



*PR SERIES SELECTION AND OPTIMIZATION GUIDE*



# SOLUTIONS TO FREQUENTLY MISSED SELECTIONS

Field #	1	2	3	4	5	6	7	8	9	10
Field Position & Length	1-2	3	4	5-6-7	8-9	10	11	12	13	14-15
Field Definition	Product Family	Type	Application	Nominal Capacity	Cabinet Size	Controls	Unit Voltage	Model Vintage	Airflow Orientation	Supply Blower / Size Type
Example	PR	O	A	240	C3	A	2	A	A	BG
Field #	11	12	13	14	15	16	17	18	19	20
Field Position & Length	16	17	18	19	20	21	22-23	24	25	26-27
Field Definition	Supply Blower Options	Supply Motor Size	Supply Motor Type	Cooling Coil	Compressor Type	Reserve for future use	Refrigeration Controls / Options	Heating Type	Electric Heating Capacity	Gas Heating Capacity
Example	F	E	1	B	5	0	CF	0	0	00
Field #	21	22	23	24	25	26	27	28	29	30
Field Position & Length	28	29	30	31	32	33-34	35	36	37	38-39
Field Definition	Heater Control	Heating Gas Safety Controls	Energy Recovery	Energy Recovery Options	Ventilation	Exhaust Blower Size	Exhaust Blower Options	Exhaust Motor Size	Exhaust Motor Type	Corrosion Protection
Example	0	0	F	F	C	00	T	D	1	00
Field #	31	32	33	34	35	36	37	38		
Field Position & Length	40-41	42-43	44-45	46-47	48	49	50-51	52-53		
Field Definition	Maintenance Options	Power Options	Control Options	Safety Controls	Pre-Filter	Reserve for Future Use	ALC Ship With Options	PR ROOF CURBS		
Example	00	00	00	00	0	0	BK	CC		

## Airflow Orientation & Ventilation

- These options are dependent upon the unit application and PR Controls selected. Use the tables in the Controls Guidelines section to ensure what is compatible.
- As of now, horizontal discharge is not selectable in ACE. If horizontal discharge is need then send to APPS.
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## Refrigeration Controls/Options

- These options are dependent upon the compressor type selected. Refer to the Refrigeration Controls Guideline section to ensure the correct components are selected with the desired application.

## Supply Blower Options & Supply Blower Type

The ACE Selection Software tool auto selects the fan based on the data entered, and this needs to be verified in order to make sure the fan options do not conflict.

- If the ACE Selection Software selects an ECM Fan (GHKM), then only select from the ECM options.
- ANPL and ANPA fans are from Comefri, and this fan is compatible only with options labeled with "Comefri"
- Refer to the PR Cabinet Rules section to verify which fan sizes are compatible with which cabinet.

## Exhaust Blower Options and Exhaust Motor Type

The ACE Selection Software tool auto selects the fan based on the data entered, and this needs to be verified in order to make sure the fans do not conflict.

- If the ACE Selection Software selects an ECM Fan (GHKM), then only select from the ECM options.
- ANPL and ANPA fans are Comefri, and this fan is compatible only with options labeled with "Comefri"
- Ensure that options with no exhaust air flow do not select any options regarding exhaust fans. This will cause a conflict in the software.
- If 25" fans select with 3 HP in the software, this will generate an error because the smallest motor available is 5 HP. If this occurs contact the apps department.
- Refer to the PR Cabinet Rules section to verify which fans are compatible with which unit

