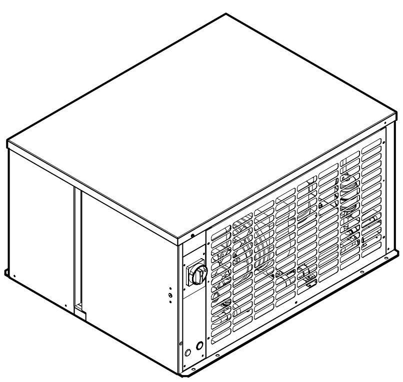
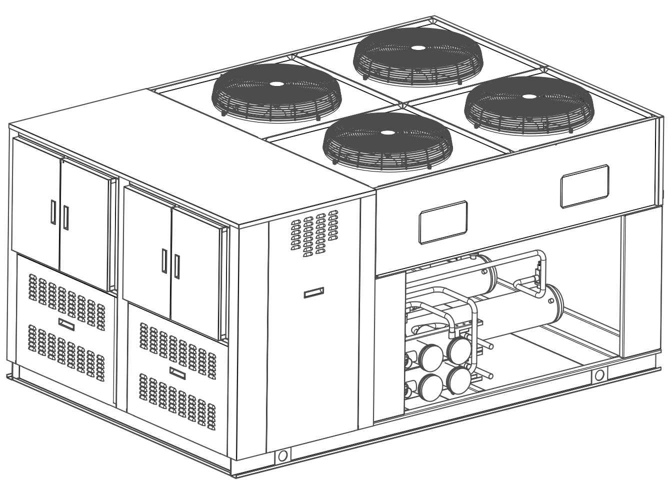
KeepRite® REFRIGERATION

Head Pressure Control Application Guide

for
Air-Cooled Condensers
and Condensing Units





Bulletin K40-HPC-AG-2

1101110

GENERAL

When air-cooled condensers or condensing units are installed outdoors, they will be subjected to varying ambient temperatures. This variance could be as much as 120°F *(48.9 °C)* of swing throughout the summer and winter seasons and will have a major impact on the performance of the condenser. As the ambient temperature drops, the condenser capacity will increase due to the wider temperature difference between ambient and condensing temperature. As this happens, the condensing temperature will also drop as the system finds a new balance point. Although overall system capacity will increase, other problems can occur. The capacity of an expansion valve is affected by both the liquid temperature entering the valve and the pressure drop across it. As the condensing temperature decreases, the pressure drop across the metering device also decreases. This lower pressure drop will then decrease the capacity of the valve. Although lower liquid temperatures increase the capacity of the metering device, the increase is not large enough to offset the loss due to the lower pressure drop. To provide adequate pressure drop, some form of head pressure control is required. Refer to the following design methods (covered in order of simplicity and features).

FAN CYCLING (Multiple Fans)

Cycling of the condenser fans helps regulate the condensing temperature. Using this approach, as the ambient drops the fans are taken off-line either one at a time, or in pairs. With multiple fan condensers, it is not recommended to cycle more than two fans per step. The reason is that the pressure in the condenser will increase drastically as several fans are taken off-line at the same time. This will result in erratic operation of the refrigeration system and applies additional stress to the condenser tubes. It is preferable to regulate the condensing temperature as smoothly as possible. Fans should be cycled independently on single row condenser fan models. On double wide condensers, when used with a single refrigeration circuit, the fans should be cycled in pairs.

Ambient temperature or pressure sensing controls can be set to bring on (or off) certain fans when the outdoor temperature or condensing pressures reach a predetermined condition. Temperature or pressure set points and differentials should be correctly set to prevent short cycling of the fans. Constant short cycling will produce volatile condensing pressures, erratic refrigeration performance, decreased fan motor life, and added stress to the condenser tubes.

For recommended fan cycling switch settings, refer to Tables 2 and 3. Differential settings on fan cycling temperature controls should be no lower than 3.5°F *(2°C)*. On fan cycling pressure controls with R404A, a differential of approximately 35 psig is recommended. On supermarket applications remote condenser fans may be cycled individually (not in pairs) and therefore lower differential settings may apply and will depend on the specific application.

Fans closest to the inlet header must run whenever the compressor is running and should NEVER be cycled since sudden stress changes placed on these inlet tubes and headers will dramatically shorten the life of the condenser. Table 1 shows the fan cycling configurations and options available for all remote condenser models.

