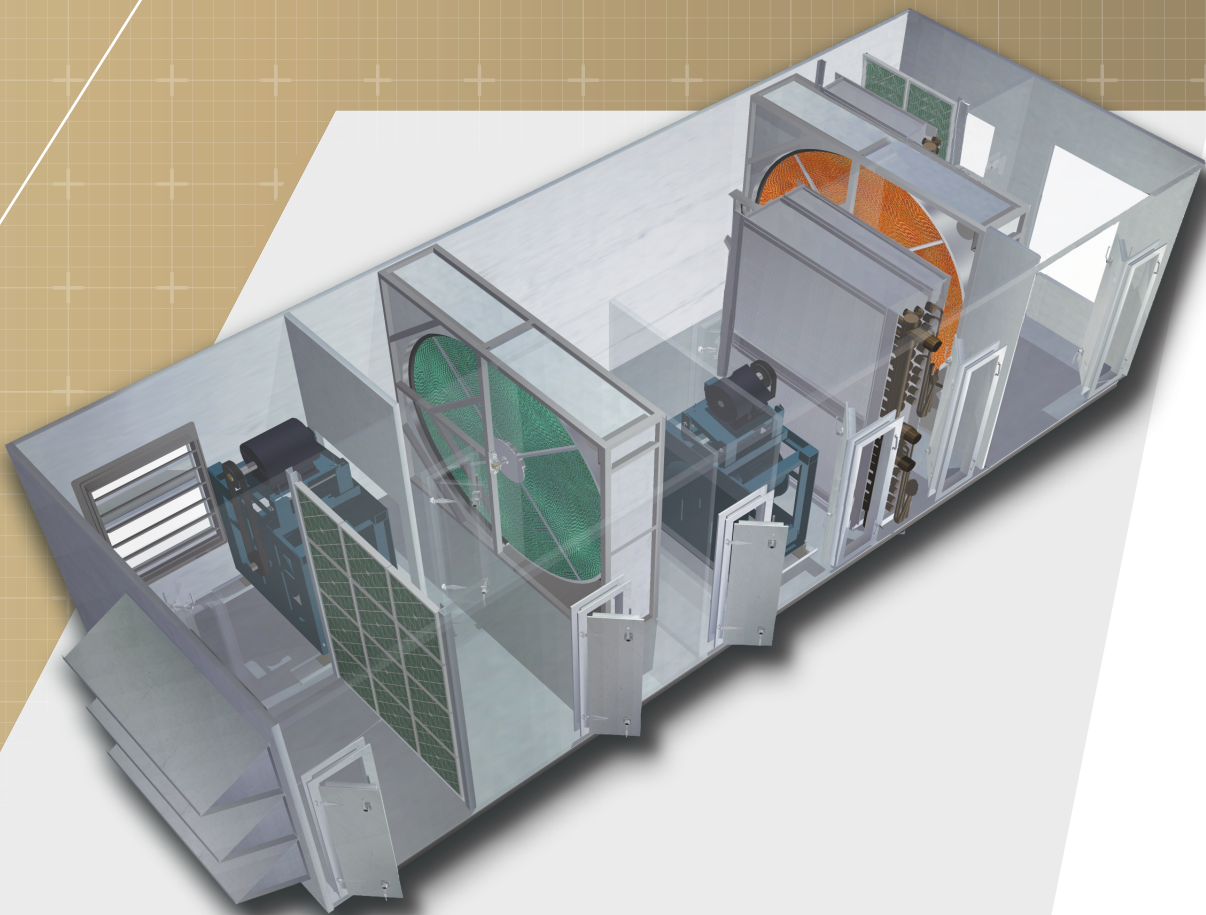


# PINNACLE<sup>®</sup> II SYSTEM

DEDICATED OUTDOOR AIR SYSTEM

TECHNICAL GUIDE



## TABLE OF CONTENTS

Overview	1
Current Design Practices	2
Background of the Pinnacle® II System Technology	2
The Pinnacle® Series	3
How it Works	4
Advantages of the Pinnacle® II System	6
School Application	6
Advantages of the Pinnacle®II	8
Benefits During Unoccupied Periods	9
Benefits During Heating Season	10
In Summary	10
Selection Procedure	11
Unit Weights and Dimensions	12
Mounting Details, Curb Support	13
Mounting Details, Grid or Pad Support	14
Electrical Data	15
Component Pressure Drop Tables	16
Sample Electrical Schematic	17
Fan Data Tables	22
Sample Specifications	26
Equipment Summary	30
Additional SEMCO Products	31

© FläktGroup SEMCO LLC 1996-2020. All rights reserved.

The information in this technical guide is furnished for informational use only, is subject to change without notice, and should not be construed as a commitment by FläktGroup SEMCO. FläktGroup SEMCO assumes no responsibility for any errors that may appear in this technical guide.

No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, recording, or otherwise, without the prior written permission of FläktGroup SEMCO.

FläktGroup SEMCO and Pinnacle® are registered trademarks of Fläktgroup SEMCO LLC. All other trademarks referenced herein are the properties of their respective owners. U.S. patented technology: 10,690,358.



## OVERVIEW

Energy efficient design and indoor air quality are the two challenges facing mechanical engineers today in the field of Heating, Ventilating and Air Conditioning (HVAC). To minimize the loss of energy, building envelopes have been made more energy efficient. This reduces the cost associated with cooling or heating the building. By tightening the building envelopes, the amount of outside air entering the building is reduced. However, that outside air is needed to remove the air contaminants generated indoors. Flushing these pollutants from the indoors to the outdoors has been the most effective way of reducing indoor air contaminants to acceptable levels.

The HVAC industry has responded to these indoor air quality (IAQ) concerns through its professional organization, The American Society of Heating and Refrigerating and Air Conditioning Engineers (ASHRAE). ASHRAE IAQ Standard 62, entitled "Ventilation for Acceptable Indoor Air Quality," emphasizes the need for continuous outdoor air ventilation as well as the importance of maintaining indoor humidity levels. This standard has now been integrated, in some fashion, into each of the major building codes used throughout the United States.

Most people are aware that outdoor air pollution can damage their health, but many do not know that indoor air pollution can also cause harm. Environmental Protection Agency (EPA) studies of human exposure to air pollutants indicate that indoor levels of pollutants may be 2-5 times, and occasionally more than 100 times, higher than outdoor levels. These levels of indoor air pollutants are of particular concern because it is estimated that most people spend about 90% of their time indoors.

Studies have found that the quality of indoor air has been linked to many illnesses (sick building syndrome and building related illnesses), and has been shown to have a direct impact on worker and student productivity and comfort. New research strongly suggests that indoor humidity levels have a far greater impact on the health of building occupants than previously suspected. For example, microbial activity (e.g., mold and fungus), which increases at higher indoor humidity levels, has been shown to emit harmful organic compounds. Childhood asthma is now suspected by some researchers to be linked to microbial activity.

In addition to direct health effects, the odors associated with microbial activity are often cited as a primary reason why indoor air quality is considered unacceptable to occupants. When odors are encountered in a building, building managers often respond by increasing outdoor air quantities in an attempt to eliminate odors. This intensifies the problem because increasing outdoor air quantities often results in higher indoor humidity levels, which, in turn, fosters continued microbial activity.

## CURRENT DESIGN PRACTICES

Systems currently being employed to accommodate the new IAQ code requirements fall into two categories; traditional designs using a cool-and-reheat approach or more advanced, desiccant-based solutions. The cool-and-reheat method increases the cooling capacity to “over-cool” the outdoor air volume to the required humidity content, then reheat the “over-cooled” airstream to near-room neutral temperature. This approach is perceived as the “lowest cost” solution and is therefore the most popular, yet the energy consumption is very high.

More advanced systems, such as those that include both active and passive desiccant based technology, provide far more energy efficient solutions. They typically require only a third of the energy consumed

by the cool-and-reheat method. In the past, their size and first cost has limited their widespread acceptance in the marketplace.

So, there is, a significant need for a novel, compact system design which effectively controls the indoor space humidity while simultaneously providing high quantities of outdoor air in an energy-efficient and cost-effective manner. The benefit of such a system is greatly increased if that system can also provide preconditioned outdoor air to a space at humidity levels well below what is possible with conventional cooling alone.

## BACKGROUND OF PINNACLE® SERIES TECHNOLOGY

Facilities with high occupancy rates or elevated levels of indoor contaminants, such as schools, hospitals, nursing homes, and many offices, require large amounts of outdoor air. This presents a significant HVAC design challenge. This challenge is further exacerbated in hot and humid climates, due to the high humidity levels and large number of partial-load cooling hours. Maintaining relative humidity levels recommended by the ASHRAE Standard 62 is difficult and costly if conventional HVAC approaches are used for such facilities.

Conventional packaged equipment is designed to accommodate approximately only 15 to 20% outdoor air on an intermittent basis. If the equipment is applied to provide higher outdoor air quantities on a continuous basis — as called for by ASHRAE Standard 62 — unacceptably high space humidities can result for extended periods of time.

At partial load conditions, e.g., on days when the temperature is moderate but the humidity is high, a packaged HVAC unit will quickly bring the space to the desired set point temperature, then cycle off. Generally, no outdoor air is brought into a conditioned space as long as the thermostat does not call for cooling. Since there is no humidity control exercised, the indoor humidity increases until the sensible load in the space

causes the thermostat to call for cooling. By this time, the mixed air condition supplied to the coil is elevated in humidity. This results in a high dew point temperature leaving the cooling coil.

The space temperature is maintained but humidity control is lost, resulting in elevated space humidity conditions, which promote microbial growth and other moisture related IAQ problems.

Given that all of the major building codes now require compliance with the ASHRAE Standard 62 and that data supporting the need for improved humidity control is available and that 80-90% of all HVAC sold in the U.S. each year are conventional packaged units — effective solutions that will allow packaged equipment to accommodate more outdoor air on a continuous basis are needed. The solution is the Pinnacle® Series.

## THE PINNACLE® SERIES

The Pinnacle® Series economically provides high quantities of outdoor air and controls indoor humidity levels at the same time. It accomplishes this by dehumidifying the supply air to very low dew points in an energy efficient manner, without the use of a regeneration heating source. It continuously delivers the outdoor air to the occupied space while simultaneously controlling humidity levels at the conditions recommended by ASHRAE, even at partial-load conditions. The Pinnacle® Series is capable of providing a very high degree of latent cooling using only a minimum amount of conventional cooling input.

The Pinnacle® Series approach utilizes the strengths of passive total energy recovery, conventional cooling technology and a new class of desiccant product, the passive dehumidification wheel, to provide the best possible outdoor air preconditioning system.

The system is comprised of a supply fan, an exhaust fan, a total energy wheel, coil(s), a passive dehumidification wheel and compressor. The total energy wheel is used to precondition fresh air using the exhausted building air. The cooling coil and passive dehumidification wheel then work in concert to further treat this fresh air stream to produce room temperature air at a much reduced humidity level.

### An example of the Pinnacle® Series Capabilities:

A 10,000 CFM Pinnacle® Series can provide as much as 50 tons of latent load (68 tons of total load) with only an input of 32 tons of conventional cooling.

Using the conventional over-cooling approach would require 90 tons of cooling input and would require 15,000 CFM plus reheat energy.

# HOW IT WORKS

The key to providing the exceptional dehumidification capability provided by the Pinnacle® II System is the passive dehumidification wheel. This wheel uses a desiccant material that is optimized to remove moisture from a saturated air stream.

The Pinnacle® II System can provide dry outdoor air in an extremely energy efficient manner. All the components, coil(s), total energy recovery wheel, compressor and the passive dehumidification wheel — are optimized to operate in their most efficient respective envelopes. The result is minimal cooling energy input and maximum latent cooling output. As importantly, by changing the rotational speed of the “passive” dehumidification wheel, the amount of dehumidification capacity and the amount of reheat energy available can be optimized to meet the requirements of varying space temperatures and humidities.

The Pinnacle® II System has the advantage over conventional HVAC systems of being able to respond to various combinations of temperature and humidity, including the conditions described above, in an energy efficient manner and while providing humidity levels well below that possible with other conventional approaches.

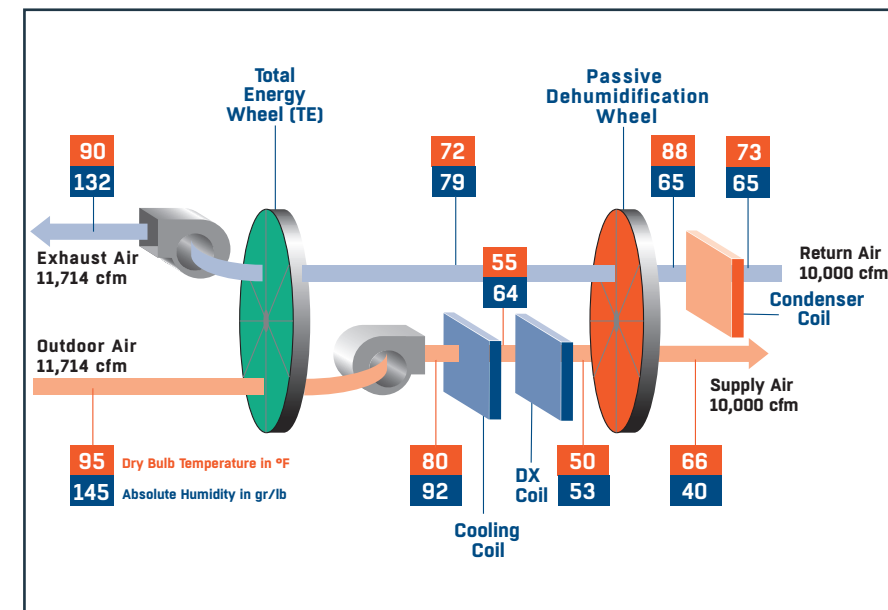
The Pinnacle® II System is able to respond to these varying conditions by modulating the rotational speed of the passive dehumidification wheel, and/or adjusting the energy input to the cooling coil. The rotational speed can be adjusted to control the level of temperature and moisture exchanged by the passive dehumidification wheel. The integrated DX loop further controls the cooling and dehumidification capacities and can be adjusted and optimized based upon the conditions in the space, providing various combinations of temperature and humidity, to maintain the desired, indoor conditions.

For example, during times when the space humidity content is as desired but is too hot, the controlled space can be cooled by the Pinnacle® II System without substantially lowering the space humidity. To do so the Pinnacle® II control system would increase the cooling output and adjust the rotational speed of the passive dehumidification wheel to a predetermined range at which it would provide a minimal amount of reheat to the supply air stream.