## PR CABINET RULES

Cabinet	MAX Blower Size	MAX ECW	Max Furnace Heating Capacity	Max Furnace XL Cabinet	Max EH Cabinet
<b>A Cabinet</b> 450-3300 CFM	GHKM400 355,315,280 <b>(ECM Motors ONLY)</b>	ECW364 244,324	100 MBH Furnace (30 KW Electric)	N/A	EH 30KW
<b>B Cabinet</b> 1000-5700 CFM	GHKM450 450,355  ANPL16 10,11,12,14,16	ECW424  244,324, 364	200 MBH Furnace (100 KW Electric)	(2)200 MBH	EH 100KW
<b>C Cabinet</b> 3500-7000 CFM	GHKM450  ANPL20 14,16,18	ECW486  324,364, 424,484	300 MBH Furnace (100 KW Electric)	(2)400 MBH	EH 100KW
<b>D Cabinet</b> 5000-14000 CFM	2-GHKM450 2-355, 450,  ANPL25 22,20,18	ECW706  484,486, 544,606, 664,666	400 MBH Furnace (150 KW Electric)	(2)600 MBH	EH 150KW
<b>E Cabinet</b> 9000-20000 CFM	(2) ANPL20 (1) ANPL25	ECW8412	600 MBH Furnace (150 KW Electric) <b>(No horizontal supply available)</b>	<u>Vertical Supply</u> (4)400 MBH <u>Horizontal Supply(EXL Only)</u> (2)600 MBH	EH 150KW

### Furnace Options

Furnace MBH Input	Furnace MBH Output	Heaters	Stages	Modulation
75	60	(1) 75	2	5:1
100	80	(1)100	2	5:1,10:1
150	120	(1)150	2	5:1,10:1
200	160	(1)200	2	5:1,10:1
250	200	(1)250	2	5:1,10:1
300	240	(1)300	2	5:1,10:1
350	280	(1)350	2	5:1,10:1
400	320	(1)400	2	5:1,10:1
500	400	(1)500	2	5:1,10:1
600	480	(1)600	2	5:1,10:1
200	160	(2)100	4	10:1
300	240	(2)150	4	10:1
400	320	(2)200	4	10:1
500	400	(2)250	4	10:1
600	480	(2)300	4	10:1
700	560	(2)350	4	10:1
800	640	(2)400	4	10:1
1000	800	(2)500	4	10:1
1200	960	(2)600	4	10:1
800	640	(4)200	8	20:1
1000	800	(4)250	8	20:1
1200	960	(4)300	8	20:1
1400	1120	(4)350	8	20:1
1600	1280	(4)400	8	20:1

### Electric Heater Options

208 V Capacity kW	280/480 V Capacity kW	Heater Control Stages
3.65	5	1,SCR
7.50	10	2,SCR
11.25	15	2,SCR
15.00	20	2,4,SCR
18.75	25	2,4,SCR
22.50	30	2,4,SCR
26.25	35	2,4,SCR
30.00	40	2,4,SCR
37.50	50	4,SCR
45.00	60	4,SCR
52.50	70	4,SCR
60.00	80	4,SCR
75.00	100	4,SCR
81.40	110	4,SCR
90.00	120	4,SCR
97.50	130	4,SCR
105.00	140	4,SCR

# OPTIMIZING PR CABINET SELECTIONS

Use the following matrix for determining an optimal PR Cabinet when price is a concern.

## PR Cabinet Selection Guide

Cabinet	CFM Range	Gas Heater Max Size	Refrigeration Sizes Available	When to use XL	Notes
A Cabinet	450-3,300 Horizontal SA 3,300 Max Horizontal RA 2,700 Max	100 MBH	3-8 Tons	NA	ECM fans ONLY.  If you need ODP or TEFC use B Cabinet.  On a PRRA, will require 6 row coil for DOE.
B Cabinet	1,000-5,700 Horizontal SA 5,700 Max Horizontal RA 3,300 Max	200 MBH 400 MBH (XL)	3-20 Tons	When you need between 350-400 MBH	If you need 250-300 MBH use the C cabinet. (Price will be lower always)
C Cabinet	3,500-7,000 Horizontal SA 7,000 Max Horizontal RA 3,000 Max	300 MBH 800 MBH (XL)	8-35 Tons	350-800 MBH	You might not be able to run ECW above 5,000 CFM in Ace. If this occurs send to apps.
D Cabinet	5,000-14,000 Horizontal SA 10,000 Max Horizontal RA 5,500 Max	400 MBH 1,200 MBH (XL)	20-55 Tons	400 MBH-1,200 MBH  Some Heat Pumps	D Cabinet is going to be a better price than E 99% of the time.  Use Sub-cooling and always check 4 row coil performance compared to 6 row coils.
E Cabinet	9,000-20,000 Horizontal SA 16,000 Max (XL ONLY) NO Horizontal RA (E AND EXL)	600 MBH 1,600 MBH (XL) (Vertical) 1,200 MBH (XL) (Horizontal)	40-70	Required for some Tandem compressors  Above 1200 MBH	Check 4 row coil performance to ensure price savings for minimal performance drop.

