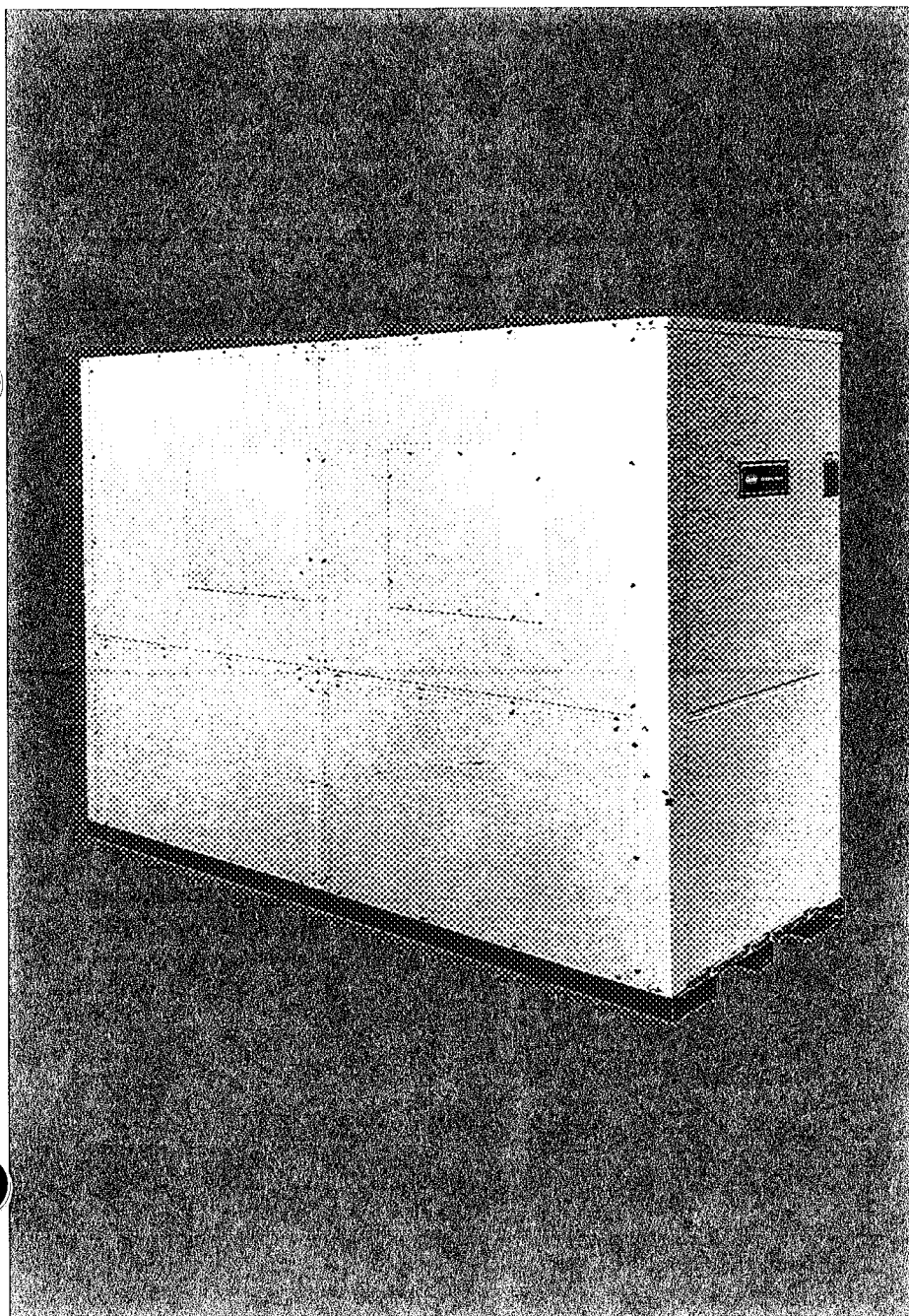




Product Data

50BJ,BK 50BJP,BKP Indoor Packaged Cooling — Variable Air Volume System

40 to 60 Nominal Tons



The Ideal System for Variable Air Volume, Constant Temperature Applications

- floor-by-floor building comfort
- design flexibility
- variable air volume savings
- microprocessor-based controls
- single-package economy

Features/Benefits

Floor-by-floor design flexibility

Carrier 50BJ,BK,BJP,BKP units offer the maximum design flexibility for new construction, replacement, and renovation jobs. Individual floors can be occupied, one at a time, as the units are installed. Individual tenant utility metering is also available. Whenever interior layouts are updated or modified, the systems allow for quick and easy changes without disrupting the other building occupants.

Operating savings

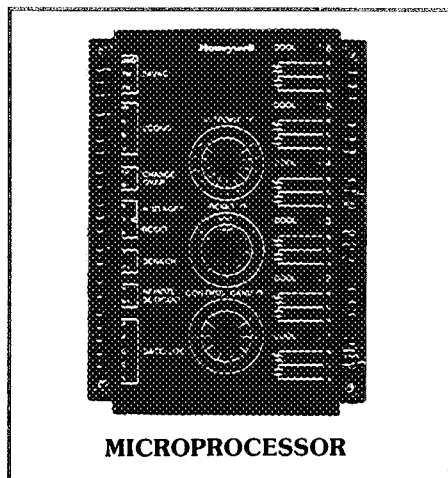
Whether you choose the 50BJ,BJP water-cooled unit or 50BK,BKP condenserless model, you'll get a package that can cool, dehumidify, and circulate air — all under a microprocessor master control that assures minimum energy consumption at full and part load.

The 50BJ,BK units have an advanced solid-state microprocessor system that assures maximum operating economy. This computer brain constantly monitors unit discharge air temperature and compares it with conditioned space temperatures. Logic circuits then sequence cooling stages to provide just the amount of mechanical cooling necessary for stable, comfortable conditioned space temperatures.

The microprocessor control provides precise control over the leaving-air temperature by narrowing the throttling range around the set point. This is the most important ingredient in true energy saving systems. Using this microprocessor, a truly integrated field-supplied air or water side economizer is possible.

Additional savings are available by ordering the inlet guide vane option. All hardware and associated controls are factory installed.

All 50BJ,BJP models are available with a factory-installed hydronic economizer option. An aquastat senses the cooling tower water, and, if the water temperature is low enough, circulates it through a water-cooling coil in the unit. This keeps the compressors off for longer periods of time and provides additional unit operating savings.



MICROPROCESSOR

Product integrated controls (PIC)

Models 50BJP and BKP with product integrated controls are also microprocessor based. These controls are suitable for a single unit on a stand-alone basis, or in a Carrier Comfort Network (CCN) system, for remote monitoring and control. The 50BJ,BK PIC models include the following control functions:

- Cooling capacity control up to 6 stages
- Seven-day electronic time clock (with full battery back-up) that allows up to 8 occupied periods
- Fully integrated hydronic economizer control that operates according to the status of a changeover switch

- Unoccupied cooling option that uses a space thermistor for initiating cooling during unoccupied periods
- Remote or keyboard-timed override
- Demand limiting
- Space temperature reset
- A factory or field test that allows individual outputs to be exercised during the standby mode

Convenient installation and minimum maintenance

The units serve any building. . . schools, offices, libraries, or high rises. Just set the packaged cooling unit in the equipment room or conditioned space, attach the ductwork and install the self-contained system-powered Moduline® or Modubox® variable air volume (VAV) terminals

The packaged cooling unit, in its rugged compact package, can be placed in a variety of locations, whether in the equipment room or the conditioned space. Each unit can be or-

dered with either vertical or horizontal air discharge. The factory-installed piping and the prewired electrical center simplify field connections.

The units are designed to provide years of trouble-free service with low maintenance.

All components of the unit are mounted on a sturdy steel frame encased in a Weather Armor® cabinet of heavy-gage, galvanized steel. This rugged construction provides strength and durability and affords excellent protection against damaging dirt or moisture.

Easy-to-remove panels provide complete access to internal components and controls. The time-tested serviceable semi-hermetic compressors are sealed against dirt and moisture contamination. Their precision parts have minimum-wear surfaces that are thoroughly protected by positive pressure lubrication.

Table of contents

	Page
Features/Benefits	1-3
Model Number Nomenclature	3
Physical Data	4
Options	5
Accessories	5
Base Unit Dimensions	5
Selection Procedure	6
Performance Data	6-11
Electrical Data	12
Controls	13,14
Typical Control Wiring Schematics	15-17
Typical Piping and Wiring	18
Guide Specifications	19-23

**Quality-engineered
features assure
outstanding performance**

Dual Carrier semi-hermetic compressors deliver quiet, reliable high cooling capacities at low cost. The Time Guard® circuit, a Carrier exclusive, eliminates short cycling and simultaneous start-up of compressors if any of the safety devices open. This feature minimizes power surges.

Automatic capacity control at partial load is provided by electric unloaders and compressor cycling that tailor cooling capacity to cooling requirements. A temperature-actuated microprocessor cycles the electric unloaders and compressors to ensure positive control of the supply air temperature as it leaves the unit. The result is lower operating costs.

Positive compressor protection is assured on all units by the use of

calibrated, single-phase protection circuit breakers and high- and low-pressure switches.

Crankcase heaters are energized during the compressor off-cycle to reduce dilution of oil by refrigerant.

Intertwined indoor coil for better cooling and dehumidification at part load. Modu-Vac system refrigerant circuiting features an indoor coil with intertwined design. This allows each refrigerant circuit to chill the entire coil face and depth. If one circuit shuts down for part load operation, the full-finned surface of the coil still remains cool, providing controlled space conditions even at light load.

Forward-curved fans move large volumes of indoor air quietly and at a lower rpm than most comparable fans. The compact housing gives the fans superior capability for vertical or horizontal supply air discharge.

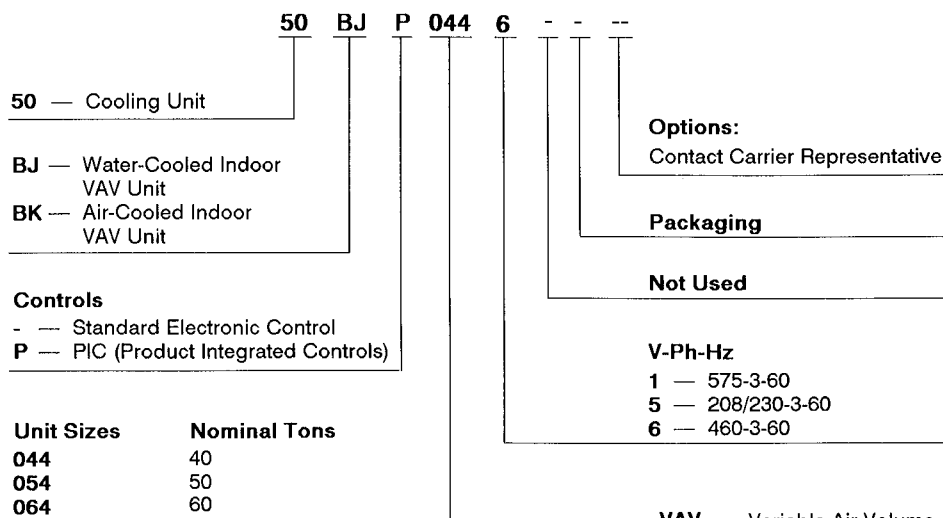
High-efficiency condensers (50BJ,BJP) provide maximum exposed heat-exchange surface for greater heat rejection with less water consumption.

