shall be run-balanced at the specified speed to insure smooth and trouble-free operation. The run balance shall include filter-in and filter-out balancing in all three (3) planes, on both sides of the fan assembly at the bearings.
 - a. Filter-in measurements shall be taken in the horizontal and vertical planes on the drive and opposite-drive sides of the fan shaft.
 - b. Filter-out measurements shall be taken in the horizontal, vertical and axial planes on the drive and opposite-drive side of the fan shaft.
- H. The fan motor and fan-assembly shall be internally mounted. The fan motor and fan-assembly shall be mounted on a common base to allow consistent belt tension with no relative motion between the fan and motor shafts. The common base shall be isolated on a full width isolator support channel using 1" [2"] springs [with seismic restraints].
 - a. Fan motor and drive shall be contained within an OSHA-compliant belt guard.
 - b. The fan motor shall be on an adjustable base.
 - c. The fan discharge shall be connected to the cabinet through a canvas flexible connection to insure vibration-free operation.
 - d. Thrust restraints shall be provided as specified to mitigate fan assembly vibration in the horizontal plane.
 - e. Fan segments shall be equipped with an access door located on [drive side, opposite drive side, both sides] of the segment.
 - f. Fan sections shall be equipped with safety screens covering bottom inlets and discharge openings, sufficient to hold 300 lb. service person with minimal deflection.
 - g. Fan assemblies shall be balanced for inverter duty operation.
 - h. The fan will be balanced over the entire range of fan operation (30% to 100% of RPM).

2.04 FANS

- A. Fans shall be Class I, II, and III, as scheduled, selected to provide the airflow and pressure specified.
- B. Fan segments shall be equipped with [double width double inlet (DWDI) housed fans] or [single width single inlet (SWSI) plenum fans as scheduled.] Double width double inlet (DWDI) fans shall be industrial grade, having airfoil or forward curved blades as scheduled. All single width single inlet fans (SWSI) fans shall have airfoil (AF) blades. Flat plate blades shall not be acceptable.
- C. All airfoil fans shall bear the AMCA Seal. Airfoil fan performance shall be based on tests made in accordance with AMCA standards 210 and comply with the requirements of the AMCA certified ratings program for air and sound. In addition, all airfoil wheels shall comply with AMCA standard 99-2408-69 and 99-2401-82.
- D. SWSI fans shall be provided with [inlet screens, fan screens and belt guards.] DWDI fans shall be provided with [inlet screens] as specified.
- E. Industrial grade DWDI airfoil fans shall be provided with an optional access door in the fan scroll.
- F. Fans shall have polished steel shafts sized so the first critical speed is at least 25% over the maximum operating speed for each pressure class. Close tolerances shall be maintained where the shaft makes contact with the bearing. Shaft shall be factory coated after assembly with an anti-corrosion coating.

2.05 BEARINGS AND DRIVES

- A. Fan bearings shall be designed for an average life (L50) of at least 200,000 hours [an L10 life of at least 200,000 hours].
- B. Plenum fans shall be [belt-driven] or [direct-drive].
- C. All re-greaseable bearings shall be factory lubricated and equipped with standard hydraulic grease fittings and lube lines extended [to the motor side of the fan] [to the exterior of the unit]. Re-greasable bearings provided without factory installed lubrication lines are unacceptable.

- D. Fan drives shall be selected for a 1.5 service factor and anti-static belts shall be furnished.
- [All drives shall be fixed pitch] [All drives 15 hp or smaller on constant volume units shall be adjustable pitch. Drives 20 hp or larger or any drives on units equipped with VFDs shall be fixed pitch].
 - [All fans with motors 10 HP or larger shall be equipped with multiple belt drives].
 - Sheaves shall be machined from a close grain cast iron and statically balanced by the manufacturer. A fixed pitch sheave shall be provided on the motor.
 - Drive belts shall be a V type. All drive belts shall be precision molded raw edge construction. Belts shall be oil and heat resistant.

2.06 ELECTRICAL CHARACTERISTICS AND COMPONENTS

- A. Fan motors shall be furnished in sizes, electrical power and starting characteristics as shown in the schedule.
- All fan motors will be built in accordance with the latest standards of the National Electrical Manufacturer's Association (NEMA) and IEEE and shall be rated for continuous duty at full load at 40°C ambient temperature rise and a service factor of 1.15.
 - Fan motors shall be NEMA design ball bearing type.
 - Fan motors shall be 1750 RPM [1500 RPM], [open drip proof], or [totally enclosed, fan cooled type] [as indicated on the schedule].
 - Direct drive plenum fans shall be coupled with appropriately sized motors to nearly match synchronous motor speed, as detailed in the schedule.
 - All fan motors shall be [high] or [premium] [unless otherwise scheduled] efficiency.
 - Motors shall be [suitable for use in variable frequency application, per NEMA MG-1 Part 30] or ["inverter ready", complying with *NEMA STD MG1 PART 31.4.4.2*].
- B. Variable-air-volume units shall be equipped with factory mounted and [wired] variable frequency drives serving [supply] [supply and return/exhaust] for fan unloading control. Wiring to motor shall be provided in flexible conduit.
- Each drive shall be mounted in a dedicated, NEMA 1 compartment located on the side of its associated fan section. Outdoor units shall encase controls in a weatherproof control enclosure.
 - After the air unit is installed, the VFD shall be field commissioned by a factory trained and employed service technician.
- C. The VFD shall be UL listed and comply with all applicable provisions of the National Electric Code. The VFD shall include the following features:
- Multi-line, multi-lingual alphanumeric display for operator control, parameter set-up and operating data. Display data includes output frequency (Hz), speed (RPM), motor current, calculated % motor torque, calculated motor power (kW), DC bus voltage, output voltage, heatsink temperature, elapsed time meter (re-settable), kWh (re-settable), input / output terminal monitor, PID actual value (feedback) & error, fault text, warning text, and scalable process variable display, Hand-Off-Auto and speed selection.
 - Integral input reactor(s) – equivalent 5% impedance.
 - Modbus RTU, Johnson N2, Siemens FLN as standard communications, with options for BACnet and LONworks.
 - Two (2) analog inputs.
 - Six (6) programmable digital inputs.
 - Two (2) programmable analog outputs.
 - Three (3) programmable digital relay outputs.
 - Adjustable filters on analog inputs and outputs.
 - Input speed signals, including current 0(4)-20 mA, voltage 0(2)-10 VDC, Accel/Decel contacts (floating point control), RS-485 Modbus, Johnson N2, Siemens FLN, BACnet and LONworks communications.
 - Start/Stop options shall include 2 wire (dry contact closure), 3 wire (momentary contacts), application of input power, and application of reference signal (PID sleep/wake-up).
 - Protection circuits shall include overcurrent, ground fault, overvoltage, undervoltage, overtemperature, input power loss of phase, loss of reference/feedback, adjustable current limit regulator, UL 508C approved electronic motor overload (12t).
 - Premagnetization on start.
 - DC braking/hold at stop.
 - Auto restart shall be customer selectable and adjustable.
 - Ramp or coast to stop.
 - Seven (7) preset speeds.
 - Three (3) critical frequency lockout bands.
 - Start function shall include ramp, flying start,