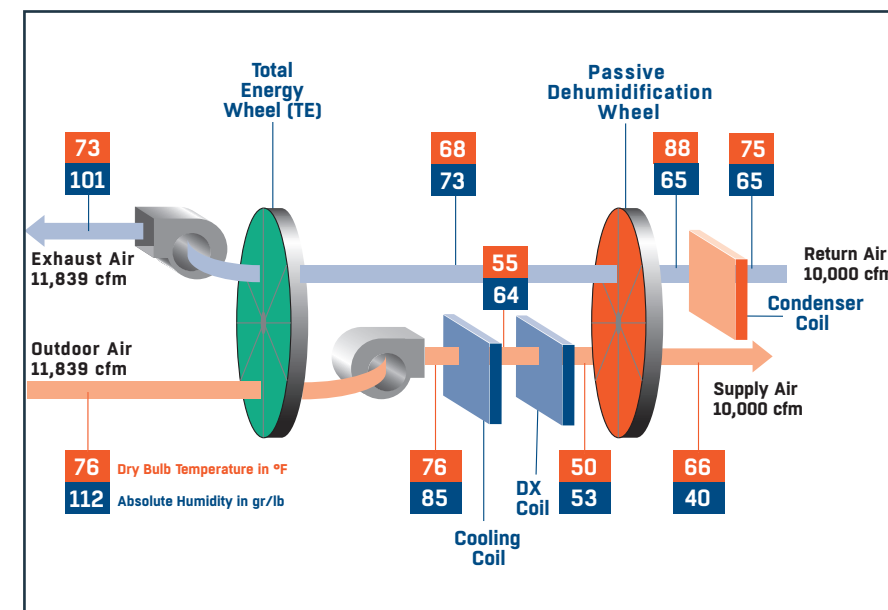
When the space is too hot and too humid, the controlled space is cooled and dehumidified by increasing the output of the coil(s), and optimizing the rotational speed of the passive dehumidification wheel so that the dehumidification provided is maximized while the reheat capacity is minimized.

When the space is too cold and too humid, the controlled space is dehumidified without being cooled, by increasing the cooling output of the coil(s) and adjusting the rotational speed of the passive dehumidification wheel to provide maximum dehumidification and maximum reheat.

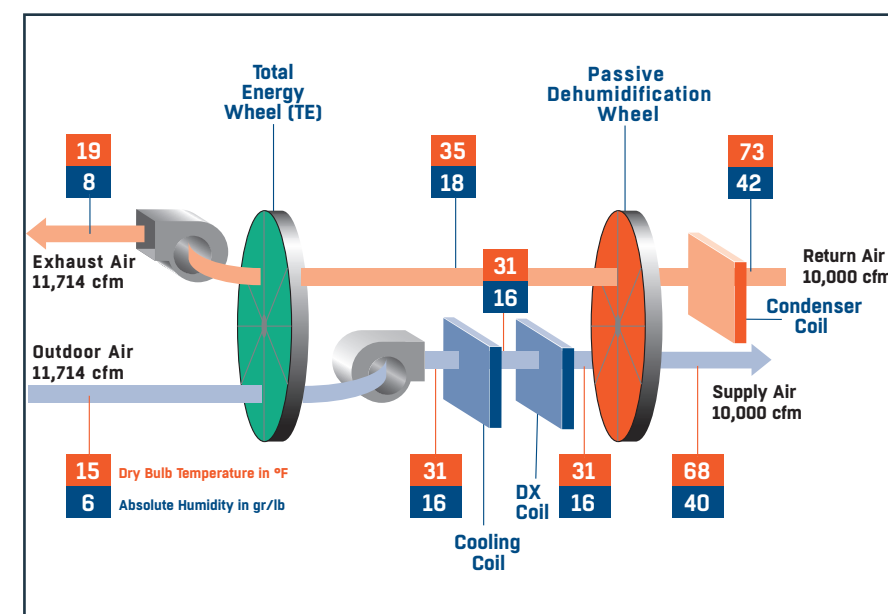
And finally, when the space requires heating, the passive dehumidification wheel and the cooling coil are turned off. The total energy recovery wheel preheats and humidifies the incoming air. In many buildings, this is sufficient to allow the building to be heated by its internal loads.



**FIGURE 1** Operating at peak space latent load providing 88.5 tons of total cooling at a sensible heat ratio (SHR) of 0.29 using only 40.16 tons of refrigeration input. The dew point delivered to the space is 42.3°F. A conventional system with the same leaving coil temperature will NOT deliver the same dew point. It would require 97.4 tons of refrigeration and 226 MBtuh to achieve the same leaving coil condition.



**FIGURE 2** Operating at part-cooling load providing 42 tons of total cooling at a SHR of 0.18 using only 30.6 tons of refrigeration input. An equivalent conventional system would require 72.1 tons of cooling and 260 MBtuh of reheat to achieve the same leaving cooling coil temperature, yet without being able to deliver the same dew point of 42.3°F.



**FIGURE 3** Operating in heating mode providing 573 MBtuh of energy and 219 MBtuh of humidification.



# UNIVERSITY APPLICATION

The Pinnacle® II System is perfect for use at schools and universities, due to its energy efficiency and ability to provide ideal indoor quality as well as the air volume needed to comply with ASHRAE 62-20B – 8 CFM per student. The example on this page looks at four average 1,000 SQ. FT. lecture halls, with 150 seated students each, trying to achieve high energy efficiency and ideal indoor air quality using the Pinnacle® II System versus conventional systems.

One of the advantages of the Pinnacle® II System is its ability to easily "decouple" all of the latent load (outdoor and space) being delivered into a lecture hall. The internal latent load calculated for an average 1,000 SQ. FT. lecture hall with 150 seated students, plus modest infiltration is approximately 19,830 btus. The sensible load associated with the lights, occupants and infiltration is approximately 37,164 btus.

When the lecture hall is equipped with only chilled beams to optimize occupant comfort, energy efficiency and noise reduction, most of the energy savings incurred are due to reduced fan energy. With an ideal chilled beam system design, low airflows are employed at very low static pressures, and the only air moved mechanically is prescribed outdoor air. This can only be done when the primary air, in this case the outdoor air volume, can be dehumidified to a level that will accommodate the entire indoor latent load.

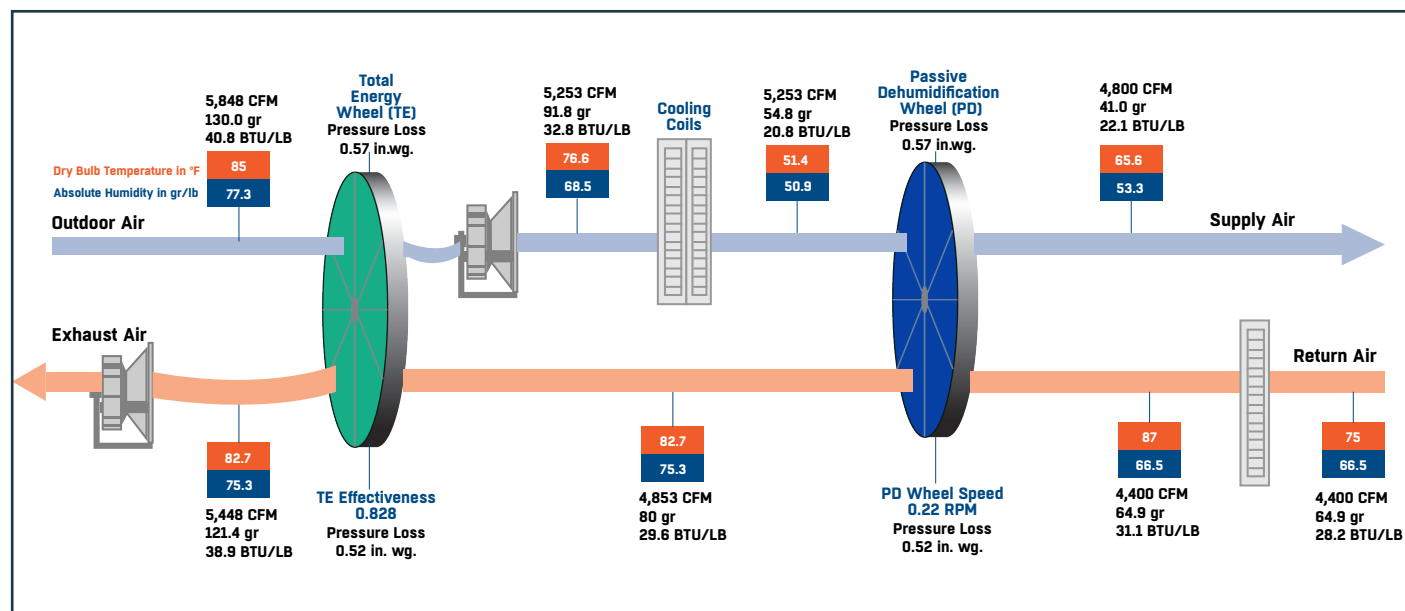
Air in the lecture hall must be delivered at a level of 41 grains or a 43° dewpoint in order to maintain the target space relative humidity of 50% and avoid the possibility of condensation on the chilled beams.

(As shown in FIGURE 4) This can easily be achieved by adding a Pinnacle® II unit to the chilled beam design. The Pinnacle® II unit can be operated to easily deliver these required conditions using the university's conventional chilled water. Highly energy efficient, the Pinnacle® II requires only 19 tons of chilled water input (23 tons total including the integrated secondary cooling circuit) while delivering a total cooling output of 34 tons with, most importantly, 24 tons of latent capacity.

A Pinnacle® II unit sized to deliver 4,800 CFM of low dewpoint, outdoor air serves 8 – 6' beams in each lecture zone. Each beam is fed by 0.5 gpm of 58° water to process the remaining 24,200 btus of sensible load, while inducing room air to supply a total system airflow quantity in the range of 15,000 CFM. The result is a system with optimum energy efficiency, ideal humidity control and comfort. Continuous outdoor air flow cannot be closed off by maintenance (since all heating and air conditioning would be lost), as a result ASHRAE 62-20B is always maintained.

In comparison, conventional systems utilizing only chilled water, can only achieve a supply humidity level of 50 grains. In order to satisfy the internal latent load, the system would have to be increased in size to deliver 8,000 CFM, resulting in substantial increases in fan energy consumption, duct size, beam pressure and associated sound generation. Additionally, substantial reheat energy is required to avoid overcooling due to high airflow and low leaving coil temperature during times of low occupancy. Conventional systems use 48 tons of cooling input and 83,000 btus of reheat energy as a opposed to the 23 tons utilized by Pinnacle® II.

FIGURE 4



# UNIVERSITY APPLICATION CHILLED BEAMS SELECTION

Project designation: IQHC sample selection

INPUT SECTION	
PROJECT DESIGNATION: IQHC SAMPLE SELECTION	
ZONE DESIGNATION	CLASSROOM 1450
ZONE AREA (GROSS SQ FT)	170
OUTDOOR AIR REQUIREMENT (CFM)	150
COOLING SENSIBLE LOAD (BTU/HR)	4,650
COOLING LATENT LOAD (BTU/HR)	0
FROM GLOBAL INPUT	
DESIRED BEAM PRESSURE (INWG)	0.45
COIL WATER FLOW (GPM)	—
BEAM WATER TEMPERATURE (°F)	58
PRIMARY AIR TEMPERATURE (°F)	65
PRIMARY AIR HUMIDITY (GRAINS)	42
CEILING TEMPERATURE (°F)	76

OUTPUT SECTION: COOLING	
SELECTION OPTIONS COOLING (PER BEAM) PERFORMANCE BASED	
BEAM MODEL	IQHC — HIGHEST CAPACITY, ALL COOLING — 2 PIPE
NUMBER OF BEAMS PER ZONE	1
BEAM LENGTH (FT)	6
SLOT SETTING	12.0
COIL COOLING CAPACITY (BTU/HR)	2,868
AIR COOLING CAPACITY (BTU/HR)	1,825
TOTAL COOLING (BTU/HR)	4,693
PRIMARY AIRFLOW REQUIRED (CFM)	150
OUTDOOR AIR PERCENTAGE (%)	98%
BEAM PRESSURE (INWG)	0.45
SOUND DATA (NC RATING*)	28.8 DB
FINAL COOLING WATER FLOW (GPM)	0.50
WATER PRESSURE LOSS (FT WATER)	2.9
OUTLET WATER TEMPERATURE (°F)	69.5
DELTA WATER TEMPERATURE (° F)	11.5
MAXIMUM THROW LENGTH (FT)†	15.1
MINIMUM THROW (45° FPC)†	7.3

## KEY EXAMPLE METRICS

- **Ventilation requirements** (per ASHRAE 62) if you have a classroom of 150 students: 8CFM per student = 1,200 CFM per lecture hall is required
- **Sensible and latent loads** in each 1,000 SQ FT lecture hall
  - **Sensible load**
    - Total sensible load = 37,164 BTU
    - 150 people at 225 BTU per person = 33,750 BTU
    - Lighting load = 2,314 BTU based on 0.68 watts per SQ FT
    - Infiltration = 100 CFM x 1.08(85° - 75°) = 1,100 BTU
  - **Latent load**
    - Total latent load = 19,830 BTU
    - 150 people at 105 BTU per person = 15,750 BTU
    - Infiltration = 100 CFM x 0.68(125 grains - 65 grains)
- **Supply humidity required to accommodate latent load:**
  - Grains: 65 grains - (19,830 btu of latent load / (1,200 CFM x 0.68) = 41 grains required

\* AS PER ASHRAE STANDARD 70-2006  
 † DISTANCE FROM BEAM OUTLET WHERE THE AIR VELOCITY DROPS BELOW 50 FT/MIN

## ADVANTAGES OF THE PINNACLE® II SYSTEM

The two most significant advantages offered by the Pinnacle® II system, when compared with the traditional over-cooling-and-reheat systems, are that the dehumidification or latent capacity (e.g., dryness of the air provided to the controlled space) is significantly increased and the energy efficiency is greatly improved.

The Pinnacle® II System has more latent capacity and higher energy efficiency than a desiccant-based cooling (DBC) or a dual-wheel energy recovery system (DWERS).

For example, a DBC system processing outdoor air on a latent design day (85°F and 130 gr/lb) is limited to a supply air condition of approximately 60 grains with technology currently available. To reach this condition requires the equipment to be operated at very low face velocities (resulting in very large system space requirements) and requires that the air be reheated at very high regeneration temperatures at very high regeneration temperatures (large, costly energy inputs).