Table 1 - Fan Cycling Control Schedule

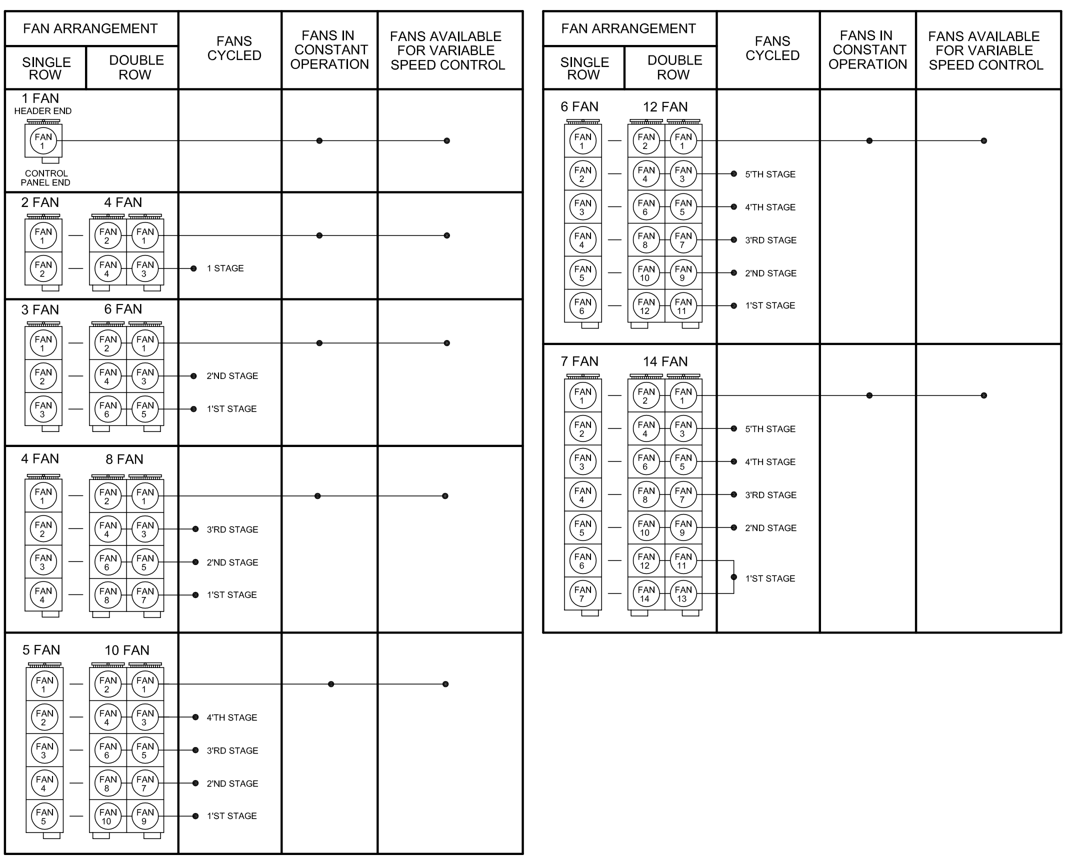


Table 2 - Ambient Fan Cycling Thermostat Cut-Out Settings

NUMBER OF FANS ON CONDENSER		DESIGN T.D. °F *(°C)*	THERMOSTAT SETTINGS °F *(°C)*				
Single Row Models	**Double Row Models**		**1st Stage**	**2nd Stage**	**3rd Stage**	**4th Stage**	**5th Stage**
2	4	30 *(16.7)*	60 *(15.6)*				
		25 *(13.9)*	65 *(18.3)*				
		20 *(11.1)*	70 *(21.1)*				
		15 *(8.3)*	75 *(23.9)*				
		10 *(5.6)*	80 *(26.7)*				
3	6	30 *(16.7)*	60 *(15.6)*	40 *(4.4)*			
		25 *(13.9)*	65 *(18.3)*	55 *(12.8)*			
		20 *(11.1)*	70 *(21.1)*	60 *(15.6)*			
		15 *(8.3)*	75 *(23.9)*	65 *(18.3)*			
		10 *(5.6)*	80 *(26.7)*	75 *(23.9)*			
4	8	30 *(16.7)*	60 *(15.6)*	50 *(10.0)*	30 *(-1.1)*		
		25 *(13.9)*	65 *(18.3)*	55 *(12.8)*	40 *(4.4)*		
		20 *(11.1)*	70 *(21.1)*	60 *(15.6)*	50 *(10.0)*		
		15 *(8.3)*	75 *(23.9)*	65 *(18.3)*	60 *(15.6)*		
		10 *(5.6)*	80 *(26.7)*	75 *(23.9)*	70 *(21.1)*		
5	1 0	30 *(16.7)*	60 *(15.6)*	55 *(12.8)*	45 *(7.2)*	30 *(-1.1)*	
		25 *(13.9)*	65 *(18.3)*	60 *(15.6)*	50 *(10.0)*	35 *(1.7)*	
		20 *(11.1)*	70 *(21.1)*	65 *(18.3)*	60 *(15.6)*	40 *(4.4)*	
		15 *(8.3)*	75 *(23.9)*	70 *(21.1)*	65 *(18.3)*	55 *(12.8)*	
		10 *(5.6)*	80 *(26.7)*	75 *(23.9)*	70 *(21.1)*	65 *(18.3)*	
6 / 7	12 / 14	30 *(16.7)*	55 *(12.8)*	50 *(10.0)*	40 *(4.4)*	30 *(-1.1)*	25 *(-3.9)*
		25 *(13.9)*	60 *(15.6)*	60 *(15.6)*	55 *(12.8)*	45 *(7.2)*	35 *(1.7)*
		20 *(11.1)*	65 *(18.3)*	65 *(18.3)*	60 *(15.6)*	50 *(10.0)*	40 *(4.4)*
		15 *(8.3)*	70 *(21.1)*	70 *(21.1)*	65 *(18.3)*	60 *(15.6)*	50 *(10.0)*
		10 *(5.6)*	75 *(23.9)*	75 *(23.9)*	70 *(21.1)*	65 *(18.3)*	60 *(15.6)*