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automatic torque boost, and automatic torque boost with flying start.

19. Integral RFI/EMI filtering to meet EMC EN61800-3 First Environment Main disconnect.

Constant volume units shall be equipped with factory mounted and [wired] or motor starter panel(s) serving [supply] [supply and return/exhaust] fan motor(s). Wiring to motor shall be provided in flexible conduit (if any).

- a. The motor starter panel(s) and all associated components shall be U.L. listed.
 - b. The motor starter panel shall be protected by an environmental enclosure per ETL rating enclosure.
 - c. Individually protected supply fan starter with short circuit and overload protection.
 - d. 115 volt control power transformer with primary and secondary protection.
 - e. The starter panel shall be provided with a 5 point terminal strip for field connections.
 - f. An integral [non-fused] [fused] main power-disconnect shall be provided.
 1. The disconnect shall be an integral part of the motor starter panel.
 2. The disconnect shall be factory wired.
- D. The motor starter panel shall contain a main power block, single speed fan motor contactor(s) with overload device(s), three phase ambient compensated overload heater elements, two primary control fuses, one secondary control line size fuse, terminal strip, and a door-mounted on/off auto switch.
- E. The air-handling unit shall be equipped with factory mounted and [wired] or [wired with flexible conduit] external [non-fused] [fused] disconnect in a separate NEMA [1, 12, 3R] enclosure.
- F. The air-handling unit shall be power wired for a single point connection. All power loads to be wired to one point of power source entrance.
- G. The air-handling unit shall be power wired for independent power source for receptacle and lights, having[one switch] or [multiple switches for independent light control], separate from the Motor power source entrance. Lighting circuit shall receive power from a "Dedicated Circuit Breaker" — remotely provided by others.
- H. [120V Incandescent Light] [120V Fluorescent Light] shall be provided in segments as indicated on the schedule.
- I. External light switch shall be provided with a 1 hour timer device on Fan segment.

- J. Individual (internal) light switches to operate individual lights shall be provided as scheduled.
- K. 120V convenience outlet(s) shall be provided as scheduled.

2.07 HEATING/COOLING COMPONENTS

- A. Coil segment length shall be optimized to contain selected coil(s), spacer(s), and optional access doors. Coils shall be selected to maximize unit tunnel area using [single] or [stacked] coil arrangements as needed to satisfy required coil face areas.
- a. Coil segment design and coil selection shall not require a drain pan in any downstream section to contain the coil condensate.
 - b. All cooling and/or heating coils shall be furnished to meet the performance requirements set forth in the schedule.
 - c. All water and steam coils shall have performance certified in accordance with ARI Standard 410 for coil capacity and pressure drop.
 - d. Coils used with glycol are outside the scope of ARI-410, but shall be selected to meet scheduled performance.
 - e. All coils must be circuited to operate at design load with water velocity within the ARI range of certified rating conditions.
 - f. Multiple coils in a single coil segment shall be separated by [galvanized steel] [stainless steel] coil spacers. Coil spacers should accommodate side-access via a removal side-plate.
 - g. [Coil segment side and top panels (indoor units)] [Coil segment side panels (outdoor units)] shall be removable to allow for removal and replacement of coils, without affecting the structural integrity of the unit.
 - h. Upstream and downstream segment door clearances shall accommodate a minimum 2-inches of field installed external piping insulation.
 - i. Coil segment shall accommodate full-face height or reduced face height coils, as specified.
- B. Cooling Coil Segment shall be provided with a full-width, multi-sloped (IAQ) drain pan that extends downstream a minimum 6" beyond the last coil in the section to provide drain pan access for cleaning and inspection.
- C. Drain pan design and application shall comply fully with the stated intent of ASHRAE 62-2001.
- D. Drain pans shall be sloped in a minimum of 2 planes; cross break interior pans and pitch toward drain

connections to ensure complete condensate drainage. Units with cooling coils shall have drain pans under complete cooling coil section. A minimum of 1" clearance shall be provided from the bottom of the coil casing to the drain pan so that the drain pan can be visually inspected and physically cleaned, including underneath coil, without removal of the coil. All drain pan connections will be to one side of the unit to enable proper trapping. Drain pans that do not comply with these maintenance requirements will be the responsibility of the contractor to field modify.