The DWERS and other conventional over-cooling-and-reheat systems are limited by the humidity level of the air leaving the cooling coil. Since most conventional cooling systems have a practical limit of approximately 48°F leaving air temperature, the absolute humidity level obtainable from most conventional systems is about 50 grains per pound of moisture (gr/lb).

As a result, the only commercially available way to dehumidify outdoor air below approximately 50 grains of moisture involves cooling the outdoor air below approximately 48°F, and requires expensive, non-standard cooling equipment with very deep cooling coils, complex controls with defrost cycles and significantly elevated kW/ton energy consumption (i.e. poor energy efficiency).

The Pinnacle® II System can provide outdoor air at a humidity content of 40 gr/lb using standard cooling equipment. This results in a 90 gr/lb reduction at the typical latent design condition of 130 gr/lb, and can be designed and operated to provide air as dry as 35 gr/lb. Providing very dry air using conventional cooling equipment has many advantages including a significant reduction of energy consumption and thereby cost. With very dry air, lower air flow quantities can handle far more latent load.

For example, an office building could reduce energy consumption by operating its VAV air handling systems serving the space with dry cooling coils, allowing the supply air leaving temperature to be set by the controlled space sensible loads. This is possible if the outdoor air volume provided to the VAV air handling system is dehumidified enough to handle both the outdoor air and space latent loads. Because the percentage of outdoor air compared to the total supply air volume of a typical office designed to comply with ASHRAE Standard 62 may only be 15-20%, the outdoor air would need to be very dry if the entire internal latent load is to be handled by the outdoor air volume (dry cooling coils).

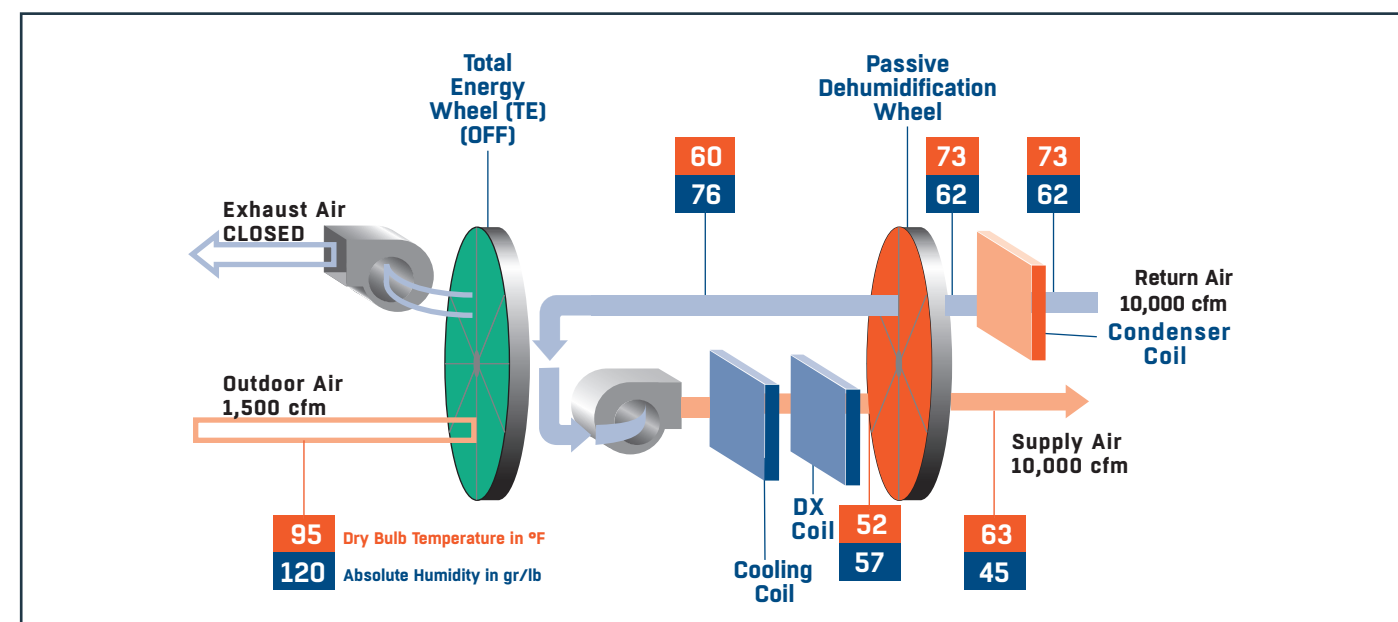
## BENEFITS DURING UNOCCUPIED PERIODS \*WHEN EQUIPPED WITH OPTIONAL RECIRCULATION DAMPER

Another advantage offered by the Pinnacle® II System is its ability to control humidity levels in unoccupied facilities which can not be effectively accomplished with current preconditioning technologies.

During unoccupied times, as research has shown, the building materials (e.g., carpeting, furnishings, etc.) act as a moisture sponge as the humidity level rises. This rise in humidity is typical because many building operators reduce the capacity of or cycle off the HVAC system in an attempt to conserve energy. Because the sensible load in unoccupied buildings is minimal, controlling humidity can only be accomplished effectively if reheat is utilized after the air leaves the coils. This reheat capability is seldom designed into projects or utilized if the capability exists.

The Pinnacle® II System can be operated to provide an effective solution to either “dry out” the humidity stored in the building materials or to provide humidity control during unoccupied periods. This is both practical and energy efficient because additional reheat is not required, since it is provided by the passive dehumidification wheel.

The Pinnacle® II System can also reduce the quantity of outdoor air as a function of building occupants, e.g., demand controlled ventilation, as shown in FIGURE 5. This strategy allows schools to control humidity during the summer vacation with very low airflow rates through the system when compared to the flow volume delivered when the controlled space is occupied. Reducing the flow through the system results in reduced fan horsepower, reduced chilled water requirements at the cooling coil, increased recovery efficiency at the total energy wheel and the ability to provide drier air from this passive dehumidification wheel.



**FIGURE 5** Operating in unoccupied mode. The system can operate in 100% recirculation mode and with very little refrigeration input effectively controlling the indoor humidity, to comply with ASHRAE 62.1 addendum ae.

## BENEFITS DURING HEATING SEASON

Another advantage of the Pinnacle® II system is that, during the heating mode, both the total energy wheel and the desiccant-based dehumidification wheel can be operated to recover more than 90% of the energy (temperature and humidity.) In most cases, this level of recovery efficiency allows the controlled spaces to be self heating, even on very cold days, once normal lighting and people loads are introduced to the controlled space.

## IN SUMMARY

The Pinnacle® II system offers a cost effective solution to the ventilation mandate and the humidity control dilemma facing designers as a result of ASHRAE Standard 62. The system's flexibility allows engineers to consider whole new design schemes. This is a result of its ability to provide very dry outdoor air in a straight forward, simple, energy efficient manner delivered by a totally integrated packaged system.

A very significant reduction in energy consumption during the cooling season is recognized with the Pinnacle® II system when compared to conventional over-cool and reheat designs applied most often today. These reductions are typically in the range of 50 to 60%. With the Pinnacle® II system, winter time heating and humidification is reduced to only 10 to 15% of what it would be without the system. As importantly, the unoccupied dehumidification, made possible with the technology, allows building owners to maintain humidity levels during unoccupied times at a fraction of the cost of alternate systems.

The Pinnacle® II significantly reduces energy consumption for commercial buildings in the US; offsetting the significant energy increase that would otherwise come as a result of the increased compliance with IAQ code requirements (i.e. ASHRAE Standard 62).

## SELECTION PROCEDURE

A selection program has been developed to assist in choosing achievable performances for varying building applications. The selection tool allows the user to complete performance modeling for the Pinnacle® II System and supplies the following information:

### PERFORMANCE TOOL OUTPUT

#### PERFORMANCE DATA:

- Space peak latent conditions
- Space peak sensible condition
- Outdoor peak heating conditions

#### ENERGY SAVINGS ANALYSIS:

- Estimate of the Pinnacle® II System annual cost of operation
- Estimate of the over-cooling/reheat approach annual cost of operation
- ROI/life cycle costs — available upon request

#### SCHEDULE:

- Pinnacle® II System performance schedule based upon input parameters

#### SPECIFICATION:

- Pinnacle® II System sample specification

## REQUIRED INPUTS

To complete your selection you will need the following information:

#### AIRFLOW:

The main criterion for basic unit selection is the amount of ventilation air to be processed.

Airflow is determined by the higher value desired between the supply air flow (CFM) and the return air flow (CFM). To determine minimum airflow for the building application review ASHRAE 62.1 airflow recommendation with building load requirements.

When the required airflow is available in multiple unit sizes, you should consider the following options:

#### BOX SIZE OR JOBSITE AREA FOR UNIT

- Smaller units are lighter in weight and take up less project space.

#### PERFORMANCE

- Larger units have lower face velocities, which results in higher performance.

#### COST

- Smaller units are less costly to build.

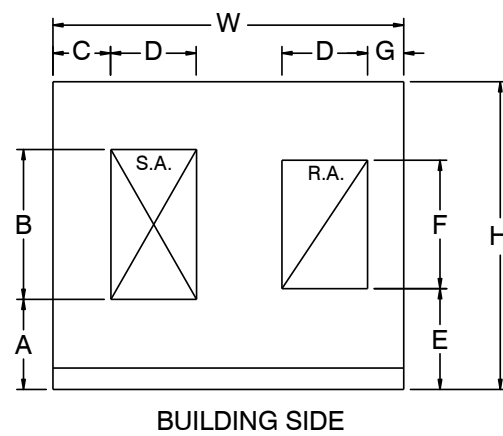
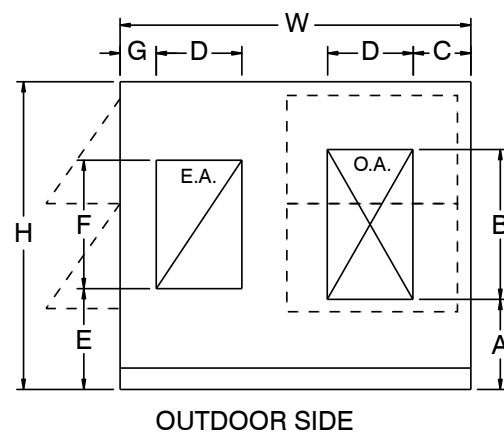
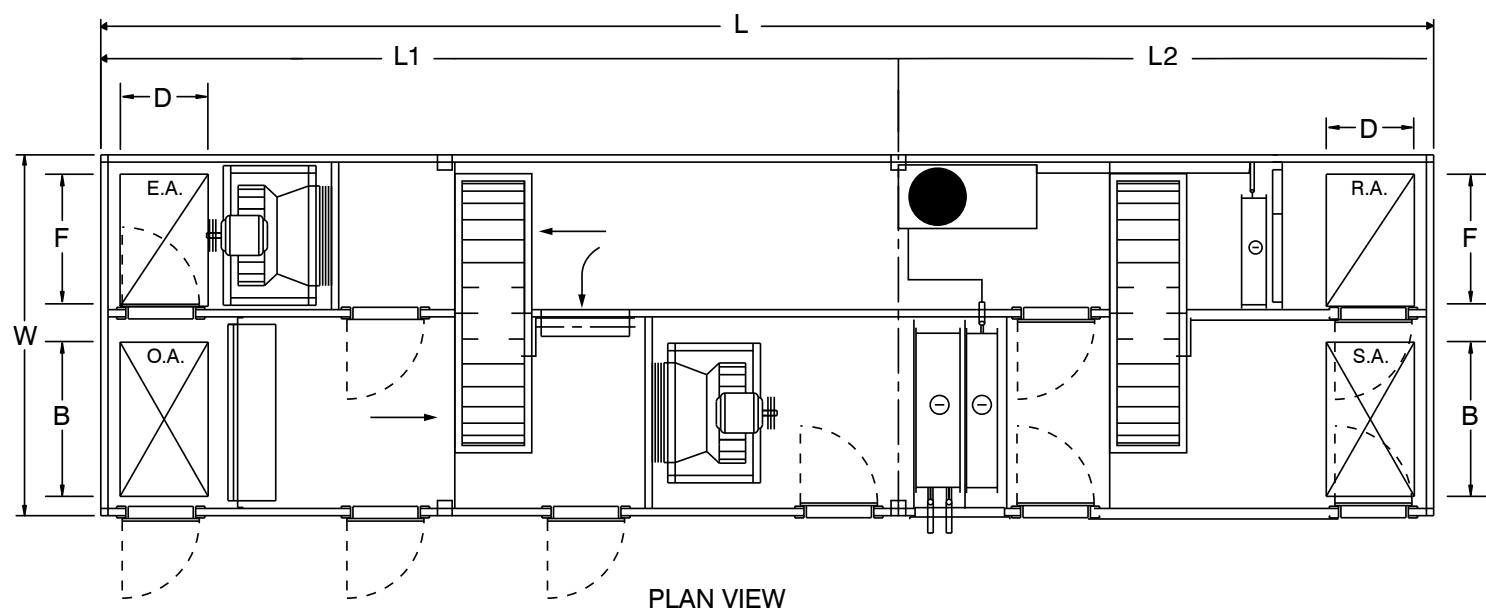
FIGURE 6 System sizes and airflow capacities

MODEL	AIRFLOW CAPACITY	
PVS II-05	LOW	3,000
	MID	4,000
	HIGH	4,500
PVS II-09	LOW	4,500
	MID	6,000
	HIGH	8,000
PVS II-13	LOW	6,000
	MID	8,000
	HIGH	10,000
PVS II-18	LOW	8,000
	MID	10,000
	HIGH	15,000
PVS II-24	LOW	11,000
	MID	14,000
	HIGH	18,000

To receive a copy of the Pinnacle® II System modeling program please contact your local representative. You can find a listing of representatives at: [www.semcohv.com](http://www.semcohv.com).