Hot gas bypass prevents indoor coil freeze-up at very low loads. Hot gas bypass refrigerant control assures reliable cooling operation on those rare occasions when the load drops to extremely low levels. During those low load periods, when the system is experiencing minimum airflows, the hot gas bypass valve allows space condition to remain comfortable.

Pre-wired electrical control center contains all control devices. Terminal block provides for a single-point field power connection.

Outdoor fan relay is factory-installed on 50BK units. The BKP units have a built-in outdoor fan control, no relay is necessary.

Model number nomenclature



VAV — Variable Air Volume

MODEL 50	BJ,BJP	BK,BKP	BJ,BJP	BK,BKP	BJ,BJP	BK,BKP
	044		054		064	
NOMINAL CAPACITY (tons)	40		50		60	
OPERATING WEIGHT (lbs)	3660	3155	3888	3298	4030	3305
OPERATING CHARGE (lbs) (Note 1)			Refrigerant 22			
System 1	26	18	33	18	34	18
System 2	26	18	33	18	34	18
COMPRESSOR — TYPE 06E			Semi-Hermetic, 1750 Rpm			
System 1	2150	2250	7265	7265	7175	7275
System 2	A150	A250	A150	A250	F175	F275
No. of Unloading Cylinders	2		4		4	
No. of Capacity Steps	4		6		6	
HPS Setting (psig)	395		395		395	
LPS Setting (psig)	27		27		27	
STANDARD CONDENSER (BJ,BJP Only)						
No. ...Type	2...TT		2...TT		2...TT	
Max. Working Pressure (psig)	400		400		400	
Connection Size (Qty) in. ...Type						
Water Inlet	(2) 2 1/8 IDF		(2) 2 1/8 IDF		(2) 2 1/8 IDF	
Water Outlet	(1) 3 1/8 IDF		(1) 3 1/8 IDF		(1) 3 1/8 IDF	
OPTIONAL CONDENSER (BJ,BJP Only)						
Qty...Type	2...ST		2...ST		2...ST	
Max. Working Pressure (psig)	150		150		150	
Connection Size (Qty) in. ...Type						
Water Inlet	(2) 2 FPT		(1) 2, (1) 2 1/2 FPT		(2) 2 1/2 FPT	
Water Outlet	(2) 2 FPT		(1) 2, (1) 2 1/2 FPT		(2) 2 1/2 FPT	
CONDENSER CONNECTIONS (BK,BKP Only)						
(Qty) in. ...Type						
Liquid	(2) 7/8 ODS		(2) 7/8 ODS		(2) 7/8 ODS	
Discharge	(2) 1 3/8 ODS		(2) 1 3/8 ODS		(2) 1 3/8 ODS	
CONDENSATE CONNECTION						
Condensate Drain — in. ...Type	1 1/2 FPT		1 1/2 FPT		1 1/2 FPT	
INDOOR FAN (Note 2)			Adjustable, Belt-Driven Centrifugal; 1750 Rpm Motor			
Qty	2		2		2	
Size (in.)	20 x 10		20 x 18		20 x 18	
Nominal Cfm	16,000		20,000		24,000	
Maximum Allowable Rpm	1200		1200		1200	
No. of Belts (Note 3)	2		2		2	
Fan Shaft Diameter (in.)	1 1/16		1 1/16		1 1/16	
INDOOR COIL			Copper Tubes — Aluminum Plate Fins			
No. of Rows...Fins/in.	3...15		4...15		4...15	
Total Face Area (sq ft)	37 1/2		37 1/2		37 1/2	
RETURN AIR FILTER SECTION*						
STANDARD MOTOR						
Hp...Frame Size	15...254T		20...256T		25...284T	
Motor Efficiency (%)	85		87		89	
Fan Pulley Pitch Diameter (in.)	18 11/16		18 11/16		18 11/16	
Motor Shaft Diameter (in.)	1 5/8		1 5/8		1 7/8	
Motor Pulley A Diameter (in.)	9		9 3/4		9 3/4	
Motor Pulley B Diameter (in.)	10 5/16		10 7/8		10 7/8	
Center to Center (standard and horizontal)	17 7/8 - 21 1/8		17 7/8 - 21 1/8		17 - 20 3/8	
Center to Center (alternate top discharge)	18 3/8 - 22		18 3/8 - 22		17 7/8 - 21 1/2	
Fan Speed (Rpm)						
Pulley A	840		915		915	
Pulley B	961		1023		1023	
ALTERNATE MOTOR 1						
Hp...Frame Size	20...256T		25...284T		30...286T	
Motor Efficiency (%)	88		89		89	
Fan Pulley Pitch Diameter (in.)	18 11/16		18 11/16		18 11/16	
Motor Shaft Diameter (in.)	1 5/8		1 5/8		1 7/8	
Motor Pulley A Diameter (in.)	10 7/8		10 7/8		10 7/8	
Motor Pulley B Diameter (in.)	11 13/16		12 1/2		11 13/16	
Center to Center (standard and horizontal)	17 7/8 - 21 1/8		17 - 20 3/8		17 - 20 3/8	
Center to Center (alternate top discharge)	18 3/4 - 22		17 7/8 - 21 1/2		17 7/8 - 21 1/2	
Fan Speed (Rpm)						
Pulley A	1023		1023		1023	
Pulley B	1107		1170		1107	
ALTERNATE MOTOR 2						
Hp...Frame Size	25...284T		25...284T† 30...286T**		40...324T	
Motor Efficiency (%)	88		89		90	
Fan Pulley Pitch Diameter (in.)	16		16		16	
Motor Shaft Diameter (in.)	1 5/8		1 5/8† 1 7/8**		2 1/8	
Motor Pulley Diameter (in.)	10 7/8		10 7/8		10 7/8	
Center to Center (standard and horizontal)	17 - 20 3/8		17 - 20 3/8		17 - 20 3/8	
Center to Center (alternate top discharge)	17 7/8 - 21 1/2		17 7/8 - 21 1/2		17 7/8 - 21 1/2	
Fan Speed (Rpm)	1192		1192		1192	

LEGEND

HPS	—	High-Pressure Switch
IDF	—	Inside Diameter, Female (Solder)
LPS	—	Low-Pressure Switch
ODS	—	Outside Diameter Solder
ST	—	Shell-in-Tube
TT	—	Tube-in-Tube

NOTES:

- Operating charge for 50BK,BKP units does not include charge for matching air-cooled condenser or refrigerant connecting piping. All 50BK,BKP units are shipped with a holding charge. Operating values are approximate. See Installation Instructions.
- Alternate motor 2 is available as a factory-installed option (except on size 064, 575-v unit).
- Fan motor pulleys are fixed pitch type. The smaller of the 2 pulleys is factory-installed.

*Not factory supplied. Contact Carrier Marketing or refer to current price pages for ordering information.

†208/230 and 460 v

**575 v

Factory-installed options



The following options are available:

Inlet guide vanes for increased fan motor kW savings at part load.

Mechanically cleanable condensers (BJ,BJP) available at 150 psig (or 250 psig on special order).

Alternate horizontal fan position for horizontal discharge applications.

Alternate motor and drive packages for high airflow and static requirements.

Alternate top discharge for upblast rear discharge.

Hydronic economizer package (BJ,BJP) is available for additional energy savings.

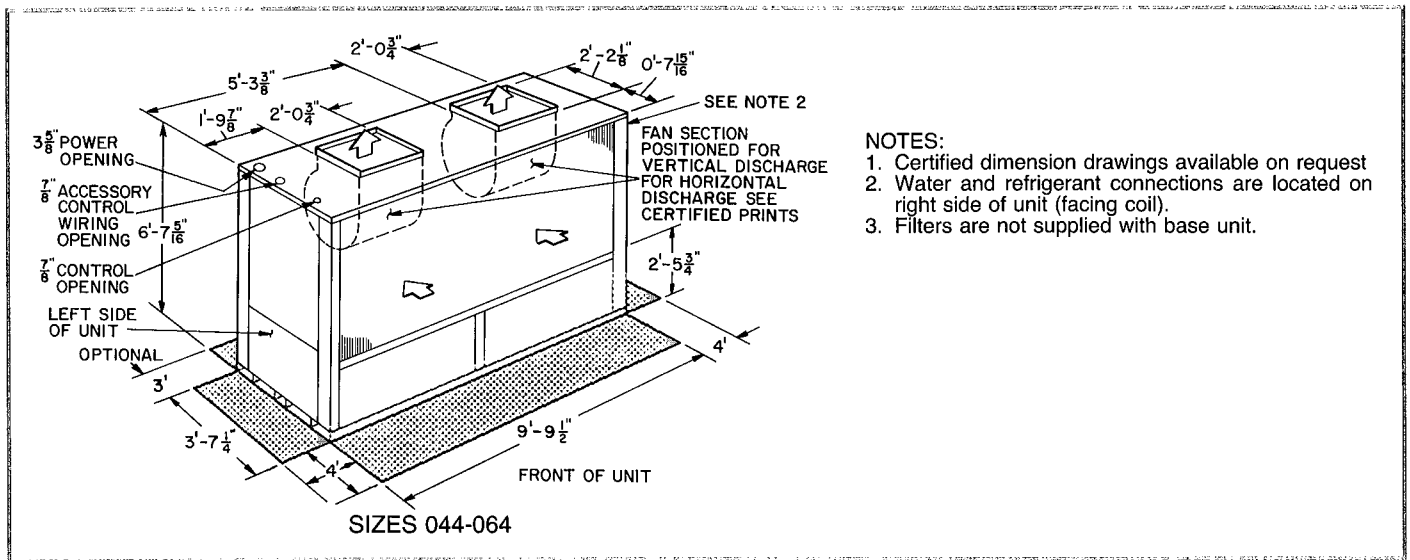
Hydronic economizer package (BJ,BJP) with pre-heat section is available.

Field-installed accessories

Timer control panel (BJ,BK) includes a 7-day programmable clock with skip-a-day operation, status lights for monitoring system modes, and a 5-hour bypass timer for placing unit temporarily in occupied mode during otherwise unoccupied times. A battery back-up maintains operation during power failure.

Winter start-up package (BK,BKP) provides a 3-minute time delay by bypassing the low-pressure switch on each compressor. This enables each compressor to start even during low ambient conditions.

Base unit dimensions



Selection procedure (with example)



I Determine design conditions.

Given:

	BJ,BJP Water- Cooled	BK,BKP Air- Cooled
Total Capacity (TC/Btuh)	750,000	685,000
Sensible Heat Capacity (SHC/Btuh)	565,000	540,000
Indoor Air Quantity (cfm)	24,000	24,000
Entering Air Conditions (F)		
dry bulb	80	80
wet bulb	67	67
Entering Condenser Water Temp (EWT)	85	—
Gallons Per Minute (Gpm)		
Required	180	—
Entering Condenser Air Temp (EAT.)	—	95
External Static Pressure (in. wg)	1.5	1.5

A Water-Cooled Selection Method — BJ,BJP

Enter the gross cooling capacity tables of the unit whose capacity is closest to the required capacity. Read down and across to obtain the following data:

Unit Selection — BJ,BJP064 selected at 24,000 cfm and 85 F ewt; and 80/67 dry bulb/wet bulb

TC = 762,000

SHC = 577,000

Compressor Power Input = 53.5 kW

Condenser Pressure Drop — 10.8 ft

Gpm — 180

Tables are based on 80 F entering dry bulb. If other than 80 F edb is used, see SHC Correction Factor table on this page.

B. Air-Cooled Selection Method — BK,BKP

Enter the gross cooling capacity tables of the unit whose capacity is closest to the required capacity. Read down and across to obtain the following data:

Unit Selection — BK,BKP064 selected at 24,000 cfm and 95 EAT., and 80/67 dry bulb/wet bulb.