- E. The drain pan shall be of double wall construction with a minimum 20 gage galvanized [stainless steel] liner and shall be insulated with spray-injected foam to completely seal the drain pan assembly. Fiberglass insulation is not acceptable.
- F. The drain pan liner shall have a [mastic] [anti-microbial] coating.
- G. Drain pan shall be provided with a minimum 1-1/4" MPT condensate connection positioned beneath the lowest point of the drain pan. Drain connection shall be welded to the drain pan and shall match the drain pan liner material type. If threaded screw-type joint is used, all joints must be easily accessible for inspection and service.
- H. All coils shall be slide out, "shipping" type, mounted on tracks, and easily removable from the air handling unit by removing only one exterior panel. Coils that require additional disassembly of the unit or replacement of the entire coil section (e.g. "unit" type coils) for coil removal are unacceptable.
- I. Coils shall be supported by galvanized [stainless steel] coil support members, constructed of channeled members, allowing uninhibited access for inspection and safe cleaning.
- J. All vertical coil supporting members (bulkheads) and blockoffs shall be constructed of galvanized steel [stainless steel] and shall entirely seal off the coil, preventing air bypass.
- K. Coil grommets shall be provided on all coils to completely seal the area between the coil connection and the unit casing.
- L. Drainable Water coils shall be designed to operate at 250 psig design working pressure and up to 300° F and shall be tested with 325 psig compressed air under water. Circuiting shall provide free and complete draining and venting when installed in the unit. All vent and drain connections shall be extended to the outside of the unit casing.
- M. Direct expansion coils shall be designed to conform to the ANSI B9.1 (Safety Code for Mechanical Refrigeration) when operating with a refrigerant pressure not exceeding 250 psig and shall be tested with 325 psig compressed air under water. The completed coil shall be dehydrated, including headers, return bends and distributors and sealed for shipment. Each coil shall be furnished with a brass distributor with solder-type connections. Suction and discharge connections shall be on the same end regardless of rows deep. Direct expansion liquid lines should be extended to outside of unit. All refrigerant specialties should be mounted outside of unit.
- N. Steam Distributing (1" O.D.) coils shall be designed for operation at 100 psig pressure and a corresponding saturated steam temperature of 338° F. Coils shall be tested with 315psig compressed air under water. The outer tube shall be 1" O.D. and the inner distribution tube will be 5/8" O.D. The circuiting shall be of a non-trapping condensate drainable design facilitating gravity drain. The steam shall discharge in the direction of condensate flow to ensure even distribution and heat transfer through the full length of each tube.
- O. The primary surface shall be 5/8" O.D. or 1/2" O.D. copper tube, staggered in direction of airflow. Tubes shall be mandrel expanded to form fin bond and provide burnished, work-hardened interior surface. The tubes shall have a minimum tube wall thickness of [0.020"] [0.025"] [0.035"] for 5/8" O.D coils and [0.016"] [0.020"] [0.032"] for 1/2" O.D. coils. Specified thickness shall be maintained throughout the tube including brazed U-bends.
- P. Extended surface shall consist of die-formed, continuous, [aluminum] [copper] [corrugated] enhanced performance fins. The fins shall have fully drawn collars to accurately space fins, and to form a protective sheath for the primary surface. The fin thickness shall be [0.006"] [0.010"].
- Q. Coils with finned height greater than 48 inches shall have an intermediate drain pan extending the entire finned length of the coil. Cooling coils in excess of 48 inches in height shall not be acceptable unless provided with an intermediate drain pan. The intermediate pans shall have PVC [copper] down spouts to guide condensate to the main drain pan.
- R. Coil casing shall be constructed of 16-gauge galvanized steel [stainless steel]. Tube sheets on each end shall have drawn collars to support tubes. A single intermediate coil support shall be provided on coils with a finned length of more than 62 inches, two (2) intermediate supports above 100 inches in length, and three (3) intermediate supports on coils with a finned length of more than 141 inches. Cas-

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ing channels shall be free-draining, without depressions to collect moisture and contaminants. Casing channels shall not block fin area.

- S. Headers shall be of heavy seamless copper] [red brass] tubing, silver-brazed to tubes. Connections shall be of steel [red brass], with male pipe threads, silver-brazed to the headers. A 1/4" FPT, plugged vent or drain tap shall be provided on each connection. All vent and drain connections shall be extended to the outside of the unit casing.
- T. Coil shall be protected with a [Phenolic], [Heresite®], [Electrofin] [flexible dip and baked epoxy coating].
- U. Circuiting shall be to provide free draining and venting, through one vent and one drain on each coil, when installed with casing level. Coils shall be circuited, and have connections arranged, for counter-flow of air and water with supply on bottom and return on top of coil headers. Coil circuiting shall provide for design water velocity in tubes without exceeding total water pressure drops in schedule.
- V. Coils using turbulators are unacceptable.

2.08 FILTERS

- A. Filters and filter segments shall be provided as scheduled. Filter tracks shall be constructed of galvanized steel and be built as an integral part of the unit. Filter media shall be listed Class 2 or Class 1 under U.L. Standard 900 as required by local codes.
- B. **Flat Filter (FF) segment** shall be provided with throwaway (2"), permanent cleanable (2"), or 30% pleated (**2" or 4"**) as scheduled.
- C. **Angle Filter (AF) segment** shall be provided with throwaway (2"), permanent cleanable (2"), or 30% pleated (**2"**) as scheduled.
- D. **High Efficiency Filter (RF) segment** shall accommodate [4"] [12"] [22"] media.
 - a. Media shall be 4" mini-pleated (60-65% efficiency-MERV 11 (80-85% efficiency-MERV 13 (90-95% efficiency-MERV 14, or as scheduled.
 - b. Media shall be 12" rigid (60-65% efficiency-MERV 11 (80-85% efficiency-MERV 13 (90-95% efficiency-MERV 14 or as scheduled.
 - c. Media shall be 22" bag (60-65% efficiency-MERV 12 (80-85% efficiency-MERV 14 (90-95% efficiency-MERV 15 or as scheduled.
 - d. Prefilter media shall be throwaway or permanent cleanable or 30% efficient. Spare sets of media shall be provided as scheduled.
- E. **HEPA filter segments (HF)** shall be provided with MERV 17 (99.97% efficient) [18(99.99% efficient)

Manufacturer's HEPA filter system design shall be confirmed by independent, 3rd party performance testing to meet or exceed the scheduled efficiencies per I.S. Military Standard MIL-STD282 and Institute of Environmental Sciences and Technology Recommended Practice IEST-RP-CC001.3.

2.09 DAMPERS

- A. Dampers will be of ultra-low leak design having airfoil blades. The damper blades shall be provided with extruded vinyl edge seals and flexible metal compressible jamb seals. Outside air and Exhaust Air dampers shall have leakage not exceeding 4 CFM/square foot at 1" w.g., complying fully with the requirements of ASHRAE 90.1. Damper blades shall be parallel acting [opposed acting].