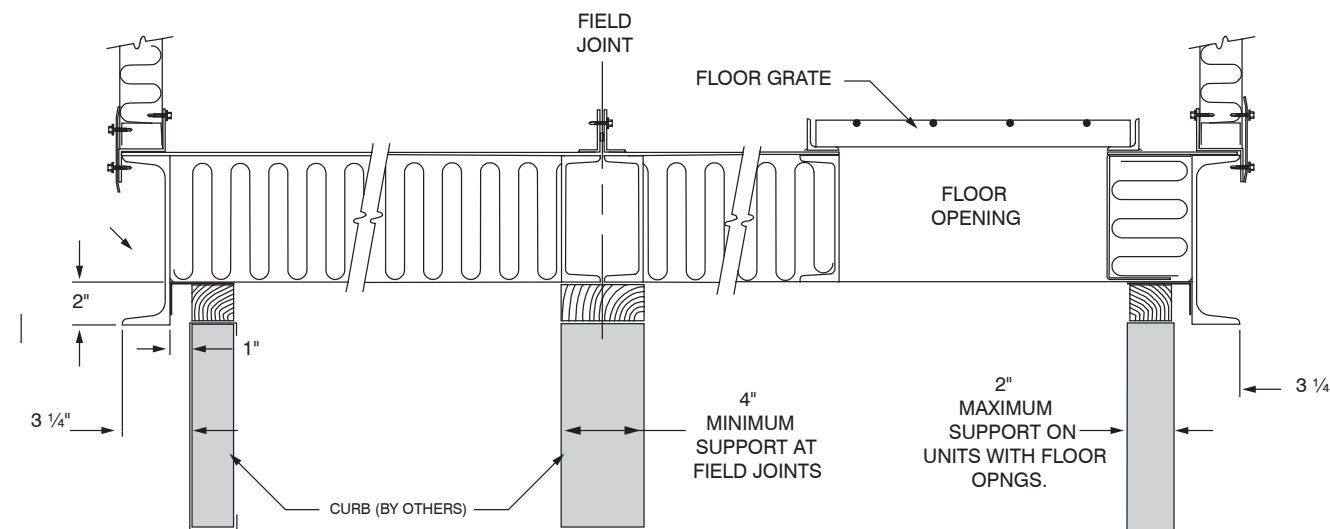
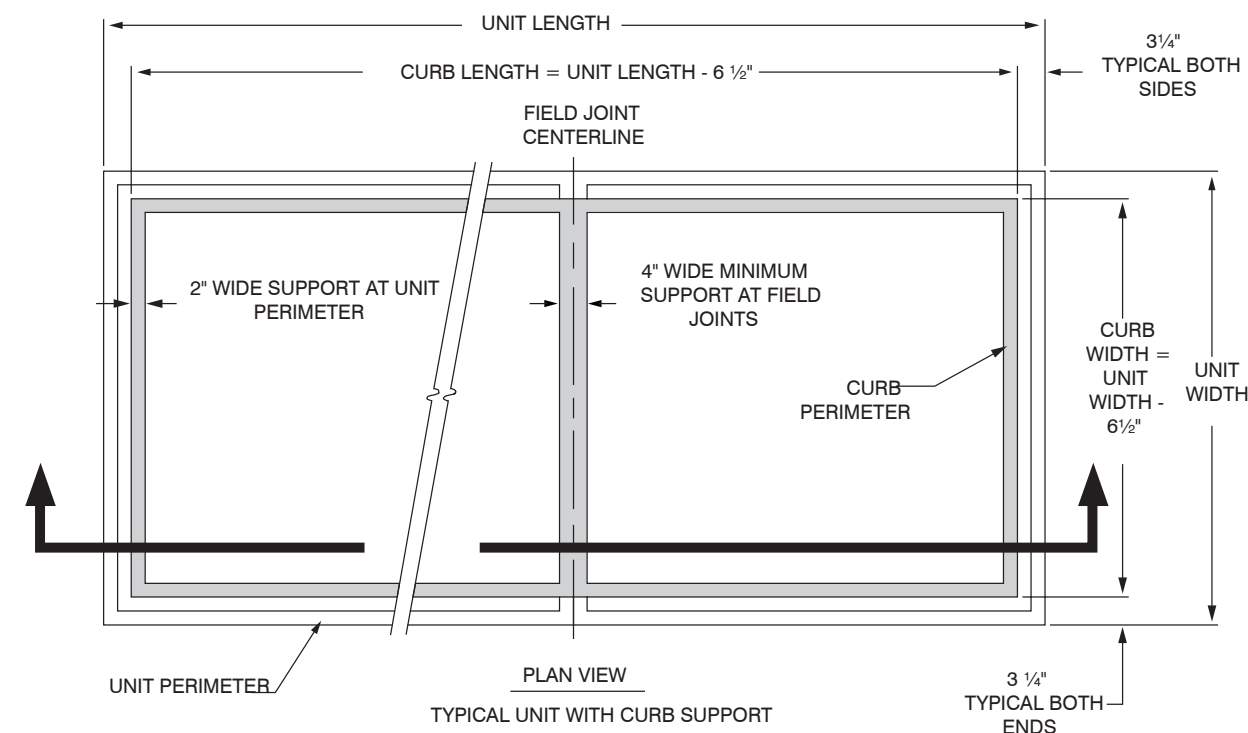
# UNIT WEIGHTS AND DIMENSIONS

PINNACLE SERIES (PVS)  
SIZES 5-24



MODEL	W	H	A	B	C	D	E	F	G	WEIGHT L1	WEIGHT L2	L	L1	L2
	IN.	IN.	IN.	IN.	IN.	IN.	IN.	IN.	IN.	LBS.	LBS.	IN.	IN.	IN.
PVSII-05	86.25	60.25	15.25	34.25	14.25	20.00	20.25	24.00	14.25	8,700	0	296.50	0.00	0.00
PVSII-09	98.25	72.25	15.25	46.25	20.25	20.00	21.25	34.00	14.25	11,000	0	304.38	0.00	0.00
PVSII-13	98.25	86.25	23.25	46.25	17.25	26.00	29.25	34.00	11.25	4,400	9,750	333.13	99.63	233.50
PVSII-18	122.25	98.25	23.25	58.25	23.25	26.00	29.25	46.00	17.25	5,800	12,250	348.88	107.50	241.38
PVSII-24	122.25	110.25	29.25	58.25	20.25	32.00	35.25	46.00	14.25	6,700	14,150	364.63	115.38	249.25

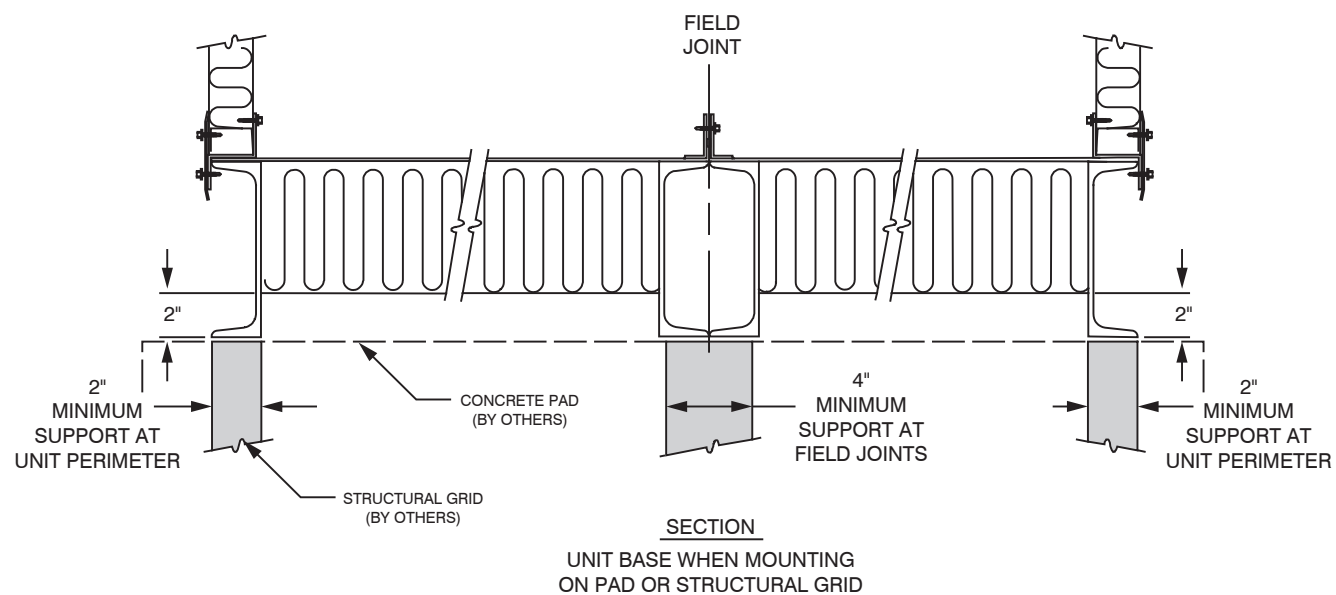
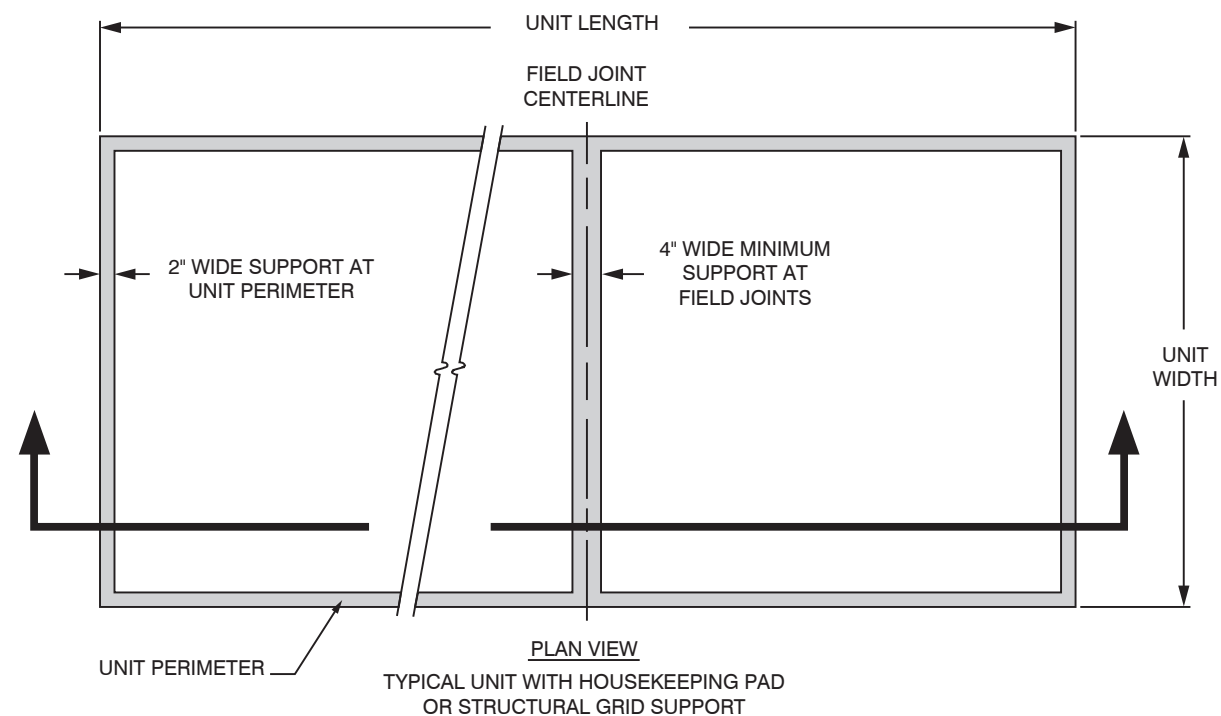
# MOUNTING DETAILS, CURB SUPPORT



- NOTES**
1. ROOF CURB SHOULD BE SIZED TO ALLOW UNIT TO HANG OVER CURB.
  2. CURB SIZE:  
WIDTH = UNIT WIDTH - 6.5"  
LENGTH = UNIT LENGTH - 6.5"
  3. UNIT SUPPORT IS REQUIRED AROUND THE ENTIRE PERIMETER AND ALONG BOTH SIDES OF ANY FIELD JOINTS.
  4. WHEN UNITS REQUIRE FIELD JOINTS, SUPPORT SHOULD BE LEVEL TO 1/16" BETWEEN FIELD JOINTS.



# MOUNTING DETAILS, GRID OR PAD SUPPORT



**NOTES**

1. UNIT SUPPORT IS REQUIRED AROUND THE ENTIRE PERIMETER AND ALONG BOTH SIDES OF ANY FIELD JOINTS.
2. WHEN UNITS REQUIRE FIELD JOINTS, SUPPORT SHOULD BE LEVEL TO 1/16" BETWEEN FIELD JOINTS.

# ELECTRICAL DATA

HP	3 PHASE FULL LOAD AMPS			MINIMUM EFFICIENCY STANDARD MOTORS	MINIMUM EFFICIENCY HIGH EFF. MOTORS
	208 V	240 V	480 V		
1/6	0.6	0.6	0.3	—	—
1/4	1.0	1.0	0.5	—	—
1/2	2.4	2.2	1.1	—	—
3/4	3.5	3.2	1.6	73	—
1	4.6	4.2	2.1	76.6	82.5
1-1/2	6.6	6.0	3.0	80	84
2	7.5	6.8	3.4	79.9	84
3	10.6	9.6	4.8	83.1	86.5
5	16.7	15.2	7.6	83.4	87.5
7-1/2	24.2	22	11	86.6	88.5
10	30.8	28	14	88.2	89.5
15	46.2	42	21	89.3	90.2
20	59.4	54	27	90.4	91
25	74.8	68	34	90.5	92.4
30	88.0	80	40	89.3	93
40	114	104	52	90	93
50	—	130	65	91.2	94.1
60	—	—	77	92	93.6
75	—	—	96	92.4	94.1
100	—	—	124	92.5	94.1
HP	3Ø VARIABLE FREQUENCY DRIVE			YASKAWA MODEL #	
	208 V	280 V	480 V		
1	7.3	7.3	7.3	CIMR-VU-2A0006FAA	
1	—	—	2.1	CIMR-VU-4A0002FAA	
SIZE	CONTROL POWER TRANSFORMER				
	208 V	240 V	480 V		
150 VA	0.7	0.6	0.4		
500 VA	2.4	2.0	1.0		
2 KVA	9.62	8.7	4.17		

To determine minimum circuit ampacity, add the FLA's for each fan motor, the FLA of the constant speed wheel motor or the variable frequency drive. Then add the CPT amps and 25 percent of the largest motor FLA.

Fuse recommendations: size fuses at the unit FLA and 75% of the largest motor FLA, then select the next larger size dual-element, time-delay fuses (LOW-PEAK®, FUSETRON® or equivalent). If the fuses don't hold, consult N.E.C. for suitability of larger sized fuses.

Use a 2 KVA transformer for units with line side 120 volt lights. Otherwise use the 500 VA transformer.