TC = 696,000

SHC = 548,000

Compressor Power Input = 62.8 kW

Saturated Discharge Temperature (SDT) (F) = 126

Tables are based on 80 F entering dry bulb. If other than 80 F edb is used, see SHC Correction Factor table on this page.

II Determine required fan rpm and bhp.

A. Enter the indoor fan performance curve for the selected unit(s) at given air quantity (24,000 cfm) and external static pressure (1.5 in. wg). Find that for an 064 unit, fan rpm is 940 and required bhp is 22.2.

B. In the unit Physical Data table, check the factory-included indoor fan pulley speed ratings (915 or 1023 rpm) and nominal Hp (25) for the selected unit size. The standard fan drive package and motor fulfill the rpm and bhp requirements.

NOTES

- Included with each unit are 2 motor pulleys selected at different speeds. The smaller diameter pulley selected at the lower rpm is factory installed.
- If unit selection requires an rpm out of standard package range, refer to Fan Pulley Selection table, page 11.

Performance data

COOLING CAPACITY LEGEND AND NOTES FOR TABLES, PAGES 7-10

LEGEND

ARI	— Air Conditioning and Refrigeration Institute
BF	— Bypass Factor
EAT.	— Entering-Air Temperature (F)
Ewb	— Entering Wet Bulb Temperature (F)
EWT	— Condenser Entering Water Temperature (F)
kW	— Compressor Motor Power Input (Kilowatts)
SDT	— Saturated Discharge Temperature (F)
SHC	— Sensible Heat Capacity (1000 Btuh)
TC	— Gross Total Capacity (1000 Btuh)

NOTES:

- All units are tested and rated in accordance with ARI Standard 360-86.
- Operation of unit above 145 F saturated condensing temperature is not recommended as it may cause nuisance tripping of the high-pressure switch.
- Gross capacities do not include deduction for indoor fan motor heat.
- All BJ,BJP gpm values are based on .0005 fouling factor using standard condensers.
- Direct interpolation is permissible. Do not extrapolate.
- All combinations use R-22. Unless otherwise designated, ratings are at optimum charge.
- Ratings for BK,BKP units are based on 15° F of subcooling. For 0° F subcooling, reduce capacity by 7.5%.
- Most BK,BKP selections are based on a 30 F ΔT . Selections using over 40 F ΔT are not recommended. ($\Delta T = SDT - EAT.$).

SHC CORRECTION FACTOR

SHC is based on 80 F dry bulb (db) temperature of air entering indoor coil. Below 80 F db, subtract (corr factor x cfm) from SHC

Above 80 F db, add (corr factor x cfm) to SHC

BYPASS FACTOR (BF)	ENTERING AIR DRY-BULB TEMPERATURE (F)					
	79	78	77	76	75	Under 75
	81	82	83	84	85	Over 85
	Correction Factor					
.025	1.07	2.12	3.19	4.25	5.32	Use formula shown below
.05	1.04	2.07	3.11	4.14	5.18	
.10	.98	1.96	2.94	3.92	4.90	
.20	.87	1.74	2.62	3.49	4.36	
.30	.76	1.53	2.29	3.05	3.82	
.35	.71	1.42	2.13	2.83	3.54	

Interpolation is permissible

Correction Factor = $1.10 \times (1 - BF) \times (db - 80)$

GROSS COOLING CAPACITIES – WATER-COOLED UNITS

1	50BJ,BJP044 (40 TONS)															
COND EWT (F)	GPM	PRESSURE DROP			Evap Air — Cfm/BF											
		Ft of Water	Psig		8000/04			12,000/06			16,000/09			20,000/11		
					Evap Air — Ewb Temp (F)											
					72	67	62	72	67	62	72	67	62	72	67	62
65	60	3.5	1.5	TC SHC kW	513 244 33.2	470 289 31.8	— — —	557 277 34.6	513 343 33.2	472 407 31.9	581 306 35.4	538 391 34.0	498 467 32.7	595 333 35.8	552 434 34.5	520 514 33.4
					120	11.0	4.8	TC SHC kW	527 250 30.2	481 295 29.2	— — —	575 284 31.1	529 350 30.2	485 413 29.3	601 313 31.6	556 398 30.8
	160	18.0	7.8	TC SHC kW					530 251 29.4	484 296 28.5	— — —	579 286 30.2	532 351 29.4	488 415 28.6	607 316 30.7	559 400 29.9
					60	3.5	1.5	TC SHC kW	495 236 35.7	453 281 34.1	— — —	537 269 37.3	494 335 35.6	454 397 34.2	559 298 38.1	516 382 36.5
	120	11.0	4.8	TC SHC kW					509 242 32.8	464 287 31.7	— — —	555 276 34.0	509 341 32.8	467 404 31.7	579 306 34.6	534 389 33.5
					160	18.0	7.8	TC SHC kW	512 243 32.1	467 288 31.0	— — —	559 278 33.1	513 343 32.1	470 405 31.1	584 307 33.6	538 391 32.6
85	60	3.5	1.5	TC SHC kW					476 228 38.1	436 273 36.4	397 316 34.7	515 261 39.8	474 326 38.0	436 388 36.4	537 291 40.7	495 374 39.0
					120	11.0	4.8	TC SHC kW	490 234 35.5	447 278 34.2	— — —	533 268 36.8	488 333 35.4	448 394 34.2	556 297 37.5	512 380 36.2
	160	18.0	7.8	TC SHC kW					493 235 34.8	450 280 33.5	— — —	537 269 36.0	492 334 34.7	451 396 33.6	561 299 36.6	516 382 35.4
					60	3.5	1.5	TC SHC kW	457 220 40.5	417 264 38.5	379 307 36.7	494 253 42.3	453 317 40.3	416 378 38.5	513 282 43.2	473 364 41.3
	120	11.0	4.8	TC SHC kW					470 226 38.1	428 270 36.6	389 312 35.0	510 259 39.5	467 324 38.0	428 384 36.6	532 288 40.3	489 371 38.7
					160	18.0	7.8	TC SHC kW	473 227 37.5	431 271 36.0	391 313 34.6	514 261 38.8	471 325 37.4	431 386 36.0	536 290 39.4	493 373 38.1

2	50BJ,BJP054 (50 TONS)				Evap Air — Cfm/BF															
COND EWT (F)	GPM	PRESSURE DROP			10,000/02				15,000/04				20,000/05				25,000/07			
		Ft of Water	Psig		Evap Air — Ewb Temp (F)															
					72	67	62	72	67	62	72	67	62	72	67	62				
65	80	3.4	1.5	TC	637	583	534	688	636	587	716	664	621	731	682	649				
				SHC	303	361	418	346	432	512	385	495	595	421	554	649				
				kW	37.5	35.8	34.4	39.0	37.5	36.0	39.8	38.3	37.0	40.2	38.8	37.8				
	150	10.0	4.3	TC	649	594	543	705	650	599	736	680	635	755	699	663				
				SHC	309	367	423	353	438	520	392	502	603	429	561	661				
				kW	34.5	33.4	32.2	35.6	34.5	33.5	36.2	35.1	34.2	36.6	35.4	34.7				
200	16.0	6.9	TC	653	597	—	711	654	602	741	685	638	760	705	667					
			SHC	310	368	—	355	440	522	394	504	604	431	563	665					
			kW	33.6	32.6	—	34.6	33.6	32.7	35.2	34.1	33.3	35.5	34.5	33.8					
75	80	3.4	1.5	TC	614	563	515	664	612	565	689	640	598	706	657	628				
				SHC	294	352	408	337	422	503	376	486	581	412	543	628				
				kW	40.4	38.7	37.1	42.1	40.3	38.8	42.9	41.3	39.8	43.5	41.9	40.9				
	150	10.0	4.3	TC	628	574	524	681	627	577	708	656	612	726	674	641				
				SHC	300	357	413	343	428	510	382	492	590	419	550	641				
				kW	37.7	36.3	35.0	38.9	37.6	36.4	39.5	38.3	37.3	39.9	38.7	38.0				
200	16.0	6.9	TC	632	577	—	686	631	581	714	660	615	733	679	645					
			SHC	301	359	—	345	430	511	385	494	592	521	552	645					
			kW	36.8	35.6	—	37.9	36.8	35.7	38.5	37.4	36.4	38.9	37.8	37.1					
85	80	3.4	1.5	TC	592	542	495	639	588	543	663	613	575	677	631	606				
				SHC	284	342	398	328	412	492	367	475	566	403	532	606				
				kW	43.4	41.5	39.7	45.2	43.3	41.5	46.1	44.3	42.7	46.7	44.9	44.0				
	150	10.0	4.3	TC	605	553	504	655	602	555	682	629	588	697	647	618				
				SHC	290	347	402	334	418	498	373	481	575	409	539	618				
				kW	40.8	39.3	37.8	42.2	40.7	39.3	43.0	41.5	40.3	43.4	42.0	41.2				
200	16.0	6.9	TC	609	556	511	660	606	558	687	633	592	703	652	622					
			SHC	291	349	406	335	419	500	375	483	577	411	541	622					
			kW	40.0	38.6	35.8	41.3	39.9	38.6	42.0	40.6	39.5	42.4	41.1	40.3					
95	80	3.4	1.5	TC	568	519	473	612	562	519	634	587	551	648	601	581				
				SHC	274	332	387	318	401	480	356	464	549	393	520	581				
				kW	46.3	44.2	42.2	48.3	46.1	44.2	49.2	47.2	45.6	49.8	47.8	46.9				
	150	10.0	4.3	TC	581	530	482	628	576	531	653	601	564	668	619	595				
				SHC	280	337	392	323	407	482	363	470	559	399	527	595				
				kW	44.0	42.2	40.5	45.5	43.8	42.2	46.3	44.6	43.4	46.8	45.2	44.4				
200	16.0	6.9	TC	584	533	489	632	580	534	657	605	567	673	623	598					
			SHC	281	338	395	325	408	488	364	472	561	401	529	598					
			kW	43.2	41.6	38.7	44.6	43.0	41.6	45.4	43.8	42.6	45.8	44.3	43.6					

GROSS COOLING CAPACITIES — WATER-COOLED UNITS (cont)