2.10 APPURTENANCES

- A. **Mixing box (MB) segment** shall be supplied as indicated on the drawings. Mixing Box segment(s) shall be supplied with air inlets optimized to achieve mixing of outside air and return air.
 - a. The inlet segment shall have outside and return airstreams directed into each other by damper assemblies to facilitate mixing of the airstreams, or return air connection only, or outside air opening only as indicated on the schedule.
 - b. Outside air rain-hood with "bird screen" will be provided for outdoor applications. Rain hood shall be outfitted with a moisture eliminator to channel moisture away from the air being drawn into the unit. Return air opening shall be sized for 100% of unit airflow.
 - c. The return air inlet shall [be left open, having no damper] [have Airflow Monitoring Station] [be blanked off, having no damper option] [have standard control damper], constructed of [aluminum] [galvanized steel] with parallel [opposed] blades. Damper configuration shall be full faced [25% min/max] [25%/75% split].
 - d. The outside air inlet shall [be left open, having no damper] [have Airflow Monitoring Station] [be blanked off, having no damper option] [have standard control damper], constructed of [aluminum] [galvanized steel] with parallel [opposed] blades. Damper configuration shall be full faced [25% min/max] [25%/75% split].
 - e. A factory installed safety screen shall be provided over all bottom inlet openings, sufficient to hold 300 lb. service person with minimal deflection.
 - f. The airflow monitoring station must be tested for pressure drop in accordance with AMCA Stan-

- Standard 611-95 in an AMCA registered laboratory. The airflow monitoring station must bear the AMCA Certified Ratings Seal for Airflow Measurement Performance.
- B. Filter/Mixing box (FM) segment** shall be provided with combination Filter/Mixing Box combining the filtering and mixing functions in one segment.
- a. Segments shall be designed to accommodate 2" angled filter media. The filter media shall be side-loading.
 - b. A magnahelic differential pressure gauge shall be factory installed and flush mounted to measure the pressure drop across the filter bank.
 - c. The return air inlet shall [be left open, having no damper] [have Airflow Monitoring Station] [be blanked off, having no damper option] [have standard control damper], constructed of [aluminum] [galvanized steel] with parallel [opposed] blades. Damper configuration shall be full faced [25% min/max [25%/75% split]].
 - d. The outside air inlet shall [be left open, having no damper] [have Airflow Monitoring Station] [be blanked off, having no damper option] [have standard control damper], constructed of [aluminum] [galvanized steel] with parallel [opposed] blades. Damper configuration shall be full faced [25% min/max [25%/75% split]].
 - e. The airflow monitoring station must be tested for pressure drop in accordance with AMCA Standard 611-95 in an AMCA registered laboratory. The airflow monitoring station must bear the AMCA Certified Ratings Seal for Airflow Measurement Performance.
- C. Flat Filter (FF) segment** shall be designed to accommodate 2" [4]" media. The filter shall be side loading.
- a. A magnahelic, differential pressure gauge shall be factory installed and flush mounted to measure the pressure drop across the filter bank.
- D. Angle Filter (AF) segment** shall be designed to accommodate (2") media. The filter shall be side loading.
- a. A magnahelic differential pressure gauge shall be factory installed and flush mounted to measure the pressure drop across the filter bank.
- E. High Efficiency Filter (RF) segment** shall be designed to accommodate [4 inch mini-pleat] [12 inch rigid] [21 inch bag] filter media. The prefilter depth shall be [2"] [4"].
- a. Filters shall be side [front or rear] loading, as indicated in the schedule.
 - b. A magnahelic differential pressure gauge(s) shall be factory installed and flush mounted to measure the pressure drop across the [prefilter only] [final filter only] [combination prefilter and final filter][prefilter and final filter separately].
- F. Heating Coil (HC) segment** shall be supplied as indicated on the drawings.
- a. The outdoor unit shall have a pipe chase with a nominal depth of [24] [36] [48] inches.
- G. Cooling Coil (CC) segment** shall be supplied as indicated on the drawings.
- a. The outdoor unit shall have a pipe chase with a nominal depth of [24] [36] [48] inches.
- H. Vertical coil (VC) segment** shall be supplied as indicated on the drawings.
- I. Turning (TN) segment** shall be supplied as indicated on the drawings.
- J. Economizer (EE) segment** shall be supplied as indicated on the drawings. Economizer segment(s) shall control mixing of outside air and return air through the use of modulating economizer dampers and an exhaust air damper. The Economizer segment shall be an integral part of the unit.
- a. The return air, outside air, and exhaust/relief air dampers shall be sized for 100% of unit airflow.
 - b. The return air inlet shall [be left open, having no damper] [have Airflow Monitoring Station] [be blanked off, having no damper option] [have standard control damper], constructed of [aluminum] [galvanized steel] with parallel [opposed] blades. Damper configuration shall be full faced [25% min/max] [25%/75% split].
 - c. The outside air inlet shall [be left open, having no damper] [have Airflow Monitoring Station] [be blanked off, having no damper option] [have standard control damper], constructed of [aluminum] [galvanized steel] with parallel [opposed] blades. Damper configuration shall be full faced [25% min/max] [25%/75% split].
 - d. The exhaust air outlet shall [be left open, having no damper] [be blanked off, having no damper option] [have standard control damper][have barometric relief damper], constructed of [aluminum] [galvanized steel] with parallel [opposed] blades. Damper configuration shall be full faced [25% min/max(if any)].
 - e. Outdoor units shall be provided with a rain-hood and bird screen assembly for protection of the outside and exhaust air dampers from the elements. The outside air hood shall have a [moisture eliminator].