# COMPONENT PRESSURE DROP TABLES

## DUAL WHEEL UNIT PRESSURE DROPS

SIZE	PVS-5			PVS-9			PVS-13		
CFM	3,000	4,000	4,500	4,500	6,000	8,000	6,000	8,000	10,000
TE WHEEL PURGE	404	409	412	596	601	609	844	849	855
PD WHEEL PURGE	338	345	350	453	461	477	589	597	607
SUPPLY FAN CFM	3,338	4,345	4,850	4,953	6,461	8,477	6,589	8,597	10,607
EXHAUST FAN CFM	3,742	4,754	5,262	5,549	7,062	9,086	7,433	9,446	11,462
OA OPENING	0.01	0.01	0.02	0.01	0.02	0.03	0.01	0.01	0.02
EA OPENING	0.08	0.13	0.16	0.18	0.29	0.48	0.08	0.14	0.20
RA OR EA OPENING	0.05	0.09	0.11	0.06	0.10	0.18	0.06	0.11	0.17
SA OR OA OPENING	0.03	0.04	0.06	0.03	0.05	0.10	0.03	0.06	0.09
DAMPER	0.01	0.02	0.02	0.01	0.02	0.03	0.01	0.02	0.03
OA FILTER	0.25	0.36	0.44	0.21	0.30	0.40	0.25	0.36	0.44
RA FILTER	0.20	0.28	0.34	0.28	0.44	0.72	0.28	0.46	0.66
TE WHEEL	0.59	0.82	0.95	0.53	0.73	1.06	0.46	0.62	0.81
PD WHEEL	0.58	0.81	0.95	0.53	0.73	1.07	0.46	0.62	0.82
COOLING COIL	0.39	0.66	0.82	0.30	0.51	0.94	0.36	0.61	0.99
MAIN HEATING COIL	0.05	0.09	0.11	0.04	0.07	0.13	0.05	0.09	0.13
MISC. LOSSES	0.169	0.30	0.38	0.13	0.232	0.414	0.144	0.257	0.401
EVAPORATOR	0.14	0.24	0.29	0.12	0.20	0.34	0.14	0.23	0.35
CONDENSER	0.11	0.18	0.22	0.14	0.23	0.37	0.14	0.23	0.40

SIZE	PVS-18			PVS-24		
CFM	8,000	10,000	15,000	11,000	14,000	18,000
TE WHEEL PURGE	1,112	1,115	1,127	1,411	1,416	1,424
PD WHEEL PURGE	727	734	756	875	884	899
SUPPLY FAN CFM	8,727	10,734	15,756	11,875	14,884	18,899
EXHAUST FAN CFM	9,839	11,849	16,883	13,286	16,300	20,323
OA OPENING	0.01	0.01	0.03	0.01	0.01	0.02
EA OPENING	0.15	0.21	0.24	0.10	0.15	0.23
RA OR EA OPENING	0.06	0.09	0.20	0.07	0.12	0.19
SA OR OA OPENING	0.04	0.06	0.13	0.05	0.07	0.12
DAMPER	0.01	0.02	0.04	0.02	0.02	0.04
OA FILTER	0.21	0.29	0.46	0.27	0.38	0.51
RA FILTER	0.24	0.32	0.60	0.30	0.46	0.68
TE WHEEL	0.44	0.55	0.89	0.46	0.59	0.79
PD WHEEL	0.45	0.56	0.92	0.47	0.60	0.81
COOLING COIL	0.27	0.41	0.95	0.38	0.59	1.02
MAIN HEATING COIL	0.04	0.06	0.13	0.05	0.09	0.14
MISC. LOSSES	0.120	0.188	0.423	0.148	0.24	0.398
EVAPORATOR	0.11	0.17	0.35	0.16	0.25	0.40
CONDENSER	0.10	0.15	0.30	0.17	0.24	0.36

Filter pressure drops based on 2 inches thick, 30% efficient Class II filter.

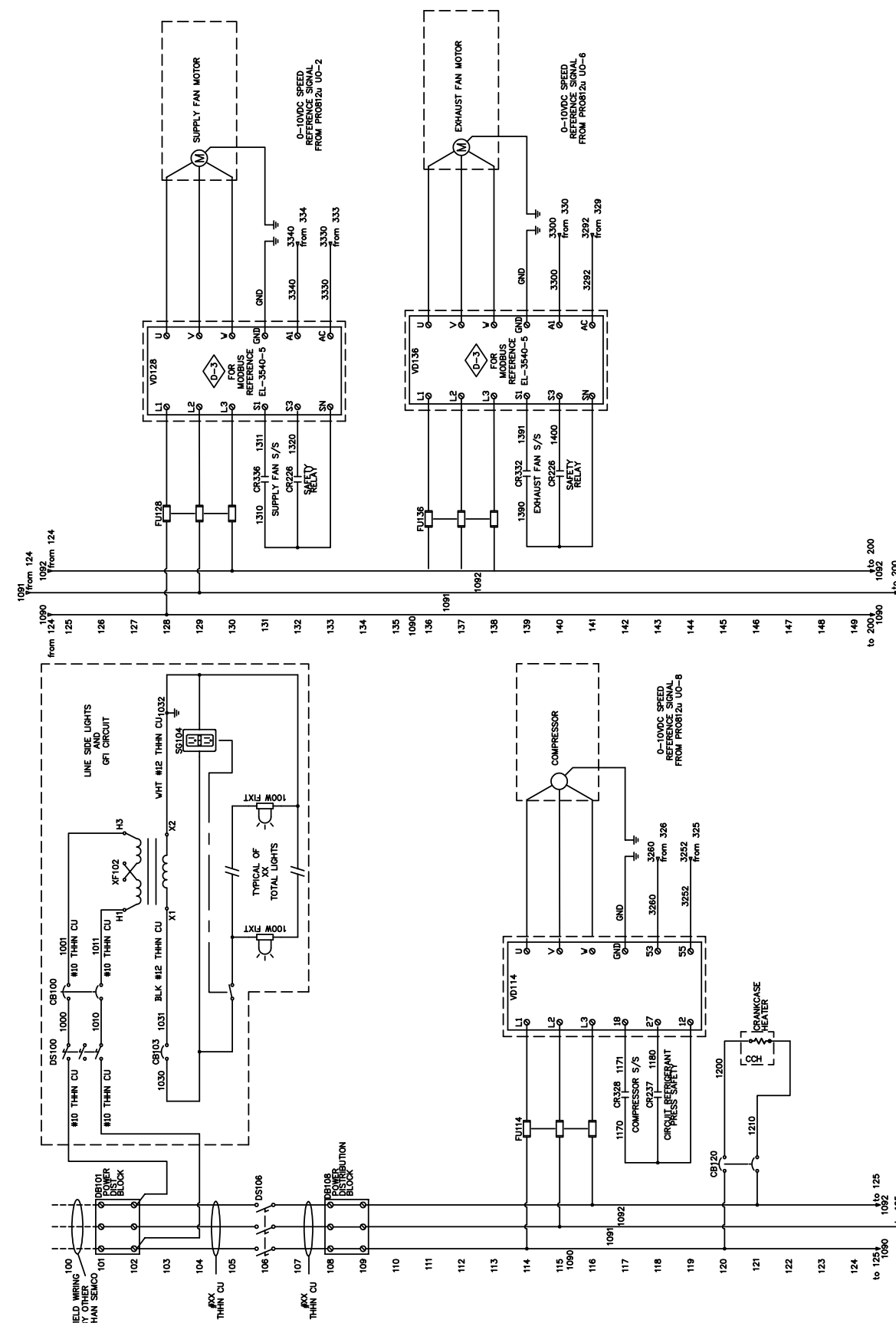
Cooling coil pressure drops based on 6 row, 10 fins per inch single-circuited coil.

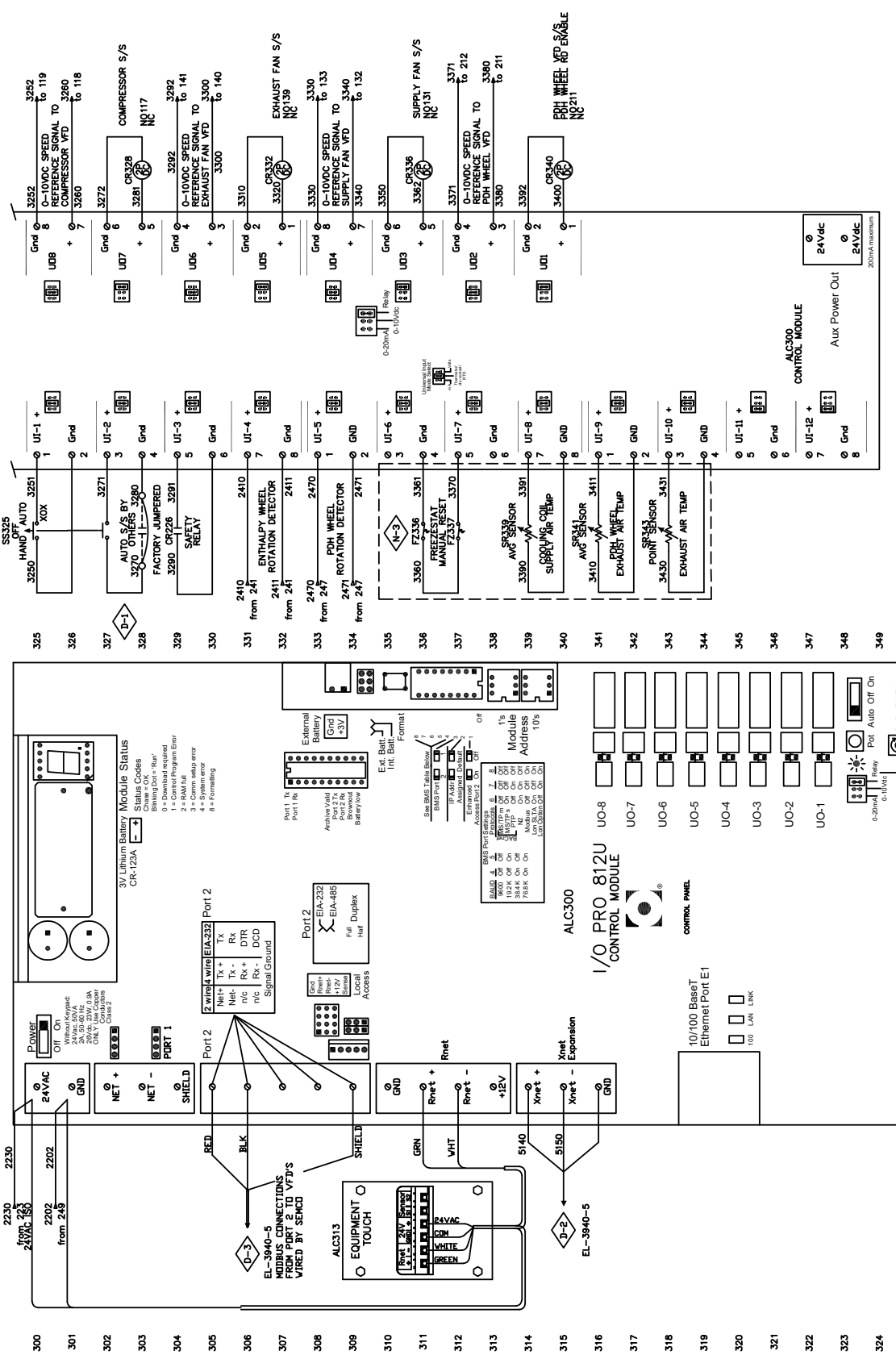
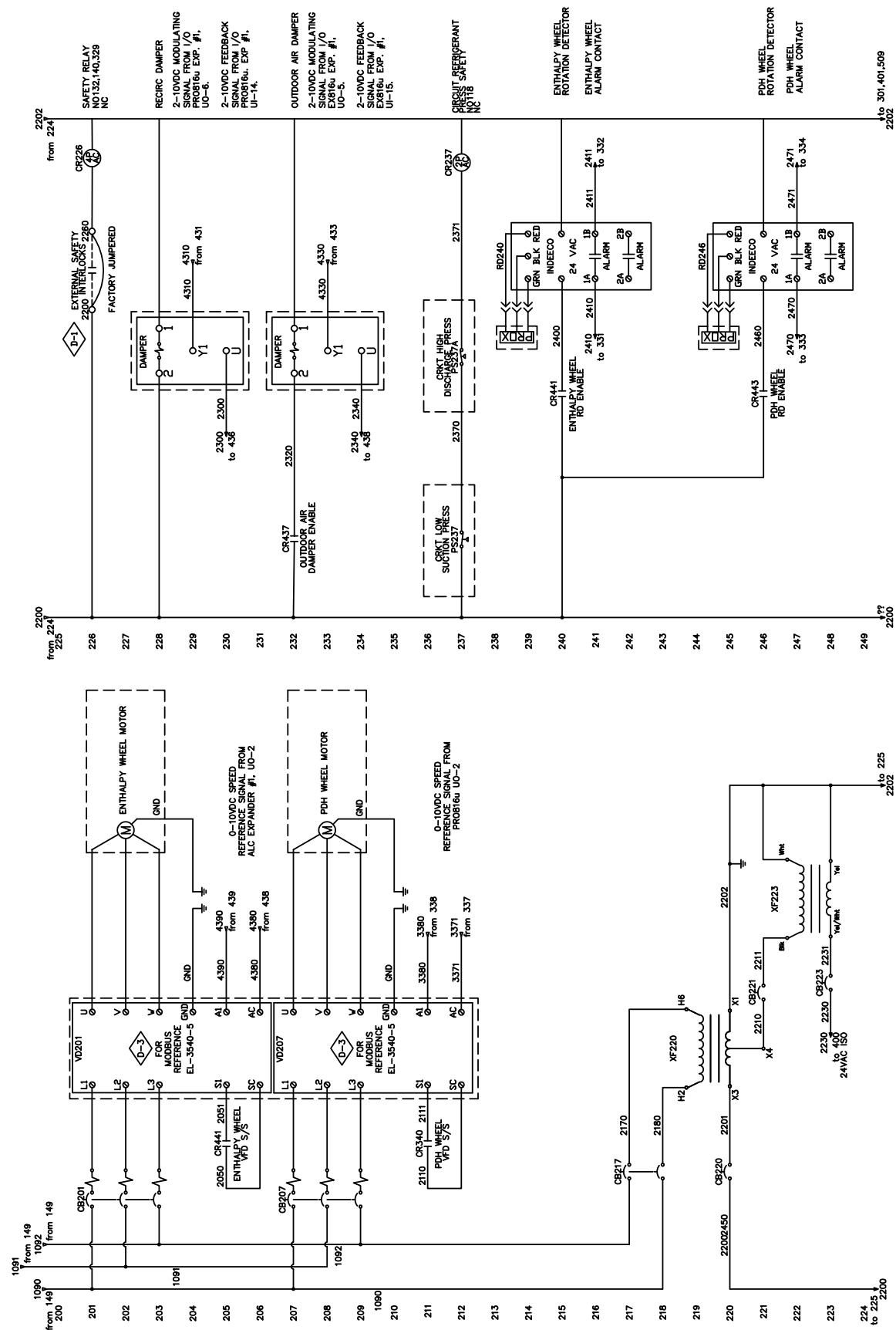
Heating coil pressure drops based on 1 row, 6 fins per inch.