3	50BJ,BJP064 (60 TONS)					Evap Air — Cfm/BF											
COND EWT (F)	GPM	PRESSURE DROP			Evap Air — Ewb Temp (F)												
		Ft of Water	Psig		16,000/.04			20,000/.05			22,000/.06			24,000/.07			
					72	67	62	72	67	62	72	67	62	72	67	62	
65	90	3.4	1.5	TC	816	752	692	846	782	725	856	793	737	866	804	749	
				SHC	401	492	581	423	544	650	443	569	681	463	594	711	
				kW	50.6	48.1	45.8	51.7	49.2	47.1	52.1	49.6	47.5	52.5	50.1	48.0	
	180	10.8	4.7	TC	843	775	711	877	809	746	888	821	760	899	832	774	
				SHC	412	503	591	444	556	662	459	571	694	474	605	725	
				kW	46.0	44.1	42.3	46.9	45.0	43.3	47.1	45.3	43.6	47.4	45.7	44.0	
240	18.0	7.8	TC	850	781	716	884	815	751	896	827	765	908	839	779		
			SHC	415	505	593	447	558	664	463	583	696	478	608	728		
			kW	44.8	43.0	41.4	45.6	43.9	42.3	45.9	44.2	42.6	46.2	44.5	43.0		
75	90	3.4	1.5	TC	785	722	664	813	750	695	823	761	708	832	771	720	
				SHC	389	479	567	421	531	636	436	556	665	451	580	694	
				kW	54.5	51.7	49.3	55.6	52.9	50.6	56.0	53.3	51.1	56.5	53.8	51.6	
	180	10.8	4.7	TC	811	745	683	843	776	716	854	787	729	864	798	742	
				SHC	399	489	576	432	542	646	447	567	677	462	591	708	
				kW	50.0	47.9	45.9	51.0	48.9	47.0	51.3	49.2	47.4	51.7	49.6	47.8	
240	18.0	7.8	TC	818	750	687	850	782	721	861	794	735	872	804	748		
			SHC	402	492	579	434	544	649	450	569	680	465	594	711		
			kW	48.8	46.9	45.0	49.7	47.8	46.0	50.0	48.1	46.4	50.4	48.4	46.8		
85	90	3.4	1.5	TC	751	691	636	779	718	665	788	727	677	796	736	689	
				SHC	375	466	553	408	517	620	423	541	648	437	565	675	
				kW	58.2	55.4	52.8	59.6	56.6	54.2	60.0	57.0	54.7	60.4	57.5	55.3	
	180	10.8	4.7	TC	777	713	653	806	742	685	817	752	698	827	762	711	
				SHC	386	476	562	418	528	631	434	553	660	449	577	689	
				kW	54.1	51.8	49.6	55.1	52.8	50.8	55.4	53.1	51.2	55.8	53.5	51.7	
240	18.0	7.8	TC	784	718	658	813	747	690	824	758	703	834	768	716		
			SHC	388	478	564	421	530	633	436	555	663	451	579	692		
			kW	53.0	50.8	48.7	53.9	51.7	49.8	54.2	52.0	50.2	54.6	52.4	50.7		
95	90	3.4	1.5	TC	719	659	606	743	684	635	751	693	647	759	701	659	
				SHC	363	453	538	395	504	603	410	528	629	425	552	654	
				kW	62.2	59.0	56.3	63.4	60.3	57.7	63.8	60.7	58.3	64.3	61.2	59.0	
	180	10.8	4.7	TC	742	680	623	769	707	653	779	717	666	788	726	678	
				SHC	372	461	547	405	513	614	420	538	642	435	562	669	
				kW	58.2	55.6	53.3	59.2	56.7	54.5	59.6	57.1	55.0	60.0	57.5	55.5	
240	18.0	7.8	TC	748	685	627	775	712	658	785	722	671	794	731	683		
			SHC	375	463	549	407	515	616	422	540	644	437	564	672		
			kW	57.1	54.7	52.5	58.1	55.7	53.7	58.4	56.0	54.1	58.8	56.4	54.6		

PRESSURE DROPS FOR 50BJ,BJP UNITS WITH MECHANICALLY CLEANABLE CONDENSER (Shell-In-Tube Type)

UNIT 50BJ,BJP	GPM	PRESSURE DROP	
		Ft of Water	Psig
044	60	4.4	1.9
	120	16.2	7.0
	160	28.4	12.3
054	80	3.7	1.6
	150	12.4	5.4
	200	21.7	9.4
064	90	2.2	0.95
	180	8.6	3.7
	240	15.0	6.5

Head pressure control

One of the most common ways of controlling head pressure in air-conditioning units with water-cooled condensers is with a field-supplied water regulating valve.

The valve is designed to open when it senses a rise in head pressure. The resulting increase in water flow through the condenser carries away excess heat and head pressure drops. Refer to unit installation instructions for further information.

GROSS COOLING CAPACITIES — AIR-COOLED UNITS

4		50BK,BKP044/09DK044 (40 TONS)								
COND EAT. (F)		Evap Air — Cfm/BF								
		12,000/.06			16,000/.09			20,000/.11		
		Evap Air — Ewb Temp (F)								
		72	67	62	72	67	62	72	67	62
85	TC	529	487	448	549	509	474	563	524	495
	SHC	267	333	396	296	381	456	324	426	495
	kW	38.2	36.7	35.2	39.0	37.5	36.2	39.5	38.0	37.0
	SDT	116	114	112	117	115	113	118	116	114
95	TC	504	463	427	522	484	452	535	497	474
	SHC	258	323	385	287	371	443	315	415	474
	kW	41.4	39.6	37.9	42.3	40.5	39.0	42.8	41.1	40.0
	SDT	126	123	121	127	124	122	127	125	124
100	TC	491	451	417	508	471	442	521	484	465
	SHC	253	318	380	282	366	436	310	410	465
	kW	42.9	41.0	39.2	43.8	41.9	40.4	44.4	42.5	41.5
	SDT	130	128	126	131	129	127	132	130	129
105	TC	478	439	406	494	458	431	506	471	454
	SHC	248	313	375	277	361	428	305	404	454
	kW	44.4	42.3	40.4	45.4	43.3	41.7	45.9	44.0	43.0
	SDT	135	132	131	136	133	132	136	134	133
115	TC	453	416	385	472	433	408	478	445	431
	SHC	239	304	363	269	351	408	296	393	431
	kW	47.3	44.9	42.8	48.3	46.0	44.4	48.9	46.7	45.8
	SDT	144	142	140	145	143	141	145	143	143

5		50BK,BKP/BU054/09DK054 (50 TONS)											
COND EAT. (F)		Evap Air — Cfm/BF											
		10,000/.02			15,000/.04			20,000/.06			25,000/.08		
		Evap Air — Ewb Temp (F)											
		72	67	62	72	67	62	72	67	62	72	67	62
85	TC	593	543	497	639	589	544	665	615	576	679	630	604
	SHC	285	343	399	328	412	492	366	474	566	402	530	604
	kW	44.5	42.6	40.8	46.2	44.3	42.6	47.2	45.3	43.8	47.7	45.9	44.9
	SDT	114	112	110	117	114	112	118	116	114	119	116	115
95	TC	566	518	474	608	560	518	631	584	549	644	598	577
	SHC	274	331	387	316	400	478	355	462	547	390	516	577
	kW	48.1	46.0	43.9	50.0	47.8	45.9	51.0	48.9	47.3	51.5	49.5	48.6
	SDT	124	122	119	126	123	121	127	125	123	127	125	124
100	TC	552	505	462	592	545	505	614	568	536	626	582	564
	SHC	268	325	381	310	394	472	349	455	535	384	510	464
	kW	49.9	47.6	45.4	51.8	49.5	47.5	52.8	50.6	49.0	53.4	51.4	50.4
	SDT	128	126	124	130	128	126	131	129	127	132	130	129
105	TC	538	495	452	576	533	493	597	552	522	608	568	549
	SHC	262	320	376	304	389	466	343	449	522	378	503	549
	kW	51.6	49.2	46.8	53.6	51.2	49.1	54.6	52.4	50.7	55.3	53.1	52.2
	SDT	133	131	129	135	133	131	136	134	132	136	134	133
115	TC	511	468	427	546	503	466	561	520	496	574	535	523
	SHC	252	309	364	293	376	451	330	436	496	366	488	523
	kW	55.0	52.3	49.7	57.1	54.5	52.2	58.1	55.7	54.2	58.9	56.5	55.8
	SDT	142	140	138	144	142	140	144	142	141	145	143	143

LEGEND

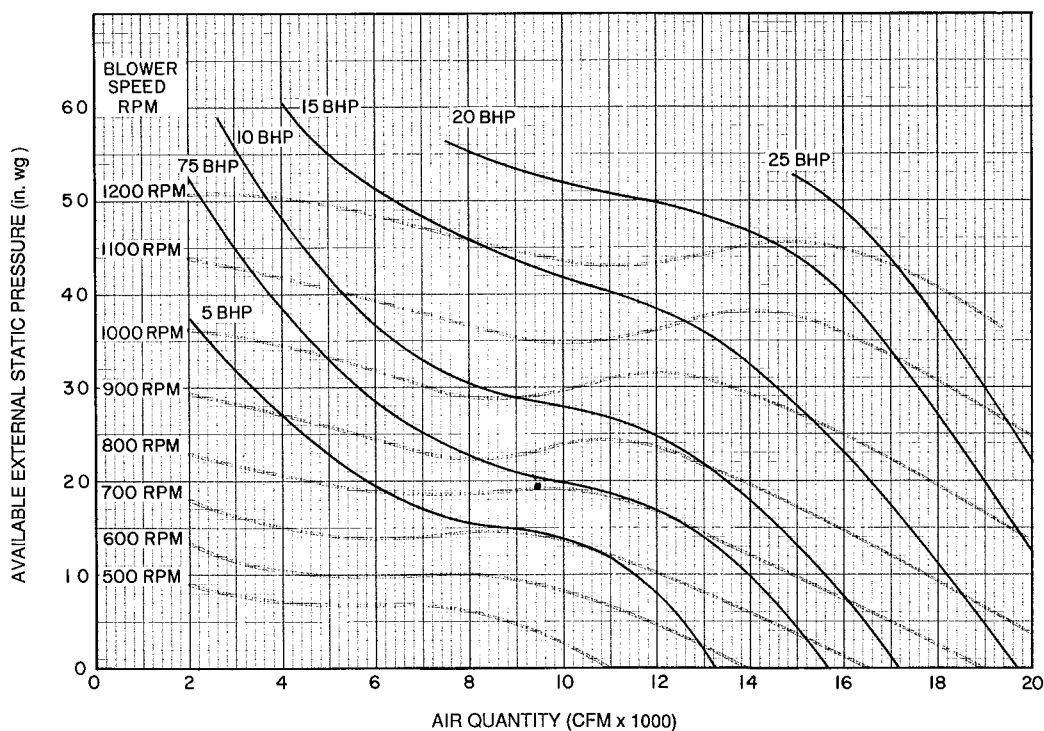
ARI	—	Air Conditioning and Refrigeration Institute
BF	—	Bypass Factor
EAT.	—	Entering-Air Temperature (F)
Ewb	—	Entering Wet Bulb Temperature (F)
EWT	—	Condenser Entering Water Temperature (F)
kW	—	Compressor Motor Power Input (Kilowatts)
SDT	—	Saturated Discharge Temperature (F)
SHC	—	Sensible Heat Capacity (1000 Btuh)
TC	—	Gross Total Capacity (1000 Btuh)

GROSS COOLING CAPACITIES — AIR-COOLED UNITS (cont)

6 50BK,BKP/BU064/09DK064 (60 TONS)

COND EAT. (F)		Evap Air — Cfm/BF											
		16,000/.04			20,000/.06			22,000/.07			24,000/.07		
		Evap Air Ewb Temp (F)											
		72	67	62	72	67	62	72	67	62	72	67	62
85	TC	748	691	635	771	714	664	782	726	675	790	733	688
	SHC	374	465	551	404	514	617	420	540	645	434	563	673
	kW	59.4	56.9	54.4	60.5	57.9	55.6	60.9	58.4	56.2	61.3	58.7	56.7
	SDT	118	115	113	119	116	114	119	117	114	119	117	115
95	TC	712	658	608	733	679	636	744	690	646	750	696	656
	SHC	360	451	538	391	500	602	406	525	629	420	548	650
	kW	63.6	60.8	58.1	64.8	62.0	59.5	65.2	62.4	60.1	65.6	62.8	60.6
	SDT	126	124	122	127	125	123	128	125	123	128	126	124
100	TC	694	641	594	713	661	618	724	671	631	730	678	641
	SHC	353	444	531	383	493	592	399	517	619	413	540	639
	kW	65.7	62.7	59.9	67.0	64.0	61.4	67.3	64.4	62.0	67.8	64.8	62.5
	SDT	131	128	126	132	129	127	132	130	128	132	130	128
105	TC	675	623	580	693	646	603	703	652	616	709	658	626
	SHC	346	436	523	376	487	583	392	510	609	406	532	626
	kW	67.7	64.6	61.6	69.1	65.9	63.2	69.4	66.3	63.8	69.9	66.8	64.5
	SDT	135	133	131	136	134	132	136	134	132	137	134	133
115	TC	635	587	547	655	607	569	660	612	582	669	618	594
	SHC	332	421	506	363	471	562	376	493	582	392	516	594
	kW	71.8	68.4	65.1	73.1	69.7	66.9	73.5	70.2	67.6	73.9	70.7	68.5
	SDT	144	142	140	145	142	141	145	143	141	145	143	142