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- f. A factory installed safety screen shall be provided over all bottom inlet openings, sufficient to hold 300 lb. service person with minimal deflection.
- g. [Provide associated return or exhaust fan as scheduled].
- K. **Diffuser (DI) segment(s)** shall be supplied as indicated on the drawings. Diffuser segment(s) shall be supplied with a perforated diffuser plate used to distribute high-velocity fan discharge air across the entire tunnel face to assure even distribution of airflow across the entire unit air tunnel. Diffuser segment(s) shall be located immediately downstream of DWDI fans discharging into blow-through coils or filters. Units with fans blowing directly into coils and/or filters shall be unacceptable.
- L. **Access (XA) segment** shall be supplied as indicated on the drawings. Access segments shall be of length specified in schedule.
- M. **Discharge plenum (DP) segment** shall be supplied as indicated on the drawings [horizontal] or [vertical] application. Discharge plenum segment(s) shall be supplied with factory discharge opening(s) in locations shown on the drawings.
- a. Discharge plenum segment shall be supplied with a factory installed safety screen over all air bottom openings.
- N. **Filter/Economizer (EF) segment** shall be supplied as indicated on the drawings. Filter/Economizer segment shall accommodate 2" angled filter media and shall control mixing of outside air and return air through the use of modulating economizer dampers and an exhaust air damper. The Economizer segment shall be an integral part of the unit.
- a. The return air, outside air, and exhaust/relief air dampers shall be sized for 100% of unit airflow.
- b. The return air inlet shall [be left open, having no damper] [have Airflow Monitoring Station] [be blanked off, having no damper option] [have standard control damper], constructed of [aluminum] [galvanized steel] with parallel [opposed] blades. Damper configuration shall be full faced] [25% min/max] [25%/75% split].
- c. The outside air inlet shall [be left open, having no damper] [have Airflow Monitoring Station] [be blanked off, having no damper option] [have standard control damper], constructed of [aluminum] [galvanized steel] with parallel [opposed] blades. Damper configuration shall be full faced [25% min/max [25%/75% split].
- d. The exhaust air outlet shall [be left open, having no damper] [be blanked off, having no damper option] [have standard control damper] [have barometric relief damper], constructed of [aluminum] [galvanized steel] with parallel [opposed] blades. Damper configuration shall be full faced [25% min/max].
- e. Outdoor units shall be provided with a rain-hood and bird screen assembly for protection of the outside and exhaust air dampers from the elements. The outside air hood shall have a moisture eliminator.
- f. A factory installed safety screen shall be provided over all bottom inlet openings, sufficient to hold 300 lb. service person with minimal deflection.
- g. Provide associated return or exhaust fan as scheduled.
- O. **Supply fan (FS) segment** shall be supplied as indicated on the drawings. Supply fan segments shall be equipped with [double width double inlet (DWDI) housed fans] or [single width single inlet (SWSI) plenum fans as scheduled].
- a. Supply fan segments shall be equipped with [a single belt-drive fan], or [single, direct-drive fan] as scheduled.
- b. Supply fan segment shall include a factory installed safety screen on all air opening.
- Return fan (FR) segment(s) shall be supplied as indicated on the drawings. Return fan segments shall be equipped with [double width double inlet (DWDI) housed fans or [single width single inlet (SWSI) plenum fans] as scheduled.
- c. Return fan segments shall be equipped with [a single belt-drive fan], or [single direct-drive fan] as scheduled.
- d. Return fan segment shall include a factory installed safety screen on all bottom air opening.
- P. **Exhaust fan (FE) segment** shall be supplied as indicated on the drawings. Exhaust fan segments shall be equipped with [double width double inlet (DWDI) housed fans].
- a. Exhaust fan segments shall be equipped with a single belt-drive fan as scheduled.
- b. Exhaust fan segment shall include a factory installed safety screen on all bottom air opening.
- c. A factory installed safety screen shall be provided over all bottom inlet openings, sufficient to hold 300 lb. service person with minimal deflection.
- Q. **Integral Face and Bypass Coil segment** shall adhere to the following specifications:
1. Shall be ARI certified
 2. Each heating coil to consist of built-in series of finned heating elements and by-passes with interlocked dampers controlled by op-

tional electric damper motor(s) and air stream thermostat.

3. Dampers to be arranged so as to completely enclose and isolate the heating coil passes when no temperature rise is required.
 4. Each coil shall be capable of maintaining a constant discharge air temperature regardless of variations in entering air temperatures with full steam pressure or water flow at all times.
 5. Proportioning of the air shall be such that the temperature at any point in a plane parallel to the face of the coil three feet downstream from the leaving side will not vary more than $\pm 5^{\circ}\text{F}$ from the average discharge air stream temperature.
 6. Finned heating elements shall be fabricated of seamless 5/8 inch O.D. copper tubes with 0.035 inch wall thickness and rectangular embossed aluminum fins of 0.010 inch thickness.
 7. Fins shall not be spaced closer than 12 fins per inch.
 8. Each tube shall be individually secured to the supply and return headers by a brazed joint with provision for individual tube expansion and contraction.
 9. Headers shall be 3 inch SCH 40 pipe.
 10. Volume of air passing through the coil shall not vary more than $\pm 5^{\circ}\text{F}$, regardless of the position of the internal dampers.
- R. Vertical discharge plenum (VP) segment** shall be supplied as indicated on the drawings for vertical airflow application.
- S. Indirect Fired Gas Heater**
1. Interior and exterior frame structure, and casing, shall be of G-90 galvanized steel. The cabinet construction shall be double-wall G-90 galvanized steel construction, with 18 gauge exterior panels and 20 gauge interior liner panels.
 2. Front casing double-wall construction shall be internally insulated comprising three-inch thick, 3PCF density fiberglass insulation, providing R-13 thermal resistance.
 3. Double-wall construction shall be internally insulated comprising one-inch thick, 2PCF density fiberglass insulation, providing R-4 thermal resistance.
 4. Base Channels shall be of 10 gauge steel 'C' channels, minimum 3" height, spanning width of unit, perpendicular to air flow, secured by weld procedure, forming a rigid structural support base.
 5. At heat exchanger, airflow outlet 1" duct flanges, of 18 ga. galvanized formed steel, shall be provided to accommodate connection of heat exchanger module to downstream ductwork, or other system components.
 6. The Heat Exchanger shall be a multi-pass design featuring a gasketed flue gas tight positive seal suitable for internally pressurized forced draft natural gas firing.
 7. Primary heating surface shall be of fully welded construction type 430 stainless steel comprising cylindrical combustion chamber, and reversing chamber, with 2nd pass 16 gauge type 304, 409 or 430 stainless steel firetubes, secured to reversing chamber and flue gas exit assembly by attachment weld. 4" OD Firetubes shall incorporate 20 gauge type 304 or 430 stainless steel multi-plane turbulators to assure turbulent flue gas flow.
 8. Full access to flue gas exit assembly shall be accommodated through cabinet exterior casing access panel at ID Fan mounting flange. Internally, a removable gasketed flue gas tight positive sealed flue gas exit assembly access panel permits direct access to firetubes and turbulators to accommodate Heat Exchanger internal inspection, cleaning and turbulator replacement.
 9. A condensate drain connection shall be provided internally within cabinet, from heat exchanger reversing chamber to the flue gas exit assembly and piped externally to same connection of ID Fan housing.
 10. Condensate drain piping shall be Schedule 40 type 304 stainless steel pipe and fittings.
 11. A factory mounted and wired Induced Draft Fan (ID Fan) shall be of direct drive centrifugal type, self-ventilating motor with ball bearings capable of withstanding Flue Gas Outlet temperatures.
 12. The fan shall incorporate a split double-inlet wheel applied such that 80% of the capacity is used for flue gas induction, while 20% draws cooling air over the inboard motor bearing and shaft.
 13. An adjustable diaphragm actuated air proving switch shall sense negative pressure at the fan inlet and shall be interlocked with the control circuit.