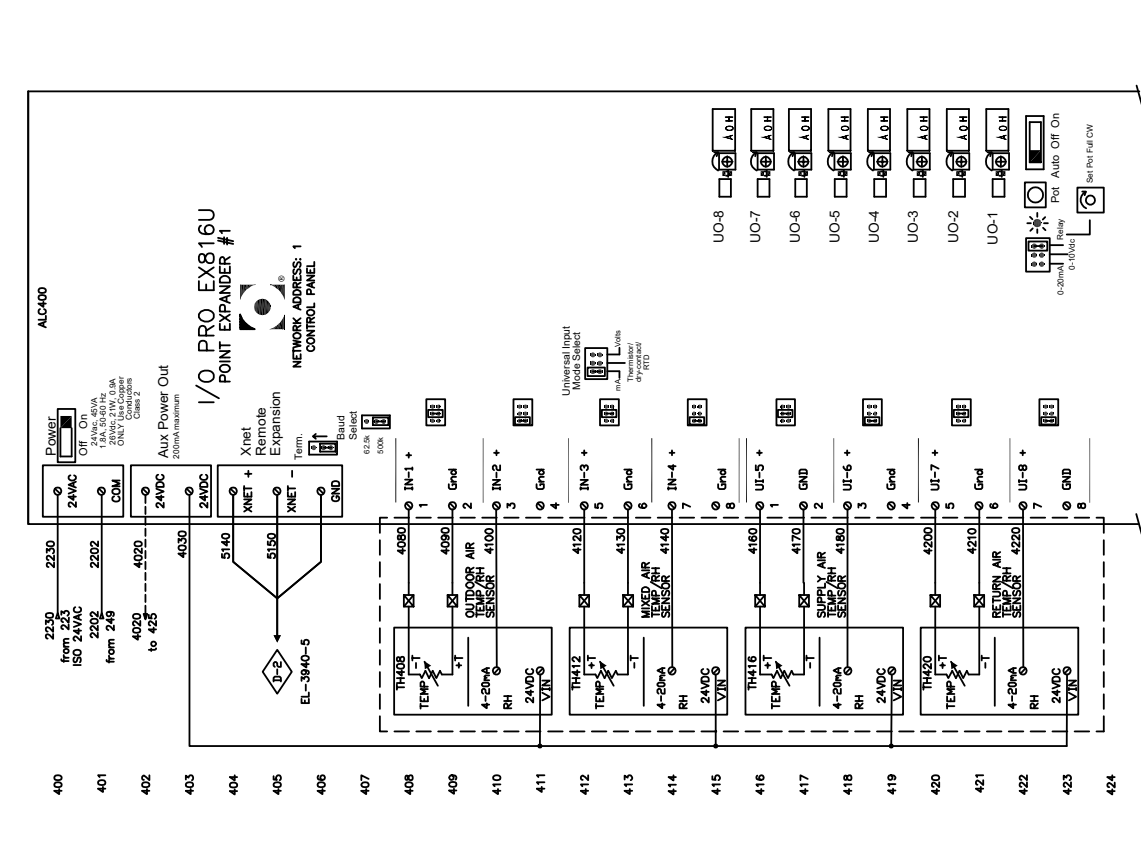
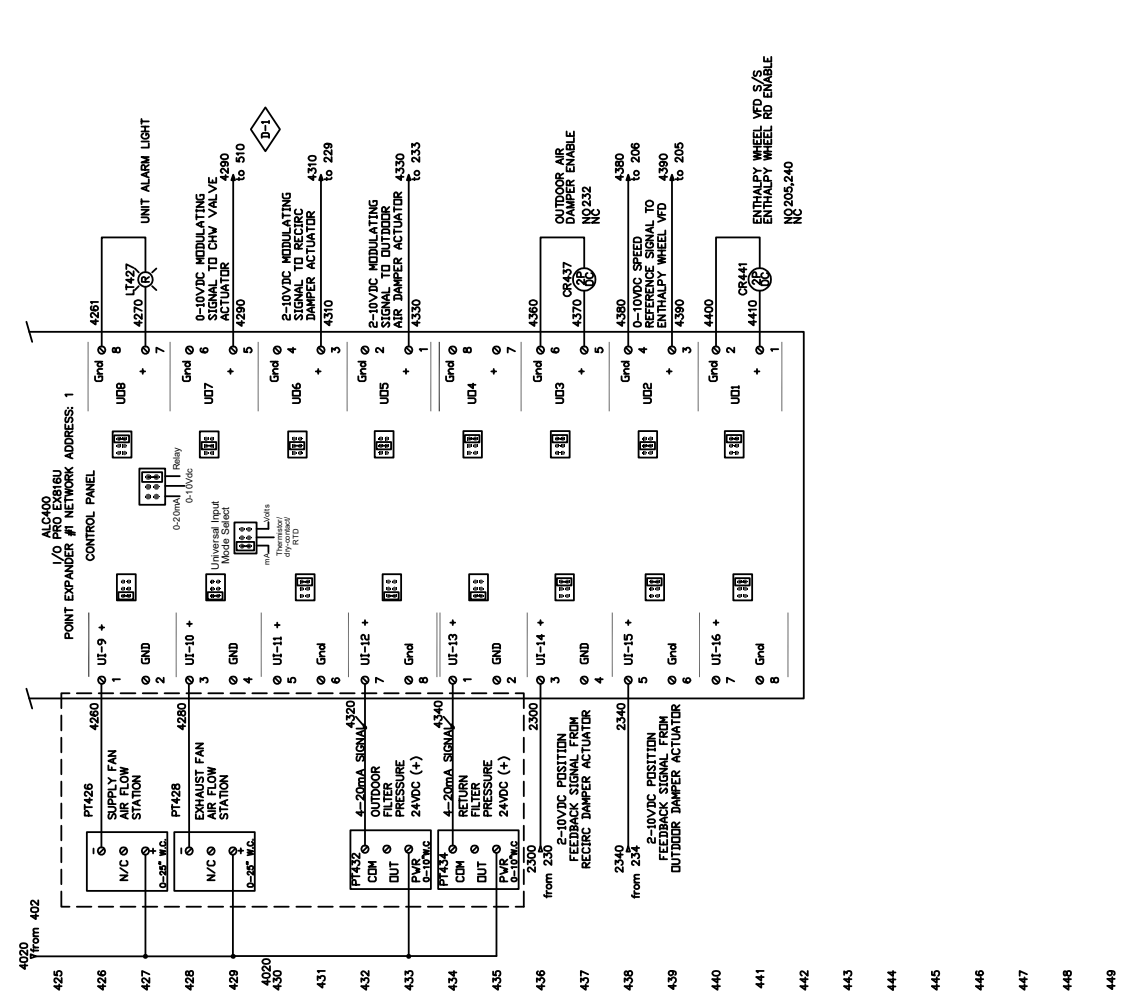
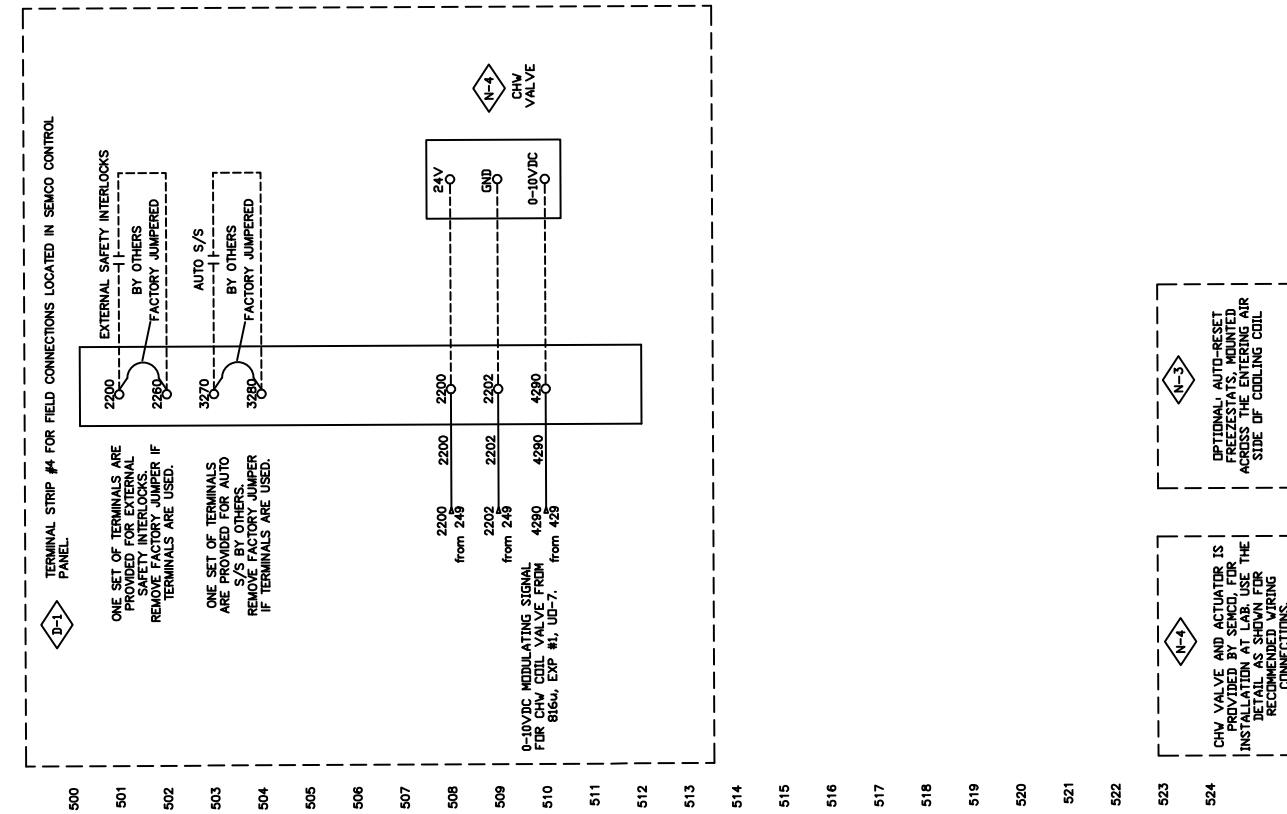
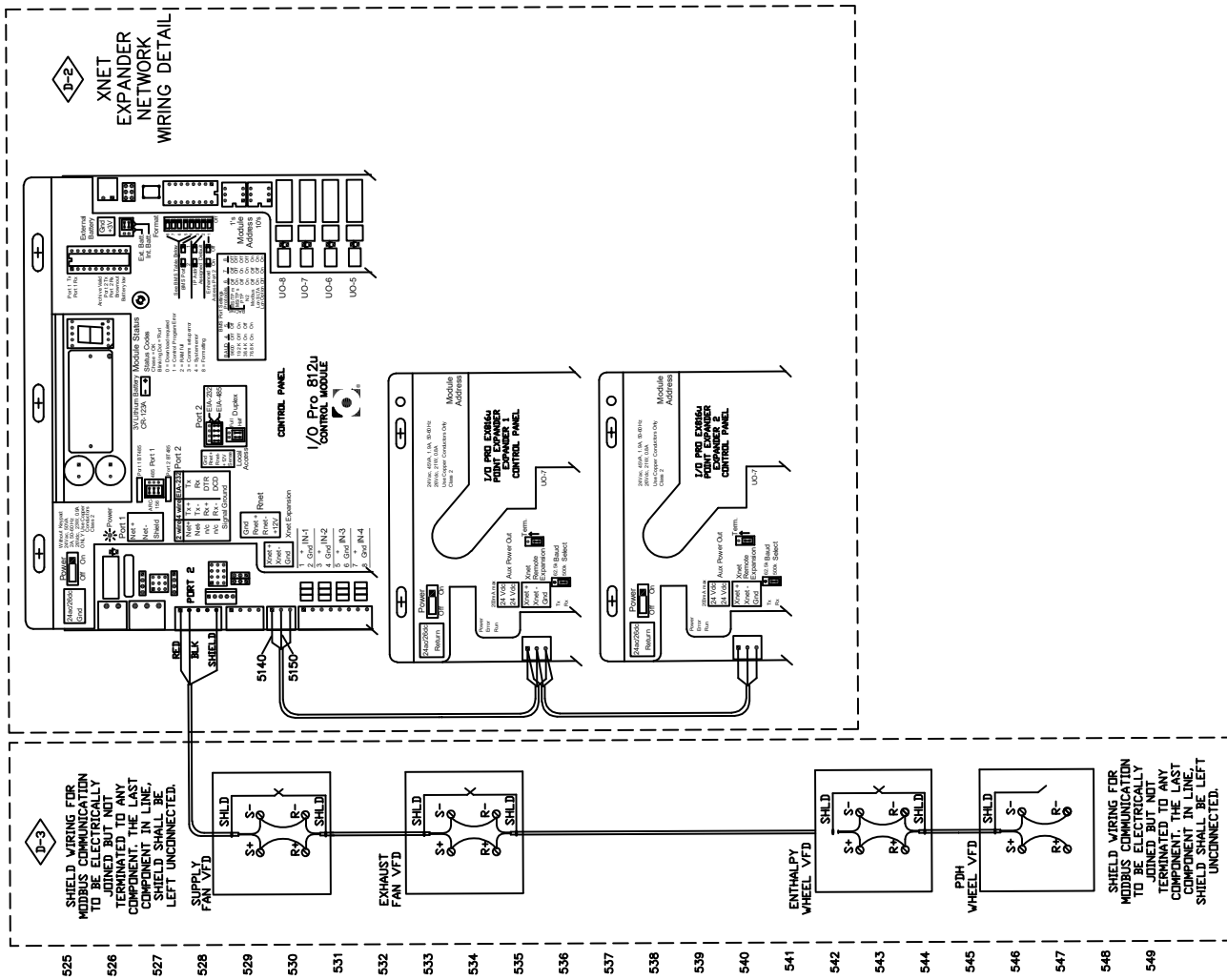
Purge volumes based on 4 inches P<sub>DA</sub>-P<sub>RA</sub> for enthalpy wheel and 1 inch for PD wheel.

Casing losses include fan inlet losses.