Table 3 - Pressure Fan Cycling Cut-In Control Settings

NUMBER OF FANS ON CONDENSER		DESIGN T.D.	REFRIGERANT	CONTROL SETTINGS Pressure Switch Cut-In Settings PSIG				
Single Row Models	**Double Row Models**			**1st Stage**	**2nd Stage**	**3rd Stage**	**4th Stage**	**5th Stage**
2	**4**	20	R134a	147				
			R22	215				
			R407A R448A R407C R404A R507	220				
3	**6**	20	R134a	147	155			
			R22	215	245			
			R407A R448A R407C R404A R507	220	247			
4	**8**	20	R134a	147	155	160		
			R22	215	231	247		
			R407A R448A R407C R404A R507	220	238	255		
5	**1 0**	20	R134a	147	153	156	160	
			R22	215	225	236	247	
			R407A R448A R407C R404A R507	220	238	250	260	
6 / 7	**12 / 14**	20	R134a	147	150	153	157	160
			R22	215	223	230	239	247
			R407A R448A R407C R404A R507	220	238	245	255	265

- For R449A, use R448A data.

FAN CYCLING CONTROLS SHOULD BE SET TO MAINTAIN A MINIMUM OF (5) FIVE MINUTES ON AND (5) MINUTES OFF. SHORT CYCLING FANS CAN RESULT IN PREMATURE FAILURE OF FAN BLADES AND/OR FAN MOTORS

VARIABLE SPEED MOTOR CONTROL ON HEADER FAN (used with fan cycling)

If additional head pressure control is required beyond the last step of fan cycling, variable fan motor speed methods may be used. A varying motor speed may be accomplished using a modulating temperature or modulating pressure control. Varying the speed of the header Fan motor can be achieved by using a varying voltage controller (triac sine wave chopper), variable frequency drives (VFD), or EC (electronically commutated) motors. EC motors are preferred due to their simplicity, reliability, and energy savings.

VARIABLE SPEED EC MOTOR CONTROL ON ALL FANS

EC (electronically commutated) motors can be controlled to provide a similar function to the fan cycling method by constantly varying their speed and air flow through the condenser as opposed to the sudden air flow change from a fan cycling on and off. Air cooled condensers and condensing units utilizing EC motor technology offer many benefits; Improved efficiency, reduced sound levels, variable speed head pressure control, refrigerant savings, energy savings and reliability.

Improved Efficiency

EC motors are more energy efficient than conventional AC (PSC and shaded pole) motors. Unlike AC motors that see efficiency decrease as the motor speed is decreased, an EC motor efficiency remains consistent throughout its range of operation.

Reduced Sound

As EC motor speeds vary for different operating conditions they also offer reduced sound levels when compared to conventional motor running full speed. Sound levels are reduced on cooler days and in evenings.

Head Pressure Control

EC motors make it easier to maintain stable head pressures when motor speeds are varied according to operating conditions. When compared to a conventional fan cycling system, EC motors do a much better job maintaining stable head pressures. System performance is further enhanced with consistent liquid temperatures that ensure optimized operation of the nozzle and TX valve in the evaporator. In colder ambients, special consideration should be given to the use of heated and insulated receivers and wind guard protection on the condenser. (See Table 6 for recommendations)

Refrigerant Savings

System charges can be reduced by 30 – 40% by utilizing variable speed EC motors to control head pressures. The elimination of the head pressure control valve also eliminates the need for any extra winter refrigerant charge required to flood the condenser.

Energy Savings

When a system's head pressure is controlled using a flooded head pressure control valve, the condenser fan motor runs at 100% fan speed all of the time. When head pressure is controlled using an EC motor and the motor speed is varied according to operating conditions, this results in lower energy consumption of the motor. The amount of energy to be saved depends on; ambient conditions, system operation conditions and head pressure set point.

Simplicity and Reliability

The installation and control of EC motors is very simple compared to other methods of speed control used on conventional AC motors. Lower running operating temperatures and smooth transitional speed changes make EC motors durable and reliable. To provide speed control, a separate electronic controller and pressure transducer sensing the high side pressure is required. This provides fan speed regulation down to the lowest RPM and fan pulsation where applicable. For colder ambient temperatures 10˚F *(-12˚C)* and below, a further positive means of control is required (such as flooding valve type methods or new Limitrol+ option).

CONDENSER FLOODING (REFRIGERANT REGULATING CONTROLS)

During colder 10˚F*(-12˚C)* and below ambient temperatures , reducing the condenser fan air flow may not be enough to maintain an acceptable minimum 70˚F*(21˚C)* condensing temperature. This requires the condenser's primary heat transfer surface to be reduced . This can be achieved by displacing a portion of the internal condenser volume with vapour free liquid refrigerant. This common control method is achieved by the use of head pressure control flooding valves. The specific type of regulating valve and piping configuration will vary with system size (capacity), application and desired user features. The amount of the additional liquid charge required to maintain an adequate head pressure (condensing temperature) will vary with both the actual ambient temperature and the system application (low, medium, or high temperature evaporating temperatures). Depending on actual ambient and specific application, the condenser could require flooding charges anywhere between 30 to 95% of the condenser's internal volume. At lower, colder ambient temperatures below -20˚F*(-29˚C)*, the use of a heated and insulated receiver should be considered. For further details on flooding valve operation and piping arrangements refer to literature provided by the various regulating valve suppliers (Sporlan, Parker, etc.).