# REFRIGERATION CONTROLS GUIDELINES

Use the following table to ensure the correct PR selections are made.

## PR Series Refrigeration Controls Application Based on Compressor Selection

Compressor Type	How to Implement HGRH	How to Implement HGBP	Notes	How to Implement Liquid Subcooling
<b>Standard Scroll/Single Circuit</b>	Single Circuit Staged or Modulating..	<b>REQUIRED</b> for 100% OA applications. Select HGBP on the Lead circuit	Units 96 MBH capacity and <b>BELOW</b>	
<b>Dual Scroll/ Dual Circuit</b>	Select Dual Circuit <b>OR</b> Single Circuit Staged or Modulating..	Select Dual Circuit HGBP <b>ONLY</b>	Units 120 MBH capacity and <b>ABOVE</b>	
<b>Digital Scroll/Single Circuit</b>	Single Circuit Staged or Modulating..	<b>No HGBP with Digital Scrolls.</b>	Units 96 MBH capacity and <b>BELOW</b> Heat pump and water source	
<b>Single Digital and Single Scroll(Dual Circuit)</b>	Select Dual Circuit <b>OR</b> Single Circuit Staged or Modulating..	<b>REQUIRED</b> for 100% OA applications. Select HGBP on the Lag circuit	Digital Scroll <b>ALWAYS</b> on lead circuit. Units 120 MBH and <b>ABOVE</b>	
<b>Dual Digital Scroll (Dual Circuit)</b>	Select Dual Circuit <b>OR</b> Single Circuit Staged or Modulating..	<b>No HGBP with Digital Scrolls.</b>	Units 120 MBH and <b>ABOVE</b>	

**DO NOT** select with Dual Circuit HGRH.  
Select with Single Circuit HGRH **OR** alone.  
**DO NOT** select with Heat Pump applications.

# CONTROLS GUIDELINES

PR CONTROLS Vs. Ventilation Options Matrix	Available at this unit type									
		Q= None	A= Hood & Birdscreen without Damper	B= Manual OA Damper without Actuator	C= Motorized 2-Position OA Damper with 2-Position Actuator (ALC, Field DDC, EV)	D= Motorized Proportional OA Damper with 0-10Vdc Actuators (ALC, Field DDC)	E= Motorized 2-Position OA & RA Dampers with 2-Position Actuators (ALC, Field DDC)	F= Modulating OA & RA Dampers with 0-10Vdc Actuators (ALC, Field DDC)	G= Modulating Enthalpy Economizer (EV)	H= Modulating Sensible Economizer (EV)
A = ALC, Standard Program, DOAS	PRO		X	X	X	X				
B = ALC, Standard Program, DOAS w/ Recirc NSB	PRO with return						X			
C = ALC, Standard Program, Recirc	FRR	X		X		X				
D = ALC, Standard Program, w/ Econo., Enthalpy	FRM/FRR							X		
E = ALC, Standard Program, DOAS for Lonworks	PRO		X	X	X	X				
F = ALC, Std. Program, DOAS w/ Recirc NSB for Lonworks	PRO with return						X			
G = ALC, Std. Program, Recirc for Lonworks	FRR	X		X		X				
H = ALC, Std. Program, w/ Econo., Entpy. for Lonworks	FRM/FRR							X		
J= Controls by others, factory mounted	PRO, FRM/FRR	X	X	X	X	X	X	X		
K= Terminal strip, controls provided and field mtd. by others	PRO, FRM/FRR	X	X	X	X	X	X	X		
L= Remote Thermostat	FRM/FRR	X		X					X	X
M= Compressor Lockout Thermostat	PRO		X	X	X				X	X
N = ALC, Standard Program, w/ Econo., Sensible	FRM/FRR							X		
P = ALC, Std. Program, w/ Econo., Sens. for Lonworks	FRM/FRR							X		