# SAMPLE ELECTRICAL SCHEMATIC











SIZES 18, 13X, 9XX

MAXIMUM 30 HP MOTOR

Table with columns for CFM, 1" SP, 2" SP, 3" SP, 4" SP, 5" SP, 6" SP, 7" SP, 8" SP, 10" SP, 12" SP. Rows range from 3,000 to 19,800 CFM.

CLASS I = MAX. 1,476 RPM CLASS II = MAX. 1,919 RPM CLASS III = MAX. 2,435 RPM APF281

SIZES 24, 18X, 13XX

MAXIMUM 50 HP MOTOR

Table with columns for CFM, 1" SP, 2" SP, 3" SP, 4" SP, 5" SP, 6" SP, 7" SP, 8" SP, 10" SP, 12" SP. Rows range from 5,000 to 26,000 CFM.

CLASS I = MAX. 1,310 RPM CLASS II = MAX. 1,671 RPM CLASS III = MAX. 2,160 RPM APF321

SIZE 24X, 18XX

MAXIMUM 50 HP MOTOR

Table with columns for CFM, 1" SP, 2" SP, 3" SP, 4" SP, 5" SP, 6" SP, 7" SP, 8" SP, 10" SP, 12" SP. Rows range from 6,000 to 31,200 CFM.

CLASS I = MAX. 1,164 RPM CLASS II = MAX. 1,486 RPM CLASS III = MAX. 1,921 RPM APF351

SIZE 24XX, 18XXX

MAXIMUM 50 HP MOTOR

Table with columns for CFM, 1" SP, 2" SP, 3" SP, 4" SP, 5" SP, 6" SP, 7" SP, 8" SP, 10" SP, 12" SP. Rows range from 7,000 to 38,500 CFM.

CLASS I = MAX. 1,028 RPM CLASS II = MAX. 1,337 RPM CLASS III = MAX. 1,696 RPM APF391

## SAMPLE SPECIFICATIONS

Dedicated outdoor air system units will be SEMCO standard Pinnacle® II series with components as follows:

### CASING

Standard panels shall consist of 2" thick dual wall 18 gauge (20 gauge for unit sizes 5 and 9) galvanized solid exterior skins and 22 gauge galvanized steel solid interior skins enclosing 2 inch thick 3 pcf mineral wool insulation with a U-factor of 0.10 BTU/(hr-sq.ft.-deg.) The housing shall be supported by a painted structural steel base. The base includes a solid welded floor with 6" thick (4" thick for unit sizes 3, 5, and 9) mineral wool insulation. The bottom face of the insulation shall be protected with a 22 gauge galvanized steel cover. The base is to be self-flashing when set on a properly sized curb. Floor openings have perimeter lips turned up into unit and are covered by a protective grate. Lifting lugs shall be welded to the structural base.

### OUTDOOR CONSTRUCTION

Units shall have a factory-installed, 24 gauge galvanized steel standing seam sheet metal sloped roof. Roof field joints will consist of tapered expanded polystyrene filler panels and standing seam metal roof that must be installed and crimped by the contractor. Outdoor air intake and exhaust air discharge openings shall have galvanized steel sheet metal hoods with openings covered with bird screen. Hoods may ship loose for field installation depending on shipping width restrictions.

Outdoor Intake Filters - Research Products Industrial EZ-Kleen, aluminum mesh, 1" thick, washable filters shall be mounted in the outdoor air intake hoods. These shall be a low resistance-roughing filter.

### ACCESS

Access shall be provided through large hinged, tightly sealed doors or easily removable access panels. Access doors shall be constructed of the same materials as the unit casing and use SEMCO's standard hardware. Each door shall be provided with two cam type handles and two heavy duty hinges to achieve maximum sealing. Handles are to be internal and external for opening from the inside or outside of the unit. All doors shall be air pressure closing. Removable panels shall be provided for heating and cooling coils.

### FANS

Fan performance is based on tests conducted in accordance with AMCA Standard test code for air moving devices and shall bear the AMCA Certified Rating Seal for Air and Sound. Fans have a sharply rising pressure characteristic extending through the operating range and continuing to rise beyond the efficiency peak to ensure quiet and stable operation. Fans shall be of the centrifugal plenum type, designed without a scroll type housing. Fans shall incorporate a non-overloading type backward inclined airfoil blade wheel, heavy gauge reinforced steel inlet plate with removable spun inlet cone, structural steel frame, and shaft and bearings in the AMCA Arrangement 4 configuration to form a heavy duty integral unit. Fan wheels have a spun non-tapered style blade-retaining ring on the inlet side to allow higher efficiencies over the performance range of the fan. Sizes 281 and larger shall have nine die-formed hollow airfoil blades continuously welded around all edges. Smaller sizes shall have nine airfoil-shaped aluminum extruded blades. Fan wheels are statically and dynamically balanced to a level of G6.3 (per ANSI 2-19) or better.

### SHAFTS

The fan shaft is polished steel, accurately turned, ground and ring gauged for accuracy. Shafts shall have first critical speeds at least 1.43 times the maximum speeds of the fan.

### BEARINGS

The fan wheel bearings are heavy duty, grease lubricated, anti-friction ball or roller, self-aligning, pillow block type and selected for minimum average bearing life (AFBMA L-50) in excess of 200,000 hours at the maximum class RPM.

### FAN VIBRATION ISOLATION

Fans assemblies are mounted on spring isolators with flexible connections between fan and fan wall.

### MOTORS

Fan motors shall be standard NEMA frame, EPACT compliant, with 1.15 service factor and open drip-proof enclosures.

### ENTHALPY RECOVERY WHEEL

The rotor media shall be made of aluminum, which is coated to prohibit corrosion. All media surfaces shall be coated with a non-migrating solid adsorbent layer prior to being formed into the honeycomb media structure to insure that all surfaces are coated and that adequate latent capacity is provided. The media has a flame spread of less than 25 and a smoke developed of less than 50 when rated in accordance with ASTM E84.

The faces of the total energy recovery wheel shall be sealed with a two-part polymer acid resistant coating to limit surface oxidation. The media face coating shall also include a proprietary Teflon-based anti-stick additive shown, by independent testing, to effectively limit the collection of dust or smoke particulate and to aid in the surface cleaning process should cleaning be required.

The entire recovery wheel media face shall be treated with Avron46, and shall exhibit effective antimicrobial action, supported by independent test data. Any antimicrobial agent used must, by law, carry an EPA registration for use in duct systems. All desiccant surfaces within the transfer media shall also exhibit bacteria-static properties as supported by independent testing.

The desiccant is inorganic and specifically developed for the selective adsorption of water vapor. The desiccant utilizes a 3A molecular sieve certified by the manufacturer to have an internal pore diameter distribution, which limits adsorption to materials not larger than the critical diameter of a water molecule (2.8 angstroms.)

Equal sensible and latent recovery efficiencies are documented through a certification program conducted in accordance with ASHRAE 84-78P and the results presented in accordance with ARI 1060 standards. The certification has been conducted by a qualified independent organization.

Independent wheel testing from a credible test laboratory documents that the desiccant material utilized does not transfer pollutants typically encountered in the indoor air environment. The cross-contamination and performance certification reports shall be provided upon written request for engineering review.

### PASSIVE DEHUMIDIFICATION WHEEL

Dehumidification wheel shall be specifically designed to dehumidify the outdoor air stream leaving the cooling coil, without the use of additional regeneration energy of any type. The dehumidification wheel media backbone shall be an aluminum film substrate. The substrate shall be coated, prior to being formed into

the honeycomb media structure, with a dense layer of solid, non-migrating adsorbent desiccant materials specifically designed to provide optimum dehumidification performance. The desiccant coating and wheel media are suitable for use in a saturated, high humidity environment and cleanable with low temperature steam or hot water without adversely affecting performance. The media has a flame spread rating of less than 25 and a smoke developed of less than 50 when rated in accordance with ASTM E84.

### ROTOR MAINTENANCE

The media is cleanable with low-pressure steam (less than 5 psi,) hot water or light detergent, without degrading the latent recovery. Dry particles up to 800 microns shall freely pass through the media.

### PURGE SECTOR

The unit is provided with a factory set, field adjustable purge sector designed to limit cross contamination to less than .04 percent of that of the exhaust air stream concentration when operated under appropriate conditions.

### ROTOR SEALS

The rotor is supplied with labyrinth seals only, which at no time are required to make contact with any rotating surface of the exchanger rotor face. These multi-pass seals shall utilize four labyrinth stages for optimum performance.

### ROTOR SUPPORT SYSTEM

The rotor media is provided in segmented fashion to allow for field erection or replacement of one section at a time without requiring side access. The media is rigidly held by a structural spoke system made of extruded aluminum.

### ROTOR HOUSING

The rotor housing is a structural framework, which limits the deflection of the rotor due to air pressure to less than 1/32". The rotor is supported by two pillow block bearings which can be maintained or replaced without the removal of the rotor from its casing or the media from its spoke system.

Drive System - The rotor is driven by a black b-section v-belt and an integral gearmotor for reliable operation. A/C motors are utilized for both constant and variable speed applications.



**INTEGRAL DX SECTION**

General - Integral condensing units shall be factory wired, piped, pressure tested, evacuated, charged with refrigerant and tested. The energy recovery unit and condensing unit share electrical and control panels.

**COMPRESSOR**

Compressors shall be heavy-duty commercial, high efficiency scrolls with oil level sight glass, low vibration, and discharge and suction Rotolock service valves.

**AIR FILTERS****RETURN AIR FILTERS**

Return air filters shall be 2" disposable.

**2" PRE-FILTERS**

Filters shall be Farr type 30/30. Air filters shall be 2" thick, pleated, disposable type. Each filter shall consist of a non-woven cotton and synthetic fabric media, media support grid and enclosing frame. Filter media shall be a cotton and synthetic blend with at least 15 pleats per linear foot. A welded wire grid, spot-welded on one-inch centers and treated for corrosion resistance is bonded to the downstream side of the media to maintain the radial pleat and prevent media oscillation. The filter media shall have a Minimum Efficiency Reporting Value of MERV 7 when evaluated under guidelines of ASHRAE Standard 52.2-1999 and an average dust spot efficiency of 25-30% when evaluated under ASHRAE Standard 52.1-1992. The filter is listed by Underwriters' Laboratories as Class 2. A bank of 16-gauge galvanized steel universal holding frames with filter sealing flange, centering dimples, sealing gasket and lances for air filter fasteners shall be arranged for upstream access. Provisions shall be made on the downstream side of the frames to prevent filter blowout from moisture or overloading.

**HIGH EFFICIENCY 95% OUTDOOR AIR FILTERS**

Mounted in the same filter bank with the Pre-filters shall be 12" deep high performance filters, which shall be high lofted supported media disposable type. The media blanket shall be formed into uniform tapered radial pleats and bonded to a welded wire media support grid, which is spot-welded on one-inch centers, and treated for corrosion resistance. Media support contour stabilizers shall be mechanically fastened to diagonal support members of the same construction to create a rigid and durable filter enclosure. There shall be a minimum of four contour stabilizers on the air entering side and six on the air exiting side. The media shall have a Minimum Efficiency Reporting Value of MERV 14 when evaluated under guidelines of ASHRAE Standard 52.2-1999 and an average dust spot efficiency of 90-95% when evaluated under ASHRAE Standard 52.1-1992. The filter is listed by Underwriters' Laboratories as Class 2.

**CHILLED WATER COIL**

Primary surface is round seamless 5/8" O.D. by .020" thick copper tube on 1.5" centers, staggered in the direction of airflow. All joints shall be brazed.]

Secondary surface shall consist of .0060" rippled aluminum plate fins for higher capacity and structural strength. Fins shall have full drawn collars to provide a continuous surface cover over the entire tube for maximum heat transfer. Bare copper tube shall not be visible between fins and the fins shall have no openings punched in them to accumulate lint and dirt. Tubes shall be mechanically expanded into the fins to provide a continuous primary to secondary compression bond over the entire finned length for maximum heat transfer rates.

Casings shall be constructed of galvanized steel. Coil side plates shall be of reinforced flange type.

Coils shall have equal pressure drop through all circuits. Coils shall be circuited for counter flow heat transfer to provide the maximum mean effective temperature difference for maximum heat transfer rates.

Headers on coils shall be seamless copper tubing. The headers shall have intruded tube holes to provide a large brazing surface for maximum strength and inherent flexibility. Supply and return connections shall be steel with male pipe threads.

The complete coil shall be submerged in water and tested with a minimum of 315 psig air pressure to verify suitability for operation at 250 psig working pressures. Individual tube test and core tests before installation of headers shall not be considered satisfactory. Water-cooling coils shall be circuited for drain ability. Use of internal restrictive devices to obtain turbulent flow shall not be acceptable. Vents and drains shall be furnished on all coils. Coils shall be rated in accordance with ARI.

Coils shall be mounted in galvanized holding racks. Water coil supply and return connections shall be extended to the unit exterior. Water coil drain and vent connections are accessible inside the unit and are not extended. Cooling coils shall be mounted in an insulated pitched 304 stainless steel condensate pan. Banks with more than one coil high shall have insulated intermediate 304SS condensate pans individually piped to the lower pan.

**HOT WATER COIL**

Primary surface shall be round seamless 5/8" O.D. by .020" thick copper tube on 1.5" centers, staggered in the direction of airflow. All joints shall be brazed.

Secondary surface shall consist of .0075" rippled aluminum plate fins for higher capacity and structural strength. Fins shall have full drawn collars to provide a continuous surface cover over the entire tube for maximum heat transfer. Bare copper tube shall not be visible between fins and the fins shall have no openings punched in them to accumulate lint and dirt. Tubes shall be mechanically expanded into the ins to provide a continuous primary to secondary compression bond over the entire finned length for maximum heat transfer rates.

Coils shall have equal pressure drop through all circuits. Coils shall be circuited to provide the maximum mean effective temperature difference for maximum heat transfer rates.

Headers on coils shall be seamless copper tubing. The headers shall have intruded tube holes to provide a large brazing surface for maximum strength and inherent flexibility. Supply and return connections shall be steel with male pipe threads.

The complete coil shall be submerged in water and tested with a minimum of 315 psig air pressure to verify suitability for operation at 250 psig working pressures. Coils shall be circuited for drain ability. Internal restrictive devices to obtain turbulent flow shall not be used. Vents and drains shall be furnished on all coils. Coils shall be rated in accordance with ARI.

Coils shall be mounted in galvanized holding racks. Water coil supply and return connections shall be extended to the unit exterior. Water coil drain and vent connections are accessible inside the unit and are not extended.

**MODULATING OUTDOOR AIR DAMPERS**

Dampers could have galvanized steel frames and blades, with blade and jamb seals for low leakage performance. Dampers could have modulating electric actuators with an integral limit switch.