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14. A rectangular to cylindrical 16 gauge type 430 stainless steel flue gas outlet breeching transition fitting to accommodate cylindrical breeching system.
15. The housing of the induced fan shall have a condensate drain connection that shall be pre-piped to main heat exchanger condensate drain piping manifold.
16. The modular duct furnace shall be provided with a NEMA-1 control station which shall accommodate a single point electrical connection, suitable for 460v-3ph-60hz main supply voltage, incorporating a 120v-1ph-60hz step down transformer to further accommodate control circuit and applicable fractional motor horsepower loads.
17. Applicable 3ph line starters, fractional motor and control circuits shall be properly fused.
18. Mounted and pre-wired operating controls including an automatic operating/recycling and manual reset temperature limit, and airflow proving device, shall be provided.
19. The modular duct furnace shall operate automatically at the command of a 'Heat On' signal, provided by BMS. A set of dry contacts shall be provided for 'Heat On' firing sequence verification.

T. ELECTRIC HEAT SEGMENT

Electric heat of capacity, voltage and steps of control specified will be provided as an integral part of the unit. The electric heater and control panel will be a UL recognized electric duct heater.

All electric heater elements will be of 80% nickel and 20% chrome. Coil elements will float freely in ceramic bushings, which are stacked in support brackets, not exceeding 4.5 inches apart. Coils will be machine crimped into stainless steel terminals, which are insulated with high temperature ceramic insulators. Heater casing and support brackets will be of galvanized steel.

All heaters will be supplied with internal wiring of controls, contactors, etc. including 120 volt, 60 hertz con-

trol circuit transformer, automatic reset thermal cutout and fuses per NEC and UL (on heaters exceeding 48 amps).

U. IP SEGMENT

Inlet plenum (IP) segment(s) shall be supplied as indicated on the drawings for horizontal airflow application. Inlet plenum segment(s) shall be supplied with factory discharge opening(s) in locations shown on the drawings

2.11 FINISHES

- A. Air-handling units shall be painted prior to shipment, as specified.
 - a. The exterior of the unit shall be completely cleaned prior to application of finished coats.
 - b. A prime coat shall be applied to the unit.
 - c. A finish coat of desert sand (or other owner approved color) acrylic polyurethane shall be applied.
 - d. The finished unit shall exceed 500-hour salt spray solution (5%) without any sign of red rust when tested in accordance with ASTM B-117.
- B. G90 galvanized exceed 250-hr
 - a. Shrink-wrap for indoor units.

PART 3: EXECUTION

3.01 INSTALLATION

- A. General: Installing contractor shall install air handling unit(s), including components and controls required for operation, in accordance with air handling unit manufacturer's written instructions and recommendations.
 - a. Air handling unit(s) shall be stored only in a clean, dry place, protected from weather and construction traffic.
 - b. Air handling unit(s) shall be handled such that damage to components, enclosure, and finish is avoided.
 - c. Isolate fan segments with flexible duct connections.

Factory Packaged Controls Guide Specifications

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Guide specification to be used as a basis for design when using optional factory-supplied factory package end devices and controls.
 - a. Factory mounted end devices will imply a package of devices that would be able to tie into any control manufacturers building automation system & would be mounted and commissioned at the HVAC manufacturer's factory.
- B. These specifications should be reviewed to match the specific system control requirements and available control packages.

1.02 GENERAL REQUIREMENTS

- A. The controls shall be an integral part of the air handler, with start-up an available option and warranty supported provided by the air handler manufacturer.
- B. The air handler shall carry the ETL approval.
- C. The factory package control (automatic temperature control) system shall utilize electric/electronic control. Valve and damper actuation shall be electric/electronic control, except where specific devices to be required to be pneumatically actuated.
- D. Factory supplied control panel shall include power supplies for main control panel, actuators (including valve actuators) and transducers provided as part of the air handling unit assembly. **(if mount and wire)**
- E. The manufacturer and provider of the air handler and controls shall be regularly engaged in the engineering, programming, installation and service of control systems of similar size and complexity. Bids from franchised dealers, wholesalers, contractors, manufacturers representatives, or any firm whose principal business is not manufacturing and installing Building Automation System's shall not be acceptable.
- F. The manufacturer and provider of the air handler and controls shall be in compliance with ISO 9001. The intent of this specification requirement is to assure that the products from the provider are delivered through a quality system and framework that will assure consistent quality in products delivered.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Please be advised that the following information does not imply that York International is condoning the storage of indoor units outdoors. Nor does the

information imply that York International is assuming responsibility for the storage of the units and or the condition of the units during and after the storage period.

- B. *Helpful Hints for long term storage:*
- C. Control panels, electronic or pneumatic devices and/or air modulators must be removed and specially enclosed and protected from moisture and humidity with desiccant bags. Replace the desiccants every 30-60 days depending on the Relative humidity during the storage period. RH greater than 60% requires changing bags every 30 days. Electronic equipment cannot be stored in wet or damp areas even though they are sealed and secured.
- D. Motors should be protected and inspected in accordance with the manufacturers specific instructions regarding periods of long storage. Periodic rotation of the shaft is required during long storage periods. Provisions should be made to ensure no water is allowed to collect and remain in the motor terminal box or any electrical junction box.
- E. Follow responsibilities and guidelines listed on Form 50.20-NM3.
- F. Protection of the complete unit for avoidance of general rusting must be handled as best suits the circumstances. Alternatives would be to provide a special paint to meet anticipated climatic conditions during storage and/or building a special frame to shelter the units from environmental conditions (venting the space accordingly).
- G. All loose-shipped items need to be packed, protected and secured with the air units. All the above precautions apply to all loose-shipped items.