PR Controls Vs. Airflow Orientation	A = Vertical Supply and Vertical Return	B = Horizontal Supply and Vertical Return	C = Vertical Supply and Side Return	D = Horizontal Supply and Side Return	E = Vertical Supply and No Return	F = Horizontal Supply and No Return
	A = ALC, Standard Program, DOAS					✓
B = ALC, Standard Program, DOAS w/ Recirc NSB	✓	✓	✓	✓		
C = ALC, Standard Program, Recirc	✓	✓	✓	✓		
D = ALC, Standard Program, w/ Econo., Enthalpy	✓	✓	✓	✓		
E = ALC, Standard Program, DOAS for Lonworks					✓	✓
F = ALC, Std. Program, DOAS w/ Recirc NSB for Lonworks	✓	✓	✓	✓		
G = ALC, Std. Program, Recirc for Lonworks	✓	✓	✓	✓		
H = ALC, Std. Program, w/ Econo., Entpy. for Lonworks	✓	✓	✓	✓		
J= Controls by others, factory mounted	✓	✓	✓	✓	✓	✓
K= Terminal strip, controls provided and field mtd. by others	✓	✓	✓	✓	✓	✓
L= Remote Thermostat	✓	✓	✓	✓		
M= Compressor Lockout Thermostat					✓	✓
N = ALC, Standard Program, w/ Econo., Sensible	✓	✓	✓	✓		
P = ALC, Std. Program, w/ Econo., Sens. for Lonworks	✓	✓	✓	✓		

## **Price Optimizing Measures**

### Compressors

- Digital is always more expensive than regular scroll compressors.
- A good balance in terms of performance and price for dual circuit units is to use the single digital/single scroll option with lag hot gas bypass (unless your project requires otherwise). This option will always be less expensive than dual digital scrolls.

### Liquid Subcooling

- Recommended as a method to improve upon cost and provide more efficiency for 100% OA Units.
- No Liquid Subcooling is available for Heat Pump applications larger than 300MBH cooling capacity. The receiver for this application is too big and it cannot be implemented for that purpose.

### 4 row coils vs. 6 row coils (Especially when deciding between the E and D cabinet).

- 4 row coils are less expensive than 6 row coils, however compare with 6 row coils to ensure performance drop is minimal/acceptable. If the 6 row coil can get you to a smaller cabinet size, then it will usually be more cost effective in this case to use the 6 row coil.
- For smaller cabinets, it may be less expensive to select a 6 row coil with no subcooling than with a 4 row coil and subcooling.

### Fans

- ECM fans are the most expensive, followed by the ANPA fans, and then the ANPL fans (in terms of fans of the same size). For example, an ANPL16 will be less expensive than an ANPA16.
- The software can be directed to choose one fan over the other in the selection page. For ANPL fans, you will have to select the ODP motor, and backwards incline. For ANPA fans you will have to select ODP motor and airfoil. For ECM, you will have to indicate the motor to be ECM, and the other field should automatically update with backwards incline as the option selected.

### Heater controls

- Heater controls are more expensive with the higher degree of modulation that you go. For example, the 10:1 modulation is more expensive than the 5:1 modulation, and the 5:1 modulation is more expensive than the 2 stage.

## **Procedure for Optimization**

It is advised when optimizing price to copy the unit multiple times and switch out the options accordingly, in order to definitively see which options are the cheapest. In most cases, going to the smallest cabinet possible will result in the best price. If the cabinet size can't be changed, then coil size and refrigeration options can save the most money.

- Use the tables in the previous pages to determine which cabinet will be the optimal choice for your application.
- Once that is selected, refer to the tables to make sure the controls, refrigeration, and fan options are correct.
- Test your performance with the combination of 4 row coil, 6 row coil, and liquid subcooling (for 100% OA)  
In terms of price, these features are listed from cheapest to most expensive:
  1. 4 row coil with no subcooling
  2. 6 row coil with no subcooling
  3. 4 row coil with subcooling
  4. 6 row coil with subcooling
- As stated earlier, cabinet size is the most important factor for reducing price. For instance, a C cabinet with 6 row coil and liquid subcooling will be cheaper than a D cabinet with a 4 row coil only.
- If a furnace size is forcing you into a cabinet, always make sure to check performance between a 4 row and 6 row coil (sometimes the difference in performance is less than 1 degree).