**RECIRCULATION DAMPERS**

Dampers could have galvanized steel frames and blades, with blade and jamb seals for low leakage performance. Dampers could have two-position electric actuators with an integral limit switch.

**EXHAUST AIR DAMPERS**

Dampers could be gravity operated back draft type. Dampers could have aluminum frames and blades, with blade seals for low leakage performance.

**ELECTRICAL PANEL**

Unit will require a 3 phase, 60 cycle field power connection at the main electrical panel. The electrical panel will be NEMA 4 rated and mounted on the unit exterior as shown on the General Arrangement drawings. The electric panel will consist of a non-fused disconnect and HOA switch for the unit. Separate branch circuits, each with overcurrent protection, are provided for each fan, wheel, and transformer. IEC full voltage starters are provided for each non VFD controlled fan and wheel.

Starter coils will be 24volt AC for motor contactors. Electrical panels will bear an ETL label. See the wiring schematic for additional information.

All high voltage wiring up through size #2 will be run in MC cable. All wire size #1 and larger wire is run in EMT. Fan motors requiring wire run in EMT will have less than 48" of flexible metal conduit between the EMT and the motor junction box. Plenum cable is used for low voltage wiring and is not run in conduit.

**LIGHTS & GFI RECEPTACLE (POWERED SEPARATELY)**

Vapor tight light fixtures with compact LED lamps will be provided in access compartments as shown on the General Arrangement drawing. Lights will be wired to a single GFI / switch combo on the unit exterior.

Power is optional line side or load side of main unit disconnect. A separate disconnect and enclosure serves the light and receptacle circuit and is independently fused.

An optional separate 120volt field power connection if chosen will be required at the GFI receptacle to provide power for the lighting and GFI receptacle circuit.

**WARRANTY**

Please see the terms and conditions for your order or contact [service.semco@flaktgroup.com](mailto:service.semco@flaktgroup.com).



# PINNACLE® II SERIES - EQUIPMENT SUMMARY

MODEL SIZE	5	9	13	18	24
WIDTH	86.25	98.25	98.25	122.25	122.25
HEIGHT	284.625	292.5	316.125	337.0	352.75
SUPPLY AIR CFM RANGE <sup>1</sup>	3,000-4,500	4,500-8,000	6,000-10,000	8,000-15,000	11,000-18,000
RETURN AIR CFM RANGE <sup>1</sup>					
PURGE VOLUME <sup>2</sup>	1,005	1,278	1,620	1,977	2,366
HEAT/COOL COIL TOTAL FIN HEIGHT	45 in	54 in	66 in	78 in	90 in
HEAT/COOL COIL TOTAL FIN LENGTH	30 in	42 in	42 in	54 in	54 in
NUMBER OF STACKED COILS (HEIGHT)	(1) 45 in	(2) 27 in	(2) 33 in	(2) 39 in	(2) 45 in
SUPPLY FILTER QUANTITIES & SIZES	(2) 24x24	(6) 20x24	(6) 24x24	(3) 20x24	(12) 20x24
	(2) 12x24	-	-	(9) 20x20	-
RETURN FILTER QUANTITIES & SIZES	(2) 24x24	(2) 24x24	(3) 24x24	(6) 24x24	(8) 24x24
	(2) 12x24	(3) 12x24	(3) 12x24	(2) 12x24	-
DOOR SIZE (INCHES)	13.25x42.75	13.25x55.75	19x66	19x66	19x66

<sup>1</sup>Maximum airflow limitations vary. Consult SEMCO before laying out unit with velocities greater than 525 fpm on 2" filters, 525 fpm on cooling coils, and 1100 fpm on wheels.

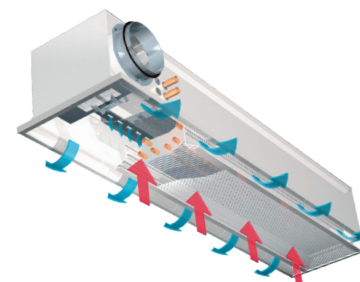
<sup>2</sup>Dual wheel purge volume based on 4" P<sub>DA</sub>-P<sub>RA</sub> on Enthalpy wheel, 1" P<sub>DA</sub>-P<sub>RA</sub> on PD wheel.

# ADDITIONAL SEMCO PRODUCTS



## NEUTON™ CONTROLLED CHILLED BEAM PUMP MODULE

- State-of-the-art active condensation control effectively eliminates chilled beam condensation concerns.
- Reduces cost of a chilled beam installation by 30% or more by utilizing smaller pipe diameters, fittings & fewer feet of pipe.
- Uses a fraction of the energy used by traditional pump systems.
- Virtually eliminates field control requirements at the zone level.



## FLEXICOOL IQSA CHILLED BEAM

- Supply air beams are designed to manage high cooling effects
- Equipped with adjusting rails, comfort control, for the adjustment of air flow, cooling effect and flow pattern
- Capacity & flow directions easily adjustable
- Fastening brackets for quick & easy mounting - lift up - snap on



## IQHC ACTIVE CHILLED BEAM

- Industry best capacity to energy consumption ratio
- Utilizes the lowest air & water pressure to enhance the overall energy benefit of chilled beams
- Universal duct & water connections for easy installation
- Superior indoor air quality & energy efficiency.



## CHILLED BEAM WITH ACTUATED SLOTS (WEGA II / NOVA II / SILENCIA)

- Motorized Energy Control
- Flow pattern control to adapt to the frequent changes of the modern office
- Control and regulation equipment
- Heating function: water coil or electrical coils
- Lighting



## LYRA II CASSETTE CHILLED BEAM

- Pi (Pressure Independent) Airflow control provides built-in flexibility
- Very low noise level combined with high flexibility and high cooling capacity
- Fastening brackets make for easy installation - only 1 person needed to install
- Diffuses air in 4 directions to provide high cooling capacity and high level of comfort



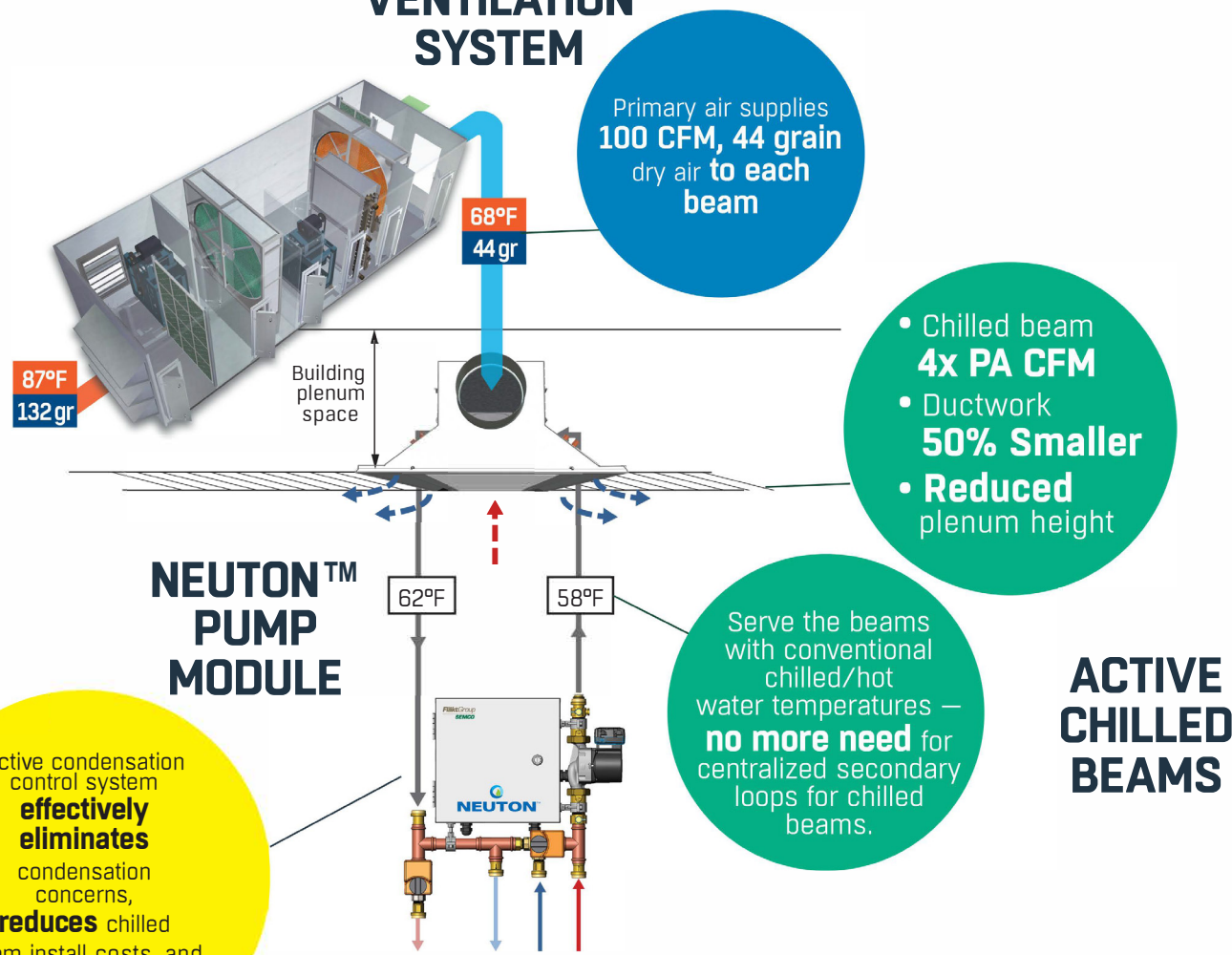
## QPVA PASSIVE CHILLED BEAM

- Provides convective cooling to a space without requiring air duct connection
- Designed for pendant or ceiling grid mount
- Lengths available include 4, 6, 8, 10 & 12 feet
- Utilized alone, or as a supplement to active chilled beams to reduce primary air required in a high sensible load room

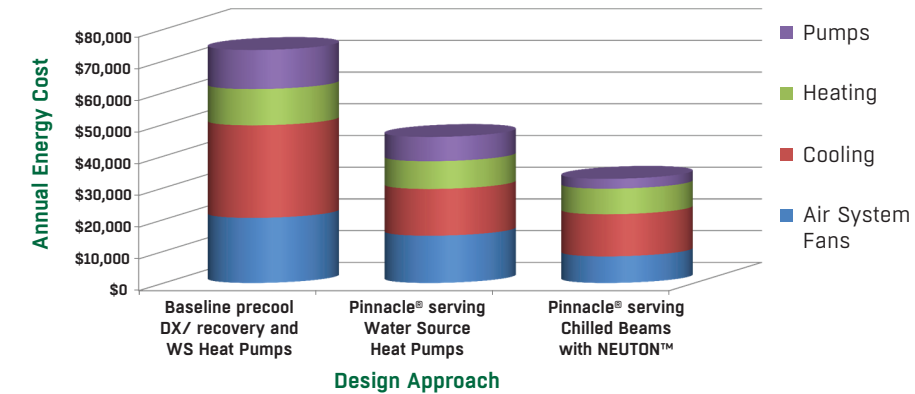
# 3FFICIENCY



## PINNACLE® I VENTILATION SYSTEM

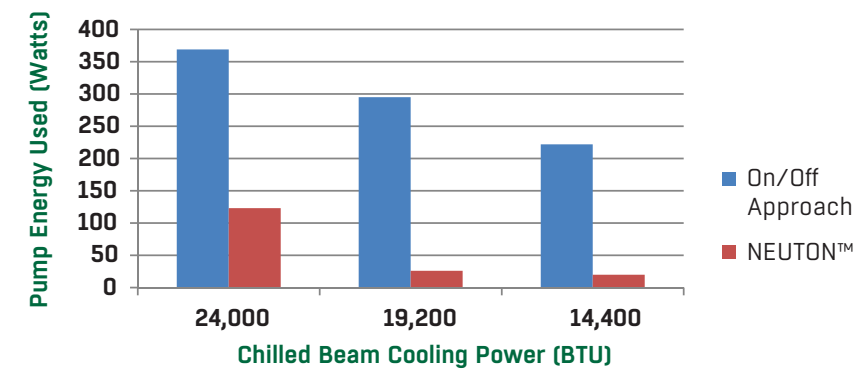


## 3FFICIENCY™ ENERGY SAVINGS



Energy modeling completed for a high school project comparing three design approaches which highlights the energy savings offered by the 3fficiency™ system, even over the efficient Pinnacle I® serving water source heat pumps.

## VARIABLE FLOW USING HIGH EFFICIENCY PUMP VS CONVENTIONAL



Standard efficiency pump (on/off) vs high efficiency ECM variable speed pump served by the NEUTON™ pump module control logic

- The Pinnacle® Series combined with active chilled beams and the NEUTON™, chilled beam pump modules — creates a whole-building efficient hydronic system 3fficiency™. The 3fficiency™ system is uniquely designed to maximize cost savings and create superior indoor air quality, making it a better alternative to variable refrigerant flow (VRF).
- The energy savings created by employing the 3fficiency™ system are so significant that it was named to the Top 10 Green Building Products list in 2018, and it has also received recognition throughout the HVAC industry for not only being energy efficient, but also an easy-to-specify integrated system.
- A high-efficiency ECM motor combined with substantial power reduction offered by the NEUTON™ variable flow pump results in significant energy savings over traditional, constant flow — on/off approach.
- Three cooling conditions are analyzed above: peak coil cooling power (24,000 BTUs), 80% of peak (19,200 BTUs) and 60% of peak (14,400 BTUs)
- The constant speed pump operates to deliver a constant flow of 6 gpm at a 13 foot pressure head — cycled on and off during part load.
- The NEUTON™ ECM variable flow pump runs continuously, but varies the flow from 6 gpm down to 3 gpm, greatly reducing the pump energy used.

# EXCELLENCE IN SOLUTIONS

FläktGroup SEMCO delivers smart, energy-efficient, air-quality solutions to support every building application. We offer our customers innovative technologies, high-quality products and outstanding performance supported by more than fifty years of accumulated industry experience. The broadest offering on the market and a strong market presence in 65 countries worldwide guarantees that we are always by your side, ready to deliver: Excellence in Solutions.

### FläktGroup SEMCO

Corporate Headquarters  
1800 East Pointe Drive  
Columbia, Missouri 65201 USA

573.443.1481

[sales.semco@flaktgroup.com](mailto:sales.semco@flaktgroup.com)

To learn more about FläktGroup SEMCO offerings and to contact your nearest representative please visit

[www.semcohvac.com](http://www.semcohvac.com)