NEW LIMITROL+
FLOATING HEAD PRESSURE CONTROL SYSTEM

This new floating head pressure control option, Limitrol+ (Limitrol Plus) has been specifically designed for Air-cooled condensing units and combines various technologies into a responsive system that floats the head pressure below 90˚F*(32˚C)* condensing temperatures, saving energy and reducing environmental impact. Unlike previous head pressure flooding valve applications, this system uses EC motor technology and condenser portioning control to provide reduced operating refrigerant charges without the need for a flooding valve and oversized receiver. As a result, this non-flooding system can provide control at much colder ambient temperatures where previous designs have proven ineffective.

Limitrol+ offers the following benefits:

- Reduces compressor energy consumption and run time
- Utilizes EC motor technology which further reduces energy consumption
- Lowers environmental impact through reduced refrigerant use
- Provides stable system performance at very low temperatures

To see how much Limitrol+ can save on energy and refrigerant, compared to conventional flooded valve systems, refer to Tables 4 and 5.

LIMITROL+

FLOATING HEAD PRESSURE CONTROL SYSTEM

LIMITROL+ POTENTIAL SAVINGS

Table 4 - Percentage & Dollar KWH Savings over Flooded Valve Systems

MODEL	Philadelphia, PA		New York, NY		Boston, MA		Charlotte, NC		Atlanta, GA		Los Angeles, CA		St Louis, MO		St. Paul, MN		Toronto, ON	
	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$
5 HP Cooler	22	616	23	1,099	25	1,081	18	474	16	521	16	835	20	624	25	798	27	638
7.5 HP Cooler	21	1,008	22	1,805	23	1,707	18	843	17	954	17	1,499	19	1,053	24	1,270	25	1,000
10 HP Cooler	18	1,204	18	2,131	20	2,095	15	975	14	1,089	18	2,446	16	1,227	20	1,529	21	1,223
15 HP Cooler	19	1,852	20	3,300	21	3,170	16	1,567	15	1,767	19	3,570	17	1,916	22	2,337	22	1,834
6 HP Freezer	24	903	25	1,621	26	1,548	21	753	20	848	23	1,548	22	928	26	1,119	27	891
7.5 HP Freezer	21	994	21	1,783	23	1,726	17	800	16	891	18	1,591	19	1,012	23	1,255	24	1,004
13 HP Freezer	19	1,425	19	2,535	21	2,450	16	1,150	15	1,286	15	2,110	17	1,471	21	1,798	22	1,428
15 HP Freezer	18	1,602	19	2,846	20	2,717	16	1,312	15	1,479	14	2,224	17	1,672	20	2,009	21	1,587

* The above is a BIN Hour Analysis. Weather data was used from ASHRAE Weather Data Viewer and electrical rates for each city are based on June 2013 data from EIA (U.S. Energy Information Administration).
** Above numbers do not include refrigerant savings, and further cost savings can be expected.

Table 5 - Refrigerant Savings over Flooded Valve Systems

KE Model HP	*Flood Valve -20°F Ambient	*Limitrol+ -20°F Ambient	% Charge *Savings
3 M	8.6	6	30%
3, 3.5, 4 L	9.3	6.4	31%
5 H,M	18.1	11.9	34%
6, 7.5 L	20.0	12.9	36%
7.5 H	18.2	12	34%
7.6, 8, 10 H	20.1	15.9	21%
9, 10 L	22.2	17	23%
12, 15, 20 H	33.0	25.8	22%
12, 13, 15,22 L	36.6	27.6	25%

KMS Model HP	*Flood Valve -20°F Ambient	*Limitrol+ -20°F Ambient	% Charge *Savings
7.5,7.6 M,H	22.6	15.5	31%
7.5 L	24.6	16.5	33%
8 H,M	21.4	17.2	20%
10 H,M	29.3	22.9	22%
10 L	23.5	18.2	23%
12L	32.4	24.5	24%
12,15 H,M	37.4	29.2	22%
22L	41.4	31.2	25%

KVS Standard Model HP	*Flood Valve -20°F Ambient	*Limitrol+ -20°F Ambient	% Charge *Savings
8 V,10L,12 L	30	19.8	34%
12V,16V,15L	37.2	24.4	34%
15 M, H	34.2	26.8	22%
20, 22 ,25 M,H	44.9	34.9	22%
20,22 L	37.8	28.7	24%
20V,25V,27L,30L	49.9	37.4	25%
30 M,H	56.9	44.2	22%
30V,40 L	63.2	44.1	30%
35 M,H	66.6	51.9	22%
40 M,H	81.8	62.4	24%
50 M,H	88.3	67.4	24%

KVS Hi-Eff. Model HP	*Flood Valve -20°F Ambient	*Limitrol+ -20°F Ambient	% Charge *Savings
11,13L	41.4	28.6	31%
16,21,23L	49.9	37.2	25%
16M,H	44.9	34.9	22%
21,23M,H	56.9	44.2	22%
26,28,31L	63.2	47.4	25%
31M,H	81.8	62.4	24%
36M,H	131.6	98.9	25%
41,51,M,H	163.4	120.9	26%

* Note: Does not include evaporator and liquid line charge
Shaded area has multiple fans with applicable fans cycled off.
KMD Double compressor models are 2 x above KMS single model. KVD Double compressor models are 2 x above KVS single model

LIMITROL+ THEORY OF OPERATION

Refer to the following Limitrol+ condensing unit piping diagram FIG. 1 shown below.
The Limitrol+ standard design includes the following four main components:

- Portion controlled Air-cooled Condenser- (A).
- EC (Electronically commutated) condenser fan motor(s)-(B).
- Electronic programmable logic controller w/pressure transducer- (C).
- Suction accumulator with Liquid heat–exchanger-(D).