INDOOR FAN PERFORMANCE — SIZE 044



BHP — Brake Horsepower

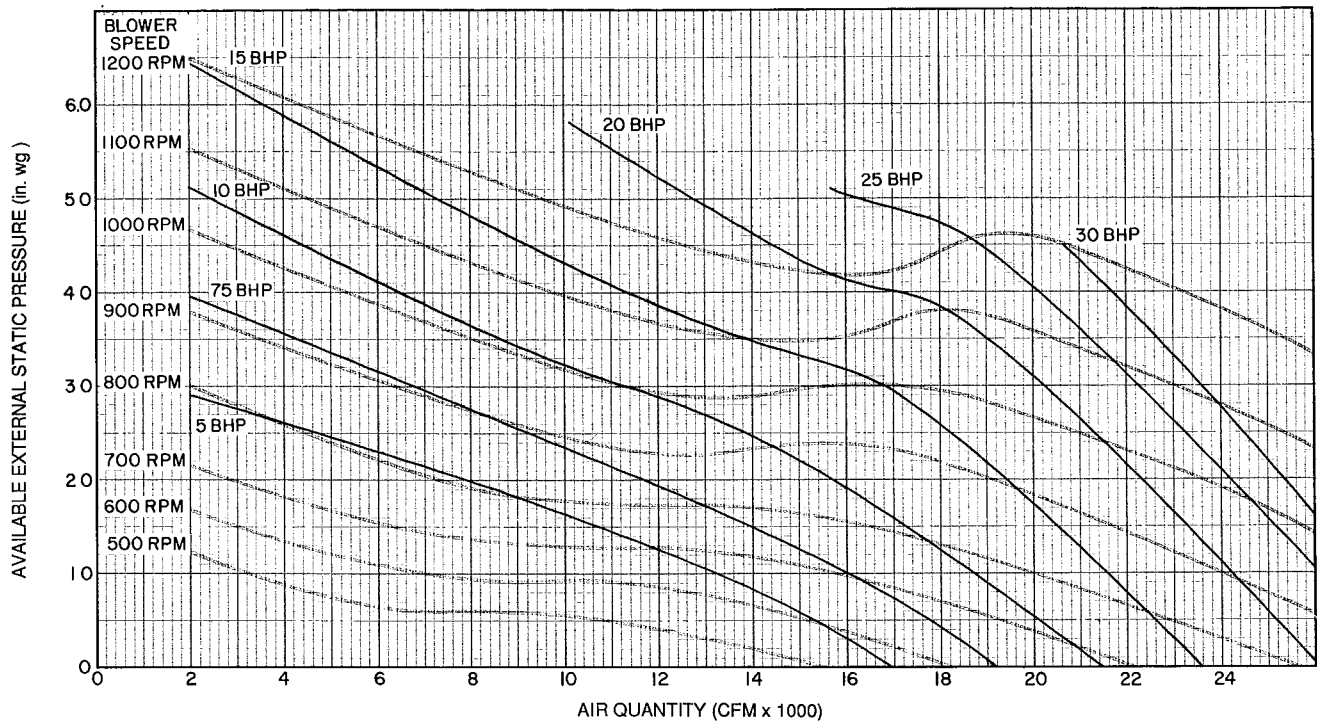
NOTES:

1. Fan performance is based on wet coil, clean filters, and deducted casing losses. Refer to Physical Data table for average efficiencies

$$kW = \frac{Bhp \times .746}{\text{Efficiency}}$$

2. For units with inlet guide vane option, see Correction Factors table, page 11

INDOOR FAN PERFORMANCE — SIZES 054,064



BHP — Brake Horsepower

NOTES:

- 1 Fan performance is based on wet coil, clean filters, and deducted casing losses. Refer to Physical Data table for average efficiencies.

$$kW = \frac{Bhp \times .746}{\text{Efficiency}}$$

- 2 For units with inlet guide vane option, see Correction Factors table, below

CORRECTION FACTORS FOR UNITS WITH INLET GUIDE VANES EXTERNAL STATIC PRESSURE DROPS (in. wg)

UNIT CFM	SIZE 044	SIZES 054,064
2,000	0.10	1.00
4,000	0.30	1.00
6,000	0.30	0.90
8,000	0.30	0.75
10,000	0.40	0.60
12,000	0.30	0.30
14,000	0.10	0.25
16,000	0.40	0.30
18,000	0.30	0.20
20,000	0.10	0.40
22,000	—	0.40
24,000	—	0.30

When unit is equipped with inlet guide vanes, correct external static pressure shown on standard fan performance curves by subtracting correction factor shown above

Example: BJ,BJP044

16,000 — Cfm

1,200 — Blower Speed (Rpm)

4.5 in wg (from standard indoor fan performance curve)

-0.4 in wg (correction factor from table for inlet guide vanes)

4.1 in wg (available external static with inlet guide vanes)

Example: BJ,BJP054

16,000 — Cfm

1,200 — Blower Speed (Rpm)

4.18 in wg (from standard indoor fan performance curve)

-0.30 in wg (correction factor from table for inlet guide vanes)

3.88 in wg (available external static with inlet guide vanes)

FAN PULLEY SELECTION TABLE

FAN RPM	MOTOR PULLEY PITCH DIAMETER (in.)	FAN PULLEY PITCH DIAMETER (in.)	5V BELT SIZE (2 Required) BELT LENGTH (in.)
600	8.0	23.6	90
650	7.1	18.7	80
700	7.5	18.7	80
738	8.0	18.7	85
789	8.5	18.7	90
840	9.0	18.7	85
865	9.25	18.7	85
915	9.8	18.7	85
961	10.3	18.7	85
1000	8.0	14.0	75
1023	10.9	18.7	85
1054	11.3	18.7	90
1107	11.8	18.7	90
1170	12.5	18.7	90
1192	10.9	16.0	80

Shaded values indicate standard or optional pulley combinations available as shown in Physical Data table
All other combinations are field-supplied

50BJ,BJP

UNIT SIZE	V-PH-HZ	VOLTAGE RANGE		COMP NO. 1		COMP NO. 2		INDOOR FAN MOTOR		POWER SUPPLY	
		Min	Max	RLA	LRA	RLA	LRA	Hp	FLA	MCA*	MOCP†
044	208/230-3-60	187	254	57.9	283	57.9	283	15	46.2	176.5	225
	460-3-60	414	508	26.5	142	26.5	142	15	21.0	80.6	100
	575-3-60	518	632	22.2	98	22.2	98	15	15.4	65.4	80
044 Alt Motor 1	208/230-3-60	187	254	57.9	283	57.9	283	20	59.4	190.0	225
	460-3-60	414	508	26.5	142	26.5	142	20	27.0	86.8	110
	575-3-60	518	632	22.2	98	22.2	98	20	20.0	70.0	90
044 Alt Motor 2	208/230-3-60	187	254	57.9	283	57.9	283	25	74.8	209.3	250
	460-3-60	414	508	26.5	142	26.5	142	25	34.0	95.5	125
	575-3-60	518	632	22.2	98	22.2	98	25	25.6	76.4	100
054	208/230-3-60	187	254	80.8	446	60.0	283	20	59.4	220.4	300
	460-3-60	414	508	35.8	223	26.5	142	20	27.0	98.3	125
	575-3-60	518	632	30.0	164	22.2	98	20	20.0	79.7	100
054 Alt Motor 1	208/230-3-60	187	254	80.8	446	60.0	283	25	74.8	235.8	300
	460-3-60	414	508	35.8	223	26.5	142	25	34.0	105.3	125
	575-3-60	518	632	30.0	164	22.2	98	25	25.6	85.3	110
054 Alt Motor 2	208/230-3-60	187	254	80.8	446	60.0	283	25	88.0	250.8	300
	460-3-60	414	508	35.8	223	26.5	142	25	40.0	112.3	150
	575-3-60	518	632	30.0	164	22.2	98	30	30.0	89.7	110
064	208/230-3-60	187	254	91.5	446	91.5	446	25	74.8	280.7	350
	460-3-60	414	508	40.0	253	40.0	253	25	34.0	124.0	150
	575-3-60	518	632	32.2	164	32.2	164	25	25.6	98.1	125
064 Alt Motor 1	208/230-3-60	187	254	91.5	446	91.5	446	30	88.0	293.9	350
	460-3-60	414	508	40.0	253	40.0	253	30	40.0	130.0	150
	575-3-60	518	632	32.2	164	32.2	164	30	30.0	102.5	125
064 Alt Motor 2	208/230-3-60	187	254	91.5	446	91.5	446	40	96.0	303.0	350
	460-3-60	414	508	40.0	253	40.0	253	40	48.0	138.0	175

50BK,BKP

UNIT SIZE	V-PH-HZ	VOLTAGE RANGE		COMP NO. 1		COMP NO. 2		INDOOR FAN MOTOR		POWER SUPPLY	
		Min	Max	RLA	LRA	RLA	LRA	Hp	FLA	MCA*	MOCP*
044	208/230-3-60	187	254	77.2	345	77.2	345	15	46.2	219.9	250
	460-3-60	414	508	35.8	173	35.8	173	15	21.0	101.6	125
	575-3-60	518	632	30.0	120	30.0	120	15	15.4	82.9	110
044 Alt Motor 1	208/230-3-60	187	254	77.2	345	77.2	345	20	59.4	233.1	300
	460-3-60	414	508	35.8	173	35.8	173	20	27.0	107.6	125
	575-3-60	518	632	30.0	120	30.0	120	20	20.0	87.5	110
044 Alt Motor 2	208/230-3-60	187	254	77.2	345	77.2	345	25	74.8	248.5	300
	460-3-60	414	508	35.8	173	35.8	173	25	34.0	114.6	150
	575-3-60	518	632	30.0	120	30.0	120	25	25.6	93.1	110
054	208/230-3-60	187	254	101.5	446	77.2	345	20	59.4	263.5	350
	460-3-60	414	508	48.6	223	37.9	173	20	27.0	125.7	150
	575-3-60	518	632	38.6	164	30.0	120	20	20.0	98.3	125
054 Alt Motor 1	208/230-3-60	187	254	101.5	446	77.2	345	25	74.8	278.9	350
	460-3-60	414	508	48.6	223	37.9	173	25	34.0	132.7	175
	575-3-60	517	632	38.6	164	30.0	120	25	25.6	103.9	125
054 Alt Motor 2	208/230-3-60	187	254	101.5	446	77.2	345	30	88.0	292.1	350
	460-3-60	414	508	48.6	223	37.9	173	30	40.0	138.7	175
	575-3-60	518	632	38.6	164	30.0	120	30	30.0	108.3	125
064	208/230-3-60	187	254	120.0	506	120.0	506	25	74.8	344.8	450
	460-3-60	414	508	56.5	253	56.5	253	25	34.0	161.1	200
	575-3-60	518	632	42.9	176	42.9	176	25	25.6	122.1	150
064 Alt Motor 1	208/230-3-60	187	254	120.0	506	120.0	506	30	88.0	358.0	450
	460-3-60	414	508	56.5	253	56.5	253	30	40.0	167.1	200
	575-3-60	518	632	42.9	176	42.9	176	30	30.0	126.5	150
064 Alt Motor 2	208/230-3-60	187	254	120.0	506	120.0	506	40	96.0	366.0	450
	460-3-60	414	508	56.5	253	56.5	253	40	48.0	175.1	225

LEGEND

CSA	—	Canadian Standards Association
ETL	—	ETL Testing Laboratories
FLA	—	Full Load Amps
LRA	—	Locked Rotor Amps
MCA	—	Minimum Circuit Amps
MOCP	—	Maximum Overcurrent Protection Device (amps)
NEC	—	National Electrical Code
RLA	—	Rated Load Amps



NOTES:

- Compressor circuit breakers are current sensitive and temperature compensated to ensure compressor cutoff if current draw becomes excessive. Breakers must be manually reset.
- Low- and high-pressure switches automatically shut off compressor(s) if refrigerant pressure exceeds switch settings. This action protects against loss of charge.
- Indoor fan motor circuit breakers protect against motor overload. Breaker requires manual reset.
- The units are ETL listed at 208/230 and 460 v, and CSA certified at 208/230, 460 and 575 v.
- Three-phase imbalance shall not exceed 2%.
- Wire sizing amps are a sum of 125% of the FLA for largest motor plus 100% of FLA for all other motors in the unit.
- Maximum instantaneous current flow during starting is the sum of the LRA for last compressor to start plus the FLA for all other compressors in the unit.