1.04 WARRANTY

- 1.04.1 Warranty is limited to manufacturers defect only.
- 1.04.2 Warranty will be as per the standard airside products warranty. Warranty is not extended to any alteration, modifications or external component attached to "original" equipment "as-built" and shipped from YORK manufacturing facilities. All factory provided controls will carry the "Limited Warranty" as described in FORM 50.05-NM2.

PART 2 PRODUCTS

2.01 SYSTEM CONTROL DEVICES & SPECIFICATIONS

- A. The FACTORY MOUNTED END DEVICE option shall provide the capability to perform any of the following functions per the specific devices provided.

Factory Packaged Controls Guide Specifications

2.02 DEVICE SPECIFICATIONS (INCLUDE SECTION AS DEVICE IS SELECTED IN YW)

AIR FLOW MONITORING (25-OAF, 75/100 OAF)

The YORK AMS-60 airflow monitoring station combines the functions of control damper and airflow measurement station in one assembly. Shall be factory installed in Solution air handling units. The AMS-60 shall be tested to AMCA Standard 611-95 and shall bear the AMCA Ratings Seal for Airflow Measurement Performance.

Temperature Sensors (SAT/RAT)

The Temperature Sensor line offers an economical solution for a wide variety of temperature sensing needs. Each sensor provides precision remote temperature sensing for building automation systems.

The duct temperature sensor is designed for direct mounting on sheet metal duct systems. The sensor is point sensitive and comes with 2" & 9" insertion depths.

Sensors are available in the following types:

- 1k RTD 8" Duct Immersion
- 1k RTD 3" Duct Immersion
- 10k Type III thermistor 9" Duct Immersion
- 10k Type III thermistor 2" Duct Immersion
- 10k thermistor 9" Duct Immersion
- 10k thermistor 2" Duct Immersion
- 100k thermistor 9" Duct Immersion
- 100k thermistor 2" Duct Immersion
- 20k thermistor 9" Duct Immersion
- 20k thermistor 2" Duct Immersion

Averaging Sensor (HCDT, CCDT, MAT)

The duct-averaging sensor is designed for direct mounting to sheet metal for average duct temperature sensing. The sensor is multi-point sensitive through the length of the temperature conductive tubing

Sensors are available in the following types:

- 1k RTD 17' Averaging Sensor
- 1k RTD 8' Averaging Sensor
- 10k Type III thermistor 25' Averaging Sensor
- 10k Type III thermistor 8' Averaging Sensor
- 10k thermistor 25' Averaging Sensor
- 10k thermistor 8' Averaging Sensor
- 100k thermistor 25' Averaging Sensor
- 100k thermistor 8' Averaging Sensor
- 20k thermistor 25' Averaging Sensor
- 20k thermistor 8' Averaging Sensor

Outside Air Sensor (OAT)

The temperature sensor provides precision remote temperature sensing in multiple applications such as Duct,

OSA, and immersion installations for building automation systems.

Sensors are available in the following types:

- 1k RTD Outside Air Sensor
- 10k Type III thermistor Outside Air Sensor
- 10k thermistor Outside Air Sensor
- 100k thermistor Outside Air Sensor
- 20k Thermistor Outside Air Sensor

Static Pressure Transducer (SAP, FDP1, 2, 3, REFSP, DXFC, ZP)

The choice of pressure probe, which is designed to pick up static pressure in a duct, plenum, air handler or other HVAC equipment are 100% solid state, micro-machined, glass on silicone ultra stable capacitance sensor.

Sensors are available in the following types:

- Static Pressure Transducer
- Probe for S.P. Trans. above (Use on high side)
- Static Pressure Transducer FlexSys
- Probe for S.P. Trans. above (Use on high side)
- Building Static Pressure

Damper & Valve Actuator on/off 2-10v

The Electric Spring Return Actuator shall allow direct-mount, spring return line of electric actuators that operates on 24 VAC or VDC power and is available for use with on/off, proportional controllers. These bi-directional actuators shall be factory mounted and sized to operate the devices they are connected to.

Differential Pressure Switch (SFP, FDP1, 2,3, REFP, HAFC)

The differential pressure switch is for use in applications where a proof of airflow is needed for proper system operation. All switches are designed for use only as operating controls. Where an operating control failure would result in personal injury and/or loss of property, it is the responsibility of the installer to add devices (safety, limit controls), or systems (alarm, supervisory systems) that protect against, or warn of, control failure.

Duct-mount Humidity/Temperature Sensor (OARH, RARH, SAH)

The sensor combines humidity and temperature sensing in a single surface-mounted unit for use inside economizers. The humidity sensor is capable of measuring humidity over the range of 0 to 100% RH, and its construction increases resistance to corrosion in HVAC environments. The sensor (a thin-film nickel sensor) can be powered with 14 to 30 VDC or 20 to 30 VAC and features a user-selectable output of 0 to 5 VDC.

Freeze stat/Low Limit Temperature Cutout Control (FS)

Low temperature cutout controls shall have DPST contact action or be supplied with a powered relay that has DPDT contacts.

The low temperature cut out shall be factory installed so that the top and bottom 1 ½" is protected and the remaining sensing element is spaced evenly across the face of the coil. The controls shall have an adjustable temperature set point range with a fixed differential.

The range adjustment screw is accessible at the bottom of the control, and at the top of the control when the cover is removed. The setting shall be set at the factory for 35° F.

High Temperature Manual Reset Control (HTC)

The single-pole control is supplied in a wide selection of ranges to meet most application needs. Models may be supplied to open a circuit on temperature increase. A single-pole control may optionally include a separate reverse-acting auxiliary contact.

Static Pressure Limit Manual Reset (SPC, RELPC)

The sensing switch is designed to sense static pressure or differential pressure and break an electrical circuit when the set point is exceeded. The electrical circuit will remain open until the reset button on the switch is pressed.