Also included are the following optional (application related) components:

- Heated and insulated receiver-(E)
- Wind guard for horizontal air flow units -(F)

The Limitrol+ provides optimized compressor and condenser fan energy savings by lowering the condensing pressure and power consumption during low operating loads and cooler ambient temperature conditions.

An electronic logic controller (C) senses the discharge pressure (from the pressure transducer) and targets a factory pre-set 70˚F*(21˚C)* floating condensing temperature. The condenser EC fan motor (B) responds to a DC voltage signal input that directly controls the fan speed. The DC signal is primarily based upon the discharge transducer pressure which is affected by the evaporator load and condensing unit ambient temperature. At peak ambient temperatures the condenser will be required to operate at full capacity using maximum condenser fan speeds. As the ambient becomes cooler less condenser capacity is required. The condensing temperature can then float down towards the minimum condensing temperature by the fan starting to slow down.
Once the condenser fan has reached its lowest functional minimum speed (when the ambient becomes much colder) a section of the condenser surface (A) can be removed (staged) in order to continue to provide the minimum condensing temperature set point. Note that in a conventional system this is normally accomplished by adding a head pressure control flooding valve and adding extra liquid refrigerant into the receiver allowing liquid to back up into the condenser displacing the active condenser surface. During the initial transition with the new condenser staging (smaller portioning) the fan motor must then respond to an increased air flow requirement .The electronic logic controller (C) will accordingly send a new signal to increase the EC motor (B) RPM. From this point the EC motor can vary its range of RPM in order to further control the head pressure at the lower ambient.

During the lower ambient stage if the load or ambient temperature increases and the condenser fan reaches its functional maximum speed a portion of the condenser (A) is then added back (staged) providing added necessary capacity to maintain the required control setpoint. Note that in a conventional head pressure control valve system, the extra liquid that had been previously required to be backed up in the condenser would then need to be transferred and stored back into the receiver (requiring oversizing). During the initial transition with the new condenser staging (larger portioning) the fan motor must then respond to a decreased air flow requirement .The electronic logic controller (C) will then send a new signal to decrease the EC motor (B) RPM.

Limitrol+ Logic Controller and Condensing unit wiring
Logic control, EC motor and condenser staging wiring are covered in FIG. 2 (8 hp and smaller units) and FIG.3 (over 8 HP, larger units) wiring diagrams.

Logic control is provided by the electronic controller which senses the discharge pressure through the pressure transducer. The controller provides condenser portioning control (through output relays) and DC signal control (though analog outputs) for the EC motor speed. There are two different analog signals (0-10VDC output) for the EC motor. The first analog signal is activated during the cold ambient when the condenser has been staged (portioned) and the second analog signal is activated during the warm ambient when the condenser has not been staged (not portioned). The 0-10V DC signal output directly controls the fan speed (RPM). Refer to the control manufacturer's operating instructions and the condensing unit QSU (quick set up) set point instruction sheet for details on operation and programming.

The wiring method for Condenser staging varies with the unit model.The smaller units (8 HP and lower) close off the condenser portion during the cold ambient by a discharge line solenoid valve (NC normally closed). Also another smaller bleed line solenoid valve (NC) is used to purge any refrigerant or oil from the idle condenser portion over to the suction side. Both are wired through the controller output relays. The Larger units (above 8 HP) use a special three way splitting valve (with internal bleed function) to replace the discharge solenoid valve and bleed/purge valve function. The use of check valves prevent any migration/logging of refrigerant and oil into the idle condenser portion during the cold ambient stage.