*Minimum circuit amps (MCA) for wire sizing complies with NEC Section 430-24
†In compliance with NEC requirements for multimotor and combination load equipment (Refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse only

Control sequence (BJ,BK)

All units — The indoor fan circuit breaker (IFCB) must be closed for the control circuit to be energized. When breaker is closed, the SYSTEM light will be energized.

The units are equipped with a switch labeled STANDBY. When switch is closed, the indoor fan contactor (IFC) is energized and the indoor fan will start and run continuously. A light labeled FAN will also be energized. To use accessory timer control, switch must be put in standby position.

All units are equipped with the Honeywell W7100 discharge air controller. This controller is equipped with 3 control knobs: set point, reset, and control band. Purpose of controller is to regulate the leaving air temperature to the set point. A setting below 50 F may decrease unit efficiency due to use of hot gas bypass at light loads. The reset knob is used to adjust reset control range from 5 to 20 F. Reset feature requires field-supplied components and wiring. The control band knob allows controller to be adjusted for the required number of stages. The control band should be set at 8 F for 044 units and 6 F for 054 and 064 units. Increasing control band setting above these recommended settings will decrease compressor cycling and increase leaving air temperature variations. Decreasing setting will NOT reduce discharge air temperature variations but will increase compressor cycling.

The controller is also factory-equipped with 2 fixed resistors. One resistor is used to correct for the number of steps. This is done by placing a 1/4-w, 5% resistor across terminals 7 and 8 on microprocessor. A 4-stage, 400-ohm resistor is used on 044 units and a 600-ohm resistor is used on 054 and 064 units. A second 510-ohm resistor is connected be-

tween terminals 9 and Y to indicate unit does not have an airside economizer. These units do not have a factory-supplied airside economizer. If a field-supplied airside economizer is to be added, remove the 510-ohm resistor. Contact Carrier Application Engineering for more details.

If the discharge air deviates 1° F above or below the control band while unit is running, then a cooling capacity stage will be either added or removed according to the Loading Sequence table found on page 14. Additional capacity stages will be turned either on or off until discharge air temperature is within control band, or changing at a rate that will allow it to be within control band within 10 minutes.

The controller also has a fixed guaranteed minimum on and off time of 4 minutes to prevent compressor cycling.

These units are equipped with a Time Guard® circuit. This circuit prevents compressor no. 1 from restarting until 4 minutes, 45 seconds have elapsed from last shutdown. Compressor no. 2 will not restart until 6 minutes, 10 seconds have elapsed.

Each compressor is equipped with a high-pressure switch (HPS) and low-pressure switch (LPS). If either of these trips, the compressor will shut down. If after 4 minutes 45 seconds for compressor no. 1, and 6 minutes 10 seconds for compressor no. 2, the switch resets, the compressor will restart within 15 seconds for compressor no. 1, or 19 seconds for compressor no. 2.

The BK condenserless units are equipped with a liquid line solenoid valve (LLS). When a stage calls for compressor shutdown, the LLS will close first. The compressor will continue to run until the low-pressure switch opens.

Control sequence (BJP,BKP)

Cooling — When the unit enters the Occupied mode, the indoor fan will activate, and the control will compare the leaving air temperature to the leaving air set point. If leaving air is above set point, the control will turn on capacity steps one at a time until unit capacity (depending on unit size) meets the load. The rate at which capacity stages are turned on and off depends on the differential between leaving air actual temperature and set point, the rate of change of leaving air and return air temperature, and recent load history.

On units with hydronic economizer, the unit will go through a 3-minute initialization period when it enters the Occupied mode. During initialization, the economizer 3-way valve will open and close the economizer circuit before the unit goes into the Cooling mode. This allows the processor to program the position of the valve at both extremes, so that it can properly modulate the economizer function during cooling. The indoor fan will not be activated until completion of the initialization process.

An aquastat is utilized with the hydronic economizer to determine if the condenser water is cool enough to provide free cooling. The aquastat set point is adjustable and must be set at installation. When unit goes into the Cooling mode, if condenser water temperature is below the aquastat set point, controls will attempt to satisfy the cooling load with the economizer before bringing on any stages of mechanical cooling. Once mechanical cooling is energized, the economizer is held at 100% open.

For 50BKP applications, when the first stage of compression is turned on, the relay module will close a set of contacts between terminals 1 and 2 on TB5 to activate the remote condenser fans. The low-pressure switches are bypassed during the first 2.5 minutes of operation of each compressor, to assist low-ambient starting situations.

Units equipped with temperature reset — Temperature reset is a means for preventing overcooling at light loads, while keeping air circulation at reasonable levels. The effect is to reset the leaving air set point upward, as the conditioned space temperature drops below a predetermined temperature level. The leaving air set point is raised 0.33° F

for every degree the space temperature drops below the reset set point. The reset set point is equal to the space temperature at which temperature reset is to begin. The maximum reset set point is adjusted by setting the reset limit to the maximum amount of reset desired.

Units equipped with external time clock — When a 24-v signal is sent to terminal 21 of TB5, the unit enters the Occupied mode. When signal is removed, the unit enters the Unoccupied mode. This signal will override any unoccupied schedule programmed into the internal clock. However, it cannot override an occupied schedule. If the external clock is intended to be the permanent control, then the internal clock must be disabled.

Unoccupied cooling — The purpose of unoccupied cooling is to provide a means for cooling a space during the Unoccupied mode before space temperature exceeds some predetermined temperature. The unit will enter the Occupied mode at 2° F above the space temperature set point, and will reenter the Unoccupied mode at 1° F below the space temperature set point.

Demand limit — Two-step demand limit control is available for the purpose of limiting the number of stages of cooling allowed at a particular time. This is typically used to reduce electrical utility demand charges at peak power consumption periods of the day.

When connected to the Carrier Comfort Network (CCN), demand limiting may be accomplished through the loadshed option of CCN instead of the demand limiter. When the loadshed option issues a redline alert to the controller, first-stage demand limit will be used. When the loadshed option issues a shed command to the controller, second-stage demand limit will be used.

LOADING SEQUENCE

UNIT SIZE	STAGE					
	1	2	3	4	5	6
044	25%	50%	75%	100%	—	—
054	19%	38%	57%	63%	84%	100%
064	17%	34%	50%	67%	84%	100%

LEGEND AND NOTES, BJ,BK TYPICAL WIRING SCHEMATIC, PAGE 16

C	— Contactor	OFR	— Outdoor-Fan Relay
CB	— Circuit Breaker	SW	— Switch
CH	— Crankcase Heater	SYS	— System
COMP	— Compressor	TB	— Terminal Board
CR	— Control Relay	TDR	— Time-Delay Relay
GND	— Ground	TM	— Timer Motor
HPS	— High-Pressure Switch	TR	— Timer Relay
HR	— Holding Relay	TRAN	— Transformer
IFC	— Indoor-Fan Contactor	U	— Unloader
IFCB	— Indoor Fan Circuit Breaker	UR	— Unloader Relay
LLS	— Liquid Line Solenoid	—	Factory Wiring
LPS	— Low-Pressure Switch	---	Field Wiring

NOTES (BJ,BK):

- 1 Maximum contact rating is 125 va at 120/250 vac; 60 Hz.
- 2 Minimum switching inrush is 6 va
- 3 Wiring diagrams are presented for information only. For specific unit diagrams, see unit wiring labels and installation instructions
- 4 Condenser (outdoor) fan relays are factory-installed in BK units
- 5 On all extended voltage (208-230) units, the control transformer is connected for 208-3-60 application. For 230-3-60 application, the transformer must be reconnected
- 6 Three-phase motors are protected under primary single-phasing conditions.

LEGEND AND NOTES, BJP,BKP TYPICAL WIRING SCHEMATIC, PAGE 17

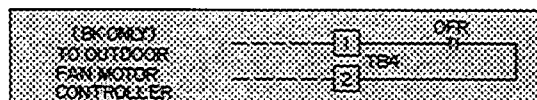
A	— Amber Light	LLS	— Liquid Line Solenoid
ALT MTR	— Alternate Motor and Drive	LPS	— Low-Pressure Switch
& DRV	— Alternate Motor and Drive	NC	— Normally Closed
BOT	— Bottom	NO	— Normally Open
C	— Contactor	OFC	— Outdoor-Fan Contactor
CB	— Circuit Breaker	PL	— Plug
CH	— Crankcase Heater	POT.	— Potentiometer
COM	— Common	PSIO	— Processor Module
CR	— Control Relay	PWR	— Power
DSIO	— Relay Module	R	— Red Light
EAT.	— Entering Air Temperature Sensor	STG	— Stage
ECR	— Economizer Closed Relay	SW	— Switch
EOR	— Economizer Open Relay	SYS	— System
FU	— Fuse	TB	— Terminal Board
HGS	— Hot Gas Solenoid	TRAN	— Transformer
HPS	— High-Pressure Switch	U	— Unloader
HSIO	— Local Interface Device	—	Factory Wiring
IFC	— Indoor-Fan Contactor	---	Field Wiring
IFCB	— Indoor Fan Contactor Relay	---	Accessory Wiring
LAT	— Leaving-Air Temperature Sensor		