IAQ Sensor (ZIAQ, IAQ, OAQ)

The sensor to be used for demand control ventilation – specifically for CO2 sensing. Controls the ventilation system to ensure the right amount of fresh air when and where you need it. Applications extend to control ventilation in a building where occupancy varies frequently; control ventilation to ensure excess outside air is not causing energy waste; ensure good air distribution throughout zones.

Duct Humidity Limit (Auto Reset) (HHLR-6, HHLR-3)

The control will limit duct humidity by comparing a controller's request for humidification with the humidity present in a duct. It will proportionately reduce its output signal to the humidification equipment as duct RH% approaches a user-defined, high-limit set point.

Current Operated Switch for fan status (SFP, REFP)

The control will provide an On/Off status for direct drive fans, pumps and motors. 100% solid state, no moving parts to fail. (Not intended to detect belts breaking)

Zone Temperature & Zone Humidity Sensor

The zone space temperature sensor allows separate

heating and cooling settings. Single or dual set point adjustment with choice of warmer or cooler graduation scales in C° or F° .

The humidity sensor shall be capable of measuring humidity over the range of 0 to 100% RH, and it shall be of a construction which is resistant to corrosion in harsh environments. (Optional: shall also include an additional thin-film nickel, thin-film platinum or thermistor temperature sensor for use in enthalpy control and other strategies requiring both humidity and temperature information.)

VoluProbe Air Flow Monitoring

The control is an airflow measuring element assembly specifically designed for installation in the inlet cone of centrifugal fans or inlet bell of vane axial fans. Each assembly is complete with two (2) airflow-measuring elements, pivot mounting hardware and signal connection fittings.

2.03 SYSTEM CONTROL OPERATION CAPABILITIES:

- Control of the chilled water valve to maintain supply-air temperature (SAT)
- Control of stages of direct expansion cooling to maintain SAT
- Control of the hot water valve to maintain return-air temperature to an occupied or un-occupied set point.
- Control of stages of electric heat to maintain return-air temperature or room temperature to an occupied or unoccupied low set point. Fail-safe control mode shall be provided to turn the stages off should the PSIO fail.
- Control fan inlet guide vanes (or field-supplied and installed variable-frequency drive) to maintain static pressure set point (VAV units only).
- Control of mixed-air dampers to provide a constant outside airflow (cfm) during VAV operation.
- Indoor air quality control during occupied times using a single gas, single gas with indoor/outdoor differential control, or using two gases. When a single sensor reaches the field-adjustable setting, it shall modulate outside air control of dampers to reduce sensor (CO2 or volatile organic compound [VOC]) levels. When 2 sensors are used for differential monitoring, they shall accomplish a comparative analyses of VOC gas levels and modulate supply, mixed, or return dampers to provide the best air to the space.
- Nightly purge of stagnant indoor air for a configured duration prior to occupancy.
- Control of mixed-air damper (economizer) to provide integrated use of out-side air to provide free

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cooling when controlling supply air, room temperature, or minimum outdoor air.

- Control of two-position dampers to meet minimum outdoor air requirements during occupied periods.
- Control of the supply fan based on the occupancy schedule.
- Control of supply fan to cause adaptable start/morning warm-up of the system.
- Control of the mixed-air damper to maintain a minimum position when the enthalpy switch or differential enthalpy calculation indicates the outside air is unsuitable for cooling.
- Provide alarms based on freeze stat, duct high humidity, pressurization, and evacuation, smoke purge, and fire shutdown input states being true.
- Allow manual and system override of selected output channels and internal values.
- Return fan capacity control.
- Filter maintenance option.
- Smoke evacuation.
- Smoke purge.
- Building pressurization.
- Fire shutdown.
- Humidifier control; proportional analog or two-stage discrete.

PART 3 EXECUTION

3.01 SCOPE OF WORK

1. Factory mounted end devices, less controller, will imply a package of devices that would be able to tie into any control manufacturers building automation system.
 - a. It shall be the responsibility of the factory mounted end device provider to properly locate and install the control panels, sensors and all control devices required to implement a fully wired system.
 - b. All factory control wiring shall be internal to the unit. Internal wiring shall consist of plenum-rated wire ETL approved. The electrical components shall be listed under UL. The unit shall be in compliance with the NFPA 90A standard and ETL approved.
 - c. The mounted and wired end device option shall furnish and install all control and interlock wiring between motor control method and control devices such as start-stop switches, pilot lights, electric relays, low limit thermostats, high limit thermostats, smoke detectors, differential pressure switches, DDC devices and sensors, and associated safety and limit devices.

- d. It shall be the responsibility of the end device provider to properly locate and install the control panels, sensors and all control devices required to implement a fully functional system.

3.02 WIRING WORK

- a. The wiring definition within this section applies to either of the optional factory-supplied controls:
- b. Factory mounted end devices will imply a package of devices that would be able to tie into any control manufacturers building automation system
- c. Electric control wiring shall be in accordance NEC codes & ETL requirements. Specific state and local codes should be referenced to ensure compliance.
- d. All factory control wiring shall be internal to the unit. Internal wiring shall consist of plenum-rated wire ETL approved. The electrical components shall be listed under UL. The unit shall be in compliance with the NFPA 90A standard and ETL approved.
- e. All plenum rated wiring shall be installed in a neat and workmanlike manner.
- f. Line voltage and sensor wire shall not be installed in same wiring harness.
- g. Low voltage and communication wiring (less than 30 volts) may be installed in the same harness.
- h. The provider shall issue a schematic drawing of the entire control system for the air handler.

3.03 FINAL TESTING PROCEDURE

- a. This procedure defining the requirements of material to be furnished and performed is not subject to interpretation.
- b. After final assembly of each device, the device shall be tested per the manufacturers standard.
- c. The manufacturer final test procedure will assure that the products from the provider are delivered through a quality system and framework that will assure consistent quality in products delivered.
- d. Necessary deviations must be approved, in writing, for each case and be applicable only to specific production sales order number.
- e. After successful testing, inspector shall apply the marking "TESTED" and date of test (or a serial number providing the manufacture, the lot and date information).

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