LIMITROL+ PIPING SCHEMATIC

Figure 1 - LIMITROL+ Piping Schematic

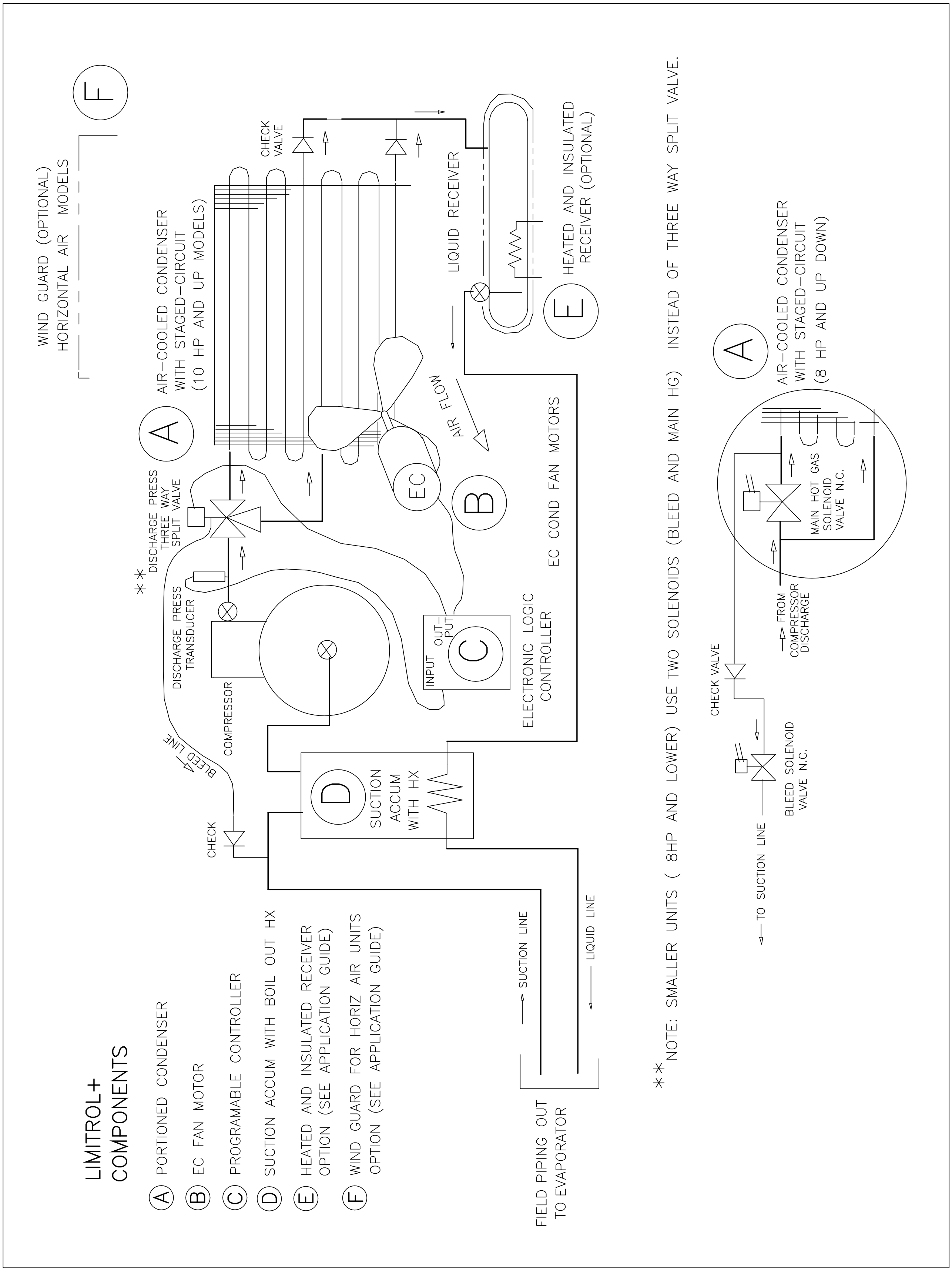


Figure 2 - LIMITROL+ Wiring Diagram (8HP and lower)