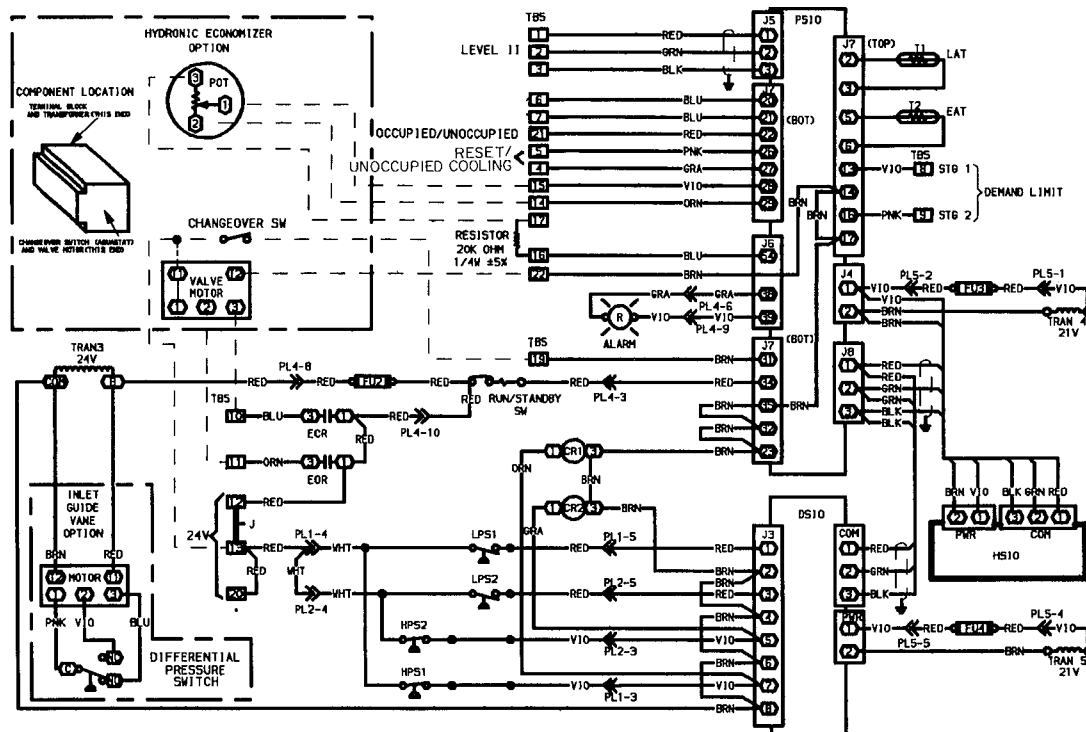
*BKP054 208/230, BJP,BKP064 208/230

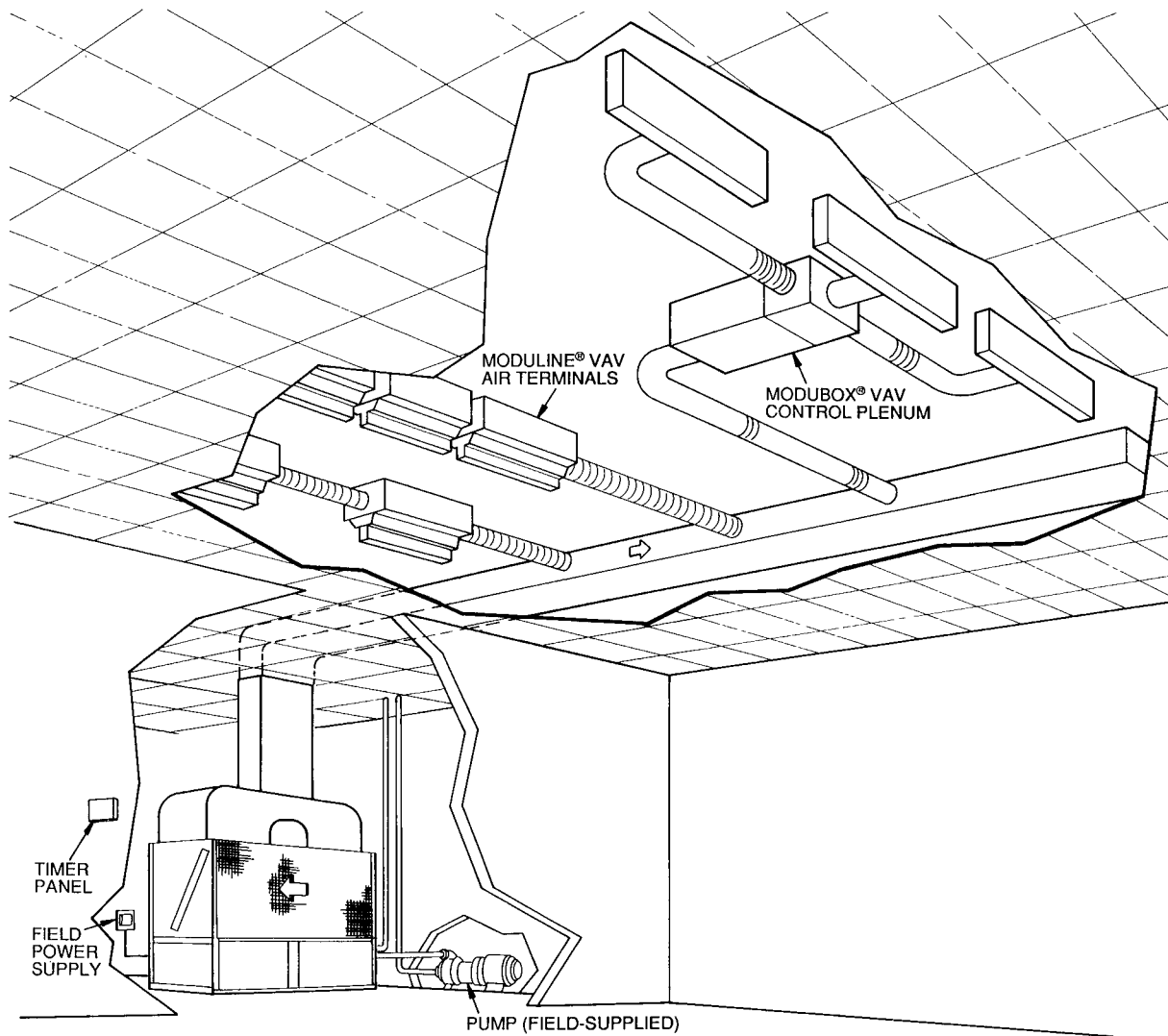
†BJP,BKP064 208/230

NOTES: (BJP,BKP).

- 1 Wiring diagrams are presented for information only. For specific unit diagrams, see unit wiring labels and installation instructions.
- 2 Condenser (outdoor) fan relays are *not* supplied nor needed with BKP units. This function is handled by the control relay module (DSIO). The outdoor-fan contactors can be controlled directly by contacts in the control relay module, provided the contactor load is not greater than 2 amps at 115 v.
- 3 On all extended voltage (208-230) units, the control transformer is connected for 208-3-60 application. For 230-3-60 application, the transformer must be reconnected.
- 4 Three-phase motors are protected under primary single-phasing conditions







VAV — Variable Air Volume

NOTES

1. Wiring and piping shown are provided only as a general guide. Diagram is not intended to include all details for a specific installation.
2. All wiring must comply with applicable local and national codes.
3. All piping must follow standard refrigerant piping techniques. Refer to Carrier System Design Manual, Part 3, for details.
4. For maximum working pressure, see Physical Data table, page 4.

Indoor Packaged Unit Variable Volume Application — Water-Cooled (50BJ) and Condenserless (50BK)

Size Range: **40 - 60 Tons, Nominal**
Carrier Model Number: **50BJ,BK**

Part 1 — General

1.01 SYSTEM DESCRIPTION

- A. Indoor vertical, microprocessor-controlled cooling packaged unit utilizing reciprocating semi-hermetic compressors. Unit shall supply air through ductwork as shown on the contract drawings.

1.02 QUALITY ASSURANCE

- A. Unit shall be designed to conform to ANSI/ASHRAE 15 Safety Code for Mechanical Refrigeration.
- B. Unit shall be ETL listed and CSA certified.
- C. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. To be according to manufacturer's recommendations

Part 2 — Products

2.01 EQUIPMENT

A. General:

Factory-assembled, single-piece, vertical, water-cooled (BJ only) cooling unit. The unit shall consist of condenser(s) (BJ only), serviceable semi-hermetic compressor(s), fan section complete with centrifugal fan and motor mounting bracket, coil section complete with direct-expansion coil, drain pan, factory wiring, piping, and controls. An operating charge of refrigerant (R-22) shall be furnished with BJ unit. A holding charge shall be provided with BK unit.

B. Unit Cabinet:

- 1. Cabinet shall be constructed of zinc surface alloyed steel with a baked enamel decorative finish.
- 2. Cabinet shall be fully insulated with a fire retardant material.

C. Fan Section:

- 1. Double inlet centrifugal fan wheel with forward curved blades shall be designed for continuous operation at maximum fan speed. Fan wheel and scroll shall be constructed of steel with corrosion-resistant finish and shall be statically and dynamically balanced.
- 2. Fan shall be belt-driven and drive shall include a fixed pitch motor pulley.
- 3. Bearings shall be sealed, permanently lubricated, ball bearing type.

D. Compressors:

- 1. Serviceable semi-hermetic type.
- 2. Factory mounted on spring vibration isolators.
- 3. Shall be equipped with a factory-installed crank-case heater.

E. Condenser (BJ):

- 1. The condenser shall be of the tube-in-tube type.

- 2. Tubes shall be seamless with no internal joints.
- 3. Condenser shall have a maximum working pressure of 400 psig on the water side.

F. Coils:

- 1. Evaporator coil shall have aluminum plate fins mechanically bonded to seamless copper tubes with all joints brazed.
- 2. Tube sheet openings shall be belled to prevent tube wear.
- 3. Evaporator coil shall be of the full face active design.
- 4. Direct-expansion coils shall be designed and tested in accordance with ANSI/ASHRAE 15 Safety Code for Mechanical Refrigeration.

G. Operating Characteristics:

- 1. Unit shall be capable of providing a variable volume of air at a specified external static pressure within the unit's normal operating range
- 2. Unit shall have multi-stage cooling capacity control.

H. Controls and Safeties

1. Unit Controls:

- a. A unit-mounted system selector switch shall be provided for on-off operation.
- b. An electrical interlock for remote condenser fan shall be provided (BK).
- c. Unit shall have a factory-installed and wired discharge air control system based on a microprocessor controller which shall:
 - 1) Provide for compressor staging.
 - 2) Include an adjustable set point discharge air temperature control.
 - 3) Contain a memory function to provide stable discharge air temperature.
 - 4) Program a reset of discharge air temperature based on average room temperatures.
 - 5) Contain a control band adjustment to control compressor loading rate and match number of control stages.
 - 6) Provide a capability to incorporate an integrated hydronic economizer or field-supplied air economizer.

2. Safeties:

- a. Compressors shall be provided with the following minimum protection:
 - 1) High pressure
 - 2) Low pressure
 - 3) Overcurrent (circuit breakers)
 - 4) Short cycle (minimum 5 minutes)
- b. Indoor-fan motor shall have external thermal overload device factory-installed in the control box.