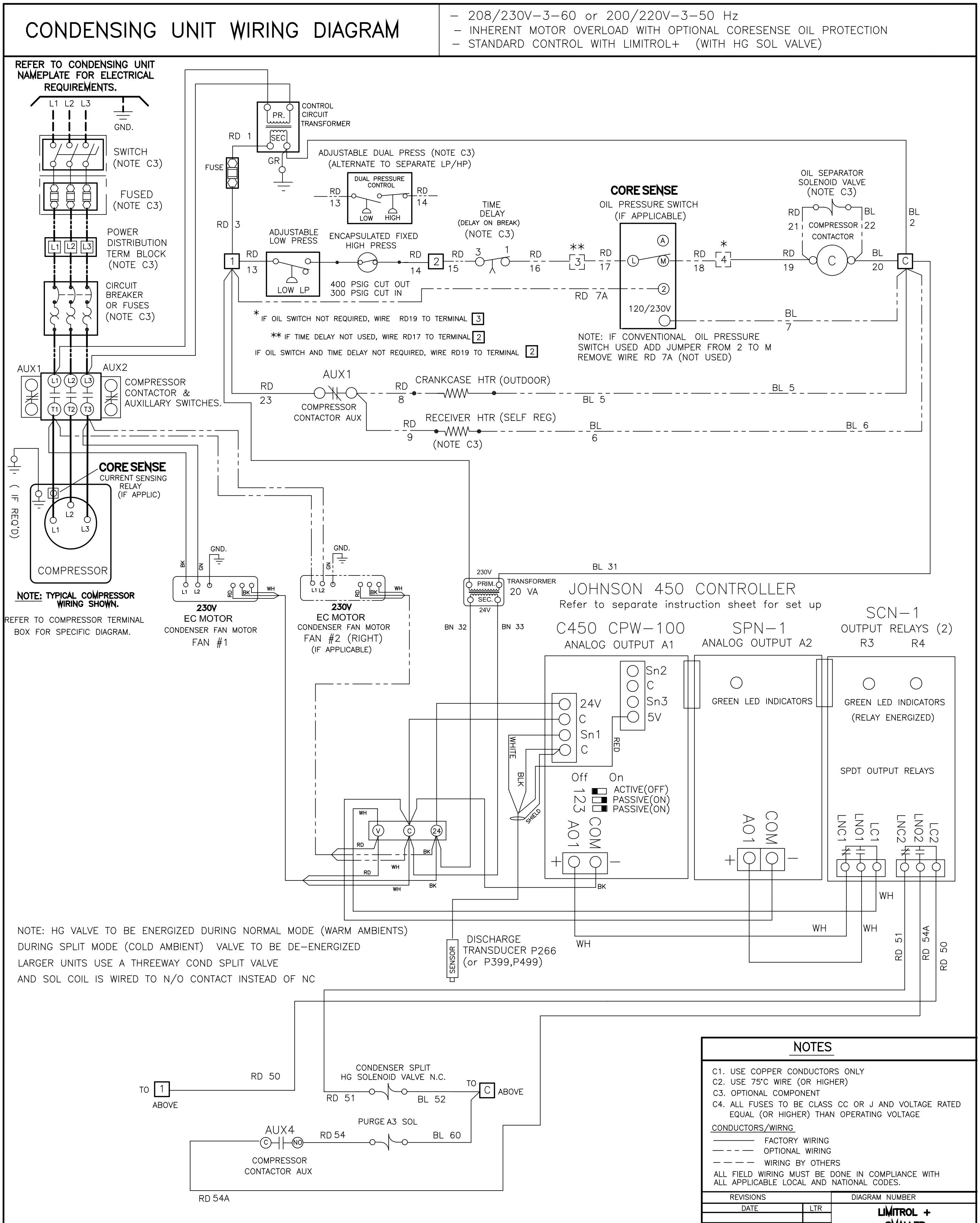
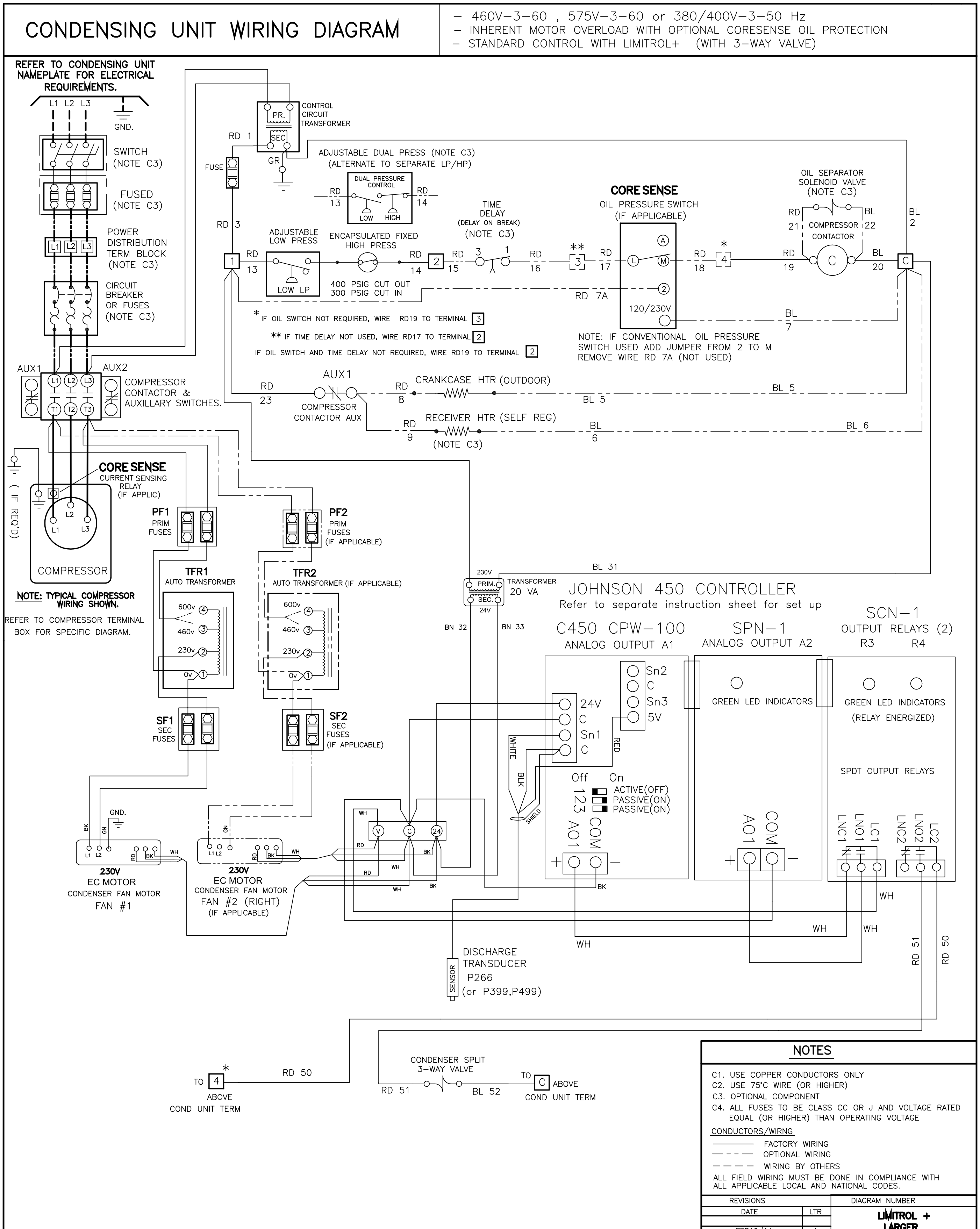


Figure 3 - LIMITROL+ Wiring Diagram (Over 8HP)



LIMITROL+ APPLICATION LIMITATIONS

Under colder ambient temperatures there could exist limitations on the effective control of the minimum condensing pressure. Proper design of the evaporator must be reviewed to ensure circuiting, distributor nozzles, distributor tubes, and expansion valve type (balanced port required) and size are properly designed to operate at the lower pressures and liquid temperatures. The use of the following optional components should be considered. For an overall summary of recommended ambient ranges and comparisons to other head pressure control methods, refer to Table 6.