I. Refrigerant Components:

Refrigerant circuit components shall include:

- 1. Thermal expansion valve



2. Filter drier
 3. Compressor service valves
 4. Liquid line shutoff valves
 5. Liquid line sight glass
 6. Discharge line muffler
 7. Liquid line solenoid valve (BK)
- J. Electrical Requirements:
All electrical wiring shall enter the unit cabinet at a single location.
- K. Special Features:
- 1 Hydronic Economizer with Preheat Coil Package (BJ):
Unit shall include a factory-installed hydronic economizer complete with 4-row precooling coil, 2-row hot water preheat coil, coil casing, filter section with disposable filters, drain pan, and outer casing.
 2. Timer Control Panel:
Shall provide a 7-day clock with a battery back-up, a 5-hour bypass timer and indicating lights for Power-on, Fan, and Cooling modes. For field installation.
 3. Hydronic Economizer Package (BJ):
Unit shall include a factory-installed hydronic economizer complete with 4-row precooling coil, coil casing, filter section with disposable filters, drain pan, and outer casing.
 4. Hydronic Economizer Piping Package (BJ)
Unit shall be factory fitted with 3-way bypass valve, 2-way water regulator valve, aquastat, piping, all control wiring to microprocessor control, and a cabinet enclosure.
 - 5 Winter Start Package (BK):
Accessory shall provide a time delay of low pressure switch under low ambient conditions.
 6. Inlet Guide Vanes:
Optional inlet guide vanes and controls shall be factory installed.
 7. Optional Mechanically Cleanable Condenser (BJ):
 - a. The condenser shall be of the shell-in-tube type.
 - b. Tubes shall be seamless with no internal joints
 - c. Condenser shall have a maximum working pressure of 150 psig on the water side (250 psig by special order)
 - 8 Unit shall be factory-equipped with:
 - a. Alternate horizontal fan position
 - b. Motor and drive package
 - c. Top discharge

Indoor Packaged Unit Variable Volume Application — Water-Cooled (50BJP) and Condenserless (50BKP)

Size Range: **40 - 60 Tons, Nominal**
Carrier Model Number: **50BJP, 50BKP**

Part 1 — General

1.01 SYSTEM DESCRIPTION

- A. Indoor vertical, microprocessor-controlled cooling packaged unit utilizing reciprocating semi-hermetic compressors. Unit shall supply air through ductwork as shown on the contract drawings.

1.02 QUALITY ASSURANCE

- A. Unit shall be designed to conform to ANSI/ASHRAE 15 Safety Code for Mechanical Refrigeration
- B. Unit shall be ETL listed and CSA certified.
- C. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. To be according to manufacturer's recommendations.

Part 2 — Products

2.01 EQUIPMENT

A. General.

Factory-assembled, single-piece, vertical, water-cooled (BJP only) cooling unit. The unit shall consist of condenser(s) (BJP only), serviceable semi-hermetic compressors, fan section complete with centrifugal fan and motor mounting bracket, coil section complete with direct-expansion coil, drain pan, factory wiring, piping, and controls. An operating charge of refrigerant (R-22) shall be furnished with BJP unit. A holding charge shall be provided with BKP unit.

B. Unit Cabinet:

1. Cabinet shall be constructed of zinc surface alloyed steel with a baked enamel decorative finish.
2. Cabinet shall be fully insulated with a fire retardant material.

C. Fan Section:

1. Double inlet centrifugal fan wheel with forward curved blades shall be designed for continuous operation at maximum fan speed. Fan wheel and scroll shall be constructed of steel with corrosion-resistant finish and shall be statically and dynamically balanced.
2. Fan shall be belt-driven and drive shall include a fixed pitch motor pulley.
3. Bearings shall be sealed, permanently lubricated, ball bearing type.

D. Compressors:

1. Serviceable semi-hermetic type.
2. Factory mounted on spring vibration isolators.
3. Shall be equipped with a factory-installed crank-case heater.

E. Condenser (BJP):

1. The condenser shall be of the tube-in-tube type.
2. Tubes shall be seamless with no internal joints.
3. Condenser shall have a maximum working pressure of 400 psig on the water side.

F. Coils:

1. Evaporator coil shall have aluminum plate fins mechanically bonded to seamless copper tubes with all joints brazed.
2. Tube sheet openings shall be belled to prevent tube wear.
3. Evaporator coil shall be of the full face active design.
4. Direct-expansion coils shall be designed and tested in accordance with ANSI/ASHRAE 15 Safety Code for Mechanical Refrigeration.

G. Operating Characteristics.

1. Unit shall be capable of providing a variable volume of air at a specified external static pressure within the unit's normal operating range.
2. Unit shall have multi-stage cooling capacity control.

H. Controls:

NOTE: The following guide specification is provided to assist in specifying indoor packaged cooling units with Product Integrated Controls (PIC). There are several options that may be applied, depending on application requirements. These specifications have been written such that the indoor packaged cooling unit equipment supplier is also the temperature control vendor.

1. Product Integrated Controls:

The PIC shall be factory installed and wired as specified as an integral part of the unit.

2. Microprocessor Controller:

The product integrated control shall include a factory-installed solid-state microprocessor controller using direct digital control with software designed to perform control functions as specified. The microprocessor controller shall be factory installed and wired within the packaged cooling unit. All application software actually performing the required control functions shall be factory supplied, pre-tested, and preconfigured.

3. Building Control System Network Interface:

The PIC shall have the ability to interface and communicate directly to the building control system without the use of additional field-installed hardware or software. The building control system, packaged cooling unit equipment and factory-installed PIC must be supplied by same manufacturer.

4. Standard Control Hardware

The PIC shall include the following control hardware standard with each packaged cooling unit

- a. Local Interface Device
 - 1) The PIC shall be provided with an optional factory-mounted local interface device that shall allow the user to configure the unit time schedule(s) and set points, operate a field test of all inputs and controlled devices, and dynamically view the status of the system. The local interface device shall consist of an 8-character liquid crystal display and a keyboard containing 24 keys. It shall be shipped installed in each unit as specified and may be removed and remote mounted if required.
 - 2) The local interface device may be mounted up to 1000 ft from the unit and shall be wired and installed per temperature control vendor instructions. The power and communication signals shall be sourced from the PIC unit.
- b. Entering-Air Thermistor:

The entering-air thermistor shall be factory supplied for field mounting and wiring. It shall have a nominal resistance of 5,000 ohms at 77 F
- c. Leaving-Air Thermistor:

Leaving-air thermistor sensor shall be factory supplied for field mounting and wiring. It shall have a nominal resistance of 5,000 ohms at 77 F.
5. Optional Control Hardware:

The PIC shall include the following optional hardware as required with each packaged cooling unit Hydronic Economizer Control.

Unit shall be supplied with a factory-mounted hydronic economizer with aquastat.
6. Local Interface Device Operation

The local interface device shall have a minimum of 6 special function keys that shall provide the following 6 functions:

 - a. Status

The Status function allows display of information related to unit operation. Typical information a user may display locally: Current alarms, current operating modes, current operating set points, system inputs, system outputs
 - b. History

Alarm history of the 5 most recent alarm messages is stored and available for display locally
 - c. Schedule

The Schedule function shall allow a user to define the occupied and unoccupied schedule using the electronic time clock within the PIC. Scheduling shall provide the user with the following functions:

 - 1) Define schedule period times (unoccupied/occupied)
 - 2) Define days of week and period times apply (Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday, and Holidays).
 - d. Service

The Service function shall provide the user with the following features:

 - 1) Verification of software version (ID number).
 - 2) Editing or setting building management network address.
 - 3) Entering unit configuration for operation, including space temperature reset, demand limiting, ventilation/economizer position, unoccupied cooling, and electronic time clock.
 - e. Set Point
 - 1) Configuration and display of system set points, including: leaving air temperature, reset temperature, demand limit, and unoccupied cooling
 - 2) Configuration and display of electronic clock current time (day of week, time, hour and minute, A M /P.M.).
 - f. Test

The Test function permits the user to run a PIC resident diagnostic test to exercise and test any of the input/outputs connected to the PIC.
7. General Requirements:
 - a. The PIC shall provide standalone operation. It shall accept analog and digital signals from sensors, switches, relays, etc. and shall multiplex the various signals into digital format. All closed loop direct digital control shall utilize PIC-based software algorithms that shall be resident in the PIC. All standard control PIC-based algorithms shall operate independently of an on-line host computer.
 - b. All set points shall be factory supplied and reside within the PIC with factory-provided defaults. The set points shall be configurable by the user through the local interface device or building supervisor.
8. Direct Digital Control Algorithms:

The PIC digital controller shall contain resident algorithms for processing analog and digital outputs. The algorithms shall be as follows:

 - a. Control of economizer valve position.
 - b. Unoccupied cooling control to maintain space temperature set point.
 - c. Keyboard override of unit using a local interface device or front end (remote). The duration of override shall be in one-hour increments with a maximum of 4 hours. Once override time has expired, keyboard override cannot be repeated unless it is reprogrammed at the local interface device.

- d. Manual override of unit by enabling the occupied override input on the processor module. Unit shall remain in the Occupied mode as long as the input remains enabled.
 - e. The space temperature reset algorithm shall reset the leaving-air temperature set point upwards as the space temperature falls below the reset temperature set point.
 - f. Capacity control for up to 6 stages of cooling. The software shall maintain leaving air temperature set point by cycling compressors and unloaders.
 - 1) Slow change override prevents the addition or subtraction of another stage when the leaving-air temperature is close to the set point and moving towards the set point
 - 2) Low-temperature override protects against rapid load decreases.
 - 3) High-temperature override protects against rapid load increases.
 - 4) Time delay prevents compressors from rapid cycling and allows oil return on short ON periods.
 - g. Two-step demand limit shall limit the maximum stage number using one of 2 set points
 - h. Compressor output control shall control the staging of compressors and unloaders based on the number of stages requested. Software shall prevent economizer dampers from moving after the desired economizer position is reached.
 - i. Quick Test software shall be supplied with each PIC. The program shall be initiated and controlled by the local interface device. The software shall allow a service technician or user to test all inputs and outputs controlled by the PIC. When initiated, the software shall display all current values of input channels and allow the user to exercise all output channels.
 - j. Diagnostic software shall permit the control to check all inputs every 3 seconds (if option is currently enabled) and to display codes on the local interface device.
 - 1) Thermistor failure
 - 2) Compressor faults
 - 3) Loss of charge failure
 - 4) Economizer valve position
- I. Safeties:
- 1. Compressors shall be provided with the following minimum protection:
 - a. High pressure
 - b. Low pressure
 - c. Overcurrent (circuit breakers)
 - d. Short cycle (minimum 5 minutes)
 - 2. Indoor-fan motor shall have external thermal overload device factory-installed in the control box.
- J Refrigerant Components:
- Refrigerant circuit components shall include:
- 1. Thermal expansion valve
 - 2. Filter drier
 - 3. Compressor service valves
 - 4. Liquid line shutoff valves
 - 5. Liquid line sight glass
 - 6. Discharge line muffler
 - 7. Liquid line solenoid valve (BKP)
- K Electrical Requirements:
- All electrical wiring shall enter the unit cabinet at a single location.
- L. Special Features:
- 1. Hydronic Economizer with Preheat Coil Package (BJP):
Unit shall include a factory-installed hydronic economizer complete with 4-row precooling coil, 2-row hot water preheat coil, coil casing, filter section with disposable filters, drain pan, and outer casing
 - 2. Hydronic Economizer Package (BJP):
Unit shall include a factory-installed hydronic economizer complete with 4-row precooling coil, coil casing, filter section with disposable filters, drain pan, and outer casing.
 - 3. Hydronic Economizer Piping Package (BJP):
Unit shall be factory fitted with 3-way bypass valve, 2-way water regulator valve, aquastat, piping, all control wiring to microprocessor control, and a cabinet enclosure.
 - 4. Winter Start Package (BKP):
Accessory shall provide a time delay of low pressure switch under low ambient conditions.
 - 5. Inlet Guide Vanes:
Optional inlet guide vanes and controls shall be factory installed.
 - 6. Optional Mechanically Cleanable Condenser (BJP):
 - a. The condenser shall be of the shell-in-tube type.
 - b. Tubes shall be seamless with no internal joints.
 - c. Condenser shall have a maximum working pressure of 150 psig on the water side (250 psig by special order)
 - 7. Unit shall be factory-equipped with
 - a. Alternate horizontal fan position
 - b. Motor and drive package
 - c. Top discharge