Limitrol + Heated and Insulated Receiver
For colder 10˚F *(-12˚C)* and lower ambient temperatures the addition of a heated and insulated receiver option is recommended (this ensures adequate pressure is available during start-up after any prolonged off cycle).

Limitrol+ Wind Guard (Horizontal Air Flow Units)
On smaller condensing units that use horizontal air flow condensers, special attention to the unit site location must be considered. Unprotected, strong cold winds blowing directly on the condenser face can affect the control of the condensing temperature. In colder, northern climates at temperatures of 0˚F (*-18˚C*) and lower the use of an optional wind guard should be considered or where feasible consider locating the unit beside a building structure or barrier where it may be protected from the wind.

Limitrol+ with installed Flooding Valve (for extreme cold temperatures)
If extreme cold -20˚F*(-29˚C)* and below ambient temperatures and excessive winds exist, the use of an adjustable flooding valve (with added refrigerant charge) should be considered. The valve must be adjusted to a lower setting than the logic controller set point and must be installed at the condenser common liquid line downstream of the liquid lines (and check valve(s) of the two condenser staging circuits). Limitrol+ still offers an advantage over conventional flooding systems due to the fact that only the portioned half of the condenser will need to be flooded minimizing the refrigerant charge.

Limitrol + with Capacity Control – compressor unloading
During the cold ambient stage system power consumption is reduced and compressor efficiency is increased (from the lower condensing temperatures). Also system capacity is further increased from the net refrigeration effect of the colder sub-cooled liquid temperatures. This increase of capacity will affect the summer design rating of the compressor/evaporator balance (evaporator TD). Optional compressor unloading or other control methods (i.e. hot gas bypass) may be required on any medium or high temperature application requiring specific humidity control. The use of compressor unloading will also result in further KWH energy savings (reducing the power consumption and increasing compressor efficiency).

Table 6 - Head Pressure Control Method Comparison And Application Guide

METHOD OF HEAD PRESSURE	ENERGY SAVINGS	RELIABILITY/ PERFORMANCE	REFRIGERANT SAVINGS	AMBIENT RANGE** 120°F to...
FAN CYCLING ONLY	POOR	FAIR	FAIR	50°F
FAN CYCLING w/VARIABLE SPEED ON HEADER FAN	FAIR	FAIR	GOOD	20°F
FLOODING VALVE w/FAN CYCLING	POOR	GOOD	POOR	-40°F
VARIABLE SPEED EC MOTORS (ONLY) NO WIND PROTECTION*	VERY GOOD	GOOD	VERY GOOD	10°F
VARIABLE SPEED EC MOTORS (ONLY) w/WIND PROTECTION (GUARD OR WALL)*	VERY GOOD	VERY GOOD	VERY GOOD	0°F
LIMITROL+ STANDARD PACKAGE* HORIZONTAL CU w/NO WIND PROTECTION	EXCELLENT	EXCELLENT	EXCELLENT	-10°F
LIMITROL+ STANDARD PACKAGE* VERTICAL UNITS & HORIZONTAL UNITS w/WIND PROTECTION	EXCELLENT	EXCELLENT	EXCELLENT	-20°F
LIMITROL+ w/FLOODING VALVE ON 1/2 COND HORIZONTAL & VERTICAL UNITS	EXCELLENT	EXCELLENT	GOOD	-40°F

* HEATED AND INSULATED RECEIVER REQUIRED ON UNITS OPERATING IN AMBIENTS <10°F

** These are recommended temperature application ranges only and all facets of each installation need to be considered when deciding which method of head pressure control to use. Location, mounting orientations, prevailing winds, wall/barriers, etc., will have an impact on which method is appropriate for the application.

PRODUCT SUPPORT RESOURCES

PRODUCT SUPPORT	*web:* **k-rp.com/support** *email:* **smcu@k-rp.com** *call:* **1-844-893-3222 x521**
TROUBLESHOOTING	*email:* **troubleshooting@k-rp.com** *call:* **1-844-893-3222 x529**
SERVICE PARTS	*web:* **k-rp.com/parts** *email:* **parts@k-rp.com** *call:* **1-844-893-3222 x504**
WARRANTY	*web:* **k-rp.com/warranty** *email:* **warranty@k-rp.com** *call:* **1-844-893-3222 x507**
ORDERS	*email:* **orders@k-rp.com** *call:* **1-844-893-3222 x501**
SHIPPING	*email:* **shipping@k-rp.com** *call:* **1-844-893-3222 x503**

KeepRite®
REFRIGERATION

KeepRite Refrigeration
Brantford, ON • Longview, TX
1-800-463-9517   info@k-rp.com   www.k-rp.com